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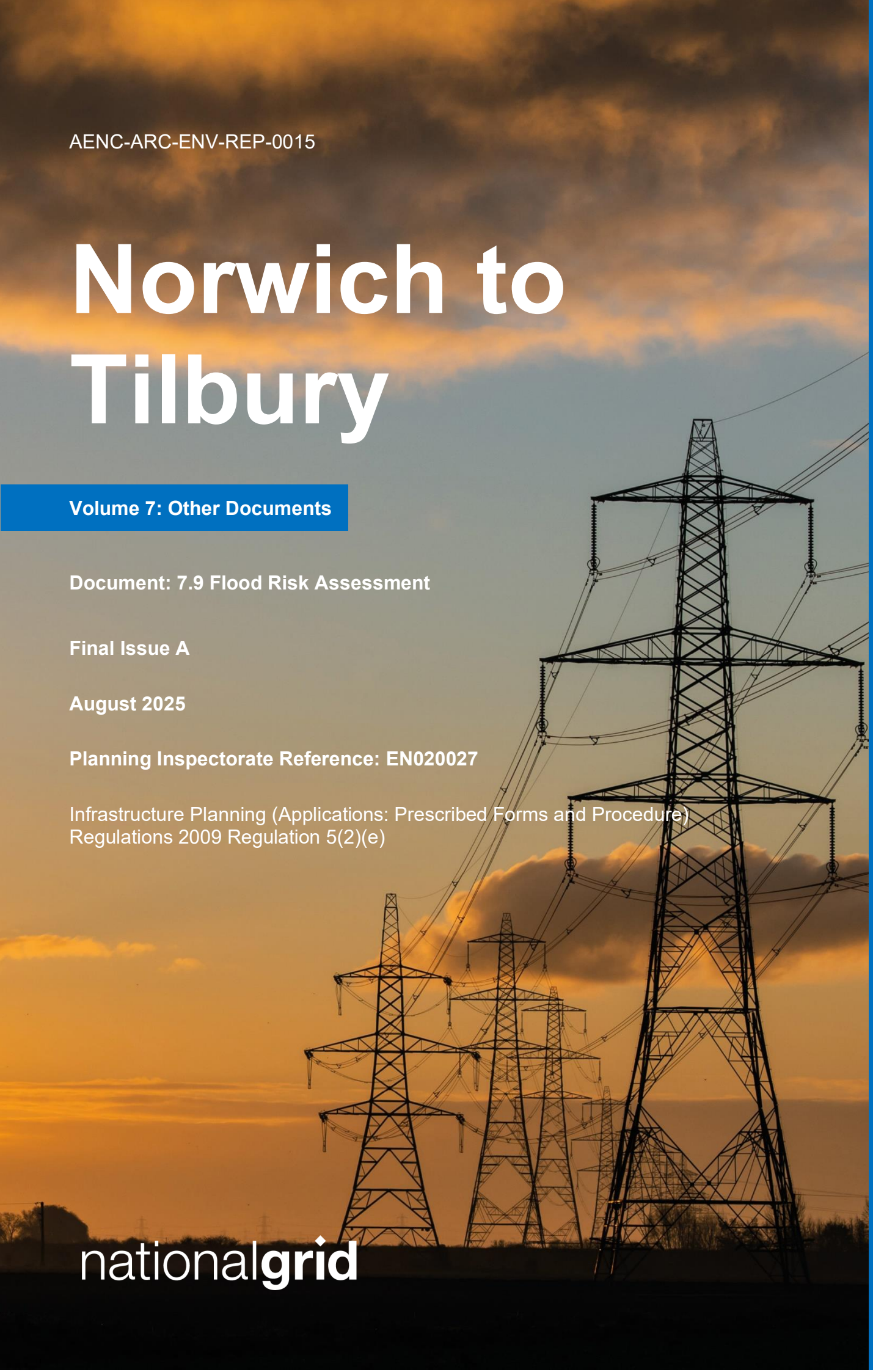

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Purpose of this Report

National Grid has developed plans for Norwich to Tilbury (the 'Project'). The Project would support the UK's net zero target through the connection of new low carbon energy generation in East Anglia and by reinforcing the transmission network.

The Project comprises reinforcement of the transmission network between the existing Norwich Main Substation in Norfolk and Tilbury Substation in Essex, via Bramford Substation, the new East Anglia Connection Node (EACN) Substation and the new Tilbury North Substation.

The Project includes the construction of approximately 180 km of new 400 kV electricity transmission infrastructure, including approximately 159 km of new overhead line and approximately 21 km of underground cabling, along with associated infrastructure.

Multiple main rivers, ordinary watercourses and drains flow through land within the Order Limits. The Environment Agency (2025a) Flood Map for Planning (Rivers and Sea), updated in March 2025, shows that the majority of the land within the Order Limits lies within Flood Zone 1, whilst some localised areas at some watercourse crossings are in Flood Zones 2 and 3.

This Flood Risk Assessment (FRA) has been produced to support the application for development consent and the accompanying Environmental Statement. The FRA documents the assessment undertaken to understand whether the Project is likely to be at risk of flooding or is likely to increase flood risk elsewhere in accordance with the requirements set out in relevant national policy.

Scope of the Assessment

Flooding from sewers, reservoirs and other artificial sources were scoped out of the assessment in agreement with the Planning Inspectorate following a screening activity that was undertaken. The FRA Screening Report, forming Appendix 12.2 of Volume 3 of the Preliminary Environmental Information Report (National Grid, 2024b), was shared with the Environment Agency and Lead Local Flood Authorities (LLFAs) who were satisfied with its conclusion that these sources of flood risk could be scoped out. Therefore, the FRA focuses on fluvial, pluvial (surface water), coastal and tidal, and groundwater flood risk.

The assessment has used published data sources, including the January 2025 and March 2025 updates to the National Flood Risk Assessment (NaFRA2) (Environment Agency, 2025b) and Flood Map for Planning (Environment Agency, 2025a), and detailed flood model results provided by the Environment Agency, to identify the risks relevant to the Project. National Grid has also undertaken consultation with relevant stakeholders, including the Environment Agency, Norfolk County Council, Suffolk County Council, Essex County Council and Thurrock Council, Internal Drainage Boards (IDBs) and local communities, to help inform this report.

Results of the Assessment

A sequential approach has been taken to siting infrastructure for the Project, particularly those elements that are vulnerable to inundation. The proposed temporary construction compounds and Cable Sealing End (CSE) compounds are located in Flood Zone 1, with one exception

concerning a CSE compound site at Wenham Grove that is partially situated in Flood Zone 3 in the updated flood mapping dataset. However, this CSE compound would be situated within the defined Limits of Deviation (LoD) to avoid Flood Zone 3, as secured by commitment W19 within the Outline Code of Construction Practice (CoCP) (document reference 7.2). All of the proposed new substations and extensions to existing substations are located in Flood Zone 1. Due to its linear nature and the geographical extent of the Project, some components, namely pylons, must necessarily be located in areas with a medium and high risk of flooding (Flood Zones 2 and 3). The Exception Test is therefore triggered and this report provides the evidence of how the Project passes this test.

Fluvial and surface water (pluvial) sources pose a risk to some temporary construction worksites. These risks would be reduced and managed by implementing a range of mitigation measures set out in the Outline CoCP (document reference 7.2), including those detailed in a Flood Warning and Evacuation Plan (Appendix G of the Outline CoCP (document reference 7.2)) and by programming construction activities in floodplains to avoid periods of likely high river levels where practicable. With these measures in place, the residual risk of flooding from these sources during the construction phase has been assessed as low risk. There is no land within the Order Limits that is at risk of tidal flooding. Groundwater flood risk across the Project has been assessed as generally low.

During operation (and maintenance) over the Project lifetime, flood risk from fluvial, surface water, tidal and groundwater sources is assessed to be low due to locating key infrastructure in Flood Zone 1 and areas at low risk of flooding from surface and groundwater sources. The residual risk, associated with the pylons in areas of medium to high risk, is assessed as low due to the low vulnerability of this type of infrastructure to inundation.

1. Introduction

1.1 Overview

1.1.1 National Grid Electricity Transmission plc ('National Grid') owns and maintains the national high voltage electricity transmission network throughout England and Wales.

1.1.2 National Grid has developed plans for Norwich to Tilbury (the 'Project'). The Project would support the UK's net zero target through the connection of new low carbon energy generation in East Anglia and by reinforcing the transmission network.

1.1.3 The Project comprises reinforcement of the transmission network between the existing Norwich Main Substation in Norfolk and Tilbury Substation in Essex, via Bramford Substation, the new East Anglia Connection Node (EACN) Substation and the new Tilbury North Substation.

1.1.4 A summary of the Project is provided in Section 3.1 of this document, with full details provided in Environmental Statement (ES) Chapter 4 Project Description (document reference 6.4) and shown on ES Figure 4.1: Proposed Project Design (document reference 6.4.F1) and ES Figure 4.2: Proposed Project Design – Permanent Features (document reference 6.4.F2).

1.2 Purpose of this Report

1.2.1 This Flood Risk Assessment (FRA) details relevant legislation policy and guidance, provides an overview of the development description, includes a summary of flood risk from all relevant sources to the Project and an assessment of the predicted impact of the Project on flood risk elsewhere.

1.2.2 This FRA also describes how the risk of flooding would be managed and includes the standard mitigation measures that are proposed to reduce any potential residual impacts associated with the Project. The standard mitigation measures are documented within the Outline Code of Construction Practice (CoCP) (document reference 7.2) and have been given a code, e.g. GG01, to allow the measures to be easily cross referenced. The codes relevant to the FRA are outlined in Table 1.1.

Table 1.1 Standard mitigation measures relevant to the FRA taken from the CoCP

Ref	Standard Mitigation Measure	Relevance to FRA
W01	All qualifying works within and in proximity to main rivers and flood defences will be in accordance with a method approved under environmental permits issued by the Environment Agency under the Environmental Permitting Regulations. Qualifying works to ordinary watercourses will accord with the protective provisions of the Development Consent Order (DCO) for the benefit of the LLFAs.	Working in accordance with the conditions of relevant consents and permits would safeguard the integrity of watercourses and their flow conveyance qualities and capacities, reducing flood risk.
W02	For open cut watercourse crossings and installation of vehicle crossing points, mitigation measures will include but not be limited to: • Where practicable, reducing the working width for open cut crossings of a main or ordinary watercourse whilst still providing safe working and reinstating the riparian vegetation and natural bed of (where practical) the watercourse, using the material removed when appropriate on completion of the works and compacting as necessary • Installation of a pollution boom downstream of open cut works • The use and maintenance of temporary lagoons, tanks, bunds, silt fences or silt screens as required • Have spill kits and straw bales readily available at all crossing points for downstream emergency use in the event of a pollution incident • The use of all static plant such as pumps in appropriately sized spill trays • Prevent refuelling of any plant or vehicle within 15 m of any watercourse • Prevent storing of soil stockpiles within 15 m of any watercourse or drain where practicable • Inspect all plant prior to work adjacent to watercourses for leaks of fuel or hydraulic fluids. Reinstating the riparian vegetation and natural bed of the watercourse, using appropriately sized material of similar composition to that removed. As far as practically possible gravel will be retained in-channel. Where practicable,	The Project crosses numerous land drains, ordinary watercourses and main rivers, so these measures would reduce flood risk during construction.

Ref	Standard Mitigation Measure	Relevance to FRA
	reinstated material will aim to closely match what is removed, particularly gravel, at between 15 and 40 mm in size to ensure suitability for fish spawning.	
W03	Riverbank and in-channel vegetation will be retained where not directly affected by installation works. Culverts in waterbodies will either preserve the natural bed or be box culverts with inverts sunk a minimum of 300 mm below the hard bed of the watercourse with natural/existing bed material placed across the inside of the culvert to lift the level up to meet that of the existing. New culverts will be as short as practicable, and sized to maintain the current land drainage regime and to avoid narrowing of natural channel widths. Temporary culverts will be sized to convey flows generated by upstream catchments to maintain the current land drainage regime and during culvert installation, downstream flows would be maintained.	This would help to minimise impacts on the existing land drainage regime.
W06	Where a main river is crossed by a trenchless crossing, the cables will be laid at least 1 m below the hard bed level of the river and will remain at or below this level for not less than 3 m from the brink of the riverbank. Marker posts shall also be positioned on each bank of the river to indicate the location of the under-crossing and the nature of the works. The Project proposes the following trenchless crossings (as detailed in Table 4.9 within ES Chapter 4: Project Description (document reference 6.4)): • Section C: Higham Road • Section C: River Stour (north part), River Stour (south part) • Section C: A12 highway crossing • Section C: Railway crossing (east of Ardleigh)	This would reduce the risk that flood events and erosion expose underground cables in the future (i.e. embed flood resilience into the Project design).
W07	Where construction activities take place in Flood Zone 3, temporary construction compounds, laydown areas and other work sites will be laid out in accordance with the Sequential Test and incorporate flood resilience measures where necessary. There would be no land raising and storage of construction equipment and materials will be done in such a way as to avoid	This would reduce the risk of impediment of floodplain flows during large flood events and limit the impact of any severe events, both in terms of disruption to construction and potential environmental impact.

Ref	Standard Mitigation Measure	Relevance to FRA
	forming barriers to floodplain flows. Material storage areas will be located outside of the fluvial floodplain where practicable.	
W08	Measures to manage surface water runoff from operational above ground infrastructure and to maintain existing overland flow routes, for example the proposed box culverts at Tilbury North Substation and the eastern of the two Cable Sealing End (CSE) compounds, will be developed liaising with the LLFA. Such measures will be managed in accordance with the requirements and standards of the relevant LLFA and maintained for the Project's lifetime. Surface water runoff will be captured using sustainable drainage techniques that will be designed to allow for climate change resilience and with consideration of exceedance flow routes.	This would reduce the risk of groundwater and surface water flows being impacted by above ground features.
W09	Where construction activities take place within surface water flood zones, including statutory undertaker works, prior to works commencing appropriate site drainage will be put in place to reduce the risk of standing water and avoid substantial delays to the construction programme, as well as to prevent offsite increases in surface water flood risk.	This would reduce the risk of surface water flooding during construction.
W10	Where construction haul roads pass within or cross watercourses and/or their floodplains and key overland flow routes, the haul road design will include for flood mitigation/drainage to allow for the flow of water within the floodplain during flood events up to and including the 1% Annual Exceedance Probability event (i.e., ducting). The design of the haul roads themselves will include for some resilience to flooding for example, incorporating suitable geo-textiles to stabilise the road surfacing, as well as allowing water to flow within the floodplain. Suitable materials would be used to surface the haul roads. In some cases, bespoke construction methodologies may be used based on site constraints and ground conditions.	This would reduce the risk of impediment of floodplain flows during large flood events and limit the impact of any severe events, both in terms of disruption to construction and potential environmental impact.
W11	Construction activities within Flood Zones 2 and 3 will include mitigations to avoid effects on the key flood flow routes within the zones.	This would avoid increased fluvial flood risk through impediment of floodplain flow routes.

Ref	Standard Mitigation Measure	Relevance to FRA
W12	For access roads and haul roads, the Project requires the crossing of multiple ditches, drains and watercourses. Large or sensitive watercourses, for example those designated as main river, and those with Water Framework Directive (WFD) status, would be crossed using clear span bridges or suitably assessed and approved alternatives. Soffit heights at clear span crossings would be set on a site-specific basis, following more detailed survey and design work by the appointed Main Works Contractor(s). On watercourses with a high or good WFD status for invertebrates, soffits will be set as high as is practicable above the Q95 water level (indicative of a summer, low flow condition) accounting for site specific constraints.	This would reduce restrictions to flood flows during construction which could increase flood risk upstream.
W13	Surface water drainage features, based on Sustainable Drainage System (SuDS) techniques, will be installed at sites and laydown areas during construction. These areas will be reinstated after completion of the temporary works, as agreed with the landowner. Access roads and haul roads, as well as areas where impermeable material will be installed where heavy equipment would be used, will also have suitable drainage provisions via appropriate SuDS. Drainage features will provide attenuation and treatment of runoff.	This would reduce the risk of groundwater and surface water flows being impacted by above ground features.
W14	Once the Project has been constructed, the working areas will be removed. Any stripped topsoil will be reinstated, and the site will be returned to its former use, subject to any planting restrictions or agreements with landowners. Temporary bridges and culverts (associated with the construction haul routes) will only be retained by exception e.g. if the new temporary structure has replaced an existing one in poor repair[1]. When these locations are confirmed, crossings would be designed to reflect their permanence e.g. culvert sizing to accommodate climate change allowance. Replacement drainage schemes will be installed where appropriate. A specialised drainage contractor(s) will review the drainage designs and the relevant LLFA will be consulted on proposals (where it is not simply a replacement of the existing	Reinstating the land to its previous condition would avoid an increased flood risk compared to pre-construction conditions.

[1] Note, the crossings at which this situation is applicable are currently unknown and would be confirmed following assessments undertaken by the Main Works Contractor(s) to inform the detailed design of the Project.

Ref	Standard Mitigation Measure	Relevance to FRA
	drainage run). The specialist contractor(s) will provide advice to National Grid and the Main Works Contractor(s) during all relevant construction and reinstatement activities. Permanent records of the land drainage locations will be made and passed to the landowners/occupiers.	
W16	The water supply needs of the Project during construction will be sourced either from mains water supply or in remote locations, where this option may not be available, water will be tankered in. Water use would be monitored and reported and measures to encourage efficient water use would be put in place. With regards to grey water generated from welfare facilities will be discharged to the public sewer, or where this is not practicable, be collected and tankered off site to a licensed disposal facility.	This measure addresses the water supply needs of the Project and proposals for management of grey water from welfare facilities.
W17	For events up to and including the 1% annual exceedance probability flood event plus climate change, where pylons would be located within the fluvial floodplains of watercourses, compensatory storage within the Order Limits will be provided for loss of floodplain storage.	This would reduce the risk of the Project increasing fluvial flood risk through permanent loss of floodplain storage.
W18	The temporary access route and underground cables will cross flood defences. The crossing designs would avoid impacts on the defence foundations and construction works would be undertaken using methods that limit ground movement/settlement to reduce the potential to compromise the condition and stability of the defence. 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 of the Project. The requirement for any such monitoring will be discussed with the Environment Agency as part of the application for a Flood Risk Activity Permit.	This would safeguard the integrity of the existing flood defences, preventing an increase in fluvial flood risk.

Ref	Standard Mitigation Measure	Relevance to FRA
W19	The proposed Wenham Grove CSE compound would be positioned within the defined Limits of Deviation within Flood Zone 1, avoiding Flood Zone 3.	This would reduce the risk of fluvial flooding at the CSE compound whilst remaining within the defined Limits of Deviation.
W20	Pylons would be situated a minimum of 8 m from the top of bank of any designated Main River and a minimum of 3.5 m from the top of bank of any ordinary watercourses	This would reduce the risk of fluvial flooding at the pylons.
GG22	The Main Works Contractor(s) will prepare a Surface Water Management Plan to inform discharge of the DCO Requirement. The Surface Water Management Plan will demonstrate how runoff across the site will be controlled to prevent any off-site increases in flood risk and/or pollution, including consideration of exceedance flow routes. A variety of methods including header drains, buffer zones around watercourses, on-site ditches, silt traps and bunding, shall be adopted as specified in the Surface Water Management Plan, and where identified as necessary during inspections, audits and in response to incidents. Construction drainage measures will be developed liaising with the Lead Local Flood Authorities (LLFAs), with ongoing dialogue during implementation of the measures. There will be no intentional discharge of site runoff to ditches, watercourses, drains or sewers without appropriate treatment and agreement of the appropriate authority (except in the case of an emergency).	This would reduce the risk of surface water flooding during construction.
GG28	Where necessary, temporary appropriate technology / material will be installed in areas where heavy equipment, such as cranes and piling rigs, are to be used to provide stable working areas and reduce disturbance to the ground by spreading loads and reducing soil compaction. This will be required for overhead line construction and would be temporary.	Reducing ground disturbance would help to minimise impacts on the existing land drainage regime.
GG32	Run-off across the site will be controlled through a variety of methods including header drains, buffer zones around watercourses, on-site ditches, silt traps and bunding. There will be no intentional discharge of site runoff to ditches, watercourses, drains, including highways drainage systems, or	This would reduce the risk of surface water flooding during construction. This would support construction planning in terms of temporary works and activities to limit the

Ref	Standard Mitigation Measure	Relevance to FRA
	sewers without appropriate treatment and agreement of the appropriate authority. All practicable steps would be put in place to prevent pollution of watercourses in the case of an emergency, with protocols in place to address accidental spills and severe weather events.	impact of any severe events, both in terms of disruption to construction and potential environmental impact.
GH02	A Foundation Works Risk Assessment (FWRA) will be undertaken by the Main Works Contractor(s) at locations of pylons, CSE compounds, and substations (where the use of piled foundations are anticipated prior to construction). The Main Works Contractor(s) will use construction methods, such as appropriate piling techniques, to minimise and avoid the risk of introducing new contamination (if required), creating new contamination pathways, and mixing of aquifer bodies. The FWRA would be undertaken once the proposed foundation solutions are known, in accordance with Environment Agency guidance 'Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination' (Environment Agency, 2025).	The FWRA would inform proposals relating to piled foundations. This is relevant to the assessment of groundwater flood risk.
AS01	Soil management measures are detailed in an Outline Soil Resource Plan (see Appendix C). Measures will include but not be limited to the following: • Details of the soil resources present • How topsoil and subsoil will be stripped and stockpiled based on their specific characteristics • Suitable conditions for when handling soil will be undertaken and climatic STOP conditions • Principles to determine suitable soil storage locations • How soil stockpiles will be designed taking into consideration site conditions and the nature/composition of the soil • Specific measures for managing sensitive soils • Suitable protective surfacing where soil stripping can be avoided, based on sensitivity of the environment and proposed works • Approach to reinstating soil that has been compacted, where required	Appropriate soil management would help to minimise impacts on the existing land drainage regime.

Ref	Standard Mitigation Measure	Relevance to FRA
	• Details of measures required for soil restoration	
AS05	Engagement with affected landowners will be carried out to investigate the current extent of land drainage. A scheme of pre-construction land drainage will be designed with the intent of maintaining the efficiency of the existing known land drainage system and to assist in maintaining the integrity of the working area during construction. The Project may include a system of 'cut-off' drains which feed into a new header drain and the Project will also consider surface water runoff measures. The Main Works Contractor(s) will ensure any affected land drains, within the Order Limits, as a result of the Project, will be reinstated to their former condition, where agreed with the landowner. Any installed pre-construction land drainage to replace existing land drains affected by permanent infrastructure, as well as any drainage improvements resulting from the Project, would be retained. Those outside the Order Limits will be the responsibility of the landowner.	Reinstating the land to its previous condition would avoid an increased flood risk compared to pre-construction conditions.
AS09	Appropriate technology / material will be installed in areas where heavy equipment, such as cranes and piling rigs, are to be used, as outlined in GG28 to provide stable working areas and reduce disturbance to the ground. Typically the area will be stripped of the topsoil (and subsoil where required), which will be stored and reinstated (following removal) in accordance with the soil management measures contained in the Outline Soil Resource Plan (Appendix C of the Outline CoCP (document reference 7.2)).	Reducing ground disturbance would help to minimise impacts on the existing land drainage regime.

1.2.3 The Outline CoCP (document reference 7.2) and associated management plans are secured by Requirement 4 in the draft DCO (document reference 3.1), together with being a contractual obligation the appointed Main Works Contractor(s) would have to follow.

1.3 Consultation and Engagement

1.3.1 The design has developed as a result of ongoing engineering design, landowner discussions, environmental assessment and consultation and engagement responses received during formal consultation and through Project meetings with relevant stakeholders.

1.3.2 This FRA has been informed by consultation and engagement with the relevant flood risk management authorities (the Environment Agency and LLFAs (Norfolk County Council, Suffolk County Council, Essex County Council and Thurrock Council)) and the Water Management Alliance Internal Drainage Boards (IDBs), as well as Anglian Water.

1.3.3 Table 1.2 provides a summary of the key comments that have shaped and informed this FRA. Further details are provided in Appendix K and Appendix M of the Consultation Report (document reference 5.1) and in Appendix A. This appendix provides stakeholder feedback on two technical notes that were shared, detailing key principles and controls linked to works in, under and in proximity to watercourses and flood defences; and surface water management.

1.3.4 In addition, a draft of this FRA was shared with the Environment Agency and the LLFAs in January 2025. A range of comments and feedback was received, which have been incorporated into the assessment. The Environment Agency noted that the draft FRA provided a suitable way to assess the flood risks arising from the Project and stated no objection if the FRA was to support the DCO application.

Table 1.2 Summary of flood risk consultation

Reference	Comment	Project Response
Environment Agency (3 July 2024) Comments on Flood Compensation Storage Technical Note	We are broadly satisfied with the initial compensatory storage details provided for the Project. They seem to be precautionary. It is good to see they will be hydraulically linked and designed to drain following a flood event. We would look to condition that full details are provided before work takes place.	Provision of compensatory storage is secured by commitment W17 within the Outline CoCP (document reference 7.2).

Reference	Comment	Project Response
Environment Agency (24 July 2024)	Our primary concern relates to development within the Tilbury Flood Storage Area. This is not permitted unless offset capacity, temporary or otherwise, is provided for lost storage. The substation at Tilbury is located in Flood Zone 3 (a defended tidal flood zone) so an assessment of the impacts of the removal of flood storage on the breach flood risk within the area should be undertaken, and flood compensation provided if the impacts are not insignificant.	Revisions to the Project design have removed any works within the Tilbury Flood Storage Area and the wider defended floodplain (Flood Zone 3) of the River Thames.
	A site-specific FRA should assess and mitigate flood risk. This should show how the proposed temporary and permanent works will be safe and resilient to flooding and will result in no net loss of flood storage and so not increase flood risk elsewhere, for the lifetime of the development.	Section 4 of this document presents the requested information.
Essex County Council (25 July 2024)	The FRA should assess the areas susceptible to surface water flooding and requires appropriate measures to mitigate any adverse impacts during the construction phase, including any implication associated with existing drainage interruption/blockage or temporary diversions.	An assessment of surface water flooding risks is presented in Section 4.10 and the measures to mitigate adverse effects on this source of flooding are described in Table 1.1, which also details a commitment to the appointed Main Works Contractor(s) preparing a Surface Water Management Plan (GG22).
	Consent will be required for the areas where the Project will have direct or indirect effect on drainage channels, or ordinary water courses: Section 23 of the Land Drainage Act (1991).	All works within main rivers or ordinary watercourses would be in accordance with a method approved under relevant environmental consents and permits.
Thurrock Council (July 2024)	FRA that includes a comprehensive review of flood risk from various sources like fluvial/ tidal, pluvial, and groundwater flooding is required. The FRA needs to address flood resilience,	This FRA (Section 4) presents an assessment of flood risk to and arising from the Project from fluvial, pluvial and groundwater flooding (changes in Project design

Reference	Comment	Project Response
	emergency planning, exceedance flood flow routes, and mitigation measures to prevent increased flooding elsewhere. The importance of a drainage strategy aligned with guidelines like the Essex Sustainable Drainage System (SuDS) Guidance was highlighted.	having removed any permanent infrastructure from the tidal floodplain). Section 5 describes the proposed flood resilience and mitigation measures including the Flood Warning and Evacuation Plan. Commitment W08 secures that surface water runoff from operational above ground infrastructure will be managed in accordance with the requirements and standards of the relevant LLFA and the adoption of suitable sustainable drainage techniques that would be maintained for the Project's lifetime, designed to allow for climate change resilience.
Suffolk County Council (29 July 2024)	The Project should encompass a comprehensive Flood Risk Assessment covering various types of flood risk such as river/sea, surface water, groundwater. The assessment data should include EA national mapping, LLFA's Preliminary Flood Risk Assessment (PFRA), District Councils Strategic Flood Risk Assessment (SFRA), and historical flood records. Surface Water Management Plans must be in place to address water management during construction. For works impacting watercourses, such as temporary culverts, it is essential to obtain appropriate Land Drainage Act consents.	This FRA (Section 4) presents an assessment of flood risk to and arising from the Project from fluvial, pluvial and groundwater flooding (changes in Project design having removed any works from the tidal floodplain). Section 4 also describes the sources of data that have been utilised, which include national mapping, PFRA, SFRA and historical flooding records. Table 1.1, details a commitment to the appointed Main Works Contractor(s) preparing a Surface Water Management Plan (commitment GG22). All works within main rivers or ordinary watercourses would be in accordance with a method approved under relevant environmental consents and permits.

