Rampion 2 Wind Farm

Category 6: Environmental Statement

Volume 4, Appendix 26.2: Flood Risk Assessment (tracked changes)

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1. Introduction

1.1 Context

1.1.1 This Flood Risk Assessment (FRA) accompanies **Chapter 26: Water environment, Volume 2** of the Environmental Statement (ES) (Document Reference: 6.2.26). The ES is the written output of the Environmental Impact Assessment (EIA) undertaken for Rampion 2 Offshore Wind Farm (Rampion 2) located adjacent to the existing Rampion Offshore Wind Farm ('Rampion 1') in the English Channel in the south of England.

1.1.2 Rampion 2 (the 'Proposed Development') comprises of both onshore and offshore infrastructure associated with the proposed offshore wind farm including:

- up to 90 offshore wind turbine generators (WTGs) and associated foundations;
- inter-array cables connecting the WTGs to up to three offshore substations;
- up to four offshore export cables will be buried under the seabed within the final cable corridor;
- a single landfall site connecting offshore and onshore cables using Horizontal Directional Drilling (HDD) installation techniques;
- buried onshore cables in a single corridor for the maximum route length of up to 38.8km using:
  - trenching and backfilling installation techniques; and
  - trenchless and open cut crossings.
- a new onshore substation that will connect to the existing National Grid substation at Bolney, Mid Sussex; and
- extension to and additional infrastructure at the existing National Grid Bolney substation to connect Rampion 2 to the national grid electrical network.

1.1.3 The FRA should also be read in conjunction with the full description of the Proposed Development provided in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4). The FRA considers potential sources of flood risk on the onshore elements of the Proposed Development from tidal, fluvial, surface water, groundwater, sewers and artificial sources. It also considers any potential impacts on flood risk exerted by the onshore elements of the Proposed Development towards other receptors. Additionally, it includes a coastal change vulnerability assessment for the 'onshore' elements of the Proposed Development (landward of the mean high water springs (MHWS)). Throughout, the FRA considers the influence of climate change pressures.

1.1.4 Rampion 2 is a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008 (the 'Act'). Under Section 31 of the Act, development consent is required for development to the extent that it is or forms part of an NSIP. Development consent is granted by the making of a Development Consent Order (DCO) for which an application may be made under Section 37 of the Act to the

Secretary of State (delegated to the Planning Inspectorate). The following FRA forms part of the DCO application.

1.1.5 This FRA considers the potential flood risks to the onshore elements of the Proposed Development and its potential impact elsewhere. This assessment has benefitted from feedback from stakeholders in response to the first Statutory Consultation exercise on an earlier version of this FRA, namely the Flood Risk Screening Assessment (FRSA) which accompanied the Preliminary Environmental Information Report (PEIR) (Rampion Extension Development Limited (RED), 2021) submission.

1.1.6 This FRA has been prepared in accordance with the extant National Policy Statement (NPS) EN-1 of Energy and Climate Change, (Department of Energy and Climate Change (DECC), 2011a), and NPS EN-3 (DECC, 2011b) and NPS EN-5 (DECC, 2011c) which cover renewable energy infrastructure and electricity transmission and distribution, respectively. The revised draft NPSs released for consultation in 2023 (Department for Energy Security and Net Zero (DESNZ), 2023a; 2023b & 2023c) have also been considered as a material consideration.

1.1.7 Reference has also been made to the *National Planning Policy Framework* (NPPF) (Ministry of Housing, Communities & Local Government (MHCLG), 2021) and associated *Planning Practice Guidance* (Ministry of Housing, Communities & Local Government, 2022) where relevant for additional guidance regarding flood risk and development, as appropriate. Consultation and engagement with key stakeholders, including the Environment Agency, and West Sussex County Council (the Lead Local Flood Authority) has also informed the development of this assessment.

1.2 Scope

1.2.1 This FRA accompanies the ES, presenting the flood risk baseline, the relevant onshore elements of the Proposed Development, and the environmental measures embedded within the final design (and/or to be enacted / implemented during the construction phase).

1.2.2 This FRA considers the flood risks associated with the construction, operation and maintenance and decommissioning phases of the onshore elements of the Proposed Development (landward of MHWS). Both flood risks 'to' and flood risks 'from' the onshore elements of the Proposed Development are considered. The FRA covers the onshore part of the proposed DCO Order Limits (indicated as a red line boundary in the various Figures associated with this FRA), which is the anticipated maximum extent of land in which the onshore elements of the Proposed Development, including construction works, will take place. The onshore part of the proposed DCO Order Limits is also illustrated in **Figure 1.1, Volume 3** of the ES (Document Reference: 6.3.1). For ease of reference throughout this FRA, the onshore part of the ES Assessment boundary will be referred to as the 'proposed DCO Order Limits' and the onshore elements of the Proposed Development will be referred to as the 'Proposed Development'.

1.2.3 This FRA follows a source-pathway-receptor led approach to the assessment of flood risk. Sources are defined as the source of the flood risk, such as direct rainfall, watercourses, the sea, groundwater, sewers or artificial sources.

Pathways define the means by which the source of flood risk can impact receptors. Examples of pathways include the floodplain of the River Arun and overtopping or breaching of defences. A specific combination of sources and pathways is referred to as a flood mechanism, such as tidal overtopping of the sea defences as a result of high tides and storm surge. Receptors comprise those persons or assets that could be vulnerable to the flood mechanisms identified.

