The Great Grid Upgrade

Sea Link

Sea Link

Volume 6: Environmental Information

Document 6.8 Flood Risk Assessment

Planning Inspectorate Reference: EN020026

Version: ~~A~~B

~~March 2025~~

April 2026

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

Contents

Table of Tables

Version History

Date	Version	Status	Description / Changes
March 2025	A	Final	For DCO Submission
April 2026	B	Final	For Deadline 6 Submission

Executive Summary

Ex1.1 Purpose of this Report

Ex1.1.1 National Grid Electricity Transmission plc (here on referred to as National Grid) is making an application for development consent to reinforce the transmission network in the South East and East Anglia. The Sea Link Project (hereafter referred to as the 'Proposed Project') is required to accommodate additional power flows generated from renewable and low carbon generation, as well as an addition to new interconnection with mainland Europe. The reinforcement would be achieved via the construction and operation of a High Voltage Direct Current (HVDC) Link between the proposed Friston substation in the Sizewell area of Suffolk and the existing Richborough to Canterbury 400 kV overhead line close to Richborough in Kent.

Ex1.1.2 The Order Limits cross the following main rivers: River Stour (Kent), River Fromus and Hundred River/River Alde, as well as the Minster Stream, Stonelees Stream and numerous other ordinary watercourses. The Order Limits also cross the Minster Marshes in Kent which are drained by a network that is managed by the Stour (Kent) Internal Drainage Board (IDB), and several tributaries of the River Fromus in Suffolk.

Ex1.1.3 The Environment Agency Flood Map for Planning (Rivers and Sea) (See Figure 1, Appendix A) shows that the majority of the Proposed Project components in the Suffolk Onshore Scheme are located in Flood Zone 1, whilst localised areas at some watercourse crossings and at the landfall site, are in Flood Zones 2 and 3. Most of the Project components of the Kent Onshore Scheme are also within Flood Zone 1, however the overhead line section and landfall are located within Flood Zone 3.

Ex1.1.4 This Flood Risk Assessment (FRA) has been produced to support the application for development consent and the accompanying Environmental Statement under the Planning Act 2008. The FRA documents the assessment undertaken to understand whether the Proposed 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.

Ex1.2 Scope of the Assessment

Ex1.2.1 Flooding from sewers and water mains, reservoirs and other artificial sources were scoped out of the assessment through engagement with the flood risk management authorities (Environment Agency, Suffolk County Council, East Suffolk Council, Kent County Council, Thanet District Council and Dover District Council). Therefore, the FRA focuses on flood risk from rivers and the sea, surface water and groundwater sources.

Ex1.2.2 The assessment has used published data sources and flood modelling data to identify the risks relevant to the Proposed Project. National Grid has also undertaken consultation with relevant stakeholders, including the Environment Agency, Suffolk County Council, East Suffolk District Council, Kent County Council, Dover District Council, Thanet District Council, East Suffolk Water Management Board and Stour (Kent) IDB, to help inform the report.

Ex1.2.3 Table Ex 1.1 outlines the Environment Agency guidance for completing and FRA and where it has been complied with in this assessment.

Table Ex 1.1 Compliance with Environment Agency flood risk assessment guidance

Guidance	Compliance within this FRA
Check if your development needs to satisfy the sequential test.	The Sequential approach to locating operational infrastructure has been applied, with all new above ground infrastructure e.g. substations and converter stations, sited in areas at low risk of flooding. Given the linear nature of the Proposed Project and the requirements for improvements to existing infrastructure (e.g. overhead lines) it has not been wholly possible to avoid areas at higher risk of flooding. The exception test has therefore been applied.
The exception test is needed for development with a vulnerability classification of: • 'highly vulnerable' in Flood Zone 2 • 'more vulnerable' in Flood Zone 3a • 'essential infrastructure' in Flood Zone 3a or 3b	The Proposed Project is classified as 'essential infrastructure', with some areas located within Flood Zone 3. The criteria for the exception test have therefore been assessed and it has been concluded that the sustainability benefits of the Proposed Project outweigh the degree of flood risk and that the Proposed Project will be safe for its lifetime in the context of flood risk, and will not increase flood risk elsewhere.
Check if you need any other permissions or consents	The Proposed Project is not seeking to disapply the Environmental Permitting Regulations, applications for any consents and permits for qualifying works, for example, Flood Risk Activity Permits, would be prepared and submitted by the appointed Contractor.
Your FRA should be: • appropriate to the scale, nature and location of the development • proportionate to the degree of flood risk	This FRA assesses the Suffolk and Kent Onshore Schemes. A full assessment has been undertaken, considering all sources of flood risk to the Proposed Project and setting out how risks will be managed and controlled.

Ex1.3 Results of the Assessment

Ex1.3.1 A sequential approach has been taken in siting Proposed Project infrastructure, particularly those elements that could be at risk of flooding during the operational lifetime of the Proposed Project. The substations, converter stations and cable transition joint bays are all located in Flood Zone 1. Due to its linear nature some components of the Proposed Project must necessarily be in areas with a medium or high likelihood of flooding (Flood Zones 2 and 3). Whilst these components are of low vulnerability to flooding, the Exception Test is triggered. This report presents the evidence that the Proposed Project passes this latter part of the test, with a design that ensures the Proposed Project will be safe for its lifetime in the context of flood risk, and will not increase flood risk elsewhere. The first part of the Exception Test is met given the need for the Proposed Project, which is set out in **Application Document 7.2 Strategic Options and Back Check Report,** and other environmental and economic benefits.

Ex1.3.2 Flood risk from rivers and the sea during construction has been largely avoided through embedded measures, including the trenchless installation of the cables beneath the Hundred River and Stonelees Stream, and also through good practice measures set out in the Outline Code of Construction Practice (**Application Document 7.5.3.1 Construction Environmental Management Plan Appendix A Outline Code of Construction Practice**). Hydraulic modelling of the River Fromus watercourse crossing has been carried out to support the assessment, details of which are outlined in **Annex B**. Good practice measures to manage localised groundwater and surface water flood risks have also been documented in the Register of Environmental Actions and Commitments, which forms Appendix B of the CEMP (**Application Document 7.5.3.2 CEMP Appendix B Register of Environmental Actions and Commitments (REAC)**). With these measures in place, the residual risk of flooding during the construction phase has been assessed as, in the main, low risk for all sources, except for in localised areas of the Order Limits, where ~~it locally increases to~~the residual risk is assessed as medium.

Ex1.3.3 During operation, flood risk from rivers and the sea, surface water and groundwater sources is assessed to be low due to locating key infrastructure (the substations and converter stations) in Flood Zone 1 and implementing permanent surface water drainage solutions, based on suitable forms of Sustainable Drainage, embedding climate change resilience into the Proposed Project's design. The residual risk (associated with the overhead line pylons in Kent) is assessed as low.

1. Introduction

1.1 Overview

1.1.1 The Sea Link Project (hereafter referred to as the 'Proposed Project') is a proposal by National Grid Electricity Transmission plc (hereafter referred to as National Grid) to reinforce the transmission network in the South East and East Anglia. The Proposed Project is required to accommodate additional power flows generated from renewable and low carbon generation, as well as accommodating additional new interconnection with mainland Europe.

1.1.2 National Grid owns, builds and maintains the electricity transmission network in England and Wales. Under the Electricity Act 1989, National Grid holds a transmission licence under which it is required to develop and maintain an efficient, coordinated, and economic electricity transmission system.

1.1.3 National Grid is also required, under Section 38 of the Electricity Act 1989, to comply with the provisions of Schedule 9 of the Electricity Act 1989. Schedule 9 requires licence holders, in the formulation of proposals to transmit electricity, to:

- Schedule 9(1)(a) "…*have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest*;" and
- Schedule 9(1)(b) "*…do what [it] reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects*".

1.1.4 The Proposed Project is proposed to reinforce the transmission system in the South East of England and East Anglia. This would be achieved by reinforcing the network with a High Voltage Direct Current (HVDC) Link between the proposed Friston substation in the Sizewell area of Suffolk and the existing Richborough to Canterbury 400 kV overhead line close to Richborough in Kent.

1.1.5 This Flood Risk Assessment (FRA) has been produced to support the application for development consent and the accompanying Environmental Statement (ES) under the Planning Act 2008.

1.2 Purpose of this Report

1.2.1 This document includes a summary of flood risk from all relevant sources to the Proposed Project and the predicted impact of the Proposed Project on flood risk elsewhere.

1.2.3 This document also describes how the risk of flooding has been avoided when situating vulnerable infrastructure, and for other less vulnerable components, how flood risk would be managed through design, and the control and management measures that are proposed to reduce any potential residual impacts associated with the Proposed Project. The measures are documented within the Outline Code of Construction Practice which forms Appendix A of the Construction Environmental Management Plan (CEMP) (**Application Document 7.5.3.1 CEMP Appendix A Outline Code of Construction Practice**) and the Register of Environmental Actions and Commitments, which forms Appendix B of the CEMP (**Application Document 7.5.3.2 CEMP Appendix B Register of Environmental Actions and Commitments (REAC)**) and have been given a code, e.g. GG01, to allow the measures to be easily cross referenced. The ones relevant to the FRA are outlined in Table 1.1 for ease of reference.

Table 1.1 Good practice measures relevant to the FRA taken from the CoCP and REAC

Ref	Mitigation Commitment	Relevance to the FRA
GG07	Land used temporarily will be reinstated where practicable (bearing in mind restrictions on planting and land use) to its pre-construction condition and use, unless agreed otherwise (…).	Reinstating the land to its previous condition would avoid an increase in flood risk compared to pre-construction conditions.
GG15	Runoff 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).	Installing control measures for the runoff of water across the site would aim to safeguard the integrity of watercourses, drains and sewers, and their flow conveyance qualities and capacities, reducing flood risk.
GG16	Where required, wash down of vehicles and equipment will take place in designated areas within construction compounds. Wash water will be prevented from passing untreated into watercourses and groundwater. Appropriate measures will include use of sediment traps. Ensure there is an adequate area of hard surfaced road between the wash facility and the site exit, wherever site size and layout permits.	Working in accordance with the conditions of relevant consents and permits, this would safeguard the integrity of watercourses and their flow conveyance qualities/capacities, reducing flood risk.
GG24	An Incident Response Plan will be developed by the contractor for the construction phase. This will be prepared prior to construction works commencing	Enacting the Emergency Action Plan would reduce the risks of disruption to construction, safeguard the health and safety of construction personnel and

Ref	Mitigation Commitment	Relevance to the FRA
	and thereafter complied with. It will outline procedures that will be implemented in case of unplanned events, including but not limited to site flooding and pollution incidents. Local authorities will be informed of any large scale incidents under the Incident Resource Plan. Smaller scale issues will be recorded in a register that will be made available to local authorities for review on request.	reduce flood risk and environmental impacts.
W01	All works within main rivers, ordinary watercourses and board drains will be in accordance with a method approved under environmental permits issued under the Environmental Permitting Regulations by the Environment Agency and /or the relevant secondary consents or permits from the Lead Local Flood Authorities and Internal Drainage Boards.	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, good practice 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; • 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;	Good practice measures would reduce restrictions to watercourses and flood flows, ensuring no increase to flood risk both upstream and downstream of the site. These measures would also safeguard the integrity of the watercourses and their flow conveyance qualities/capacities, reducing flood risk.

Ref	Mitigation Commitment	Relevance to the FRA
	• prevent refuelling of any plant or vehicle within 15 m of a watercourse; • prevent storing of soil stockpiles within 15 m of a main river (16m where the river is tidal); • inspect all plant prior to work adjacent to watercourses for leaks of fuel or hydraulic fluids; ~~and~~ • reinstating the riparian vegetation and natural bed of the watercourse, using the material removed when appropriate, on completion of the works and compacting as necessary. If additional material is required, appropriately sized material of similar composition will be used~~.~~; and • prevent siting of construction compounds, laydown areas for heavy machinery (excluding short term laydown for the River Stour bridge construction works) and materials that could move in a flood within 15 m of a main river (16 m where river is tidal).	
W03	Riverbank and in-channel vegetation will be retained where not directly affected by installation works. Where ditches retaining seasonal flows are crossed, culverts in waterbodies will either preserve the natural bed or be box culverts with inverts sunk a minimum of 300mm below the hard bed of the watercourse and natural / existing bed material placed across the inside of the culvert, to maintain existing channel gradients and habitat for aquatic invertebrates, as well as to ensure continued passage for in channel species.	This would retain the existing flow conveyance properties of watercourses to be crossed by the Project, reducing the potential for any localised increases in flood risk.

Ref	Mitigation Commitment	Relevance to the FRA
W04	Where watercourses are to be crossed by construction traffic, measures will include the use of culverts or temporary spanned bridges. Once the culvert is installed, the area above the culvert will be backfilled and construction mats placed over the backfilled area to permit the passage of plant, equipment, materials and people. Culverts will be sized to reflect the span width and the estimated flow characteristics of the watercourse under peak flow conditions and kept free from debris. The installation works would be timed to avoid flood flow conditions where practicable, or if periods of work were necessary when higher flow conditions could be expected, suitable pumping provision would be put in place, with standby pumps also made available. Where used, temporary bridges will be designed specifically to consider the span length and the weight and size of plant and equipment that will cross the bridge. The bridge across the River Stour would have a soffit height sufficient to meet with navigational requirements and in excess of the 0.5% flood level plus 600 m freeboard.	This would reduce restrictions to flood flows during construction which could increase flood risk upstream of crossing locations.
W05	The contractor(s) will comply with all relevant consent conditions or DCO provisions regarding de-watering and other discharge activities. This will particularly be with regard to volumes and discharge rates and will include discharges to land, water bodies or third-party drains/sewers.	Working in accordance with the conditions of relevant consents and permits would safeguard the integrity of watercourses and their flow conveyance qualities/capacities, reducing flood risk.
W06	Where new or additional impermeable surfacing is required on any access tracks, bellmouths and in compound areas e.g. for parking provision, site offices, Sustainable Drainage Systems (SuDS) will be incorporated, appropriate to the existing ground conditions, with infiltration to ground preferred where conditions are suitable. These would be put in place as early activities in the construction schedule so as to avoid or	This would reduce the risk of surface water flooding during construction. This would avoid the risk that soil piles create an additional barrier to flow routes during construction, which may result in increased flood risk within the areas of construction. This would reduce the risk of surface water flooding post-construction phase, by reinstating the ground to the original conditions.

Ref	Mitigation Commitment	Relevance to the FRA
	reduce working on land that is prone to waterlogging and flooding. The Proposed Project will incorporate appropriate surface water drainage measures into its final design for the haul roads and access tracks so that they do not lead to a significant increase in flood risk. Temporary haul routes and all other temporary works within Flood Zone 3 and areas of high and medium risk of flooding from surface water will be removed at the end of the construction phase and the ground surface will be reinstated to pre-project levels, except in instances where the ground level has been adjusted as part of the Proposed Project subject to the provisions of the draft DCO in Article 27. No During construction of the Suffolk Onshore Scheme, construction materials shouldwould be stored within Flood Zone 31 and areas of high and mediumat low risk of flooding from surface water, where this cannot be avoided, for example in . For the Kent Onshore Scheme, given the expansive nature of the River Stour floodplain-, this commitment cannot practicably be achieved. It is therefore proposed that storage of materials within Flood Zone 3 will be minimised with materials such as pylon steelwork stored for up to 30 days and adequate mitigation measures will be applied. For example, model outputs would inform the temporary placement of soil during construction and soil stockpiles would be aligned in the direction of flow to avoid impeding flood flow routes. In addition, the contractor would monitor weather forecasts and flood alerts/warnings, enacting protocols to remove temporary stores out of FZ3B on receipt of a warning. Where construction access routes cross Flood Zone 3 and areas at high risk of surface water flooding no land raising would be required, except for the approaches to the temporary bridge crossing of the River Stour.	

Ref	Mitigation Commitment	Relevance to the FRA
W07	The contractor(s) will subscribe to the Environment Agency's Floodline service, which provides advance warning of potential local flooding events, and subscribe to the Met Office's Weather Warnings email alerts system and any other relevant flood warning information. The contractor(s) will implement a suitable flood risk action plan, which will include appropriate evacuation procedures should a flood occur or be forecast.	Severe weather warnings would support construction planning in terms of temporary works and activities to limit the impact of any severe rainfall events, in terms of disruption to construction, the health and safety of construction personnel and potential flood risk and environmental impacts.
~~W11~~W10	Severance of existing land drainage routes, including agricultural field drainage systems, would be managed during construction through provision of temporary alternative drainage routes, and these drainage systems would be permanently reinstated or rerouted ensuring their existing function is maintained.	This would reduce the risk of surface water flooding during construction.
~~W12~~W11	Surface water drainage from permanent above ground infrastructure would be managed and treated using SuDS in accordance with policy and guidance requirements of the relevant Lead Local Flood Authorities to include allowances for climate change in accordance with current (May 2022) Environment Agency guidelines. These SuDS would be maintained over the lifetime of the Proposed Project and the ~~the~~ drainage infrastructure would provide the storage necessary to achieve discharges at greenfield rates and would not significantly alter groundwater recharge patterns by transferring a significant recharge quantity from one catchment to another.	This would reduce the risk of groundwater and surface water flows being impacted by above ground features.
W12	At the Suffolk and Kent landfalls the offshore cables will be brought onshore using a trenchless technique, avoiding physical disturbance of several watercourses and areas of coastal floodplain. Monitoring of existing flood defences would be undertaken during the cable installation in agreement with Environment Agency protocols to ensure	This will assure the integrity of existing flood defences and the level of protection they provide and avoid physical works to watercourses and the floodplains at the landfall sites.

Ref	Mitigation Commitment	Relevance to the FRA
	no detriment to the integrity of the defences.	
W14	The Contractor shall develop a Drainage Management Plan and this must be submitted to the Local Planning Authority for approval prior to construction works for the Proposed Project commencing and thereafter the approved plan shall be complied with, subject to any amendments that are subsequently approved pursuant to Requirement 6 of Schedule 3 of the draft DCO. The plan shall demonstrate how the Contractor would manage surface water runoff across the worksite, including details of how offsite impacts would be managed and mitigated.	The Plan will demonstrate the detail of how surface water flows will be managed at construction work sites to avoid increasing flood risk from this source.
W15	The contractor shall prepare a construction phase Flood Management Plan that shall consider all construction phase activities and temporary works necessary to deliver the Proposed Project and this must be submitted to the Local Planning Authority for approval prior to construction works for the Proposed Project commencing and thereafter the approved plan shall be complied with, subject to any amendments that are subsequently approved pursuant to Requirement 6 of Schedule 3 of the draft DCO.	The Flood Management Plan will demonstrate the detail of how flood risks will be managed at construction work sites.
W35	For events up to and including the 1% Annual Exceedance Probability flood events plus climate change, where pylons and a temporary drainage pond would be located within the fluvial floodplain of the River Stour as part of the Kent Onshore Scheme, compensatory storage within the Order Limits will be provided for loss of floodplain storage, in accordance with a Floodplain Compensation Strategy detailed in the Drainage Management Plan that is secured under Requirement 6 of the DCO and to which the Environment Agency is a consultee.	This would ensure no loss of floodplain storage and maintain the existing floodplain storage capacity. Details are included in **Application Document 9.101 Kent Onshore Scheme – Fluvial Flooding from the River Stour [REP4-096].**
AS05	Consultation with affected landowners will be carried out to investigate the current extent of land drainage which will be	This would reduce the risk of surface water flooding during construction by maintaining the efficiency of the

Ref	Mitigation Commitment	Relevance to the FRA
	taken into account in the development of the Drainage Management Plan (see W14) prior to construction, with the intent of maintaining the efficiency of the existing land drainage system.	current land drainage regime (or equivalent).
AS08	Clay bungs or other vertical barriers will be constructed within trench excavations where deemed necessary by a suitably experienced person, to prevent the creation of preferential drainage pathways.	Underground cables trenches could act as a preferential flow route for water if not managed, changing the existing land drainage regime and potentially increasing flood risk.
AS01	The Outline Soil Management Plans set out specific guidance in relation to soil handling, including, soil stripping, soil stockpiling and soil reinstatement. These will be updated to Soil Management Plans prior to construction, to include information from soil and agricultural land classification (ALC) surveys. Measures will include but not be limited to the following: (…) how topsoil and subsoil will be stripped and stockpiled; suitable conditions for when handling soil will be undertaken, for example avoiding handling of waterlogged soil; (…) details of measures required for soil restoration.	Good management of soils will aid in re-instating the existing rainfall runoff properties of the land following construction, to maintain the current land drainage regime.

1.3 Consultation

1.3.1 The scope of this assessment has been agreed through pre-application engagement with the Environment Agency and Kent and Suffolk County Councils in their role as Lead Local Flood Authorities (LLFA). The Order Limits partially lie within the Stour (Kent) Internal Drainage Board (IDB) and East Suffolk Water Management Board districts, with whom National Grid has also engaged. Table 1.2 summarises the relevant consultation feedback.

Table 1.2 Summary of flood risk consultation

Stakeholder	Matter Raised	Response
Suffolk		
Suffolk County Council, East Suffolk District Council	The FRA should address the recent change in guidance set out in the update to the National Planning Policy Framework	As described in Section 4.2, all relevant sources of flood risk have been considered and critical/flood vulnerable components of

Stakeholder	Matter Raised	Response
	linked to application of the Sequential Test, which is now to consider all forms of flood risk.	operational infrastructure have been located in areas that are at low risk of flooding from rivers and the sea, surface water and groundwater flooding.
Suffolk County Council	The Council are content with the stated assumption of no new surface water flood modelling to inform the FRA, though noted that this may be necessary to discharge DCO requirements in due course.	A qualitative assessment of surface water flood risk is presented in Section 4.4 in accordance with the agreed scope.
Suffolk County Council	The Proposed Project needs to consider whether works to any watercourses are needed e.g. watercourse diversions. These works would need Land Drainage Consent if the DCO is not seeking to disapply the Land Drainage Act 1991. Watercourses in the vicinity of the proposed Friston Substation are of particular concern.	The potential effects of watercourse diversions and culverting are assessed in Section 4.3. As secured by commitment W01 in the **Application Document 7.5.3.1 CEMP Appendix A Outline Code of Construction Practice**, all works within main rivers and ordinary watercourses will be in accordance with a method approved under environmental permits issued by the Environment Agency and /or the relevant secondary consents or permits from protective provisions of the Development Consent Order (DCO) for the benefit of the Lead Local Flood Authorities and Internal Drainage Boards
Suffolk County Council	Operational surface water drainage proposals for Saxmundham Converter Station.	Ground Investigation data has confirmed that the site is not sufficiently permeable to support infiltration drainage solutions, so an attenuated discharge to surface water is proposed. A permanent attenuation pond has been sized to accommodate the 1% annual exceedance probability storm with a 45% allowance for climate change and would discharge into an IDB watercourse that discharges to the River Fromus.
Suffolk County Council, East Suffolk District Council, Environment Agency	Proposed crossing of the River Fromus for permanent access and impacts on the floodplain.	The effects of the proposed crossing (new permanent bridge) have been assessed as detailed in Section 4.3 and Appendix B.

Stakeholder	Matter Raised	Response
East Suffolk Water Management Board	Design parameters for crossings of IDB drains and for making discharges to these watercourses	A suite of design principles and parameters have been agreed with regard to crossing (W02) and making discharges to the Boards drains (W05) and all works would be undertaken in line with W01.
Kent		
Kent County Council, Environment Agency, Suffolk County Council	Scope of the FRA, covering the sources of flood risk that will be assessed, the policy and guidance that will be followed and the datasets that will be referenced to inform it.	All stakeholders agreed that the proposed scope of the FRA presented here is suitable.
Kent County Council, Environment Agency	Understanding groundwater conditions, drainage and flood risk at the site of the proposed Minster Converter Station and Substation.	Monitoring of groundwater levels has been carried out in this area with soil soakage testing, the results of which confirm drainage via infiltration to ground is likely not to be practical. Attenuation storage for a discharge to surface water is incorporated into the design and the data collected has also informed the assessment of groundwater flood risk presented in Section 4.5.
Kent County Council, Dover District Council, Environment Agency	Project activities that are proposed in the floodplain of the River Stour.	Activities include removal of and works to existing pylons and construction of new temporary and permanent pylons, in addition to construction of a temporary bridge over the River Stour. The impacts of these activities are assessed in Section 4.3. As the Stour floodplain in this location is tidal and given the design of the proposed crossing, the Environment Agency have agreed that compensation for floodplain storage loss would not be required.
Stour (Kent) IDB	Design parameters for crossings of IDB drains and for making discharges to these watercourses	A suite of design principles and parameters have been agreed with regard to crossing (W02) and making discharges to the Boards drains (W05) and all works would be undertaken in line with W01.

1.3.2 A draft of this report was shared with the Environment Agency and feedback was received in February 2025, with subsequent updates made to address key comments.

1.4 Structure of this Report

1.4.1 The structure of this report is summarised in Table 1.3.

Table 1.3 Structure of this report

Chapter	Content
1: Introduction	Background information and a summary of engagement with relevant consultees.
2: Proposed Project Description	Description of the Proposed Project and existing baseline environment.
3: Legislation, Policy and Guidance	Summarises relevant local and national flood risk and drainage policies and climate change allowances. Summarises the Sequential and Exceptional Tests.
4: Flood Risk	Summarises the main sources of flood risk to the Proposed Project during construction and operation and the measures proposed to avoid and reduce effects.
5: Conclusion	States the conclusions of the FRA.

2. Proposed Project Description

2.1 Proposed Project Description

2.1.1 The Proposed Project would comprise the following elements:

The Suffolk Onshore Scheme

- A connection from the existing transmission network via Friston Substation, including the substation itself. Friston Substation already has development consent as part of other third-party projects. If Friston Substation has already been constructed under another consent, only a connection into the substation would be constructed as part of the Proposed Project.
- A high voltage alternating current (HVAC) underground cable of approximately 1.9 km in length between the proposed Friston Substation and a proposed converter station (below).
- A 2 GW HVDC converter station (including permanent access from the B1121 and a new bridge over the River Fromus) up to 26 m high plus external equipment (such as lightning protection, safety rails for maintenance works, ventilation equipment, aerials, similar small scale operational plant, or other roof treatment) near Saxmundham.
- A HVDC underground cable connection of approximately 10 km in length between the proposed converter station near Saxmundham, and a transition joint bay (TJB) approximately 900 m inshore from a landfall point (below) where the cable transitions from onshore to offshore technology.
- A landfall on the Suffolk coast (between Aldeburgh and Thorpeness).

The Offshore Scheme:

- Approximately 122 km of subsea HVDC cable, running between the Suffolk landfall location (between Aldeburgh and Thorpeness), and the Kent landfall location at Pegwell Bay.

The Kent Onshore Scheme:

- A landfall point on the Kent coast at Pegwell Bay.
- A Transition Joint Bay (TJB) approximately 800 m inshore to transition from offshore HVDC cable to onshore HVDC cable, before continuing underground for approximately 1.7 km to a new converter station (below).
- A 2 GW HVDC converter station (including a new permanent access off the A256), up to 28 m high plus external equipment (such as lightning protection, safety rails for maintenance works, ventilation equipment, aerials, and similar small scale operational plant), near Minster. A new substation would be located immediately adjacent.

- Removal of approximately 2.2 km of existing HVAC overhead line, and installation of two sections of new HVAC overhead line, together totalling approximately 3.5 km each connecting from the substation near Minster and the existing Richborough to Canterbury overhead line.

2.1.2 The Proposed Project also includes modifications to sections of existing overhead lines in Suffolk (only if Friston Substation is not built pursuant to another consent) and Kent, diversions of third-party assets, and land drainage from the construction and operational footprint. It also includes opportunities for environmental mitigation and compensation . The construction phase will involve various temporary construction activities including overhead line diversions, use of temporary towers or masts, working areas for construction equipment and machinery, site offices, parking spaces, storage, accesses, bellmouths, and haul roads, as well as watercourse crossings and the diversion of public rights of way (PROWs) and other ancillary operations.

2.1.3 With regard to watercourse crossings, in the Suffolk Onshore Scheme nine temporary and three permanent culverts are proposed and as part of the Kent Onshore Scheme 27 temporary and four permanent culverts are proposed. None of these would be located on a main river. The temporary crossings would be removed following completion of construction of the Proposed Project, with watercourses re-instated.

2.2 Construction Assumptions

2.2.1 Subject to gaining development consent, construction works would be expected to start in 2026 and be functionally completed by 2031 with reinstatement potentially continuing into 2032. The construction schedule will be developed as the Proposed Project progresses and will take account of seasonal constraints such as protected species breeding or hibernation seasons and to reduce impacts associated with working on land that is prone to waterlogging and flooding.

2.3 Environmental Baseline

2.3.1 The Proposed Project crosses predominantly rural, open land both in Suffolk and in Kent. Due to the extent of the Proposed Project, it crosses the following Environment Agency main rivers and their associated floodplains in Suffolk (see **Application Document 6.4.2.4.1 Study Area and Water Environment Receptors**):

- Hundred River (a tributary of the River Alde); and
- River Fromus.

2.3.2 In Kent it crosses the River Stour (see **Application Document 6.4.3.4.1 Study Area and Water Environment Receptors**).

2.3.3 None of the proposed HVDC cable corridors (either in Suffolk or in Kent) would cross these watercourses and none of the proposed converter stations or substations would be situated in their floodplains. There would therefore be relatively limited interaction with these waterbodies and their floodplains, limited to clear span bridge crossing of the River Stour (temporary bridge during construction, illustrated in Drawing SEAL-MMD-SEAL-ENG-DWG-0720 in Appendix A) and River Fromus (permanent bridge, illustrated in Drawing SEAL-MMD-SEAL-ENG-DWG-0821 in Appendix A) for access and trenchless installation of the underground cables beneath the Hundred River floodplain and the coastal floodplain of the Stour at the Proposed Project's landfalls.

2.3.4 The topography of the Suffolk Onshore Scheme is such that the land within the Order Limits predominantly follows the topographic ridge running north-west from the coast between the Hundred River and River Alde. The ground has an average elevation of 23 metres above ordnance datum (mAOD), increasing at the north-western end of the scheme to a high point of approximately 30 mAOD. The proposed access route to the Saxmundham Converter Station which would cross the River Fromus in the western part of the Suffolk Onshore Scheme crosses a steep valley.

2.3.5 The topography of the Kent Onshore Scheme is predominantly uniform, with an average ground elevation of approximately 2 mAOD. From landfall to the A256, ground levels slope up to a peak of approximately 16 mAOD, before the land within the Order Limits slopes down again towards the Minster Marshes and River Stour.

2.3.6 The geology within the Order Limits of the Suffolk Onshore Scheme is defined by bedrock of the sands, gravels, silts and clays of the Crag Formation, the Chillesford Church Sand Member and at landfall the Corraline Crag. Within the Kent Onshore Scheme, bedrock deposits are of the Thanet Formation which overlies a chalk bedrock of the White Chalk Subgroup.

2.3.7 The superficial geology present beneath the Order Limits for the Suffolk Onshore Scheme is variable, comprising various lithologies of the Lowestoft Formation. For the Kent Onshore Scheme the superficial deposits are predominantly Tidal Flat Deposits, with limited areas indicated to be underlain by Head Deposits.

2.3.8 The hydrogeology in Suffolk is defined by Principal aquifers supported by the bedrock geology and secondary aquifers (a range of Secondary A, B and undifferentiated) supported by the superficial deposits. In Kent the bedrock geology supported Secondary A and Principal aquifers, with the superficial deposits supporting Secondary A and unproductive aquifers.

2.3.9 A more in-depth analysis of the geology and hydrogeology can be found in the groundwater risk assessments (**Application Document 6.3.2.5.B Appendix 2.5.B Preliminary Groundwater Risk Assessment** and **Application Document 6.3.3.5.B Appendix 3.5.B Preliminary Groundwater Risk Assessment Risk Assessment**) and the groundwater baseline assessments presented within **Application Document 6.2.1.5 Part 1 Introduction Chapter 5 EIA Approach and Methodology**.

2.3.10 In Suffolk, along the eastern areas of the Order Limits the soil is described as freely draining and slightly acidic sandy soils. Moving westwards the soils around Leiston are categorised as freely draining acid but base-rich highly fertile loamy soils. The north-western section of the proposed site around Saxmundham consists of slowly permeable, and seasonally wet slightly acid but base-rich loamy and clayey soils.

2.3.11 In Kent soil types present within the Order Limits are predominantly described as loamy and clayey soils of coastal flats.

3. Legislation, Policy and Guidance

3.1 Introduction

3.1.1 The following legislation and policy have been considered when producing this FRA:

- Flood and Water Management Act 2010 (The National Archives, 2010);
- Overarching National Policy Statement (NPS) for Energy (EN-1) (Department for Energy Security & Net Zero , 2023);
- NPS for Electricity Networks Infrastructure (EN-5) (Department for Energy Security & Net Zero, 2023);
- National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2024);
- Planning Policy Guidance (PPG) (Ministry of Housing, 2022); and
- Flood Risk Assessments: Climate Change Allowances (Environment Agency, 2022).

3.2 National Policies and Guidance

Overarching National Policy Statement for Energy (EN-1)

3.2.1 EN-1 provides specific guidance on the development of energy infrastructure in relation to flood risk for the lifetime of the Proposed Project.

3.2.2 EN-1 confirms that an FRA is required to assess flood risk from all sources for the lifetime of the Proposed 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.

3.2.3 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 and an assessment of all relevant sources of flood risk are presented in Section 4 of this FRA.

3.2.4 EN-1 also includes several additional requirements that are specific to Energy Infrastructure. Those that are of potential relevance to the FRA are set out in Table 3.1, together with the location in this FRA where they are addressed.

Table 3.1 EN-1 requirements relating to flood risk relevant to the Proposed Project and where they are addressed in this FRA

EN-1 Requirement	Where Addressed in the FRA
Part 5.8.7 "*Where new energy infrastructure is, exceptionally, necessary in flood risk areas (for example where there are no reasonably available sites in areas at lower risk), policy aims to make it safe for its lifetime without increasing flood risk elsewhere and, where possible, by reducing flood risk overall. It should also be designed and constructed to remain operational in times of flood.*"	In developing the Proposed Project there has been a comprehensive consideration of alternatives, as detailed in **Application Document 6.2.1.3 Part 1 Introduction Chapter 3 Main Alternatives Considered**, and a detailed routing and siting strategy has been developed. Details of the flood resilience built into the design of the Proposed Project and the measures to mitigate the potential for the Proposed Project to cause increases in flood risk elsewhere are provided in Section 4.
Part 5.8.14 "*This assessment should identify and assess the risks of all forms of flooding to and from the project and demonstrate how these flood risks will be managed, taking climate change into account.*"	Future flood risk to the Proposed Project over its lifetime is assessed in Section 4, and mitigation measures required to ensure flood resilience, taking climate change predictions into account are detailed in Sections 3.3 and 4.3. The Proposed Project's resilience to other aspects of climate change is addressed in **Application Document 6.2.5.1 Part 5 Project Wide Effects Climate Change**.
Part 5.8.18 *"Applicants for projects which may be affected by, or may add to, flood risk should arrange pre-application discussions before the official pre-application stage of the NSIP process with the [Environment Agency] or NRW, and, where relevant, other bodies such as Lead Local Flood Authorities, Internal Drainage Boards, sewerage undertakers, navigation authorities, highways authorities and reservoir owners and operators."*	The Proposed Project has engaged regularly with the Environment Agency, LLFAs and IDBs during the pre-application stage to agree assessment methodologies and key design principles and water environment mitigation measures. Details of these discussions are presented in Section 1.3.
Part 5.8.19 *"Such discussions should identify the likelihood and possible extent and nature of the flood risk, help scope the FRA, and identify the information that will be required by the Secretary of State to reach a decision on the application when it is submitted. The Secretary of State should advise applicants to undertake these steps where they appear necessary but have not yet been addressed."*	

EN-1 Requirement	Where Addressed in the FRA
Part 5.8.27 *"The surface water drainage arrangements for any project should, accounting for the predicted impacts of climate change throughout the development's lifetime, be such that the volumes and peak flow rates of surface water leaving the site are 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 effects of climate change on rainfall intensity have been accounted for in the drainage designs for the Proposed Project, as detailed in Section 3.3.

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

3.2.5 This is the NPS specific to electricity infrastructure and with regard to flood risk reiterates the requirements set out in EN-1, detailed above. Paragraph 2.3.2 of EN-5 states that the Proposed Project's resilience to climate change should be assessed and the policy states that an FRA should be prepared. The Proposed Project's resilience to climate change is assessed in **Application Document 6.2.5.1 Part 5 Project Wide Effects Climate Change** and is also addressed within this FRA.

National Planning Policy Framework (NPPF) and Guidance

3.2.6 The NPPF (Ministry of Housing, Communities and Local Government, 2024) sets out the Government's planning policies for England so that flood risk is considered at all stages of the planning and development process. The policy aims 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 policy advocates application of a sequential test whereby development in the low risk flood zone (Flood Zone 1) is preferentially supported. Where there are no reasonably available sites in Flood Zone 1, 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.

3.2.7 In addition, paragraph 170 of the 2024 NPPF states that '*the development should be made safe for its lifetime without increasing flood risk elsewhere*'. For a development to be considered acceptable with regard to flood risk, the Sequential Test requirements must be satisfied, along with demonstrating that:

- 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; and
- safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

3.2.8 Further details of the requirements for sequential testing and sustainable drainage are provided below.

Sequential Testing

3.2.9 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.

3.2.10 The PPG on Flood Risk and Coastal Change (Ministry of Housing, 2022) supports the NPPF with additional guidance on flood risk vulnerability classifications and managing residual risks. The PPG provides further description of Flood Zones (Table 3.2) and Vulnerability Classifications (Table 3.3) in order to assess the suitability of a specific site for a certain type of development.

Table 3.2 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%).
3b	High – Functional Floodplain	This zone comprises land where water must flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments (SFRA) areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on Flood Maps).

Table 3.3 Flood risk vulnerability and Flood Zone 'Compatibility'

Flood Zone Risk Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone 1	~~✓~~✓	~~✓~~✓	~~✓~~✓	~~✓~~✓	~~✓~~✓
Flood Zone 2	~~✓~~✓	~~✓~~✓	Exception Test required	~~✓~~✓	~~✓~~✓

Flood Zone Risk Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone 3	Exception Test required	~~✓~~✓	X	Exception Test required	X
Flood Zone 3b 'Functional Floodplain'	Exception Test required	~~✓~~✓	X	X	X

Key: ~~✓~~✓ = Development is appropriate; X = Development should not be permitted

3.2.11 The Proposed Project is classified as 'essential infrastructure' with respect to flooding vulnerability in the NPPF. The proposed Saxmundham Converter Station and Friston Substation in Suffolk; and the proposed Minster Converter Station and Substation in Kent, which represent the parts of the Proposed Project that are most vulnerable to flooding, are situated in Flood Zone 1, and have also been situated to avoid areas at high risk of surface water and groundwater flooding (see Section 4), satisfying the Sequential Test as these parts of the Proposed Project would be the most adversely affected by flooding.

3.2.12 The Proposed Project, including the Order Limits, presented on the General Arrangement Plans (**Application Document 2.14.1 General Arrangements Plans – Suffolk**) and (**Application Document 2.14.2 General Arrangements Plans – Kent**) have been developed following an extensive options appraisal process. Most of the underground cable sections are in Flood Zone 1. The location of the proposed permanent crossing of the River Fromus in Suffolk to provide access to the Saxmundham Converter Station has been selected to avoid land in Flood Zone 3. However, as is inevitable with a linear scheme, some locations cross Flood Zones 2 and 3, in particular associated with construction access routes (e.g. proposed temporary bridge over the River Stour in Kent) and where the marine cables make landfall.

3.2.13 As detailed in good practice measure W06 in the Outline CoCP (**Application Document 7.5.3.1 CEMP Appendix A Outline Code of Construction Practice**), National Grid would seek to avoid storage of construction materials within Flood Zone 3 and areas of high and medium risk of flooding from surface water and temporary access routes within Flood Zone 3 and areas of high and medium risk of flooding from surface water will be suitably designed for flood resilience in accordance with any conditions of a Flood Risk Activity Permit and removed at the end of the construction phase, with the land re-instated.

3.2.14 It is therefore concluded that the Proposed Project passes the Sequential Test.

Exception Test

3.2.15 As shown on the mapping in Appendix A, there are areas of the Proposed Project which lie within Flood Zone 3. Therefore, in accordance with NPS EN-1, the NPPF and PPG it is necessary for these aspects of the Proposed Project to satisfy the Exception Test, as the Proposed Project is classified as 'essential infrastructure'. The majority of the components of the Proposed Project which lie within Flood Zone 3 are water-compatible, such as drainage outfalls and overhead line pylons. Highly vulnerable components have been located outside of the floodplains.

3.2.16 The Exception Test at paragraph 5.8.11 of NPS EN-1 requires it to be demonstrated that:

a. *"The development would provide wider sustainability benefits to the community that outweigh the flood risk; and*

b.the project will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible will reduce flood risk overall".

3.2.17 Footnote 216 of this paragraph sets out that the wider sustainability benefits to the community include the benefits (including need), for the infrastructure set out in Part 3 of NPS EN-1.

3.2.18 In response to meeting part (a) of the Exception Test the need for the Proposed Project is explained in **Application Document 7.2 Strategic Options and Back Check Report**. The Proposed Project is one of the essential network reinforcements needed to deliver the UK's net zero target. The reinforcement will also support security and reliability of electricity supply. Without reinforcement, the capacity of the existing electricity network in East Anglia and the South East of England is insufficient to accommodate the connection of proposed new power sources connecting in the area. The Proposed Project would provide this reinforcement, helping to deliver 50 Gigawatts of electricity from offshore wind by 2030, and ultimately contributing towards achieving net zero.

3.2.19 Landscape and ecological enhancements are also proposed as part of the Proposed Project's design as detailed in **Application Document 7.5.7.1 Outline LEMP- Suffolk** and **Application Document 7.5.7.2 Outline LEMP- Kent.** Other benefits of the Proposed Project include employment generation and Gross Value Added contribution during construction and safeguarding land within the design for future improvements to Public Rights of Way.

3.2.20 In response to meeting part (b) of the Exception Test, this is addressed in this FRA which demonstrates that with mitigation the Proposed Project will be safe from flooding throughout its lifetime without increasing flood risk elsewhere. This includes through its design with site-specific drainage schemes and a range of control measures to prevent any increases in flood risk to neighbouring land and communities. This also takes into account climate change impacts required by paragraph 5.8.12 of NPS EN-1. Therefore, the Proposed Project satisfies part (b) of the Exception Test.

3.2.21 As the Proposed Project satisfies both elements of the Exception Test, development of essential utility infrastructure within Flood Zone 3 can proceed in accordance with the policy framework.

Sustainable Drainage

3.2.22 The PPG on Flood Risk and Coastal Change (Ministry of Housing, 2022) 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.

3.2.23 To manage surface water, the guidance states that it is necessary to consider the appropriateness of various SuDS measures, using the SuDS hierarchy set out in the PPG. The aim should be to re-use water where possible and where a discharge of surface runoff is required that this should be made according to the following drainage options, listed with the most favourable option first and least preferable last:

- into the ground (infiltration);
- to a surface water body;
- to a surface water sewer, highway drain, or another drainage system; and
- to a combined sewer.

3.2.24 The Environment Agency classifies surface water flood risk in four categories; 'very low', 'low', 'medium' and 'high' (Table 3.4).

Table 3.4 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%).

3.2.25 Surface water flooding can be managed through SuDS. The Outline CoCP (**Application Document 7.5.3.1 CEMP Appendix A Outline Code of Construction Practice**) sets out the good practice measures, including SuDS, that are proposed for managing surface water flood risk. As per good practice measure W11, where new permanent impermeable areas are created, drainage would be designed in accordance with the requirements of policy and guidance requirements of the relevant LLFAs and will include allowances for climate change in accordance with current (May 2022) Environment Agency requirements (Environment Agency, 2022).

Flood Risk Assessments: Climate Change Allowances

3.2.26 The United Kingdom Climate Projections 2018 (UKCP18) (Met Office, 2021) are a set of climate change projections that replace the previous set (UKCP09). These 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 but of relevance to this FRA, effects on rainfall intensity and river flows. These climate change allowances are described in Sections 3.3 and 4.3.

3.2.27 The Environment Agency's online advice note Flood Risk Assessments: Climate Change Allowances (2022) was published in February 2016 and most recently amended in May 2022.

3.2.28 Fluvial climate change allowances have been applied in the assessment of the proposed permanent crossing of the River Fromus in accordance with these Environment Agency guidelines.

3.2.29 The assessment of the temporary crossing of the River Stour for construction access has not applied climate change allowances. Construction of this bridge would be carried out within the near future (see Section 2.2), meaning future climate change effects are not applicable. However, the requirement to maintain navigation along the river, means that the soffit height of the proposed bridge is considerably in excess of the 1 in 100 year plus climate change flood level. An outline method statement providing information on how the bridge is intended to be constructed is provided in Appendix E (noting that a different model may be selected by the appointed contractor, but similar methods and controls would be adopted).

3.3 Rainfall Allowance for Drainage

3.3.1 The Suffolk Onshore Scheme is within the Environment Agency's East Suffolk management catchment (Environment Agency, 2022), where peak rainfall intensity is anticipated to increase between 20% (central estimate) and 45% (upper end estimate) and peak river flow increases range from 19% to 54% in the design lifespan of the Proposed Project. The Kent Onshore Scheme is within the Environment Agency's Stour management catchment (Environment Agency, 2022), where peak rainfall intensity is anticipated to increase between 20% (central estimate) and 45% (upper end estimate) and peak river flow increases range from 38% to 101% in the design lifespan of the Proposed Project.