Reference	Comment	Project Response
Norfolk County Council (July 2024)	Due to the duration of the Project and the multiple phasing of the construction programme, the LLFA requires Surface Water Management Plan to be provided.	Table 1.1 details a commitment to the appointed Main Works Contractor(s) preparing a Surface Water Management Plan (commitment GG22).
Water Management Alliance (23 July 2024)	Watercourse crossings within Internal Drainage Districts would require Board consent. The Boards issue consents only when satisfied that the proposals would not significantly impact the effectiveness of drainage. The Boards look forward to seeing the ordinary watercourse crossing schedule and welcome discussion with the applicant in the development of appropriate crossing methods for each IDB watercourse. The Boards are keen to see detail of the location of stockpiles and temporary work areas – as well as pylon and substation foundations, underground cable locations, and haul roads/access roads, in order to properly evaluate flood risk impacts.	All works within main rivers or ordinary watercourses would be in accordance with a method approved under relevant environmental consents and permits. Watercourse crossings schedules have been prepared for the overhead line and cable sections of the Project and are provided in ES Appendix 4.2: Watercourse Crossing Details (document reference 6.4.A2). Watercourse crossing locations are shown on ES Figure 4.1: Proposed Project Design (document reference 6.4.F1). Pylon and substation foundations would be designed in accordance with a Foundation Works Risk Assessment, as secured by commitment GH02 within the Outline CoCP (document reference 7.2).

1.4 Scope of Assessment

1.4.1 Flooding from sewers and reservoirs and other artificial sources were scoped out of the assessment in agreement with the Planning Inspectorate, as detailed in the Scoping Opinion (document reference 6.20) and following a screening activity that was undertaken which confirmed that these sources of flood risk could be scoped out. The FRA Screening Report, forming Appendix 12.2 of Volume 3 of the Preliminary Environmental Information Report (National Grid, 2024b), was shared with the Environment Agency and LLFAs, who agreed with its conclusions. Therefore, the FRA focuses on fluvial, pluvial (surface water), coastal / tidal and groundwater flood risk.

2. Legislation Policy and Guidance

2.1 Introduction

2.1.1 Legislation and policy have been considered at a national and local level. The following legislation and policy have been considered when producing this FRA:

- Flood and Water Management Act 2010
- Overarching National Policy Statement (NPS) for Energy (EN-1) (Department for Energy Security and Net Zero (DESNZ), 2024a)
- NPS for Electricity Networks Infrastructure (EN-5) (DESNZ, 2024b)
- National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2025)
- Flood Risk and Coastal Change Planning Practice Guidance (PPG) (Department for Levelling Up, Housing and Communities, 2022)
- Flood Risk Assessments: Climate Change Allowances (Environment Agency, 2022).

2.2 National Policy and Guidance

Overarching National Policy Statement for Energy (EN-1)

2.2.1 The Overarching NPS for Energy (EN-1) (DESNZ, 2024a) provides specific guidance on the development of energy infrastructure in relation to flood risk for the lifetime of a project. The sections of EN-1 of relevance to this FRA are:

- Section 4.10, which discusses climate change adaption
- Section 5.8, which discusses flood risk, setting out the minimum requirements of a FRA, as well as information on the application of the Sequential and Exception Tests.

2.2.2 EN-1 confirms that an FRA is required to assess flood risk from all sources for the lifetime of the Project. It states that the FRA needs to identify, among other aspects, flood risk reduction and management measures. Residual risks would also require assessment to consider their acceptability.

2.2.3 EN-1 states that the scope of the FRA must be proportionate to the risk and appropriate to the scale of the development that is proposed. EN-1 also states that the FRA must consider different sources of flooding and their effects, as well as the impacts of climate change. These overarching principles have been followed as the FRA Screening Assessment, which was prepared alongside the Preliminary Environmental Information Report (PEIR) (National Grid, 2024b), considered all sources of flood risk and provided justification for the sources scoped in for detailed assessment in the FRA.

2.2.4 EN-1 also includes several additional requirements that are specific to energy infrastructure.

2.2.5 Table 2.1 summarises the requirements for FRAs set out in EN-1 and lists where they are addressed in this FRA.

2.2.6 This FRA has been prepared by a Chartered Hydrologist with more than 20 years' experience of FRA and flood risk management.

Table 2.1 EN-1 requirements relating to flood risk relevant to the Project and where they are addressed in this FRA

Topic	EN-1 Minimum Requirement	Where Addressed in the FRA
Policy	The development proposal should be in line with any relevant national and local flood risk management strategies (Paragraph 5.8.36).	Section 2
Flood risk	Where necessary, the development should be appropriately flood resilient and resistant, and it should be demonstrated that any residual risk can be safely managed over the lifetime of the development (Paragraph 5.8.7).	Sections 4 and 5
Operation of the site	The development should be designed to remain operational when floods occur (Paragraph 5.8.7).	Sections 4 and 5
Functional floodplain	The development should not result in a net loss of floodplain storage and any deflection or constriction of flood flow routes should be safely managed within the site (Paragraph 5.8.12 and 5.8.41).	Section 4.8
Flood Warning and Evacuation Plan	The receipt of and response to warnings of floods is an essential element in the management of the residual risk of flooding. Flood Warning and evacuation plans should be in place for those areas at an identified risk of flooding (Paragraph 5.8.33).	Section 4.8
Climate change	The impacts of climate change should be considered when planning the location, design, build, operation and, where appropriate, decommissioning of the Project (Paragraph 4.10.8).	Sections 2.2 and 2.3
Climate change	The Secretary of State should be satisfied that applicants for new energy infrastructure have taken into account the potential impacts of climate change using the latest UK Climate Projections available at the time the ES was prepared to ensure they have identified appropriate mitigation or adaptation measures. This should cover the estimate lifetime of the new infrastructure, including any decommissioning period (Paragraph 4.10.13).	Sections 2.2 and 2.3

Topic	EN-1 Minimum Requirement	Where Addressed in the FRA
Climate change	Where energy infrastructure has safety critical elements, the applicant should apply a credible maximum climate change scenario. It is appropriate to take a risk-averse approach with elements of infrastructure which are critical to the safety of its operation (Paragraph 4.10.12).	Sections 2.2, 2.3 and 4.8
Climate change	Applicants should demonstrate that proposals have a high level of climate resilience built-in from the outset and should also demonstrate how proposals can be adapted over their predicted lifetimes to remain resilient to a credible maximum climate change scenario (Paragraph 4.10.11).	Sections 2.2, 2.3, 4.8 and 4.10
Adaptation	Any adaptation measures should be based on the latest set of UK Climate Projections, the government's latest UK Climate Change Risk Assessment, when available and in consultation with the Environment Agency's climate change allowances for FRAs (Paragraph 4.10.17). Adaptation measures should be required to be implemented at the time of construction where necessary and appropriate to do so (Paragraph 4.10.19).	Sections 2.2, 2.3, 4.8 and 4.10
Drainage and SuDS	SuDS should be used unless there is clear evidence that their use would be inappropriate (Paragraph 5.8.36).	Table 1.1 and Section 4.10
Drainage and SuDS	The Development Consent Order, or any associated planning obligations, would need to make provision for appropriate operation and maintenance of any SuDS throughout the Project's lifetime. Where this is secured through the adoption of any SuDS features, any necessary access rights to property would need to be granted (Paragraph 5.8.38).	Table 1.1
Drainage and SuDS	Site layout and surface water drainage systems should be designed to cope with events that exceed the design capacity of the system, so that excess water can be safely stored on or conveyed from the site without any adverse impacts (Paragraph 5.8.26).	Table 1.1, Sections 2.3 and 4.10

Topic	EN-1 Minimum Requirement	Where Addressed in the FRA
Drainage and SuDS	The volumes and peak flow rates of surface water leaving the site should be no greater than the rates prior to the proposed Project, unless specific off-site arrangements are made and result in the same net effect. The predicted impacts of climate change should be accounted for (Paragraph 5.8.27).	Table 1.1, Sections 2.3 and 4.10
Drainage and SuDS	The FRA should consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of the Project may affect drainage systems (Paragraph 5.8.15).	Section 4.10, Table 1.1
Sequential Test	The Sequential Test and sequential approach should be applied (Paragraphs 5.8.9, 5.8.21 to 5.8.23).	Section 5
Exception Test	The Exception Test, where necessary, should be applied (Paragraphs 5.8.10, 5.8.11).	Section 5.2
Vulnerability and safe access	The FRA should consider the vulnerability of those using the site, including arrangements for safe access and escape (Paragraph 5.8.15).	Table 1.1, Sections 4.8 and 5.2
Reducing flooding overall and natural flood management	Identify and secure opportunities to reduce the causes and impacts of flooding overall, making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management (Paragraph 5.8.15).	Table 1.1, Sections 4.8 and 4.10

2.2.7 In addition to the requirements described above, EN-1 also details the following:

'Exceptionally, where an increase in flood risk elsewhere cannot be avoided or wholly mitigated, the Secretary of State may grant consent if they are satisfied that the increase in present and future flood risk can be mitigated to an acceptable and safe level and taking account of the benefits of, including the need for, nationally significant energy infrastructure' (Paragraph 5.8.42).

National Policy Statement for Electricity Networks Infrastructure (EN-5)

2.2.8 EN-5 is the NPS specific to electricity infrastructure and with regard to flood risk reiterates the requirements set out in EN-1, detailed above. Paragraph 2.3.3 of EN-5 (DESNZ, 2024b) states that the Project's resilience to climate change should be assessed and the policy states that an FRA should be prepared. ES Chapter 12: Hydrology, Land Drainage and Flood Risk (document reference 6.12) assesses the Project's resilience to climate change.

2025 Revisions to National Policy Statements

2.2.9 In April 2025, the government launched a consultation on proposed changes to EN-1 and EN-5 that ended on 29 May 2025. The consultation covers updates to:

- Draft: Overarching National Policy Statement for Energy (EN-1) (DESNZ, 2025a)
- Draft: National Policy Statement for Electricity Networks Infrastructure (EN-5) (DESNZ, 2025b)

2.2.10 Changes consulted upon in the draft 2025 updates to the energy infrastructure NPSs include alignment with Clean Power 2030 targets and endorsement of the Centralised Strategic Network Plan. The 2025 revisions have strengthened the process for delivering major new infrastructure, reinforcing the government's ambition to deliver clean power by 2030.

2.2.11 The transitional provisions on the status of the 2025 revisions say:

'While the review is undertaken, the current suite of energy NPS remain relevant government policy and EN-1 to EN05 have effect for the purposes of the Planning Act 2008. The Secretary of State has decided that for any application accepted for examination before amending the energy NPSs, the current suite of energy NPS, published in 2024, should have effect. The amended energy NPSs will therefore only have effect in relation to those applications for development consent accepted for examination after the publication of the final amended energy NPSs. However, any emerging draft energy NPSs (or those amended but not having effect) are potentially capable of being important and relevant considerations in the decision-making process. The extent to which they are relevant is a matter for the relevant Secretary of State to consider within the framework of the Planning Act 2008 and with regard to the specific circumstances of each development consent order application'.

2.2.12 At the point of submission of the Project, the NPSs designated in January 2024 were government policy.

2.2.13 If the revised NPSs are designated prior to a decision being made on the application for development consent, deliverables will be reviewed for consistency with the newly-designated NPSs, and any additional requirements would be captured within an errata document post submission. It was confirmed in Section 51 advice received from the Planning Inspectorate that if the new NPSs are adopted after the application has been submitted, the Examining Authority can issue procedural decisions to ask all parties for views on the impacts of new NPSs.

National Planning Policy Framework and Guidance

2.2.14 The NPPF (Ministry of Housing, Communities and Local Government, 2025) sets out the government's planning policies for England to ensure that flood risk is considered at all stages of the planning and development process, to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk of flooding. To achieve this, the NPPF advocates application of a Sequential Test whereby development in the low risk flood zone (e.g. Flood Zone 1) is preferentially supported. Where there are no reasonably available sites in Flood Zone 1 for example, reasonably available sites in Flood Zone 2 should be considered. Only when there are no reasonably available sites for development in Flood Zones 1 and 2, should the suitability of sites in Flood Zone 3 be considered.

2.2.15 The sequential approach should be used in areas known to be at risk now or in the future. The Flood Risk and Coastal Change PPG requires other sources of flooding to be considered consistently with risks from rivers and the sea so that the sequential approach can be applied with respect to all forms of flooding (Paragraphs 173 and 174).

2.2.16 In addition, the NPPF states that development should be made safe for its lifetime without increasing flood risk elsewhere and also states that for a development to be considered acceptable with regard to flood risk, the Sequential Test requirements must be satisfied, along with demonstrating that (Paragraph 181):

- Within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location
- The development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment
- It incorporates SuDS, unless there is clear evidence that this would be inappropriate
- Any residual risk can be safely managed
- Safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

2.2.17 Further details of the requirements for sequential testing and sustainable drainage are provided in the paragraphs that follow.

Sequential Testing

2.2.18 The Sequential Test should be applied to demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development proposed.

2.2.19 The PPG on Flood Risk and Coastal Change supports the NPPF with additional guidance on flood risk vulnerability classifications and managing residual risks. The PPG provides further description of Flood Zones (Table 2.2) and a Vulnerability and Compatibility Matrix (Table 2.3) in order to assess the suitability of a specific site for a certain type of development.

Table 2.2 Summary of Flood Zone definitions

Flood Zone	Probability of Flooding	Return Periods
1	Low	Land having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).
2	Medium	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%); or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%).
3a	High	Land having a 1 in 100 or greater annual probability of river flooding (≥1%); or land having a 1 in 200 or greater annual probability of sea flooding (≥0.5%).

Flood Zone	Probability of Flooding	Return Periods
3b	High – Functional floodplain	Land where water has to flow or be stored in times of flood, identified by Local Planning Authorities (LPAs) in Strategic Flood Risk Assessments. Identification of functional floodplain should take account of local circumstances and not be solely defined on rigid probability parameters. Functional floodplain normally comprises: Land having >3.3% 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).

Table 2.3 Flood risk vulnerability and Flood Zone 'compatibility'

Flood Zone Risk Vulnerability Classification (see Table 2.2)	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone 1	✓	✓	✓	✓	✓
Flood Zone 2	✓	✓	Exception Test required	✓	✓
Flood Zone 3	Exception Test required	✓	X	Exception Test required	✓
Flood Zone 3b 'Functional Floodplain'	Exception Test required	✓	X	X	X

Key:

✓ Development is appropriate

X Development should not be permitted

2.2.20 Following application of the Sequential Test, if it is not possible (consistent with wider sustainability objectives) for the development to be located in zones with a lower probability of flooding, the Exception Test can be applied, if appropriate.

2.2.21 For the Exception Test to be passed it must be demonstrated that based on a site-specific flood risk assessment:

- The development provides wider sustainability benefits to the community, that outweigh flood risk
- The development would be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk overall.

2.2.22 Where the Exception Test is applied, both elements of the Exception Test would have to be passed for development to be permitted, as detailed in Section 5.2.

Sustainable Drainage

2.2.23 The PPG on Flood Risk and Coastal Change supports the NPPF with additional guidance on managing flood risk. It states that new development presents opportunities to reduce the causes and impacts of flooding through the use of natural flood management techniques, including a comprehensive sustainable drainage approach.

2.2.24 In order to manage surface water on the site, it is necessary to consider the appropriateness of various SuDS measures, using the SuDS hierarchy set out in the PPG. Where surface water cannot be reused by the Project, the aim should be to discharge surface runoff according to the following drainage options, listed with the most favourable option first and least preferable last:

1) Into the ground (shallow infiltration in areas of low contamination risk)[2]
2) To a surface water body
3) To a surface water sewer, highway drain, or another drainage system
4) To a combined sewer.

2.2.25 The Environment Agency classifies surface water flood risk into four categories: 'very low', 'low', 'medium' and 'high' (Table 2.4).

Table 2.4 Flood risk from surface water definitions

Probability of Surface Water Flooding	Return Period
Very Low	Land with less than 1 in 1,000 annual probability of surface water flooding (<0.1%)
Low	Land with between 1 in 1,000, and 1 in 100 annual probability of surface water flooding (0.1% – 1%)
Medium	Land with between 1 in 100, and 1 in 30 annual probability of surface water flooding (1% – 3.3%)
High	Land with greater than 1 in 30 annual probability of surface water flooding (>3.3%).

2.2.26 Surface water flooding can be managed through SuDS. The Outline CoCP (document reference 7.2) describes the standard mitigation measures including SuDS for managing surface water flood risk that would be adopted. As per commitment W08, surface water runoff from operational above ground infrastructure would be managed in accordance with the requirements and standards of the relevant LLFA using suitable SuDS that are maintained for the Project's lifetime.

[2] The designs of infiltration drainage features would be based on infiltration tests that have been undertaken in accordance with BRE 365 testing procedures. Infiltration deeper than 2 m or in areas of land affected by contamination are likely to be lower in the hierarchy.

Flood Risk Assessments: Climate Change Allowances

2.2.27 The United Kingdom Climate Projections (Met Office, 2024) are a set of climate change projections that are interpreted by the Environment Agency to develop a set of allowances to be applied to assess the predicted impact of climate change on a range of parameters.

2.2.28 The Environment Agency's (2022) online advice note Flood Risk Assessments: Climate Change Allowances was published in February 2016 and most recently amended in May 2022 to take account of an update to recommended climate change allowances for rainfall intensity.

2.2.29 The allowances applicable to this FRA are for fluvial (peak river flow) and peak rainfall intensities. The fluvial climate change allowances are summarised in Table 2.5 for the management catchments the Project would be located within. The higher river flow allowance is shown in Table 2.5 given the advice note states this should be used for essential infrastructure which the Project is classified as. Rainfall is addressed in the following section.

Table 2.5 Environment Agency fluvial climate change allowances applicable to the Project

Management Catchment	Peak River Flow Allowance (2080s3)
Broadland Rivers	20%
East Suffolk	29%
Combined Essex	38%
South Essex	26%

2.2.30 Fluvial climate change allowances have been considered in relation to permanent infrastructure associated with the Project but have not been applied to the construction phase assessment. This has been agreed with the Environment Agency.

2.3 Rainfall Allowance for Drainage

2.3.1 As indicated in Table 2.5, the Project is located within four management catchments. For these, the Environment Agency climate change allowances suggest peak rainfall intensity is anticipated to increase between 20% and 40% in the design lifetime of the Project.

2.3.2 The effects of climate change on rainfall intensity are included for in the operational drainage design in accordance with the upper end allowances for the 2050s epoch for each management catchment. The allowance, applied within the surface water drainage designs, is for a 45% uplift (through application of the exception rule), which is higher than the 40% allowance that is recommended for the 2070s epoch.

2.3.3 LLFA guidance for applying climate change allowances to temporary drainage designs has also been considered in line with commitment W08 in the Outline CoCP (document reference 7.2) (see Table 1.1).

[3] Given the 80-year development lifetime applied to the Project.

2.3.4 For temporary features serving construction, drainage design considers a 1 in 100 year (1% annual exceedance probability (AEP)) event, plus a 20% to 25% allowance for future climate change (in underground cable and overhead line sections of the Project respectively).

2.4 National Grid Policy

2.4.1 National Grid requires that substations considered to be critical infrastructure, should be resilient to flooding from rivers and the sea up to the 0.1% (1 in 1,000 year) AEP flood event, including an appropriate allowance for climate change, where practicable. The proposed new EACN and Tilbury North Substations, and the substation extension at Bramford Substation, are located in Flood Zone 1 and meet the requirements of the policy.

2.5 Local Planning Policy and Guidance

2.5.1 This section refers to local planning policy, guidance documents and flood-risk-related reporting that have informed this FRA. Whilst these do not form the final basis for determining the application for development consent for the Project, Paragraph 4.1.12 of EN-1 states that the Secretary of State will consider Development Plan documents or other documents in the Local Development Framework relevant to its decision making.

2.5.2 In addition to the national and local planning policy, there are various flood risk management-related documents related to the Project, prepared by either the LPA or the LLFA for the area. The Strategic Flood Risk Assessments (SFRAs), Preliminary Flood Risk Assessments (PFRAs) and Local Flood Risk Management Strategies (LFRMSs) are addressed in Section 4 of this FRA.

2.5.3 The remainder of this section lists the relevant Local Plans for the Project and provides an overview of their content relevant to the FRA.

Norfolk County Council

Greater Norwich Local Plan, Adopted 2024

2.5.4 This sets out strategic policies within the area and how the LPA addresses the NPPF on a local basis. The Greater Norwich Local Plan includes measures to:

- Avoid locating inappropriate development in areas at risk of flooding
- Apply the Sequential and Exception Tests to new developments
- Ensure flood risk is not increased elsewhere when building a new development
- Advocate for SuDS to be incorporated into developments, unless there is clear evidence that this would be inappropriate.

Mid Suffolk District Council

Babergh District Council and Mid Suffolk District Council Local Plan, Adopted 2023

2.5.5 This sets out strategic planning policies within the area and how the LPA addresses the NPPF on a local basis. The objectives, strategic policies and development management policies that are relevant to flood risk are outlined below:

- Seek direct development away from the areas of highest flood risk, or where this is unavoidable, ensure that development is made safe for its lifetime without increasing risk elsewhere
- The SFRA must be regarded when proposing a development
- Where necessary, a site-specific FRA should be carried out
- The Sequential Test set out in national planning policy should be followed
- Early consideration should be given to the potential to use SuDS to identify when/where the use of such technologies is feasible and to also identify which type of SuDS is most appropriate.

Essex County Council

2.5.6 In the Essex County Council area, the Local Development Plans are produced by the district, city or borough councils. The Order Limits pass through six local council areas: Tendring District Council, Colchester City Council, Braintree District Council, Chelmsford City Council, Brentwood Borough Council and Basildon Council.

2.5.7 The Local Development Plan from each of these has been reviewed and summarised collectively below to set out policies within the Essex area which address the NPPF on a local basis. The common points presented below reflect a comprehensive approach to managing flood risk in the context of urban planning, aiming to safeguard communities, property and the environment.

- FRAs are required by all councils for new developments to ensure they are safe from present and future flooding, and do not exacerbate flood risk
- Developments are encouraged to be located in areas with the lowest risk of flooding. Where necessary, higher risk areas may be used if they pass the Sequential and Exception Tests
- Incorporation of SuDS into development design is a common requirement in order to manage surface water runoff and reduce risk of surface water flooding
- Green infrastructure should be protected and enhanced to naturally absorb rainwater and manage flood risk. This includes preserving open spaces, wetlands and river corridors
- Planning policies must consider future flood risk accounting for climate change and ensure the long-term resilience of developments
- Development proposals must demonstrate that they will not place people at risk of flooding and will contribute to community resilience.

Thurrock Council

Local Development Framework, Adopted 2015

2.5.8 This sets out strategic planning policies within the area and how the LPA addresses the NPPF on a local basis. The objectives, strategic policies and development management policies that are relevant to flood risk are outlined below:

- To reduce and manage the risk of flooding to and from development through its location, layout and design
- To ensure facilities and services are designed to be resilient to flooding and other emergencies to ensure continuity of service in times of flooding
- Core Strategy and Policy 27: Management and Reduction of Flood Risk. This policy outlines how Thurrock Council aims to manage future development in areas of flood risk, particularly noting the need for Exception Tests as much of Thurrock's urban area lies within Flood Zone 3a.

2.5.9 The Thurrock Council Local Plan is currently under review and a new plan is set to be adopted in summer 2026. Regulation 18 Consultation took place between December 2023 and February 2024.

3. Project Description

3.1 Project Description

3.1.1 The Project is a proposal by National Grid to upgrade the electricity transmission system in East Anglia between Norwich and Tilbury, comprising:

- A new 400 kilovolt (kV) electricity transmission connection of approximately 180 km overall length from Norwich Main Substation to Tilbury Substation via Bramford Substation, a new EACN Substation and a new Tilbury North Substation, including:
  - Approximately 159 km of new overhead line supported on approximately 509 pylons, either standard steel lattice pylons (approximately 50 m in height) or low height steel lattice pylons (approximately 40 m in height) and some of which would be gantries (typically up to 15 m in height) within proposed CSE compounds or existing or proposed substations
  - Approximately 21 km of 400 kV underground cabling, some of which would be located through the Dedham Vale National Landscape (an Area of Outstanding Natural Beauty (AONB[4])
- Up to seven new CSE compounds (with permanent access) to connect the overhead lines to the underground cables
- Modification works to connect into the existing Norwich Main Substation and a substation extension at the existing Bramford Substation
- A new 400 kV substation on the Tendring Peninsula, referred to as the EACN Substation (with a new permanent access). This is proposed to be an Air Insulated Switchgear (AIS) substation
- A new 400 kV substation to the south of Orsett Golf Course in Essex, referred to as the Tilbury North Substation (with a new permanent access). This is proposed to be a Gas Insulated Switchgear (GIS) substation
- Modifications to the existing National Grid Electricity Transmission overhead lines to facilitate the connection of the existing network into the new Tilbury North Substation to provide connection to the Tilbury Substation
- Ancillary and/or temporary works associated with the construction of the Project.

3.1.2 In addition, third party utilities diversions and/or modifications would be required to facilitate the construction of the Project. There would also be land required for environmental mitigation and Biodiversity Net Gain (BNG).