1.2.4 With due consideration of the temporary nature of many of the onshore elements of the Proposed Development, which is only required during construction of the onshore cable corridor and onshore substation, the approach taken in this assessment is considered to be proportionate to the risk and appropriate to the scale, nature and location of the onshore elements of the Proposed Development.

1.3 Sources of information and consultation

1.3.1 Consultation and engagement with key stakeholders regarding the scope of this FRA and acquisition of data to support these studies has included the following activities:

- a first Expert Topic Group (ETG) meeting as part of the Evidence Plan Process (EPP) including the Environment Agency, West Sussex County Council (WSCC) and various key stakeholders on 28 October 2020 to discuss the EPP and roadmap for future ETG meetings;
- a meeting with the Environment Agency on 09 November 2020 to discuss general flood risk matters, Climping sea flood defences, and the Internal Drainage Board. Minutes of this meeting are included in **Annex A**;
- email communications with the Environment Agency regarding flood model data (15 July 2020 and 2 December 2020);
- email communications with Southern Water regarding historic flood incidents and sewer flooding (3 September 2020 and 29 October 2020);
- a second ETG meeting with various key stakeholders (including Environment Agency and WSCC) on 23 March 2021 to provide a project update and set expectations for content of FRA for PEIR (RED, 2021);
- a meeting with the Environment Agency regarding onshore construction activities in the floodplain on 22 March 2022 and subsequent email correspondence. Minutes of this meeting are included in **Annex A**;
- a targeted stakeholder meeting to discuss local sources of flood risk with WSCC and Mid Sussex District Council on 1 April 2022. Minutes of this meeting are included in **Annex A**;
- a targeted stakeholder meeting to discuss local sources of flood risk and drainage with WSCC, Horsham District Council, and Arun District Council on 22 June 2022. Minutes of this meeting are included in **Annex A**;
- a third ETG meeting with various key stakeholders (including the Environment Agency, Arun District Council, Horsham District Council, South Downs Nation Park Authority (SDNPA), WSCC, and Mid Sussex District Council) on 22

November 2022 to provide a project update and set expectations for content of the FRA for ES;

- a targeted consultation meeting with the Environment Agency and Southern Water to discuss local flood risk and wider water environment matters concerning access routes in Source Protection Zone 1, held on 6 March 2023;
- a fourth ETG meeting with various key stakeholders (including the Environment Agency, Arun District Council, Horsham District Council, South Downs Nation Park Authority, West Sussex County Council, Poling Parish Council and Mid Sussex District Council) on 7 March 2023 to provide a project update, discuss consultation responses and additional data collection; and
- A fifth ETG meeting with the same key stakeholders was held on 22 June 2023 to discuss the final onshore cable route, conclusions of the assessments and the process of Statements of Common Ground (SoCG) going forward.

1.3.2 Minutes from selected meetings have been provided in **Annex A** as those that record key maters of agreement on flood risk matters with stakeholders. Minutes of meetings not included in Annex A will be included in the wider **Consultation Report** (Document Reference: 5.1) accompanying the DCO Application.

1.3.3 Sources of wider data and information consulted as part of this FRA are detailed within **Table 1-1**.

Table 1-1 Sources of data

Data	Source	Purpose
Environment Agency (2023a) Statutory Main River Map	https://data.gov.uk/ accessed 14 May 2023	Definition of watercourses, in relation to the development
Flood Map for Planning (Environment Agency, 2023b)	https://flood-map-for-planning.service.gov.uk/ accessed 14 May 2023	For assessment of fluvial and tidal flood risk
Risk of Flooding from Surface Water (RoFSW) Mapping (Environment Agency, 2023c)	https://flood-warning-information.service.gov.uk/long-term-flood-risk/map accessed 14 May 2023	For assessment of surface water flood risk
Flood Risk from Reservoirs Mapping (Environment Agency, 2023c)	https://flood-warning-information.service.gov.uk/long-term-flood-risk/map accessed 14 May 2023	For assessing reservoir flood risk
Geological Mapping	British Geological Survey (BGS) (2022) Geology of Britain Viewer: https://mapapps.bgs.ac.uk/geologyofbritain/home.html	To characterise the underlying geology and hydrogeology

Data	Source	Purpose
	BGS (2020) Onshore GeoIndex: http://mapapps2.bgs.ac.uk/geoindex/home.html BGS Hydrogeological mapping: https://largeimages.bgs.ac.uk/iip/mapsportal.html?id=1003976 (BGS, 1978) accessed 14 May 2023	
Aquifer Designations (Defra, n.d.)	http://www.magic.gov.uk/ accessed 14 May 2023	To characterise the underlying aquifers and hydrogeology
Soils Mapping (Cranfield University, 2023)	http://www.landis.org.uk/soilscapes/ accessed 14 May 2023	To characterise the underling soil type
Environment Agency flood model data	Environment Agency supplied data on 14 May 2021 (see **Table 5-3** for more details)	For assessment of fluvial and tidal flood risks

1.4 Flood event probability and Flood Zone definitions

1.4.1 Throughout this FRA, 'Annual Exceedance Probability' (AEP) terminology is used to describe the magnitude and likelihood of a flood event. AEP expresses the probability of a flood occurring in a given year. For example, what is commonly referred to as a '1 in 50 year flood event', is a flood with a 1 in 50 or two percent probability of occurring in any given year.