3.3.2 The effects of climate change on rainfall intensity, in accordance with the latest published guidance in May 2022, would be included in the drainage design for the proposed Saxmundham Converter Station and Friston Substation in Suffolk, and the Minster Converter Station and Substation in Kent, in line with good practice measure W11 in the Outline CoCP (**Application Document 7.5.3.1 CEMP Appendix A Outline Code of Construction Practice**) which states *'Surface water drainage from permanent above ground infrastructure would be managed and treated using sustainable drainage systems (SuDS) in accordance with policy and guidance requirements of the relevant Lead Local Flood Authorities to include allowances for climate change in accordance with current (May 2022) Environment Agency requirements. These SuDS would be maintained over the lifetime of the Proposed Project and the drainage infrastructure would provide the storage necessary to achieve discharges at greenfield rates and would not significantly alter groundwater recharge patterns by transferring a significant recharge quantity from one catchment to another.''*

3.4 National Grid Policy

3.4.1 National Grid policy 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 1000 year) Annual Exceedance Probability flood event, including an appropriate allowance for climate change, where possible. As detailed in Section 4 Saxmundham Converter Station and Friston Substation in Suffolk, and the Minster Converter Station and Substation in Kent are located in Flood Zone 1 and meet the requirements of the policy. The proposed cable transition joint bays in both Suffolk and Kent, are also all located within Flood Zone 1, therefore meet the requirements of the policy.

3.5 Local Planning Guidance

3.5.1 In addition to the PPG described above, there are flood risk management-related guidance prepared by district and county councils. The relevant ones are listed below in Table 3.5 and have been considered when preparing this FRA.

Table 3.5 Local Planning Guidance

Name of Guidance	Summary	Where Addressed in the FRA
Suffolk		
Planning a Development in a Flood Zone (Suffolk County Council, 2024)	Aimed at planning for residential development, the guidance advises that developers should ensure emergency resources are able at the site to respond to a flood event and also advises that vehicles are likely unable to operate in water deeper than 20cm.	Details of the Emergency Action Plan and mitigations for construction worksites near water are listed in Table 1.1.
Suffolk Flood Risk Management Strategy (Suffolk Flood Risk Management Partnership, 2023)	Includes several policies for managing risk, improving resilience, and limiting impacts caused by flooding in Suffolk. These include the Protocol for Local Planning Authorities and Developers on SuDS, Surface Water Drainage and Local Flood Risk in Suffolk; Policy for Working on Watercourses in Suffolk, and Advice on what to do before, during and after a flood.	Details of the surface water management strategy, including the inclusion of SuDS is outline in Sections 3.3 and 4.4.
Suffolk SuDS Palette (SSP) (Suffolk County Council, 2018)	Includes guidance on developing landscape management plans in keeping with the landscape characteristics of Suffolk, whilst	Details of incorporating SuDS to manage surface water flood risk are

Name of Guidance	Summary	Where Addressed in the FRA
	maintaining resilience against climate change.	included in Table 1.1 and Section 4.4.
A Guide for Masterplanning Sustainable Drainage into Developments (AECOM, 2013)	This guidance outlines the process for integrating SuDS into the design of large developments. It provides guidance on how to design SuDS to address a range of flood risk issues.	Details of how SuDS have been incorporated into the Project design to manage surface water flood risk are included in Table 1.1 and Section 4.4.
Kent		
Kent Drainage and Planning Policy Statement (Kent County Council, 2019)	Outlines the Kent County Council policy requirements for sustainable drainage. These policies include the requirement for large developments to submit a drainage strategy at outline planning stage, which provides the overall site drainage strategy.	Details of the surface water management strategy, including the inclusion of SuDS is outline in Sections 3.3 and 4.4.

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 Proposed Project and its setting. These reports draw together a range of information and are prepared by relevant planning authorities in their role as LLFA. The evidence base related to flood risk presented in each of these reports is summarised in Table 4.1.

Table 4.1 Summary of flood risk data sources

Source	Key Information
Suffolk	
Suffolk Coastal and Waveney District Councils Level 1 SFRA (Scott Wilson, 2008)	Recorded flood incidents indicate that the most recent flooding assumed to be within the Order Limits resulted from major tidal surges along the East Suffolk coastline. There is no mapping available to represent specific locations affected.
Suffolk County Council Preliminary Flood Risk Assessment Report (AECOM, 2017)	Very coarse mapping indicates that areas within the Order Limits in Suffolk lie in the vicinity of a potential flooding area, defined by a 1km grid square using data from a 1 in 200 year annual chance rainfall event. More refined data is available from the Friston Surface Water Study (BMT, 2020).
Suffolk Flood Risk Management Strategy (Suffolk Flood Risk Management Partnership, 2023)	There is no mention of any flood events in the study area.
Friston Surface Water Study (BMT, 2020)	The surface water modelling study indicates that the location of the proposed Friston Substation is at low risk of surface water flooding, with only very localised areas at higher risk in the near vicinity. An extract of the modelling data is shown in Plate 4.2. A significant history of surface water flooding impacting the village of Friston is detailed in the study.
Lowestoft to Felixstowe SMP7 Shoreline Management Plan (Suffolk Coastal District Council, 2012)	The Thorpeness Haven Beach ALB14.2 unit (Suffolk) has a management approach outlined as 'monitor and allow the frontage to realign'. In some areas works to repair or construct short stretches of defence to provide localised protection (such as to a slipway, access point or isolated properties) may be considered by the Local Planning Authority.
Lead Local Flood Authority Section 19 (Flood and	Flood event in vicinity of (but not within) Suffolk Onshore Scheme Order Limits at Moverley Way, Aldeburgh on 6 October 2019

Source	Key Information
Water Management Act (2010) Flood Investigation Report – Moverley Way, Aldeburgh, Suffolk (Suffolk Flood Risk Management Partnership, 2020))	caused by surface water flooding resulting from significant rainfall event.
Lead Local Flood Authority Section 19 (Flood and Water Management Act (2010) Flood Investigation Report – Alde Lane, Aldeburgh, Suffolk (Suffolk Flood Risk Management Partnership, 2020))	Flood event in vicinity of Suffolk Onshore Scheme Order Limits at Alde Lane, Aldeburgh on 6 October 2019 caused by surface water flows resulting from significant rainfall event.
Lead Local Flood Authority Section 19 (Flood and Water Management Act (2010) Flood Investigation Report – Aldeburgh Road, Friston (Suffolk Flood Risk Management Partnership, 2020))	Flood event in vicinity of Suffolk Onshore Scheme Order Limits at Aldeburgh Road, Friston on 6 October and 21 October 2019, caused by surface water runoff from adjacent agricultural land, resulting from significant rainfall event.
Lead Local Flood Authority Section 19 (Flood and Water Management Act (2010) Flood Investigation Report – Old Homes Road, Thorpeness, Aldringham cum Thorpe (Suffolk Flood Risk Management Partnership, 2021))	Flood event in vicinity of Suffolk Onshore Scheme Order Limits at Old Homes Road, Thorpeness, on 6 October 2019 caused by surface water flooding from exceedance of surface water drainage systems.
Kent	
Strategic Flood Risk Assessment Thanet District Council (Herrington Consulting Ltd, 2022)	The most recent record of flooding associated with the River Stour within the Kent Onshore Scheme Order Limits was documented in 2000.
Strategic Flood Risk Assessment 2019 Dover District Council (Herrington Consulting Limited, 2019)	The SFRA indicates that the River Stour is protected by flood defences along the extent of the reach within the Kent Onshore Scheme Order Limits. The mapping shows there are recorded fluvial flood events within the Order Limits associated with the River Stour.
Level 2 Strategic Flood Risk Assessment 2019 Dover District Council (Herrington Consulting Limited, 2021)	There is no mention of any flood events in the study area.

Source	Key Information
Kent County Council Preliminary Flood Risk Assessment (Kent County Council, 2011)	Coarse mapping of recorded past surface water flood events indicates that the Kent Onshore Scheme Order Limits may coincide with the location of historic flood locations in Pegwell Bay.
Kent Local Flood Risk Management Strategy (Kent County Council, 2017)	The surface water flood risks in the area surrounding Ramsgate are not considered to constitute a nationally significant flood risk, therefore it is not confirmed as a PFRA flood risk area.
Thanet Stage 1 Surface Water Management Plan (JBA Consulting, 2013)	The report identifies that SuDS are the preferred method of surface water management within the District. Where land take and groundwater protection allow, infiltration SuDS have a medium potential. Where infiltration is not possible, preference should be given to discharge surface water into watercourses rather than into foul water drains.
Dover Surface Water Management Plan (Jacobs, 2011)	There is no mention of any flood events in the study area.

4.2 Sources of Flooding

4.2.1 Table 4.2 outlines the sources of flooding which have been scoped out of the assessment after engagement with the flood risk management authorities.

Table 4.2 Summary of scoped out flood sources

Flood Source	Reason for Scoping Out
Sewers (foul water) and Water Mains	As outlined in **Application Document 6.2.1.4 Part 1 Introduction Chapter 4 Description of the Proposed Project**, the substations and converter stations would include permanent surface and foul drainage systems. Hard standing areas would be drained to the surface water drainage system, attenuated and treated through sustainable drainage systems (SuDS) and discharged to local watercourses or infiltrated where geology allows. There would be no permanent foul discharge required at the sites, but a waste/foul water system would be used on the sites, comprising short pipes from the amenities buildings to separate cesspools that would be periodically emptied as required. Wastewater generated would be very limited given the substation sites would be unmanned and the converter stations would only have a small contingent of staff, wastewater would only come from use of facilities in the amenities buildings. The Proposed Project would not add burden to existing foul sewers and therefore, this source of flooding has been scoped out.

Flood Source	Reason for Scoping Out
Reservoirs and other Artificial Sources	There are no reservoirs, canals or other artificial water bodies within the Order Limits. Therefore, these sources of flood risk have been scoped out.

4.2.2 Based on the review of existing flood risk data and reports, the following potential sources of flooding have been considered in relation to the Proposed Project:

- rivers and the sea;
- pluvial (surface water); and
- groundwater.

4.2.3 Given the nature of the Proposed Project, there is an important distinction to be made between flood risk during construction and operational risk. The construction phase (spanning approximately five years) would require various temporary works in terms of working areas, excavations and other elements, which, once the works are complete, would be removed and working areas reinstated. The operational phase would require a smaller footprint of works with a design life of typically 40 years (though in line with policy requirements and as agreed with the Environment Agency a design life of 75 years has been applied). The assessment presented in the following sections assesses both construction and operation for each source of flooding.

4.2.4 The assessment considers both the potential impacts on the Proposed Project, and the potential impacts elsewhere as a result of the Proposed Project.

4.3 Flood Risk from Rivers and the Sea

Introduction

4.3.1 The Flood Map for Planning (Environment Agency, 2021) shows the Flood Zones for these forms of flooding, as defined in Section 3. It highlights that the Proposed Project, as well as proposed temporary construction compounds, are largely in Flood Zone 1 (low risk).

4.3.2 Localised areas of the Proposed Project (as shown on the General Arrangement Plans (**Application Document 2.14.1 General Arrangements Plans – Suffolk**) and (**Application Document 2.14.2 General Arrangements Plans – Kent**) are located in Flood Zone 3 (See Figure 1 Appendix A). The approximate widths of these floodplain areas and the section of the Proposed Project they are located within the Order Limits are:

Suffolk Onshore Scheme

- approximately 700 m inland from landfall;
- approximately 40 m adjacent to School Road (Hundred River);
- approximately 10 m at Church Road (tributary of River Alde);
- approximately 160 m, narrowing to 15 m, at western extent of Order Limits (River Fromus);

- approximately 70 m across the proposed permanent monitoring access route from the B1121 to the permanent outfall (tributary of River Fromus); and
- approximately 30 m to 80 m at Hazlewood Common, south of Aldeburgh Road (tributary of River Alde).

Kent Onshore Scheme

- Approximately 450 m inland from landfall.
- Approximately 125 m across proposed access track through Stonelees Golf Course (tributary of Minster Stream).
- Approximately 500 m in area of proposed pylons (River Stour).

4.3.3 Another source of available data that defines flood risk from rivers and the sea is the National Flood Risk Assessment 2 (NaFRA2), mapped outputs from which have recently been published by the Environment Agency. The mapping uses both existing detailed local information and improved national data and shows areas that are at high risk (more than a 3.3% chance of a flood each year), medium risk (between 1% and 3.3% chance of a flood in each year), low risk (between 0.1% and 1% chance) and very low risk (less than 0.1% chance).

4.3.4 The most recent record of flooding (1978) within the Suffolk Onshore Scheme Order Limits was at landfall, shown on the Environment Agency Historic Flood Map (Environment Agency, 2023).

4.3.5 The most recent record of flooding (2000) associated with the River Stour within the Order Limits is documented in the Thanet District Council SFRA (Herrington Consulting Ltd, 2022).

4.3.6 The risk of flooding from the sea has been incorporated within the assessment of the fluvial flood risk, as the River Stour and River Alde are tidally influenced in their downstream reaches within the study area.

Construction Phase Risk Assessment

Suffolk Onshore Scheme

4.3.7 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 and sea is defined as very low, as corroborated by the NaFRA2 dataset.

4.3.8 The following aspects of the Suffolk Onshore Scheme are located within Flood Zone 1: proposed underground HVDC/HVAC cable route, Friston Substation, Saxmundham Converter Station, all construction compounds and all cable transmission joint bays. This also means there is no potential for these elements of the Proposed Project to increase fluvial/tidal flood risk during their construction.

4.3.9 The emergence of the underground cables at landfall lies within Flood Zone 1, however the underground HVDC cable route linking to the Offshore Scheme crosses the functional floodplain of the Hundred River and is therefore at high risk of fluvial/tidal flooding. A trenchless crossing of Flood Zone 3 is proposed for the underground cable installation, which avoids effects on the River Hundred during construction (W12).

4.3.10 The proposed temporary drainage outfall to the Hundred River and the proposed permanent, buried infiltration outfall pipe and outfall, to a tributary of the River Alde at Church Road in Friston, lie within Flood Zone 3. Outfalls would be constructed with a minimum vertical distance of 200mm from the permanent water level of the receiving watercourse to avoid submergence. Headwalls will be provided, and the outfalls would be angled at 45 degrees to the water flow, with scour protection, for example placed rip rap. provided as necessary.

4.3.11 During construction, one temporary drainage attenuation basin is proposed to be located in the fluvial floodplain to serve the Suffolk Onshore Scheme. Details of this temporary basin are outlined in Table 4.3.

Table 4.3 Summary of temporary drainage attenuation basin in the floodplain – Suffolk Onshore Scheme

	Suffolk Onshore Scheme
Basin ID	TC-40-ATPN
Flood depth (mm)	75 - 200
Footprint (m^2)	265
Volume of storage loss (m^3)	19 – 53
In Flood Zone 3b	No
Crest level	Above the 1 in 100 yr flood level

4.3.12 At the proposed temporary basin location, flood water depths are shallow, reaching a maximum of 200 mm in the 1% (1 in 100) annual chance flood event and flood flows would be able to continue to route from north to south around the basin. The impediment caused by the raised embankment around the basin would likely cause some backing up of water, which may cause a limited increase in flood depths and extent immediately north of the pond. However, this area of land is within the Order Limits. There are no vulnerable third-party land uses, or existing infrastructure/properties in the vicinity.

4.3.13 However, recognising the policy driver to avoid development in Flood Zone 3, an alternative design solution comprising approximately 250 m of linear drainage infrastructure (swale, trench or similar) would be feasible in this location, replacing basin TC-40-ATPN.

~~4.3.11~~4.3.14 The proposed access route from School Road to the pylon located adjacent to the Hundred River, also lies within Flood Zone 3. There will be no alteration to the level of the land along this route therefore no potential for impacts on floodplain flow paths or floodplain storage.

~~4.3.12~~4.3.15 Construction within the floodplains at these three locations would be done in accordance with the good practice measures set out in **Application Document 7.5.3.1 CEMP Appendix A Outline Code of Construction Practice**, including: W01, W02, W04, W07 and GG05. On receipt of a severe flood warning, the contractor would deploy suitable flood protection measures to safeguard work site personnel and equipment.

~~4.3.13~~4.3.16 The footprint of the proposed permanent watercourse crossing over the River Fromus is located outside of the functional floodplain under both of the bridge design options, therefore meets with the ethos of the Sequential Test. Neither of the design options for the bridge encroach into the channel of the watercourse, with abutments set 8 m back from the channel over both banks. The construction compound to the east of the ditch connecting to the River Fromus is located outside of Flood Zones 2 and 3, in the low risk flood zone.

~~4.3.14~~4.3.17 The Suffolk Onshore Scheme is considered to be mainly at a low risk of flooding from rivers and the sea during construction, with localised areas at watercourse crossings and at landfall at a medium to high risk. These risks will be managed through the measures detailed in and secured by the **Application Document 7.5.3.1 CEMP Appendix A Outline Code of Construction Practice**, summarised in Section 1 above, reducing the residual risk of flooding from these sources to low.

Kent Onshore Scheme

~~4.3.15~~4.3.18 During construction, the following aspects of the Kent Onshore Scheme are located within Flood Zone 1, as corroborated by the NaFRA2 dataset, therefore are at very low risk flooding from rivers and the sea: proposed HVDC underground cable route, Minster Converter Station and Substation, all construction compounds and all cable transition joint bays. This also means there is no potential for these elements of the Proposed Project to increase flood risk from these sources during construction, as project activities would not result in any loss of floodwater storage or interruption of any floodplain flow paths.

4.3.19 The emergence of the underground cables at the Pegwell Bay landfall lies within Flood Zone 1~~, however~~. At the Kent landfall, rock bags/concrete used at the HDD exit (in the temporary and permanent case) will not be located within 16 m of the River Stour (tidal element) or the coastal flood defences. HDD exits will be located within the temporary coffer dams at the landfall, which are located more than 100 m from both the River Stour (tidal element) and the coastal flood defences.

~~4.3.16~~4.3.20 However, the underground HVDC cable route linking to the Offshore Scheme crosses the functional floodplain of the River Stour and Stonelees Stream and is therefore at high risk of fluvial/tidal flooding. A trenchless crossing of Flood Zone 3 is proposed for the underground cable installation, which avoids effects on the River Stour and Stonelees Stream during construction and measures would be put in place during the installation to ensure the integrity of existing flood defences (W12). Good practice measure W02 also states that soil stockpiles will be stored in excess of 15 m from the main river (16 M where the river is tidal), to avoid impacts on the floodplain flow paths.

~~4.3.17~~4.3.21 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 overhead line and associated pylon works. Within Flood Zone 3, there are six proposed new pylons, two pylons to be dismantled and five existing pylons to undergo maintenance works. Temporary overhead line structures would be required during construction to carry out the maintenance works. These aspects of the construction are at a high risk of fluvial flooding. However, given the nature of the Proposed Project, to link into the existing overhead line network, it is not possible to locate the pylons outside of Flood Zone 2 and 3. The works would therefore be undertaken in accordance with good practice measures W01 and W07 in the **Application Document 7.5.3.1 CEMP Appendix A**

Outline Code of Construction Practice, with contractor(s) subscribing to the Environment Agency's Floodline service, Met Office's Weather Warnings email alerts system and any other relevant flood warning information. The contractor(s) will implement a suitable flood risk action plan, which will include appropriate evacuation procedures should a flood occur or be forecast.

~~4.3.18~~4.3.22 There is a temporary construction access crossing proposed over the River Stour. In line with good practice measure W04, the crossing will be a clear span bridge. The bridge soffit height will be sufficient to meet with navigational requirements and in excess of the 1% flood level plus 600 mm freeboard in accordance with Environment Agency requirements. Abutments would be set back 8m from the river's edge. The good practice measures outlined in W02 for vehicular watercourse crossings would also be implemented. All of these measures would prevent any impacts on the current flow regime and flood risk associated with this watercourse.

~~4.3.19~~4.3.23 The smaller watercourses (such as the tributaries of the Minster Stream and River Stour) do not have mapped fluvial flood extents. The Proposed Project interacts with these at numerous watercourse crossing locations. The crossings would be designed to avoid impacts on flow regimes and prevent increases in the risk of fluvial flooding and would be constructed in line with good practice measures W02, W03, W04 and W07.

~~4.3.20~~4.3.24 The Kent Onshore Scheme is considered in the main to be at a low risk of flooding from tidal/fluvial sources during construction, with the southern part of the Kent Onshore Scheme (overhead line) and landfall areas at a high risk. Implementation of good practice measures would reduce the residual risk of flooding from these sources to low.

4.3.25 During construction, one temporary drainage attenuation basin is proposed to be located in the fluvial floodplain to serve the Kent Onshore Scheme. Details of this temporary basin are outlined in Table 4.4.

Table 4.4 Summary of temporary drainage attenuation basin in the floodplain – Kent Onshore Scheme

	Kent Onshore Scheme
Basin ID	TC-18-ATPN
Flood depth (mm)	600
Footprint (m^2)	194
Volume of storage loss (m^3)	116
In Flood Zone 3b	Yes
Crest level	Above the 1 in 100 yr flood level

4.3.26 The floodplain extent in which the Kent basin is located is extensive and the footprint of the pond is small. Flood flows would continue to route around the basin with limited impediment caused by its raised embankment. The Order Limits cover a large area of land in this location and as shown in **Application Document 9.101 (B) Kent Onshore**

Scheme – Fluvial Flooding from the River Stour submitted at Deadline 6, there is ample space to provide floodplain compensation storage, which for this basin, is secured by commitment W35 within **Application Document 9.84 (C) Register of Environmental Actions and Commitments**. There are no vulnerable third-party land uses, or existing infrastructure/properties in the vicinity.

Summary

~~4.3.21~~4.3.27 A summary of the construction temporary works activities located within Flood Zone 3 is provided in Table 4.~~3~~5. As illustrated, works are very limited in extent and would cause negligible disruption to the movement of water across the floodplains. In Suffolk, no land raising or topographical changes are associated with these works, ~~therefore there~~and an alternative design solution for basin TC-40-ATPN would ~~be no~~avoid any temporary loss of floodplain storage and ~~no~~ perceptible temporary change to baseline flood conditions. In Kent, the footprint of the Proposed Project construction activities in Flood Zone 3 is also small. ~~As~~In areas of temporary construction within the fluvial floodplain of the River Stour ~~is tidally influenced, discussions~~, in discussion with the Environment Agency ~~regarding~~, provision of compensation storage ~~provision have concluded that this was not a requirement as~~is secured by commitment W25 and the impacts of the Proposed Project would be negligible.

Table 4.5 Summary of temporary construction components in Flood Zone 3

Temporary Project Component	Watercourse
Suffolk	
Haul road access from School Road to pylon Temporary drainage outfall into Hundred River	Hundred River
Temporary drainage outfall at Church Road	River Alde
Temporary drainage basin TC-40-ATPN	River Fromus
Kent	
Temporary bridge across River Stour for haul road access (crossing K/WA/0051)	River Stour
Haul road access from Ebbsfleet Lane	River Stour
Temporary drainage basin TC-18-ATPN	River Stour

Operational Risk Assessment

Suffolk Onshore Scheme

~~4.3.22~~4.3.28 During operation, the majority of the proposed works would be either buried (underground cables) or elevated (overhead line around Friston). Both the proposed Friston Substation and Saxmundham Converter Station are located within Flood Zone

1, therefore at a low risk of fluvial and tidal flooding during operation. The NaFRA2 data also indicates a low risk.

4.3.234.3.29 At landfall, trench excavation and cable trenching will be limited to the subtidal area, with trenchless techniques such as Horizontal Directional Drilling (HDD), used to bring the HVDC cable onshore. Ground investigations have been conducted, detailed in **Application Document 6.3.2.5.D Appendix 2.5.D Ground Investigation Report – Suffolk,** to confirm whether the geology is appropriate for the trenchless methods proposed and commitment GH01 secures that further intrusive ground investigations and assessment will be undertaken prior to construction to inform appropriate geotechnical designs in relation to the site and structure specific ground conditions. There are multiple techniques available, however whichever is adopted, the design is undertaken to avoid undue settlement and the surface level is monitored throughout the works to ensure agreed tolerances are adhered to. This would safeguard the integrity of existing flood defences.

Coastal Erosion and Flood Risk

4.3.30 Coastal erosion and recession processes over the lifetime of the Project have been assessed using modelling, detailed in **Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Environment**, and the final engineered HDD solution will address coastal erosion.

4.3.31 The Suffolk landfall location is on the coastline covered by the Lowestoft to Felixstowe Shoreline Management Plan (SMP) which is split into 7 areas (Royal Haskoning, 2010). The landfall location is situated within the Thorpeness to Orford Ness 5 area, which is further split it into management units. The landfall location aligns with management unit ALB14.2. The management approach for ALB14.2 in the short term (0 to 20 years, 2005 to 2025), medium term (20 to 50 years, 2025 to 2055) and the long term (50 to 100 years, 2055 to 2105) is managed realignment.

4.3.32 Data from profile S040 (which is aligned with the Suffolk landfall site) of the Anglian Coastal Monitoring Programme (Anglian Regional Coastal Monitoring Programme, 2022) shows that between 1991 – 2013/2014 the beach retreated 10 to 20 m reaching its narrowest in 2013/2014. Between 2014 to 2022, the beach partially stabilised, with no continuous erosional trend, however this section of beach still shows profile variation over the years.

4.3.33 To assess the worst-case scenario for future erosion at the Suffolk landfall, the No Future Intervention (NFI) National Coastal Erosion Risk Mapping (NCERM) 2025 dataset (Environment Agency, 2025) was utilised. This dataset estimates erosion based on the UKCP18 high emissions scenario, Representative Concentration Pathway (RCP) 8.5, in the 95th percentile. NCERM projections suggest an area of future erosion risk extending up to 77 m landwards by 2055 and 118 m by 2105, for the NFI scenario.

4.3.34 The final engineered HDD solution will address coastal erosion based on the NCERM dataset, and ensure the cable depth is such it, nor the landfall infrastructure becomes exposed, accounting for the predicted effects of climate change. This will ensure that flood risk is not adversely affected.

~~4.3.24~~

~~4.3.25~~4.3.35 All temporary crossings of watercourses would be removed, and watercourses reinstated, with planting re-established. The only watercourse crossings remaining would be the permanent access bridge over the River Fromus, a culvert on an adjacent drainage ditch, and two culverts on a small drainage ditches connected to the River Fromus, beneath the proposed permanent access route to the Friston Substation and on an access route for monitoring off the B1110. Culvert design in accordance with the requirements of relevant environmental permits (W01) and established design principles (W03) would ensure no increase in baseline flood risk at these culvert crossings.

~~4.3.26~~4.3.36 A separate hydraulic modelling assessment has been undertaken for the River Fromus crossing, the findings of which are summarised below (a more detailed summary is included within Appendix B).

Fromus Hydraulic Modelling

~~4.3.27~~4.3.37 Hydraulic modelling has been undertaken using the existing Alde, Ore and Fromus model from the Environment Agency. Two design options for the crossing, as detailed in Table 4.4 of the Project Description (**Application document 6.2.1.4 Part 1 Introduction Chapter 4 Description of the Proposed Project**) were represented in the model to assess the potential for any impact on fluvial flood risk during operation. The 1 in 30 year (3.3% chance), 1 in 100 year (1% chance) and 1 in 100 year plus 29% climate change (following climate change allowance guidance (Environment Agency, 2022)) annual probability flood events were modelled.

~~4.3.28~~4.3.38 Outputs from the modelling demonstrate that the footprint of both the larger (bridge height of up to 6 m from the ground level at the abutment to the top of the parapet, with ~~62m~~62 m long approach ramps) and smaller (bridge height of up to 4 m from the ground level at the abutment to the top of the parapet, with 42 m long approach ramps) bridge designs lie outside of the fluvial modelled flood extents. Therefore, it has been concluded that the proposed permanent bridge over the River Fromus would not result in any increase in fluvial flood risk. In addition, as there would be no displacement of flood waters on the fluvial floodplain, and mitigation measures are not required. The proposed permanent crossing is concluded to be at a very low risk of fluvial flooding during operation of the Proposed Project and there would be no flood risk detriment to third party land.

~~4.3.29~~4.3.39 As detailed in Appendix B, during the H++ credible maximum climate change scenario, which has been investigated as a sensitivity test within the Fromus model, in accordance with Environment Agency guidance, a small amount of flooding is predicted at the base of the western approach ramp to the proposed bridge. The maximum floodwater depth is modelled as ~~60mm~~60 mm. In a further sensitivity test if the modelling parameters a maximum flood depth of ~~70mm~~70 mm was predicted in this isolated area. At these flood depths, the bridge would remain safely accessible to vehicles under these extreme scenarios. It is also noted that the proposed Friston Substation would not be staffed continuously, being continuously monitored remotely by National Grid, with planned visits on an approximately monthly basis.

4.3.40 As detailed in Appendix B, sensitivity testing of a 20% increase in Mannings N roughness in the model was undertaken. Plate 4.1 shows that in the 1 in 100 year plus 29% climate change modelled event, including the 20% roughness increase, the western approach road to the bridge is partially flooded. There is a 25 m flood extent across the road with an average depth of 60 mm and maximum modelled flood depth of 120 mm. Although the bridge would be lightly trafficked and these flood depths passable to most traffic, to remove any future risk of the bridge not being accessible in theoretical future operational scenarios, the western approach road could be raised in the order of 100 mm to provide added flood resilience.

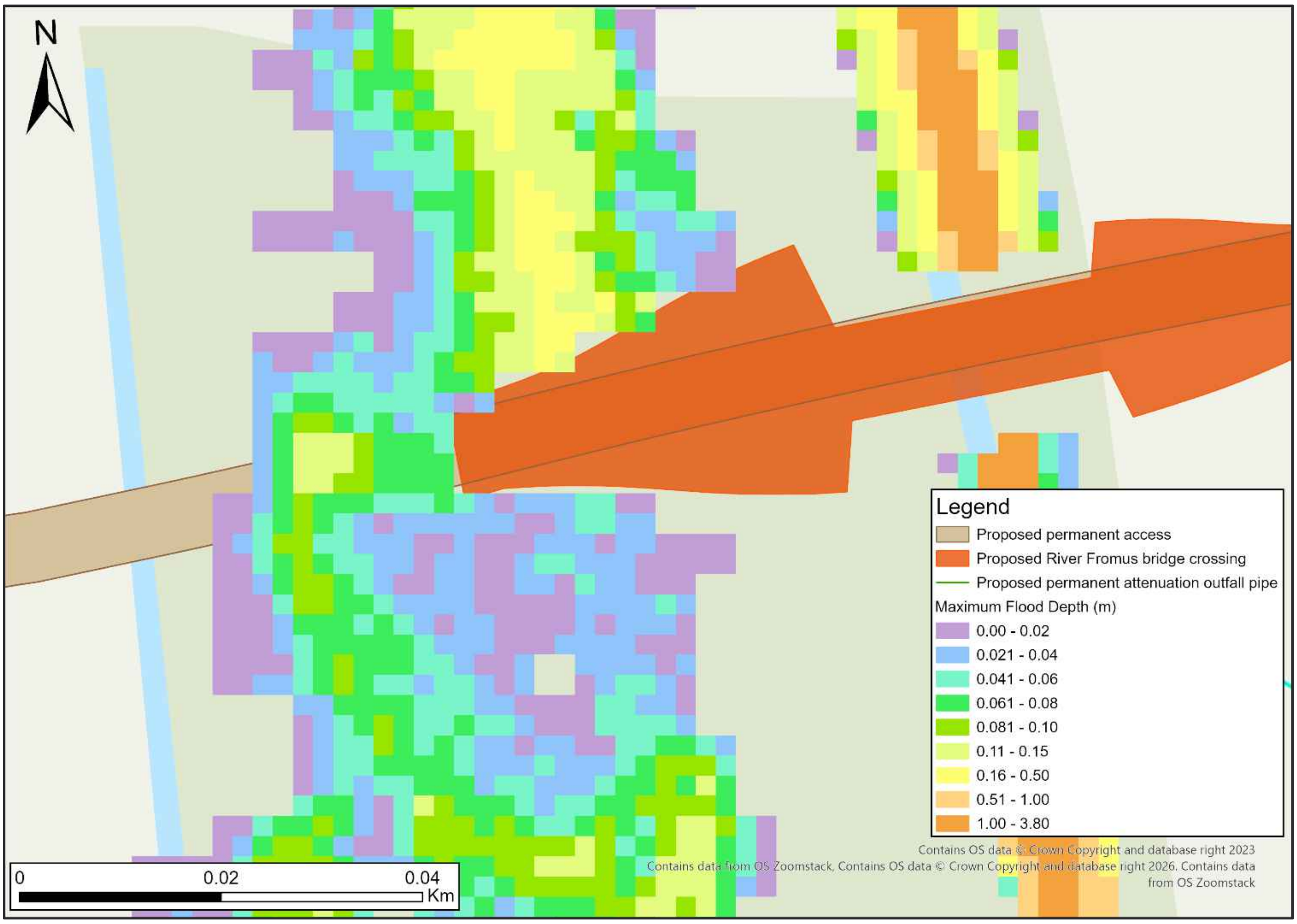


Plate 4.1 Modelled roughness sensitivity test flood water depths

~~4.3.30~~4.3.41 Operational flood risk to the Suffolk Onshore Scheme in relation to rivers and the sea is therefore concluded to be very low and the Suffolk Onshore Scheme would not impact on this status.

Kent Onshore Scheme

~~4.3.31~~4.3.42 During operation, the majority of the proposed works would be either buried (underground cables) or elevated (overhead line). Both the Minster Converter Station and Substation are located within Flood Zone 1, therefore at a low risk of fluvial/tidal flooding during operation. The NaFRA2 dataset corroborates this.

~~4.3.32~~4.3.43 At landfall, trench excavation and cable trenching will be limited to the subtidal area, with trenchless techniques such as HDD, used to bring the HVDC cable onshore.

~~4.3.33~~4.3.44 Ground investigations have been conducted, detailed in **Application Document 6.3.3.5.C Appendix 3.5.C Ground Investigation Report – Kent,** to confirm whether the geology is appropriate for the trenchless methods proposed and commitment GH01 secures that further intrusive ground investigations and assessment will be undertaken prior to construction to inform appropriate geotechnical designs in relation to the site and structure specific ground conditions. There are multiple techniques available, however whichever is adopted, the design is undertaken to avoid undue settlement and the surface level is monitored throughout the works to ensure agreed tolerances are adhered to. This would safeguard the integrity of the existing flood defences.

~~4.3.34~~4.3.45 ~~Coastal~~As detailed for the Suffolk Onshore Scheme above, coastal erosion and recession processes over the lifetime of the Project have been assessed using modelling, detailed in **Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Environment**, and the final engineered HDD solution will address coastal erosion and ensure the cable depth is such it, nor the landfall infrastructure becomes exposed, accounting for the predicted effects of climate change. This will ensure that flood risk is not adversely affected.

~~4.3.35~~4.3.46 All of the temporary watercourse crossings would be removed following the construction phase. There are only three permanent culverts proposed to remain during operation: two along the HVDC cable route (Minster Stream and tributaries) and one at the overhead line crossing of a River Stour tributary, shown in the watercourse crossing schedule (**Application Document 6.3.1.4.A Appendix 1.4.A Crossings Schedules**). All of these crossings are located within Flood Zone 1 and therefore are at a low risk of fluvial flooding during operation. Crossing designs would prevent any flood risk increases.

~~4.3.36~~4.3.47 The new pylons and overhead line route would remain during operation, located partially within Flood Zone 3. However, the nature of the structures (open lattice and raised cables) means that they are resilient to flooding and floodwater could pass through the structures unimpeded. Therefore, this part of the Kent Onshore Scheme is of low vulnerability to fluvial flooding during operation. As the River Stour floodplain in this location is tidal and given the design of the structures, compensation for floodplain storage loss would not be required, in line with stakeholder advice.

Conclusions

~~4.3.37~~4.3.48 The FRA has concluded that, as a consequence of the embedded design and control and management measures that would be adopted, the Proposed Project would not be at significant risk of flooding from these sources. It is not expected for there to be any increase in flood risk from these sources during construction or operation from the Proposed Project activities.

4.4 Surface Water Flood Risk

Introduction

4.4.1 The assessment of surface water flood risk has been made with reference to the Environment Agency Risk of Flooding from Surface Water Map, part of the recently published NaFRA2 dataset (Environment Agency, 2025), which is informed by 'direct rainfall' modelling undertaken at a high (2 m) spatial resolution, in addition to outputs from the Friston Surface Water Management Plan (BMT, 2020). This is a detailed study of surface water flood risk in the locality of Friston, informed by more spatially refined hydraulic modelling.

4.4.2 There are several recorded surface water flooding incidents in the vicinity of the Suffolk Onshore Scheme, documented in the Section 19 reports listed in Table 4.1, however none lie within the Order Limits. There are three recorded incidents of historical surface water flooding within the Kent Onshore Scheme Order Limits, documented in the Thanet District Council SFRA (Herrington Consulting Ltd, 2022).

4.4.3 Details of the key principles and commitments to managing this source of flood risk, which has the potential to be exacerbated by the Proposed Projects construction and operation without suitable controls, are provided below. Additional information is provided in Appendix C.

Construction Phase Risk Assessment

4.4.4 During construction, activities would include topsoil stripping and excavation to create for example the cable trenches, construction of temporary access routes (which would cross a number of watercourses) and establishment of construction compounds. These activities could temporarily change existing land surface permeabilities and have an effect on the rainfall runoff regime. Also, there is potential for existing land drainage systems to be disrupted, for example local to proposed watercourse crossing locations.

4.4.5 Table 4.6 below provides a summary of the watercourse crossings that are located in areas at high risk of flooding from surface water. The crossing IDs refer **Application Document 6.3.1.4.A Appendix 1.4.A Crossings Schedules**, which provides further information.

Table 4.6 Watercourse crossings at high risk of flooding from surface water

Crossing ID - Suffolk	Crossing ID - Kent
S/WA/0057	K/WA/0036
S/WA/0064	K/WA/0036.1
S/WA/0064.4	K/WA/0038
S/WA/0064.5	K/WA/0042
S/WA/0068	K/WA/0043

Crossing ID - Suffolk	Crossing ID - Kent
S/WA/0070	

4.4.6 **Application Document 7.5.3.1 CEMP Appendix A Outline Code of Construction Practice** includes good practice measures to reduce the impacts of these activities on land drainage and surface water flood risk. Measure W06 states where new or additional impermeable surfacing is required on any access tracks, bellmouths and in compound areas, for example for parking provision, site offices, Sustainable Drainage Systems (SuDS) will be incorporated, appropriate to the existing ground conditions, with infiltration to ground preferred where conditions are suitable. Runoff 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 (GG15).

4.4.7 In addition, severance of existing land drainage routes, including agricultural field drainage systems, would be managed during construction through provision of temporary alternative drainage routes, which would be permanently reinstated or rerouted to maintain their function (W10). Surface water drainage from permanent infrastructure would be managed using SuDS in accordance with LLFA policies (W11).

4.4.8 Wash water from washing down of vehicles and equipment within designated areas will be prevented from passing untreated into watercourses and groundwater. Appropriate measures will include use of sediment traps (GG16). GG07 states that land used temporarily will be reinstated where practicable to its pre-construction condition and use, unless agreed otherwise.

4.4.9 Commitment W14 commits the contractor to develop a Drainage Management Plan, demonstrating how surface water runoff would be managed across the worksite, including details of how offsite impacts would be mitigated. W15 commits the contractor to prepare a construction phase Flood Management Plan that shall consider all construction phase activities and temporary works necessary to deliver the Proposed Project.

Suffolk Onshore Scheme

4.4.10 The Risk of Flooding from Surface Water Map (Environment Agency, 2025), an extract of which is presented in Figure 2 in Appendix A, indicates that most of the land within the Suffolk Onshore Scheme Order Limits is at 'very low' risk of flooding from surface water. There are localised areas at higher risk in the vicinity of the proposed watercourse crossings, ranging from low to high risk. This includes the drainage ditch to the east of the Friston Substation (S/PR/0085), areas associated with the Hundred River (S/PR/0035.4) and River Fromus floodplains (S/WA/0068 and S/WA/0070) and their tributaries (S/WA/0057), as well as small, localised areas along the proposed underground cable route.

4.4.11 The Friston Surface Water Study mapping (BMT, 2020) shows a similar pattern of risk within the Order Limits to the Environment Agency surface water mapping, with localised areas at low to high risk of surface water flooding. The proposed Friston Substation is located in an area that has a low risk of flooding from this source. However, the mapping highlights a land drain along a field boundary within the substation footprint, which has associated flood depths of up to approximately 0.7 m in the 1 in 100 year chance event, increasing to 1.0 m in a 1 in 1000 year annual chance flood event ~~(Plate 4.1).~~(Plate 4.2).

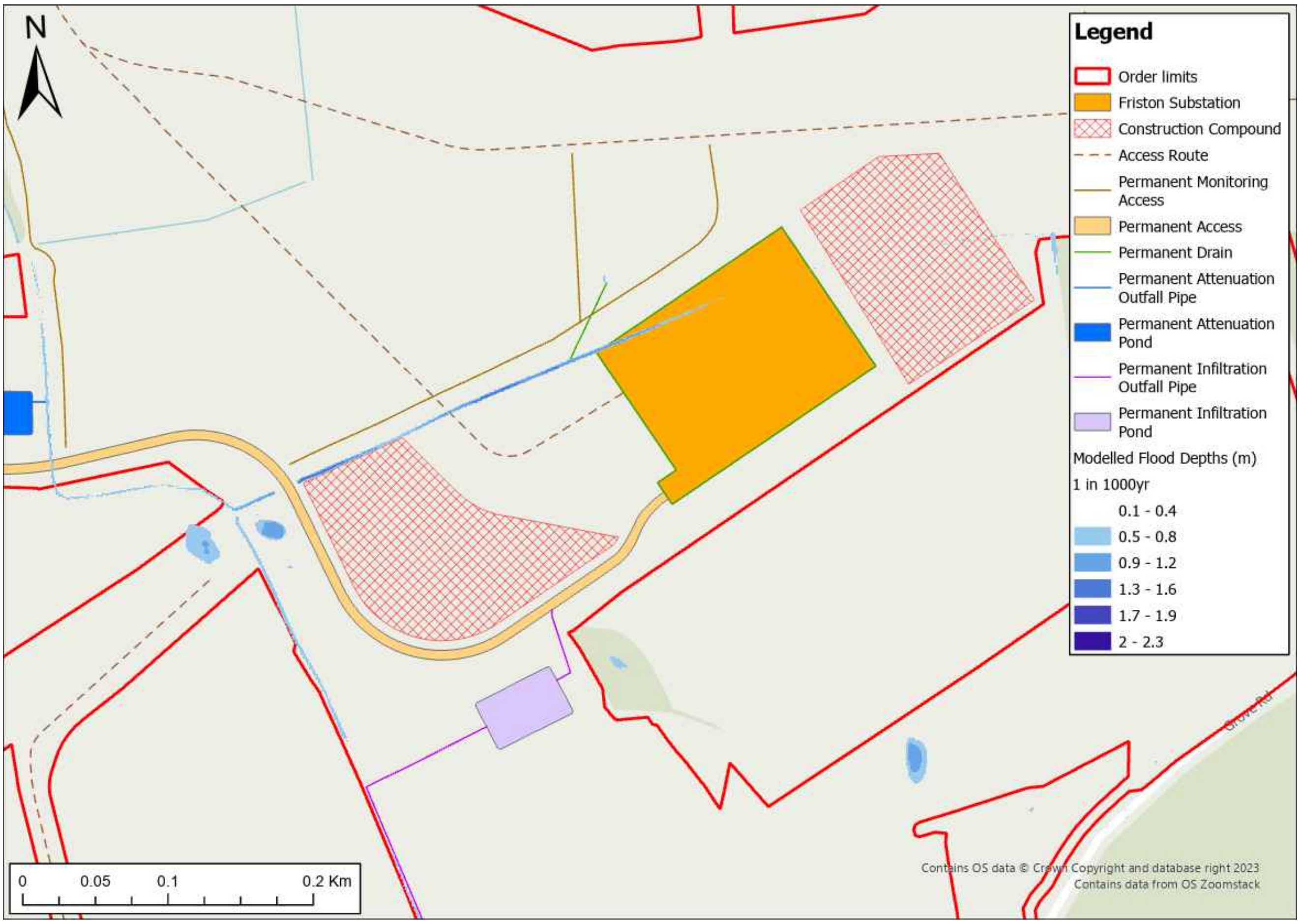


Plate 4.2 Friston surface water study modelled outputs

4.4.12 During construction, the land drain will be infilled and the existing land drainage regime replaced by the proposed temporary drainage system that will serve the construction site, and ultimately by the operational drainage system that will serve the Friston Substation. W14 in the Register of Environmental Actions and Commitments, which forms Appendix B of the CEMP (**Application Document 7.5.3.2 CEMP Appendix B Register of Environmental Actions and Commitments (REAC**)) commits the Contractor to develop a Drainage Management Plan that must be submitted to the Local Planning Authority for approval prior to construction works for the Proposed Project commencing and thereafter the approved plan shall be complied with, subject to any amendments that are subsequently approved pursuant to Requirement 6 of Schedule 3 of the draft DCO. The plan shall demonstrate how the Contractor would manage surface water runoff across the worksite, including details of how offsite impacts would be managed and mitigated.

4.4.13 It would stipulate, for example, that infilling of the land drain would occur after the new drainage systems have been constructed, to ensure flood risk is not increased. These systems, which are illustrated in **Application Document 2.14.1 General Arrangements Plans – Suffolk**, will manage surface water flows generated from the site during construction.

4.4.14 During operation of the Project, as detailed in commitment W11, surface water drainage from permanent above ground infrastructure would be managed and treated using SuDS in accordance with policy and guidance requirements of the relevant Lead Local Flood Authorities. These SuDS would be maintained over the lifetime of the Proposed Project and the drainage infrastructure would provide the storage necessary to achieve discharges at greenfield rates and would not significantly alter groundwater recharge patterns by transferring recharge quantities from one catchment to another and prevent any increase in surface water flood risk to neighbouring land.

Kent Onshore Scheme

4.4.15 The Risk of Flooding from Surface Water Map (Environment Agency, 2025) indicates that most of the land within the Kent Onshore Scheme Order Limits is at 'very low' risk of flooding from surface water (see Appendix A). There are localised areas at higher risk in the vicinity of the proposed watercourse crossings, ranging from low to high risk, including the River Stour and Minster Marshes, and their associated floodplains and smaller tributaries. The Order Limits at landfall has large areas at high risk of flooding, however there are no proposed surface works within this area, and the emergence of the underground cable route and associated construction compound is located outside of the extent of flooding.