3.1.3 As well as the permanent infrastructure, land would also be required temporarily for construction activities including, for example, working areas for construction equipment and machinery, site offices, welfare, storage and temporary construction access.

[4] National Landscape is the rebranded name of an Area of Outstanding Natural Beauty (AONB) from 22 November 2023

3.1.4 The Project would be designed, constructed and operated in accordance with applicable health and safety legislation. The Project will need to comply with design safety standards including the Security and Quality of Supply Standard (SQSS), which sets out the criteria and methodology for planning and operating the National Electricity Transmission System (NETS). This informs a suite of National Grid policies and processes, which contain details on design standards required to be met when designing, constructing and operating assets such as those proposed for the Project.

3.2 Order Limits and Project Sections

3.2.1 The Order Limits are defined as the maximum extent of land within which the Project, as defined within the ES (Volume 6 of the DCO application), may be carried out, and includes both permanent and temporary land required to build and operate (and maintain) the Project.

3.2.2 The Project has also been sub-divided into eight geographical sections for reader accessibility, based largely on Local Planning Authority boundaries:

- Section A – South Norfolk Council
- Section B – Mid-Suffolk District Council
- Section C – Babergh District Council, Colchester City Council and Tendring District Council
- Section D – Colchester City Council
- Section E – Braintree District Council
- Section F – Chelmsford City Council and Brentwood Borough Council
- Section G – Basildon Borough Council and Brentwood Borough Council (and part of Chelmsford City Council)
- Section H – Thurrock Council.

3.3 Construction Assumptions

3.3.1 Should consent be granted in 2027, it is anticipated that construction of the Project would commence in 2027, likely starting with enabling works including site clearance activities, the installation of temporary construction compounds and access roads. It is expected the main construction works would continue through to 2031 (four years). Prior to the enabling works commencing and before consent, a number of pre-construction environmental surveys would be undertaken in 2026.

3.4 Land Use and Topography

3.4.1 The landscape varies throughout the length of the Project. It typically comprises a flat to gently undulating plateau, dissected by the valleys of rivers and their tributaries. These valleys include the Tas Valley (Section A), Waveney Valley (Sections A and B), Gipping Valley (Section B), Stour Valley (Section C), Colne Valley (Section D), Blackwater and Brain Valleys (Section E), and Chelmer and Can Valleys (Section F). At the southern end of the Project the landscape forms the fringes of the Thames Basin and is generally flat and low-lying. The land cover within the Order Limits is largely

farmland, with some areas of woodland. The River Stour and its enclosing valley sides and plateau edge form part of the Dedham Vale National Landscape.

3.4.2 There are several larger urban areas in the catchments the Project is located within, as well as smaller urban areas. Larger settlements include for example Diss (Section A), Stowmarket and Needham Market (Section B), Colchester (Section D), Chelmsford (Section F) and Billericay, Brentwood and Basildon (Section G).

3.5 Soils, Geology and Hydrogeology

Soils

3.5.1 Predominant soil types within the Order Limits are slightly acidic loamy and clayey soils with impeded drainage with moderate to high fertility, and slowly permeable seasonally wet, slightly acidic but base-rich loamy and clayey with moderate fertility (LandIS, 2024). The soil types through the southern section (Sections C to H; Babergh District, Colchester District and Tendring District through to Thurrock) also show a high prevalence of soils described as freely draining, slightly acidic loamy soils. There are also small areas of fen peat soils near Roydon and Diss in south Norfolk (Sections A and B).

3.5.2 The soils characterised by slow permeability or impeded drainage would be less suitable for infiltration SuDS. Freely draining soils would likely be more suitable for infiltration.

3.5.3 A more in-depth analysis of soils can be found in ES Chapter 6: Agriculture and Soils (document reference 6.6).

Geology

3.5.4 The bedrock geology and superficial geology are shown on ES Figure 9.1: Superficial Geology (document reference 6.9.F1) and ES Figure 9.2: Bedrock Geology (document reference 6.9.F2).

3.5.5 Superficial deposits for the Order Limits are summarised as follows (British Geology Survey, 2024):

- Sections A, B, D, E and F comprise the Lowestoft Formation. Where river valleys cross the Order Limits these areas comprise the Lowestoft Formation (Sand and Gravel) Alluvium, River Terrace Deposits, Head Deposits and Kesgrave Catchment Subgroup
- Superficial deposits in Section C comprise the river valley deposits described above and large areas of Cover Sands
- For Sections G and H, the superficial deposits are recorded to be absent within much of the sections, and where they are present, they are dominated by the river valley deposits of Alluvium, River Terrace Deposits and Head Deposits.

3.5.6 Bedrock underlying the Order Limits and superficial deposits (where present) is summarised below:

- Section A: White Chalk Subgroup
- Section B: White Chalk Subgroup, Newhaven Chalk Formation and Crag Group

- Section C: Thames Group, Thanet Formation and Lambeth Group (undifferentiated) and Red Crag
- Section D, E, F, G: London Clay Formation, with the Claygate Member and Bagshot Formation also outcropping within Section F and Section G
- Section H: London Clay Formation, Harwich Formation, Lambeth Group, Thanet Formation and White Chalk Subgroup.

3.5.7 Further detail on geology can be found in ES Chapter 9: Contaminated Land, Geology and Hydrogeology (document reference 6.9).

Hydrogeology

3.5.8 A review of the aquifer designations indicates that the superficial deposits across the Study Area are classified as follows:

- Secondary A Aquifers: Alluvium, Sheringham Cliffs Formation, Happisburgh Glacigenic Formation, Lowestoft Formation – Sand and Gravel, River Terrace Deposits, Ingham Sand and Gravel Formation, Croxton Sand and Gravel Member Glaciofluvial Deposits, Kesgrave Catchment Subgroup and Stanmore Gravel Formation
- Secondary B Aquifers: Cover Sands
- Secondary Undifferentiated Aquifers: Lowestoft Formation – Diamicton and Head Deposits.

3.5.9 The bedrock aquifers are classified as follows:

- Principal Aquifers: White Chalk Subgroup, Crag Group, Newhaven Chalk Formation, Red Crag Formation and Chillesford Church Sand Member
- Secondary A Aquifers: Undifferentiated Thanet Formation, Lambeth Group, Claygate Member, Bagshot Formation and Harwich Formation
- Unproductive Strata: Thames Group and London Clay Formation.

3.5.10 Principal aquifers provide significant quantities of water. Secondary A aquifers are permeable layers that can support local water supplies and can be an important source of baseflow to rivers, whilst Secondary B aquifers are usually lower permeability layers that may store and yield limited amounts of groundwater. The Undifferentiated classification is applied where it is not possible to apply either a Secondary A or B definition due to variable rock type characteristics. Unproductive Strata are considered largely unable to support water supplies.

3.5.11 The information included here provides context for Section 4.11 of the FRA which focuses on flooding from groundwater. Further detail on hydrogeology can be found in ES Chapter 9: Contaminated Land, Geology and Hydrogeology (document reference 6.9).

3.6 Watercourses and Flood Defences

3.6.1 Schedules of watercourse crossings are provided in ES Appendix 4.2: Watercourse Crossing Details (document reference 6.4.A2).

3.6.2 The Project crosses the following main rivers and their associated floodplains:

- Section A: Frenze Beck and River Waveney
- Section B: River Waveney, River Gipping and The Channel
- Section C: Belstead Brook, Spring Brook, the River Stour and Salary Brook
- Section D: St Botolph's Brook, River Colne and Roman River
- Section E: River Blackwater, one of its tributaries and the River Brain
- Section F: River Ter, Straw Brook, River Chelmer, Chignall Brook, River Can and Roxwell Brook
- Section G: River Wid, Stock Brook and Haverings Grove Brook
- Section H: River Mardyke.

3.6.3 There are also numerous tributaries of these rivers, classified as ordinary watercourses and Board Drains, that the Project crosses. It is noted that some of the watercourses are classified as ordinary watercourses where they are crossed by the Project but are classified as main rivers further downstream (e.g. River Tas).

3.6.4 Underground cables would be located within the catchments of the River Stour, River Brett, Salary Brook and River Colne, and the River Stour itself would be crossed by underground cables in Section C.

3.6.5 Underground cables and a CSE compound would be located in the Stutton Brook catchment. Underground cables and two CSE compounds would be located within the catchment of the River Colne, and this is also the case for the River Ter.

3.6.6 The new EACN Substation, underground cables and a CSE compound would be located in the catchment of the Tenpenny Brook. The proposed works at Norwich Main Substation would be located within the catchment of the River Tas. Proposed works at Bramford Substation would be within the catchments of the River Gipping and Belstead Brook. The new Tilbury North Substation and the two CSE compounds south of the proposed Lower Thames Crossing project would be located in the catchment of a main river known as Gobions Sewer.

3.6.7 There are multiple places where the Project crosses flood defences. The locations where the Project crosses the flood defences shown in the Environment Agency spatial flood defences database (Environment Agency, 2024) are summarised below alongside the watercourse they are associated with:

- Section A: natural high ground (Frenze Beck)
- Section A/B: natural high ground (River Waveney, River Gipping)
- Section C: natural high ground (River Stour)
- Section D: natural high ground (St Botolph's Brook, River Colne and Roman River)
- Section E: natural high ground (River Blackwater and tributary, River Brain)
- Section F: natural high ground (River Ter, River Chelmer, Chignall Brook, River Can, Roxwell Brook, Margaretting Brook)
- Section G: natural high ground (River Wid, Stock Brook, Haverings Grove Brook)
- Section H: natural high ground (Amess Sewer).

4. Flood Risk

4.1 Flood Risk Data

4.1.1 There are readily available reports providing a context for flood risk, and specifically flood history, that are relevant to the Project and its Study Area, which was defined to include reaches of watercourses and floodplains that would be crossed by or likely to receive surface water runoff from the Project, extending 500 m downstream. These reports, described in Sections 4.2 to 4.5, draw together a range of information and are prepared by relevant LPAs in their role as LLFA. Information on flood history has also been obtained from stakeholder consultation which has been ongoing for the Project.

4.1.2 The following sections of this report provide a summary of flood risk/history data from relevant SFRAs, PFRAs, LFRMSs, S19 Flood Investigation Reports and stakeholder consultation, before focusing on the sources of flooding scoped into the FRA.

4.1.3 Flood risk data have also been obtained from online Environment Agency mapping (2021 and 2025a, 2025b, 2025c and 2025d) and flood model outputs provided by the Environment Agency (August 2023).

4.1.4 It is noted that the data summarised below are only for reported events. It is possible some flood events, such as groundwater flooding in remote areas, may have occurred without being reported.

4.2 Strategic Flood Risk Assessments

4.2.1 There are several recent SFRAs covering the Study Area. There are listed below in Table 4.1, along with a brief summary of the information within the documents which is relevant to the Project.

Table 4.1 Summary of the SFRAs relevant to flooding in the Study Area

Document title	Year	Project Section	Information Relevant to the Project
Greater Norwich Level 1 SFRA	2017	A	The Greater Norwich area has a history of documented flooding with the main sources being from fluvial/tidal and surface water. The River Waveney is flagged as being a source of historical flooding.
Babergh and Mid Suffolk Level 1 SFRA	2020	B, C	Reports of recurring historical flooding in the Waveney and Stour catchments due to snowmelt and rainfall, with properties flooded.
Colchester Borough Council Level 1 SFRA	2016	D	Historical flooding in the Colne catchment due to severe rainfall events.

Document title	Year	Project Section	Information Relevant to the Project
Tendring District Council Level 1 SFRA	2017	C	Ardleigh Road in Little Bromley is flagged as being a medium and high flood risk site. This road is one of the access roads proposed to be used by the Project.
Braintree District Council Level 1 SFRA	2016	E	Historical flooding associated with the River Blackwater as it flows through Coggeshall, and the River Brain south of Braintree due to rainfall events.
Chelmsford City Council Level 1 SFRA	2024	F	Recorded historical flooding along the River Chelmer.
South Essex Level 1 SFRA	2018	G	Areas of historical flooding in the Basildon Borough, mostly restricted to urban areas around the River Crouch, and not in the vicinity of the Project.
Brentwood Borough Council Level 1 SFRA	2018	G	Incidents of fluvial flooding, attributed to the River Wid, and surface water flooding at Ingatestone.
Thurrock Level 1 SFRA	2024	H	History of tidal flooding associated with the River Thames estuary system. Particularly notable incidents are 1928 and 1953. The Thurrock SFRA shows the location of the Tilbury Flood Storage Area. The Order Limits avoid encroaching into this.

4.3 Preliminary Flood Risk Assessments

4.3.1 For the Project, there are several LLFAs with PFRAs applicable to the Project. They are Norfolk County Council, Suffolk County Council, Essex County Council and Thurrock Council.

4.3.2 The PFRAs are high-level overviews of flood risk attributable to surface water, groundwater, ordinary watercourses, sewers, and canals. They draw together a wide range of readily available information as a means to inform the strategic overview of flood risk across the counties from these sources.

4.3.3 Note that whilst the focus of the PFRAs is on those sources listed above, some PFRAs also provide a broader flood risk context from main rivers.

Norfolk County Council, 2011

- There are no historical flood events within the area of Norfolk County Council which are considered to have had significant harmful consequences
- There are no flood risk areas identified within the Norfolk PFRA
- The PFRA reports incidents of flooding in Shelfanger, which is located west of the Order Limits in Section A
- There is no mention of groundwater flooding within the PFRA

- Addendum 2017: intense rainfall caused internal property flooding across the central Norfolk belt.

Suffolk County Council, 2017

- There are no reported historical flood events which are located within the Order Limits. Reported flood events are in the urban district of Ipswich
- The PFRA identifies Needham Market and Stowmarket as areas at risk of potential future flooding. Although these places are not located within the Order Limits, they are between 0.5 km and 1 km from the Order Limits
- The PFRA identifies the north-west of the county, which is not in the vicinity of the Project, as being most susceptible to groundwater flooding. However, there are areas along the main rivers within the county, for example the River Waveney, which are also identified as being more susceptible to groundwater flooding
- The Project is not identified as being at risk of flooding from ordinary watercourses or tidal sources.

Essex County Council, 2011

- Groundwater flooding is not believed to be an issue within the Essex County Council area and there have been no recorded instances of groundwater flooding in the vicinity of the Project
- There are no records of ordinary watercourse flooding within the PFRA
- Basildon is identified within the PFRA as a flood risk area due to surface water flooding. The edges of the defined flood risk area are approximately 500 m from the Order Limits, but not with the Order Limits.

Thurrock Borough Council, 2011

- The PFRA identifies incidents of historical flooding at Tilbury due to lack of maintenance of the drainage ditches leading to the backing up of water and flooding of 10 properties. Tilbury is located over 1 km from the Order Limits
- Groundwater flooding is indicated as being difficult to predict as mapping only indicated areas susceptible to groundwater flooding, not areas identified to be at risk
- It is stated there are insufficient data for the critical ordinary watercourses in Thurrock to make an accurate assessment of their potential risk
- Addendum 2017: flood risk areas identified are not within the Order Limits.

4.4 Flood Investigation Reports

4.4.1 Under Section 19 of the Flood and Water Management Act 2010, there is a statutory duty for LLFAs to investigate flood incidents if they meet certain criteria. Different LLFAs have different criteria for commencing an investigation into a flood incident. The investigations which are relevant to the Project are listed below. A Study Area of

500 m from the Order Limits has been used and has been agreed with the flood risk management authorities.

Norfolk County Council

4.4.2 Records from Norfolk County Council indicate that two Section 19 flood investigations have been undertaken within the Study Area. The locations and events covered include:

- South Norfolk district various flooding, 2014-2018
- The Heywood, Diss (July 2016): Rainfall runoff in low points of the catchment was directed towards a surface water drainage network that was already overloaded. Ditch upstream of the property was unmaintained, causing the system to back up and overflow near the property
- High Road, Roydon (February 2018): Runoff from rainfall pooled at a low point and was directed towards the surface water drainage network. These flows could not be accommodated as the system was already overloaded, causing it to surcharge elsewhere
- South Norfolk district flooding, winter 2020/2021
- Five incidents of internal property flooding in Shelfanger, within the Study Area but not within the Order Limits. Caused by substantial rainfall and pinch points in the watercourse flowing through the village leading to overtopping of the river and subsequent overloading of surface water drainage network.

Suffolk County Council

4.4.3 Records from Suffolk County Council indicate that one Section 19 flood investigation has been undertaken within the Study Area.

- A1120, between Gun Cotton Way and A14 – October 2023. Surface water flow resulted in the closure of Lane 1 of the north-eastbound carriageway on the A1120 adjacent to the A14 junction roundabout, which is a Primary Access Route.

Essex County Council

4.4.4 Records from Essex County Council indicate that one Section 19 flood investigation has been undertaken within the Study Area.

- Dead Lane, Ardleigh – January 2021. Based on available information it is understood that land within the Order Limits was not affected.

Thurrock Council

4.4.5 Records from Thurrock Council indicate that there are no Section 19 reports which suggest that the Study Area has been affected.

4.5 Local Flood Risk Management Strategies

4.5.1 Norfolk County Council, Suffolk County Council, Essex County Council and Thurrock Council, as the LLFAs, have a statutory requirement to produce LFRMSs. Their duties under the Flood and Water Management Act 2010 include the duty to

'*develop, maintain, apply and monitor*' a flood risk management strategy, which covers flooding from surface water (overland runoff), groundwater, ordinary watercourses (i.e. watercourses that are not designated as main rivers), and highway drains.

4.5.2 The LFRMS draws on information within other flood-risk-related documents, such as the PFRA and SFRA. The previously described Study Area is referred to below.

Norfolk County Council

4.5.3 The LFRMS identifies that the low-lying areas along the River Waveney are at risk of fluvial and tidal flooding, with a history of tidal surge flooding. The Order Limits cross the Waveney to the west of Diss.

4.5.4 The LFRMS identified settlements across South Norfolk that are at risk of surface water flooding and gives the number of properties predicted to be at risk. Settlements which lie within the Study Area identified include Diss and Mulbarton, though the exact location of the properties at risk is not given.

4.5.5 The Study Area is not identified as having been investigated for groundwater flooding issues.

4.5.6 The Local Flood Risk Management Strategy Policy Review (Norfolk County Council, 2021) has also been consulted.

Suffolk County Council

4.5.7 The LFRMS identifies priority flood risk management areas based on recorded risk, predicted risk, and whether they are flagged in the PFRA. Within the Study Area, there are two priority flood risk management areas identified. These are Needham Market and Stowmarket, ranked 7th and 11th in terms of priority respectively. The Order Limits pass between these towns but are understood not to pass through the risk management areas.

Essex County Council

4.5.8 With specific regard to flooding incidents or history, there is no mention of any flood events affecting the Study Area.

Thurrock Council

4.5.9 The Thurrock LFRMS identifies that the largest historical tidal flood events in the borough were in 1897, 1928, 1938 and 1953. The 1953 event led to the improvement of defences along this section of the Thames. It is understood these events did not impact land within the Order Limits.

4.5.10 Areas of Critical Drainage (AoCDs) are the areas that Thurrock Council have identified to be most at risk of flooding in the borough. Tilbury and East Tilbury are in AoCDs (assigned AoCD008 and AoCD009 respectively), but the Order Limits avoid encroaching into these AoCDs.

4.6 Information from Consultation

4.6.1 Table 4.2 summarises information provided by consultees during the consultation process regarding local flood history.

Table 4.2 Summary of flood history information from consultation

Consultee	Comment / Information Provided
South Norfolk Council	Concerns that the Project will cause catastrophic flooding at Swardeston.
Norfolk County Council	There is the potential for the displacement / disruption of surface water flow routes through the Cargate Common area. It is necessary that careful consideration is given to the proposed design in this location to prevent an increase in flood risk elsewhere.
Great Horksley Parish Council	There have been significant issues with runoff and flooding after heavy rain on local roads, with occasional flooding of residences.
Little Bromley Parish Council	The water table is high in wet periods and flooding and drainage issues occur regularly, with many properties having no mains sewerage or water supplies.
Mellis Parish residents	'The Common' is ringed by ditches and ponds which are important for flood protection.
Fordham village residents, Colchester	The construction across the valley area will greatly impede natural baseflow and spring seepage to the river. Fossetts Lane is in an area well known for significant spring flow.
Burgate Little Green residents	The area is already prone to flooding with some residents still living in temporary accommodation due to flooding of homes in 2023/2024.
Gislingham Parish residents	There has been significant flooding in 2023 and repeated flooding of Thornham Road, Finningham Road and Mill Street.
Stratford St Mary Parish Council	The significance for the proposed underground cables is that the area around Stratford St Mary, where these are proposed, has a significantly high flood risk factor and forms a significant flood relieving safety net for local communities. The officials are also drawn to an event in late 1970's where the trenching and installation of a gas main across the valley caused significant flooding and damage to properties in the area – any trenching and cabling would need to be designed to ensure that they do not impede the flood waters or divert flood waters away from their only root to the sea.
Anglian Water	Anglian Water's sewer networks in a number of locations have been impacted by the severe storms and wet weather during October 2023 to February 2024 including ingress and inundation from groundwater flooding, and surface water flooding.

4.6.2 The historical information provided highlights that, in several areas local to proposed Project activities, flooding from a range of sources causes issues. The measures described in the rest of Section 4 below describe how the Project would be designed and constructed to avoid contributing to these existing flooding issues.

4.7 Sources of Flooding

4.7.1 As noted in Section 1.4 of this FRA, flooding from sewers, reservoirs and other artificial sources were scoped out of the assessment in agreement with the Planning Inspectorate and following a screening activity that was undertaken which confirmed that these sources of flood risk could be scoped out.

4.7.2 With regard to foul water flooding, most of the land within the Order Limits is rural and in agricultural use, hence the risk of flooding from bursts and capacity exceedances of the foul sewer network is low for most of the land within the Order Limits. A review of the SFRAs did not highlight any parts of the Order Limits to be at elevated risk of flooding from sewers and water mains.

4.7.3 For areas within the Order Limits which are more developed, the Risk of Flooding from Surface Water map (Environment Agency, 2025c) was reviewed to help identify any significant low spots or flow paths that water emanating from sewer/water main networks would travel along. No significant areas of risk to vulnerable Project infrastructure were identified.

4.7.4 The Project is not anticipated to impact on or increase baseline flood risk from foul water flooding. This is because, due to the nature of the Project, foul water generation during operation (and maintenance) would be negligible and the Project would not therefore notably add to the loading / demand on sewer systems. During construction, foul water would be suitably managed in accordance with the Outline CoCP (document reference 7.2).

4.7.5 This FRA therefore focuses on the following potential sources of flooding in relation to the proposed development as shown on Figure 1: Flood Risk Areas in Appendix D:

- Fluvial
- Tidal / coastal
- Pluvial (surface water)
- Groundwater.

4.7.6 Given the nature of the Project, there is an important distinction to be made between construction risk and operational risk. The construction phase would require various temporary works in terms of working areas, excavations and other elements, which would be removed once the works are complete. The operation (and maintenance) phase would require a smaller footprint of works. The assessment presented in the following sections assesses both construction and operation (and maintenance) for each source of flooding.

4.7.7 The crossing schedules produced for the Project are included in ES Appendix 4.2: Watercourse Crossing Details (document reference 6.4.A2). These show which watercourses would be crossed for the proposed activities.

4.7.8 The assessment also considers both the potential impact on the Project, and the potential impacts elsewhere as a result of the Project.

4.8 Fluvial Flood Risk

Introduction

4.8.1 The Flood Map for Planning (Environment Agency, 2025a) shows the Flood Zones as defined in Section 2 of this FRA. It highlights that the Project is largely within Flood Zone 1. Localised areas of the Order Limits are located within Flood Zones 2 and 3. The approximate widths of these floodplain areas (based on Flood Zone 3) and the section of the Project they are located within are listed below. The floodplains within the Order Limits tend to be relatively narrow and often restricted to land immediately adjacent to watercourses, rather than wide expansive floodplains covering large areas of land.

- Section A:
  - River Tas tributaries 120 m (near Flordon), 30 m (north-east of Tacolneston) and 40 m (near Forncett End)
  - River Tas 170 m and 70 m
  - Frenze Beck 110 m
  - Frenze Beck tributary 100 m
  - River Waveney 400 m
- Section B:
  - River Waveney tributary 10 m
  - River Dove tributaries 120m (near Gislingham), 130 m (near Finningham) and 80 m (near Finningham)
  - River Gipping 30 m (near Mendlesham Green) and 180 m (west of Creeting St Mary)
  - River Gipping tributary 170 m (west of Creeting St Mary)
  - Wattisham Watercourse 60 m
  - The Channel 30 m
- Section C:
  - Belstead Brook 80 m
  - Belstead Brook tributary 40 m
  - Stutton Brook 20 m (north of Bottle Bridge Cottages) and 130 m (north-west of Bottle Bridge Cottages)
  - River Stour 630 m
  - Black Brook 20 m
- Section D:
  - Unnamed drain (Crabtree Lane/Colchester Road) 20 m
  - River Colne tributary 20 m
  - River Colne between 130 m and 310 m

- Roman River 100 m

- Section E:
  - River Blackwater 110 m
  - River Blackwater tributary 30 m to 120 m
  - River Brain 90 m
- Section F:
  - River Ter 70 m
  - River Chelmer 150 m
  - Chignall Brook 50 m
  - River Can 100 m
  - Roxwell Brook 120 m
  - Roxwell Brook tributary 40 m
  - River Wid tributaries between 30 m and 100 m (along Ivy Barns Lane) and 30 m (near Bushey Wood)
- Section G:
  - River Wid 160 m (west of Ingatestone), 130 m (near Oak Lodge) and 120 m (Haverings Grove Brook confluence)
  - Stock Brook 80 m
  - Haverings Grove Brook up to 150 m (near River Wid confluence) and 100 m (Little Bladen's Wood)
- Section H:
  - Mardyke tributaries near Brunswick 70 m and up to 120 m
  - Mardyke tributary near Noke Hall Farm 40 m
  - Mardyke tributary near Golden Bridge Cottages 80 m.

4.8.2 These areas are shown on ES Figure 12.2: Flood Risk Areas (document reference 6.12.F2). Overall, it is considered that the risk of flooding to the Project from rivers is low and that the Project, by its nature and due to the siting of substations and CSE compounds in Flood Zone 1, has a low vulnerability to flooding from this source during its operation (and maintenance). However, areas local to some watercourse crossings are at higher risk, with the potential for this form of flooding to impact on construction of the Project.

4.8.3 Reference should be made to the Flood Warning and Evacuation Plan (Appendix G of the Outline CoCP (document reference 7.2)) for further information on flood conditions within these higher risk areas. The data have been obtained from flood models provided by the Environment Agency.

4.8.4 Some of the third party infrastructure works associated with the Project would be located within the fluvial floodplain. Risks during construction would be managed in line with the measures described below. Due to the nature of the works, no change to

the existing flood risk is anticipated once the third party infrastructure works have been completed.