1.4.2 Use of the AEP terminology makes it clearer that there is a probability of this magnitude of flooding occurring in any one year, not just once every 50 years. The relationship between AEP and Flood Zones are provided in **Table 1-2**, together with the definitions for the Flood Zones, as specified in the NPPF (MHCLG, 2021). In addition, the 3.33 percent AEP event is included, owing to its common use in drainage design.

Table 1-2 Annual probability and Flood Zone definitions

Flood Zone	Flood Zone Definition	AEP	Annual probability
Flood Zone 1: Low probability	Land having less than a 1 in 1,000 annual probability of river or sea flooding.	<0.1%	<1 in 1,000
Flood Zone 2: Medium probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.	0.1%	1 in 1,000
Flood Zone: 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.	1% (fluvial) 0.5% (tidal)	1 in 100 (fluvial) 1 in 200 (tidal)
Flood Zone: 3b Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency.	5%*	1 in 20*
N/A	A commonly used design standard for sewer design, as specified in Sewers for Adoption (Water Research Centre, 2012).	3.33%	1 in 30
N/A	Q_{BAR}, a commonly used design standard for drainage design.	50%	1 in 2

* The 5 percent AEP (or 1 in 20 annual probability) event is often used to help define Flood Zone 3b, the ‘functional floodplain’, but is not part of the definition.

1.5 Structure of this FRA

1.5.1 The remainder of this FRA is structured as follows:

- **Section 2: Planning context and requirements** which establishes the planning policy context for the assessment;
- **Section 3: Site characteristics** which provides an overview of the development site location and characteristics;
- **Section 4: Description of the onshore elements of the Proposed Development** which provides a description of the onshore elements of the Proposed Development;
- **Section 5: Flood sources** which comprises a screening assessment to consider the potential risk from all sources of flooding prevailing across the proposed DCO Order Limits and the surrounding area and identifies those that may require detailed assessment;
- **Section 6: Assessment of flood risk** which presents an assessment of flood risks associated with the Proposed Development. This includes the identification of potential flood risk receptors and consideration of risks to these receptors associated with all the potentially significant hazards identified in **Section 5**;
- **Section 7: Coastal change vulnerability assessment** which provides a Coastal Change Vulnerability Assessment (CCVA), in accordance with the relevant National Planning Policy Framework (NPPF) and online Planning Practice Guidance (PPG) to demonstrate that the onshore development will be resilient to coastal change throughout its lifetime;
- **Section 8: Flood risk management** which specifies the flood risk management measures to address the potential risks identified in **Section 6** and considers residual risk. The flood risk management measures have been embedded into the design of the Proposed Development and secured through DCO Requirements;
- **Section 9: Planning requirements** which sets out how the specific planning requirements have been addressed, including the Sequential and Exception Tests;
- **Section 10: Summary and conclusions** which presents summary and concluding comments;
- **Section 11: Glossary of terms and abbreviations** which provides a glossary of terms and abbreviations; and
- **Section 12: References** outlines references referred to within this FRA.

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2. Planning context and requirements

2.1 Introduction

2.1.1 The purpose of this Section is to identify the key policy documents that define the scope of this FRA. This Section concludes by summarising the flood risk requirements applicable to this FRA. This Section is structured in a hierarchical order, from national policy down to local guidance.

2.2 National policies

2.2.1 The Proposed Development is defined as a Nationally Significant Infrastructure Project (NSIP) under Section 14(1)(f) of the Planning Act 2008. Therefore, a DCO is required to authorise the Proposed Development.

2.2.2 The Act requires that DCO applications must be determined in line with the requirements of the relevant National Policy Statements (NPSs) which provide the overarching principles and policies against which applications for NSIPs should be determined.

2.2.3 In a hierarchical context, the FRA is prepared in accordance with the Planning Act 2008, NPS EN-1 (Department of Energy and Climate Change (DECC), 2011a), which sets out planning policy with regard to NSIPs in the energy sector, and NPS EN-3 and EN-5 (DECC, 2011b; 2011c), which cover renewable energy infrastructure and electricity networks infrastructure. Reference is also made to the NPPF (MHCLG, 2021) and its associated Planning Practice Guidance (PPG) (MHCLG, 2022) as set out in **paragraphs 2.2.23** to **2.2.28**.

2.2.4 In March 2023, the UK Government published a series of revised draft NPS for consultation (Department of Energy Security and Net Zero (DESNZ), 2023a; 2023b; 2023c). However, for any DCO application accepted for examination before designation of the draft NPSs, the 2011 suite of NPSs should have effect in accordance with the terms of those NPS. Notwithstanding this, Draft NPS EN-1 (DESNZ, 2023a) sets out at paragraph 1.6.3 that the draft NPSs are potentially capable of being important and relevant to the decision-making process undertaken by the SoS.

2.2.5 The draft NPS have been reviewed to understand whether there are any notable implications to this flood risk assessment. Ultimately, the headline guidance provided in the 2011 NPSs (DECC, 2011a; 2011b; 2011c) remains, with additional specific guidance mostly reflecting the latest NPPF and PPG (MHCLG, 2021; 2022). Therefore, this FRA has been prepared in accordance with the 2011 NPS (DECC, 2011a; 2011b; 2011c) and draft 2023 NPS guidance (DESNZ, 2023a).

National Policy Statement (NPS) for Energy (EN-1)

2.2.6 The National Policy Statements (NPSs) set out UK Government planning policy for NSIPs in England and Wales. The Overarching NPS for Energy (EN-1) (DECC, 2011a) sets out national policy for energy infrastructure and provides a framework for decision-making by the Secretary of State (previously the Secretary of State for Energy and Climate Change now for Energy Security and Net Zero) on applications for energy developments that fall within the scope of the NPSs. As discussed in **paragraph 2.2.5**, this FRA has been prepared to reflect the extant (DECC, 2011a) and revised draft NPS EN-1 released in 2023 (DESNZ, 2023a).