4.4.16 Within the area of the proposed Minster Converter Station and Substation, issues were raised during pre-application consultation regarding observed waterlogged conditions. To better understand local conditions site specific Ground Investigation data, including monitoring of groundwater levels, was collected and interpreted. The data has confirmed that these conditions are a consequence of impeded drainage caused by the nature of the underlying soils and geology. To mitigate these conditions, it is proposed to undertake ground improvement works (described in Section 4.6 of **Application Document 6.2.1.4 Part 1 Introduction Chapter 4 Description of the Proposed Project**), creating a raised development platform to a maximum of 3.7 mAOD, that will provide the conditions for efficient drainage and improved buildability.

The proposed Minster Converter Station and Substation footprint is located over a land drain which drains the fields which will be constructed on. This land drain will be infilled and replaced by the proposed drainage system for the site, illustrated on **Application Document 2.14.2 General Arrangements Plans – Kent**. This system will manage surface water flows generated from the site during construction and operation and prevent any increase in surface water flood risk to neighbouring land.

Operational Risk Assessment

4.4.17 The proposed substations and converter stations in the Suffolk Onshore Scheme and Kent Onshore Scheme would include permanent drainage systems. These are described in **Application document 6.2.1.4 Part 1 Introduction Chapter 4 Description of the Proposed Project** and presented on the General Arrangement Plans (**Application Document 2.14.1 General Arrangements Plans – Suffolk**) and (**Application Document 2.14.2 General Arrangements Plans – Kent**). Hard standing areas would be drained to the surface water drainage system, attenuated and treated through sustainable drainage systems (SuDS) and discharged to local watercourses or infiltrated where geology allows. The drainage designs would embed climate change resilience.

Suffolk Onshore Scheme

4.4.18 As outlined in good practice measure W11 in **Application Document 7.5.3.1 CEMP Appendix A Outline Code of Construction Practice**, the surface water drainage from permanent infrastructure would be managed using SuDS designed in accordance with the requirements of the Suffolk Flood Risk Management Strategy (Suffolk Flood Risk Management Partnership, 2023). These SuDS would be maintained over the lifetime of the Proposed Project. Operational drainage systems would include allowances for climate change in accordance with Environment Agency requirements (W11). By conforming to the design standards, the drainage infrastructure would provide the storage necessary to achieve discharges at greenfield rates across the Proposed Project. Therefore, there would be no impact on the rainfall runoff regime or surface water flood risk during operation.

Kent Onshore Scheme

Minster Converter Station and Substation

4.4.19 As outlined in the construction section above, the proposed Minster Converter Station and Substation interacts with an existing land drain, which drains to the Minster Stream. During operation, surface water flood risk associated with this interaction would be mitigated via the permanent drainage system around the converter station and adjacent substation.

4.4.20 As outlined in good practice measure W11 in **Application Document 7.5.3.1 CEMP Appendix A Outline Code of Construction Practice**, the surface water drainage from permanent infrastructure would be managed using SuDS designed in accordance with the requirements of the Thanet Stage 1 Surface Water Management Plan (JBA Consulting, 2013) and Dover Surface Water Management Plan (Jacobs, 2011). These SuDS would be maintained over the lifetime of the Proposed Project.

4.4.21 It would include allowances for climate change in accordance with Environment Agency requirements (W11). By conforming to the design standards, the drainage infrastructure would provide the storage necessary to achieve discharges at greenfield rates across the Proposed Project. Therefore, there would be no impact on the rainfall runoff regime or surface water flood risk during operation.

Conclusions

4.4.22 The FRA has concluded that, as a consequence of the embedded design and control and management measures that would be adopted, the Proposed Project would not be at significant risk of flooding from surface water. Also, there would not be any increase in surface water flood risk to land outside of the Order Limits during construction or operation as a result of the Proposed Project.

4.5 Groundwater Flood Risk

Introduction

4.5.1 Groundwater flood 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 via 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; and
- 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 river banks.

4.5.2 This assessment of flood risk from groundwater is supported by the Groundwater Assessment presented in **Application Document 6.2.2.5 Part 2 Suffolk Chapter 5 Geology and Hydrogeology** and **Application Document 6.2.3.5 Part 3 Kent Chapter 5 Geology and Hydrogeology**.

4.5.3 In response to a request for information linked to groundwater flooding within the Order Limits interest, the LLFAs confirmed that they hold no information relating to previous incidents of groundwater flooding in the study area.

Construction Phase Risk Assessment

Suffolk Onshore Scheme

4.5.4 The potential for the Suffolk Onshore Scheme to encounter groundwater during construction has been assessed using local ground investigation data.

4.5.5 At the landfall location a trenchless crossing will be drilled in one section to bring the offshore cables onshore. The trenchless bore is anticipated to be approximately 1,500 m in length and would reach a depth of approximately 17 to 25 m below ground level for the majority of the length. The depth of the launch pits is likely to be around 2 m below ground level to allow the installation of the joint bay. Therefore, the trenchless bore would intercept the Crag Group and the underlying London Clay.

4.5.6 Local data suggests that groundwater is unlikely to be intercepted in the launch/reception pit and that dewatering is unlikely to be required. Changes in groundwater levels or flow pathways are therefore not anticipated, which results in a low risk of groundwater flooding in this location and negligible impacts on the existing groundwater regime.

4.5.7 Where trenches are excavated for installation of the underground cables, these would be approximately 1.5 m to the base of the trench and approximately 0.9 m from the finished ground level to the top of the protective tile. Several watercourses would be crossed using this technique, as detailed in **Application Document 6.3.1.4.A Appendix 1.4.A Crossings Schedules**. The joint bay excavations would extend to around 2 m below ground level (bgl).

4.5.8 Ground investigation data gathered for the Proposed Project indicates that the groundwater table would not be intercepted along most of the cable trenches, and the risk assessment (**Application Document 6.3.2.5.B Appendix 2.5.B Preliminary Groundwater Risk Assessment**) has concluded that dewatering is unlikely to be required. The risk of groundwater flooding to this element of the Proposed Project is therefore low and changes in groundwater levels or flow pathways are not anticipated.

4.5.9 Groundwater within the area of the proposed Saxmundham Converter Station and Friston Substation is anticipated to be relatively deep (approximately 15 m bgl) and therefore is unlikely to be intercepted by any shallow foundation excavations in these locations. The risk of groundwater flooding to these elements of the Proposed Project is therefore low and changes in groundwater levels or flow pathways are not anticipated.

Kent Onshore Scheme

4.5.10 Two trenchless crossings are currently proposed comprising two back to back trenchless bores at the landfall location at Pegwell Bay and then onward underneath the A256 Richborough Way. The trenchless bore is anticipated to be approximately 940 m in length and would reach a depth of approximately 18 to 20 m below ground level for the majority of the length. Local data indicates that groundwater is unlikely to be intercepted in the launch/reception pit necessary for the drilling.

4.5.11 Dewatering is likely to be required within the areas of open cut trenching for installation of the cables. The locations of the watercourses that would be crossed using this open cut technique are included in **Application Document 6.3.1.4.A Appendix 1.4.A Crossings Schedules.** However, the dewatering is anticipated to be limited due to the relatively shallow nature of the proposed trenches and transition joint bays.

4.5.12 Within the area of the proposed Minster Converter Station and Substation, as described above, issues were raised during pre-application consultation regarding observed waterlogged conditions.

4.5.13 The Chalk bedrock is overlain and confined by less permeable layers and there is limited potential for groundwater heads in the Thanet Formation and Chalk Group to rise significantly above ground level given the setting and the confined aquifer units. Based on the available data, including that collected by the Proposed Project’s Ground Investigation, it has been concluded that the presence of a shallow water table impedes rainfall infiltration, and it is poor drainage, rather than emergence of groundwater from rising bedrock groundwater levels, that causes the boggy conditions that have been observed. The supporting data is provided in Appendix D.

4.5.14 The risk of groundwater flooding to the Kent Onshore Scheme is therefore low and changes in groundwater levels or flow pathways are not anticipated.

Operational Risk Assessment

Suffolk Onshore Scheme

4.5.15 The Suffolk Onshore Scheme is of low vulnerability to groundwater flooding during operation.

4.5.16 Where new foundations are created, the groundwater risk assessment (**Application Document 6.3.2.5.B Appendix 2.5.B Preliminary Groundwater Risk Assessment**) concludes that impacts on groundwater flows would be very localised and so it can be assumed any additional impact on groundwater flooding would be negligible. It has also been assessed that new operational areas of impermeable surface will not give rise to any noticeable changes on existing groundwater infiltration and rechange regimes.

Kent Onshore Scheme

4.5.17 The Kent Onshore Scheme is of low vulnerability to groundwater flooding during operation.

4.5.18 Where new foundations are created, the groundwater risk assessment (**Application Document 6.3.3.5.B Appendix 3.5.B Preliminary Groundwater Risk Assessment**) concludes that impacts on groundwater flows would be very localised and so it can be assumed any additional impact on groundwater flooding would be negligible.

4.5.19 In accordance with good practice measure W11 in **Application Document 7.5.3.1 CEMP Appendix A Outline Code of Construction Practice**, the drainage infrastructure associated with new areas of permanent impermeable land would not alter groundwater recharge patterns.

Conclusions

4.5.20 Overall, the Proposed Project is at low risk of groundwater flooding, and both operation of the Proposed Project and construction activities would have no increased impact on this source of flooding.

4.6 Summary of Potential Flood Sources

4.6.1 Table 4.7 provides a summary of the relative risk from all sources of flooding for both construction and operational phases.

Table 4.7 Summary of assessment of flood risk by source

Source	Degree of Hazard	Comments
Rivers and the sea	Construction: Low to High locally	Largely low risk; areas local to crossings of watercourses and at landfalls at higher risk. Risks mitigated through crossing designs and construction good practice measures such that residual risk is low.

Source	Degree of Hazard	Comments
	Operation: Low	Operational infrastructure sited to largely avoid areas at risk of flooding from rivers and the sea, or where this has not been possible, the Proposed Project has been designed to be resilient to flooding from these sources.
Surface water	Construction: Low to High locally Operation: Low	Largely low risk with areas crossing watercourses at higher risk. Risks mitigated through crossing designs and construction good practice measures such that residual risk is low. Substations, converter stations and permanent access routes will have drainage schemes in place during operation.
Groundwater	Construction: Low to Medium locally Operation: Low	Some dewatering of cable trenches in Kent Onshore scheme anticipated otherwise limited interaction with the groundwater table is anticipated. Substations and converter stations at low risk, buried cables and overhead lines of low vulnerability to this form of flooding.

5. Conclusion

5.1.1 This FRA accompanies a development consent application by National Grid to reinforce the transmission network in the South East and East Anglia. It has been carried out in accordance with NPS EN-1 and EN-5. Reference has also been made to the NPPF and the associated PPG for additional guidance regarding flood risk and development.

5.1.2 This FRA has been informed through consultation with relevant stakeholders, including the Environment Agency, Suffolk County Council, Kent County Council and applicable Internal Drainage Boards.

5.1.3 The predicted impacts of climate change on rainfall intensity and river flow have been included in the assessment using the Met Office UK Climate Projections and the Environment Agency Flood Risk Assessment Climate Change Allowances.

5.1.4 A sequential approach has been taken in siting the Proposed Project, with vulnerable components located in low risk areas, in accordance with the requirements of the sequential test.

5.1.5 However, due to the extent and linear nature of the Proposed Project, some parts of the Project must necessarily be located in areas with a medium or high likelihood of flooding from rivers and surface water. This FRA has demonstrated that with a range of control measures in place, including construction and operational drainage and watercourse crossing designs, the residual risk of flooding would be low and flood risk to neighbouring land would not be increased, satisfying the requirements of the Exception Test.

5.1.6 National Grid has made several commitments around flood risk management measures. These include embedded measures, which are listed within **Application Document 7.5.3.2 CEMP Appendix B Register of Environmental Actions and Commitments (REAC)**. They also include good practice measures which are documented in **Application Document 7.5.3.1 CEMP Appendix A Outline Code of Construction Practice**. With these measures in place, the residual risk during the construction phase has been assessed as low risk. Due to the siting of vulnerable operational infrastructure to avoid flood zones and areas at risk, combined with the drainage control measures and operational drainage designs, the residual risk during operation is also assessed as low.

5.1.7 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, and the flood risk management measures identified would be secured through **Application Document 7.5.3.2 CEMP Appendix B Register of Environmental Actions and Commitments (REAC)** and Requirement 6 of the DCO (**Application Document 3.1**).

References

AECOM. (2013). *Water. People. Places. A guide for master planning sustainable drainage into developments.* Kent County Council.

AECOM. (2017). *Suffolk County Council Preliminary Flood Risk Assessment Report.* Suffolk County Council.

Anglian Regional Coastal Monitoring Programme. (2022). *Suffolk (SMP 7) Coastal Trends Report 2021 Lowestoft Ness to Landguard Point. Environment Agency.*

BMT. (2020). *Friston Surface Water Study.* Suffolk County Council.

Department for Energy Security & Net Zero . (2023). *Overarching National Policy Statement for Energy (EN-1).* London: The Government Publishing Office. Retrieved from https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1

Department for Energy Security & Net Zero. (2023). *National Policy Statement for electricity networks infrastructure (EN-5).* London: The Government Publishing Office.

Environment Agency. (2021). *Flood Map for Planning*. Retrieved from Gov.uk: https://flood-map-for-planning.service.gov.uk/

Environment Agency. (2022). *Climate Change Allowances*. Retrieved from Defra: https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall?mgmtcatid=3035

Environment Agency. (2022, May 27). *Flood risk assessments: climate change allowances*. Retrieved from Gov.uk: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Environment Agency. (2023). *Historic Flood Map (England)*. Retrieved from DEFRA: https://environment.data.gov.uk/dataset/889885c0-d465-11e4-9507-f0def148f590

Environment Agency. (2025, January 28). National Coastal Erosion Risk Mapping (NCERM) - National (2024).

Environment Agency. (2025, June 14). *Risk of Flooding from Surface Water Extent*. Retrieved from data.gov.uk: https://www.data.gov.uk/dataset/95ea1c96-f3dd-4f92-b41f-ef21603a2802/risk-of-flooding-from-surface-water-extent-3-3-percent-annual-chance#:~:text=This%20dataset%20shows%20the%20extent%20of%20flooding%20from%20surface%20water

Herrington Consulting Limited. (2019). *Strategic Flood Risk Assessment 2019 Dover District Council.* Dover: Dover District Council.

Herrington Consulting Limited. (2021). *Strategic Flood Risk Assessment 2019 Dover District Council .* Dover: Dover District Council.

Herrington Consulting Ltd. (2022). *Strategic Flood Risk Assessment Thanet District Council.* Thanet District Council.

Jacobs. (2011). *Dover Surface Water Management Plan.* Kent County Council.

JBA Consulting. (2013). *Thanet Stage 1 Surface Water Management Plan.* Kent County Council.

Kent County Council. (2011). *Kent County Council Preliminary Flood Risk Assessment.* Kent County Council.

Kent County Council. (2017). *Kent Local Flood RIsk Management Strategy.* Kent County Council.

Kent County Council. (2019). *Drainage and Planning Policy.* Kent County Council.

Met Office. (2021). *UK Climate Projections: Headline Findings.* Hadley: Met Office.

Ministry of Housing, C. a. (2022, August 25). *Flood risk and coastal change*. Retrieved from Gov.uk: https://www.gov.uk/guidance/flood-risk-and-coastal-change

Ministry of Housing, Communities and Local Government. (2024). *National Planning Policy Framework.* London: The Government Publishing Office. Retrieved from https://www.gov.uk/guidance/national-planning-policy-framework

Royal Haskoning. (2010). *Suffolk SMP2 Sub-cell 3c Policy Development Zone 5 – Thorpeness to Orford Ness.*

Scott Wilson. (2008). *Suffolk Coastal and Waveney District Strategic Flood Risk Assessment.* East Suffolk Council.

Suffolk Coastal District Council. (2012). *Shoreline Management Plan - Lowestoft to Felixstowe SMP7*. Retrieved from Department for Environment Food & Rural Affairs: https://environment.data.gov.uk/shoreline-planning/shoreline-management-plan/SMP7#downloads

Suffolk County Council. (2018). *Suffolk SuDS Palette (SSP) - Guidance.* Suffolk County County Council.

Suffolk County Council. (2024). *Planning a development in a flood zone*. Retrieved from Suffolk County Council: https://www.suffolk.gov.uk/planning-waste-and-environment/planning-and-development-advice/planning-a-development-in-a-flood-zone

Suffolk Flood Risk Management Partnership. (2020). *Lead Local Flood Authority Section 19 (Flood and Water Management Act) Flood Investigation Report: Alde Lane, Aldeburgh, Suffolk.* Suffolk County Council.

Suffolk Flood Risk Management Partnership. (2020). *Lead Local Flood Authority Section 19 (Flood and Water Management Act) Flood Investigation Report: Aldeburgh Road, Friston.* Suffolk County Council.

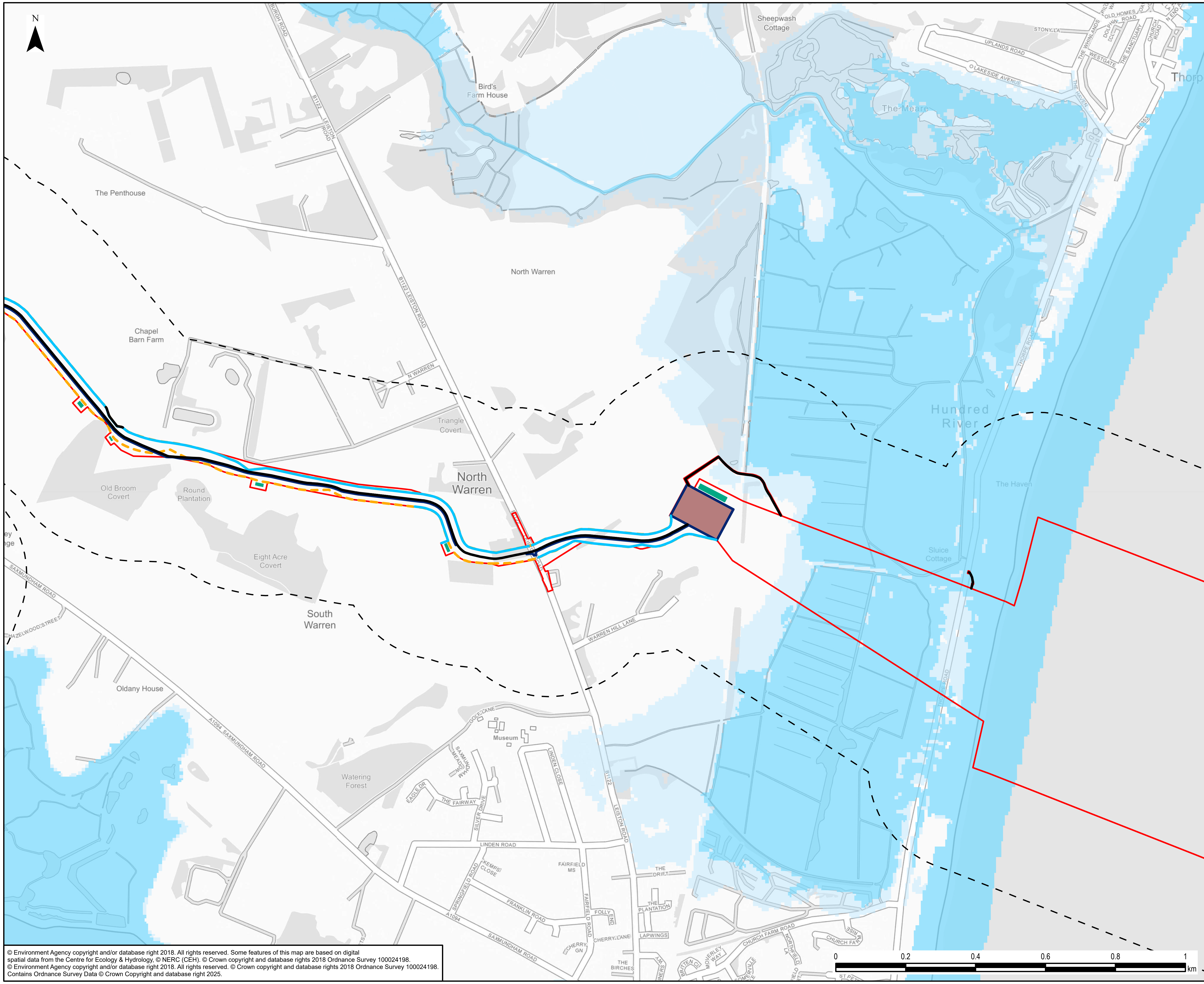
Suffolk Flood Risk Management Partnership. (2020). *Lead Local Flood Authority Section 19 (Flood and Water Management Act) Flood Investigation Report: Moverley Way, Aldeburgh, Suffolk.* Suffolk County Council.

Suffolk Flood Risk Management Partnership. (2021). *Lead Local Flood Authority Section 19 (Flood and Water Management Act) Flood Investigation Report: Old Homes Road, Thorpeness, Aldringham cum Thorpe.* Suffolk County Council.

Suffolk Flood Risk Management Partnership. (2023, February). *Flood Risk Management Strategy.* Retrieved from Green Suffolk: [redacted]

The National Archives. (2010). *Flood and Water Management Act 2010*. Retrieved from legislation.gov.uk: https://www.legislation.gov.uk/ukpga/2010/29

Appendix A Figures



Legend

- Order Limits
- Study Area
- Proposed Drainage - Temporary Drain: Clean Water
- Proposed Drainage - Temporary Drain: Construction Water
- Proposed Drainage - Temporary Infiltration Pond
- Proposed Access Route
- Cable Construction Swathe
- Proposed Construction Compound
- Flood Zone - Flood Zone 2
- Flood Zone - Flood Zone 3

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

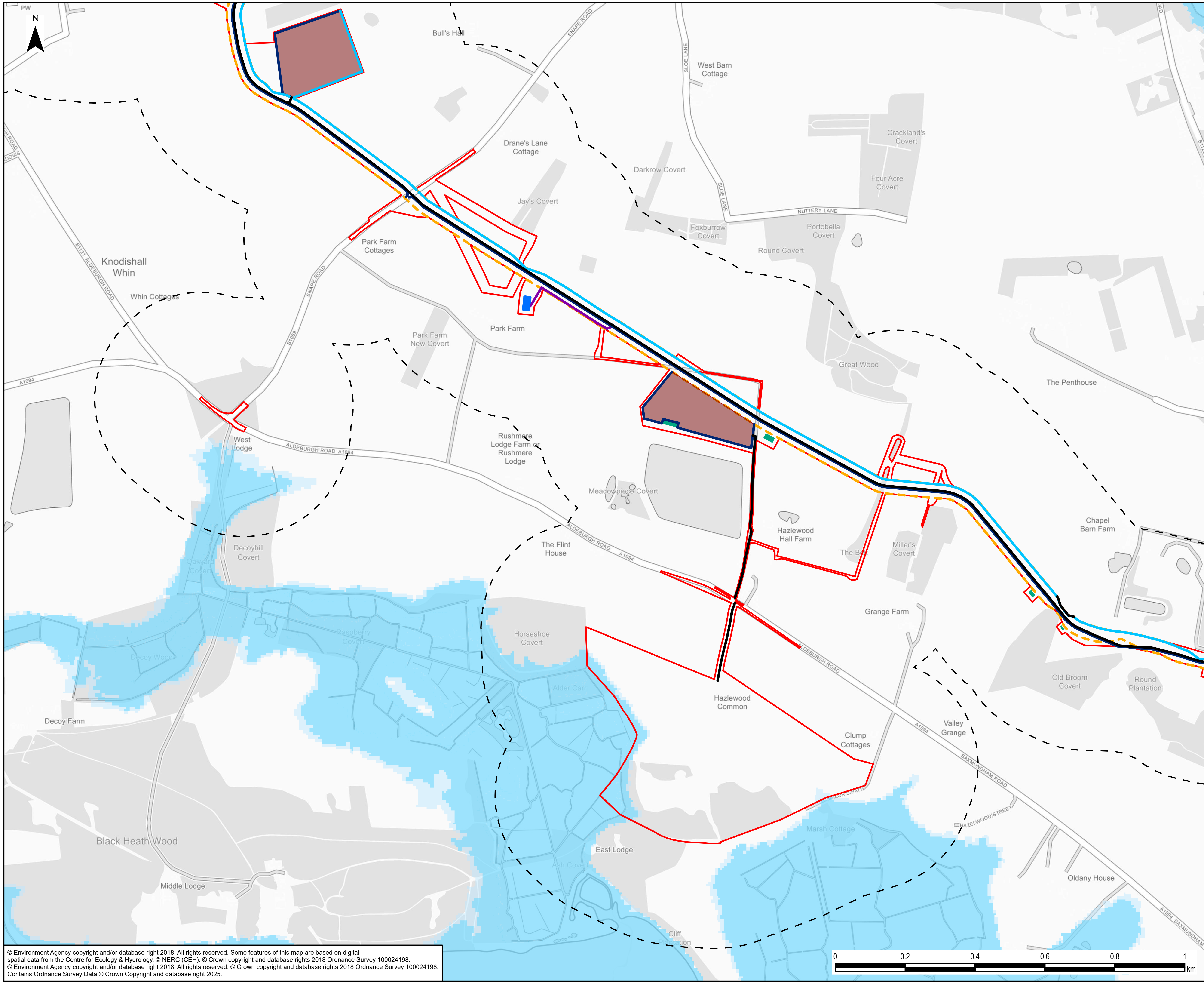
Scheme:
SEA LINK

Document Title:
CONSTRUCTION FLUVIAL FLOOD RISK BASELINE (SUFFOLK ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 1A	1:10,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig1a_Construction_Fluvial_Flood_Risk_Baseline_SuffolkOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Proposed Drainage - Temporary Drain: Clean Water
- Proposed Drainage - Temporary Drain: Construction Water
- Proposed Drainage - Temporary Rising Main
- Proposed Drainage - Temporary Infiltration Pond
- Proposed Drainage - Temporary Attenuation Pond
- Proposed Access Route
- Cable Construction Swathe
- Proposed Construction Compound
- Flood Zone - Flood Zone 2
- Flood Zone - Flood Zone 3

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

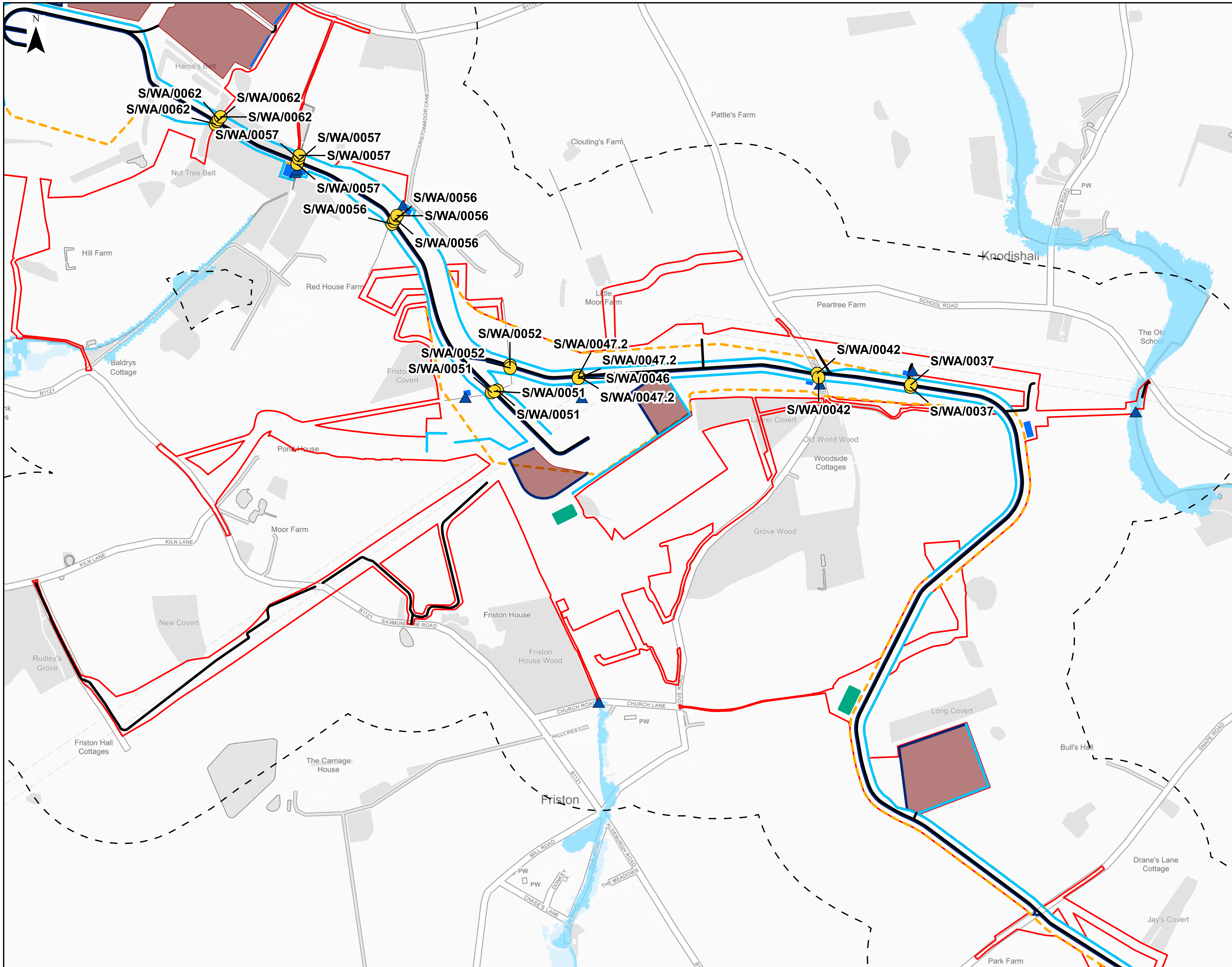
Scheme: SEA LINK

Document Title: CONSTRUCTION FLUVIAL FLOOD RISK BASELINE (SUFFOLK ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 1A	1:10,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig1a_Construction_Fluvial_Flood_Risk_Baseline_SuffolkOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Ordinary Watercourse Crossing - Temporary culvert to be installed
- Proposed Drainage - Temporary Outfall
- Proposed Drainage - Temporary Drain: Clean Water
- Proposed Drainage - Temporary Drain: Construction Water
- Proposed Drainage - Temporary Infiltration Pond
- Proposed Drainage - Temporary Attenuation Pond
- Proposed Access Route
- Cable Construction Swathe
- Proposed Construction Compound
- Flood Zone - Flood Zone 2
- Flood Zone - Flood Zone 3

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

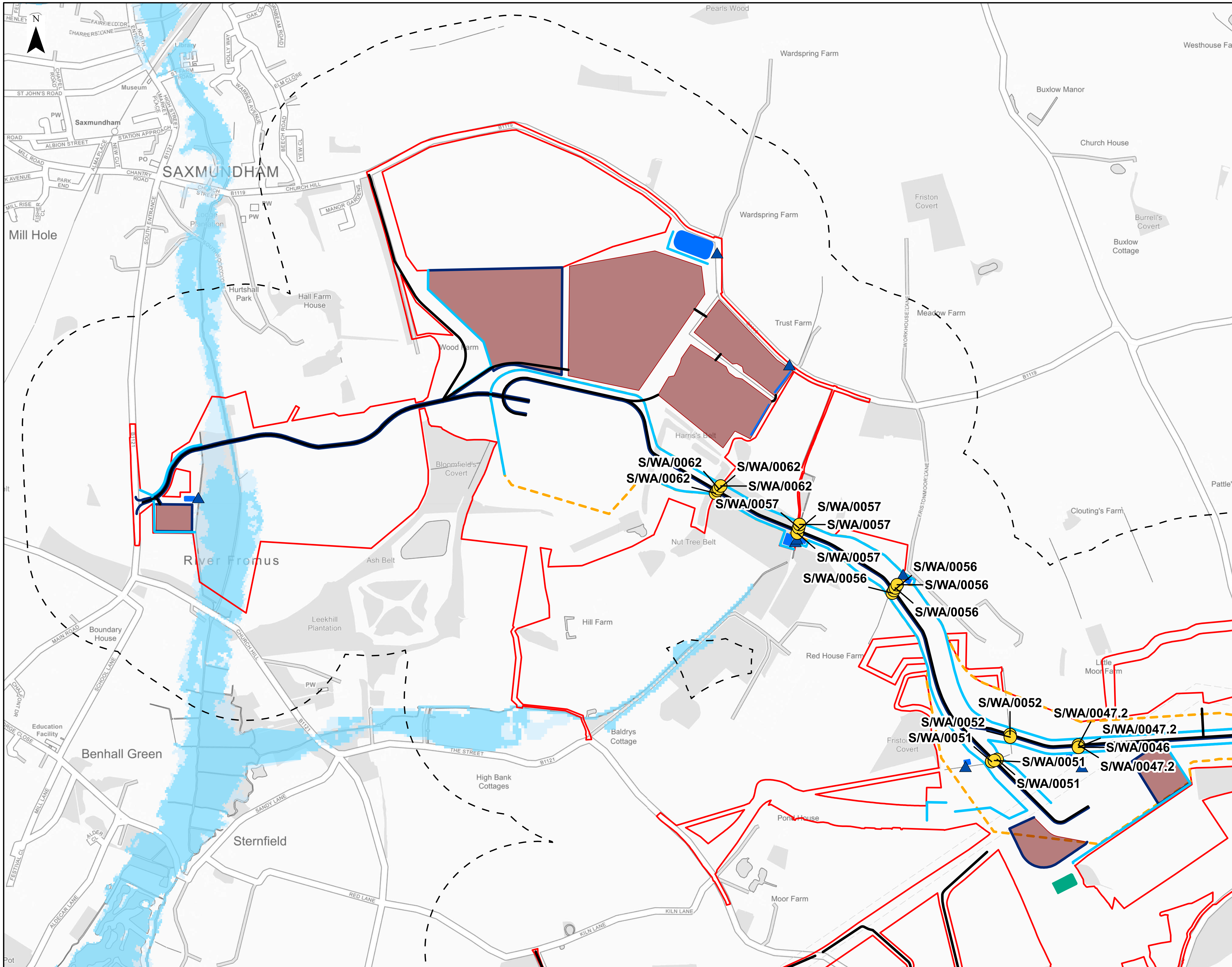
Scheme: SEA LINK

Document Title: CONSTRUCTION FLUVIAL FLOOD RISK BASELINE (SUFFOLK ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 1A	1:10,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig1a_Construction_Fluvial_Flood_Risk_Baseline_SuffolkOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Ordinary Watercourse Crossing - Temporary culvert to be installed
- Proposed Drainage - Temporary Outfall
- Proposed Drainage - Temporary Drain: Clean Water
- Proposed Drainage - Temporary Drain: Construction Water
- Proposed Drainage - Temporary Infiltration Pond
- Proposed Drainage - Temporary Attenuation Pond
- Proposed Access Route
- Cable Construction Swathe
- Proposed Construction Compound
- Flood Zone - Flood Zone 2
- Flood Zone - Flood Zone 3

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

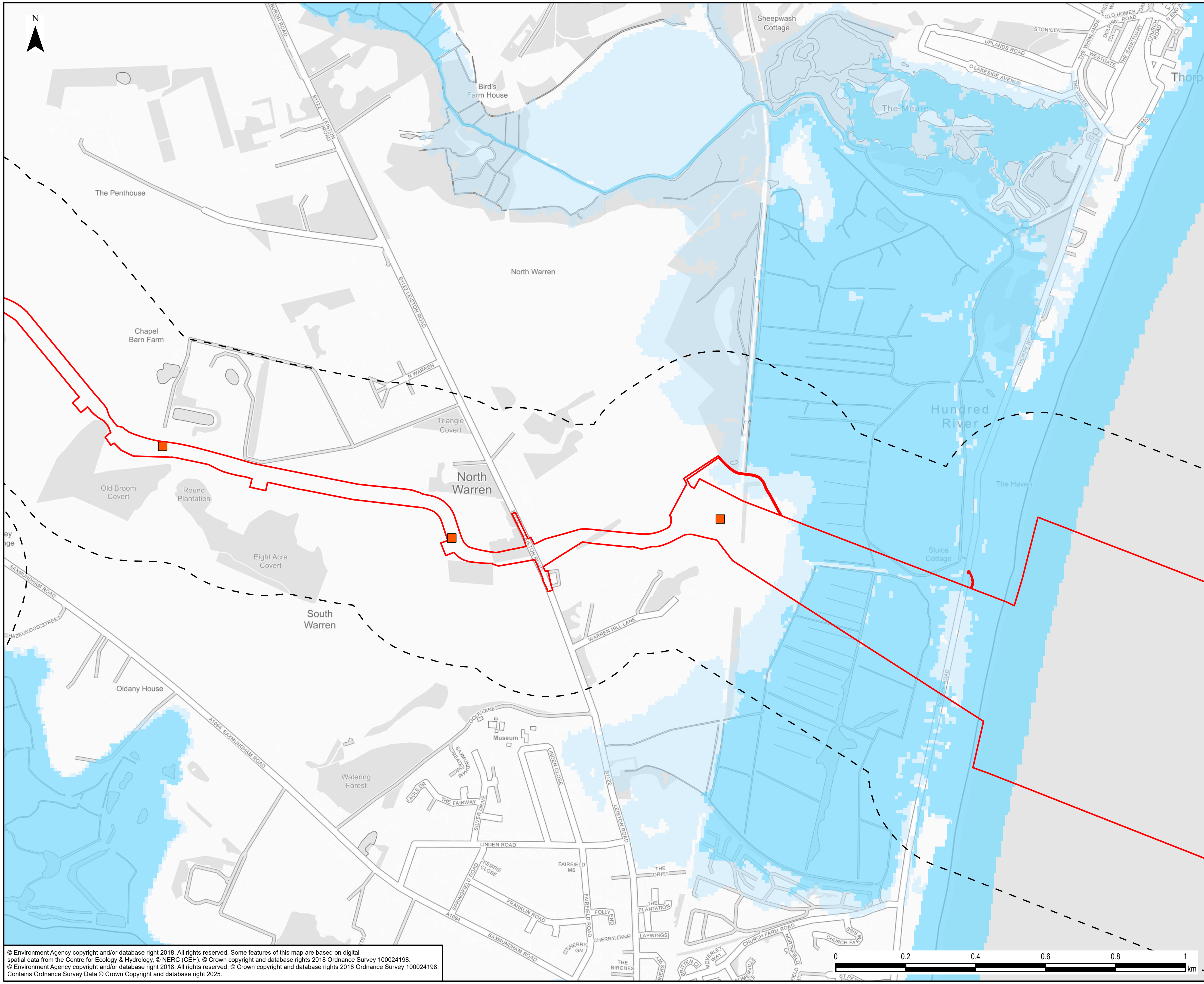
Scheme: SEA LINK

Document Title: CONSTRUCTION FLUVIAL FLOOD RISK BASELINE (SUFFOLK ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 1A	1:10,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig1a_Construction_Fluvial_Flood_Risk_Baseline_SuffolkOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Transition Joint Bay
- Flood Zone - Flood Zone 2
- Flood Zone - Flood Zone 3

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

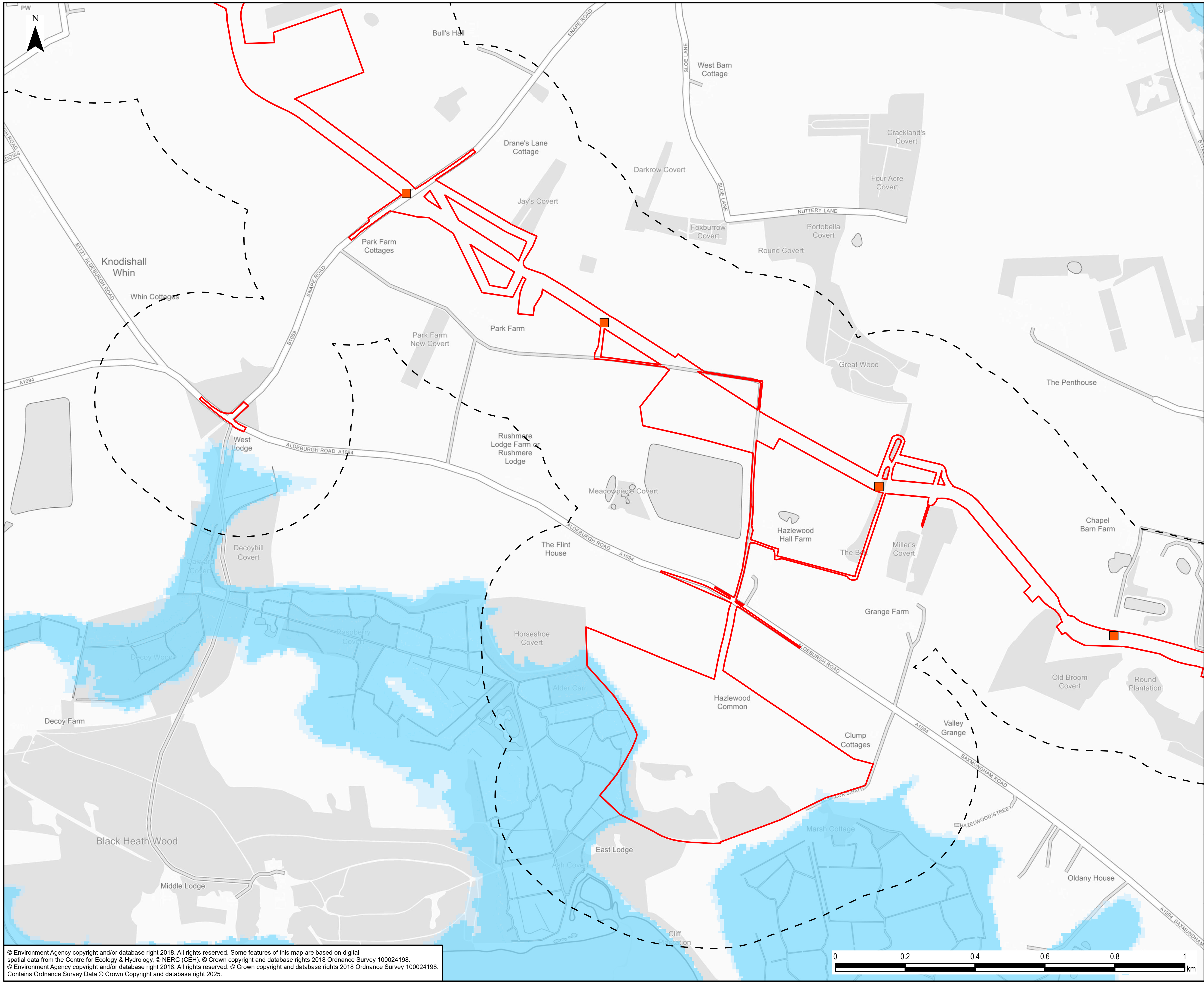
Scheme: SEA LINK

Document Title: OPERATION FLUVIAL FLOOD RISK BASELINE (SUFFOLK ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 1B	1:10,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig1b_Operation_Fluvial_Flood_Risk_Baseline_SuffolkOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Transition Joint Bay
- Flood Zone - Flood Zone 2
- Flood Zone - Flood Zone 3

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

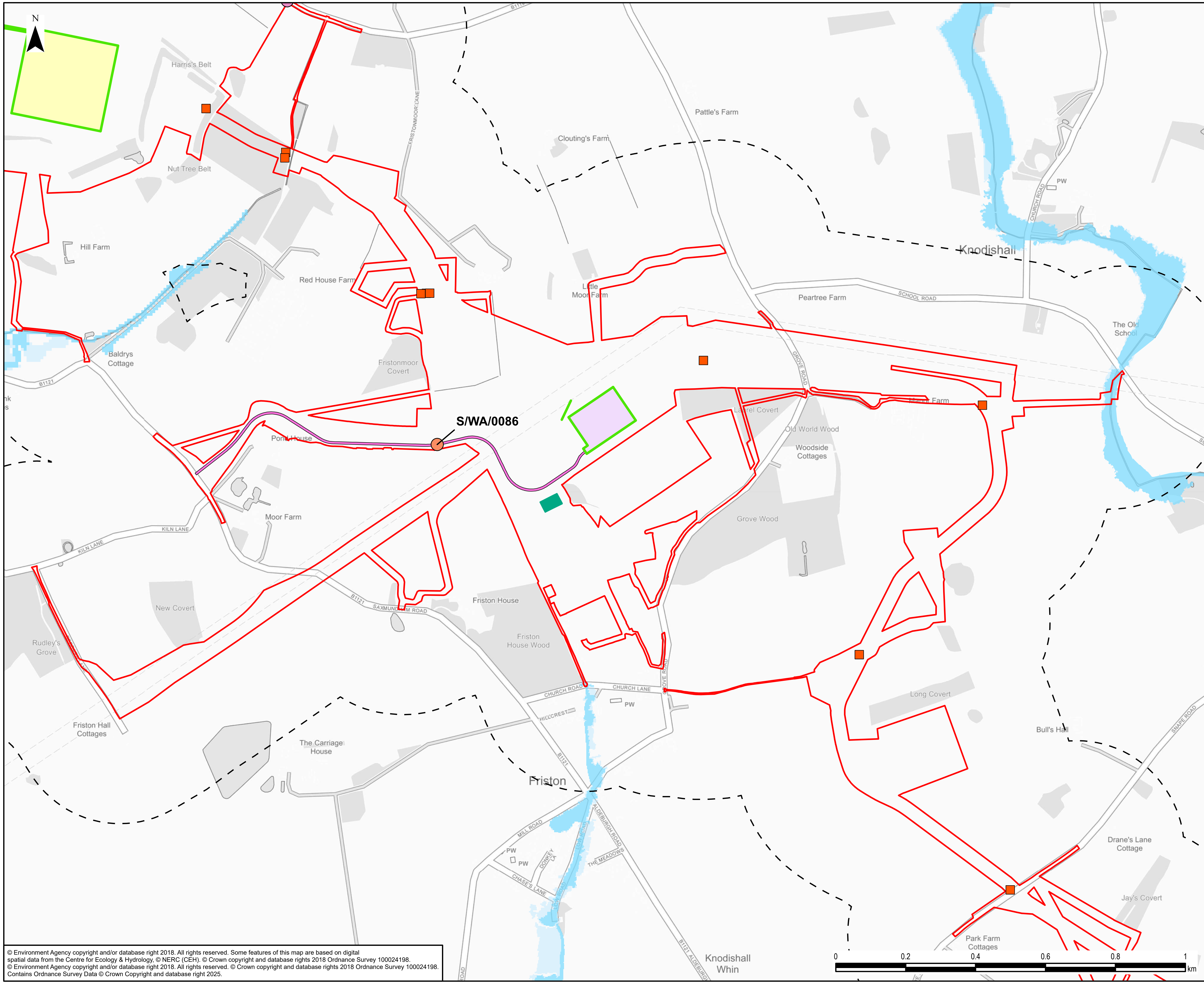
Scheme:
SEA LINK

Document Title:
OPERATION FLUVIAL FLOOD RISK BASELINE (SUFFOLK ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 1B	1:10,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig1b_Operation_Fluvial_Flood_Risk_Baseline_SuffolkOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Ordinary Watercourse Crossing - Permanent Culvert/Pipe
- Ordinary Watercourse Crossing - Permanent bellmouth
- Transition Joint Bay
- Proposed Drainage - Permanent Drain
- Proposed Permanent Infiltration Pond
- Proposed Permanent Access
- Proposed Substation
- Proposed Converter Station
- Flood Zone - Flood Zone 2
- Flood Zone - Flood Zone 3