Construction Phase Risk Assessment

4.8.5 During construction, the majority of the works would take place outside of the floodplain in Flood Zone 1, where the risk of flooding from rivers is defined as very low. At watercourse crossings, particularly at crossings for underground cables, there is a higher risk. However, commitments included in the Outline CoCP (document reference 7.2) and summarised in Table 1.1, would be put in place to manage fluvial flood risk during construction. These are secured by Requirement 4 of the draft DCO (document reference 3.1).

4.8.6 There would be a requirement to cross watercourses for the temporary construction access routes, however flood risk effects would be avoided or controlled through commitments W10, W12 and W14 in the Outline CoCP (document reference 7.2). These commitments secure flood resilient haul road design, use of clear span bridges or suitably assessed and approved alternatives (where required) and reinstatement of land at the end of construction. Information on the proposed watercourse crossings is included in the crossing schedules in ES Appendix 4.2: Watercourse Crossing Details (document reference 6.4.A2).

4.8.7 The new substations, proposed works to existing substations, and the CSE compounds would be located within Flood Zone 1. The footprint of the Wenham Grove CSE compound is partially located in Flood Zone 3, however there is sufficient space within the defined LoD for this CSE compound to avoid developing in Flood Zone 3. All infrastructure at the CSE compound would be situated in Flood Zone 1, as secured by commitment W19 within the Outline CoCP (document reference 7.2).

4.8.8 A small proportion of the pylons for the overhead line would either be located in the floodplain themselves and/or would have a construction working area within the floodplain (further detail provided in Appendix B). There would also be a small number of laydown areas partially located within the floodplain, as well as some temporary drainage infrastructure. Through detailed routeing and siting studies (National Grid, 2022; 2024a) and an iterative design process, it has been confirmed that these elements of the Project (many of which are temporary) cannot be relocated to Flood Zone 1 for operational reasons. More detail on the routeing and siting studies and iterative design process is provided in the ES Chapter 3: Alternatives (document reference 6.3). As recorded in commitment W14 in the Outline CoCP (document reference 7.2), once the Project has been constructed, the working areas would be removed, and the sites reinstated.

4.8.9 The River Stour has the most extensive floodplain within the Order Limits, and both the river and its floodplain would be crossed by the proposed underground cable. A trenchless crossing of the river is proposed for the underground cable installation (see ES Appendix 4.2: Watercourse Crossing Details (document reference 6.4.A2)) to reduce effects on the River Stour during construction. The drive and reception pits for the trenchless crossing, which are the excavations that form the entry and exit points for the drill, with approximate dimensions of 1.5 to 2 m deep, 5 m wide (measured parallel to cables) and potentially 180 m long, would be located outside of Flood Zone 3 where practicable and the construction works site would be managed in accordance with the Flood Warning and Evacuation Plan, in line with commitments W07 and W11 of the Outline CoCP (document reference 7.2). On receipt of a severe flood warning, the Main Works Contractor(s) would deploy suitable flood protection

measures to safeguard work site personnel and equipment. The Flood Warning and Evacuation Plan (Appendix G of the Outline CoCP (document reference 7.2)) would also apply to the other previously described construction works required in the floodplain.

4.8.10 Commitment W07 would reduce fluvial flood risk during construction, it states: '*Where construction activities take place in Flood Zone 3, temporary construction compounds, laydown areas and other work sites will be laid out in accordance with the Sequential Test and incorporate flood resilience measures where necessary. There would be no land raising and storage of construction equipment and materials will be done in such a way as to avoid forming barriers to floodplain flows. Material storage areas will be located outside of the fluvial floodplain where practicable*'.

4.8.11 Effects on flood risk via impacts on flood defences during construction would be mitigated through commitment W18, which would safeguard the integrity of existing flood defences.

4.8.12 The embedded and standard mitigation measures would reduce fluvial flood risk to the Project as well as limit any flood risk impacts arising from Project construction activities. With these measures in place the residual flood risk would be low.

Operational Phase Risk Assessment

4.8.13 During operation (and maintenance), the reinforcement would generally be elevated (overhead line) or buried (underground cable). The proposed new substations, substation extensions and CSE compounds would be located in Flood Zone 1.

4.8.14 Permanent above ground infrastructure for the Project in the floodplain would be limited to a small number of the pylons for the overhead line. The requirements for compensation of loss of floodplain storage associated with the pylons is addressed in the following sub-section and secured by commitment W17 in the Outline CoCP (document reference 7.2). No discernible loss of floodplain storage is associated with the CSE compound; associated above ground infrastructure has a very limited footprint.

4.8.15 The pylons would be resilient to fluvial flooding given their open, metal lattice structure and that the overhead lines carried by the pylons would be significantly higher than anticipated flood depths. If the bases of the pylons were flooded the Project would still be able to remain operational.

4.8.16 There would be no permanent land raising within Flood Zone 3, nor any permanent changes to the channel form of any watercourses, and land would be restored to pre-construction condition and use (commitment W14).

4.8.17 Where any permanent access routes pass through floodplains, any visits for routine inspections and maintenance of Project infrastructure would be programmed to avoid periods of significant high river levels and floodplain inundation.

Compensatory Storage

4.8.18 As a response to the Environment Agency stipulation, detailed in Table 1.2, that compensatory storage for pylons within the floodplain would be required, a technical note was produced and shared with the Environment Agency on this topic. The technical note set out the approach for the assessment of storage losses which was accepted by the Environment Agency (as noted in Table 1.2).

4.8.19 The Environment Agency stipulated that consideration of compensatory storage for pylons within Flood Zone 3, to the height of the 1% AEP flood event with climate change, was required. A review has been undertaken to identify pylons located within the fluvial floodplains of watercourses based on the mapped flood extents in the Environment Agency Risk of Flooding from Rivers and Sea – Climate Change 1 mapping (Environment Agency, 2025d). This dataset represents the latest available information on risk from this source accounting for predicted impacts of climate change on future risk.

4.8.20 The siting of pylons within the floodplain has largely been avoided along the Project route. Floodplain storage losses are therefore localised and very minor. Appendix B lists the pylons identified within the mapped flood extents and summarises the compensatory storage calculations that have been undertaken.

4.8.21 Floodplain storage compensation areas would be located on land outside of the floodplain (see Appendix B for further detail), within the Order Limits. The proposed location of the compensation areas are shown on ES Figure 4.2: Proposed Project Design – Permanent Features (document reference 6.4.F2). The compensation areas would be hydraulically linked to the area of loss, such that storage volume is replaced within the floodplain cell in which it is lost. The areas would also be designed to drain following a flood event. Given the very small volumetric losses (individually and cumulatively) it has been agreed with the Environment Agency that hydraulic modelling to demonstrate the effectiveness of the storage provision would not be required.

4.8.22 Due to the small compensation volumes required, there is ample space within the Order Limits to meet the provision (commitment W17 in the Outline CoCP).

4.8.23 During construction, temporary works, for example, stockpiling of soils within cable sections of the Project, would result in localised and temporary losses of floodplain storage. The Project has agreement from the Environment Agency that compensatory storage provision is not required for such temporary losses.

Decommissioning Phase Risk Assessment

4.8.24 The works required and associated flood risks during eventual decommissioning would be similar to those described previously, subject to any climate change impacts.

4.8.25 More stringent mitigation could be implemented to address the risks associated with such future works. These would be identified through an appropriate assessment to be undertaken at the time.

4.8.26 It is not anticipated that there would be any insurmountable flood risk obstacles to decommissioning that could not be overcome.

Conclusion

4.8.27 The FRA has concluded that the Project during its construction would be generally at low risk of flooding from rivers. Locally higher risks, particularly to temporary works within main river floodplains, would be reduced through embedded and standard mitigation measures. These measures would also protect construction workers, limit damages to construction equipment and materials and also limit any impacts of the Project on fluvial flood risk.

4.8.28 During the operation (and maintenance) of the Project, there would be low risk of fluvial flooding and there would be no increase in flood risk as a consequence of the Project's operation (and maintenance), subject to implementation of the recommended compensatory storage described in this FRA.

4.8.29 The works required and associated flood risks during eventual decommissioning would be similar, subject to any climate change impacts. More stringent mitigation could be implemented to address the risks associated with such future works, to be identified through an appropriate assessment to be undertaken at the time; it is not anticipated that there would be any insurmountable flood risk obstacles to decommissioning that could not be overcome.

4.9 Tidal / Coastal Flooding

4.9.1 The Project is not located within the inter-tidal zone nor is it located in close proximity to the coast.

4.9.2 Some of the watercourses crossed by the Project are tidally influenced in their downstream reaches. However, at the point they are crossed by the Project, watercourses' floodplains are not tidally dominated.

4.10 Surface Water Flood Risk

Introduction

4.10.1 The Environment Agency Risk of Flooding from Surface Water Map (January 2025 update) is informed by direct rainfall modelling undertaken at a high (2 m) spatial resolution. It illustrates those areas at elevated risk of surface water flooding, in low spots down-gradient of sloping ground or in the topographic valleys associated with current or former watercourses.

4.10.2 As noted in Table 2.4, the mapping categorises land at high, medium, low, and very low risk of flooding.

4.10.3 The Risk of Flooding from Surface Water Map indicates surface water flood risk is variable along the Project alignment as shown on ES Figure 12.2: Flood Risk Areas (document reference 6.12.F2). Most of the land within the Order Limits is shown to be at 'very low' risk of surface water flooding but there are multiple areas shown to be at higher risk.

4.10.4 Consultation feedback has highlighted several locations within the Study Area that experience surface water flooding and drainage issues (Table 4.2). Anglian Water's sewer networks have been impacted by inundation from surface water flooding in several locations.

4.10.5 Due to the nature of the third-party infrastructure works, no operational effects on surface water flood risk are anticipated, and further assessment has therefore been screened out.

Construction Phase Risk Assessment

4.10.6 Table 4.3 provides a summary of the Project interactions during construction with areas at 'high' and 'medium' risk of surface water flooding in the Environment Agency Risk of Flooding from Surface Water Map.

Table 4.3 Summary of Project interactions with areas at high and medium risk of surface water flooding – construction

Section	Location Reference	Project Component	Flood Depths in the High Risk Event
A	Norwich Main Substation	Haul road (temporary)	Less than 0.2 m.
	RG3, RG7, RG18, RG20, RG30	Overhead line conductor pulling work areas, haul roads (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	Near pylons RG14 and RG23	Haul roads (temporary)	Between 0.2 m to 0.3 m.
	Between pylon RG28 and RG29	Haul road (temporary) and site access point[5]	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	RG30 to RG33	Haul road (temporary)	Less than 0.2 m.
	RG42	Haul road (temporary), overhead line conductor pulling work area	Less than 0.2 m.
	Between RG45 and RG46	Haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	RG49 and RG50	Haul road (temporary)	Typically, between 0.2 m to 0.3 m. Localised areas reaching between 0.3m to 0.6m.
	Between RG53 and RG55	Haul road (temporary)	Less than 0.2 m.
	Between RG57 and RG58	Haul road (temporary), mitigation work area	Less than 0.2 m.
	RG61 and RG62	Overhead line conductor pulling work areas, construction access route	Less than 0.2 m.
	RG65	Overhead line conductor pulling work area, haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	Between RG70 and RG71	Haul road (temporary)	Typically, less than 0.2m. Localised areas reaching between 0.2 m to 0.3 m.

[5] The location on a Primary Access Route where construction vehicles will transition between the local road network and haul roads.

Section	Location Reference	Project Component	Flood Depths in the High Risk Event
	Between pylon RG73 and RG74	Haul road (temporary)	Less than 0.2 m.
	RG78	Haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching 0.2 m to 0.3 m.
	RG87 and RG88	Overhead line conductor pulling work areas, pylon construction working area, haul road (temporary)	Less than 0.2 m.
	The project components for Section A listed above are at both 'medium' and 'high' risk of surface water flooding: haul roads (temporary), overhead line conductor pulling work areas, mitigation work areas, construction access routes (including Primary Access Routes) and pylon construction working areas.		
B	RG89 and RG91	Overhead line conductor pulling work areas, haul road (temporary)	Between 0.3 m to 0.6 m at RG089. Less than 0.2 m at RG091.
	RG093 to RG095	Haul road (temporary)	Less than 0.2m.
	RG96/Old Bury Road	Temporary construction compound, drainage infrastructure	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	Between pylon RG97 and RG98	Haul road (temporary)	Less than 0.2 m.
	RG101 to RG102	Overhead line conductor pulling work area, haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	RG108	Haul road (temporary)	Less than 0.2 m.
	RG110 and RG111	Pylon construction working area	Less than 0.2 m.
	RG112 and RG113	Overhead line conductor pulling work area, crossing protection working area	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	RG117 to 118	Overhead line conductor pulling work area, pylon construction working area, haul road (temporary), laydown area	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.

Section	Location Reference	Project Component	Flood Depths in the High Risk Event
	RG120 to RG121	Pylon construction working area, construction access route	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	RG122 and RG123	Pylon construction working areas	Less than 0.2 m.
	RG124	Haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3m.
	RG125	Overhead line conductor pulling work area	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	RG136	Overhead line conductor pulling work area, haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	RG139	Pulling area	Less than 0.2 m.
	RG143	Haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	RG145 to RG146	Haul road (temporary), drainage infrastructure	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	RG147	Overhead line conductor pulling work area	Less than 0.2 m.
	RG151	Pylon construction working area	Between 0.2 m to 0.3 m.
	RG156 to RG161	Haul roads (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	RG164	Pylon construction working area, haul road (temporary)	Less than 0.2 m.
	RG186	Pylon construction working area, haul road (temporary)	Less than 0.2 m.
	RG189 to RG190	Haul road (temporary)	Less than 0.2 m.
	The project components for Section B listed above are at both 'medium' and 'high' risk of surface water flooding: haul roads (temporary), overhead line conductor pulling work areas, construction access routes (including Primary Access Routes), Main works compound, crossing protection work area, pylon construction working areas and drainage infrastructure.		

Section	Location Reference	Project Component	Flood Depths in the High Risk Event
	JC25 to JC26	Haul roads (temporary), drainage infrastructure	Less than 0.2 m.
	JC underground cable chainage 1600 to 2200	Drainage infrastructure, haul road (temporary)	Less than 0.2 m.
	JC underground cable chainage 10700	Cable hauling road (temporary)	Typically, between 0.2 m to 0.3 m. Localised area reaching between 0.3 m to 0.6 m.
	JC underground cable chainage 13600 to 13700	Construction swathe	Less than 0.2 m.
	JC underground cable chainage 14800	Cable hauling road (temporary)	Less than 0.2 m.
	Little Bromley Road/ EACN Substation	Temporary construction compound	Less than 0.2 m.
	The project components for Section C listed above are at both 'medium' and 'high' risk of surface water flooding: haul roads (temporary), cable hauling roads, construction swathe, temporary construction compound and drainage infrastructure.		
D	The Causeway	Land west of A134, Tye Green, Colchester (TB-CC03) secondary compound (cable)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB44	Overhead line conductor pulling work area, haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB54	Haul road (temporary), drainage infrastructure	Less than 0.2 m.
	TB60 to TB61	Haul road (temporary)	Less than 0.2 m.
	TB69	Pylon construction working area, haul road (temporary)	Typically, between 0.2 m to 0.3 m. Localised areas reaching between 0.3 m to 0.6 m.
	TB72 and TB73	Pylon construction working area	Typically, between 0.2 m to 0.3 m. Localised areas reaching between 0.3 m to 0.6 m.
	The project components for Section D listed above are at both 'medium' and 'high' risk of surface water flooding: haul roads (temporary), overhead line conductor		

Section	Location Reference	Project Component	Flood Depths in the High Risk Event
	pulling area, pylon construction working areas, (land west of A134, Tye Green, Colchester (TB-CC03)) secondary compound and drainage infrastructure.		
E	TB78 and TB79	Overhead line conductor pulling work area, haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB85 to TB87	Haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB90	Haul road (temporary)	Less than 0.2 m.
	TB93	Haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB96	Pylon construction working area	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB98	Haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB100	Overhead line conductor pulling work area	Typically, less than 0.2 m. Localised areas reaching between 0.3 m to 0.6 m.
	TB101	Haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB106 to TB107	Haul road (temporary)	Less than 0.2 m.
	TB110	Overhead line conductor pulling work area, pylon construction working area	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB118 to TB119	Haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB120	Overhead line conductor pulling work area, pylon construction working area, haul road (temporary)	Less than 0.2 m.
	TB122	Pylon construction working area	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	The project components for Section E listed above are at both 'medium' and 'high' risk of surface water flooding: haul roads (temporary), overhead line conductor pulling work areas and pylon construction working areas.		

Section	Location Reference	Project Component	Flood Depths in the High Risk Event
F	TB124	Haul road (temporary)	Less than 0.2 m.
	TB133	Overhead line conductor pulling work area, haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB134	Temporary construction compound (very small areas at high risk), haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB135 and TB136	Overhead line conductor pulling work areas, pylon construction working areas	Typically, between 0.3 m to 0.6 m. Localised areas reaching between 0.6 m to 0.9 m.
	TB144	Pulling area, haul road (temporary)	Less than 0.2 m.
	TB146	Pulling area	Less than 0.2 m.
	TB147	Pylon construction working area	Less than 0.2 m.
	TB150	Overhead line conductor pulling work area, haul road (temporary)	Typically, between 0.2 m to 0.3 m. Localised areas reaching between 0.3 m to 0.6 m.
	TB157 and TB159	Overhead line conductor pulling work areas, haul roads (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB162	Overhead line conductor pulling work area, haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB164	Overhead line conductor pulling work area, haul road (temporary)	Typically, between 0.2 m to 0.3 m. Localised areas reaching between 0.3 m to 0.6 m.
	TB170	Overhead line conductor pulling work area, haul road (temporary)	Typically, between 0.2 m to 0.3 m. Localised areas reaching between 0.3 m to 0.6vm.
	TB174	Haul road (temporary)	Typically, between 0.2 m to 0.3 m. Localised areas reaching between 0.6 m to 0.9 m.

Section	Location Reference	Project Component	Flood Depths in the High Risk Event
	TB175	Overhead line conductor pulling work area, haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB181	Overhead line conductor pulling work area, haul roads (temporary), laydown area	Typically, between 0.2 m to 0.3 m. Localised areas reaching between 0.3 m to 0.6 m.
	TB183	Overhead line conductor pulling work area, haul road (temporary)	Less than 0.2 m.
	TB185	Pulling area, haul road (temporary)	Less than 0.2 m.
	TB186	Pylon construction working area, haul road (temporary)	Less than 0.2 m.
	TB188	Haul road (temporary)	Less than 0.2 m.
	TB190	Haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB191	Overhead line conductor pulling work area, haul road (temporary)	Typically, between 0.2 m to 0.3 m. Localised areas reaching between 0.3 m to 0.6 m.
	TB192	Pylon construction working area	Less than 0.2 m.
	TB194	Pylon construction working area	Less than 0.2 m.
	TB196	Overhead line conductor pulling work area, haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	The project components for Section F listed above are at both 'medium' and 'high' risk of surface water flooding: haul roads (temporary), overhead line conductor pulling work areas, temporary construction compound, pylon construction working areas and laydown area.		
G	TB197 to TB198	Haul road (temporary)	Typically, between 0.2 m to 0.3 m. Localised areas reaching between 0.3 m to 0.6 m.
	TB202	Pylon construction working area	Typically, between 0.2 m to 0.3 m. Localised areas reaching between 0.3 m to 0.6 m.
	TB203	Haul road (temporary)	Typically, between 0.2 m to 0.3 m. Localised areas

Section	Location Reference	Project Component	Flood Depths in the High Risk Event
			reaching between 0.3 m to 0.6 m.
	TB206	Pylon construction working area	Typically, between 0.2 m to 0.3 m. Localised areas reaching between 0.3 m to 0.6 m.
	TB208	Pylon construction working area	Less than 0.2 m.
	TB210 to TB212	Haul road (temporary)	Typically, between 0.2 m to 0.3 m. Localised areas reaching between 0.3 m to 0.6 m.
	TB218	Overhead line conductor pulling work area	Less than 0.2 m.
	TB221	Haul road (temporary)	Less than 0.2 m.
	TB223	Pylon construction working area	Less than 0.2 m.
	TB225	Haul road (temporary)	Typically, between 0.2 m to 0.3 m. Localised areas reaching between 0.3 m to 0.6 m.
	TB231	Overhead line conductor pulling work area	Less than 0.2 m.
	The project components for Section G listed above are at both 'medium' and 'high' risk of surface water flooding: haul roads (temporary), overhead line conductor pulling work areas and pylon construction working areas.		
H	TB232	Pylon construction working area	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB233	Overhead line conductor pulling work area, haul road (temporary), drainage infrastructure	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB235	Haul road (temporary)	Less than 0.2 m.
	TB239	Pylon construction working areas	Less than 0.2 m.
	TB240 and TB241	Pylon construction working areas, haul road (temporary)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB245	Pylon construction working area, haul road (temporary)	Less than 0.2 m.

Section	Location Reference	Project Component	Flood Depths in the High Risk Event
	TB246	Pylon construction working area, haul road (temporary)	Less than 0.2 m.
	TB252 and TB254	Overhead line conductor pulling work area (very small areas at high risk)	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB255	Pylon construction working area	Less than 0.2 m.
	TB256	Overhead line conductor pulling work area, pylon construction working area	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	TB257	Overhead line conductor pulling work area	Less than 0.2 m.
	TB258	Pylon construction working area, haul road (temporary)	Typically, between 0.2 m to 0.3 m. Localised areas reaching 0.3 m to 0.6 m.
	TB259	Overhead line conductor pulling work area	Less than 0.2 m.
	TB260	Overhead line conductor pulling work area, haul road (temporary)	Less than 0.2 m.
	TB261	Pylon construction working area	Typically, between 0.2 m to 0.3 m. Localised areas reaching 0.6 m to 0.9 m.
	TB262	Overhead line conductor pulling work area	Less than 0.2 m.
	YYJ116 to YYJ120	Working areas for replacement/upgrade of existing overhead lines	Typically, less than 0.2 m. Localised areas reaching between 0.2 m to 0.3 m.
	The project components for Section G listed above are at both 'medium' and 'high' risk of surface water flooding: haul roads (temporary), overhead line conductor pulling work areas, pylon construction working areas and working areas for replacement/upgrade of existing overhead lines.		

4.10.7 During construction, activities would include topsoil stripping and excavation and construction of temporary access routes and temporary construction compounds, which could temporarily change existing land surface permeabilities and influence the rainfall runoff regime. Also, there is potential for existing land drainage systems to be disrupted.

4.10.8 The Outline CoCP (document reference 7.2) includes mitigation measures to reduce the impacts of these activities on land drainage and surface water flood risk.

4.10.9 As per commitment GG22, the appointed Main Works Contractor(s) would prepare a Surface Water Management Plan which would demonstrate how runoff across the site would be controlled and how any off-site effects would be managed and mitigated. Commitment W09 states that where construction activities take place within surface water flood zones, appropriate site drainage would be put in place. Further, suitable materials would be used to surface the haul roads, and the haul roads would have suitable drainage provisions, as per commitments W10 and W13.

4.10.10 As per commitments AS09 and GG28, appropriate technology/material will be installed in areas where heavy equipment would be used to reduce disturbance to the ground and minimise impacts on the existing land drainage regime. A Soil Resources Plan would also include measures to help minimise impacts on the existing land drainage regime (Appendix C: Outline Soil Resources Plan of the Outline CoCP (document reference 7.2).

4.10.11 Commitment W14 states that once the Project has been constructed, the working areas would be removed and the sites reinstated. It also states that replacement drainage schemes would be installed where appropriate. A specialised drainage contractor(s) would review the drainage designs and provide advice to National Grid and the Main Works Contractor(s) during all relevant construction and reinstatement activities.

4.10.12 Additional information regarding the proposals for surface water management during the construction phase of the Project, with supporting calculations, is provided in Appendix C.

4.10.13 Based on the surface water drainage calculations undertaken, there is enough space within the Order Limits to accommodate the required drainage features.

Operational Phase Risk Assessment

4.10.14 The majority of the permanent Project infrastructure would be located outside of the areas shown to be at ‘high’ risk of surface water flooding in the Environment Agency Surface Water Map. Of the places where the Project interacts with the high risk zone for operation (and maintenance), the majority of these are access roads. However, the Tilbury North Substation and Tilbury North (Tilbury side) CSE compound would be located where the mapping indicates there are existing surface water overland flow routes.

4.10.15 As outlined in commitment W08, surface water runoff from operational above ground infrastructure would be managed in accordance with the requirements and standards of the relevant LLFA and adopt sustainable drainage strategies designed to allow for resilience to climate change. Further, surface water drainage features, based on SuDS techniques, would be installed at the CSE compound sites during the construction phase, with access roads also having suitable drainage provisions (commitment W13).

4.10.16 The Tilbury North Substation and the eastern of the two CSE compounds for undergrounding of the ZB overhead line (referred to as ‘Tilbury North (Tilbury side)’) both clash with an overland surface water flow route. The finished surface levels of these assets would be raised as part of the need to balance cut and fill across the sites and it is proposed to install box culverts beneath the substation and CSE compound to maintain the flow route. In line with National Grid requirements, the culverts would be sized to convey flows generated during a 1 in 1,000 (0.1% AEP)

storm event. Supporting information describing the required capacity/sizing of these box culverts is provided in Appendix C.

4.10.17 The measures described would manage surface water runoff and potential effects on the land drainage regime such that the Project is not anticipated to increase surface water flood risk during its operational lifetime. The Project itself during its operation (and maintenance) would be of low vulnerability to surface water flooding.

Conclusion

4.10.18 This FRA has concluded that there would not be an increase in surface water flood risk elsewhere as a consequence of the Project during its construction or operation (and maintenance), subject to implementation of the measures described.

4.11 Groundwater Flood Risk

Introduction

4.11.1 Groundwater flooding risk is not as well-defined as other sources of flooding, and an assessment of risk often requires consideration of geological conditions. Groundwater flooding can occur from two general mechanisms:

- Clearwater flooding – where the water table in unconfined aquifers rises above the ground surface, associated with permeable bedrock such as chalk and common in areas where winterbourne streams are present, which may run dry for much of the year
- River-groundwater interaction – where river levels interact with permeable superficial deposits along river valleys, potentially flooding areas away from the river without necessarily overtopping the banks.

4.11.2 As part of the ES, a groundwater risk assessment for the whole Project was undertaken to identify where additional, more detailed, hydrogeological risk assessment may be required. The groundwater risk assessment is reported in ES Appendix 9.3: Groundwater Baseline and Qualitative Groundwater Risk Assessment (document reference 6.9.A3) and a summary of its conclusions is provided below.

4.11.3 For large areas of new overhead line, groundwater is anticipated to be below the base of the relatively shallow excavations required to construct the pylon bases. Therefore, in conjunction with the relatively small footprint of such excavations, large scale dewatering (where groundwater is actively lowered below a specific pre-planned level) is not anticipated to be required and consequently changes to groundwater levels and flows are not anticipated.