2.2.7 Sections of revised draft NPS EN-1 (DESNZ 2023a) that are relevant to this assessment and the subsequent FRA are:

- Section 4.9 which discusses climate change adaptation;
- Section 5.6 which discusses the effects on the coastline and vulnerability to coastal change; and
- Section 5.8 which discusses flood risk, setting out the minimum requirements of an FRA as well as information on the application of the Sequential and Exception tests.

2.2.8 The minimum requirements for all FRAs are set out in paragraph 5.8.15 of the revised draft NPS EN-1 (DESNZ 2023a). These are set out in **Table 2-1**, together with the location in which they are addressed in this assessment. The FRA requirements from the revised draft NPS EN-1 have been considered rather than those in the extant NPS EN-1 (DECC 2011a) given that these are more stringent and requirements from the extant NPS EN-1 remain.

Table 2-1 Revised draft NPS EN-1 minimum FRA requirements

NPS EN-1 minimum FRA requirements (paragraph. 5.8.15)		Section of FRA
Scope of FRA	"*Be proportionate to the risk and appropriate to the scale, nature and location of the project*".	**1.2, 8** & **9**
Assessment	"*Consider the risk of flooding arising from the project in addition to the risk of flooding to the project*".	**1.2, 5**& **6**
Climate change	"*Take the impacts of climate change into account, clearly stating the development lifetime over which the assessment has been made*".	**4.6**, **5.7**, **6**, **7** & **8**
Approach	"*Be undertaken by competent people, as early as possible in the process of preparing the proposal*".	**1.3**
Flood risk management infrastructure	"*Consider both the potential adverse and beneficial effects of flood risk management infrastructure, including raised defences, flow channels, flood storage areas and other artificial features, together with the consequences of their failure and exceedance*".	**5** & **6**

NPS EN-1 minimum FRA requirements (paragraph. 5.8.15)		Section of FRA
Vulnerability and safe access	"*Consider the vulnerability of those using the site, including arrangements for safe access and escape*".	**4.7** & **8.2**
Assessment	"*consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and include information on flood likelihood, speed-of-onset, depth, velocity, hazard and duration*".	**5**, **6** & **8**
Assessment	*"identify and secure opportunities to reduce the causes and impacts of flooding overall, making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management"*	**8.1**& **8.4**
Assessment	"*Consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes*".	**5**, **6** & **7**
Residual risks	*"include the assessment of the remaining (known as 'residual') risk after risk reduction measures have been taken into account and demonstrate that these risks can be safely managed, ensuring people will not be exposed to hazardous flooding"*	**8.5** & **8.7**
Surface water run-off	"*Consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of the project may affect drainage systems*".	**5.3** & **6.3**
Assessment	*"detail those measures that will be included to ensure the development will be safe and remain operational during a flooding event throughout the development's lifetime without increasing flood risk elsewhere"*	**8.1** & **8.4**
Assessment	*"identify and secure opportunities to reduce the causes and impacts of flooding overall during the period of construction"*	**8.1** & **8.3**
Baseline	"*Be supported by appropriate data and information, including historical information on previous events*".	**1.3** & **5**

2.2.9 NPS EN-1 (DECC, 2011a; DESNZ, 2023a) also includes a number of additional requirements that are specific to Energy Infrastructure. Those that are of potential relevance to the assessment are set out in **Table 2-2**, together with the location of this assessment in which they are addressed, or the other DCO Application document in which they are addressed, where appropriate.

Table 2-2 NPS EN-1 flood risk specific requirements

NPS EN-1 Requirements		**Section of FRA**
Policy	The development proposal should be in line with any relevant national and local flood risk management strategies (Paragraph 5.8.36).	**2**
Flood risk	*"the project is designed and constructed to remain safe and operational during its lifetime, without increasing flood risk elsewhere"* (Paragraph 5.8.36).	**6** & **8**
Operation of the site	*"the project includes safe access and escape routes where required, as part of an agreed emergency plan, and that any residual risk can be safely managed over the lifetime of the development"* (Paragraph 5.8.36).	**8.1**& **8.2**
Functional floodplain	*"Energy projects should not normally be consented within Flood Zone 3b, or Zone C2 in Wales, or on land expected to fall within these zones within its predicted lifetime* (Paragraph 5.8.41).	**5.2, 6, 8** & **9.3**
Flood warning and evacuation plan	*"The receipt of and response to warnings of floods is an essential element in the management of the residual risk of flooding. Flood Warning and evacuation plans should be in place for those areas at an identified risk of flooding"* (Paragraph 5.8.33)	**8.1, 8.2** & **8.4**
Flood warning and evacuation plan	*"The applicant should take advice from the local authority emergency planning team, emergency services and, where appropriate, from the local resilience forum when producing an evacuation plan for a manned energy project as part of the FRA. Any emergency planning documents, flood warning and evacuation procedures that are required should be identified in the FRA"* (Paragraph 5.8.34).	**8.2**
Climate change	*"Applicants should demonstrate that proposals have a high level of climate resilience built-in from*	**5.7** & **8**