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

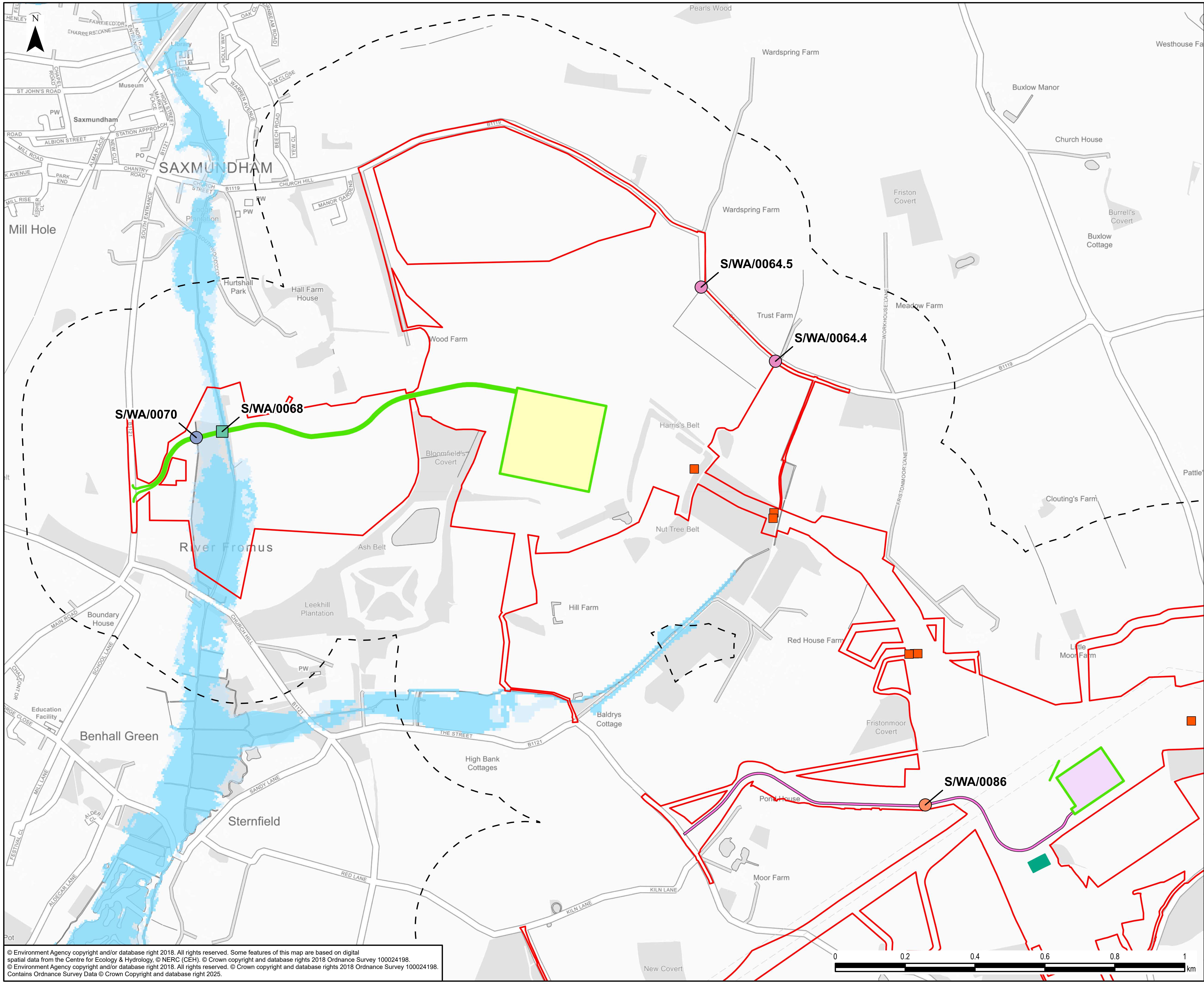
Scheme: SEA LINK

Document Title: OPERATION FLUVIAL FLOOD RISK BASELINE (SUFFOLK ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 1B	1:10,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig1b_Operation_Fluvial_Flood_Risk_Baseline_SuffolkOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Main River Crossing - Permanent bridge
- Ordinary Watercourse Crossing - Permanent Culvert/Pipe
- Ordinary Watercourse Crossing - Permanent Culvert
- Ordinary Watercourse Crossing - Permanent bellmouth
- Transition Joint Bay
- Proposed Drainage - Permanent Drain
- Proposed Permanent Infiltration Pond
- Proposed Permanent Access
- Proposed Substation
- Proposed Converter Station
- Flood Zone - Flood Zone 2
- Flood Zone - Flood Zone 3

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

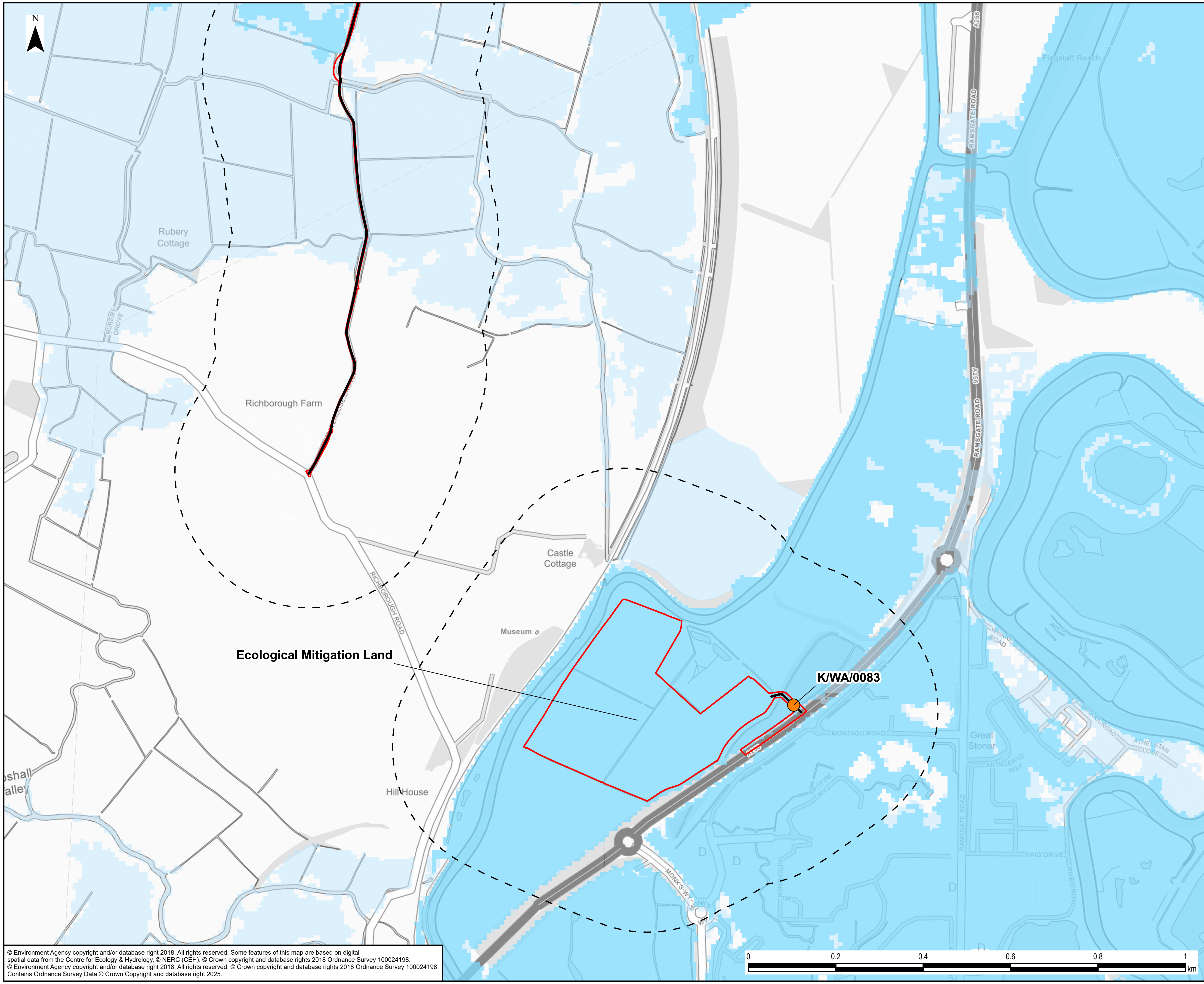
Scheme: SEA LINK

Document Title: OPERATION FLUVIAL FLOOD RISK BASELINE (SUFFOLK ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 1B	1:10,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig1b_Operation_Fluvial_Flood_Risk_Baseline_SuffolkOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Main River Crossing - Temporary bridge
- Ordinary Watercourse Crossing - Temporary Culvert
- Proposed Access Route
- Flood Zone - Flood Zone 2
- Flood Zone - Flood Zone 3

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

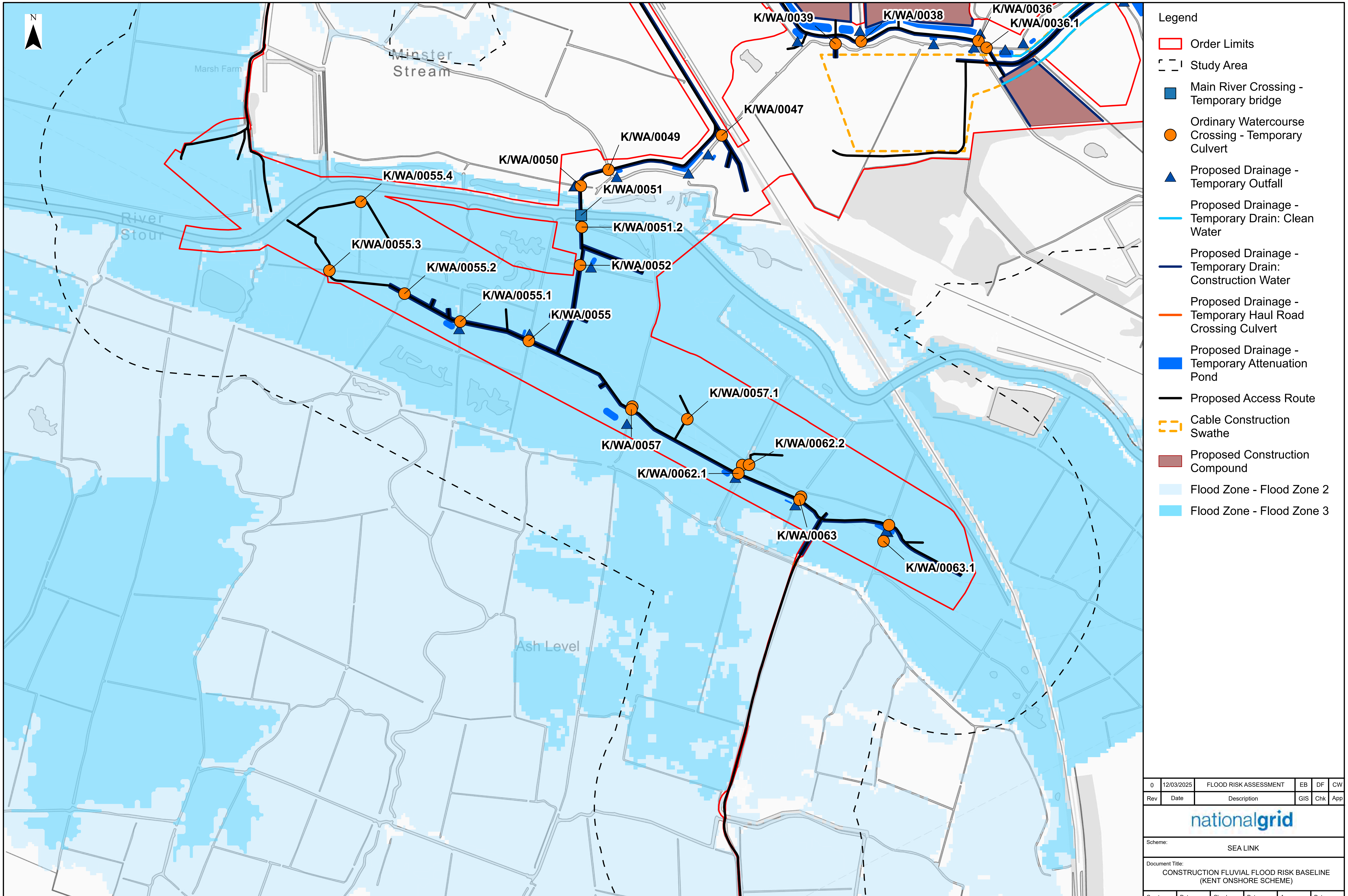
Scheme: SEA LINK

Document Title: CONSTRUCTION FLUVIAL FLOOD RISK BASELINE (KENT ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 1C	1:8,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig1c_Construction_Fluvial_Flood_Risk_Baseline_KentOnshoreScheme_20250312_EB.aprx



Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

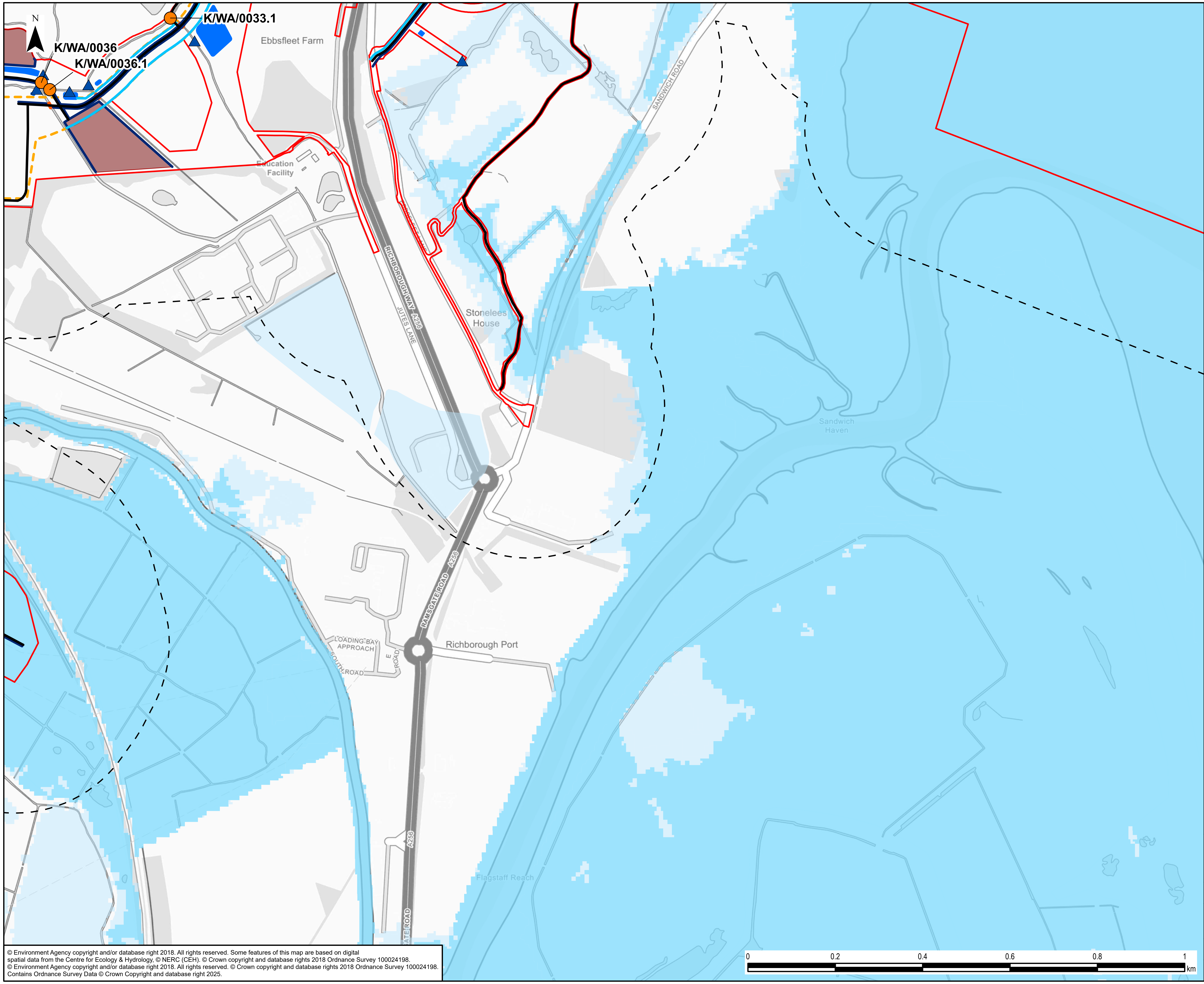
Scheme: SEA LINK

Document Title: CONSTRUCTION FLUVIAL FLOOD RISK BASELINE (KENT ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 1C	1:8,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig1c_Construction_Fluvial_Flood_Risk_Baseline_KentOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Main River Crossing - Temporary bridge
- Ordinary Watercourse Crossing - Temporary Culvert
- Proposed Drainage - Temporary Outfall
- Proposed Drainage - Temporary Drain: Clean Water
- Proposed Drainage - Temporary Drain: Construction Water
- Proposed Drainage - Temporary Haul Road Crossing Culvert
- Proposed Drainage - Temporary Attenuation Pond
- Proposed Access Route
- Cable Construction Swathe
- Proposed Construction Compound
- Flood Zone - Flood Zone 2
- Flood Zone - Flood Zone 3

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

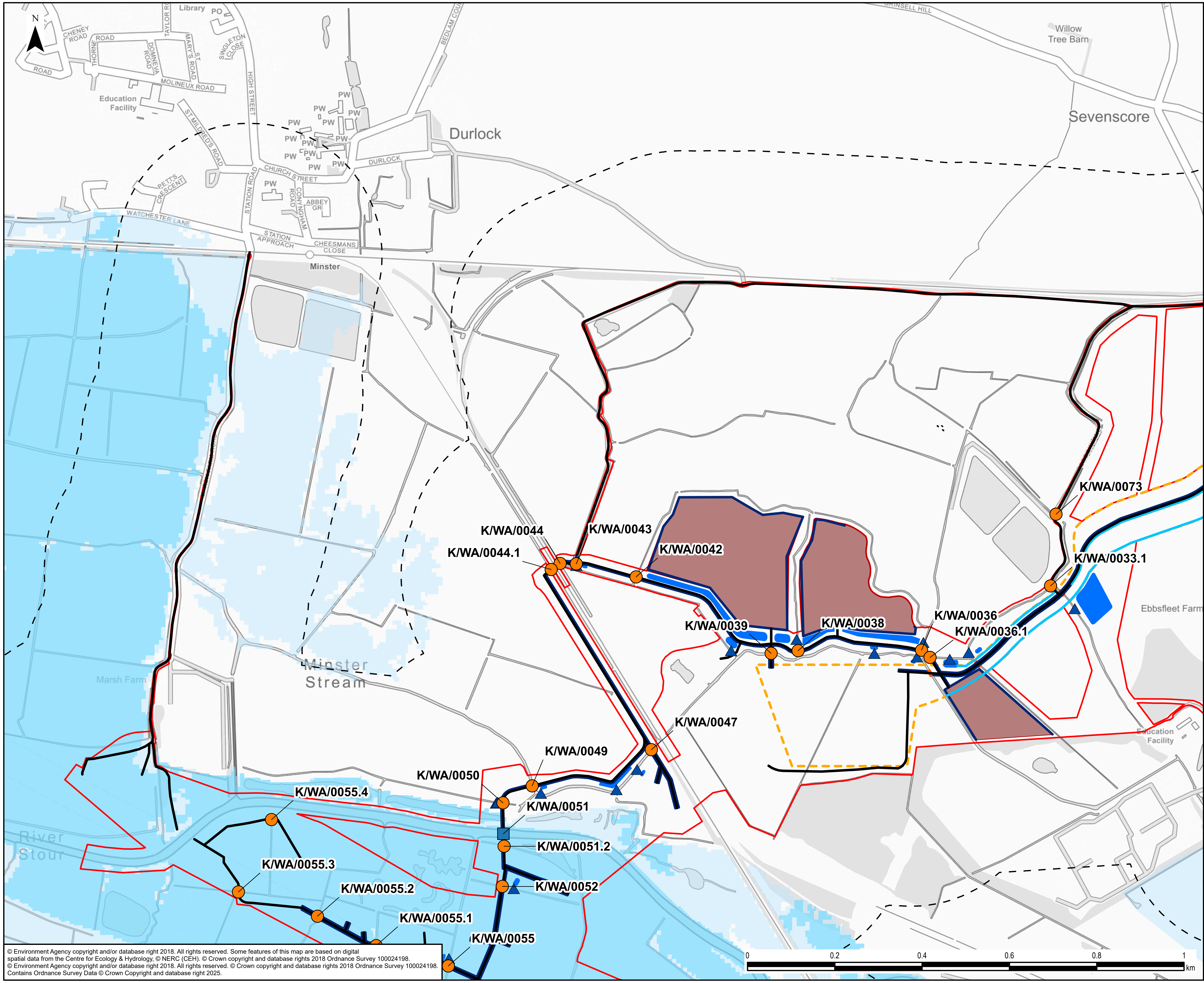
Scheme: SEA LINK

Document Title: CONSTRUCTION FLUVIAL FLOOD RISK BASELINE (KENT ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 1C	1:8,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig1c_Construction_Fluvial_Flood_Risk_Baseline_KentOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Main River Crossing - Temporary bridge
- Ordinary Watercourse Crossing - Temporary Culvert
- Proposed Drainage - Temporary Outfall
- Proposed Drainage - Temporary Drain: Clean Water
- Proposed Drainage - Temporary Drain: Construction Water
- Proposed Drainage - Temporary Haul Road Crossing Culvert
- Proposed Drainage - Temporary Attenuation Pond
- Proposed Access Route
- Cable Construction Swathe
- Proposed Construction Compound
- Flood Zone - Flood Zone 2
- Flood Zone - Flood Zone 3

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

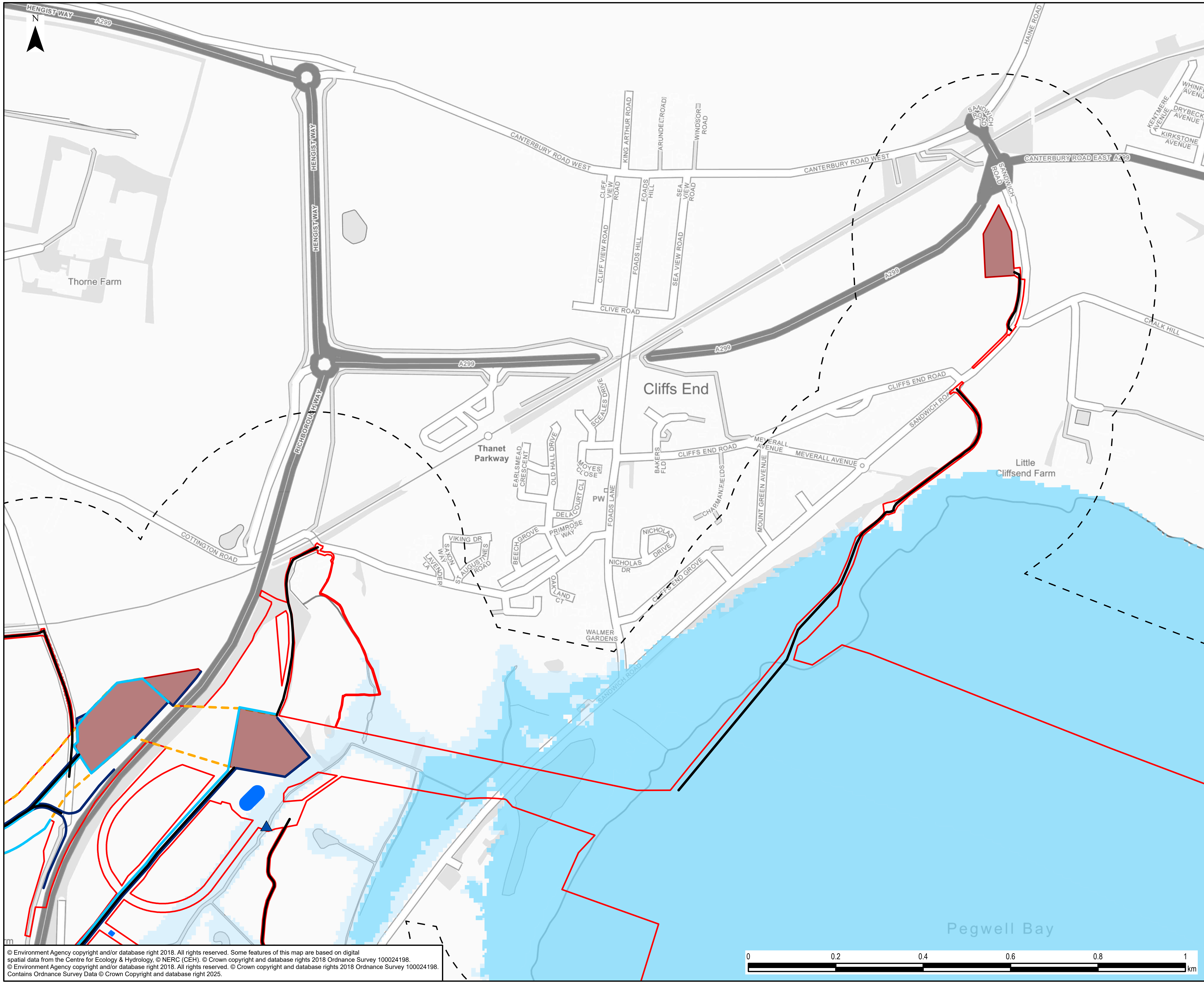
Scheme: SEA LINK

Document Title: CONSTRUCTION FLUVIAL FLOOD RISK BASELINE (KENT ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 1C	1:8,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig1c_Construction_Fluvial_Flood_Risk_Baseline_KentOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Main River Crossing - Temporary bridge
- Ordinary Watercourse Crossing - Temporary Culvert
- Proposed Drainage - Temporary Outfall
- Proposed Drainage - Temporary Drain: Clean Water
- Proposed Drainage - Temporary Drain: Construction Water
- Proposed Drainage - Temporary Attenuation Pond
- Proposed Access Route
- Cable Construction Swathe
- Proposed Construction Compound
- Flood Zone - Flood Zone 2
- Flood Zone - Flood Zone 3

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

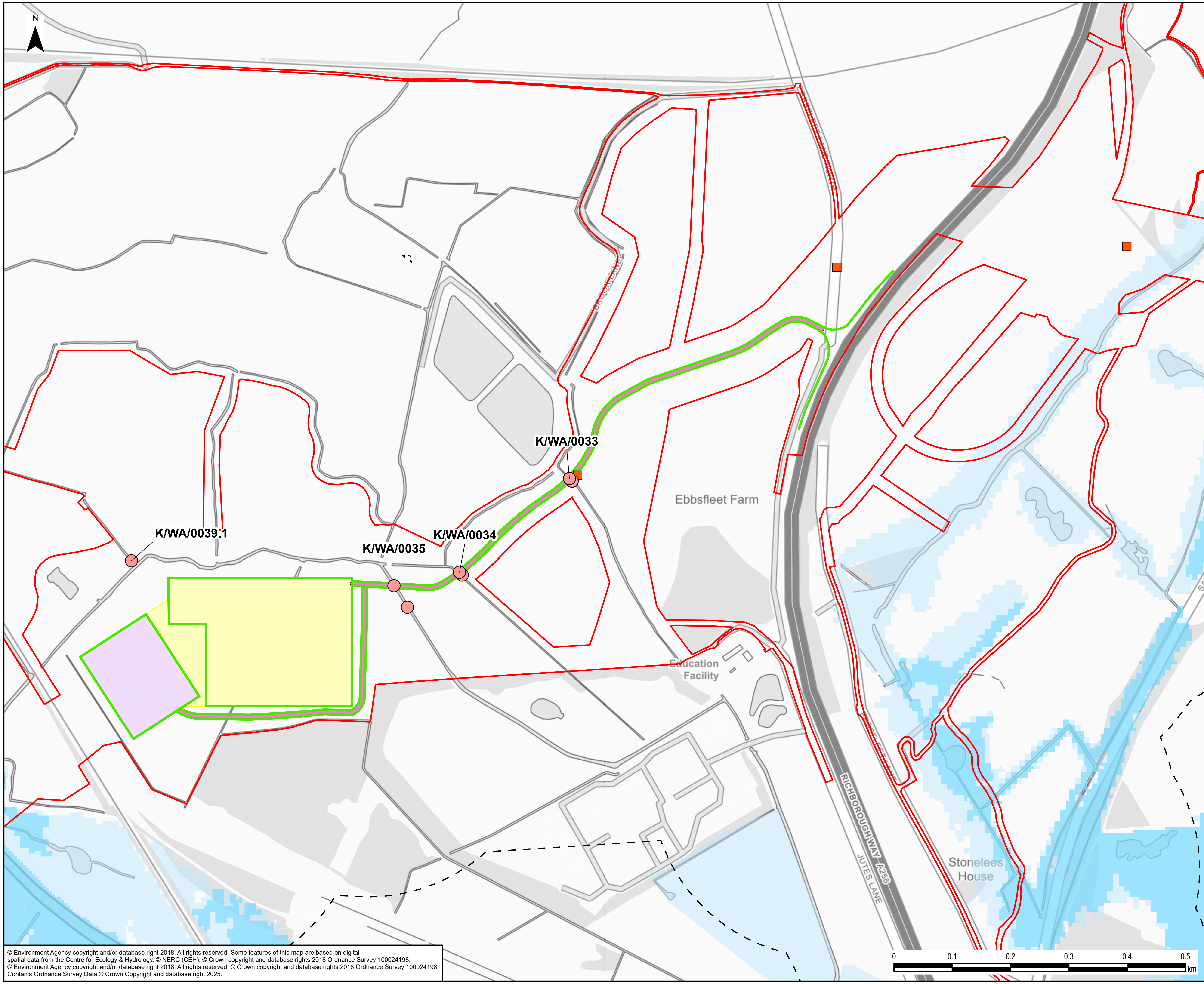
Scheme: SEA LINK

Document Title: CONSTRUCTION FLUVIAL FLOOD RISK BASELINE (KENT ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 1C	1:8,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig1c_Construction_Fluvial_Flood_Risk_Baseline_KentOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Ordinary Watercourse Crossing - Permanent Culvert
- Transition Joint Bay
- Proposed Drainage - Permanent Drain
- Proposed Permanent Access
- Proposed Substation
- Proposed Converter Station
- Flood Zone - Flood Zone 2
- Flood Zone - Flood Zone 3

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	ENVIRONMENTAL STATEMENT	EB	DF	CW

nationalgrid

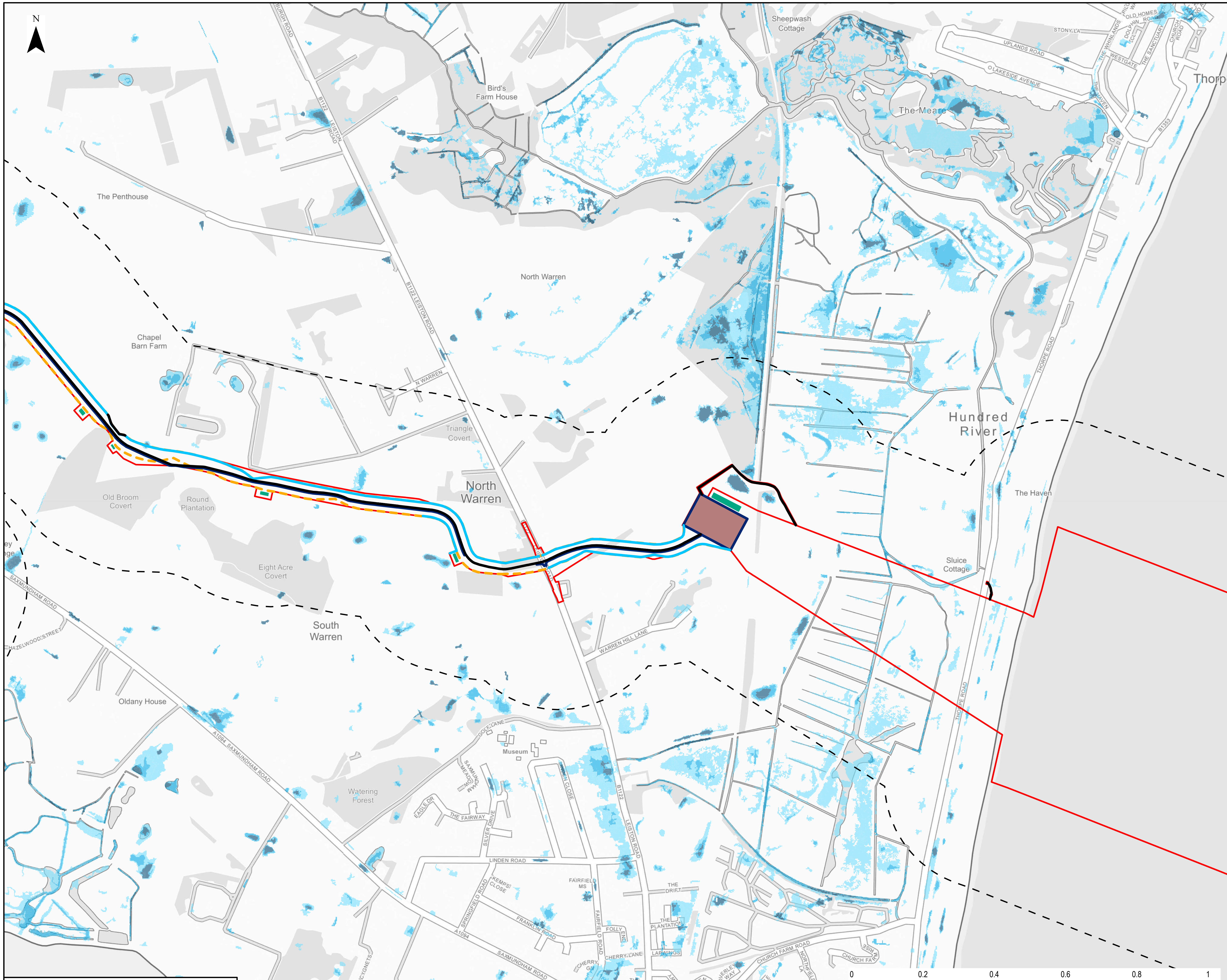
Scheme: SEA LINK

Document Title: OPERATION FLUVIAL FLOOD RISK BASELINE (KENT ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 1D	1:6,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig1d_Operation_Fluvial_Flood_Risk_Baseline_KentOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Proposed Drainage - Temporary Drain: Clean Water
- Proposed Drainage - Temporary Drain: Construction Water
- Proposed Drainage - Temporary Infiltration Pond
- Proposed Access Route
- Cable Construction Swathe
- Proposed Construction Compound

Risk of Flooding from Surface Water

- High
- Medium
- Low

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

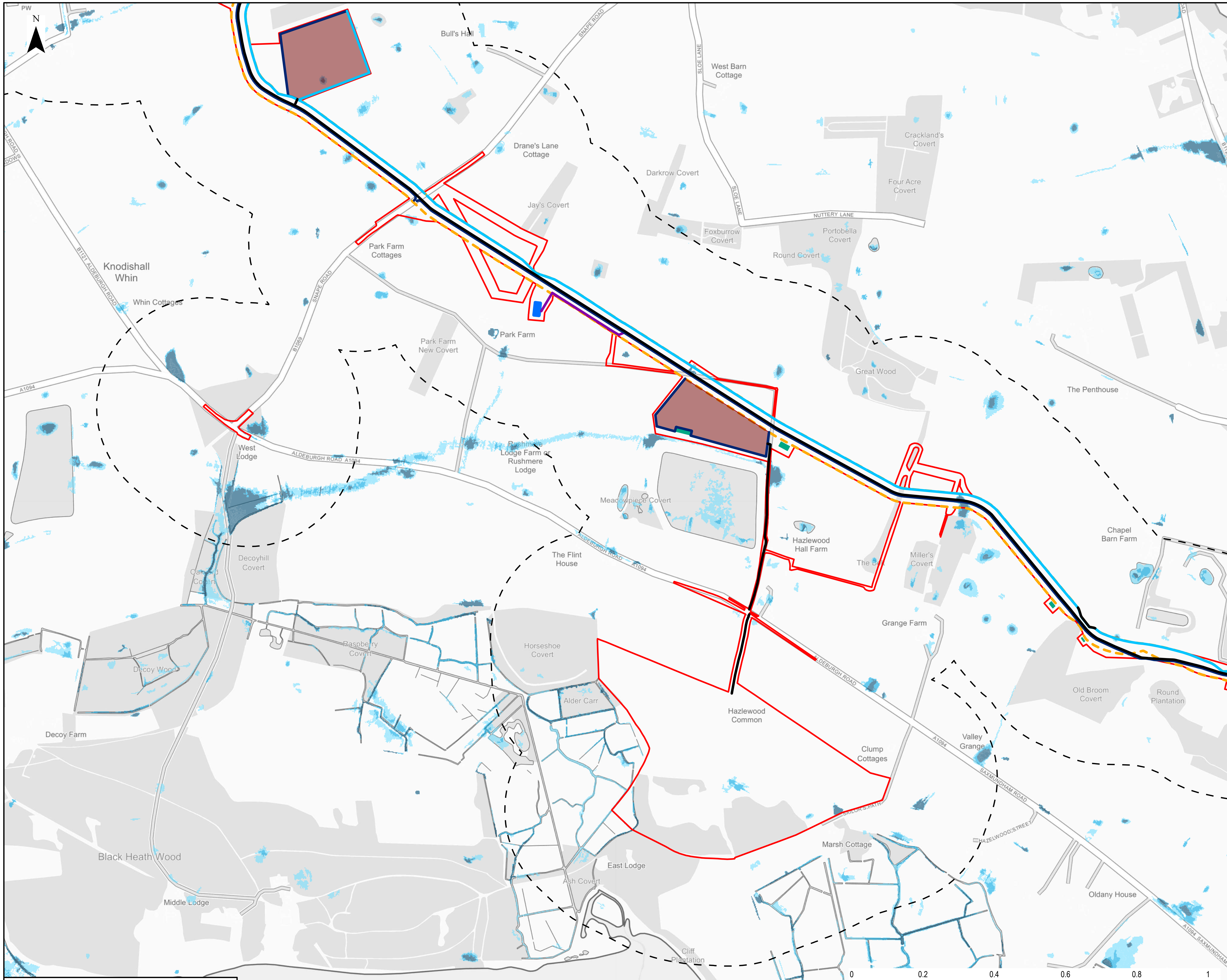
Scheme: SEA LINK

Document Title: CONSTRUCTION SURFACE WATER FLOOD RISK (SUFFOLK ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 2A	1:10,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig2a_Construction_Surface_Water_Flood_Risk_SuffolkOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Proposed Drainage - Temporary Drain: Clean Water
- Proposed Drainage - Temporary Drain: Construction Water
- Proposed Drainage - Temporary Rising Main
- Proposed Drainage - Temporary Infiltration Pond
- Proposed Drainage - Temporary Attenuation Pond
- Proposed Access Route
- Cable Construction Swathe
- Proposed Construction Compound

Risk of Flooding from Surface Water

- High
- Medium
- Low

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

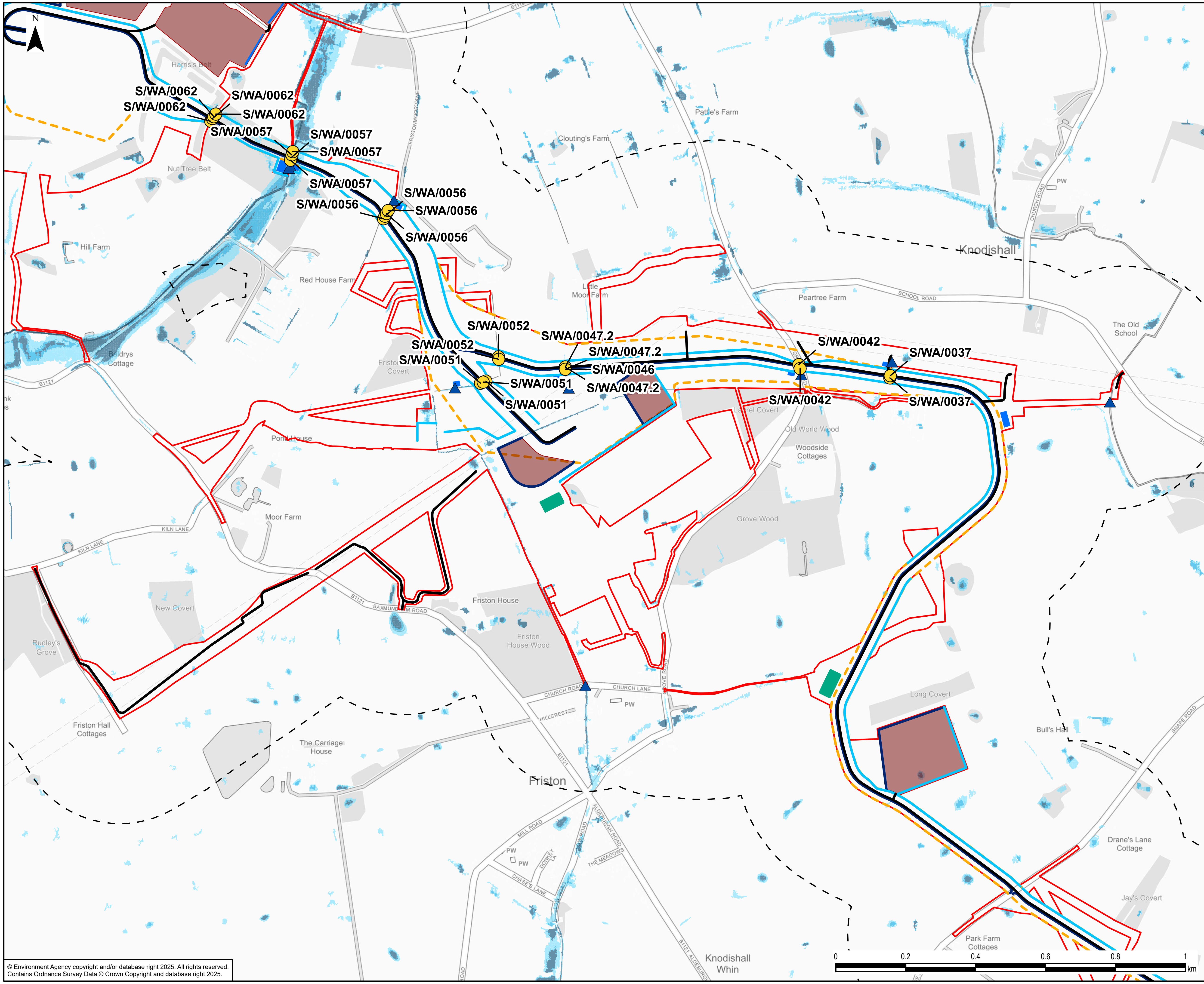
Scheme: SEA LINK

Document Title: CONSTRUCTION SURFACE WATER FLOOD RISK (SUFFOLK ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 2A	1:10,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig2a_Construction_Surface_Water_Flood_Risk_SuffolkOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Ordinary Watercourse Crossing - Temporary culvert to be installed
- Proposed Drainage - Temporary Outfall
- Proposed Drainage - Temporary Drain: Clean Water
- Proposed Drainage - Temporary Drain: Construction Water
- Proposed Drainage - Temporary Infiltration Pond
- Proposed Drainage - Temporary Attenuation Pond
- Proposed Access Route
- Cable Construction Swathe
- Proposed Construction Compound