4.11.4 The risk assessment also concluded that for the majority of the open cut trenches required in the underground cable sections of the Project (see Table 4.4), groundwater is anticipated to be below the base of the relatively shallow excavations required. Large scale dewatering is not anticipated to be required and consequently changes to groundwater levels and flows are not anticipated.

4.11.5 The risk assessment has also considered the potential for ground disturbance during construction to create new groundwater flow pathways, for example, where permeable materials or flow routes are introduced through trenches or permeable backfill material. The assessment concludes that due to the shallow depth of the

excavations required and the anticipated depth of the groundwater (below the base of the excavations) new connections between existing aquifer units are unlikely.

4.11.6 No records of groundwater flooding have been identified within the Order Limits, based on the LLFA documents reviewed to inform this FRA (see Sections 4.1 to 4.5 of this FRA). These documents suggest the Project would not be located in an area with an elevated risk of groundwater flooding. As described in Table 4.2, it is noted that Anglian Water's sewer networks have been impacted by groundwater ingress in a number of locations.

4.11.7 In areas where ground conditions are suitable, infiltration drainage features will be adopted to discharge surface water runoff generated from impermeable surfaces introduced by the Project back to ground. These features would be designed with suitable capacity to prevent any groundwater afflux. In areas where surface water attenuation basins are proposed, where necessary these would be lined to prevent groundwater ingress. This would avoid any impact on groundwater flood risk locally and from groundwater-surface water interaction.

Construction Phase Risk Assessment

4.11.8 Sections C, D, E and H would involve trench excavation for the underground cables for the proposed lengths shown in Table 4.4.

Table 4.4 Proposed underground cable requirements

Project Section	Cable Section	Approximate Length (km)
C	Dedham Vale National Landscape	16.8 *(approximately 5.7 km is within the National Landscape designation)*
D	Great Horkesley	3.9
E	Fairstead	0.15
H	North Tilbury	0.6
	Approximate total length	**21.4**

4.11.9 The standard means of installing underground cables is using open cut techniques by which cables would be laid in trenches with a typical minimum depth of 1.2 m. Where trenchless installation is required (for example using horizontal directional drilling), excavation would be required to create drive and receptor pits. The underground cable would typically be at a depth of 10 m below ground level, however, the depth would depend on the methodology employed and local constraints. The crossing schedules in ES Appendix 4.2: Watercourse Crossing Details (document reference 6.4.A2) show which technique would be used (open cut or trenchless) for all of the cable crossings of watercourses.

4.11.10 In addition to the cable trenches, a below ground chamber would be required, at every or every other joint bay, for communications cables. There may be the need for temporary, short-term dewatering such as removal of rainwater or surface water when undertaking soil excavation to create these chambers.

4.11.11 Where trenchless crossings would be used to install the underground cables, this would reduce the risk of groundwater emergence at the surface. The assessment for the River Stour crossing, reported in ES Appendix 9.3: Groundwater Baseline and Qualitative Groundwater Risk Assessment (document reference 6.9.A3) found that it is unlikely that the groundwater in the superficial deposits would be detrimentally affected during construction or operation (and maintenance) of the Project. The assessment also found that at both eastern and western corridors, the trenchless crossings are not anticipated to go through the Chalk bedrock, with no impact on groundwater levels or flows in this aquifer.

4.11.12 It is considered that the construction of the Project is unlikely to increase flood risk from groundwater and, given dewatering arrangements that would be in place where required, the Project is anticipated to be at low vulnerability to flooding from groundwater.

Operational Phase Risk Assessment

4.11.13 The Project is considered to be of low vulnerability to groundwater flooding during operation (and maintenance).

4.11.14 The risk of groundwater flooding along the majority of the Project is low. There are areas which are underlain by a Principal aquifer, as outlined in Section 3.5, which would have an increased presence of groundwater in the bedrock and therefore an increased risk of groundwater flooding. There are also areas of superficial deposits within the Order Limits where there is an increased risk of groundwater emergence. However, the proposed Project infrastructure is resilient to this form of flooding. Overhead lines and associated pylons are designed to be resilient to groundwater flooding as are buried cables.

4.11.15 Furthermore, the new pylons and CSE compounds would have concrete foundations. The effect of these foundations on groundwater flows would be very localised and so it can be assumed any additional impact on groundwater flooding would be negligible.

4.11.16 In accordance with commitments W08, W13, W14 and AS05 in the Outline CoCP (document reference 7.2), the drainage infrastructure associated with new areas of permanent impermeable land would not alter groundwater recharge patterns and land would be reinstated following construction.

4.11.17 As stated above in Paragraph 4.11.11, the assessment for the River Stour crossing in ES Appendix 9.3: Groundwater Baseline and Qualitative Groundwater Risk Assessment (document reference 6.9.A3) found that it is unlikely that the groundwater in the superficial deposits or the underlying bedrock would be detrimentally affected during construction or operation (and maintenance) of the Project.

Conclusion

4.11.18 Overall, the Project is at low risk of groundwater flooding, and neither construction activities nor the operation or decommissioning of the Project are anticipated to increase risk of flooding from this source.

4.12 Summary of Potential Flood Sources

4.12.1 Table 4.5 provides a summary of the relative risk from all sources of flooding for both construction and operation (and maintenance) phases.

Table 4.5 Summary of assessment of flood risk by source

Source	Degree of Hazard	Comments
Fluvial	Construction: low to medium/high locally	Construction: largely low risk with areas crossing watercourses at higher risk.
	Operation (and maintenance): low	Operation (and maintenance): no permanent changes to watercourses or their flow regimes. Compensatory storage provided for the minimal losses of floodplain storage associated with new pylons.
Tidal/coastal	Construction: low	Construction: no works within the inter-tidal zone or within tidally dominated floodplains.
	Operation (and maintenance): low	Operation (and maintenance): no permanent Project infrastructure proposed in the inter-tidal zone or tidal floodplain.
Surface water	Construction: low to medium/high locally	Construction: largely low risk, with some areas at higher risk.
	Operation (and maintenance): low	Operation (and maintenance): majority of Project infrastructure has low risk; measures would be in place to manage surface water runoff and minimise impacts on the land drainage regime.
Groundwater	Construction: low	Construction: limited groundwater interactions (assessment informed by a Groundwater Risk Assessment and Hydrogeological Risk Assessment for the River Stour crossing, ES Appendix 9.3, document reference 6.9.A3).
	Operation (and maintenance): low	Operation (and maintenance): the Project is of low vulnerability to this source of flooding. No changes to groundwater flood risk expected due to operation (and maintenance) of the Project.

4.12.2 Table 4.4 of ES Chapter 4: Project Description (document reference 6.4) outlines the LoD and describes a range of potential design scenarios. These, for example, allow for flexibility to provide the future detailed design and build Main Works Contractor(s) with sufficient scope for 'value engineering' through innovative design and / or construction techniques and to respond to unknown information such as ground conditions.

4.12.3 The described scenarios have been reviewed and the potential for any of these to have the potential to result in new or different flood risk impacts has been appraised. The FRA concludes that with the implementation of the standard mitigation measures and controls (described in Table 1.1) no new or different impacts are anticipated, including in scenarios where the Project interacts with other development schemes.

5. Planning Requirements

5.1 The Sequential Test

5.1.1 Section 2 of this FRA sets out the requirements of the Sequential and Exception Tests. This section summarises how these tests have been met.

5.1.2 The Project, being a Nationally Significant Infrastructure Project for energy transmission, is classed as essential infrastructure. Development is appropriate for essential infrastructure in Flood Zones 1 and 2. Where the development is located in Flood Zone 3, application of the Exception Test is required.

5.1.3 With regard to the ethos of the Sequential Test, which encourages the location of new development in areas at low risk of flooding, the analysis within the preceding sections has demonstrated that the majority of the Project lies within Flood Zone 1 and in zones that are at low risk of flooding from other sources. This has been achieved through an iterative process of design informed by detailed routeing and siting studies and stakeholder feedback. However, given the linear nature of the Project and its large geographical scale, avoidance of all areas of fluvial floodplain and areas at risk of surface water flooding is not practicable. Works in these areas however are largely temporary, associated with construction of the Project, and during its operation (and maintenance) are limited to a small number of pylons in the fluvial floodplain (that are of low vulnerability to inundation) and areas at risk of surface water flooding on some localised reaches of permanent routes of access.

5.2 The Exception Test

5.2.1 To satisfy planning requirements, an Exception Test is required to prove (NPPF Paragraph 178):

- The development provides wider sustainability benefits to the community, that outweigh flood risk
- The development will be safe for its lifetime, taking account of the vulnerability of its users, without increasing flood risk overall.

5.2.2 With regard to the first part of the test, the Project is a Nationally Significant Infrastructure Project that would play an important role in delivering renewable electricity efficiently, reliably and safely and will support the UK's move towards net zero.

5.2.3 The permanent Project works which lie within Flood Zone 3 are restricted to a small number of pylons for the overhead lines and a partial area of a CSE compound. These elements would be designed such that they are resilient to flooding, ensuring the Project would be safe and could continue to operate. A suite of measures would be adopted, as described in Table 1.1, to prevent flood risk increases during construction and operation (and maintenance) of the Project. Temporary worksites in floodplains would operate in accordance with the protocols detailed in a Flood Warning and Evacuation Plan (Appendix G of the Outline CoCP (document reference 7.2)), which is secured by Requirement 4 of the draft DCO (document reference 3.1),

to safeguard construction personnel and prevent flood damages to construction equipment and materials.

5.2.4 The Exception Test is therefore concluded to be satisfied, as the Project would bring significant benefits via its delivery of safe, reliable, and renewable electricity, the Project would not result in an increase in flood risk elsewhere and has been designed to be resilient to flooding throughout its lifetime.

6. Conclusions

6.1.1 This FRA has been carried out in accordance with NPS EN-1 and EN-5 (DESNZ, 2024a; 2024b). Reference has also been made to the NPPF (Ministry of Housing, Communities and Local Government, 2025) and the associated PPG for additional guidance regarding flood risk and development.

6.1.2 This FRA has been informed through consultation with key stakeholders, including the Environment Agency, Norfolk County Council, Suffolk County Council, Essex County Council and Thurrock Council (see Appendix A for a summary of the consultation with flood risk management authorities).

6.1.3 This FRA has focused on fluvial, pluvial (surface water), tidal, and groundwater flood risk. Flooding from sewers, reservoirs and other artificial sources were scoped out of the assessment in agreement with the Planning Inspectorate.

6.1.4 The predicted impacts of climate change have been included in the assessment. These include increases to peak flows, with respect to fluvial flooding, and increased rainfall intensity, with respect to surface water flooding.

6.1.5 A sequential approach has been taken in siting the Project infrastructure, however due to the linear nature of the Project and its large geographical scale, some parts of the Order Limits necessarily encroach into areas with a medium or high likelihood of flooding. This triggers the NPPF Exception Test, and the evidence of satisfying the requirements of this has been presented in this FRA.

6.1.6 National Grid has made a number of commitments around flood risk management measures and land drainage. These are documented in the Outline CoCP (document reference 7.2).

6.1.7 Flood risk to and arising from the Project during construction has been assessed and the following points have been concluded:

- The majority of the Project is at low risk of fluvial flooding. Locally higher risks, particularly to temporary works within main river floodplains, would be reduced through embedded and standard mitigation measures which include managing these worksites in accordance with a Flood Warning and Evacuation Plan (Appendix G of the Outline CoCP (document reference 7.2)). These measures would protect construction workers, limit damages to construction equipment and materials and also limit any impacts of the Project on fluvial flood risk
- As there would be no works within the inter-tidal zone nor in any tidally dominated floodplains, the Project would not increase tidal/coastal flood risk during its construction, operation (and maintenance) or decommissioning.
- With respect to surface water flooding, during construction and operation (and maintenance), the Project is considered to be largely at low risk, with some areas at higher risk. Measures would be in place to manage surface water runoff and minimise impacts on the land drainage regime across the Project, including allowances for climate change resilience within the designs of operational SuDS
- During construction the Project is considered to be at low risk of flooding from groundwater and is not anticipated to increase flood risk from this source.

6.1.8 During its operation (and maintenance) phase, the Project is considered to be at low risk of flooding from all sources assessed in this FRA due to the mitigation measures built into its design. The Project is not anticipated to increase flood risk elsewhere during its operation (and maintenance) as any losses of floodplain storage would be compensated for, and additional surface water runoff would be managed in line with national and local requirements. Further details on the proposals for compensatory storage and surface water drainage design have been included in this FRA.

6.1.9 The works required and associated flood risks during eventual decommissioning would be similar, subject to any climate change impacts. More stringent mitigation could be implemented to address the risks associated with such future works, to be identified through an appropriate assessment to be undertaken at the time. It is not anticipated that there would be any insurmountable flood risk obstacles to decommissioning that could not be overcome.

6.1.10 In conclusion, this FRA demonstrates that the requirements of EN-1, EN-5 and the NPPF and its associated PPG with respect to flood risk have been met. The flood risk management measures identified are secured through Requirement 4 of the draft DCO (document reference 3.1). It is also concluded that there would be no new or different impacts associated with the LoD or design scenarios set out in ES Chapter 4: Project Description (document reference 6.4), including in scenarios where the Project interacts with other development schemes.

Abbreviations

Abbreviation	Full Reference
AEP	Annual exceedance probability
AIS	Air Insulated Switchgear
AoCD	Area of Critical Drainage
AONB	Area of Outstanding Natural Beauty
BNG	Biodiversity Net Gain
CoCP	Code of Construction Practice
CSE	Cable Sealing End
DCO	Development Consent Order
DESNZ	Department for Energy Security and Net Zero
EACN	East Anglia Connection Node
ES	Environmental Statement
FRA	Flood Risk Assessment
FWRA	Foundation Works Risk Assessment
GIS	Gas Insulated Switchgear
IDB	Internal Drainage Board
kV	Kilovolt
LFRMS	Local Flood Risk Management Strategy
LiDAR	Light Detection and Ranging
LLFA	Lead Local Flood Authority
LoD	Limits of Deviation
LPA	Local Planning Authority
NaFRA	National Flood Risk Assessment
National Grid	National Grid Electricity Transmission
NETS	National Electricity Transmission System
NPPF	National Planning Policy Framework
NPS	National Policy Statement
PEIR	Preliminary Environmental Information Report
PFRA	Preliminary Flood Risk Assessment

Abbreviation	Full Reference
PPG	Planning Practice Guidance
The Project	Norwich to Tilbury
SFRA	Strategic Flood Risk Assessment
SQSS	Security and Quality of Supply Standard
SuDS	Sustainable Drainage Systems
UK	United Kingdom
WFD	Water Framework Directive

Glossary

Term	Description
Annual Exceedance Probability	The probability that a given event, such as a flood, will be equalled or exceeded in a single year.
Board Drains	Drainage systems or channels installed along roads and infrastructure to manage surface water and prevent water accumulation.
Code of Construction Practice	A code of construction practice sets out the standards and procedures to which a developer (and its contractors) must adhere in order to manage the potential effects of construction works.
Exception Test	A planning tool used to assess whether development in areas at risk of flooding can proceed, despite the risks involved. It is applied when a proposed development does not naturally meet the requirements set out in the Sequential Test, but there may be overriding reasons to justify it.
Flood Risk Assessment	A Flood Risk Assessment is an assessment of the risk of flooding, particularly in relation to residential, commercial and industrial land use. In England and Wales, the Environment Agency requires a Flood Risk Assessment to be submitted alongside planning applications in areas that are known to be at risk of flooding.
Flood Storage Area	A designated area of land that is intentionally used to temporarily hold or store excess floodwater during periods of heavy rainfall or high river flows.
Fluvial	The term ‘fluvial’ relates to processes, features or environments associated with rivers and streams.
Lead Local Flood Authority	A specific organisation, typically a county, council or unitary authority, designated under the Flood and Water Management Act 2010 to manage local flood risks.
Main Rivers	A watercourse that is formally designated as such by the Environment Agency due to its significance for managing flood risk.
Main Works Contractor(s)	Contractor(s) appointed by National Grid to construct the Project
National Planning Policy Framework	The National Planning Policy Framework (NPPF) is a key planning policy document in England that provides overarching guidance for Local Planning Authorities, developers, and decision-makers. It sets out the government’s planning policies and how they should be applied to achieve sustainable development. The NPPF is designed to ensure that planning decisions contribute to economic growth, environmental protection, and social progress while addressing community needs and national priorities.
Order Limits	The maximum extent of land within which the authorised development may take place.

Term	Description
Ordinary Watercourses	An ordinary watercourse is any watercourse that is not classified as a main river by the Environment Agency. Ordinary watercourses typically include smaller streams, rivers, ditches, drains, culverts and ponds and are typically managed at the local level by Lead Local Flood Authorities or Internal Drainage Boards.
Pluvial	Pluvial refers to processes, events or conditions related to rainfall, typically caused by heavy rainfall that overwhelms drainage systems or accumulates on the ground.
Primary Access Route	These are the roads on the local road network that would be used by construction vehicles between the strategic road network and the access points within the Order Limits.
Sequential Test	The Sequential Tool is a planning tool outlined in the NPPF used to ensure that new developments are located in areas with the lowest possible flood risk, prioritising sustainable and safe development.
Surface Water Management Plan	A document or strategy designed to manage surface water runoff and drainage during construction activities.
Sustainable Drainage Systems	Sustainable Drainage Systems (SuDS) are drainage solutions designed to manage surface water in a way that mimics natural processes, promoting sustainability by reducing flood risk, improving water quality and enhancing the environment.
Water Framework Directive	The Water Framework Directive (2000/60/EC) commits European Union member states to achieve good qualitative and quantitative status of all water bodies. It is transposed into law in England and Wales via The Water Environment (Water Framework Directive) (England and Wales) 2017 Regulations, which were retained via the European Union (Withdrawal) Act 2018.

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Appendix A. Summary of Consultation with Flood Risk Management Authorities

Appendix A
Summary of Consultation with Flood Risk Management Authorities

Table A.1 Consultation with flood risk management authorities

Comment	Response
Environment Agency GG32 in the CoCP section which states: 'Run-off across the site will be controlled through a variety of methods including header drains, buffer zones around watercourses, on-site ditches, silt traps and bunding. There will be no intentional discharge of site runoff to ditches, watercourses, drains or sewers without appropriate treatment and agreement of the appropriate authority (except in the case of an emergency)' is welcomed, and we look forward to seeing site specific details of these measures	Site specific details will be developed by the Main Works Contractor and documented in a Surface Water Management Plan.
Environment Agency In relation to SuDS, we have provided our standard advice below for your reference: 1. Infiltration sustainable drainage systems (SuDS) such as soakaways, unsealed porous pavement systems or infiltration basins shall only be used where it can be demonstrated that they will not pose a risk to the water environment. 2. Infiltration SuDS have the potential to provide a pathway for pollutants and must not be constructed in contaminated ground. They would only be acceptable if a phased site investigation showed the presence of no significant contamination. 3. Only clean water from roofs can be directly discharged to any soakaway or watercourse. Systems for the discharge of surface water from associated hard-standing, roads and impermeable vehicle parking areas shall incorporate appropriate pollution prevention measures and a suitable number of SuDS treatment train components appropriate to the environmental sensitivity of the receiving waters.	The standard advice provided will be adhered to in detailing the operational surface water drainage strategy and Surface Water Management Plan to be developed by the Main Works Contractor(s).

Comment	Response
4. The maximum acceptable depth for infiltration SuDS is 2.0 m below ground level, with a minimum of 1.2 m clearance between the base of infiltration SuDS and peak seasonal groundwater levels. 5. Deep bore and other deep soakaway systems are not appropriate in areas where groundwater constitutes a significant resource (that is where aquifer yield may support or already supports abstraction). 6. SuDS should be constructed in line with good practice and guidance documents which include the SuDS Manual (CIRIA C753, 2015) and the Susdrain website. For further information on our requirements with regard to SuDS see our Groundwater protection position statements (2017), in particular Position Statements G1 and G9 to G13	
Essex County Council I note that climate change has been proposed with Essex as 40% for drainage serving permanent assets however we would wish to see Climate change allowances for peak rainfall (data.gov.uk) utilised, the usual expectation is 45%.	As detailed in Paragraph 2.3.2 of the main body of the Flood Risk Assessment (FRA), an allowance of 45% would be adopted for operational drainage designs serving any permanent assets in Essex.
Essex County Council 'In the 1 in 30 and 1 in 100 rainfall events, the design shall ensure that excess runoff from drainage systems (exceedance flows) do not impact third party land'. We would like this point to be elaborated to incorporate the need to avoid any risk to people and property, all flows should be contained on site.	Exceedance flows would be considered in further detail and would be documented in the operational surface water drainage strategy and Surface Water Management Plan to be developed by the appointed Main Works Contractor(s), noting the requirement to avoid risk to people and property.
Essex County Council Confirmation of what is determined temporary works i.e. 2 years, 5 years etc.	It is confirmed that temporary works may be in place for up to five years.
Suffolk County Council Design standards, Temporary works – Define temporary 1y, 2y 5yr etc, think we need to definition say up to 5 years	It is confirmed that temporary works may be in place for up to five years.
Suffolk County Council Hydraulic design – min culvert diameter shall be 600 mm, unless there is a practical reason	This minimum would be adopted unless there is a practical reason for smaller diameter, and

Comment	Response
for smaller diameter and twin culverts will not be permitted, as they are prone to blockages.	twin culverts would not be included within the design.
Suffolk County Council Climate change – This shall be in line with the Climate change allowances for peak rainfall (data.gov.uk) based on the Management Catchment.	As noted in Paragraph 2.1.1 of the main body of the FRA this is the guidance that has been followed with regard to climate change allowances.
Norfolk County Council Norfolk LLFA wishes to draw your attention to the three different LLFAs approaches to temporary ordinary watercourse consents for culverts. The definition in Norfolk is not based on a time period, but rather each location is considered based on consideration of risk. The water management in Norfolk lead on issuing these consents and will continue to apply the same consistent approach in Norfolk as we currently do.	This advice is noted.

Appendix B. Compensatory Storage Calculations

Appendix B
Compensatory Storage Calculations

B.1.1 This appendix summarises the review that has been undertaken to identify pylons located within the fluvial floodplains of watercourses and summarises the compensatory storage calculations. Further context for this is included in Section 4.8 of the main body of the Flood Risk Assessment (FRA).

B.1.2 The Environment Agency Risk of Flooding from Rivers and Sea – Climate Change 1 mapping has been used as it represents the latest available information on risk from this source accounting for predicted impacts of climate change on future risk. The review has identified pylons that would be located within the 'high' risk (greater than or equal to 3.3% AEP (1 in 30) annual chance of flooding) and 'medium' risk (chance of flooding between 1% and 3.3% AEP) flood extents in the mapping.

B.1.3 All of the pylons located in these flood extents are the L6 type, the tallest type of pylon used in the United Kingdom, consisting of a steel lattice transmission pylon. The steel lattice has four feet that are each embedded into a foundational muff, as illustrated in Image B.1.

B.1.4 The foundational muffs each measure 1 m^2, with each pylon therefore having a total footprint at ground level of 4 m^2.

Image B.1 Photographs of L6 pylons showing steel lattice and foundation muffs

B.1.5 The volume of floodplain storage loss is a function of the above ground footprint of the pylons and the floodwater depth whereby:

*Storage Loss (m^3) = Pylon Footprint (m^2) * Flood Depth (m)*

B.1.6 The calculation of storage losses has been based on a ground level pylon footprint of 4 m^2. Above the muff storage losses would be negligible due to the lattice design.

B.1.7 The depth of floodwaters that would be experienced in the flood events (AEPs of between 1% and 3.3%) varies according to pylon location. The depths have been calculated based on the topography of the pylon location (defined using Light Detection and Ranging (LiDAR)) and the mapped flood extents, informed by the depths in the Risk of Flooding from Rivers and Sea – Climate Change 1 dataset.

B.1.8 At the 11 pylon locations assessed floodwater depths range from a minimum of 0.2 m to a maximum of 1.3 m.

B.1.9 For this assessment a conservative flood depth of 1.5 m has been adopted at all pylon locations. This provides for a simple yet robust assessment, which is conservative in its assumptions to allow for the uncertainty in the predicted effects of future climate change of fluvial flood peaks and flooding frequency. This could be further refined at later stages of design.

B.1.10 Each pylon was calculated to result in 6 m^3 loss of floodplain storage. Table B.1 below summarises the pylons identified and the calculated floodplain storage loss for the Project Sections. Where a pylon is located only partially in the floodplain, a conservative approach has been applied whereby the full 6 m^3 loss of floodplain storage has been used.

Table B.1 Summary of floodplain storage losses

Project Section	Pylons	Nearest Watercourse	Floodplain Storage Loss
Section A	RG087 RG088	River Waveney River Waveney	12 m^3
Section B	RG118 RG164 RG165	River Dove River Gipping River Gipping	18 m^3
Section E	TB79	River Blackwater	6 m^3
Section F	TB140 TB162	River Chelmer Roxwell Brook	12 m^3
Section G	TB190 TB202 TB232	River Wid River Wid Mar Dyke	18 m^3

B.1.11 All other above ground infrastructure such as pylons, substations, CSE compounds are within Flood Zone 1 (including the Wenham Grove CSE compound which in accordance with commitment W19 in the Outline CoCP (document reference 7.2), would be placed within the defined LoD to avoid Flood Zone 3), outside of the flood extents shown in the Risk of Flooding from Rivers and Sea mapping (including climate change), so would not contribute to losses of floodplain storage.

B.1.12 There are a total of eight watercourses' floodplains that would experience storage losses due to the construction of pylons. However, due to their design, above ground footprints are very small, with consequent very minor losses of storage in the context of the storage available within each of these floodplain cells.

B.1.13 As described in Section 4.8 of the main body of the FRA, the compensation areas would be hydraulically linked to the area of loss, such that storage volume is replaced within the floodplain cell in which it is lost. The compensation areas have been proposed outside of the 'medium' risk flood extents in the Environment Agency Risk of Flooding from Rivers and Sea – Climate Change 1 mapping.

Appendix C. Proposals for Surface Water Management

Appendix C
Proposals for Surface Water Management

C.1 Overview

C.1.1 This appendix summarises the proposals for surface water management, addressing the construction and operation (and maintenance) phases of the Project. It is noted that this appendix is reflective of the current stage of the Project's design, with further detail to be developed at later design stages.

C.1.2 As per measure GG22 within the Outline Code of Construction Practice (CoCP) (document reference 7.2), the appointed Main Works Contractor(s) will prepare a Surface Water Management Plan. The Surface Water Management Plan will demonstrate how runoff across the site will be controlled to prevent any off-site increases in flood risk, including consideration of exceedance flow routes. A variety of methods including header drains, buffer zones around watercourses, on-site ditches, silt traps and bunding, are likely to be adopted.