NPS EN-1 Requirements		Section of FRA
	the outset and should also demonstrate how proposals can be adapted over their predicted lifetimes to remain resilient to a credible maximum climate change scenario. These results should be considered alongside relevant research which is based on the climate change projections" (Paragraph 4.9.11)	
Climate change	*"Where energy infrastructure has safety critical elements (for example parts of new gas-fired power stations or some electricity sub-stations), the applicant should apply a credible maximum climate change scenario."* (Paragraph 4.9.12).	**5.7, 6.3,** & **8.4**
Climate change	*"The Secretary of State should be satisfied that applicants for new energy infrastructure have taken into account the potential impacts of climate change using the latest UK Climate Projections and associated research and expert guidance (such as the EA's Climate Change Allowances for Flood Risk Assessments or the Welsh Government's Climate change allowances and flood consequence assessments) available at the time the ES was prepared to ensure they have identified appropriate mitigation or adaptation measures. This should cover the estimated lifetime of the new infrastructure, including any decommissioning period"* (Paragraph 4.9.13).	**5.76.3,** & **8.4**
Climate change	*"The Secretary of State should be satisfied that there are not features of the design of new energy infrastructure critical to its operation which may be seriously affected by more radical changes to the climate beyond that projected in the latest set of UK climate projections, taking account of the latest credible scientific evidence on, for example, sea level rise (for example by referring to additional maximum credible scenarios – i.e. from the Intergovernmental Panel on Climate Change or EA) and that necessary action can be taken to ensure the operation of the infrastructure over its estimated lifetime"* (Paragraph 4.9.15).	**5.7, 6.2, 6.5, 7.3** & **8.4**
Climate change / adaptation	*"If any adaptation measures give rise to consequential impacts (for example on flooding, water resources or coastal change) the Secretary of State should consider the impact of the latter in*	**5.7, 6.2, 6.5, 7.3** & **8.4**

NPS EN-1 Requirements		Section of FRA
	relation to the application as a whole and the impacts guidance set out in Part 5 of this NPS.” (Paragraph 4.9.16).	
Adaptation	*“Any adaptation measures should be based on the latest set of UK Climate Projections, the government’s latest UK Climate Change Risk Assessment, when available and in consultation with the EA’s Climate Change Allowances for Flood Risk Assessments or the Welsh Government’s Climate change allowances and flood consequence assessments*.” (Paragraph 4.9.17).	**5.7**
Adaptation	*“Adaptation measures should be required to be implemented at the time of construction where necessary and appropriate to do so. However, where they are necessary to deal with the impact of climate change, and that measure would have an adverse effect on other aspects of the project and/or surrounding environment (for example coastal processes), the Secretary of State may consider requiring the applicant to ensure that the adaptation measure could be implemented should the need arise, rather than at the outset of the development (for example increasing height of existing, or requiring new, sea walls)”* (Paragraph 4.9.19)	**5.7, 6** & **8**
Drainage and SuDS	*“To satisfactorily manage flood risk, arrangements are required to manage surface water and the impact of the natural water cycle on people and property”* (Paragraph 5.8.24). *“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.”* (Paragraph 5.8.27)	**6.2** & **8.4**
Drainage and SuDS	*“The sequential approach should be applied to the layout and design of the project. Vulnerable aspects of the development should be located on*	**8.4** & **9.1**

NPS EN-1 Requirements		Section of FRA
	parts of the site at lower risk and residual risk of flooding. Applicants should seek opportunities to use open space for multiple purposes such as amenity, wildlife habitat and flood storage uses. Opportunities should be taken to lower flood risk by reducing the built footprint of previously developed sites and using SuDS" (Paragraph 5.8.29)	
Drainage and SuDS	*"In determining an application for development consent, the Secretary of State should be satisfied that where relevant* […], *SuDS* […] *have been used unless there is clear evidence that their use would be inappropriate"* (Paragraph 5.8.36)	**8.4**
Coastal processes	*"Where relevant, applicants should undertake coastal geomorphological and sediment transfer modelling to predict and understand impacts and help identify relevant mitigating or compensatory measures."* (Paragraph 5.6.11).	**7**
Coastal processes	*"The ES should include an assessment of the effects on the coast, tidal rivers and estuaries. In particular, applicants should assess:* *the impact of the proposed project on coastal processes and geomorphology, the implications of the proposed project on strategies for managing the coast as set out in Shoreline Management Plans (SMPs), how coastal change could affect flood risk management infrastructure, drainage and flood risk and the vulnerability of the proposed development to coastal change, taking account of climate change"* (Paragraph 5.6.12)	**7**
Coastal processes	*"Applicants should propose appropriate mitigation measures to address adverse physical changes to the coast, in consultation with the MMO, the EA or NRW, LPAs, other statutory consultees, Coastal Partnerships and other coastal groups, as it considers appropriate. Where this is not the case, the Secretary of State should consider what appropriate mitigation requirements might be attached to any grant of development consent."* (Paragraph 5.6.16).	**7** & **8.4**
Drainage and SuDS	*"For energy projects which have drainage implications, approval for the project's drainage*	**8.4**

NPS EN-1 Requirements		Section of FRA
	system, including during the construction period, will form part of the development consent issued by the Secretary of State. The Secretary of State will therefore need to be satisfied that the proposed drainage system complies with any National Standards published by Ministers under paragraph 5(1) of Schedule 3 to the Flood and Water Management Act 2010" (Paragraph 5.8.37).	
Sequential Test	The Sequential Test and sequential approach should be applied (Paragraphs 5.8.9, 5.8.21 and 5.8.36).	**9.1**
Exception Test	The Exception Test, where necessary, should be applied (Paragraphs 5. 8.10 and 5.8.11).	**9.2**

2.2.10 In addition to the requirements listed in **Table 2-2**, NPS EN-1 (DESNZ, 2023a) also details the following points:

- Exceptionally, where an increase in flood risk elsewhere cannot be avoided or wholly mitigated, the Secretary of State may grant consent if they are satisfied that the increase in present and future flood risk can be mitigated to an acceptable and safe level and taking account of the benefits of, including the need for, nationally significant energy infrastructure; and
- If any adaptation measures give rise to consequential impacts, the Secretary of State should consider the impact of the latter in relation to the DCO Application as a whole and the impacts guidance set out in Part 5 of the NPS (DESNZ, 2023a).