Risk of Flooding from Surface Water

- High
- Medium
- Low

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

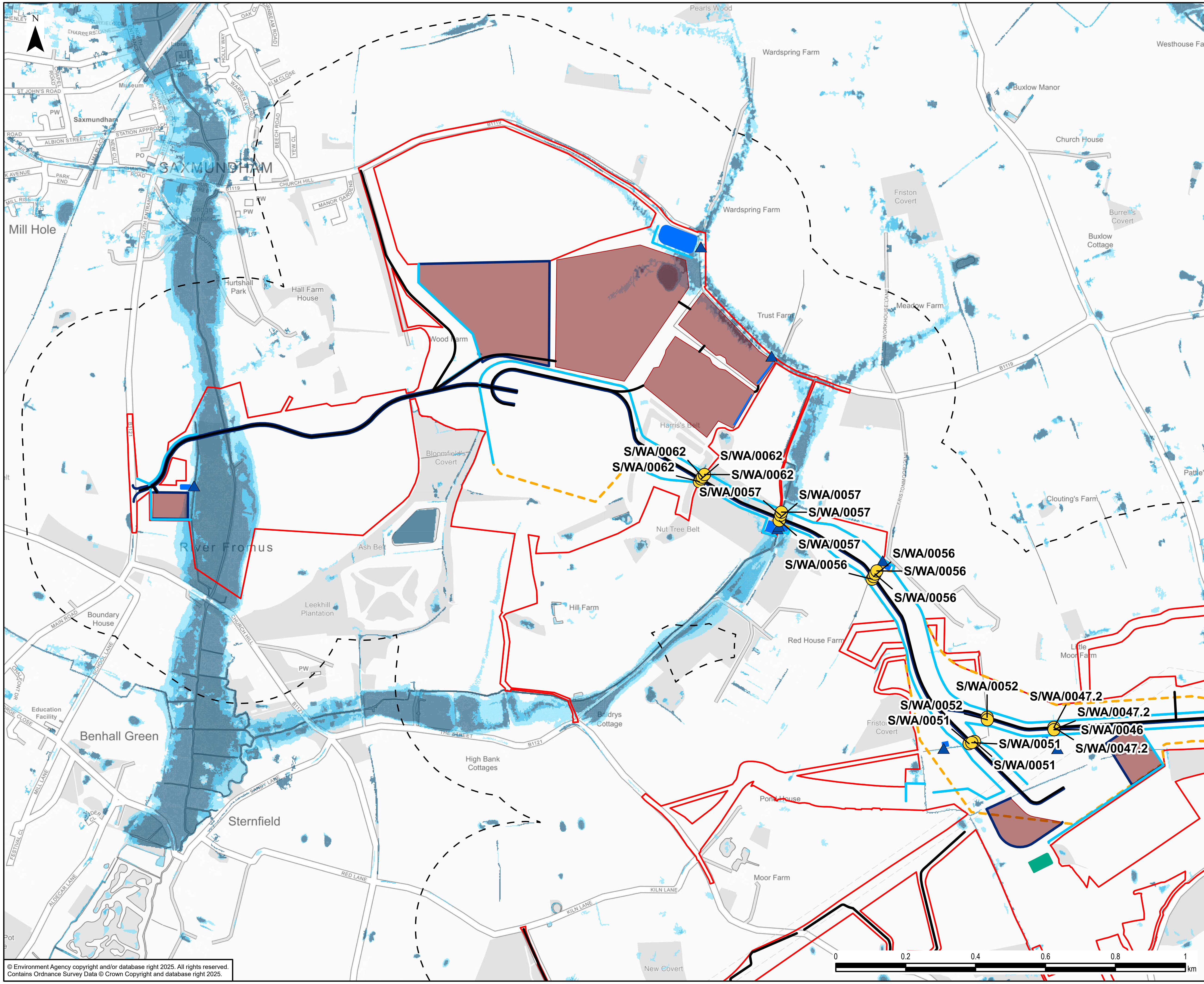
Scheme: SEA LINK

Document Title: CONSTRUCTION SURFACE WATER FLOOD RISK (SUFFOLK ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 2A	1:10,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig2a_Construction_Surface_Water_Flood_Risk_SuffolkOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Ordinary Watercourse Crossing - Temporary culvert to be installed
- Proposed Drainage - Temporary Outfall
- Proposed Drainage - Temporary Drain: Clean Water
- Proposed Drainage - Temporary Drain: Construction Water
- Proposed Drainage - Temporary Infiltration Pond
- Proposed Drainage - Temporary Attenuation Pond
- Proposed Access Route
- Cable Construction Swathe
- Proposed Construction Compound

Risk of Flooding from Surface Water

- High
- Medium
- Low

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

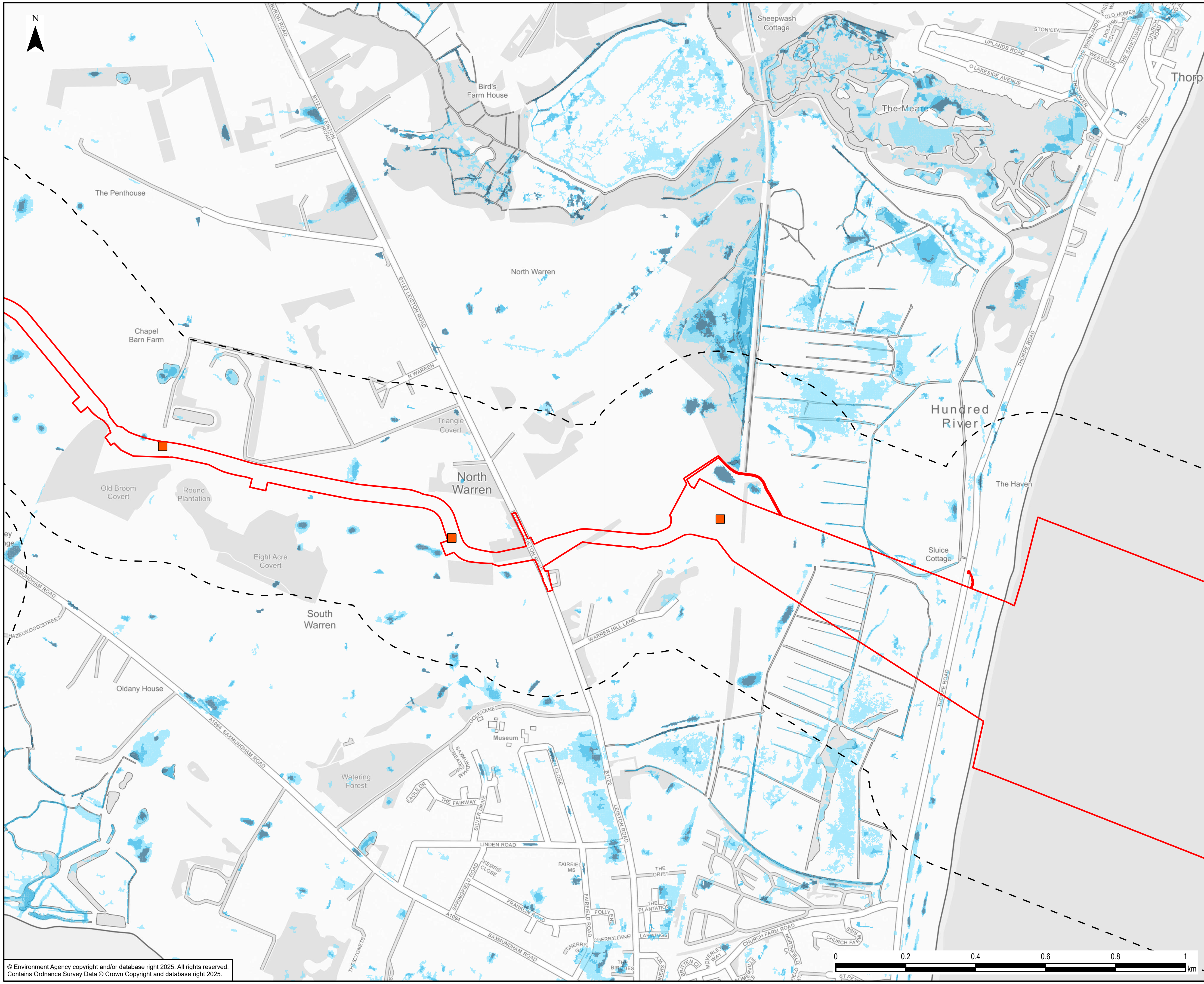
Scheme: SEA LINK

Document Title: CONSTRUCTION SURFACE WATER FLOOD RISK (SUFFOLK ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 2A	1:10,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig2a_Construction_Surface_Water_Flood_Risk_SuffolkOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Transition Joint Bay

Risk of Flooding from Surface Water

- High
- Medium
- Low

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	ENVIRONMENTAL STATEMENT	EB	DF	CW

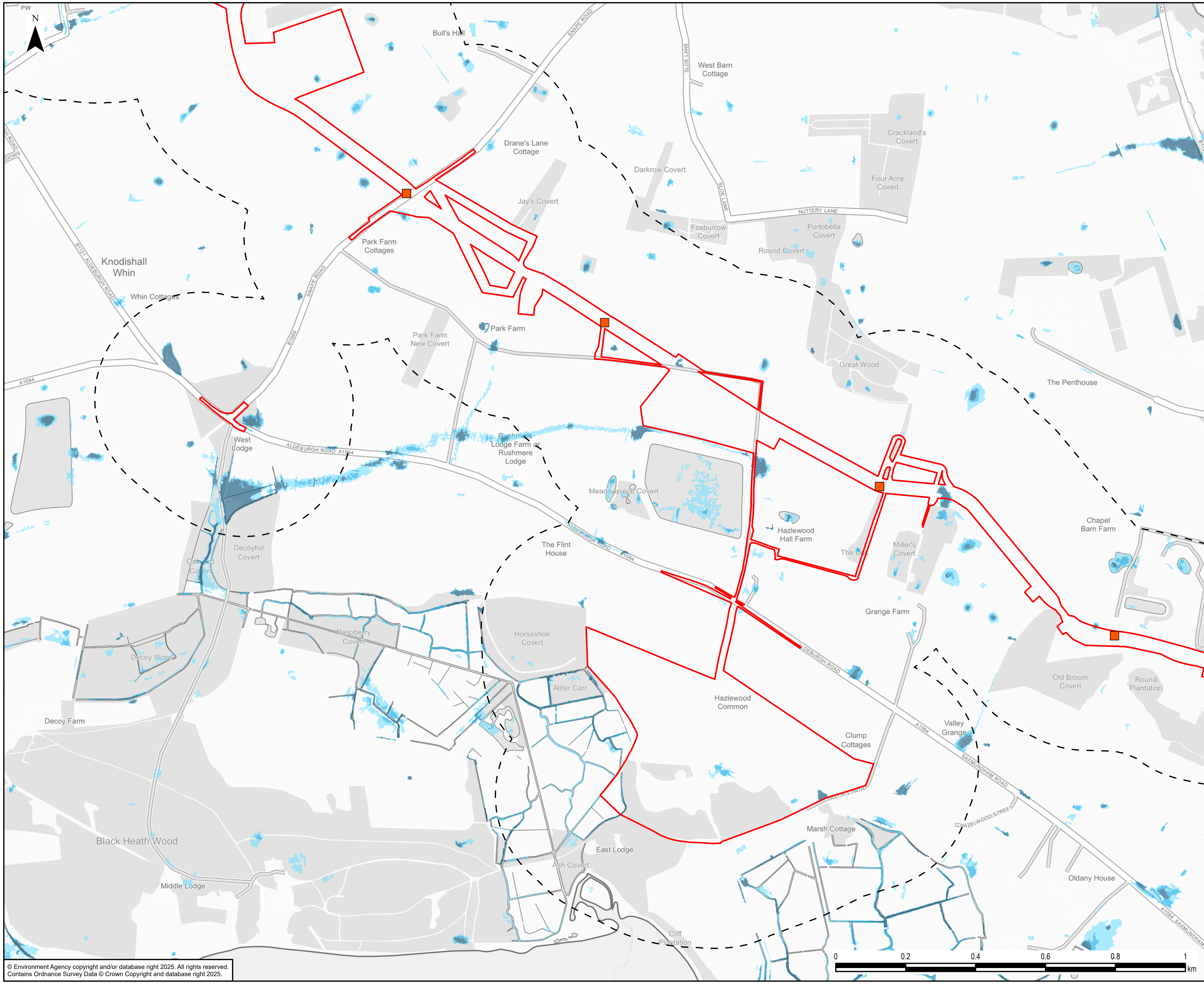
nationalgrid

Scheme: SEA LINK

Document Title: OPERATION SURFACE WATER FLOOD RISK (SUFFOLK ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 2B	1:10,000	A3	1	0



Legend

- Order Limits
- Study Area
- Transition Joint Bay

Risk of Flooding from Surface Water

- High
- Medium
- Low

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	ENVIRONMENTAL STATEMENT	EB	DF	CW

nationalgrid

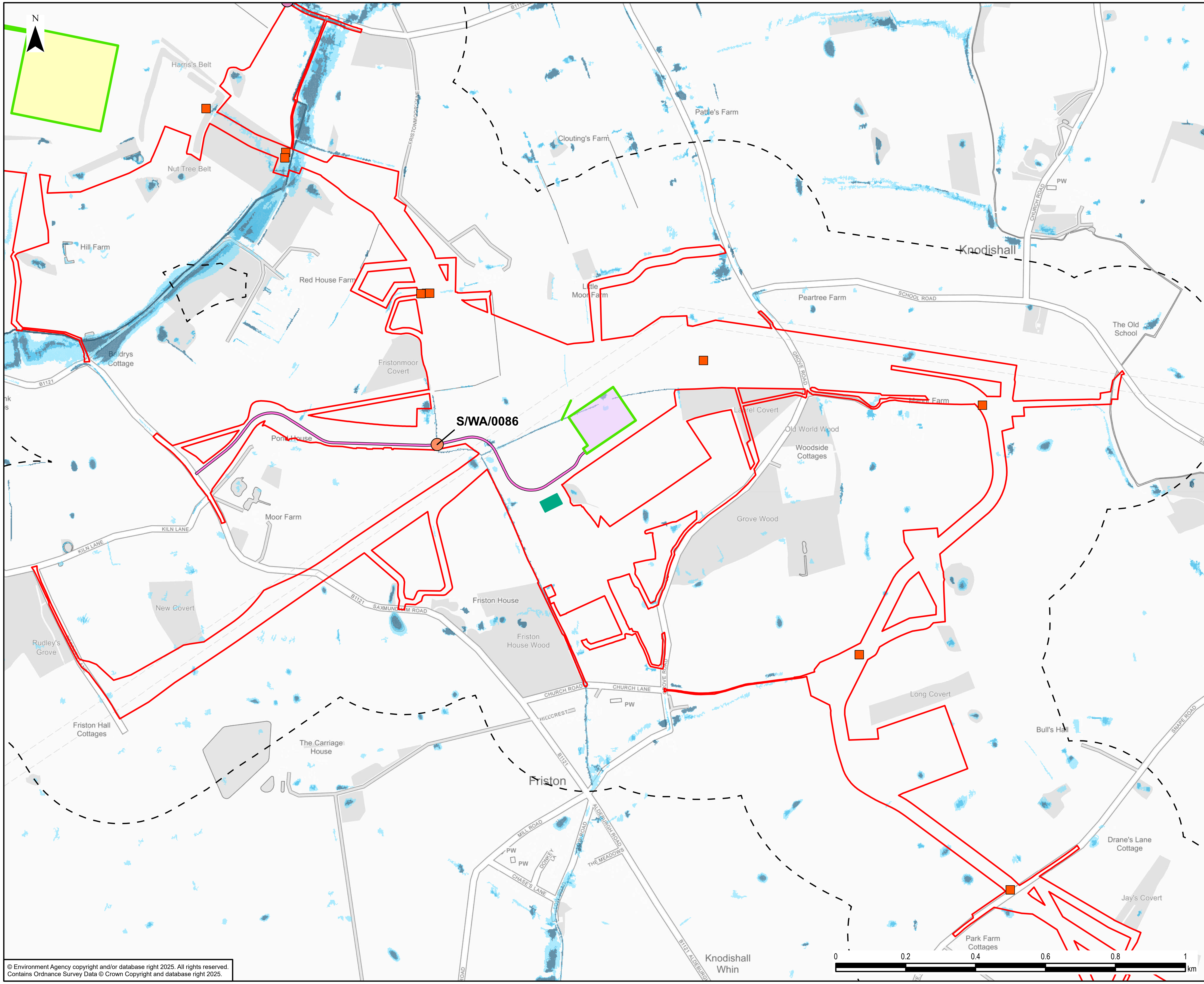
Scheme: SEA LINK

Document Title: OPERATION SURFACE WATER FLOOD RISK (SUFFOLK ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 2B	1:10,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig2b_Operation_Surface_Water_Flood_Risk_SuffolkOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Ordinary Watercourse Crossing - Permanent Culvert/Pipe
- Ordinary Watercourse Crossing - Permanent bellmouth
- Transition Joint Bay
- Proposed Drainage - Permanent Drain
- Proposed Permanent Infiltration Pond
- Proposed Permanent Access
- Proposed Substation
- Proposed Converter Station

Risk of Flooding from Surface Water

- High
- Medium
- Low

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	ENVIRONMENTAL STATEMENT	EB	DF	CW

nationalgrid

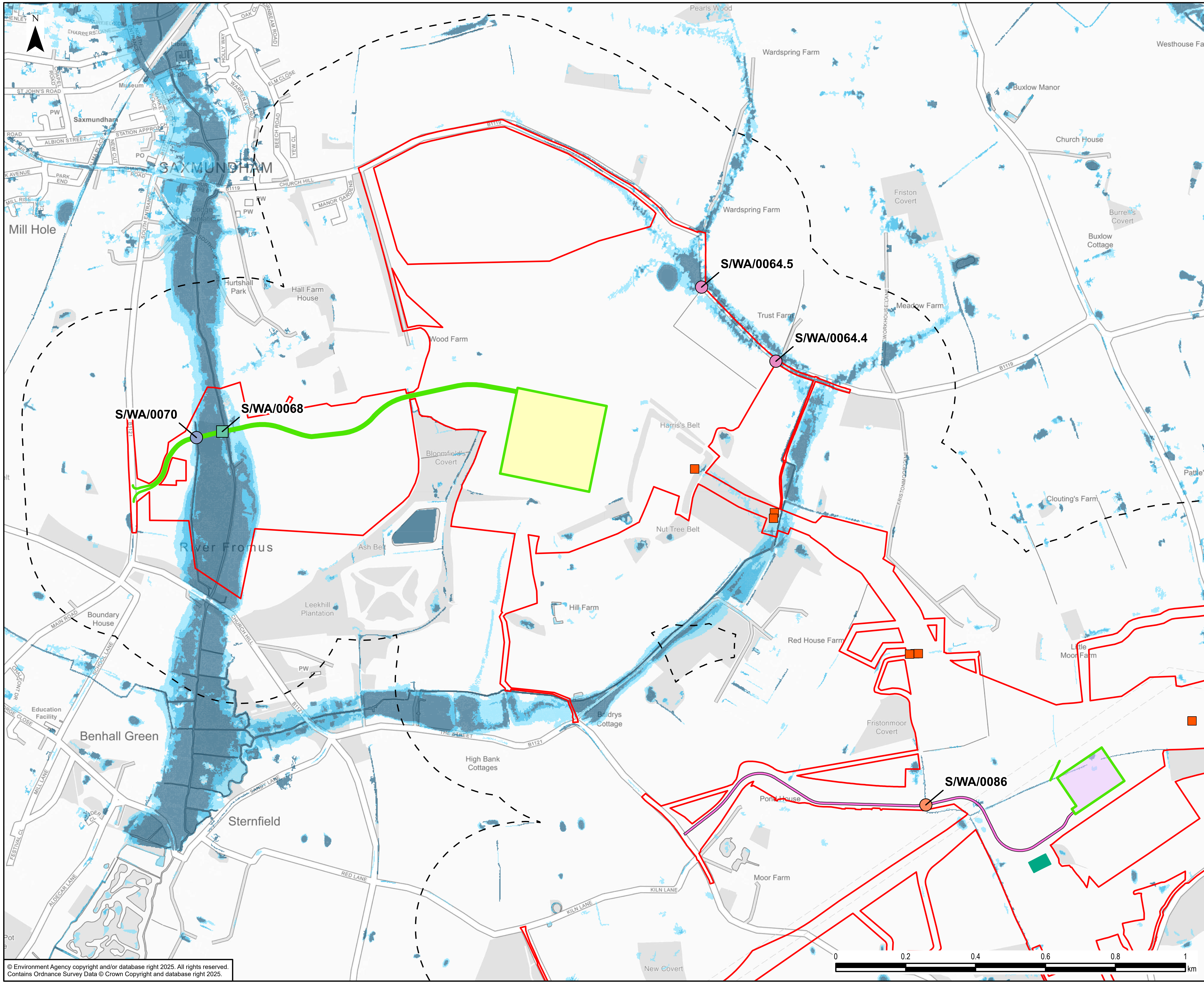
Scheme: SEA LINK

Document Title: OPERATION SURFACE WATER FLOOD RISK (SUFFOLK ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 2B	1:10,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig2b_Operation_Surface_Water_Flood_Risk_SuffolkOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Main River Crossing - Permanent bridge
- Ordinary Watercourse Crossing - Permanent Culvert/Pipe
- Ordinary Watercourse Crossing - Permanent Culvert
- Ordinary Watercourse Crossing - Permanent bellmouth
- Transition Joint Bay
- Proposed Drainage - Permanent Drain
- Proposed Permanent Infiltration Pond
- Proposed Permanent Access
- Proposed Substation
- Proposed Converter Station

Risk of Flooding from Surface Water

- High
- Medium
- Low

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	ENVIRONMENTAL STATEMENT	EB	DF	CW

nationalgrid

Scheme: SEA LINK

Document Title: OPERATION SURFACE WATER FLOOD RISK (SUFFOLK ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 2B	1:10,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig2b_Operation_Surface_Water_Flood_Risk_SuffolkOnshoreScheme_20250312_EB.aprx

Legend

- Order Limits
- Study Area
- Ordinary Watercourse Crossing - Temporary Culvert
- Proposed Access Route

Risk of Flooding from Surface Water

- High
- Medium
- Low

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

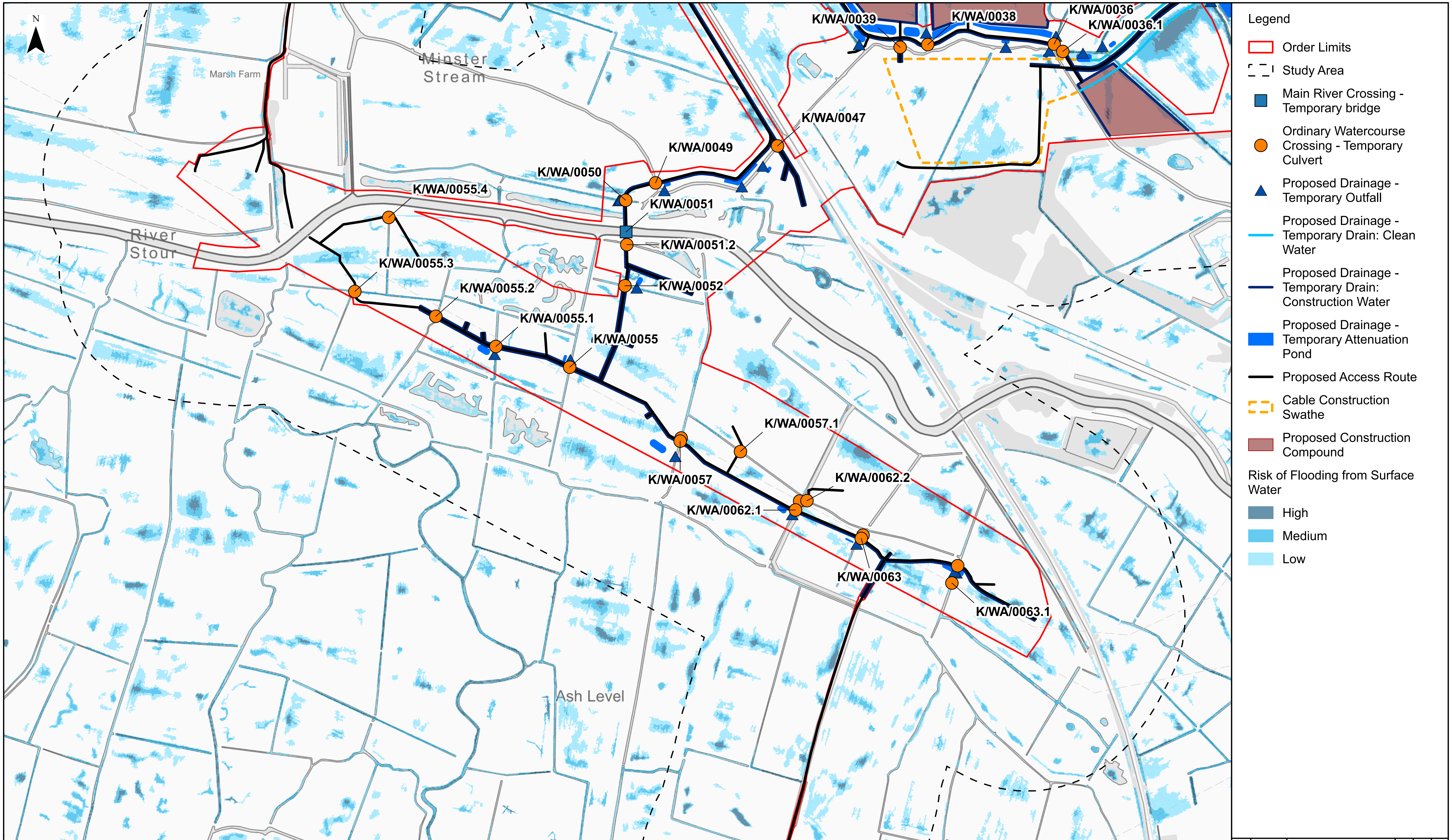
Scheme: SEA LINK

Document Title: CONSTRUCTION SURFACE WATER FLOOD RISK (KENT ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 2C	1:8,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig2c_Construction_Surface_Water_Flood_Risk_KentOnshoreScheme_20250312_EB.aprx



Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

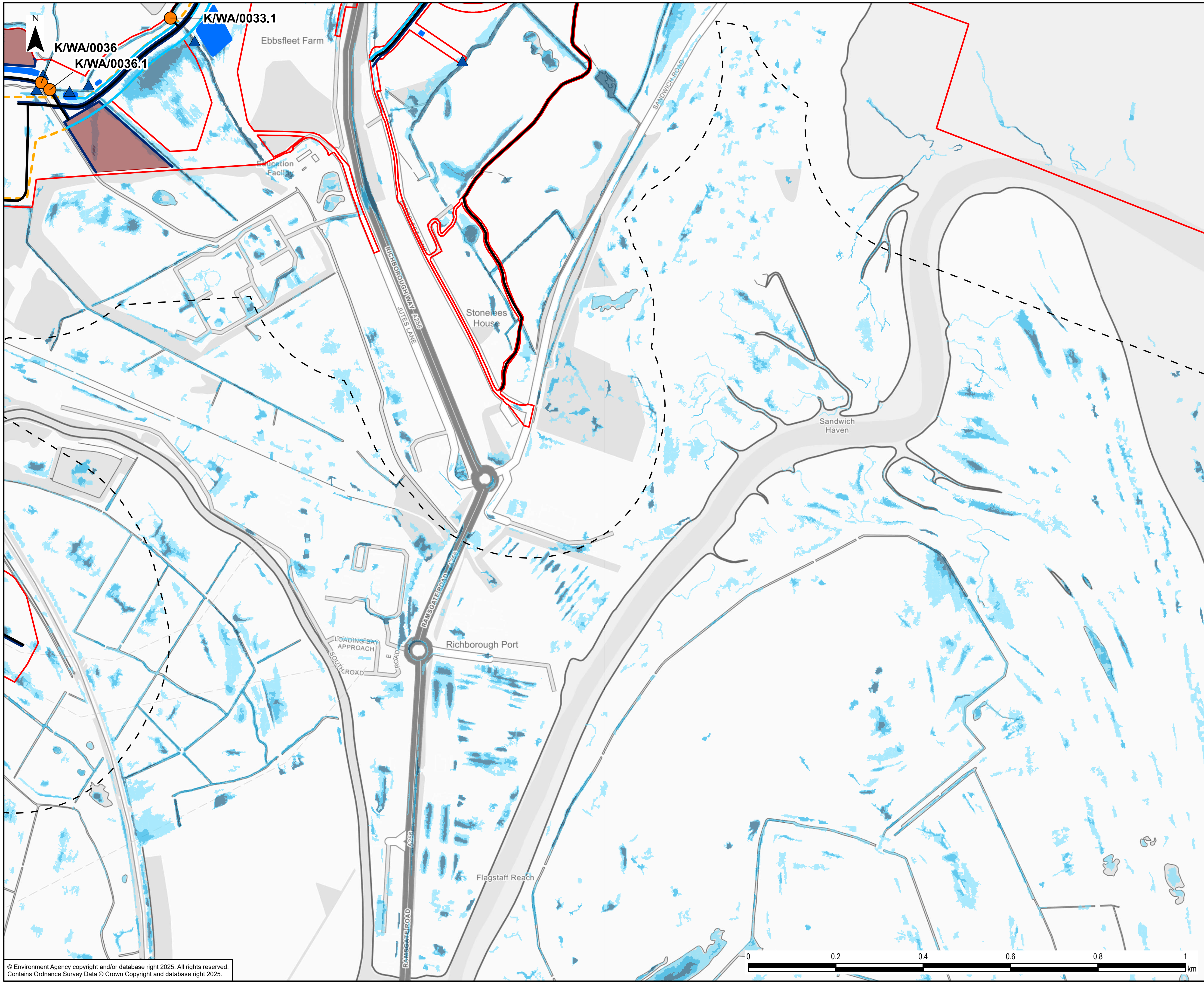
Scheme: SEA LINK

Document Title: CONSTRUCTION SURFACE WATER FLOOD RISK (KENT ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 2C	1:8,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig2c_Construction_Surface_Water_Flood_Risk_KentOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Ordinary Watercourse Crossing - Temporary Culvert
- Proposed Drainage - Temporary Outfall
- Proposed Drainage - Temporary Drain: Clean Water
- Proposed Drainage - Temporary Drain: Construction Water
- Proposed Drainage - Temporary Attenuation Pond
- Proposed Access Route
- Cable Construction Swathe
- Proposed Construction Compound

Risk of Flooding from Surface Water

- High
- Medium
- Low

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

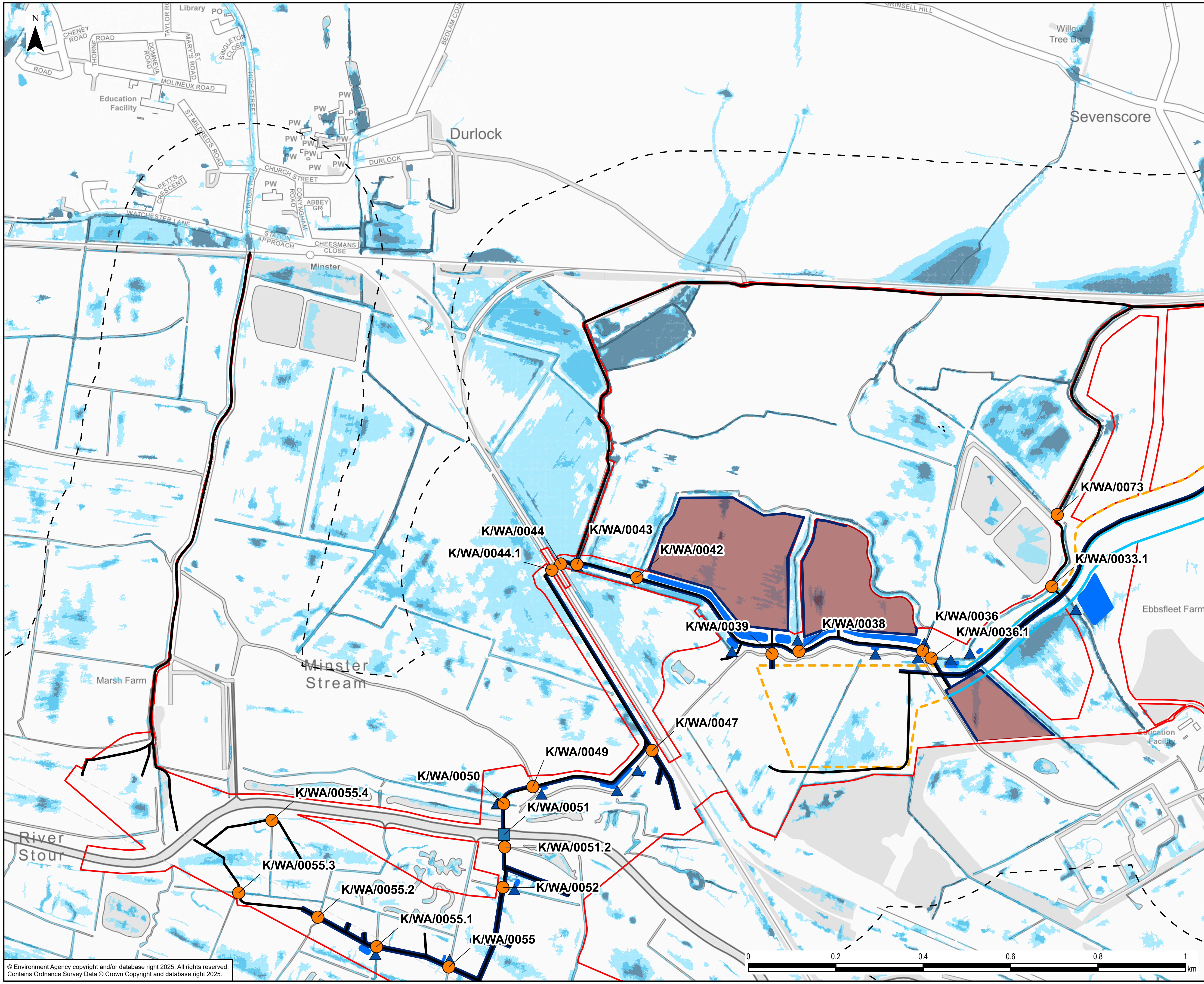
Scheme: SEA LINK

Document Title: CONSTRUCTION SURFACE WATER FLOOD RISK (KENT ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 2C	1:8,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig2c_Construction_Surface_Water_Flood_Risk_KentOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Main River Crossing - Temporary bridge
- Ordinary Watercourse Crossing - Temporary Culvert
- Proposed Drainage - Temporary Outfall
- Proposed Drainage - Temporary Drain: Clean Water
- Proposed Drainage - Temporary Drain: Construction Water
- Proposed Drainage - Temporary Attenuation Pond
- Proposed Access Route
- Cable Construction Swathe
- Proposed Construction Compound

Risk of Flooding from Surface Water

- High
- Medium
- Low

0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW
Rev	Date	Description	GIS	Chk	App

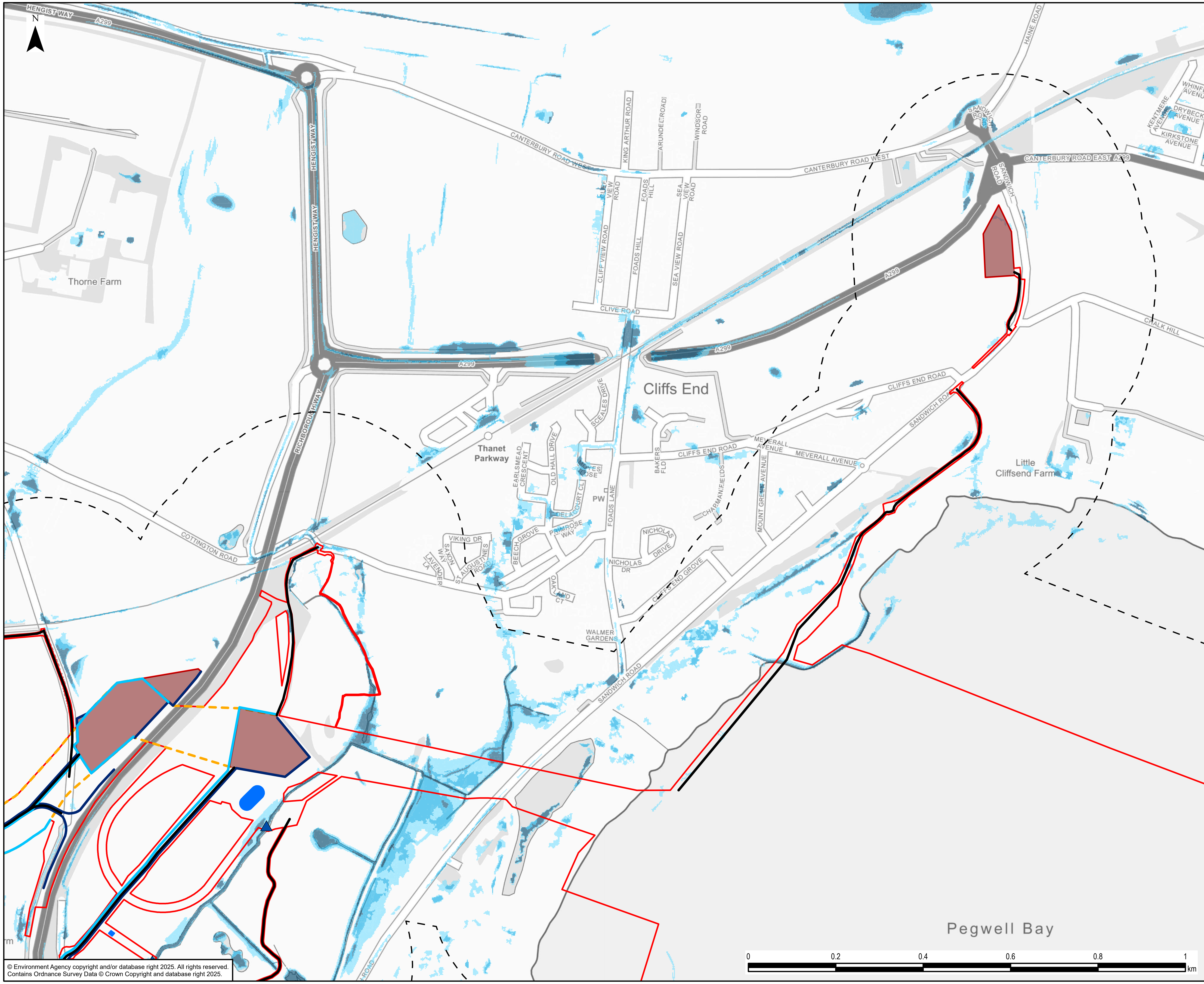
nationalgrid

Scheme: SEA LINK

Document Title: CONSTRUCTION SURFACE WATER FLOOD RISK (KENT ONSHORE SCHEME)

Creator: EB	Date: 12/03/2025	Checker: DF	Date: 12/03/2025	Approver: CW	Date: 12/03/2025
Document Ref: FIGURE 2C	Scale: 1:8,000	Format: A3	Sheets: 1	Rev: 0	

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig2c_Construction_Surface_Water_Flood_Risk_KentOnshoreScheme_20250312_EB.aprx



© Environment Agency copyright and/or database right 2025. All rights reserved.
Contains Ordnance Survey Data © Crown Copyright and database right 2025.

Legend

- Order Limits
- Study Area
- Proposed Drainage - Temporary Outfall
- Proposed Drainage - Temporary Drain: Clean Water
- Proposed Drainage - Temporary Drain: Construction Water
- Proposed Drainage - Temporary Attenuation Pond
- Proposed Access Route
- Cable Construction Swathe
- Proposed Construction Compound

Risk of Flooding from Surface Water

- High
- Medium
- Low

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	FLOOD RISK ASSESSMENT	EB	DF	CW

nationalgrid

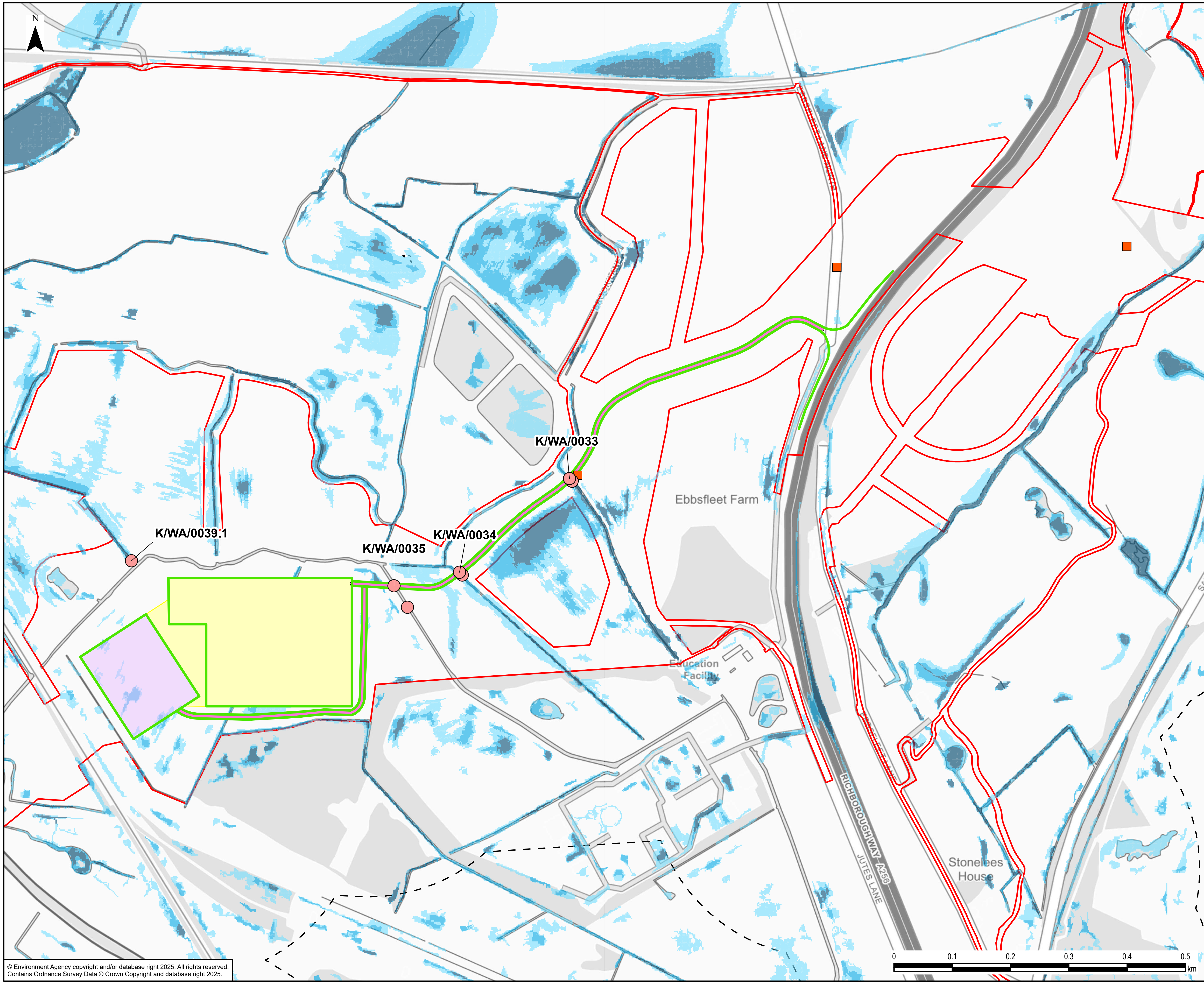
Scheme: SEA LINK

Document Title: CONSTRUCTION SURFACE WATER FLOOD RISK (KENT ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 2C	1:8,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig2c_Construction_Surface_Water_Flood_Risk_KentOnshoreScheme_20250312_EB.aprx



Legend

- Order Limits
- Study Area
- Ordinary Watercourse Crossing - Permanent Culvert
- Transition Joint Bay
- Proposed Drainage - Permanent Drain
- Proposed Permanent Access
- Proposed Substation
- Proposed Converter Station

Risk of Flooding from Surface Water

- High
- Medium
- Low

Rev	Date	Description	GIS	Chk	App
0	12/03/2025	ENVIRONMENTAL STATEMENT	EB	DF	CW

nationalgrid

Scheme: SEA LINK

Document Title: OPERATION FLUVIAL FLOOD RISK BASELINE (KENT ONSHORE SCHEME)

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	12/03/2025	DF	12/03/2025	CW	12/03/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 2D	1:6,000	A3	1	0

Document Path: L:\Legacy\UKMCR1FP002-V1IE\Proposal\3512\SEAL GIS\02_Maps\Environmental Statement\Flood Risk Assessment\Sea_Link_FRA_Fig2d_Operation_Surface_Water_Flood_Risk_KentOnshoreScheme_20250312_EB.aprx

Appendix B Fromus Hydraulic Modelling Technical Note

Memo

SUBJECT
Sea Link River Fromus Modelling Technical Note

TO
National Grid

DATE
March 2025

NAME
Arcadis

1 Background

The Suffolk Onshore Scheme (forming part of the Sea Link Project) is proposed to cross the River Fromus at National Grid Reference (NGR) TM 38837 62286. The proposed crossing will be a clear span bridge forming part of a permanent access road into the Saxmundham Converter Station site. The potential flood risk as a result of the proposed bridge has been modelled in order to inform the Water Framework Directive (WFD) compliance assessment (Application Document 6.9) and Flood Risk Assessment (FRA) (Application Document 6.8).

Two bridge design options have been modelled, a smaller bridge with a 2 metre (m) clearance between peak water level and bridge soffit (known as BR2), and a larger bridge with a 4m clearance (known as BR4).

1.1 Proposed Project

The components of the Suffolk Onshore Scheme in the area of interest (western-most area of the Order Limits) are shown in Figure 1. The Proposed Project incorporates a permanent access track connecting the B1121 road to the proposed Saxmundham Converter Station; a temporary construction compound; both temporary and permanent drains with outfalls into associated attenuation ponds, and a bridge crossing the River Fromus.