C.1.3 In line with measure W08 of the CoCP, measures to manage surface water runoff from operational above ground infrastructure and to maintain existing overland flow routes will be developed liaising with the Lead Local Flood Authorities (LLFAs). Such measures will be managed in accordance with the requirements and standards of the relevant LLFA and maintained for the Project's lifetime. Surface water runoff will be captured using sustainable drainage techniques that will be designed to allow for climate change resilience and with consideration of exceedance flow routes.

C.1.4 Climate change allowances for drainage are summarised in Section 2.3 of the main body of the Flood Risk Assessment (FRA).

C.1.5 Drainage features are shown on ES Figure 4.1: Proposed Project Design (document reference 6.4.F1) and ES Figure 4.2: Proposed Project Design – Permanent Features (document reference 6.4.F2). Proposed outfall locations for the drainage are indicated in these figures.

C.2 Overhead Line

C.2.1 Areas of the overhead line component of the Project which are assessed to have the potential to impact surface water runoff include the temporary stone haul roads, pylon working areas and temporary construction compounds.

C.2.2 Several parts of the development, such as the pylon foundations, overhead cables and temporary trackway will not cause a significant increase in impermeable area and therefore will have a negligible impact on surface water runoff. Formal surface water management for these parts of the development are not proposed.

C.2.3 Surface water management mitigation is proposed to address the following identified surface water management risks:

- Truncation of natural flow paths – installation of watercourse crossings
- Increase in runoff volume – installation of attenuation storage
- Increase in runoff rate – installation of flow restriction devices

- Pollution – installation of pollution prevention Sustainable Drainage Systems (SuDS)
- Cross catchment transfer – strict adherence to the drainage hierarchy.

Watercourse Crossings

C.2.4 It is proposed that where Project infrastructure has the potential to interrupt or truncate watercourses, temporary watercourse crossings will be constructed. The watercourse crossings will range in type depending on factors such as the depth/width of the watercourse, its Water Framework Directive (WFD) status and navigability.

C.2.5 Crossings are all temporary in nature.

Construction Phase SuDS

C.2.6 The overhead line component of the Project would result in an increase in impermeable area associated with the installation of stone haul roads, temporary construction compounds and working areas. This increase in impermeable land cover would result in an increase in runoff volume and runoff rate unless properly managed using SuDS.

C.2.7 Therefore, attenuation basins are proposed at the low point of each drainage catchment, and are designed with the following parameters, in line with the national and local drainage guidance:

- Storage capacity to accommodate the 100 year plus 25% climate change storm
- Restricted runoff rate to 1.4 litres/second/hectare (or 1 l/s, whichever is greater)
- Indicative depth of 1 m (subject to confirmation of outfall levels)
- Side slopes at a maximum gradient of 1:1
- Freeboard minimum of 15% of depth.

C.2.8 The outfall from each attenuation basin will be determined in accordance with the drainage hierarchy described in Section 2.2 of the main body of this report. The Project will not have the potential to reuse all water on site.

C.2.9 If infiltration proves viable, this outfall option would be progressed ahead of the formation of an outfall to a surface water watercourse or body. Where infiltration is not viable, an outfall to a watercourse would be installed, with a restricted flow rate and recessed headwall.

C.2.10 Using LiDAR data, the proposed impermeable infrastructure has been segmented into catchments in accordance with the local topography to ensure there is no significant cross catchment transfer.

C.2.11 To manage the potential for pollution and sedimentation, it is proposed that the attenuation basins would consist of three consecutively staged basins. The basins would be vegetated with native grass seed mix and include stone/earth weirs between each stage to allow for settlement and treatment prior to discharge. All discharges of surface water will be subject to consent from the relevant land drainage authority.

C.2.12 Surface water conveyance to the attenuation basins could be achieved via overland flows in narrow track side swales or traditional piped drainage. It would be preferable to opt for narrow track side swales as this would offer further treatment benefits, additional storage capacity and easier maintenance access.

C.2.13 It should be noted that the storage volumes and SuDS sizes (as shown on ES Figure 4.1: Proposed Project Design (document reference 6.4.F1)) have been based upon the full width of the proposed haul road swathe, which is likely to be wider than the final constructed haul road. This provides a conservative assessment and the attenuated storage volume may be able to be refined as the Project progresses.

Permanent Works

C.2.14 There would be no physical works / newly constructed tracks associated with the access routes to the overhead lines during operation (and maintenance) of the Project. These routes are proposed rights of access only to allow for any maintenance or refurbishment required.

Cables, Cable Sealing End (CSE) Compounds and Substations

C.2.15 The philosophy of the proposed surface water drainage strategy is to replicate as closely as possible the natural runoff characteristics of the existing site. This will be achieved by discharging the intercepted flows from the permanent features (substations and CSE compounds) and non-permanent features (temporary construction compounds, cable swathe and haul roads used during the construction phase) to infiltration or attenuation ponds, prior to infiltrating into the ground and/or discharging to the closest watercourse at a controlled discharge rate.

C.2.16 In line with local and national guidelines, discharge rates shall be based on the estimated 'greenfield' runoff rate (Qbar[6] or 1 in 1 year event) for the undeveloped sites. In line with guidance from the LLFAs, the flow restriction from the developed site shall be based on the estimated 'greenfield' runoff rate for the undeveloped site, limited to a maximum rate of 2 l/s/ha.

C.2.17 The general strategy has been to give consideration to infiltration and/or identify the nearest watercourse to each area of temporary and permanent development and assumes surface water runoff is disposed of via controlled discharges using Hydrobrake manholes or orifice controls.

C.2.18 Calculations have been undertaken to determine the initial attenuation/infiltration storage volumes that would be required to limit runoff from work sites to the greenfield runoff rates using the MicroDrainage Source Control Module. A freeboard value of 300 mm has been adopted for 1 m deep ponds.

C.2.19 The drainage calculations were performed using the following input data:

- The proposed catchment areas extracted from the Project plans and assigned the appropriate design criteria (for temporary or permanent design)
- The discharge rates associated to each catchment area according to their individual impermeable areas following the criteria for the post-development discharge rate.

[6] Mean Annual Maximum flow rate

C.2.20 Two types of ponds are considered – for the temporary construction phase and for the permanent operational phase:

- Permanent ponds only receive clean water from the permanent elements (substations and access roads), and they do not have a designated volume for treatment
- Temporary ponds receive water from temporary construction compounds and haul roads and have a designated treatment volume. For each pond there will be area included for settlement of silts.

C.2.21 An assessment of the groundwater conditions and local topography has been carried out to inform the proposed pond depths. In low-lying areas where the land is flat and there is proximity to a watercourse, currently available topographic levels may not allow for gravity-fed drainage to the outfall location. In these cases, the pond depth has been limited to 0.5 m, which also reduces the risk of groundwater ingress. In other areas, a general pond depth of 1 m is proposed.

C.2.22 In areas where the water table is high, surface water attenuation ponds would be lined to prevent groundwater ingress and mitigate the potential for a joint probability event.

C.2.23 Attenuation ponds will be designed with 1:3 slopes, vegetated, non-permeable geo-textile lined with an inlet forebay. When the proposed attenuation ponds are used for temporary sediment control during construction, a settling pond or vegetated forebay within the main pond would be included to trap sediments and prevent clogging of the main infiltration pond. Sediment traps would be approximately 20% of the pool volume. Where a pond with a forebay element is retained for the permanent phase, the forebay will be removed at the end of the construction phase.

C.2.24 All outfalls to proposed detention basins are to consist of headwalls with a flap valve and all outlets from proposed detention basins are headwalls with sluice gate. Scour protection should be provided for permanent and temporary outfalls. Outfalls should be angled at 45° to the water flow; small pipes (less than 300 mm diameter) can be at a maximum of 90° to the flow.

C.2.25 In some locations subbase storage will be utilised as part of attenuating the flows. This effectively creates a permeable pavement. In these locations these compounds are to have a subbase formed of a permeable Type 3 material, with 30% voids for water storage.

Temporary Works

C.2.26 At this stage, temporary construction compounds have been assumed to have 60-75% of their gross site area as impervious, based on the typical compound layout. More detail on the management of runoff from temporary construction compounds will be provided in the Surface Water Management Plan.

C.2.27 It is proposed that a “dirty” channel drain along the edges of the haul road will collect runoff from the haul road and avoid any possible pollutants draining into the ground during construction. This channel drain will discharge into the proposed attenuation ponds which include a treatment element to clean anticipated pollutants from the road. In order to locate the proposed attenuation ponds to drain the haul roads, the haul road has been subdivided into sections based on the existing longitudinal ground profile and anticipated low points along the route.

Permanent Works – Substations and CSE Compounds

C.2.28 Project elements are made up of a combination of the components. Therefore, Project element percentage impervious values have been calculated on the percentage area occupied by each component.

C.2.29 The drainage in the substations and CSE compounds will be designed to restrict runoff rates to greenfield rates and convey runoff to attenuation ponds. The finished platform levels are proposed to be stone surfacing, consisting of a minimum 300 mm deep unbound free draining subbase and a minimum 75 mm top layer of stone chippings, allowing for storage of stormwater during a storm event.

C.2.30 Volumes of attenuation storage have been calculated based on partially permeable sites (50% of the footprint permeable). Due to the lack of permeability of the existing ground where the platforms of the substation and CSE compounds sit, filter drains will be provided along the platform perimeter to collect the runoff attenuated in the platform. Filter drains will discharge into the closest watercourse via a reduced discharge rate.

C.2.31 As described in Section 4.10 of the main body of this report, the Tilbury North Substation and the eastern of the two CSE compounds for undergrounding of the ZB overhead line both clash with an overland surface water flow route. It is proposed to install box culverts sized to convey flows generated during a 1 in 1,000 (0.1% AEP) storm event. The existing overland surface water flow routes are shown on ES Figure 12.2: Flood Risk Areas (document reference 6.12.F2).

Permanent Works – Access Roads

C.2.32 Permanent formed access routes to the new EACN Substation, new Tilbury North Substation and CSE compounds would be up to 4 m wide (increasing locally for passing places) and would be either compacted stone or potentially a bound asphalt or concrete pavement. For the drainage calculations, the permanent access roads and bellmouths have been assumed to be 100% impermeable to allow for the most conservative drainage design. Runoff from the access roads and bellmouths is proposed to be collected via infiltration drains/ditches along the edge and will be attenuated via the attenuation/infiltration ponds with a controlled discharge to the nearest existing watercourse or drainage ditch.

C.2.33 There would be no physical works/newly constructed tracks associated with the access routes to the underground cable alignment, they are proposed rights of access only to allow for any maintenance or refurbishment required.

Foul Water

C.2.34 Temporary construction compounds will include portacabins for the staff as part of the on-site welfare facilities. It is proposed that there will be an independently managed foul drainage system within the temporary construction compounds to contain waste produced from welfare and toilet facilities. It is expected that the foul water will be contained on site and regularly pumped, emptied, and transported off site. Therefore, there is no requirement for any formal below ground foul drainage on site or any off-site connection.

C.2.35 There are no welfare facilities proposed for substation extensions or CSE compounds, so no permanent foul water design is required in those instances.

C.2.36 Permanent foul sewer drainage is proposed for the operational use of the new EACN Substation and the Tilbury North Substation. The proposed foul sewer flows from the Project will be infrequent and of low volume.

Appendix D. Figures

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PROJECT: Norwich to Tilbury

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Figure 1- Flood Risk Areas Overview

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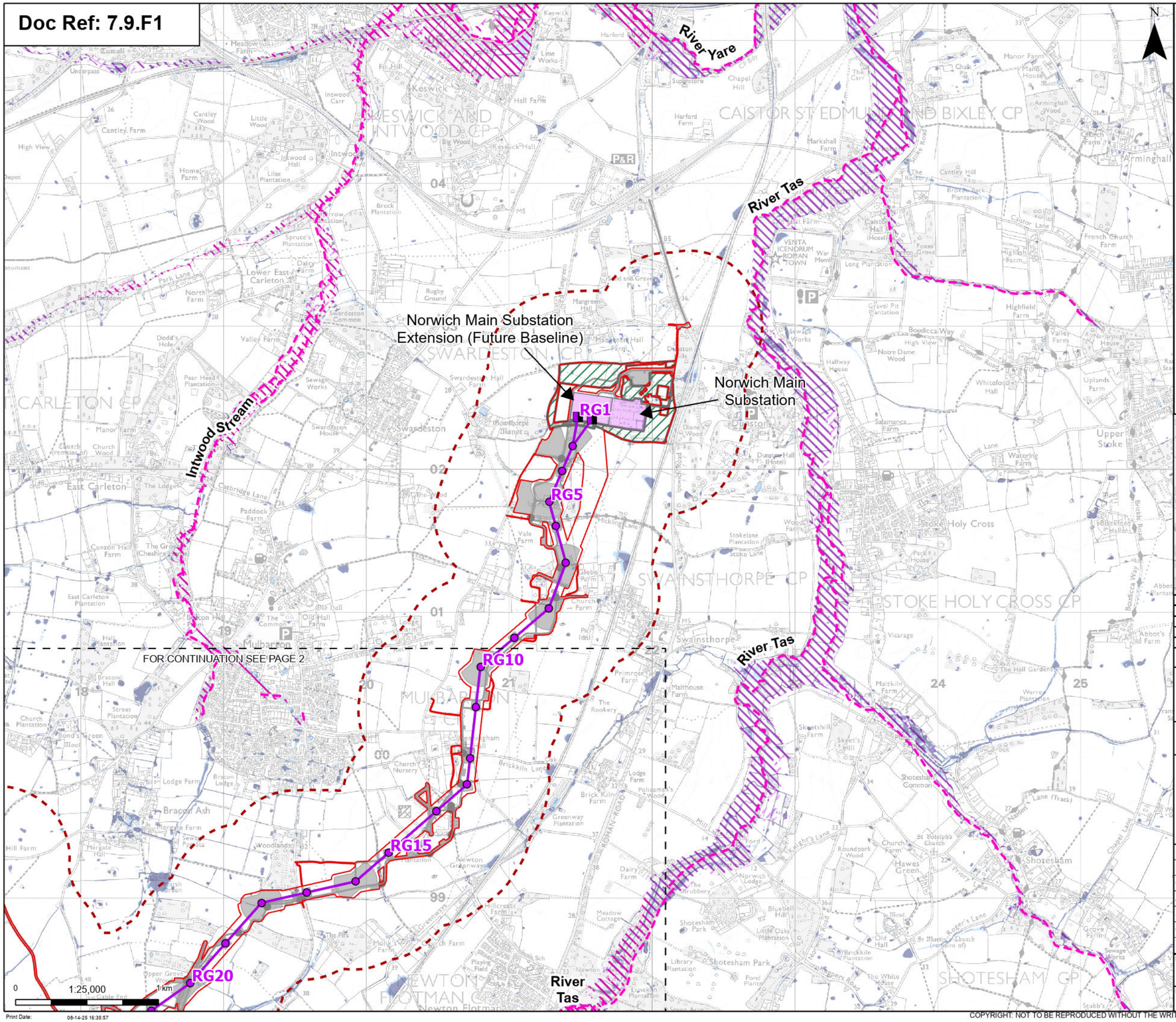

Order limits
Sheet index cutline

Proposed project design details

- Proposed full line tension gantry
- Proposed standard lattice pylon location
- Proposed overhead line alignment
- Norwich Main Substation
- Norwich Main Substation Extension (future baseline)
- Environmental area
- Other temporary and permanent construction and operational works

Discipline specific constraints

- 500 m Study Area
- Flood defences

Risk of flooding from surface water
- High
- Medium

Risk of flooding from rivers and sea
- High
- Medium

Risk of flooding from rivers and sea - climate change 1
- High
- Medium

Note: The proposed overhead line alignment and proposed underground cable alignment together comprise the alignment. For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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Figure 1- Flood Risk Areas
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River Tas

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Order limits
Sheet index cutline

Proposed project design details

Proposed standard lattice pylon location
Proposed overhead line alignment
Environmental mitigation
Other temporary and permanent construction and operational works

Discipline specific constraints

500 m Study Area
Flood defences

Risk of flooding from surface water

High
Medium

Risk of flooding from rivers and sea

High
Medium

Risk of flooding from rivers and sea - climate change 1

High
Medium

Note: The proposed overhead line alignment and proposed underground cable alignment together comprise the alignment. For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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Figure 1- Flood Risk Areas
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River Tas

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TACOLNESTON CP

FORNCETT CP

BUNWELL CP

CARLETON RODE CP

ASLACTON CP

TIVENHAM CP

GREAT MOULTON CP

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Order limits

Sheet index cutline

Proposed project design details

Proposed standard lattice pylon location

Proposed overhead line alignment

Other temporary and permanent construction and operational works

Discipline specific constraints

500 m Study Area

Flood defences

Risk of flooding from surface water

High

Medium

Risk of flooding from rivers and sea

High

Medium

Risk of flooding from rivers and sea - climate change 1

High

Medium

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Figure 1- Flood Risk Areas
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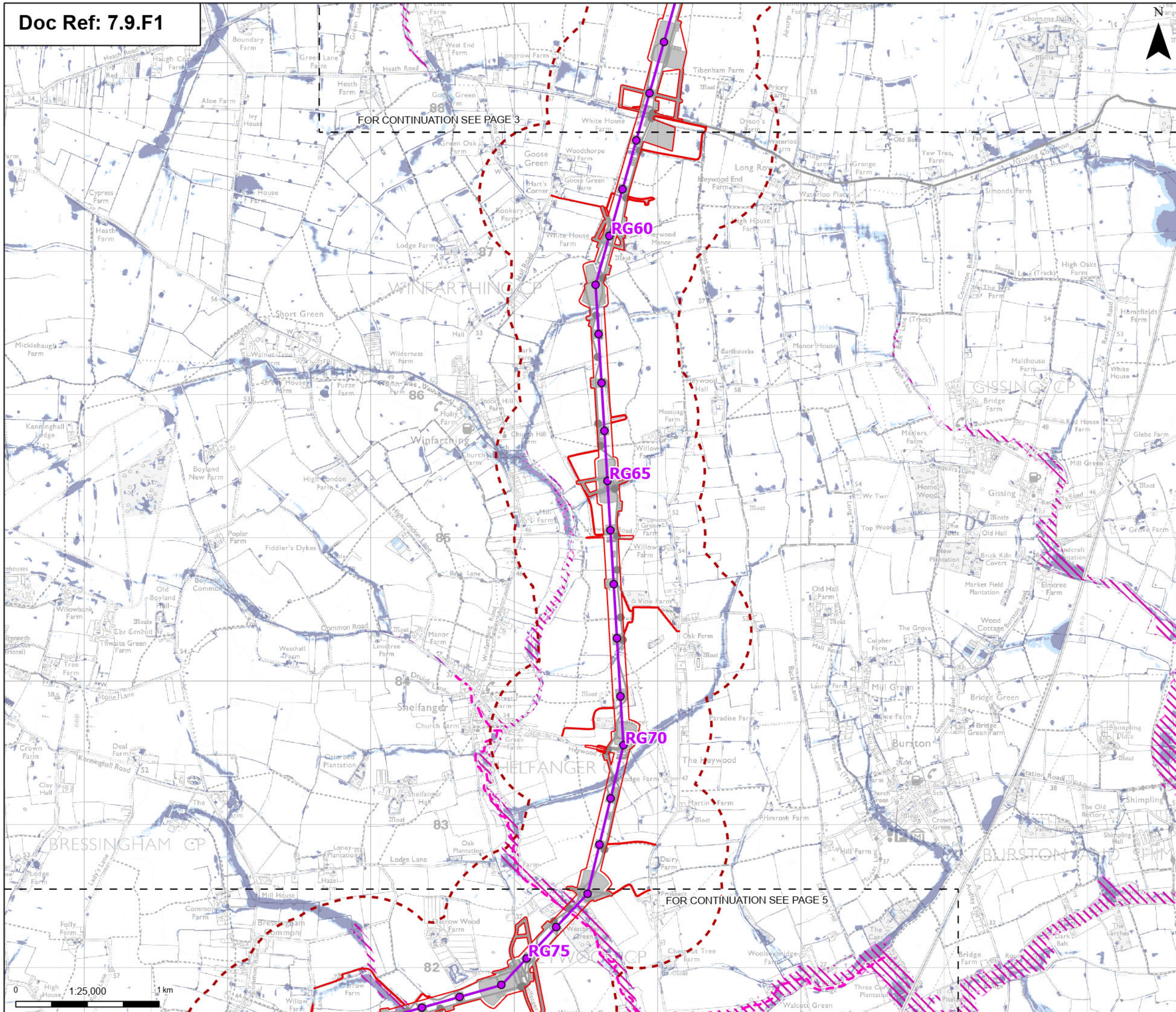

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Proposed project design details

Proposed standard lattice pylon location

Proposed overhead line alignment

Other temporary and permanent construction and operational works

Discipline specific constraints

500 m Study Area

Flood defences

Risk of flooding from surface water

High

Medium

Risk of flooding from rivers and sea

High

Medium

Risk of flooding from rivers and sea - climate change 1

High

Medium

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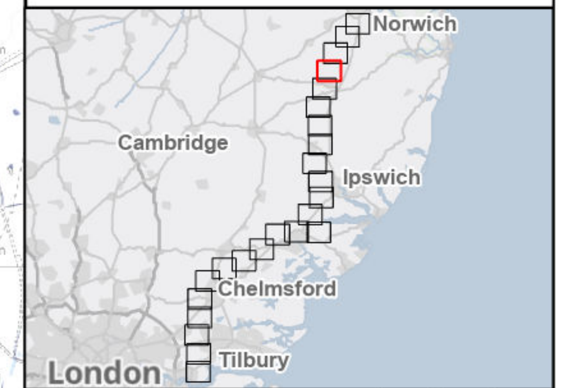

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Figure 1- Flood Risk Areas
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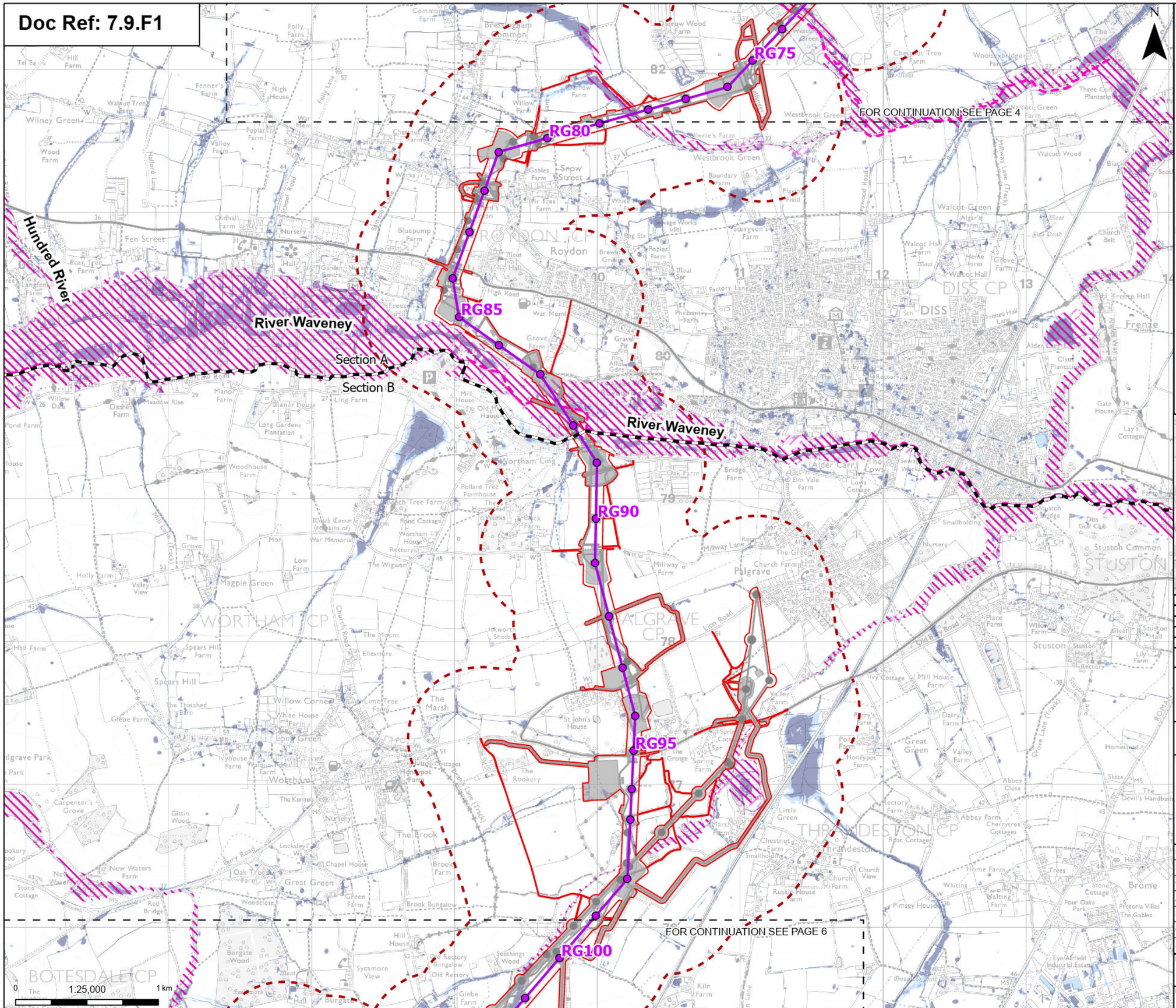

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Project section line

Proposed project design details

Proposed standard lattice pylon location
Proposed overhead line alignment
Environmental mitigation
Other temporary and permanent construction and operational works

Discipline specific constraints

500 m Study Area
Flood defences

Risk of flooding from surface water

High
Medium

Risk of flooding from rivers and sea

High
Medium

Risk of flooding from rivers and sea - climate change 1

High
Medium

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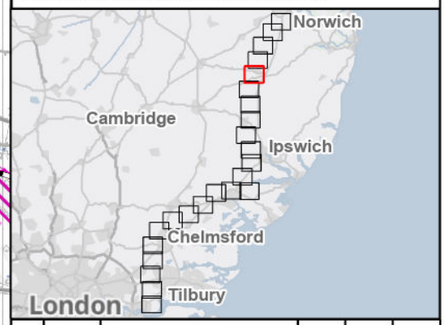

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Order limits
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Proposed project design details

Proposed standard lattice pylon location
Proposed overhead line alignment
Environmental mitigation
Other temporary and permanent construction and operational works

Discipline specific constraints

500 m Study Area

Risk of flooding from surface water

High
Medium

Risk of flooding from rivers and sea

High
Medium

Risk of flooding from rivers and sea - climate change 1

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Medium

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Figure 1- Flood Risk Areas
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River Dove