2.2.11 NPS EN-1 (DESNZ, 2023a) states that further guidance on flood risk can be found in Planning Practice Guidance Flood Risk and Coastal Change section, which accompanies the NPPF, Technical Advice Note 15 for Wales or successor documents (Welsh Government, 2021).

The Sequential Test

2.2.12 The Sequential Test is set out in NPS EN-1 (DECC, 2011a; DESNZ, 2023a), as defined in the Planning Practice Guidance (MHCLG, 2022) as follows:

"The Sequential Test ensures that a sequential, risk-based approach is followed to steer new development to areas with the lowest risk of flooding, taking all sources of flood risk and climate change into account. Where it is not possible to locate development in low-risk areas, the Sequential Test should go on to compare reasonably available sites:

- *Within medium risk areas; and*

- *Then, only where there are no reasonably available sites in low and medium risk areas, within high-risk areas."*

2.2.13 NPS EN-1 and the NPPF (DECC, 2011a; DESNZ, 2023a and MHCLG, 2021) also require that a sequential approach should be applied to the layout and design when allocating land for development and land use types within development sites.

The Exception Test

2.2.14 NPS EN-1 (DESNZ, 2023a) states that:

> *"If, following application of the Sequential Test, it is not possible, (taking into account wider sustainable development objectives), for the project to be located in areas of lower flood risk the Exception Test can be applied, as required by Annex 3 of the Planning Practice Guidance. The test provides a method of allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available."*

2.2.15 The Planning Practice Guidance for the NPPF provides further information on the circumstances under which the Exception Test should be applied. NPPF (MHCLG, 2021) guidance states that:

> *"for the Exception Test to be passed it should be demonstrated that:*
>
> - *development that has to be in a flood risk area will provide wider sustainability benefits to the community that outweigh flood risk; and*
> - *the development 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."*

2.2.16 The 'exception' to this is set out in paragraph 5.8.42 of NPS EN-1 (DESNZ, 2023a):

> *"Exceptionally, where an increase in flood risk elsewhere cannot be avoided or wholly mitigated, the Secretary of State may grant consent if it is satisfied that the increase in present and future flood risk can be mitigated to an acceptable and safe level and taking account of the benefits of, including the need for, nationally significant energy infrastructure as set out in Part 3 above. In any such case the Secretary of State should make clear how, in reaching their decision, they have weighed up the increased flood risk against the benefits of the project, taking account of the nature and degree of the risk, the future impacts on climate change, and advice provided by the EA or NRW and other relevant bodies."*

National Policy Statement (NPS) for Renewable Energy Infrastructure (EN-3)

2.2.17 NPS EN-3 (DECC 2011b) covers nationally significant renewable energy infrastructure including offshore generating stations in excess of 100 megawatts (MW), which applies to Rampion 2. As discussed in the section above, this FRA has been prepared in accordance with both the extant NPS EN-3 (DECC 2011b) and draft NPS EN-3 published for consultation in March 2023 (DESNZ, 2023b).

2.2.18 Section 3.8.81 (DESNZ, 2023b) states that *"the applicant should assess the effects of the cable and any associated infrastructure on the marine, coastal and onshore environment."*

2.2.19 Section 3.8.303 (DESNZ, 2023b) states that "*A proposed offshore electricity cable connecting the wind farm with the onshore electricity infrastructure and any offshore electricity substations that may be required, may constitute associated development, depending on their scale and nature in relation to the offshore wind farm.*" The proposed network connection is an associated development to Rampion 2, the onshore elements of which are assessed in this FRA.

2.2.20 Section 3.8.46 (DESNZ, 2023b) states that the onshore element of the grid connection (electric lines and substations) should be determined in accordance with EN-1 and the Electricity Networks Infrastructure NPS, EN-5 (DECC, 2011c).

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

2.2.21 The technology specific NPS EN-5 (DECC 2011c) covers the electricity transmission and distribution network. Section 2.4 of NPS EN-5 provides further clarification on climate change adaptation but provides no additional guidance with respect to the assessment of flood risk. As discussed in this section above, this FRA has been prepared in accordance with both the extant NPS EN-5 (DECC 2011c) and the draft NPS EN-5 released in 2023 (DESNZ 2023c).

2.2.22 With respect to climate change adaptation, Paragraph 2.3.2 of NPS EN-5 (DESNZ, 2023c) advises that as climate change is likely to increase risks to the resilience of electricity network infrastructure, applicants should set out to what extent the proposed development is expected to be vulnerable to extreme weather, including flooding, and, as appropriate, how it would be resilient, particularly for substations that are vital for the electricity transmission and distribution network.