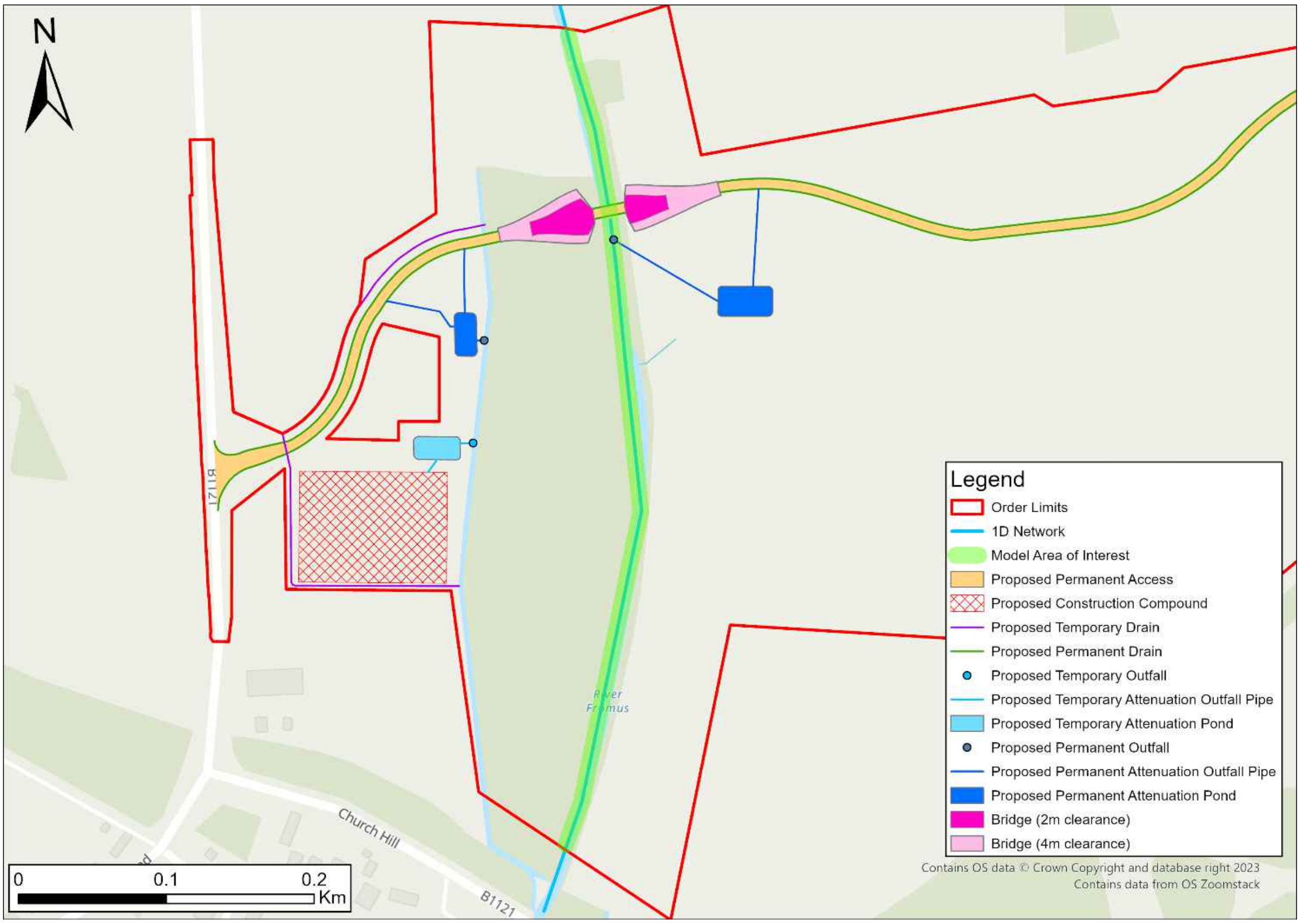


Figure 1: Overview of Proposed Project in Area of Interest

1.1.1 Bridge Design

The final design of the bridge is to be confirmed following the Sea Link Project Development Consent Order (DCO) submission. Therefore, both options have been assessed to ensure whichever design is taken forward is compliant under WFD and flood risk regulations and policy.

The two design options for the proposed permanent crossing over the River Fromus have been modelled as per drawing S42_S-TDD/SS/0020[1] (extracts of which are shown in Figure 2 and Figure 3). No detailed designs for the bridge have been created at this stage of the Proposed Project, therefore it has been assumed that these designs will remain accurate and representative of the final detailed design.

The crossing has been proposed as a clear span bridge over the River Fromus, with an opening width of 24m, deck height of 1.3m, a parapet with a height of 1m, and access ramps with a slope of 1 in 16 providing access either side of the bridge. There is a 8m setback between the channel banks and the bridge abutments.

2m Clearance Bridge (BR2)

The BR2 design option crossing is proposed as a clear span bridge with a clearance of 2m between the existing EA model 1 in 100 year plus 35% climate change scenario water level (8.45mAOD) and the bridge soffit.

[1] The National Grid Electricity Transmission Plc (Sea Link) Order Design Drawings for Consultation Typical Permanent Bridge Crossing (River Fromus) (NG Ref: S42_S-TDD/SS/0020). Created 03/07/2024.

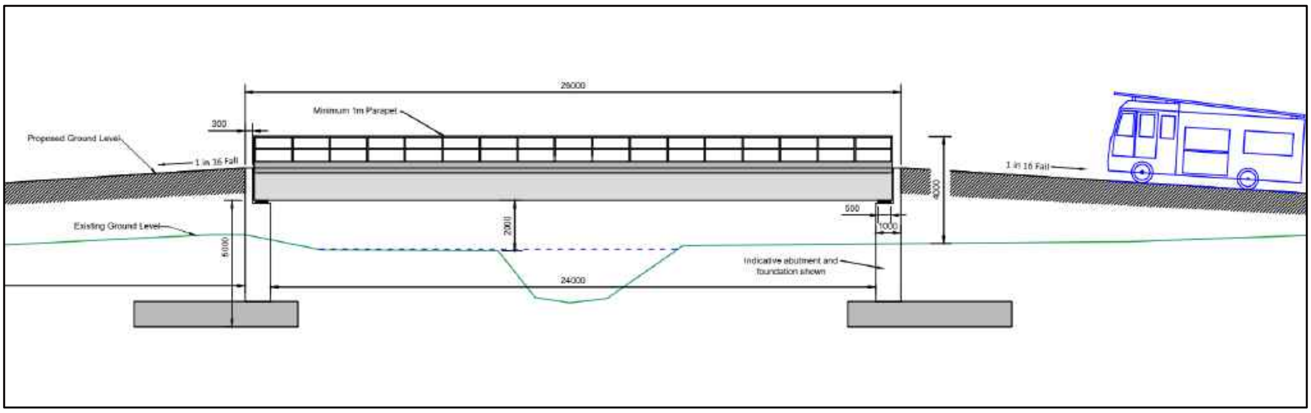


Figure 2: Proposed typical design of bridge with 2m clearance

4m Clearance Bridge

The BR4 design option crossing is proposed as a clear span bridge with a clearance of 4m between the existing EA model 1 in 100 year plus 35% climate change scenario water level (8.45mAOD) and the bridge soffit.

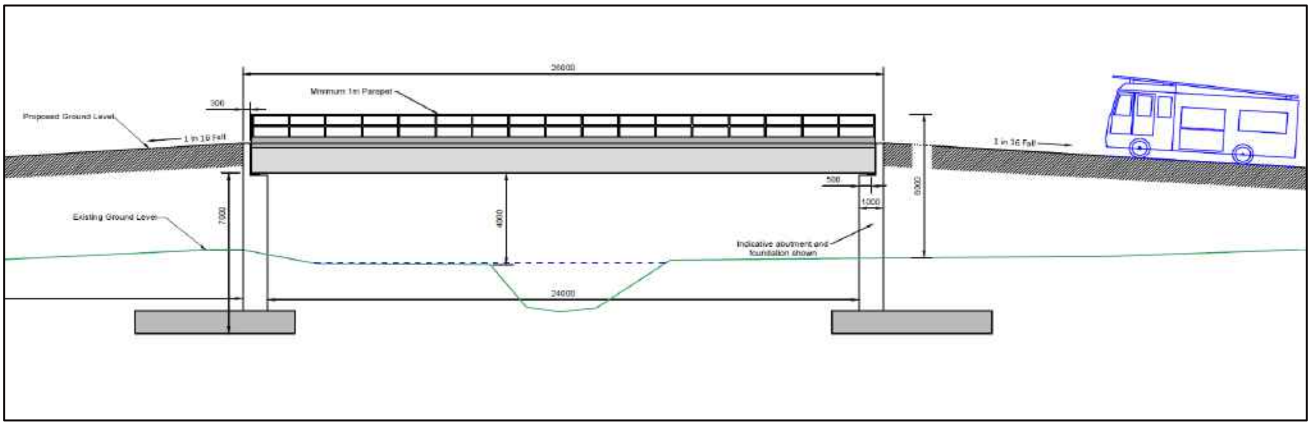


Figure 3: Proposed typical design of bridge with 4m clearance

1.2 Incoming Data

The Environment Agency (EA) holds an existing 1D-2D hydraulic model of the River Fromus. This EA model has been supplied and used as the basis for the hydraulic modelling of the proposed watercourse crossing. Accompanying the supplied model was a hydrology and hydraulic report[2].

The channel sections in the existing EA model are based on channel survey[3][4][5], which have also been supplied for use in this study.

In addition to the model, reporting and channel survey, a topographic survey of the floodplain in the area of interest was undertaken. However, this data was only spot levels across the floodplain, and did not provide detailed channel survey, so has not been incorporated into the model.

---

[2] Mott Macdonald, March 2020. Modelling Package 6 Alde, Ore and Fromus Hydrology and Hydraulics Report.
[3] Ordnance Survey, January 1995. Suffolk Fluvial Rivers Survey Location Plan, River Alde Ore Catchment.
[4] Maltby Land Surveys Ltd., August 2011. Fluvial Alde & Ore Model.
[5] Total Land Surveys Limited, January 2007. Rivers Alde, Ore and Deben Flood Risk Study – Saxmundham watercourse.

1.3 Incoming Model

The existing EA model used for this study covers three watercourses:

- The River Fromus from north of Dorley's Corner (NGR TM 36954 67263) down to its confluence with the River Alde at NGR TM 38907 57634.
- The River Alde from north of Stratford St Andrews (NGR TM 36020 60422) down to the tidal limit of the Alde at Snape (NGR TM 39638 57541).
- The River Ore, from NGR TM 35646 58161 down to its confluence with the Alde at NGR TM 36149 58379.

In addition to these watercourses, there are two tributaries of the River Fromus included Gull Stream, which is included from NGR TM 38097 64126 to its confluence with the River Fromus at NGR TM 38678 63988, and an unnamed watercourse which runs through Saxmundham, included in the model from NGR TM 37072 63491 to the confluence with the River Fromus at NGR TM 38637, 63542.

The channel sections in the existing EA model are based on channel survey. The channel survey for the River Fromus was collected in January 1995[3], the channel survey for the River Alde, River Ore and Gull Stream was collected in August 2011[4], and the channel survey for the unnamed watercourse through Saxmundham was collected in January 2007[5]. Given the age of the survey data a check survey has been commissioned and the data will be used to verfify that there have been no significant changes to channel cross section geometry in the reach of interest.

The upstream extent of the model is on the River Fromus, approximately 5.8km upstream of the area of interest. The downstream extent of the River Fromus is approximately 4.9km downstream of the area of interest. The River Alde and River Ore are also downstream from the area of interest.

The existing EA model was last updated by Mott Macdonald in 2019[2]. This 2019 update used three separate models as the base for the updates:

- A 1D-2D Flood Modeller-TUFLOW model Fluvial Alde, Ore and Fromus (JBA, 2012).
- A 1D only Flood Modeller model of Saxmundham Gull Watercourse (submitted with the Flood Risk Assessment for land off Main Road in Saxmundham, 2013).
- A 2D only TUFLOW of Alde and Ore Estuary for Alde and Ore Model Update and Options Appraisal (JBA, 2015).

According to the Mott Macdonald reporting, the 1D-2D model of the Alde, Ore and Fromus dating from 2012 was taken forward in the 2019 update but converted to a full 1D-2D model along the entire length of the watercourses. The 2019 update also incorporated newer data from the other two models, but the reporting did not contain information on what data was incorporated or where the updating to the 1D-2D links took place. The model was run using Flood Modeller Pro v4.3 and TUFLOW 2018-08-AA software.

1.3.1 Model Review

A review of the existing model was undertaken to assess if the model was fit for purpose for this study hence focusing on the area of interest, as detailed in Figure 1. The following issues with the model were highlighted in the review:

- The survey for the channel of the River Fromus dates from January 1995, nearly 30 years ago, and therefore may not be representative of the current channel geometry.
- A check of the lidar used in the existing EA model against the latest 2022 EA lidar showed a consistent difference in levels of 0.15m, with the new lidar levels being lower than the lidar in the existing EA model.
- The widths represented by the 1D channel sections did not match the widths nulled out in the 2D domain for the channel.

- Roughness values assigned to the floodplain in some locations were not representative of the current ground surface and in most cases were rougher than the best practice values both in the 1D and 2D.
- The climate change allowance applied was not in line with the latest guidance for the catchment[6].
- A number of other smaller areas for change were identified with the modelling, including the application of panel markers at changes of roughness in the area of interest (resulting in warning messages being generated) and the application of the initial conditions in the 1D model being applied via the .DAT file instead of using a separate file, both of which are not best practise.

Following a review of the existing EA model, changes were undertaken, as outlined in Section 2.2.

1.3.2 Hydrology Review

The hydrology calculations for model inflows were not provided by the EA, but it has been assumed the inflows contained within the 1D IED files were derived in 2019, along with the most recent update to the model by Mott Macdonald in 2019. A review of the incoming hydrology has been undertaken.

The Mott Macdonald report[2] showed that River Fromus hydrology in the area of interest had been derived using the Benhall Bridge level gauge, which is located immediately downstream of the area of interest (located at the crossing of Church Hill by River Fromus). Following the previously applied approach, a value for QMED at Benhhall Bridge was calculated using the recorded annual maxima peak level data series (2003 to 2023), converted to peak flows using the rating relationship developed and applied in the Mott Macdonald study. This update resulted in a reduction in QMED for the catchment of the Fromus to Benhall Bridge (from 4.2m^3/s to 4m^3/s). A flood frequency curve was subsequently developed in the current version of WINFAP to derive flows for higher return period flood events.

These were then compared with the routed flows from the Mott Macdonald study. The comparison showed that the updated estimated lumped catchment peak flows were slightly higher than the routed flows through the model at the Benhall Bridge. At the 30 year return period the routed flow is equal to 8.1m^3/s, compared to a lumped catchment FEH statistical estimate of 10m^3/s. At the 100 year return period the routed flow is equal to 10.3m^3/s compared to the lumped catchment flow estimate of 13.3m^3/s.

This is in line with expectations, given that there are out of bank flows upstream of the bridge which would reduce the magnitude of routed flows compared to the direct catchment estimates. Therefore, the existing hydrology has been accepted as appropriate for use within this study without amendment. Application of climate change allowances is discussed in Section 2.2 below.

[6] East Suffolk Management Catchment peak river flow allowances, Defra, accessed August 2024 at: https://environment.data.gov.uk/hydrology/climate-change-allowances/river-flow?mgmtcatid=3035

2 Modelling Methodology

Following the review of the existing EA model detailed in Section 1.3.1, modifications were made to the model to make it suitable for use for this study. It should be noted that any remaining uncertainties are outlined in Section 2.2.3.

There have been no modifications to the hydrology or model extents; the changes have been focussed on the area of interest highlighted in Figure 1 above.

2.1 Modelling Version and Software

The existing EA model was last run in May 2019 using Flood Modeller version 4.3 (for 1D simulation) and TUFLOW version 2018-03-AA (for 2D simulation). The 2D components of the model were represented in the model with Map Info (MI) files.

As part of this study, the model has been updated to run in the latest versions: Flood Modeller version 7.2 and TUFLOW version 2023-03-AF. In addition, the 2D model files have been converted to shape files from their original MI formatting. This is in line with the most up to date hydraulic modelling practices.

2.2 Model Modifications

2.2.1 Baseline Model

An initial review of the existing EA model was undertaken prior to the modelling of the bridges, as outlined in Section 1.3.1. As a result of this review, several modifications were made to the model, to follow best hydraulic modelling practise and to ensure the model was able to run in the latest versions of the software. All modifications were concentrated on the area of interest - the model section within the Suffolk Onshore Scheme Order Limits (shown in Figure 1).

The following modifications were made to the 1D model domain:

- 1D cross sections were extended to closely match the width of channel area nulled out in the 2D. Owing to the spacing of the 1D channel survey sections (e.g. every 3m) and the 2D cell size, there is not an exact match, but they have been matched as closely as possible.
- 1D channel roughness of the channel bed was adjusted from 0.054 to a Manning's n value of 0.04, based on the site photos shown in Figure 4 (taken on 22nd July 2024) and Figure 5 (taken on 28th November 2024). No change has been made to the channel banks, these remain set to 0.07.
- Initial conditions were regenerated and input into the model as a separate IIC file.
- A panel marker was added at cross section FROM_5750 to remove a warning message.
- A copy of FROM_6150 (1D cross section) was added at the original scheme crossing location (called FROM_6150c, located at NGR TM 38838, 62261) – this was added to represent the original bridge location but has been left in following a relocation of the bridge.
- The climate change allowance was also updated to reflect the current East Suffolk Management Catchment peak river flow allowances. The 2080s higher allowance of 29% has been used as the climate change scenario for this updated modelling[6].


Figure 4: Photos of the River Fromus channel in the area of interest ***(taken at approximately NGR TM 38846 62216, on 22nd July 2024)***

Figure 5: Photo of the River Fromus channel in the area of interest (taken at NGR TM 38839 62252, on 28th November 2024)

The following modifications were made to the 2D domain:

- 2D cell size was reduced from 8m to 4m to increase to definition of the floodplain.
- The model grid was altered to be aligned with the channel in the area of interest.
- Additional bank points were added in the 2D domain to enhance channel geometry definition based on the 1m lidar.
- The roughness for natural grassland was updated across the model domain (from 0.06 to 0.04), and a roughness value of 0.035 was set for car parks across the model domain. A roughness patch for the maintained woodland on the left bank of the Fromus in the area of interest was added, set to 0.07 to reflect the sparse tree planting here.
- Additional PO lines added across the area of interest to assess flow mechanisms.

2.2.2 Scheme Model

In addition to the baseline changes, modifications were also made to incorporate the design of the Proposed Project in the model, for both the BR2 and BR4 models.

These modifications included the following within the 1D domain:

- Span bridge added in as arch bridge from the left abutment to the right abutment based on the designs above.
- Copy of the river section upstream of the bridge added downstream of the bridge node.

Given the soffit height and clearance above the peak water level, it was concluded that a spill structure was not required in association with the bridge, as even an extreme flood would not overtop the structure.

The 2D domain was updated to reflect the 1D changes (e.g. added 1D nodes at the location of the new river section downstream of the bridge), as well as to include the ramped abutments as a zshape on either side of the channel.

2.2.3 Remaining Uncertainties

The modelling made use of the existing EA model as the baseline for the assessment. Whilst amendments have been made to the model to update it to be in line with best practice, there remains some limitations given the age of the survey and lidar used.

The survey of the River Fromus used to generate the 1D cross sections in the area of interest was undertaken in 1995. To understand the suitability of this to reflect the existing channel geometry, cross sections were plotted through the model DTM and the EA 2022 lidar and compared with the channel cross sections. Whilst lidar will not give an accurate reflection of bed levels as the survey will pick up the water surface elevation, rather than the bed level, this has been used to gauge whether the channel width and geometry is reasonable. Figure 6 shows the comparison at two key locations. As expected, the bed level in the channel is not picked up by the lidar however the geometry and shape of the channel shows a good match between both lidar datasets (model DTM and EA 2022 lidar) and the survey such that the survey is considered to be a reasonable match to the current channel geometry and widescale changes are not anticipated to have occurred since it was collected.

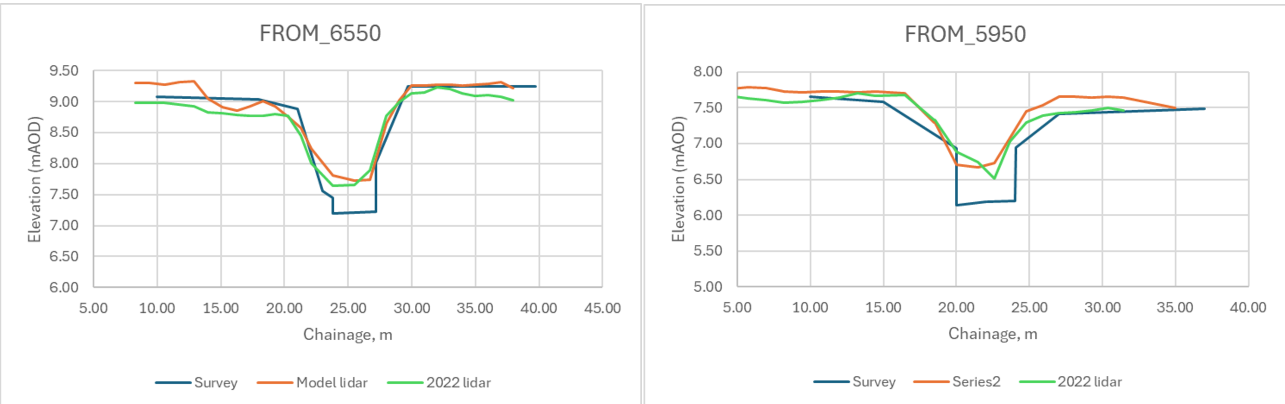


Figure 6: Comparison of lidar with cross section data

The model uses the lidar which was provided with the EA model, however there is no record of when this data was created. A comparison of the model DTM to lidar flown in 2022, shows a consistent difference in ground elevations whereby more recently flown is lower than the model DTM by around 0.15m across the model 2D domain. The model cross sections (taken from survey) show good correlation to the existing model DTM data and therefore more recent lidar has not been adopted as it would not correlate so well with the existing 1D cross sections. To understand the magnitude of impacts that would occur in the more recent lidar information was used, a sensitivity test was run with the 2022 lidar and updated bank points. This showed a small increase in 2D flood extents across the model and corresponding increase in in-channel flood levels. The increases in flood extent only occurred at locations where out of bank flooding occurs within the model currently and did not result in any new flood mechanisms in the area of interest.

The final model has been run using the existing survey and lidar as provided within the EA model. Based on the above, the use of this is not anticipated to impact the conclusions of this study.

2.3 Model Stability

2.3.1 Mass Balance

The computed mass balance stays within healthy limits for a hydraulic model (±1%) for all simulations and events for the updated hydraulic model (baseline (BAS), BR2 and BR4 runs) as shown in Figure 7. It is noted that this is a significant improvement compared to the existing EA model. Previously, the mass balance in the 1 in 100 year event spiked down to -34% on model startup.

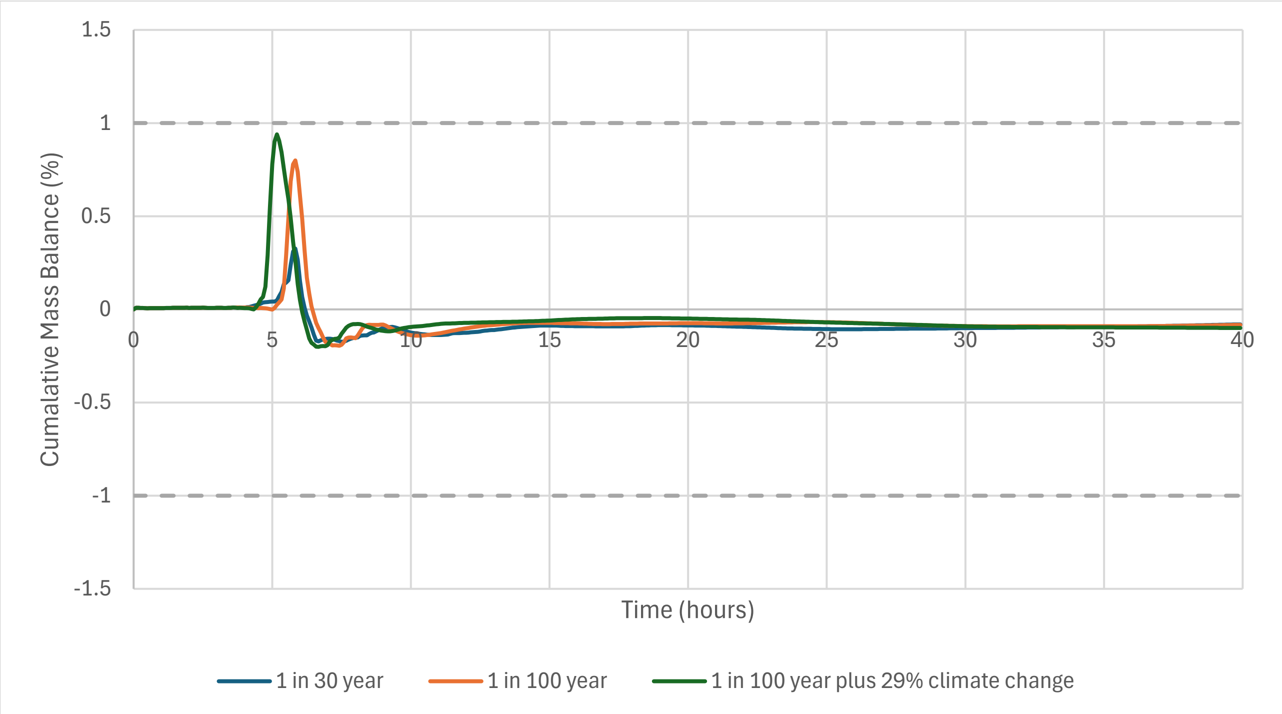


Figure 7: Mass Balance for the BR2 scenario (the cumulative mass balance for the Baseline and BR4 scenarios are the same as the BR2 scenario)

2.3.2 Stability Indicators

A review of other stability indicators and flow conservation through the area of interest has also been carried out, as discussed below.

The flow transfers between the 1D and 2D domains smoothly (e.g. flow passes into the 2D domain when the water level in the 1D domain is showing to reach the top of the bank level), and there are no issues with flow transfer whereby water is lost or gained. The flow, combined flow of the 1D domain (reported at the model nodes) and the 2D domain (reported via the PO lines) throughout the area of interest is also shown to be stable, with no irregularities causing concern with the model. A check of flow conservation through the area of interest shows that no flow is lost or gained through this reach except for a small amount which can be accounted for by storage of water on the floodplain.

3 Results

3.1 Baseline (BAS)

The baseline model was re-run for the 1 in 30 year, 1 in 100 year and 1 in 100 year plus 29% climate change events, with the model modifications detailed above and in the latest software versions. The results were compared against the model results from the existing EA model and show a reduction in the 2D flood extents (Figure 8) and a decrease in 1D water levels of approximately 0.16m for the 1 in 100 year event.

A thorough review of the differences has been undertaken to understand the cause of this change and concluded that the reduction in flood extents and levels is a result of the reduced roughness value applied to the channel and floodplain. Water is more easily able to be conveyed downstream and therefore more water remains in bank. The updated values are in line with best practice and recent site photographs and therefore the resultant flooding in this area is more reflective of the updated flood extent as shown in Figure 9. It is further noted that these impacts do not extend to the location of the proposed bridge ramps which remains outside of the 1 in 100 year extent both in the existing EA model and following the model update.

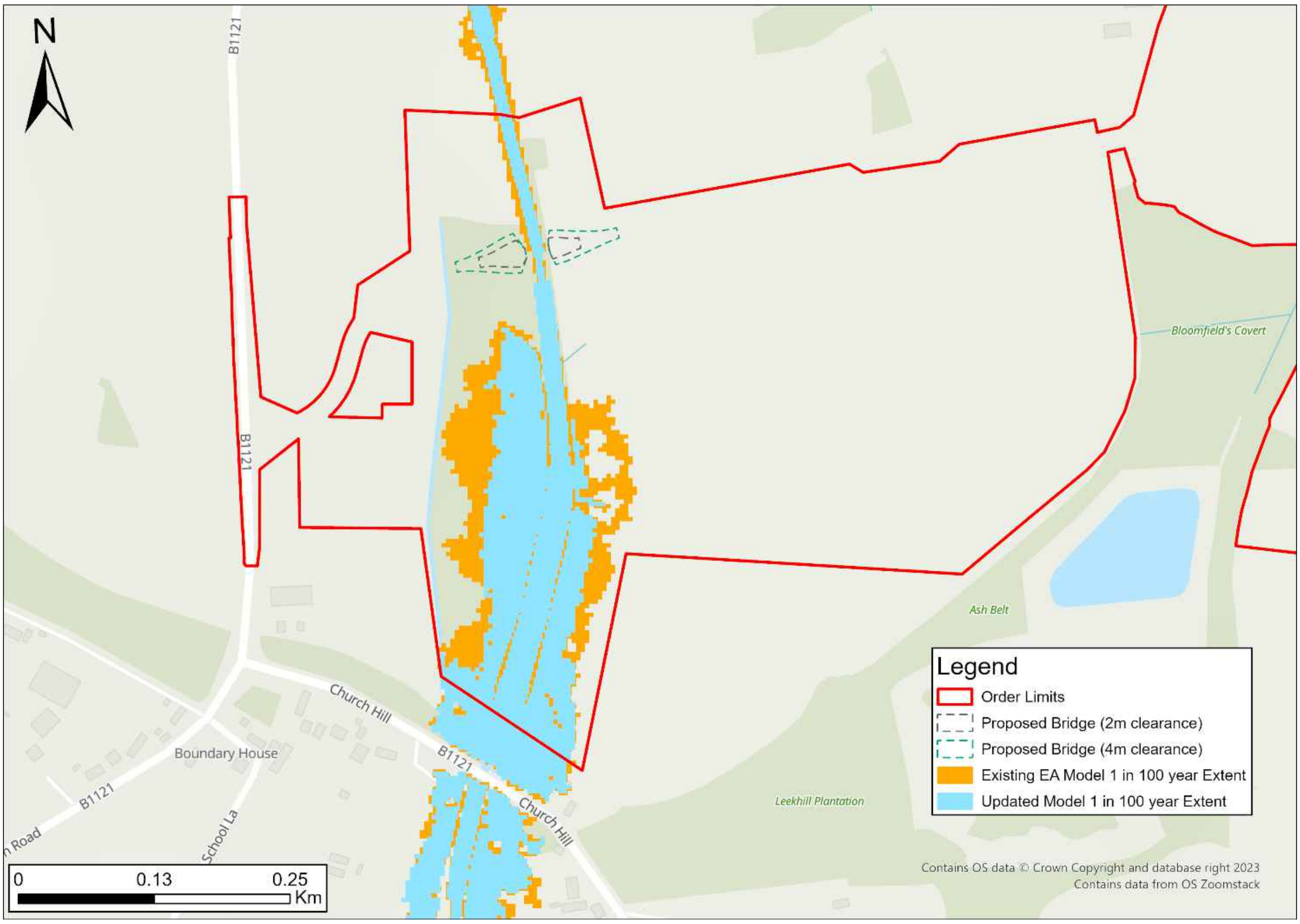


Figure 8: Comparison of modelled flood extent of the updated model to the existing EA model

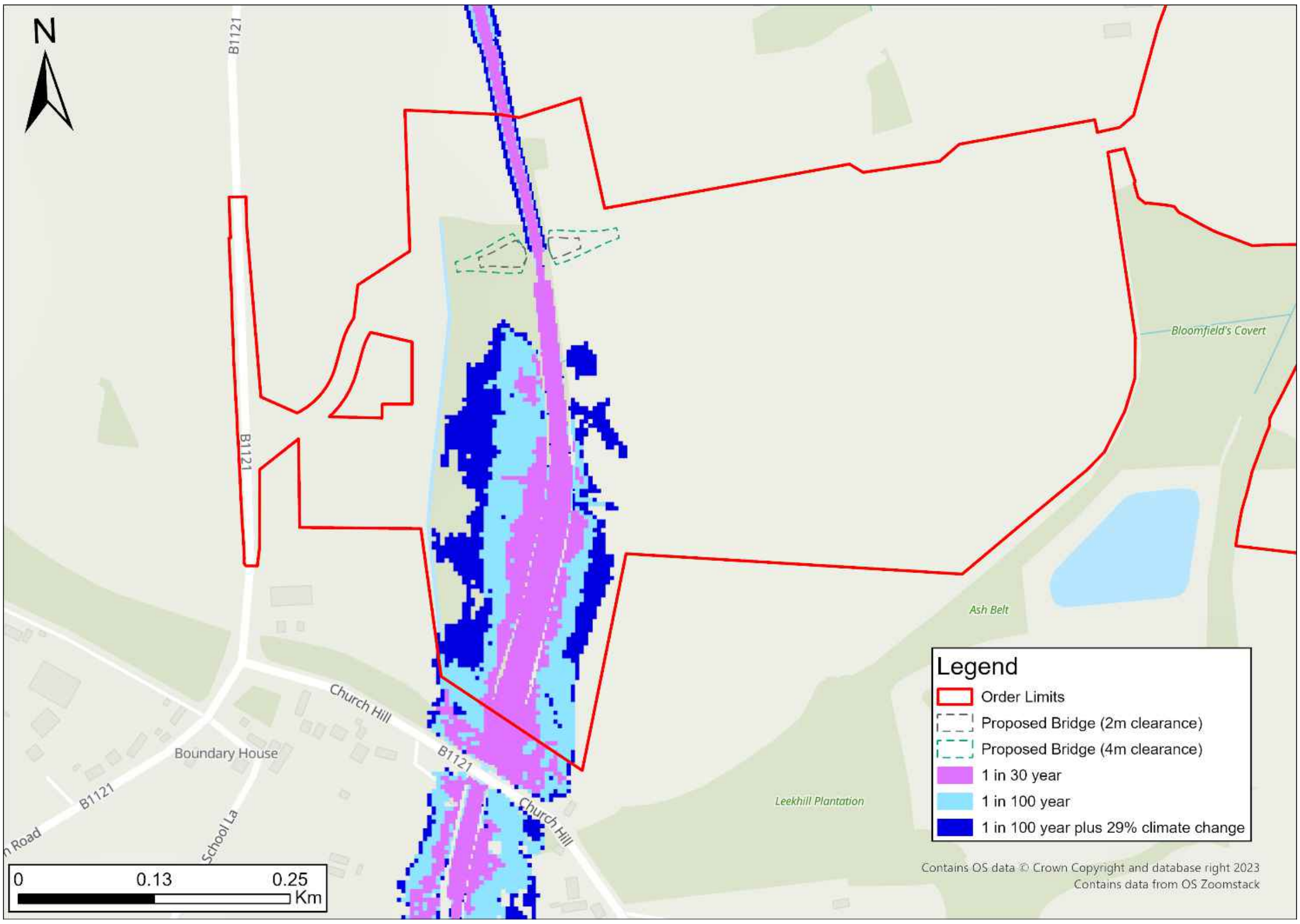


Figure 9: Maximum Flood Extent

3.2 Scheme (BR2 and BR4)

The 1D maximum flood levels are shown in Table 1 below. The 2D flood extents for both BR2 and BR4 scenarios remain as per the baseline results shown in Figure 9 above.

Table 1: Maximum Water Level (taken from node FROM_6150, immediately upstream of the bridge crossing)

Scenario	Maximum Water Level (mAOD)		
	1 in 30 year	1 in 100 year	1 in 100 year plus 29% Climate Change
BAS	8.04	8.18	8.31
BR2	8.04	8.18	8.31
BR4	8.04	8.18	8.31

It should be noted that the water level used to determine the clearance between the bridge soffit and the peak water level as discussed in Section 1.1.1 was based on the existing EA model, which uses a 35% climate change allowance. The climate change allowance has been updated in this modelling to use a 29% allowance, in line with the latest guidance[6].

There is now 2.19m of clearance between the 1 in 100 year plus 29% climate change scenario water level and the bridge soffit in the BR2 scenario, and 4.19m of clearance between the 1 in 100 year plus 29% climate change scenario water level and the bridge soffit in the BR4 scenario.

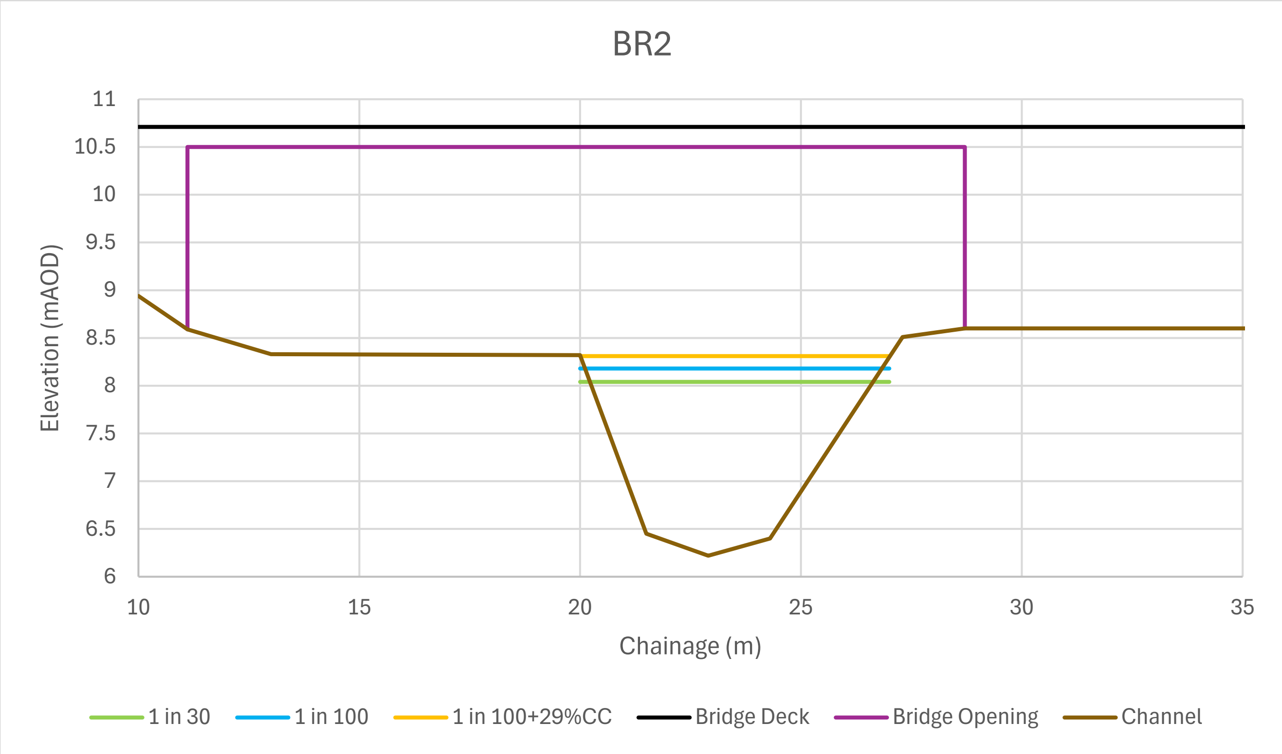


Figure 10: BR2 maximum water levels at Fromus bridge (FROM_6150)

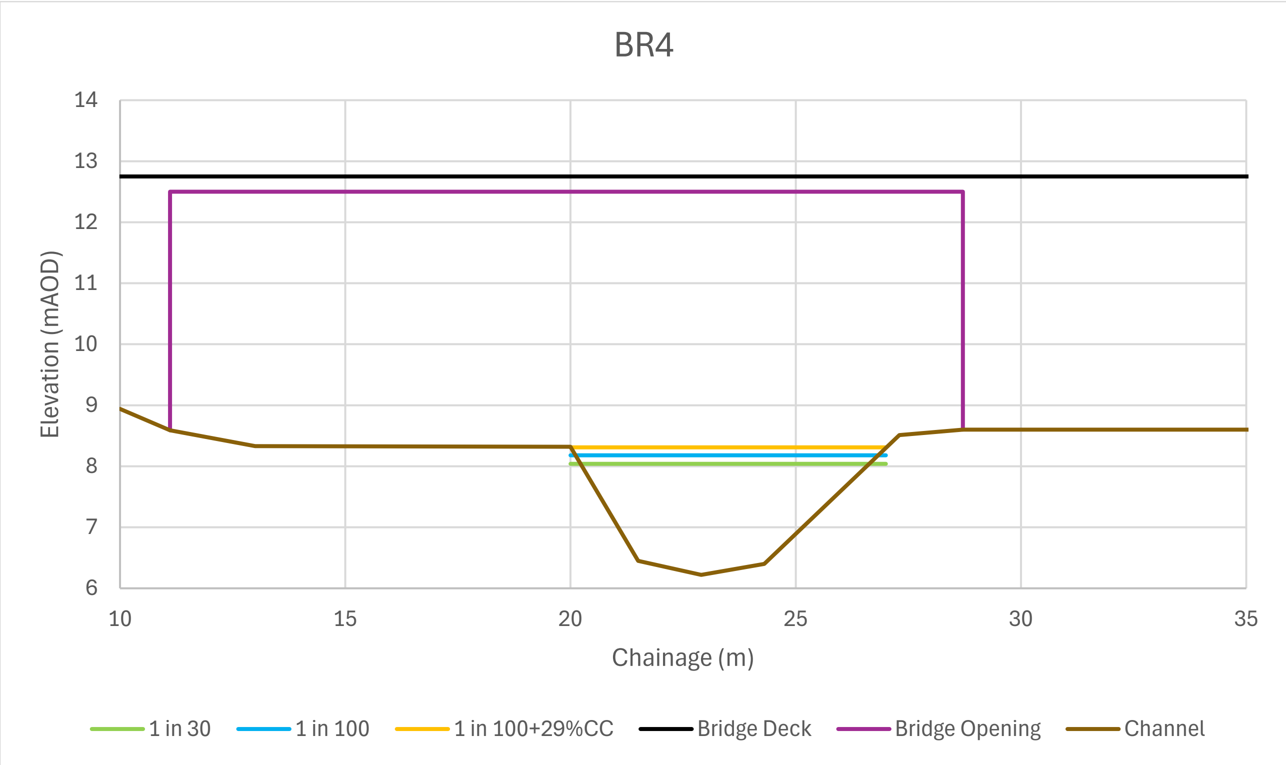


Figure 11: BR4 maximum water levels at Fromus bridge (FROM_6150)

In addition to evaluating the impact the proposed bridge crossings would have on the water level in the channel at the location of the proposed bridge, an assessment of the differences in the predicted flood depths has been carried out. Depth difference grids for each scenario and event are shown in Figure 12 to Figure 17, comparing the Baseline scenario to both bridge scenarios. These results show all changes in the flood depths are limited to the river channel, and there are no changes on the floodplain.

Grids which show the location of the cells which were wet in the Baseline scenario and are now dry in the BR2 or BR4 scenario, and cells which were dry in the Baseline scenario and are now wet in the BR2 or BR4 scenario are shown in Figure 18 to Figure 23. These also show that all changes are limited to the river channel, with no impact shown on the floodplain in either the BR2 or BR4 scenario for all three modelled flood events.