WICKHAM SKEITH CP

THWAITE CP

COTTON CP

MENDLESHAM CP

MID SUFFOLK DISTRICT

GIPPING CP

OLD NEWTON WITH DAGWORTH CP

Order limits

Sheet index cutline

Proposed project design details

Proposed standard lattice pylon location

Proposed overhead line alignment

Other temporary and permanent construction and operational works

Discipline specific constraints

500 m Study Area

Flood defences

Risk of flooding from surface water

High

Medium

Risk of flooding from rivers and sea

High

Medium

Risk of flooding from rivers and sea - climate change 1

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Medium

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RG150

RG155

RG160

RG165

River Gipping

Rattlesden River

0 1:25,000 1 km

Print Date: 08-14-25 16:36:29

Order limits

Sheet index cutline

Proposed project design details

Proposed standard lattice pylon location

Proposed overhead line alignment

Environmental mitigation

Other temporary and permanent construction and operational works

Discipline specific constraints

500 m Study Area

Flood defences

Flood storage area

Risk of flooding from surface water

High

Medium

Risk of flooding from rivers and sea

High

Medium

Risk of flooding from rivers and sea - climate change 1

High

Medium

Note: The proposed overhead line alignment and proposed underground cable alignment together comprise the alignment. For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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A	Aug 2025	FOR DCO APPLICATION	KF	AF	KB

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PROJECT: Norwich to Tilbury

Planning Inspectorate App Number: EN020027
Regulation 5(2)(a)

Title:

Figure 1- Flood Risk Areas
Page 8 of 24

Designed	L. Driscoll	Date	21 Aug 25
Drawn	K. Fischer	Date	21 Aug 25
Checked	A. Fell	Date	21 Aug 25
Approved	K. Burrows	Date	21 Aug 25
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Suitability Code:	A2	Project Number:	10059280

Suitability Description:
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FOR CONTINUATION SEE PAGE 8

FOR CONTINUATION SEE PAGE 10

RG170
RG175
RG180
RG185
RG190

River Gipping
River Gipping
Old River
The Channel

N

0 1:25,000 1 km

Print Date: 08-14-25 16:36:34

- Order limits
- Sheet index cutline
- Project section line

Proposed project design details

- Proposed standard lattice pylon location
- Proposed overhead line alignment
- Environmental mitigation
- Other temporary and permanent construction and operational works

Discipline specific constraints

- 500 m Study Area
- Flood defences

Risk of flooding from surface water
- High
- Medium

Risk of flooding from rivers and sea
- High
- Medium

Risk of flooding from rivers and sea - climate change 1
- High
- Medium

Note: The proposed overhead line alignment and proposed underground cable alignment together comprise the alignment. For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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PROJECT: Norwich to Tilbury

Planning Inspectorate App Number: EN020027
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Title:

Figure 1- Flood Risk Areas
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Designed	L. Driscoll	Date	21 Aug 25
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Suitability Code:	A2	Project Number:	10059280

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RG190
RG195
RG200
RG205
RG210
JC1
JC5
JC10
JC15

The Channel
River Gipping
River Gipping
River Gipping
Belstead Brook

Section B
Section C

Bramford Substation

Proposed substation extension

FOR CONTINUATION SEE PAGE 9
FOR CONTINUATION SEE PAGE 11

NETTLESTEAD CP
LITTLE BLAKENHAM CP
SOMERSHAM CP
ELMSETT CP
BRAMFORD CP
FLOWTON CP
BURSTALL CP
SPROUGHTON CP
HINTLESHAM CP

0 1:25,000 1 km

Print Date: 08-14-25 16:36:38

N

Order limits
Sheet index cutline
Project section line

Proposed project design details

Proposed full line tension gantry
Proposed low duty gantry
Proposed standard lattice pylon location
Proposed overhead line alignment
Bramford Substation
Bramford Substation Extension
Other temporary and permanent construction and operational works

Discipline specific constraints

500 m Study Area
Flood defences

Risk of flooding from surface water
High
Medium

Risk of flooding from rivers and sea
High
Medium

Risk of flooding from rivers and sea - climate change 1
High
Medium

Note: The proposed overhead line alignment and proposed underground cable alignment together comprise the alignment. For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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PROJECT: Norwich to Tilbury

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Figure 1- Flood Risk Areas
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Designed	L. Driscoll	Date	21 Aug 25
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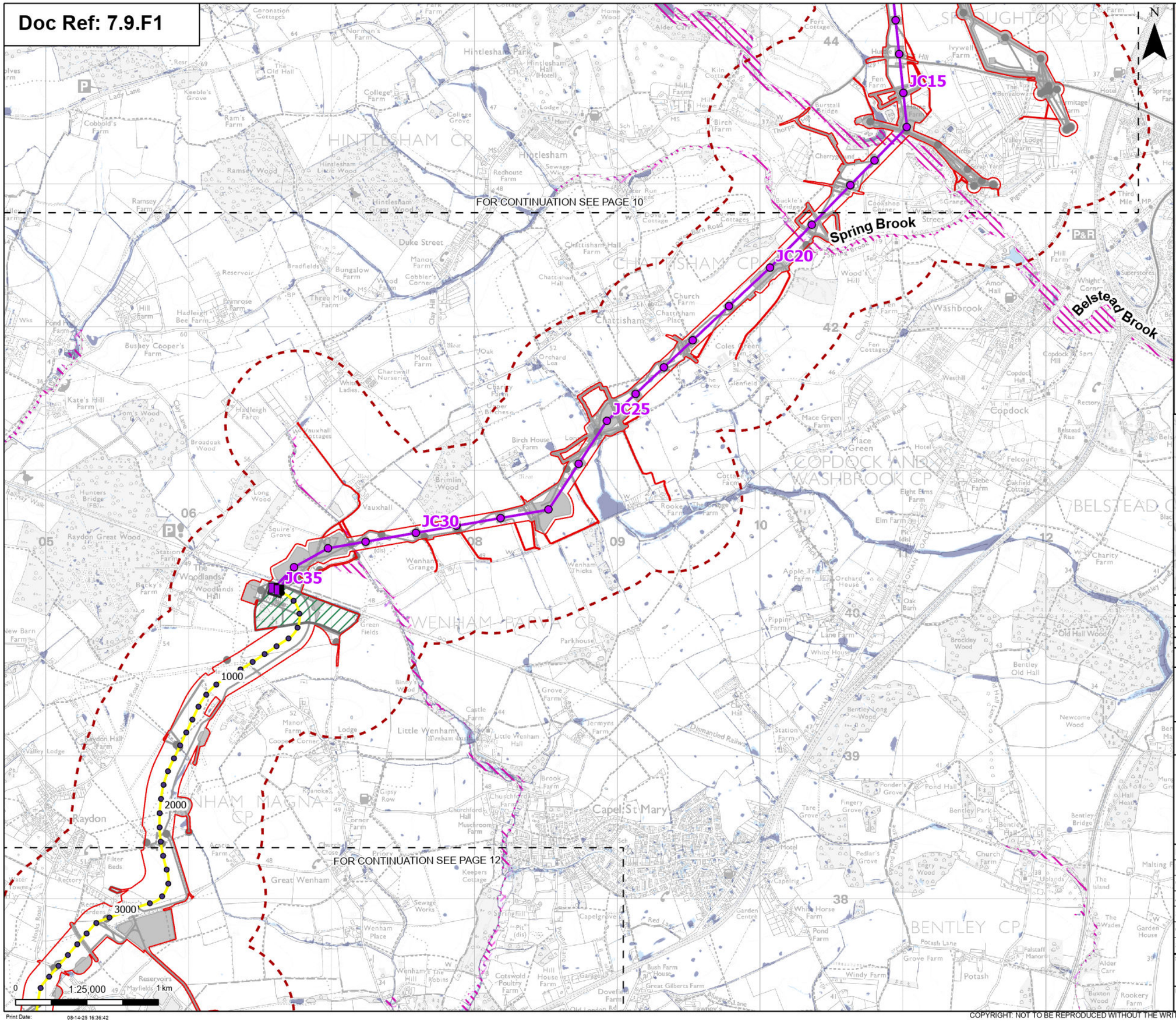

Order limits
Sheet index cutline

Proposed project design details

- Proposed full line tension gantry
- Proposed standard lattice pylon location
- Proposed overhead line alignment
- Proposed underground cable alignment
- Proposed underground cable chainage
- Proposed cable sealing end compound (CSEC)
- Environmental area
- Environmental mitigation
- Other temporary and permanent construction and operational works

Discipline specific constraints

- 500 m Study Area

Risk of flooding from surface water
- High
- Medium

Risk of flooding from rivers and sea
- High
- Medium

Risk of flooding from rivers and sea - climate change 1
- High
- Medium

Note: The proposed overhead line alignment and proposed underground cable alignment together comprise the alignment. For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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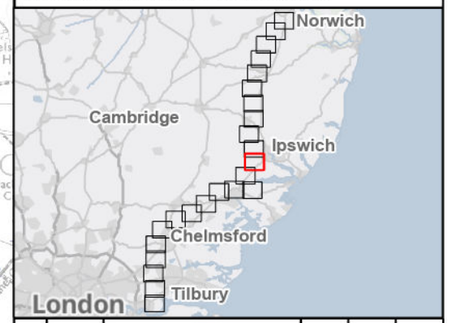

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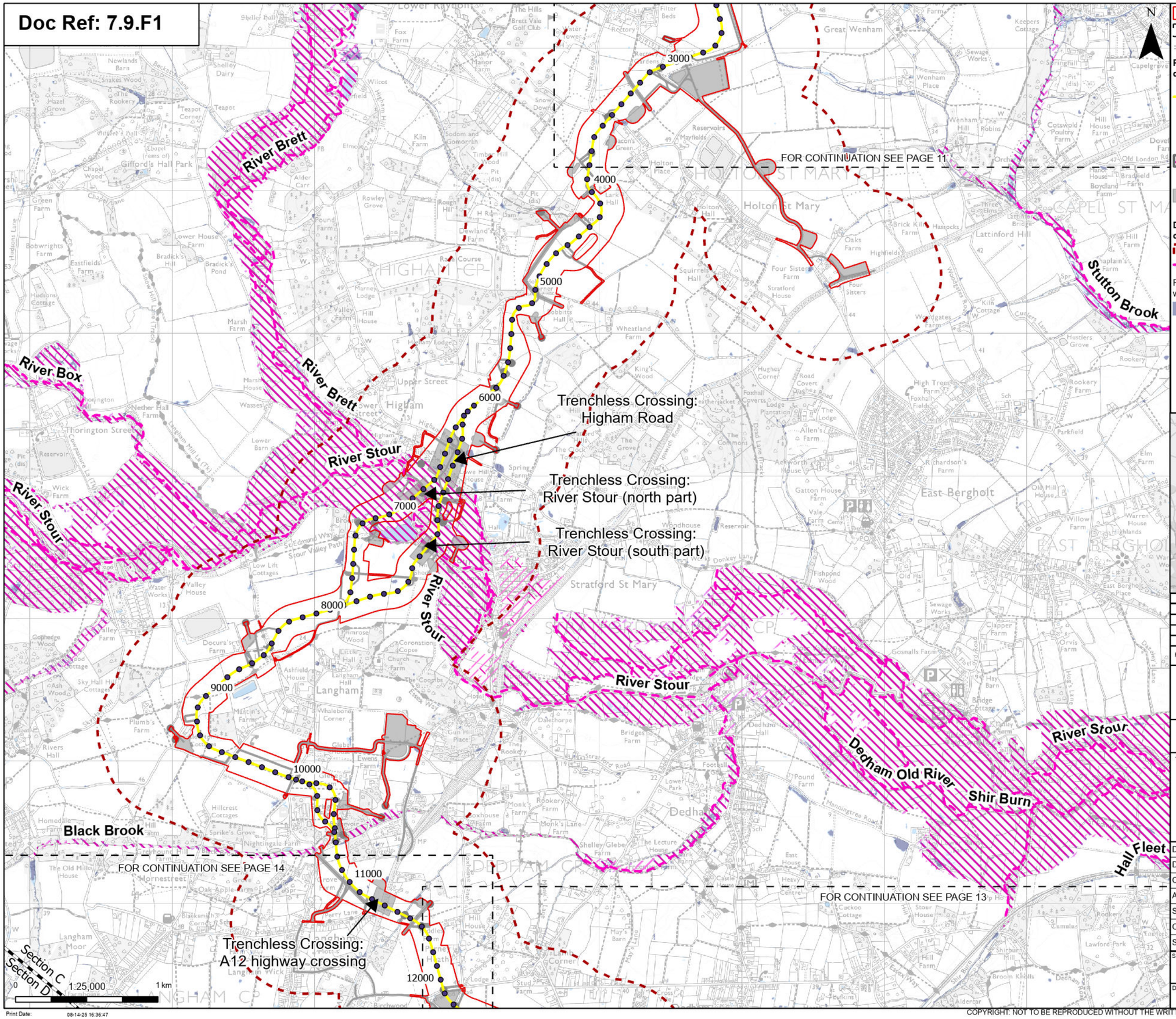

Order limits
Sheet index cutline
Project section line

Proposed project design details

Proposed underground cable alignment
Proposed underground cable chainage
Environmental mitigation
Other temporary and permanent construction and operational works

Discipline specific constraints

500 m Study Area
Flood defences

Risk of flooding from surface water

High
Medium

Risk of flooding from rivers and sea

High
Medium

Risk of flooding from rivers and sea - climate change 1

High
Medium

Note: The proposed overhead line alignment and proposed underground cable alignment together comprise the alignment. For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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Figure 1- Flood Risk Areas
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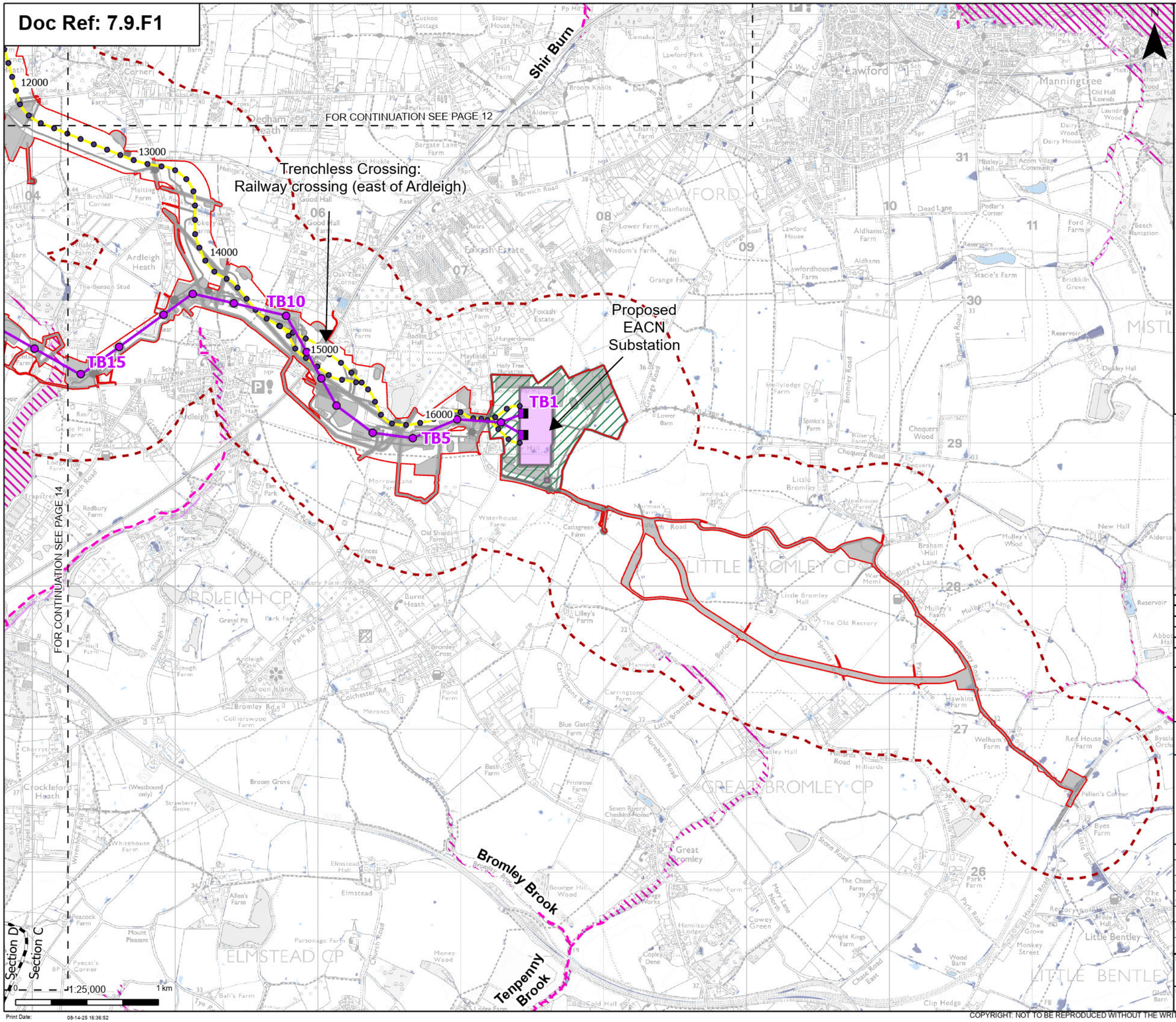

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PROJECT: Norwich to Tilbury

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Figure 1- Flood Risk Areas
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Designed	L. Driscoll	Date	21 Aug 25
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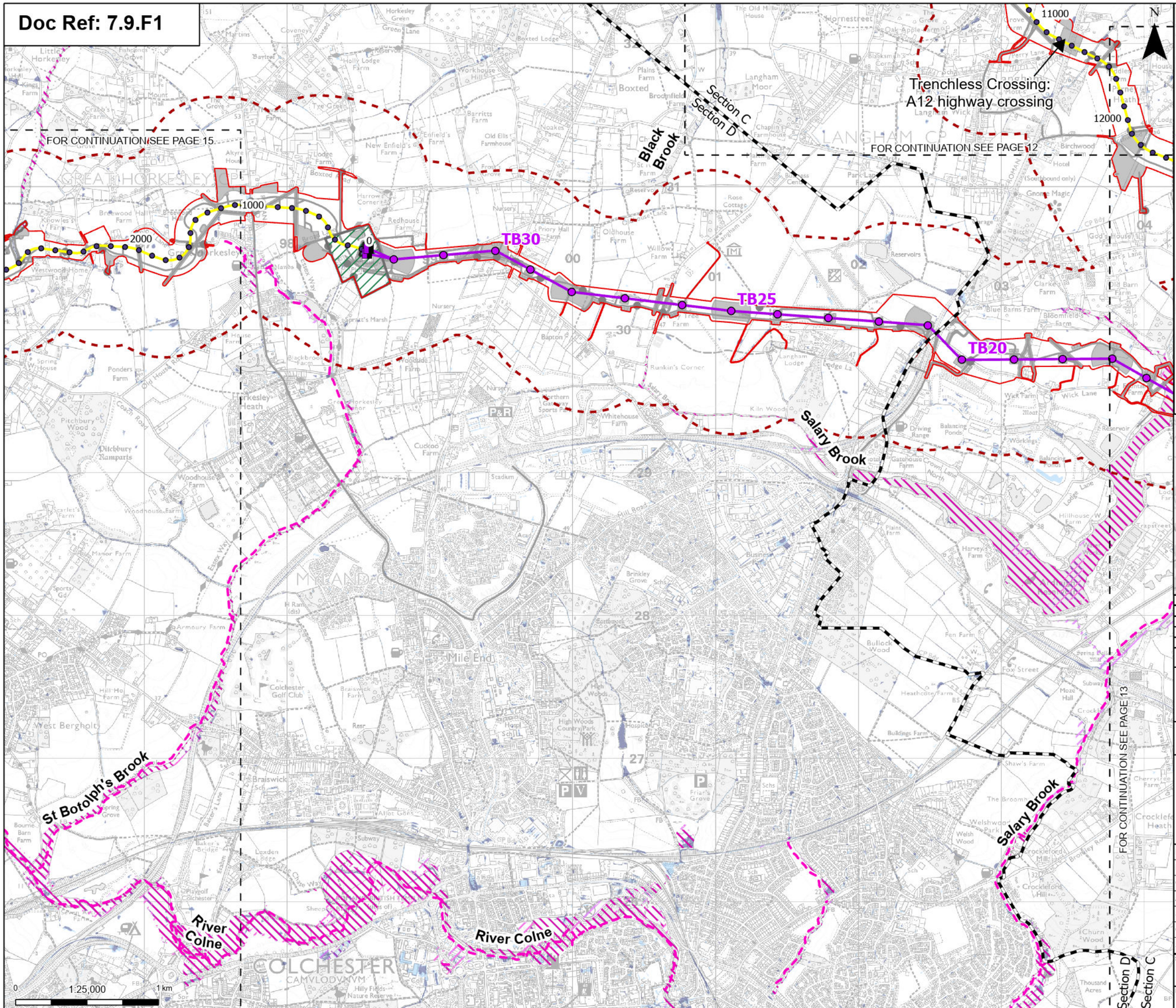

Order limits
Sheet index cutline
Project section line

Proposed project design details

- Proposed full line tension gantry
- Proposed standard lattice pylon location
- Proposed overhead line alignment
- Proposed underground cable alignment
- Proposed underground cable chainage
- Proposed underground cable chainage
- Proposed cable sealing end compound (CSEC)
- Environmental area
- Environmental mitigation
- Other temporary and permanent construction and operational works

Discipline specific constraints

- 500 m Study Area
- Flood defences

Risk of flooding from surface water
- High
- Medium

Risk of flooding from rivers and sea
- High
- Medium

Risk of flooding from rivers and sea - climate change 1
- High
- Medium

Note: The proposed overhead line alignment and proposed underground cable alignment together comprise the alignment. For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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PROJECT: Norwich to Tilbury

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Figure 1- Flood Risk Areas
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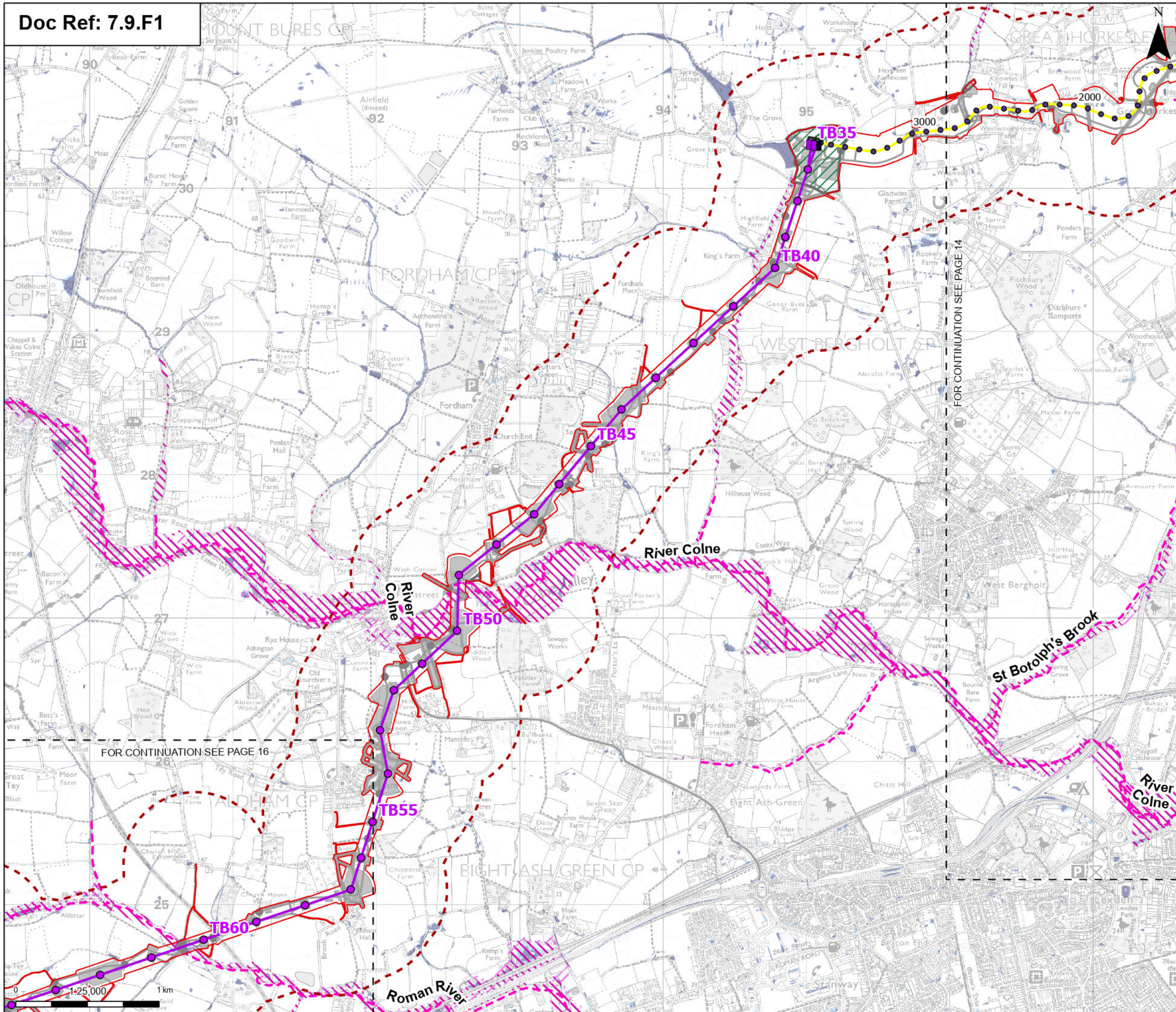

FOR CONTINUATION SEE PAGE 14
FOR CONTINUATION SEE PAGE 16

Order limits
Sheet index cutline

Proposed project design details

Proposed full line tension gantry
Proposed standard lattice pylon location
Proposed overhead line alignment
Proposed underground cable alignment
Proposed underground cable chainage
Proposed cable sealing end compound (CSEC)
Environmental area
Environmental mitigation
Other temporary and permanent construction and operational works

Discipline specific constraints

500 m Study Area

Flood defences

Risk of flooding from surface water
- High
- Medium

Risk of flooding from rivers and sea
- High
- Medium

Risk of flooding from rivers and sea - climate change 1
- High
- Medium

Note: The proposed overhead line alignment and proposed underground cable alignment together comprise the alignment. For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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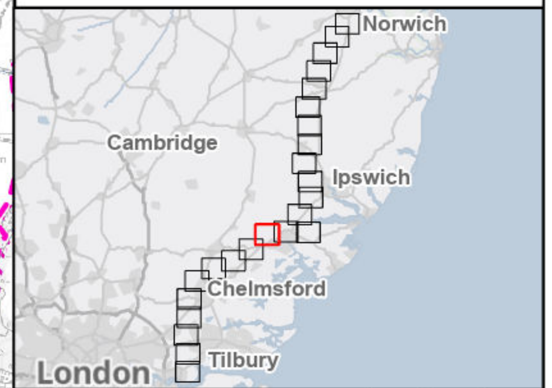