National Planning Policy Framework

2.2.23 The NPPF (MHCLG, 2021) acts as guidance for local planning authorities and decision-makers, both in drawing up plans and making decisions about planning applications. This is supported by the online Planning Practice Guidance (PPG (MHCLG, 2022)).

2.2.24 Although NPPF and associated PPG (MHCLG, 2021; 2022) is not directly applicable to NSIP developments, they do provide additional relevant guidance on a range of issues, including the definition of flood zones, development vulnerability classifications, compatibility of development types and flood zones, and appropriate allowances for the effects of climate change. The PPG was originally published in 2014 and was recently updated in August 2022 to bring it up to date and in line with the latest policy position on flood risk in the NPPF.

2.2.25 Paragraph 167 of the NPPF requires that new development should not increase flood risk elsewhere, and that opportunities should be sought to reduce flood risk, where possible. Paragraph 167 states:

'…Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

- *a) 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;*
- *b) 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;*
- *c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;*
- *d) any residual risk can be safely managed; and*
- e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.'

2.2.26 Paragraph 169 of the NPPF states:

'*Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:*

- *a) take account of advice from the lead local flood authority;*
- *b) have appropriate proposed minimum operational standards;*
- *c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and*
- *d) where possible, provide multifunctional benefits*.'

2.2.27 The NPPF also sets out the requirements for plans with respect to the risk from coastal change. Paragraph 171 of the NPPF states that plans should avoid inappropriate development in vulnerable areas to coastal change and identify as a Coastal Change Management Area (CCMA) any area that is likely to be affected by physical changes to the coast. Paragraph 172 states that:

'*Development in a Coastal Change Management Area will be appropriate only where it is demonstrated that:*

- *a) it will be safe over its planned lifetime and not have an unacceptable impact on coastal change;*
- *b) the character of the coast including designations is not compromised;*
- *c) the development provides wider sustainability benefits; and*
- *d) the development does not hinder the creation and maintenance of a continuous signed and managed route around the coast.'*

2.2.28 The policy should be read in conjunction with the PPG, which outlines that applications within a CCMA may need to be accompanied by a coastal change vulnerability assessment to demonstrate whether or not the requirements of the NPPF paragraph 172 (MHCLG, 2021) are met.

2.3 Regional policies and guidance

Environment Agency

2.3.1 The Proposed Development is located within the Solent and South Downs Environment Agency region. The Environment Agency is the lead statutory body with responsibility for protection of the water environment. It is also responsible for flood defence and drainage for Main Rivers (Main River is a statutory designation which is usually applied to larger watercourses) and estuarine and coastal areas. The Environment Agency has produced several regional management plans and policies for the water environment that cover the onshore cable corridor:

- Rivers Arun to Adur flood and erosion management strategy 2010 – 2020;
- Arun to Pagham flood and coastal erosion risk management strategy;
- Lower Tidal River Arun Strategy;
- Arun and Western Streams Catchment Flood Management Plan; and
- River Adur Catchment Flood Management Plan.

Arun Internal Drainage Board

2.3.2 The Arun Internal Drainage Board (IDB) is responsible for managing land drainage, water levels and flood risk within the Arun Internal Drainage District (IDD), that covers 3,304 hectares (ha). The Arun IDD primarily lies within the administrative boundaries of Horsham District Council and Arun District Council.

2.3.3 Consultation with the Environment Agency has identified that the Environment Agency are in fact the IDB body, though have investigated dissolving the district on the basis that it serves no purpose with respect to flood risk (see meeting minutes included in **Annex A**). Byelaws exist for the district, but the Environment Agency have advised that there are no specific maintained watercourses that the byelaws apply to. Any works within 5m of any watercourse bank top within the district require consent, irrespective of whether they are maintained or not. However, consents for the IDB District are not anticipated to be complex on the basis that the IDB is not providing a flood purpose, but rather for land drainage.

Lead Local Flood Authority

2.3.4 West Sussex County Council (WSCC) is the Lead Local Flood Authority (LLFA) (as defined by the Flood and Water Management Act, 2010) for the Proposed Development. As the LLFA, WSCC has a duty to take the lead in the coordination of flood risk management from local sources, specifically defined as flooding from surface water, groundwater and ordinary watercourses. West Sussex County Council is responsible for regulation and enforcement on ordinary watercourses and is a statutory consultee for drainage for major new developments.

2.3.5 **Table 2-3** summarises the relevant documents produced by WSCC as LLFA and includes any policies pertinent to the Proposed Development.

Table 2-3 Relevant West Sussex County Council (LLFA) flood and drainage documents

Relevant documents	Description	Pertinent policies
Preliminary Flood Risk Assessment (2011)	This provides a high-level overview of flood risk from local sources for provision to the Environment Agency, ultimately for reporting to the European Commission. The report was published in 2011 with an addendum published in 2017.	None applicable
Local Flood Risk Management Strategy (2014)	The strategy is used as a means by which the LLFA co-ordinates Flood Risk Management on a day-to-day basis. The Strategy also sets measures to manage local flood risk (flood risk from surface water, groundwater and Ordinary Watercourses.)	None applicable
Policy for the Management of Surface Water (2018)	Policy statement setting out the requirements of the LLFA for drainage strategies and surface water management provisions associated with applications for development.	SuDS Policies 1-10
Culvert Policy (2021)	Policy statement explaining the agreed WSCC policy regarding the culverting of ordinary watercourses, and providing a guide to good practice and design principles.	1.0 Local Authority Policy 4.0 Culvert Design Requirements 5.0 Environmental Considerations 6.0 Consent Procedure 7.0 Planning Application and Building Control Considerations
Guidance for the design of structures (n.d)	Policy statement providing guidance to the requirements of highway structures and design approval process.	Design Approval Process