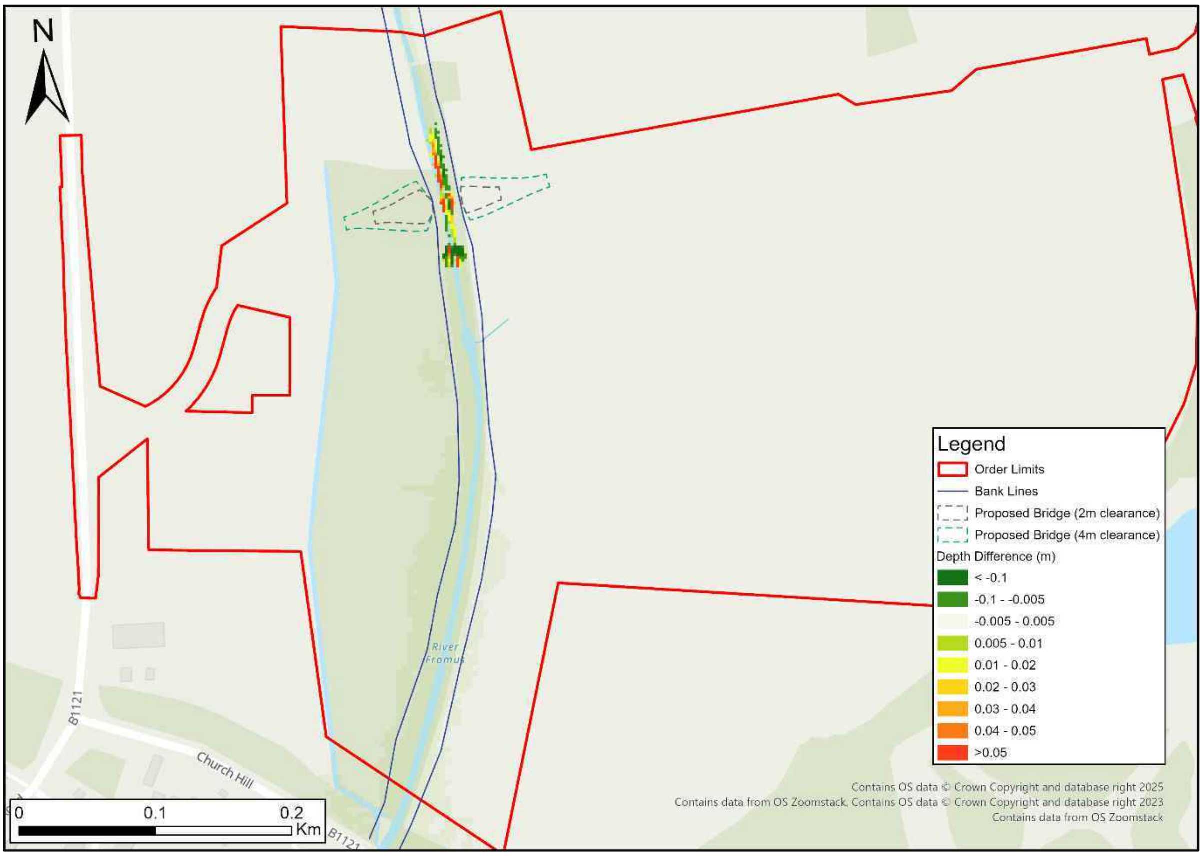


Figure 12: Difference in flood depths between the Baseline 1 in 30 year event and the BR2 1 in 30 year event

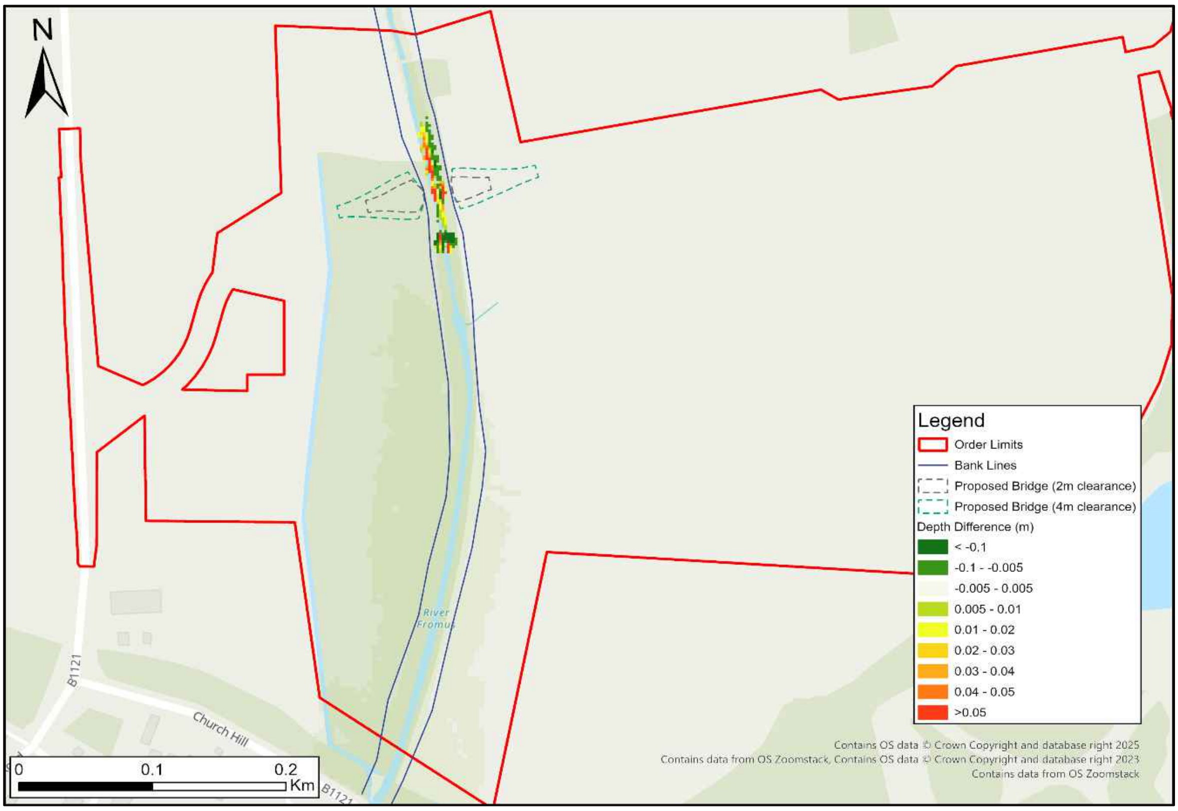


Figure 13: Difference in flood depths between the Baseline 1 in 100 year event and the BR2 1 in 100 year event

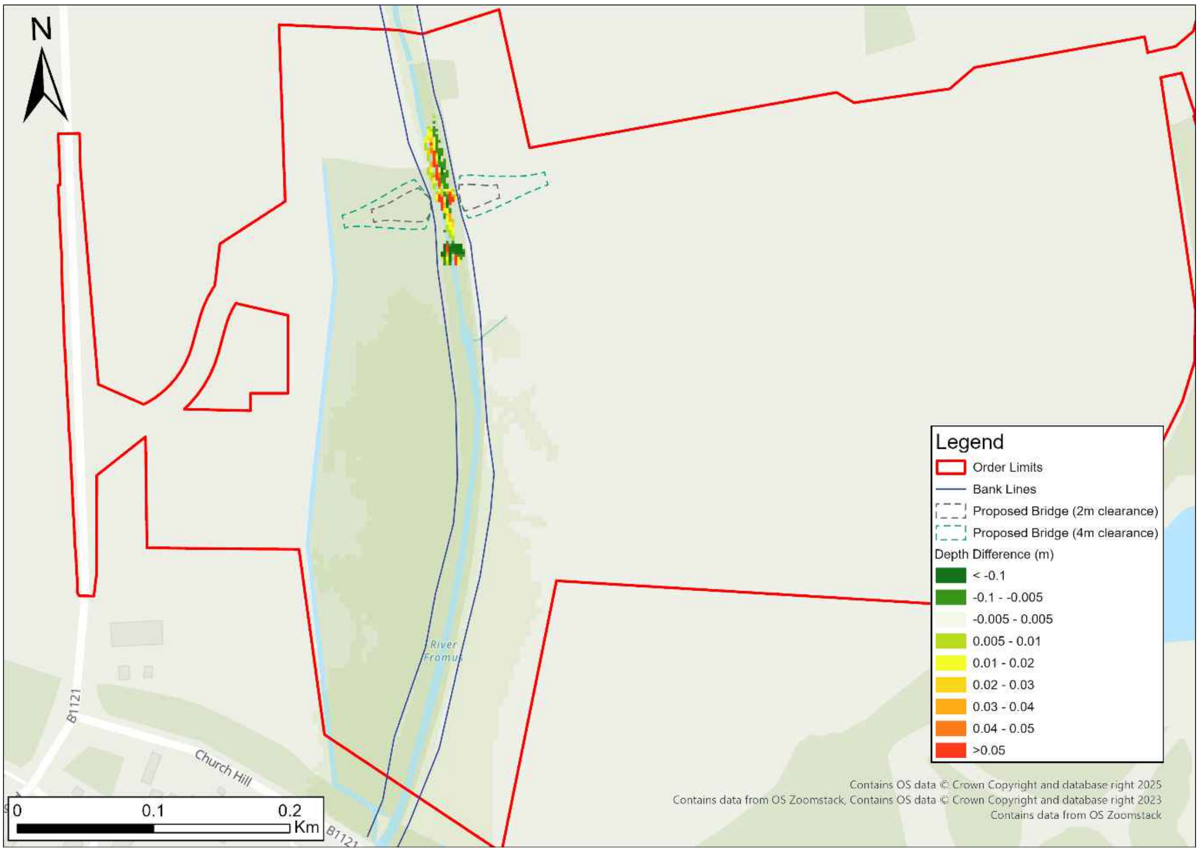


Figure 14: Difference in flood depths between the Baseline 1 in 100 year event plus 29% climate change and the BR2 1 in 100 year event plus 29% climate change

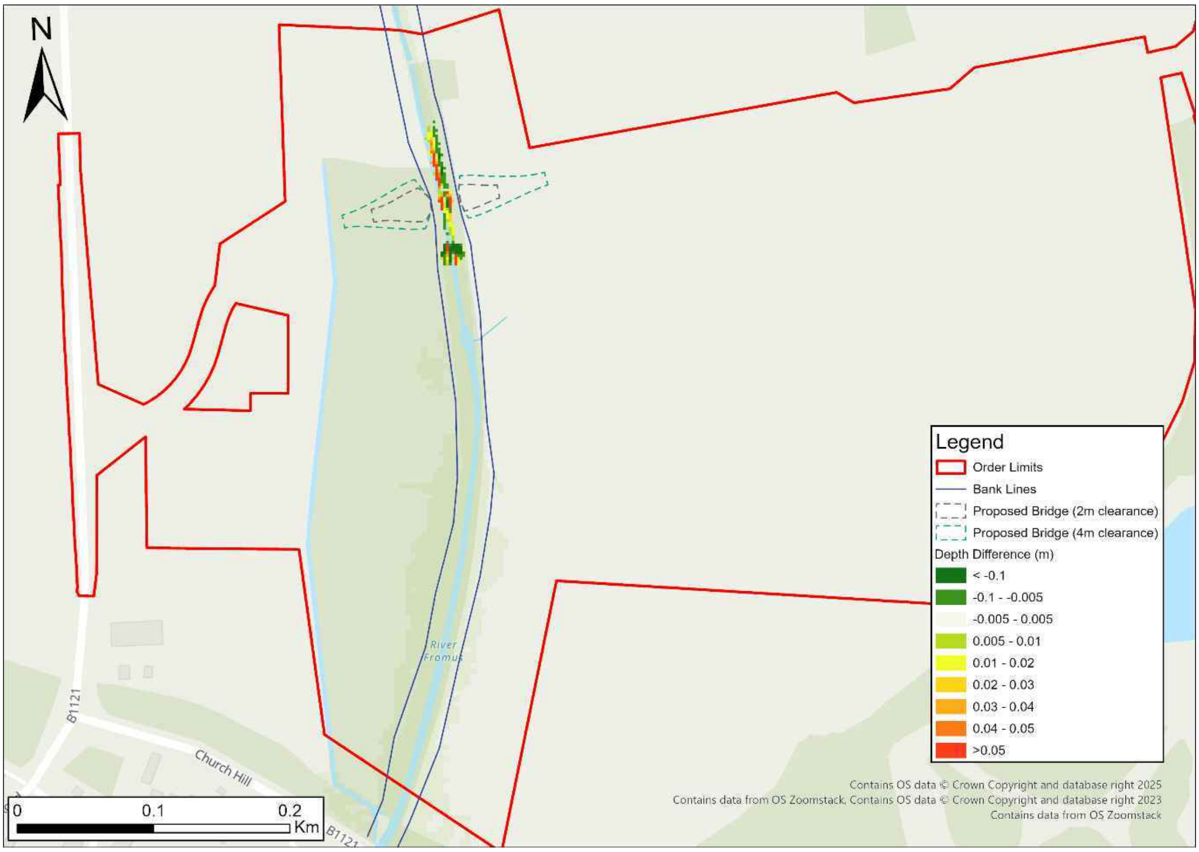


Figure 15: Difference in flood depths between the Baseline 1 in 30 year event and the BR4 1 in 30 year event

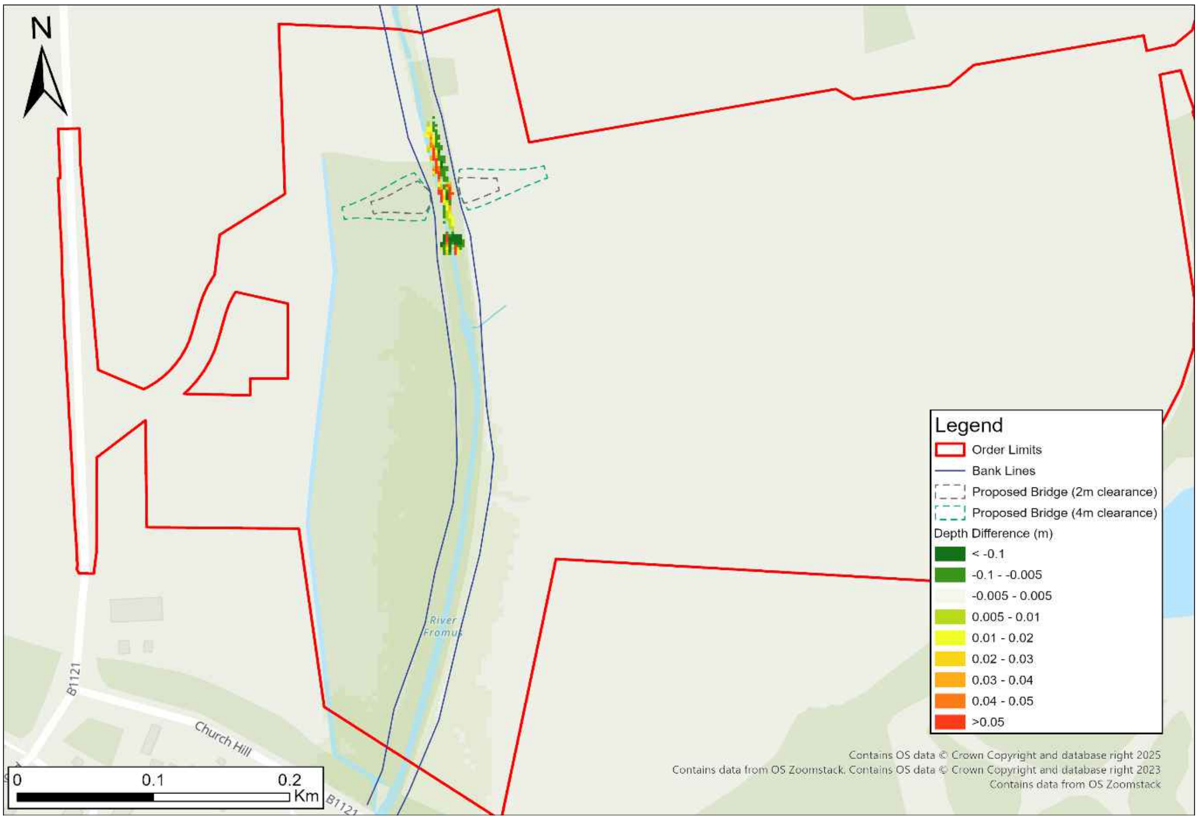


Figure 16: Difference in flood depths between the Baseline 1 in 100 year event and the BR4 1 in 100 year event

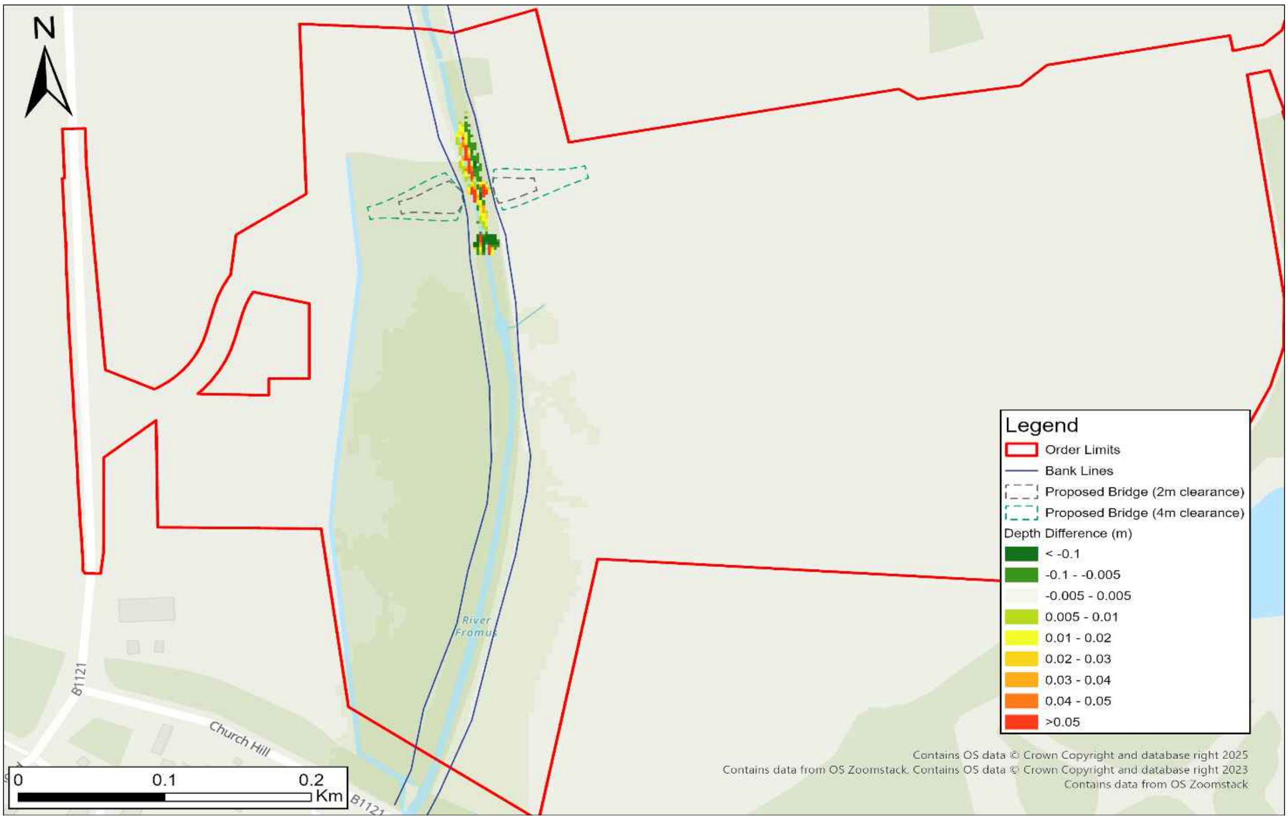


Figure 17: Difference in flood depths between the Baseline 1 in 100 year event plus 29% climate change and the BR4 1 in 100 year event plus 29% climate change

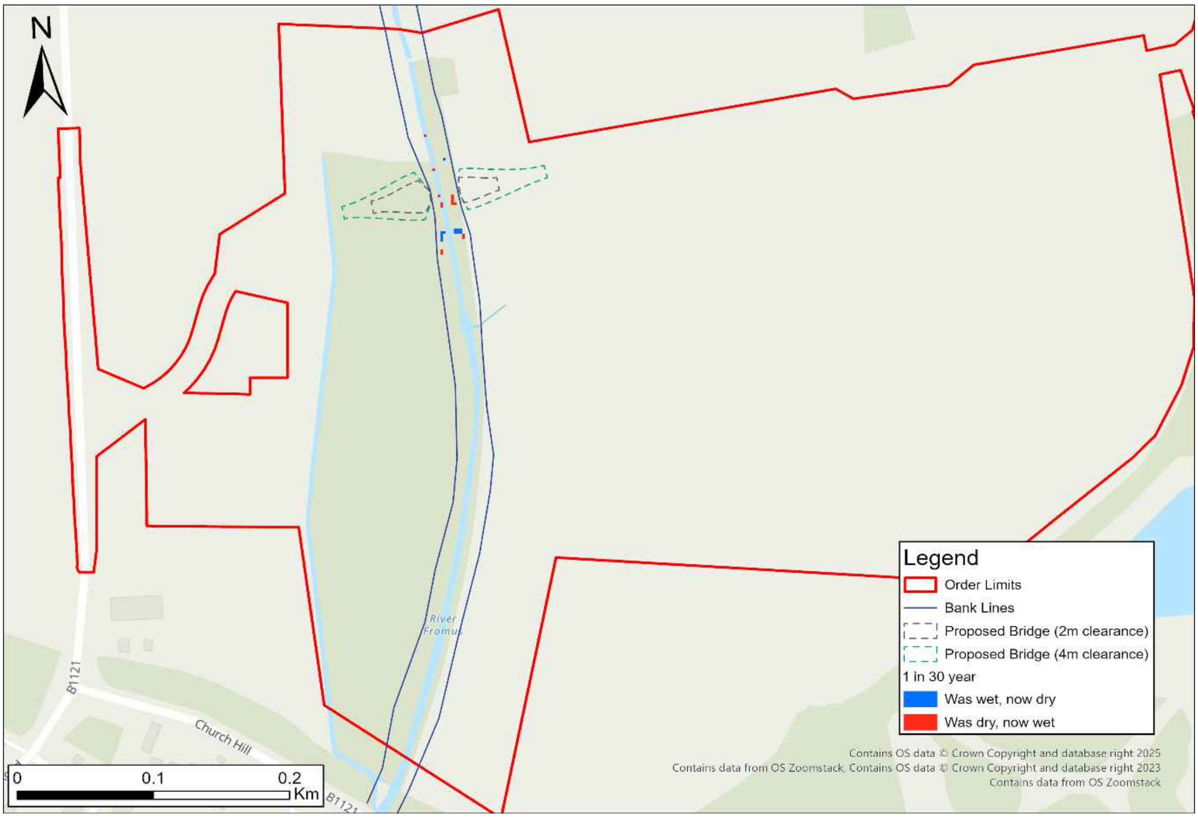


Figure 18: Location of the cells which were wet in the Baseline and are now dry in the BR2 scenario, and that were dry in the Baseline and are now wet in the BR2 scenario for the 1 in 30 year event

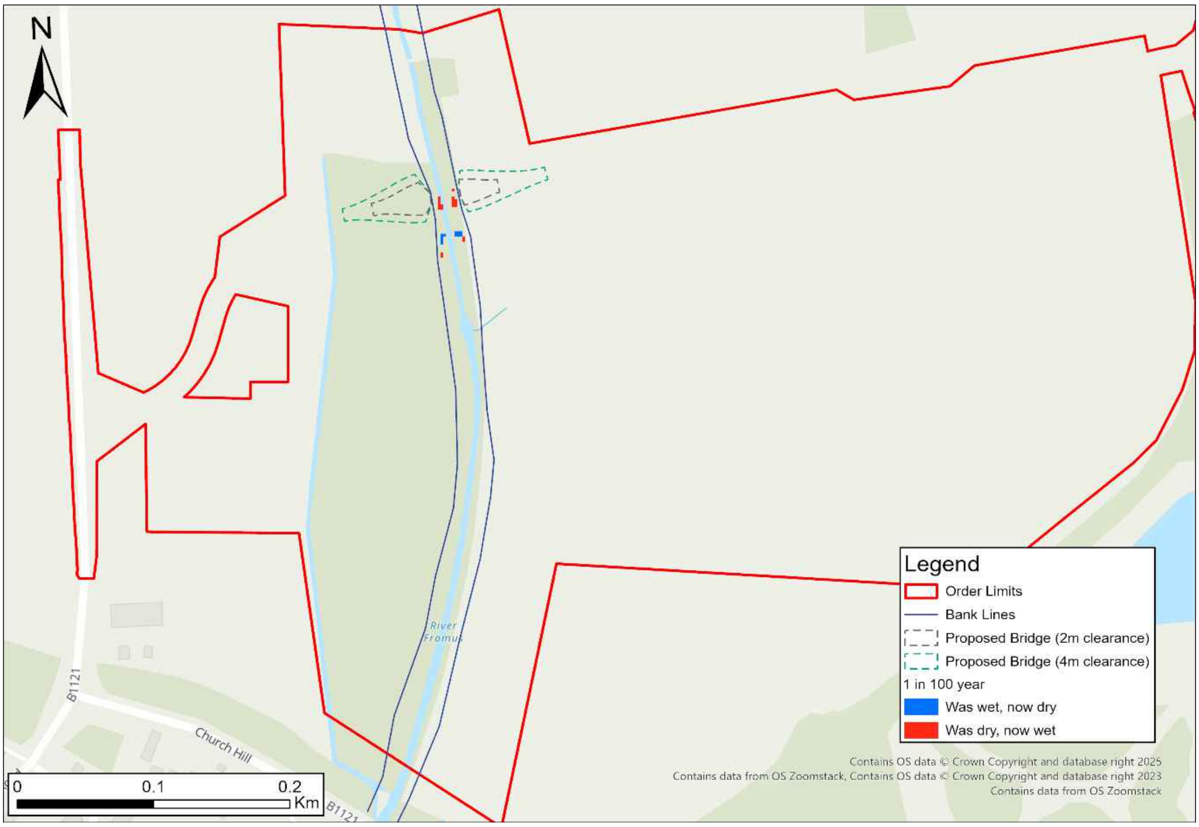


Figure 19: Location of the cells which were wet in the Baseline and are now dry in the BR2 scenario, and that were dry in the Baseline and are now wet in the BR2 scenario for the 1 in 100 year event

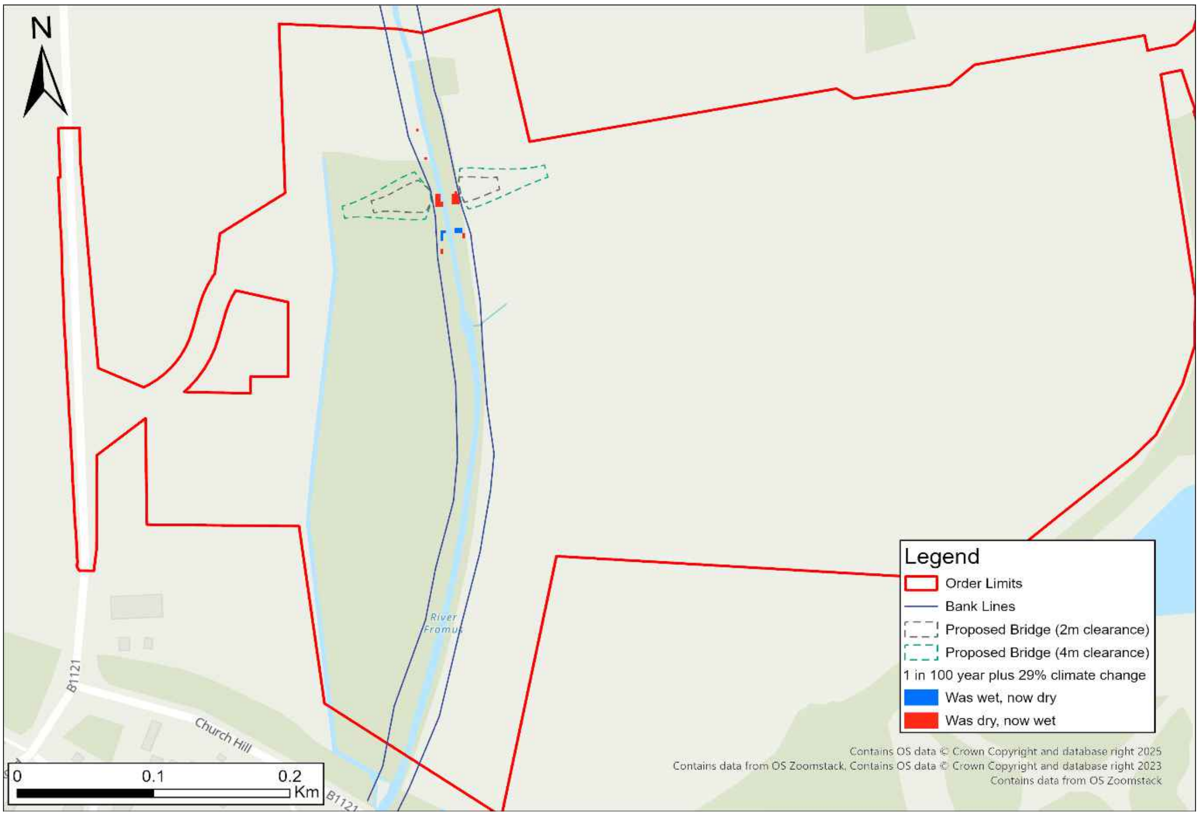


Figure 20: Location of the cells which were wet in the Baseline and are now dry in the BR2 scenario, and that were dry in the Baseline and are now wet in the BR2 scenario for the 1 in 100 year event plus 29% climate change

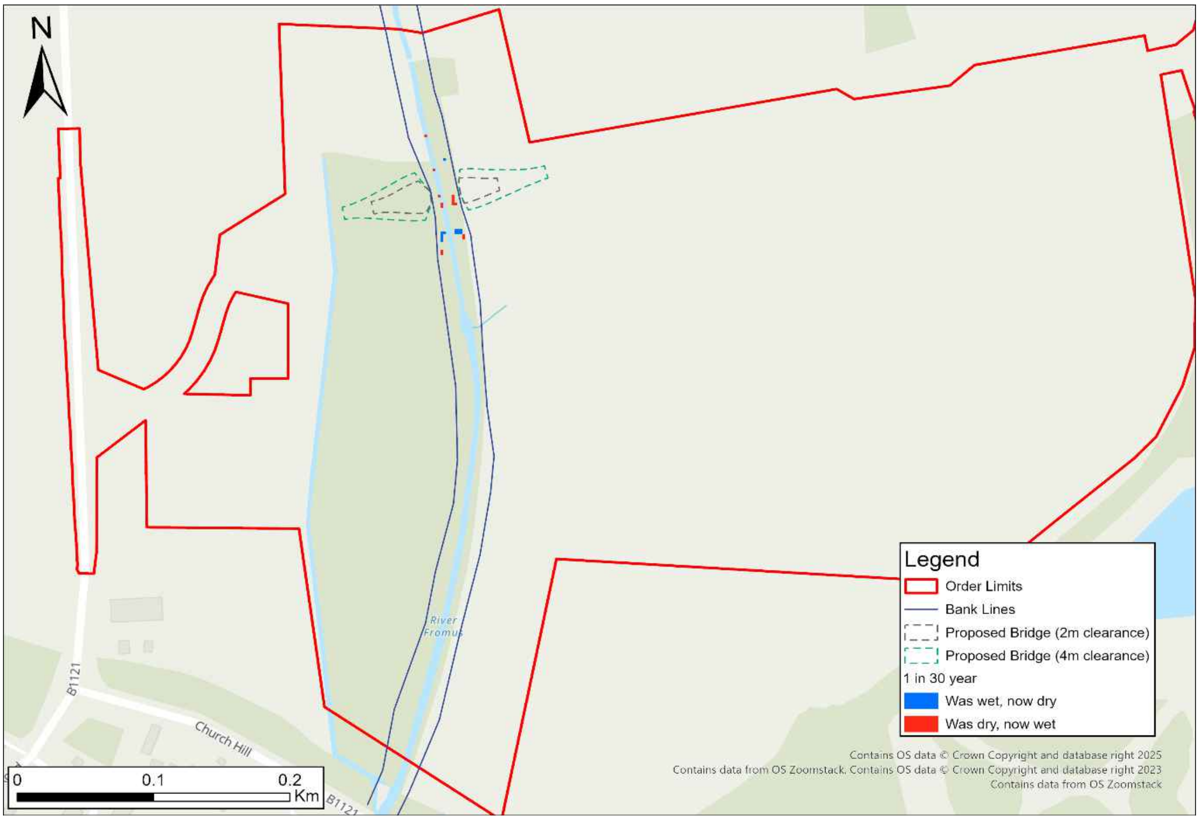


Figure 21: Location of the cells which were wet in the Baseline and are now dry in the BR4 scenario, and that were dry in the Baseline and are now wet in the BR4 scenario for the 1 in 30 year event

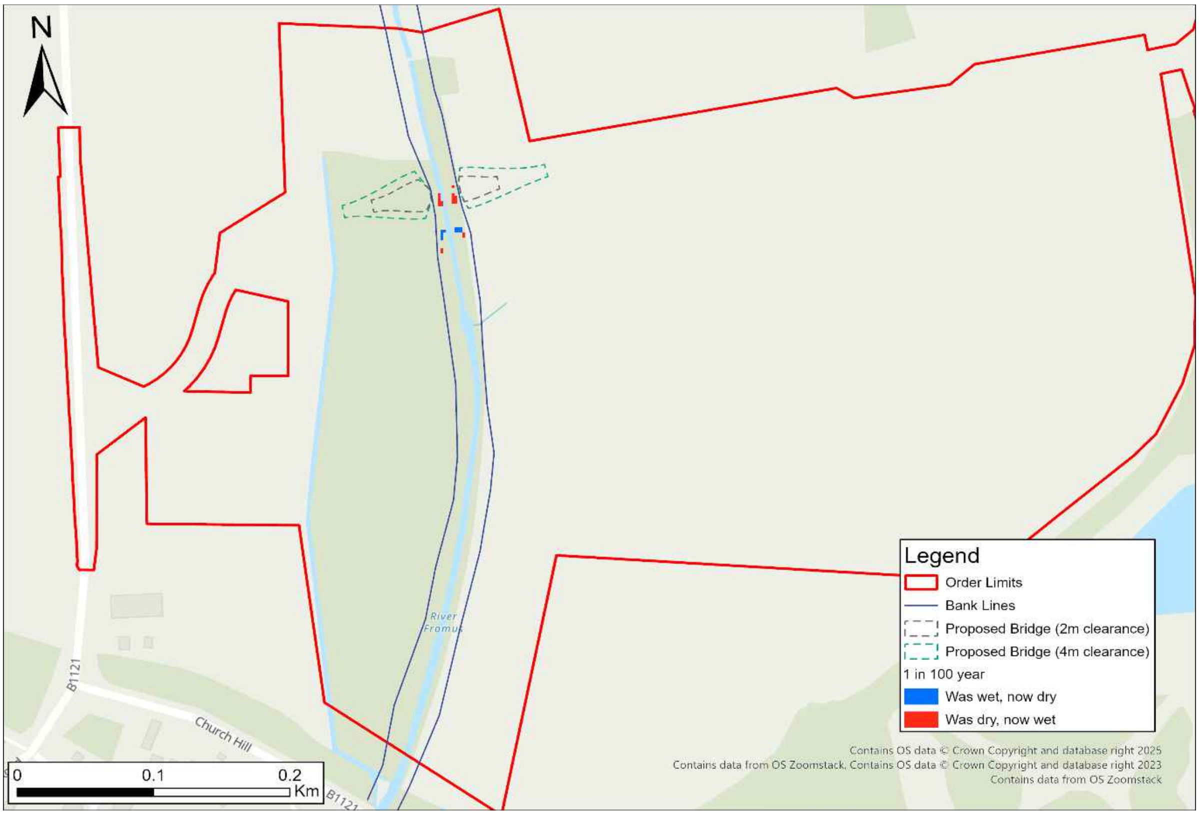


Figure 22: Location of the cells which were wet in the Baseline and are now dry in the BR2 scenario, and that were dry in the Baseline and are now wet in the BR4 scenario for the 1 in 100 year event

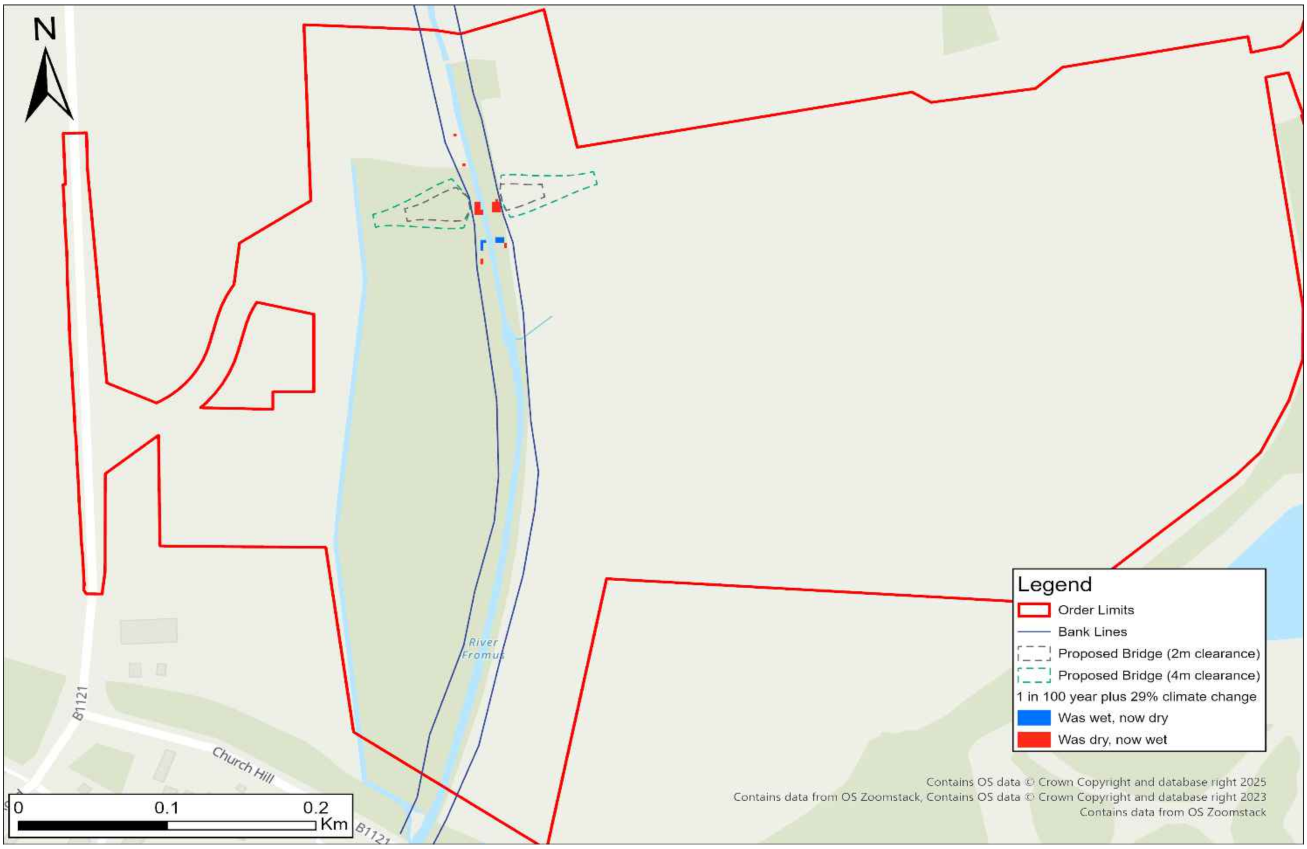


Figure 23: Location of the cells which were wet in the Baseline and are now dry in the BR2 scenario, and that were dry in the Baseline and are now wet in the BR2 scenario for the 1 in 100 year event plus 29% climate change

3.3 Sensitivity Testing

3.3.1 Roughness

The 2019 EA model was highlighted in the accompanying report[2] as being sensitive to roughness, therefore a standard 20% increase in roughness was applied to the whole model in both 1D and 2D domains. The 1 in 100 year plus 29% climate change event was run for all three scenarios (BAS, BR2, BR4). The results indicated that the increased roughness produced a higher maximum water level within the channel, however the flows do not reach or interact with the bridge opening.

Table 2: Comparison of 1D Depths

1 in 100 year plus 29% Climate Change Event	BAS / BR2 / BR4 Maximum Water Level (mAOD)
Model	8.31
Sensitivity Test (Roughness values +20%)	8.41

Although the flow does not interact with the internal opening of the bridge, the 2D flood extents show that flows exceed the channel upstream of the bridge and flow south down the right bank floodplain, as shown in Figure 24. The flows interact with the ramped abutment; however, the structure does not block the flow entirely and flow is able to pass freely around the structure and continue down the floodplain. The ramped abutment also remains flood free, so only the access road across the floodplain would be flooded: up to 0.09m AOD in the BR2 scenario and up to 0.07m AOD in the BR4 scenario. These depths are low and the hazard risk is also classified as low[7] (up to 0.50 in the BR2 scenario and 0.56 in the BR4 scenario at the location where the access road and ramps meet), and both vehicular and pedestrian access would still be available along the access road and ramps during operation. This is therefore not considered to impact the conclusions of the assessment in terms of the safety of the scheme or potential off site impacts.

The roughness values within the model have been reviewed and updated as part of the assessment therefore are considered to be most representative of the channel and floodplain. No amendments to the chosen values have been made following the completion of the roughness sensitivity modelling.

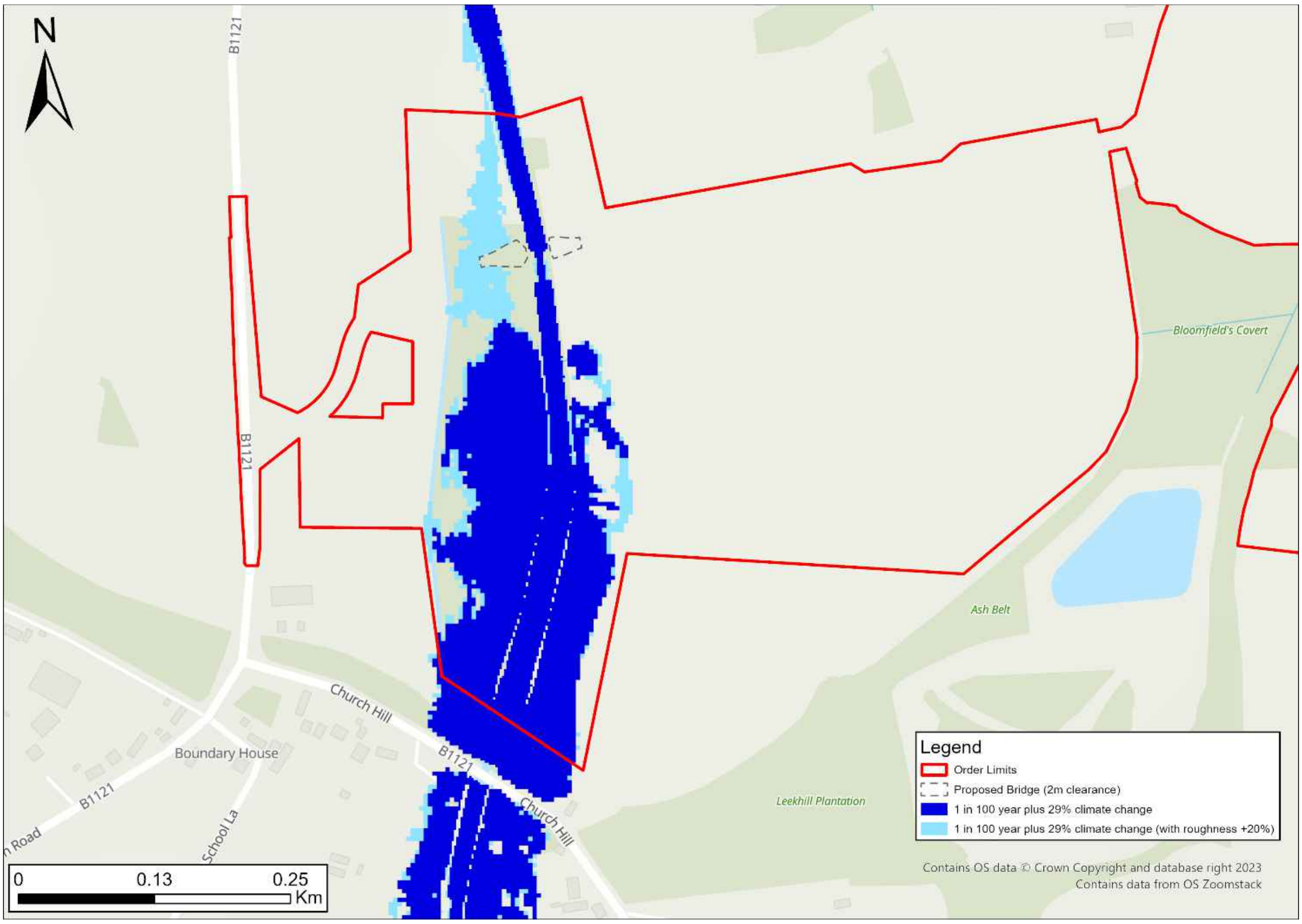


Figure 24: Comparison of the 2D flood extents for the 1 in 100 year plus 29% climate change event BR2 scenario, with and without the 20% increase in roughness

3.3.2 Flows

The flow magnitude was also sensitivity tested for the BAS, BR2 and BR4 scenarios. The flows were sensitivity tested using the upper 2080s climate change allowance for the East Suffolk Management Catchment of 54%[6]. The three scenarios were each run for the 1 in 100 plus 54% climate change event. Similarly to the roughness test, the maximum water level within the channel was 8.41mAOD, with no interaction of flows with the bridge abutments.

The 2D shows a similar pattern to the 20% increase in roughness sensitivity testing, with out of bank flows from upstream of the bridge flowing down the floodplain and interacting with the right abutment, before flowing around the structure as shown in Figure 25. In this scenario flood depths on the access road at the approach

[7] Defra and Environment Agency Flood and Coastal Defence R&D Programme, March 2006. R&D Outputs: Flood Risks to People Phase 2 FD2321/TR2 Guidance Document.

to the ramped bridge abutment are in the order of 0.06m, with the access route therefore remaining passable and safe for vehicles.

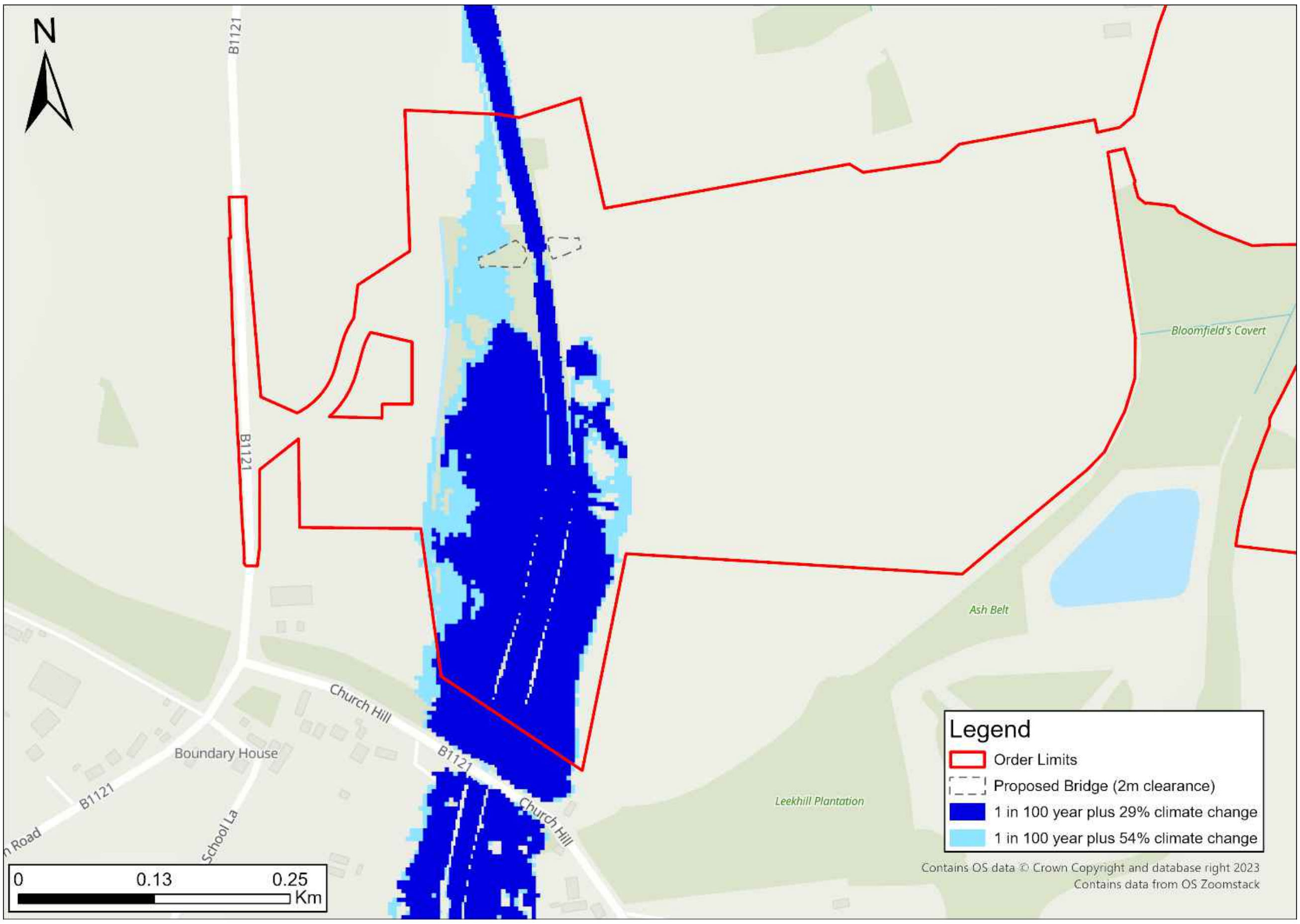


Figure 25: Comparison of the 2D flood extents for the 1 in 100 year +29% climate change event BR2 scenario and the 1 in 100 year +54% climate change event BR2 scenario

4 Conclusions

The Suffolk Onshore Scheme proposes to cross the River Fromus to provide permanent access to the proposed Saxmundham Converter Station. Following consultation with the EA, the crossing of the watercourse via clear-span bridge has been hydraulically modelled to assess the impact of the proposed bridge on the existing flow regime. The proposed crossing lies entirely within Flood Zone 1, however has been modelled to assess compliance with WFD and the FRA.