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PROJECT: Norwich to Tilbury

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Figure 1- Flood Risk Areas
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Designed	L. Driscoll	Date	21 Aug 25
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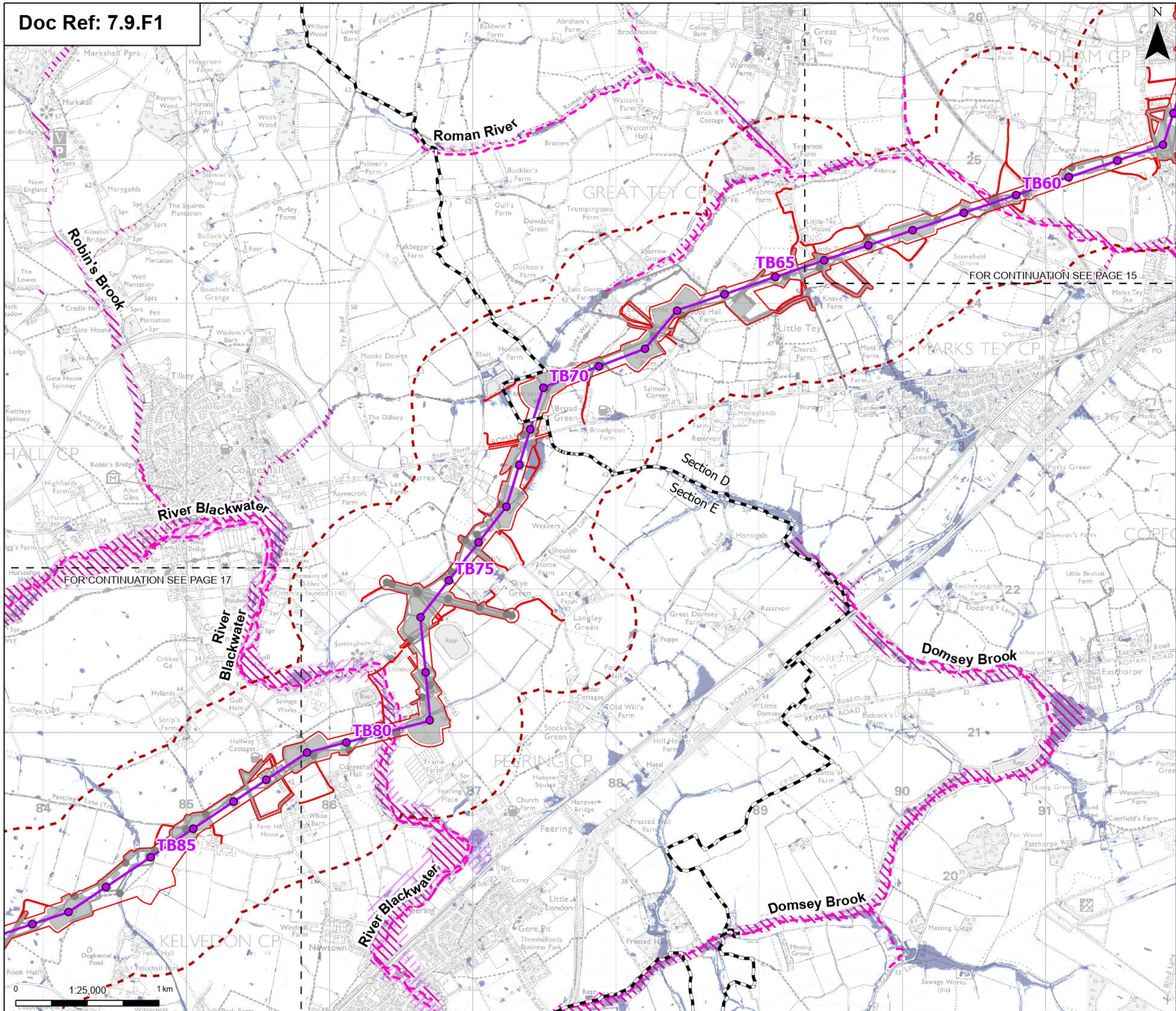

FOR CONTINUATION SEE PAGE 15

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Order limits
Sheet index cutline
Project section line

Proposed project design details

Proposed standard lattice pylon location
Proposed overhead line alignment
Environmental mitigation
Other temporary and permanent construction and operational works

Discipline specific constraints

500 m Study Area
Flood defences
Risk of flooding from surface water
High
Medium
Risk of flooding from rivers and sea
High
Medium
Risk of flooding from rivers and sea - climate change 1
High
Medium

Note: The proposed overhead line alignment and proposed underground cable alignment together comprise the alignment. For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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PROJECT: Norwich to Tilbury

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Figure 1- Flood Risk Areas
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Approved	K. Burrows	Date	21 Aug 25
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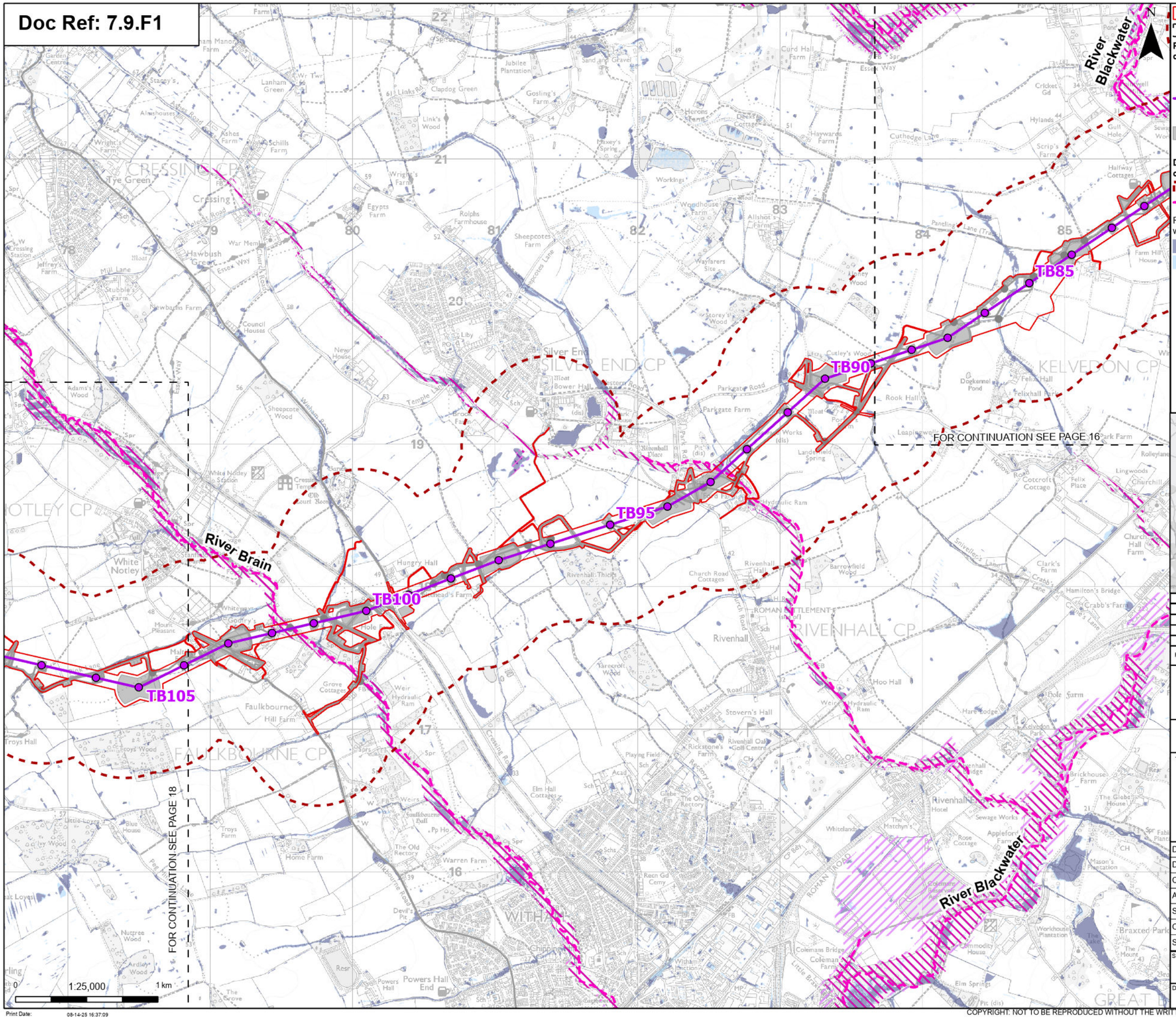

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PROJECT:
Norwich to Tilbury

Planning Inspectorate App Number: EN020027
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Title:

Figure 1- Flood Risk Areas
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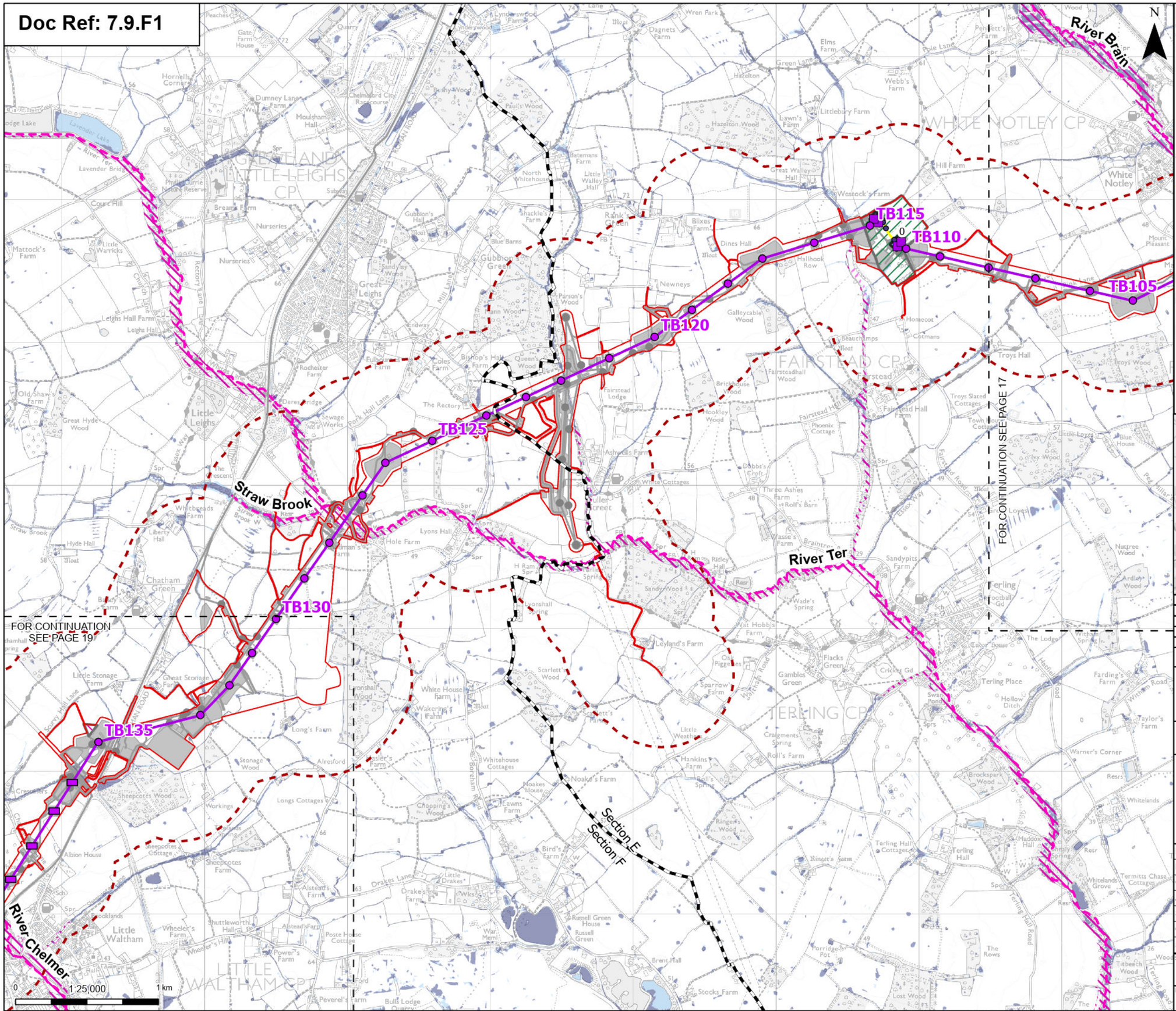

Order limits
Sheet index cutline
Project section line

Proposed project design details

- Proposed low duty gantry
- Proposed low height pylon location
- Proposed standard lattice pylon location
- Proposed overhead line alignment
- Proposed underground cable alignment
- Proposed underground cable chainage
- Proposed cable sealing end compound (CSEC)
- Environmental area
- Environmental mitigation
- Other temporary and permanent construction and operational works

Discipline specific constraints

- 500 m Study Area
- Flood defences

Risk of flooding from surface water
- High
- Medium

Risk of flooding from rivers and sea
- High
- Medium

Risk of flooding from rivers and sea - climate change 1
- High
- Medium

Note: The proposed overhead line alignment and proposed underground cable alignment together comprise the alignment. For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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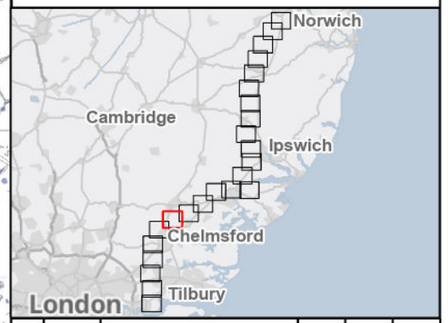

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Figure 1- Flood Risk Areas
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River Chelmer

Walthambury Brook

River Can

Newland Brook

Roxwell Brook

TB135

TB140

TB145

TB150

TB155

TB160

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FOR CONTINUATION SEE PAGE 20

0 1:25,000 1 km

Order limits

Sheet index cutline

Proposed project design details

Proposed low height pylon location

Proposed standard lattice pylon location

Proposed overhead line alignment

Environmental mitigation

Other temporary and permanent construction and operational works

Discipline specific constraints

500 m Study Area

Flood defences

Risk of flooding from surface water

High

Medium

Risk of flooding from rivers and sea

High

Medium

Risk of flooding from rivers and sea - climate change 1

High

Medium

Note: The proposed overhead line alignment and proposed underground cable alignment together comprise the alignment. For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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TB160

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TB170

TB175

TB180

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Roxwell Brook

River Can

River Wid

Sandy Brook

Ewson's Brook

Roxwell

Writtle

Widford

Hylands Park

Highwood

Edney Common

Great Oney Green

Cooksmill Green

Margaretting

HIGHWOOD CP

WRITTLE CP

N

0 1:25,000 1 km

Print Date: 08-14-25 16:37:22

Order limits
Sheet index cutline
Project section line

Proposed project design details

Proposed standard lattice pylon location
Proposed overhead line alignment
Environmental mitigation
Other temporary and permanent construction and operational works

Discipline specific constraints

500 m Study Area
Flood defences

Risk of flooding from surface water

High
Medium

Risk of flooding from rivers and sea

High
Medium

Risk of flooding from rivers and sea - climate change 1

High
Medium

Note: The proposed overhead line alignment and proposed underground cable alignment together comprise the alignment. For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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A	Aug 2025	FOR DCO APPLICATION	KF	AF	KB

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PROJECT: Norwich to Tilbury

Planning Inspectorate App Number: EN020027
Regulation 5(2)(a)

Title:

Figure 1- Flood Risk Areas
Page 20 of 24

Designed	L. Driscoll	Date	21 Aug 25
Drawn	K. Fischer	Date	21 Aug 25
Checked	A. Fell	Date	21 Aug 25
Approved	K. Burrows	Date	21 Aug 25
Scale:	1:25,000	Datum:	AOD
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Suitability Code:	A2	Project Number:	10059280

Suitability Description:
Accepted as Concept Stage

Drawing Number: 10059280-ARC-EGN-ZZ-DR-ZZ-00296

Revision: A

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FOR CONTINUATION SEE PAGE 20

FOR CONTINUATION SEE PAGE 22

Section F

Section G

TB185

TB190

TB195

TB200

TB205

River Wid

Stock Brook

0 1:25,000 1 km

Print Date: 08-14-25 16:37:27

N

- Order limits
- Sheet index cutline
- Project section line

Proposed project design details

- Proposed standard lattice pylon location
- Proposed overhead line alignment
- Environmental mitigation
- Other temporary and permanent construction and operational works

Discipline specific constraints

- 500 m Study Area
- Flood defences

Risk of flooding from surface water

- High
- Medium

Risk of flooding from rivers and sea

- High
- Medium

Risk of flooding from rivers and sea - climate change 1

- High
- Medium

Note: The proposed overhead line alignment and proposed underground cable alignment together comprise the alignment. For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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PROJECT: Norwich to Tilbury

Planning Inspectorate App Number: EN020027
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Figure 1- Flood Risk Areas
Page 21 of 24

Designed	L. Driscoll	Date	21 Aug 25
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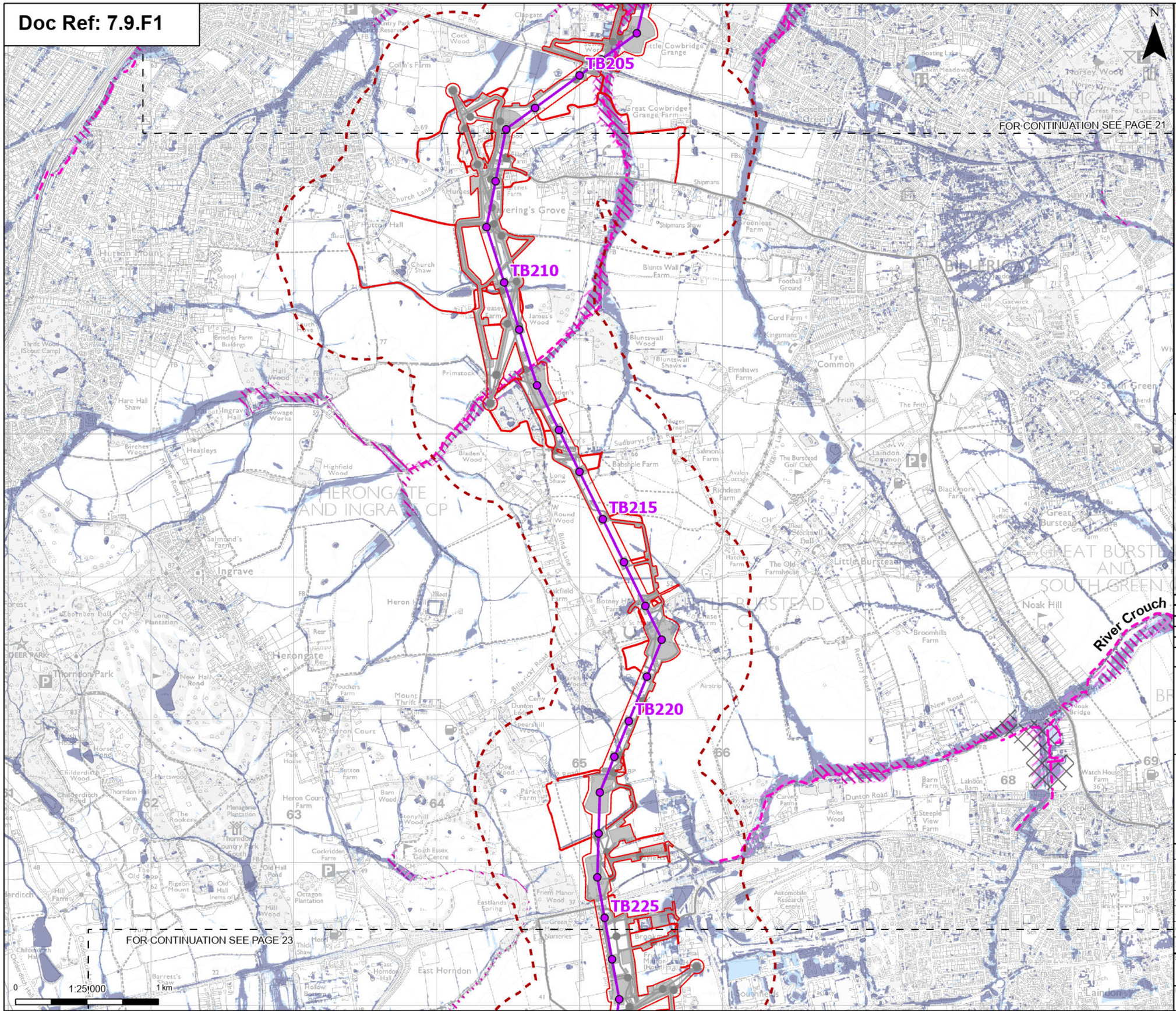

Order limits
Sheet index cutline

Proposed project design details

Proposed standard lattice pylon location
Proposed overhead line alignment
Other temporary and permanent construction and operational works

Discipline specific constraints

500 m Study Area
Flood defences
Flood storage area

Risk of flooding from surface water

High
Medium

Risk of flooding from rivers and sea

High
Medium

Risk of flooding from rivers and sea - climate change 1

High
Medium

Note: The proposed overhead line alignment and proposed underground cable alignment together comprise the alignment. For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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PROJECT: Norwich to Tilbury

Planning Inspectorate App Number: EN020027
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Title:

Figure 1- Flood Risk Areas
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Designed	L. Driscoll	Date	21 Aug 25
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FOR CONTINUATION SEE PAGE 22

FOR CONTINUATION SEE PAGE 24

TB230

TB235

TB240

TB245

TB250

Section G

Section H

Mar Dyke

0 1:25,000 1 km

N

Order limits
Sheet index cutline
Project section line

Proposed project design details

Proposed low height pylon location
Proposed standard lattice pylon location
Proposed overhead line alignment
Environmental mitigation
Other temporary and permanent construction and operational works

Discipline specific constraints

500 m Study Area
Flood defences

Risk of flooding from surface water

High
Medium

Risk of flooding from rivers and sea

High
Medium

Risk of flooding from rivers and sea - climate change 1

High
Medium

Note: The proposed overhead line alignment and proposed underground cable alignment together comprise the alignment. For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference 6.4.F2).

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PROJECT: Norwich to Tilbury

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Figure 1- Flood Risk Areas
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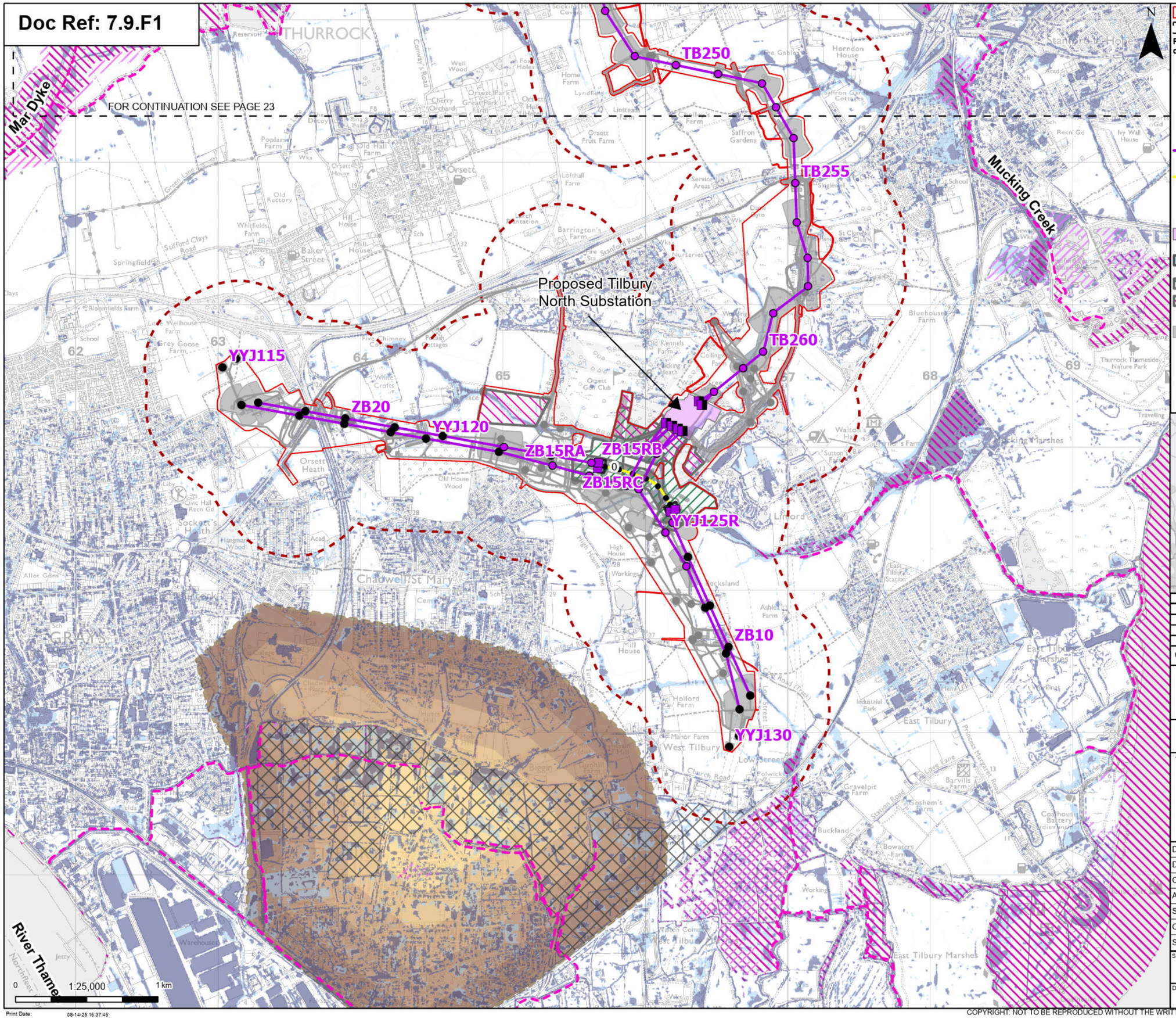

Order limits
Sheet index cutline

Proposed project design details

- Proposed full line tension gantry
- Proposed low duty gantry
- Existing pylon (modify)
- Proposed standard lattice pylon location
- Proposed overhead line alignment
- Proposed underground cable alignment
- Proposed underground cable chainage
- Proposed Tilbury North Substation
- Proposed cable sealing end compound (CSEC)
- Environmental area
- Environmental mitigation
- Other temporary and permanent construction and operational works

Discipline specific constraints

- 500 m Study Area
- Flood defences
- Tilbury Area of Critical Drainage (AoCD008)
- Flood storage area

Risk of flooding from surface water
- High
- Medium

Risk of flooding from rivers and sea
- High
- Medium

Risk of flooding from rivers and sea - climate change 1
- High
- Medium

Note: The proposed overhead line alignment and proposed underground cable alignment together comprise the alignment. For further details regarding the design, please refer to Figures 4.1 (document reference 6.4.F1) and 4.2 (document reference

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PROJECT: Norwich to Tilbury

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Figure 1- Flood Risk Areas
Page 24 of 24

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