The EA's existing 1D-2D hydraulic model of the River Fromus has been used as a base for the hydraulic modelling, with the proposed bridge added into the existing EA model as per the schematic design shared with the EA in meetings. Two design options have been modelled, a smaller bridge with over a 2m clearance between peak water level in the existing EA model of 8.45mAOD and bridge soffit (BR2) and a larger bridge with over a 4m clearance (BR4). The final design will be established post DCO submission.

For all three modelled events – the 1 in 30 year, 1 in 100 year and 1 in 100 year plus 29% climate change probability events – and for both the 2m clearance and 4m clearance bridge designs, the proposed bridge remains fully outside of the floodplain, with all flow remaining within the channel. Although there is out of bank flooding in the 2D domain downstream of the bridge, these floodplain flows also do not interact with the proposed bridge. Therefore, there is no fluvial flood risk to the proposed bridge up to and including the 1 in 100 year plus 29% climate change event. Furthermore, the proposal does not impact flood flows in this event and therefore has no third-party impact.

Appendix C Outline Surface Water Drainage Strategy

C.1.1 The proposed surface water drainage strategy is to replicate as closely as possible the natural runoff characteristics of the existing site, intercepting all flows from the permanent works and temporary works into attenuation ponds prior to discharging into the nearest watercourse and utilising infiltration drainage systems where ground conditions are suitable.

Suffolk Onshore Scheme

C.1.2 The general strategy is to use infiltration were considered feasible following assessment of the available information on permeability of the ground. Discharge to the nearest watercourse via controlled discharge rate is proposed where infiltration is considered unlikely to be feasible.

C.1.3 Infiltration test results obtained within the extents of the Lowestoft Formation Sand and Gravel indicate infiltration rates that vary from 2.34x10-4m/s to 9.33x10-6m/s. In view of the information currently available, it is considered that the use of infiltration could be feasible for the scheme in some areas within the extents of the Lowestoft Formation Sand and Gravel geology.

C.1.4 In line with Suffolk County Council guidance, where shallow infiltration (circa 2m deep) is proposed, all trial pits across the site are to be carried out to BRE365 specification with minimum infiltration rate of 10mm/hr (2.77x10-6 m/s) if infiltration is to be the sole method of drainage.

C.1.5 Infiltration features should discharge from full to half full within 24 hours for the 3.33% + climate change (cc) AEP storm with space for an additional 10% + cc AEP storm if it exceeds 24 hours so that the risk of it not being able to manage a subsequent rainfall event is minimised. To account for the reduction of infiltration over time (lack of effective pre-treatment and/or poor maintenance), the following factors of safety should be introduced, reducing the recorded infiltration rate. All infiltration pond safety factors are set to 2 along the Proposed Project's design, as most of the Proposed Project is located in agricultural land where is expected to be little damage or inconvenience caused by the failure of the infiltration ponds.

C.1.6 There is to be a minimum of 1.2m clearance between the base of the infiltration feature and the highest groundwater level.

C.1.7 A hybrid solution is proposed for the Friston Substation. The infiltration pond is designed to attenuate flows up to 1 in100-year storm event with a piped outfall. The pipe outfall is proposed as an overflow release device for the infiltration pond, sized to discharge at the greenfield runoff rate.

C.1.8 The proposed infiltration ponds are vegetated depressions designed to store runoff on the surface and infiltrate it gradually into the ground with an outflow to an attenuation pond where appropriate. They would be dry except in periods of heavy rainfall.

C.1.9 Where it is not possible to infiltrate into the ground, discharging to the closest watercourse at a restricted discharge rate is proposed. Discharge rates to receiving watercourses are based on the estimated 'greenfield' run-off rate (Qbar) for the undeveloped site in accordance with Suffolk County Council guidance.

C.1.10 The proposed discharge rate shall be controlled by a Hydrobrake manhole or an orifice control equating to the Qbar discharge rate. The advisable minimum Hydrobrake control rate is 2l/s to avoid blockages. If an orifice control is used, it would be installed in a catchpit with an overflow to mitigate the risk of blockages.

C.1.11 Further details of the other drainage features proposed, which are common to the Kent Onshore Scheme's drainage strategy, are described below.

Kent Onshore Scheme

C.1.12 Since infiltration to the ground is unlikely to be feasible due to ground conditions, the strategy relies on attenuated discharges to watercourses.

C.1.13 Discharge rates to receiving watercourses have been based on discussions with the River Stour IDB. To manage the flood risk across the site, an assessment of the pre-development discharge rates and the proposed catchment areas was carried out to assess the most suitable post development discharge rates for the Kent Onshore Scheme. Discharge rates to receiving watercourses are based on the estimated 'greenfield' run-off rate (Qbar) for the undeveloped site in accordance with Kent County Council guidance.

C.1.14 The MicroDrainage Source Control Module has been used to provide an initial estimate of attenuation storage volume that would be required to limit run-off from the site to the proposed post-development discharge rate.

C.1.15 The strategy of the drainage is established via three independent networks as per the quality of the water to be collected:

- Temporary "dirty water" drainage network
- Temporary/Permanent "clean water" drainage network
- Permanent surface water drainage network

Temporary Works Drainage Strategy

C.1.16 The construction compounds will utilise subbase storage as part of attenuating the flows. Construction compounds have been assumed to be 75% impermeable with their gross site areas. The flows originated for the runoff intercepted by the construction compounds will be attenuated using external attenuation ponds and, the subbase of the construction compounds will be used as storage as part of attenuating the flows. Any fuelling areas within the compound will be bunded and managed separately.

C.1.17 The haul roads run the length of the proposed cable route and are to be constructed from unbound granular material. There is potential for geogrid layers or other types of soil additives to be used for stabilisation. The haul road surface is considered 100% impermeable.

C.1.18 Haul road impermeable catchment areas have been based on an average haul road width of 7m. 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 of cable trenches. This channel drain will discharge into proposed attenuation ponds which include a treatment element to clean anticipated pollutants from the road 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. Attenuation ponds have been sized based on these subdivisions and a further review will be required once the vertical geometry of the haul road has been confirmed, which may increase or decrease the sizes of ponds required. The new attenuation ponds discharge into existing watercourses via a control device to a reduced runoff rate.

C.1.19 The proposed HVDC construction swathe is 40m width and contains the haul road 7m width centred in the swathe. The remainder of the proposed 40m wide construction swathe has been assumed to be permeable, but it is considered appropriate to add extra impermeable area for the cable swathe to reduce the impact of potential changes to surface water runoff and flood risk during construction. The HVDC construction swathe has therefore been assumed to be 25% impermeable.

C.1.20 The cable swathe will be bunded using the spoil excavated during the installation of the below ground cables. This has the potential to interrupt natural flow paths in some locations. Header drains will collect this “clean” surface water and direct it to the nearest watercourse.

C.1.21 The cable trenches are located within the HVDC construction swathe. The cable trenches require drainage during construction only, when the ground on top of the trenches is not yet reinstated. Any water that could enter the trenches will be pumped to the attenuation ponds that drain the construction swathe. Attenuation ponds are proposed along the cable swathe.

C.1.22 Jointing bays and transition bays have been added into the contributing impermeable area of the site. It is assumed that a sump will be provided to remove any water during construction. This sump will discharge into an attenuation pond connected to an existing ditch/watercourse.

C.1.23 All jointing bays along the cable route which will be protected from groundwater and are not expected to contribute to any localised increased risk of flooding.

C.1.24 During the installation of the pylons any runoff will be pumped of out the pylon working area and discharge into the ponds proposed to drain the temporary access road that provide access to the new pylons.

C.1.25 Greenfield runoff from existing overland flow routes will be intercepted by clean header drains and discharged to the nearest watercourse. The temporary “clean water” drainage network would capture the greenfield runoff from existing overland flow routes that intersect the works during construction stage (cable swathe and temporary haul roads) and will be intercepted by clean header drains and conveyed to the nearest watercourse without flow restriction.

C.1.26 The overland flows will discharge directly to the outfalls that drain the construction swathe, but they are not flow restricted, consequently the connection will be downstream of the proposed Hydrobrake or orifice flow control.

Permanent Works Drainage Strategy

C.1.27 Runoff intercepted by the normal features of a substation and/or converter station: transformers, buildings, internal roads, car parks and external access roads will discharge into the proposed attenuation external ponds to a reduced runoff rate (Qbar) to the adjacent watercourse, the Minster Stream (IDB Watercourse).

C.1.28 The substation and converter station are partially permeable (50% of the footprint permeable), so the total hardstanding area for the drainage design is the 50% of the footprint of the substation and converter station platforms.

C.1.29 Substation and/or converter station platform are formed by permeable stone surfacing that will be laid in accordance with National Grid Design Standards and will be constructed of a minimum 300mm deep unbound free draining subbase and a minimum 75mm top layer of stone chippings which will allow storage of storm water until it can infiltrate into the surrounding soil.

C.1.30 The proposed platform is flat and will be graded back to tie with the surrounding ground and drains naturally into the ground. The runoff from the platform area will percolate through to the groundwater table or emerge as pluvial runoff in a similar manner to the existing pre-developed site.

C.1.31 Runoff from the permanent features (substation and converter stations platform) considers surface water drainage of the substation plot, including transformers, buildings and internal roads, and the external access road. The proposed surface water drainage system will improve the water quality of surface water runoff from the proposed development, which will ultimately outfall to existing watercourses. This will be done by using a treatment chain where each subsequent system within the proposed drainage network provides treatment to improve water quality, in line with National Grid Standard TS 2.10.01. All transformer bunds will drain into oil water separator tanks that discharge into the underground network. All transformers will have a totally sealed bund with a sump which has a water control unit to pump any water out. This will be directed through an oil separator to pick up any potential small levels of residual oil before being discharged into the main operational platform drainage system.

C.1.32 Runoff from the access roads and bellmouths will be collected via filter drains/ditches along the edge and will be directed to a permanent attenuation pond that discharges to the closest watercourse. In order to locate the proposed attenuation ponds to drain the main access roads, the road has been subdivided into sections based on the existing longitudinal ground profile and anticipated low points along the route. Access roads will drain into a filter drain system or the permeable platform; this will provide an adequate level of water quality treatment.

Proposed Drainage Features

C.1.33 For the preliminary design, a simplified spatial representation of the proposed storage ponds is provided as rectangular/circular areas. An additional buffer of 5m around the ponds is included for access and maintenance and to allow for side slopes. The maximum depth of the ponds is restricted to due to the uncertainty of the groundwater table. Proposed pond depths vary from 0.5m to 1m, with 0.3m freeboard.

C.1.34 The proposed attenuation ponds will be designed with 1:3 slopes, vegetated, non-permeable geo-textile lined with an inlet forebay. This will provide treatment of the runoff by allowing for settlement of silts, heavy metals and the removal of oxygen demanding material.

C.1.35 Where a proposed attenuation pond is used for temporary sediment control during construction, a settling pond or vegetated forebay within the main pond should be included to trap sediments.

C.1.36 Header drains are to be used throughout the scheme to intercept clean surface water runoff coming from overland flows. Filter drains or swales are to be used for drainage of the haul road and construction compounds. Any runoff intercepted within the permeable subbase of the construction compounds will be directed to the perimetral swales. They will collect dirty runoff from the haul road/construction compounds and discharge to the temporary attenuation ponds along the route. Filter drains or swales used during the construction phase contain any surface water runoff of the compounds and haul roads, therefore preventing any potential pollutants, including silts and fines, entering the surrounding watercourses.

Field Drainage Management

C.1.37 Where the existing field drainage is affected by the temporary works and permanent works, the field drainage would be correctly managed with the agricultural owner or manager of the agricultural land affected by the scheme.

C.1.38 During the installation of the cables, field drainage would be diverted, rather than truncated, to avoid water backing up the system and flooding upstream areas, via header drains. Diverted field drains would discharge to the closest watercourse or via balancing ponds if required to mitigate flood risk at receiving watercourses.

Appendix D Groundwater Flood Risk Technical Note

TECHNICAL NOTE

Job Name: Sea Link (Kent Converter Station)

Job No: 331201116

Note No: TN/24/001

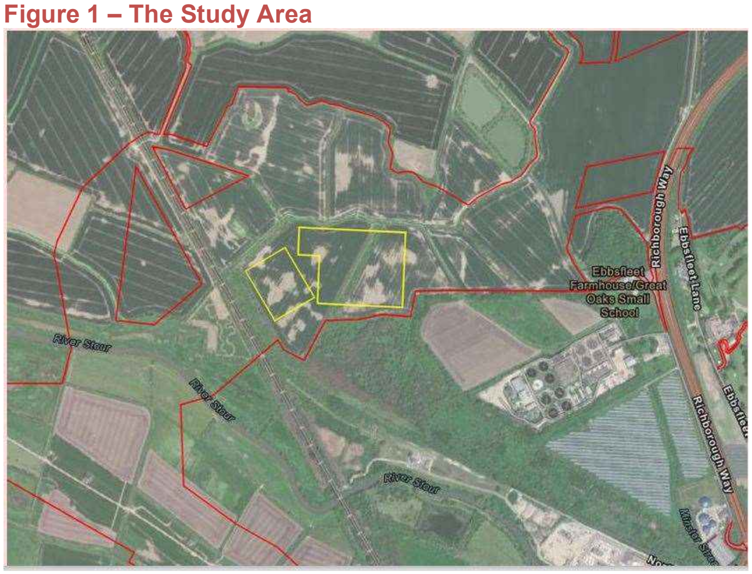
Date: 12th February 2024

Subject: Groundwater Flood Risk

Background

The focus of this assessment is the potential for groundwater flooding at the proposed Minster converter station/substation site (the area shown in yellow below). This is referred to as “the Study Area” below.

Figure 1 – The Study Area



Groundwater flooding occurs when sub-surface water emerges from the ground at the surface, or into Made Ground and structures. This may be as a result of persistent rainfall that recharges aquifers until they are full; or may be as a result of periods of sustained moderate rainfall, or high river levels or tides, driving water through near-surface deposits. This is most likely to occur in areas of porous underlying rocks (like Chalk). Groundwater is unlikely to pose a significant risk in areas which have not experienced groundwater flooding previously.

Groundwater flooding can be caused both by rising groundwater levels reaching surface, as well as by the development of a shallow water table which therefore impedes rainfall infiltration and increases the risk of surface water flooding (surface flooding driven by groundwater conditions).

DOCUMENT ISSUE RECORD

Technical Note No	Rev	Date	Prepared	Checked	Reviewed (Discipline Lead)	Approved (Project Director)
331201116/TN/24/001	-	12/02/24	AT	RD	RD	KR

T: +44 (0)118 950 0761 E: Reading.uk@stantec.com

The Kent Back Check Memo (28/01/24) states that "*through public and statutory consultation feedback it is now known that high groundwater levels may pose a design constraint at the converter station/substation site*", and that "*buildability issues would be encountered without suitable design measures being put in place, for example ground raising to build a development platform, with consequences for the construction programme".*

Groundwater levels are being monitored in the study area which has confirmed that groundwater has been recorded close to or at ground level. This is discussed further below.

Study Area Setting

The study area is located at the base of the slope running from the top of the East Kent chalk downs to Pegwell Bay to the east, and Minster Marshes to the west. The area to the south is marshy, with drainage and canalized water courses, managed by the local IDB.

As is typical in the Kent area, as you move from the uplands formed by the White Chalk and Grey Chalk Subgroups, you pass over the outcrop of the Palaeocene cover that commences with the Thanet Formation. The Chalk Group forms a Principal aquifer from which public and private groundwater abstraction occurs.

The Thanet Formation is at outcrop in most of the low-lying areas in this part of east Kent and is typically overlain by clayey Head Deposits derived from the weathering of the Chalk, Alluvium, and Tidal Flat material. To the north-west, towards Herne Bay, it is overlain by the Lambeth Group and London Clay. The Thanet Formation ranges from clay and silts to fine sands but is dominated by fine sand with some discrete clay layers locally, and is considered a Secondary aquifer due to its variable characteristics.

In the East Kent Sandwich Bay area, the Thanet Formation is typically more clay-rich than in the London Basin area (Southern Water Authority 1981 in Jones *et al.* 2000). This is evidenced in the borehole logs collected for the site. The presence of more clay rich strata implies a lower permeability than is observed in the London Basin, where there is more sand in the formation. Documented yields are low, although the porosity values (Jones *et al.* 2000) are >30%, but this is in keeping with the high proportion of clay and silt which will have a high retention of water and a low yield. Jones et al. describe that where clay predominates, the formations tend to be little-used for water supply, but provide an aquitard of regional extent, and a useful element of additional drainable storage over-lying the Chalk aquifer. This is because whilst the Thanet Formation is thought to be in hydraulic connection with the Chalk, the lower permeability of the Formation can result in confinement of Chalk groundwaters. Piezometers installed in the Chalk and the overlying Thanet Formation have been shown to demonstrate this behaviour with the degree of confinement increasing with distance from the Chalk outcrop.

At the contact between the Thanet Formation and Chalk, localized springs and seepages can be observed.

The Alluvium/Tidal Flat Deposits can also produce a similar relationship, confining the Thanet Formation, and preventing water from percolating into the system.

Groundwater flood risk – literature evidence

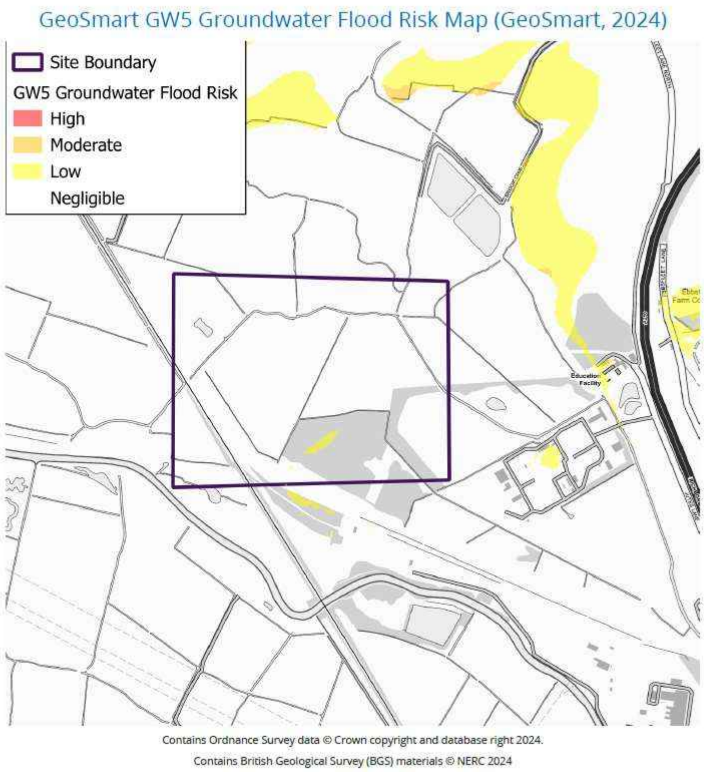
There are a number of different sources which can provide evidence of the likelihood of, and mechanism for, groundwater flooding occurring in the study area, including as follows:

1) GeoSmart GW5 Groundwater flood risk classification

The GeoSmart GW5 groundwater flood risk map has been obtained and reports a "Negligible" risk of groundwater flooding across the study area. The map is provided below in Figure 2.

This GeoSmart GW5 map classifies groundwater flood risk in every cell on a 5m grid covering Great Britain into one of 4 risk categories: Negligible, Low, Moderate, and High. Negligible risk means "*groundwater flooding in this area and any groundwater flooding incidence has an annual probability of occurrence of less than 1%*". However, data may be lacking in some areas, so assessment as 'negligible risk' does not rule out local flooding as features may be present that are not represented in the national datasets used to generate the flood risk map. Therefore, a degree of caution is required in interpretation.

Figure 2 - GeoSmart GW5 Groundwater flood risk classification



2) <u>Groundsure report</u>

The Groundsure report in the Geotechnical and Geo-environmental PRA (Mott MacDonald 2022) indicates that the study area is at 'high risk' from groundwater flooding.

The source of the 'high risk' classification is unknown, meaning that the reason for the discrepancy between the Groundsure and Geosmart maps is also unclear. It is possible that the Thanet Formation in this area of Kent has been assigned characteristics more similar to its occurrence in the London Basin (further west), where it is more permeable and behaves in concert with the Chalk Group.

3) <u>Kent County Council (KCC) – Flood Risk to Communities (Thanet) document</u>

Appendix C of this KCC document shows the study area to be within Policy 3 area, defined as "*Areas with low local flood risk which are being managed effectively. This policy will be applied to areas where local flooding risks are currently not significant. That does not mean that these areas are not at risk of local flooding, but the risks can be managed by each risk management authority undertaking its duties effectively*".

The same document reports the study area to be in CFMP Policy Area 6, defined as "*Areas of low to moderate flood risk where further action will be taken to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits*".

Geology and Hydrogeology

The geology and hydrogeology is reported in the Geotechnical & Geo-environmental PRA Report (Mott MacDonald, 2022) and is not repeated in detail here. The study area is indicated to be underlain by Tidal Flat Deposits (formerly Estuarine and Marine Alluvium), comprising clay and silt, overlying the Thanet Formation and White Chalk Subgroup. Groundwater is shallow, consistent with the flat low elevation setting of the study area within the Minster Marshes area.

A number of boreholes have been drilled within, adjacent to and distant from the study area. The exploratory hole records from selected boreholes (with groundwater monitoring installations) have been made available and the ground conditions in those boreholes within and adjacent to the study area is summarised below and in Table 1:

- Topsoil ranging in depth (to base) from 0.25 to 0.4 m bgl;
- Tidal Flat Deposits (recorded as Alluvium on the exploratory hole records), typically described as clayey silt or silty clay, ranging in depth (to base) from 5.5 m bgl to 9.5 m bgl;
- Thanet Formation, typically described as sandy, clayey silt, the base only proven in one borehole adjacent to the study area at 27m bgl
- White Chalk, only penetrated in one borehole adjacent to the study area (at 27m bgl) - base unproven

Table 1 Geology encountered within and adjacent to the study area (depth to base in metres from ground level)

Geology	R22-BH102	R22-BH103	R22-BH104	R22-BH105	R22-BH205	R22-BH501
Topsoil	0.4	0.35	0.4	0.25	0.35	0.4
Alluvium (Tidal Flat Deposits)	8.1	6	5.5	7.4	8.2	9.5
Thanet Formation	>25.45	>25.45	>25.45	>25.45	>25.45	27
White Chalk Subgroup	-					>32

These boreholes have had groundwater monitoring wells installed, with the response zones positioned as follows, indicated by the borehole logs (response zone in brackets, m bgl):

- TFD - BH102 (0.8 to 3 m bgl), BH103 (0.5 to 1 m bgl), BH105 (0.8 to 3 m bgl);
- TFD/Thanet Sands - BH104 (3 to 6 m bgl), BH103D (3 m to 6 m bgl);
- Thanet Sands – BH205 (20 to 25 m bgl), BH501 (24.5 to 26.5 m bgl);

Three further borehole records have been reviewed, for a location over 1km to the east of the study area (closer to the coast), with response zones in the Chalk, as follows;

- Chalk - R22 BH204 (26.5 m to 29 m bgl), RedP BH-6 (10 to 15 m bgl), RedP BH-8 (11 to 16 m bgl).

Continuous level logger data is available for these locations between December 2023 and January 2024, and is summarised as follows:

Chalk

R22 BH204, RedP BH-6 and RedP BH-8 all show similar groundwater level responses:

- R22 BH204 shows groundwater levels from 4.3 to 4.6 m bgl (3.01 m to 2.73 m AOD), with a tidal range of c. 0.10 m observed.
- RedP-BH8 shows groundwater levels from 0.2 to 0.54 m bgl (2.82 m to 2.47 m AOD), with a tidal range of c. 0.15 m observed.

- RedP-BH6 shows groundwater levels from 1.54 to 0.86 m bgl (2.49 m to 2.15 m AOD), with a tidal range of c. 0.2 m observed.

Again, tidal fluctuations are likely to be the result of groundwater within the Chalk responding to changing pressures within the subsurface hydrological system as tides rise and wane. The degree of fluctuation increases as the monitoring points approach the tidal system.

The results of the groundwater monitoring within these boreholes shows that the Chalk groundwater table within the aquifer is typically below surface and is higher in elevation (Figure 3) than that in layers likely to be above it, suggesting that it is confined beneath the Thanet Formation and the TFD.

It is difficult to confirm that this is the case across the Study Area due to the lack of adjacent monitoring wells (the Chalk monitoring wells described above being over 1km to the east of the Study Area).

Figure 3 below shows the groundwater elevations of the monitoring locations provided to us for review. In Figure 3 it can be seen that the groundwater levels in the Chalk monitoring wells are all at higher elevations than the others, demonstrating the confinement from overlying less permeable layers. It can also be seen that the monitoring wells with shallow single installations demonstrate rapid response to rainfall events.

Figure 3 – mAOD elevation plots of boreholes provided.

Conclusions

Groundwater levels in the Chalk aquifer have remained below ground level during the monitoring period. They display a tidal response, typical of the coastal setting, and a confined response, suggesting that they are confined by the low permeability nature of the overlying TFD and Thanet Formation.

Groundwater levels in the Thanet Sands at BH501 is at, or slightly below ground level for periods. This monitoring well has a deep response zone at 24.5 to 26.50 m bgl, with significant clay dominated layers within both the TFD and Thanet Sands and demonstrates the confining nature of the TFD.

There is limited potential for groundwater heads in the Thanet Formation and Chalk Group to rise significantly above ground level given the setting and the confined aquifer units. Therefore, it is likely that there is no significant upward flux of groundwater from these deposits. The local drainage network is present to intercept run off caused by clay material within the TFD and Thanet Formation

Groundwater levels reach ground level at BH102, BH105 and possibly BH103 for periods. These have shallow installations, finishing at 3 m, 3 m and 1 m bgl.

It is considered that the mechanism for flooding at the Study Area is a shallow water table impeding rainfall infiltration and increasing the risk of surface water flooding (surface flooding driven by groundwater conditions) rather than emergence of groundwater from rising bedrock groundwater levels. Therefore, the surface water drainage scheme should be designed based on fully saturated ground conditions with zero infiltration potential and 100% runoff requiring attenuation to prevent an increase in surface water flood risk off site.

The development design will need to account for fully saturated ground, and the need to dewater groundwater for the installation of any infrastructure required to be built in dry conditions. Drainage infrastructure will be required to prevent surface ponding/flooding, but the need for land raising of the development area should be avoidable with suitable ground drainage in place.

Appendix E Method Statement for Construction of Stour Bridge

MOTT MACDONALD

Sea Link - River Stour (Kent) Crossing
Outline method for construction

Project:	Sea Link		
Our reference:	SEAL-MMD-SEAL-ENG-TCN-0820	**Your reference:**	
Prepared by:	John Weeks	**Date:**	17/03/26
Approved by:	John Weeks	**Checked by:**	William Butcher
Subject:	River Stour (Kent) Crossing – Outline method for construction		

1 Temporary bridge erection and installation

The following outline method for construction has been produced based on the typical temporary bridge proposed which is the Acrow 700XS panel bridge as shown in drawings DCO/K/DE/PS/1266 and DCO/K/DE/PS/1267 found in Application Document 2.13 Design and Layout Plans [APP-037]. The bridge selection will be undertaken at a later stage of the project and therefore the method for installation is subject to change. However, it is considered that installation of any likely temporary bridge would follow the general principals outlined within this note.

The outline method shall be as follows:

1. Access to the north side of the bridge shall be installed using a combination of stoned haul roads and trackway, (see paragraph 4.6.40 to 4.6.51 within the 6.2.1.4 (D) Part 1 Introduction Chapter 4 Description of the Proposed Project [REP1A-003]). Access shall be via the proposed A256 access along a haul road to the 'agricultural access' level crossing. Improvement works to the level crossing if required, are to be agreed with Network Rail and carried out prior to commencement of the works to the west of the crossing.
2. Access to the south side of the bridge shall be installed using a combination of stoned haul roads and trackway, (see paragraph 4.6.40 to 4.6.51 within the 6.2.1.4 (D) Part 1 Introduction Chapter 4 Description of the Proposed Project [REP1A-003]). Access shall be via Whitehouse Drove and shall be limited to construction vehicles required for the access to, installation and removal of the bridge only.
3. Access routes are shown within the Application Document 2.14.2 Indicative General Arrangements Plans - Kent (Version 2, change request) [CR1-025].
4. Laydown and working platforms shall be created using a combination of stoned platform and trackway at the proposed abutment sites. Abutments shall be constructed a minimum of 8m away from the riverbank.
5. Welfare shall be provided at the main site compound to the north whilst mobile welfare units would support the southern work site.
6. Piling rigs shall be brought to site to install the necessary foundations for the bridge abutments. In line with commitment B10 within the Register of Environmental Actions and Commitments the project

shall use soft start non-percussive piling techniques, and in line with commitment GH02 a foundation works risk assessment shall be undertaken to inform the design and construction methodology.

7. Concrete pile caps/footings and piers shall be formed to support the bridge structure. In line with commitment W32 within the Register of Environmental Actions and Commitments, the use of precast concrete will be considered and where insitu concrete is required runoff controls will be put in place.
8. The bridge will be delivered to site in relatively small sections on suitable transportation, 20-25t capacity low loaders or similar, and offloaded at the assembly area.
9. Using a telehandler the sections will be pre-assembled, including decks, on suitable hardstanding in the field adjacent to the crossing location. Temporary bridges typically will be constructed from pre-fabricated elements and no insitu concreting works envisaged for the bridge deck itself.

There are three potential installation methods, the choice of approach will be confirmed at detailed design:

10. **Cantilever launch** uses a launching nose and counterweights to enable the bridge to be pushed/jacked into position. Given the height of the bridge over the River Stour a launching platform would be temporarily built at the height of the bridge piers to enable the assembly of the bridge prior to it being jacked into position. The launching platform would be removed and replaced with the ramp structure once the launch was complete.
11. **Crane assisted launch** works in much the same way as the cantilever launch but uses a crane to assist in the process, this reduces the nose length and counterweight requirements which helps to speed up installation.
12. **Crane lift in** is the third option for installation which allows for the bridge to be fully constructed within the laydown area and then lifted into position. This may require two cranes working in tandem on a bridge of this size.
13. In all three options the PRoW along the River Stour would need to be locally diverted during the lifting/jacking process and the River Stour closed to navigation. Once the main span is installed, the river and PRoW can be reopened.

Once the main span of the bridge is in place:

14. Remove temporary launch platform if used.
15. Install ramps using 360 Telehandler.
16. Check the bridge and hand over for grouting in of bearings and completion of backwalls and approaches.
17. Clear the site.

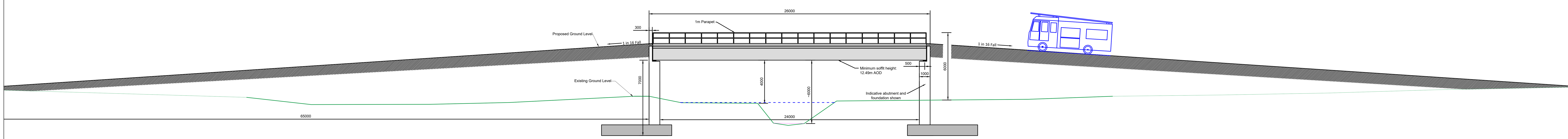
Decommissioning:

18. Following completion of the construction works the bridge would be removed in the same manner as it was installed. Abutments and piles would be removed to 1.2m below ground level or to a depth agreed with the landowner.
19. Working platforms and accesses would be removed working away from the bridge location both north and south.

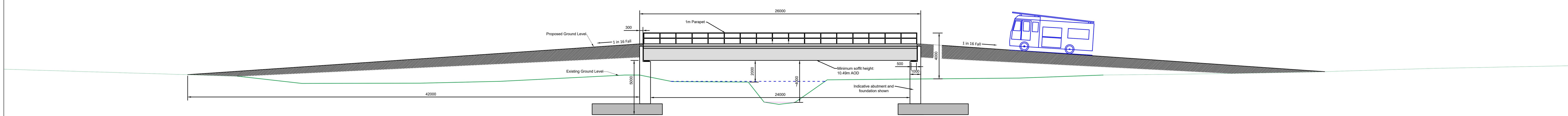
Programme:

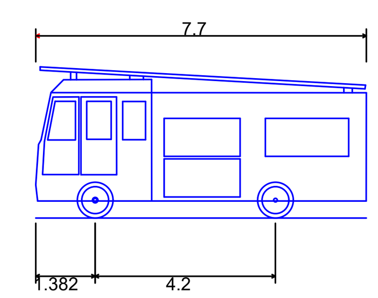
20. The period of use of the temporary bridge will depend on the detailed construction programme to be developed by the contractors. The phasing of the works, environmental commitment made and the availability of outages on the existing OHL will all influence the programme. However, it is envisaged that a period of 2 years is likely between installation and decommissioning. The construction phase of the bridge is estimated to take 2 months including foundations, abutments and superstructure installation, however this is subject to the bridge type and the launch methodology selected.

THE NATIONAL GRID (SEA LINK) ORDER
PINS APPLICATION NUMBER: EN020026
DESIGN AND LAYOUT PLANS - SUFFOLK: INDICATIVE RIVER FROMUS CROSSING
REGULATION 5(2)(o)
SHEET 1 OF 1



Typical Permanent Bridge Crossing- 4m clearance





Dennis Sabre Fire Tender (LWB)	
Overall Length	7.700m
Overall Width	2.430m
Overall Body Height	3.512m
Min Body Ground Clearance	0.397m
Track Width	2.380m
Lock to lock time	5.00s
Kerb to Kerb Turning Radius	7.400m

Typical Permanent Bridge Crossing- 2m Clearance

Notes

1. This plan is scaled at paper size A1, therefore any prints taken at smaller sizes will affect accuracy of the measurement units and should not be scaled against.
2. These plans will sit within the Order Limits. Due to the need for future flexibility, National Grid will be applying for Order Limits and Limits of Deviation within its Development Consent Order, within which any final alignment would lie. Therefore, all aspects of the authorised development, including the cable alignment, converter stations, substations and pylon locations should be treated as indicative only.
3. Reference should be made to the Guide to the Plans (Document Ref 2.1) which provides further information on what the plans show.
and pylon locations should be treated as indicative only.
4. For further information on construction please refer to the construction section of the Environmental Statement.
5. The bridge cross sections shown are indicative as are the ground profiles, designs will be finalised at detailed design following additional survey works.
6. Parapet height is 1m above the deck level shown.
7. Approach ramps are shown indicatively with a 1 in 16 slope to accommodate the access for transformer abnormal indivisible loads (AILs).
8. The River Fromus does not have a long term flow record from a gauging station, therefore the Q95 level has been estimated using LowFlows2000 © software.

Legend

- Indicative Design Flood Level
- Q95 Flow Level

Issue	Date	Remarks	Drawn	Checked	Approved
A	24/03/2026	For Submission (inclusive of soffit levels)	AW	SC	JW

Title

THE NATIONAL GRID (SEA LINK) ORDER
PINS APPLICATION NUMBER: EN020026
DESIGN AND LAYOUT PLANS- SUFFOLK: INDICATIVE RIVER FROMUS CROSSING
REGULATION 5(2)(o)
SHEET 1 OF 1

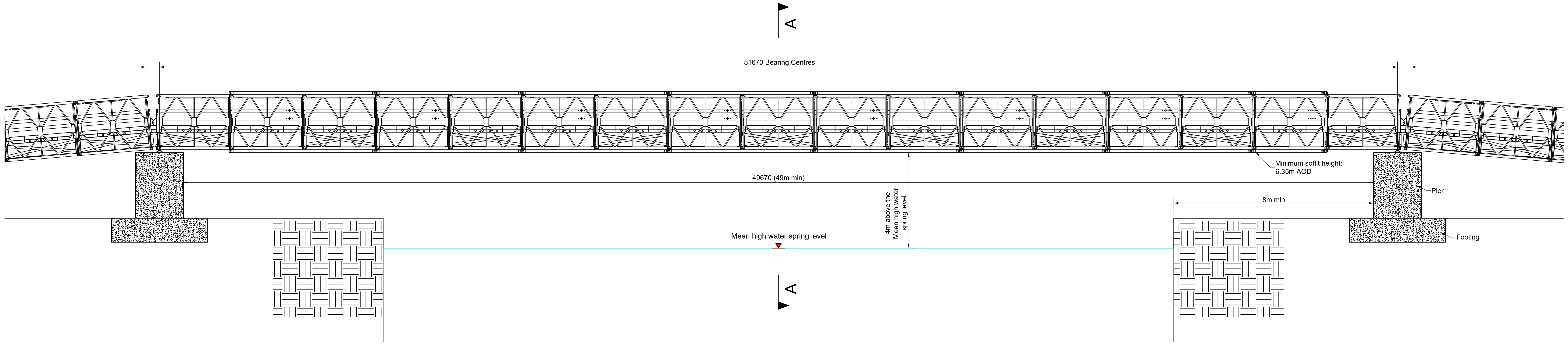
nationalgrid

Application Number: EN020026

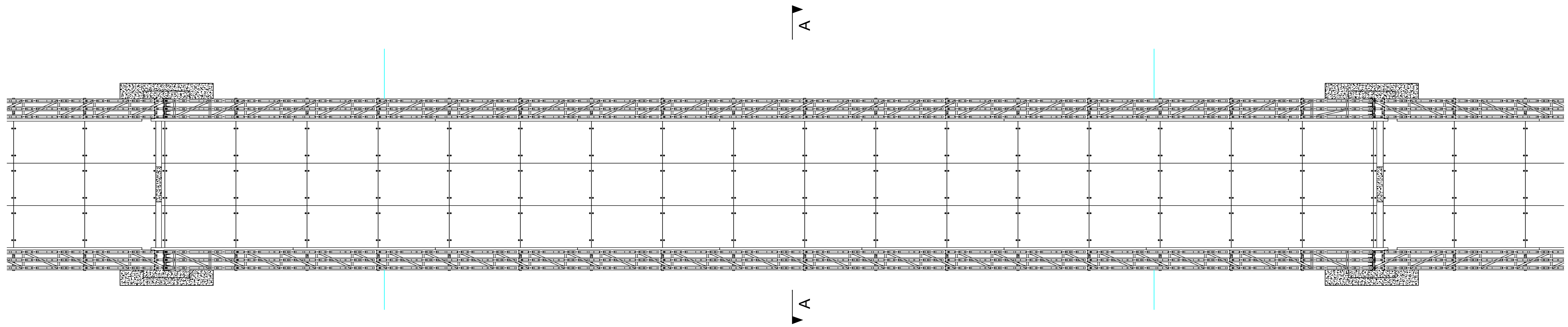
National Grid Drawing Reference: SEAL-MMD-SEAL-ENG-DWG-0821

Scale	Sheet Size	Sheet	Issue
As shown	A1	SHEET 1 OF 1	A

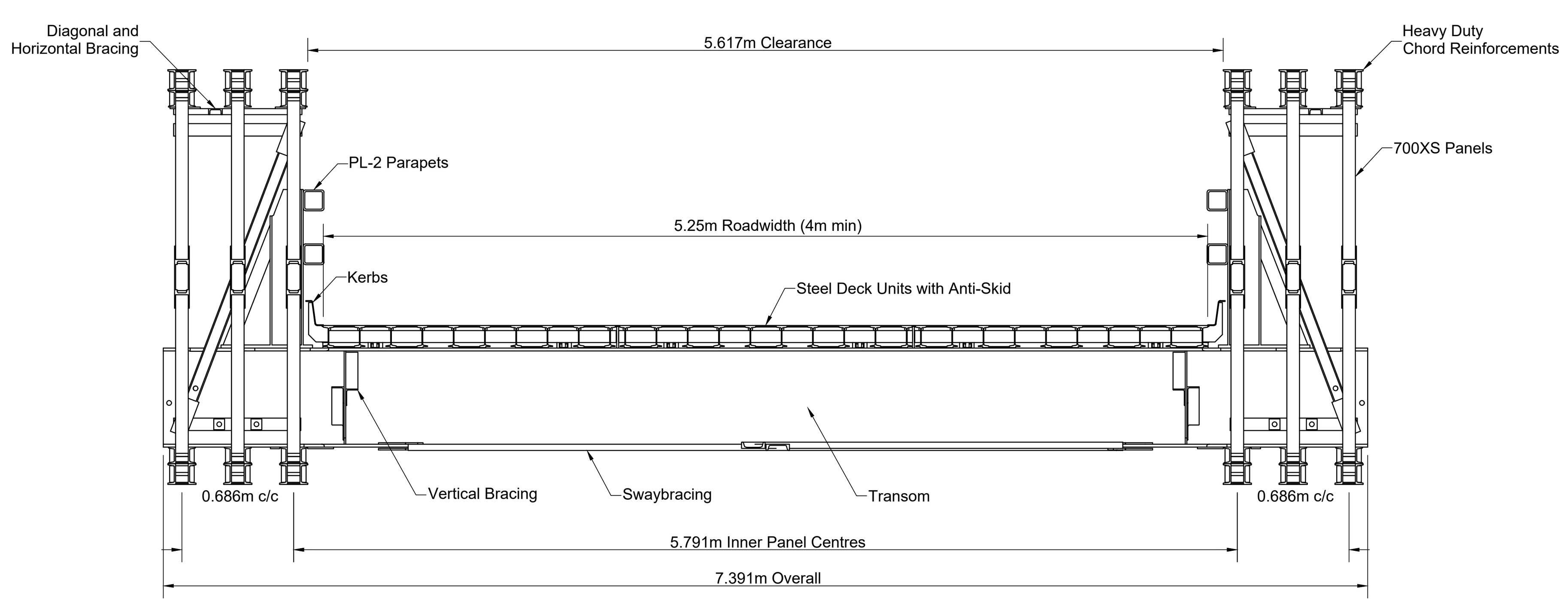
THE NATIONAL GRID (SEA LINK) ORDER
PINS APPLICATION NUMBER: EN020026
DESIGN AND LAYOUT PLANS - KENT: INDICATIVE RIVER STOUR (KENT) TEMPORARY CROSSING
REGULATION 5(2)(o)
SHEET 1 OF 2



Elevation
1:100



Plan
1:100



Section A-A
1:100

0 5m 10m
1:100

Notes

1. This plan is scaled at paper size A1, therefore any prints taken at smaller sizes will affect accuracy of the measurement units and should not be scaled against.
2. These plans will sit within the Order Limits. Due to the need for future flexibility, National Grid will be applying for Order Limits and Limits of Deviation within its Development Consent Order, within which any final alignment would lie. Therefore, all aspects of the authorised development, including the cable alignment, converter stations, substations and pylon locations should be treated as indicative only.
3. Reference should be made to the Guide to the Plans (Document Ref 2.1) which provides further information on what the plans show.
4. For further information on construction please refer to the construction section of the Environmental Statement.
5. All dimensions are in millimetres unless otherwise stated.
6. Do not scale any items or information from this drawing.
7. Indicative bridge structures shown for initial discussion and feasibility purposes only based on assumed required spans, vertical clearances and bridge width. Subject to further development following confirmation of requirements and receipt of topographical and geotechnical survey.
8. This feasibility drawing is based on the Acrow 700XS Panel Bridge System for temporary use. The Acrow 700XS panel bridge is the gold standard in modular steel bridging. Robotically manufactured in the USA using high-strength steel from ISO-certified mills, the 700XS features robust orthotropic deck panels designed to handle heavy wheel loads, and is available in single-lane, two-lane or three-lane widths with optional pedestrian footwalks.
9. The Acrow 700XS bridge, with a span of approximately 50 meters, can withstand a total load of 170 tonnes.
10. The maximum load that will be applied to the temporary bridge crossing the River Stour in Kent is approximately 62 tonnes.
11. Only one vehicle is permitted on the bridge deck at any given time.

Legend

High mean water spring tide

Reference drawings

Issue	Date	Remarks	Drawn	Checked	Approved
B	24/03/2026	Updated to include minimum soffit levels	AW	WB	JW
A	06/03/2025	For Submission	MS	WB	JW

Title

THE NATIONAL GRID (SEA LINK) ORDER
PINS APPLICATION NUMBER: EN020026
DESIGN AND LAYOUT PLANS - KENT:
INDICATIVE RIVER STOUR (KENT) TEMPORARY CROSSING
REGULATION 5(2)(o)
SHEET 1 OF 2

nationalgrid

Application Number
EN020026

National Grid Drawing Reference
SEAL-MMD-SEAL-ENG-DWG-0720

Scale	Sheet Size	Sheet	Issue
As shown	A1	SHEET 1 OF 2	B

National Grid plc
National Grid House,
Warwick Technology Park,
Gallows Hill, Warwick.
CV34 6DA United Kingdom

Registered in England and Wales
No. 4031152
nationalgrid.com