Culvert Policy (WSCC, 2021)

2.3.6 Consent from WSCC (the LLFA) will be required for works between top of bank of Ordinary Watercourses (no byelaw distance from top of bank applies is known of) outside of the IDB district (inside, consent would be required from the Environment

Agency). The WSCC Culvert Policy is therefore of particular relevance to this assessment. Selected text from this policy document is reproduced here:

> *"West Sussex Local Authorities are in general opposed to the culverting of watercourses because of the potential for adverse effect on flood risk and ecology. The Competent Authority will therefore adopt a precautionary principle and only approve an application to culvert an ordinary watercourse if there is no reasonably practicable alternative or if the potential negative impact of culverting would be so minor that they would not justify a more costly alternative."*

2.3.7 The Culvert Policy states that:

> *"a culvert will not be considered until alternatives have been considered, for example:*
>
> - *Clear span bridges;*
> - *Revision of the site layout to incorporate an open watercourse that can be easily maintained; or*
> - *Diverting the watercourse without loss of its hydraulic flow characteristics."*
>
> *"In all cases and where it is appropriate to do so, compensation in full is to be provided for any loss in storage capacity or habitat."*

2.3.8 It is worth noting that some leniency would be expected with respect to the suitability of any culverts proposed by the Proposed Development (as opposed to clear span bridges) associated with the temporary construction haul road / running track on the basis of their temporary nature (with full removal and restoration undertaken to restore the watercourse to its previous state upon completion of construction works). Based on a meeting held with Arun District Council, Horsham District Council, and WSCC in June 2022 (the meeting minutes of which are provided in **Annex A**, which provide more detail), the stakeholders were generally accepting of this approach to use temporary culverts. This is provided efforts are taken to meet the 17 culvert design requirements set out in the Culvert Policy.

2.3.9 The policies of most pertinence to flooding in the Culvert Policy (WSCC, 2021) are provided below:

- a detailed design will need to be submitted with the formal application for consent. Hydraulic calculations are required and are to include an allowance for climate change over the lifetime of the activity or development;
- culvert length should be kept as short as possible and diameter as large as possible. Depending on local circumstances, a minimum culvert diameter of 450mm is required, or as agreed with the local authority;
- the design of the culvert should consider any impact on flood flow. They must not increase flood risk to property. Consideration should also be given to the alternative flow paths in the event of a culvert becoming obstructed;
- most culverts should be set so that the inlet / outlet is at the true bed level; and
- only in exceptional circumstances where site constraints prevent a single pipe or box culvert option being practical will multiple barrel culverts be considered.

2.3.10 As well as the 17 policies, further environmental considerations are set out in the Culvert Policy, which will be taken into consideration when determining the consent.

2.4 Local policies and guidance

2.4.1 The Proposed Development passes through four local authority areas:

- Arun District Council;
- Horsham District Council;
- Mid Sussex District Council; and
- South Downs National Park Authority.

2.4.2 Each of these local authority areas have their own flood risk and drainage policies within their Local Plans, supported by Strategic Flood Risk Assessments, and perhaps supplementary planning guidance. Relevant policy and guidance are identified in **Table 2-4**.

2.4.3 Adopted Local Plans are the main source of local planning policy relating to flood risk to be considered for the Proposed Development. These will be supplemented by the supporting evidence base, and the emerging policy included in the local development documents associated with emerging Local Plans.

2.4.4 Many of the flood risk and drainage-related policies in Local Plans are directly sourced from the NPPF, its associated Planning Practice Guidance (and predecessors), or other national guidance, or are variations thereof. In such cases, to avoid repetition of well-established standard policy and/or that covered by the NPSs, these have not been replicated below. A summary of the sources of local policies relating to flood risk and drainage are set out in **Table 2-4**.

Table 2-4 Relevant flood and drainage policies within local authorities Local Plan documents.

Local authority	Local Plan documents	Pertinent policies
Arun District Council	Adoption Arun Local Plan 2011-2031 (Arun District Council, 2018) Surface Water Drainage Proposal Checklist (Arun District Council, 2022)	Policy W DM2: Flood Risk Policy W DM3: Sustainable Urban Drainage Systems
Horsham District Council	Horsham District Planning Framework (2015 – 2031) (Horsham District Council, 2015) Surface Water Drainage Statement (Horsham District Council, 2023)	Policy 38: Flooding

Local authority	Local Plan documents	Pertinent policies
Mid Sussex District Council	Mid Sussex District Plan (2014-2031) (Adopted March 2018) (Mid Sussex District Council, 2018)	DP41: Flood Risk and Drainage DP42: Water Infrastructure and the Water Environment
South Downs National Park Authority	South Downs Local Plan 2014-2033 (Adopted July 2019) (South Downs National Park Authority, 2018).	SD49: Flood Risk Management SD50: Sustainable Drainage Systems

3. Site characteristics

3.1 Study area and location

3.1.1 The onshore cable corridor runs from the landfall location at Climping in the south west, (National Grid Reference (NGR) TQ 010009), to the existing National Grid Bolney substation in the north east (NGR TQ 242213). The proposed DCO Order Limits is indicated in **Figure 26.2.1a-e, Annex B** and covers an area of 7.5km^2. Chainage distances measured in kilometres (km) from the landfall location are indicated in **Figure 26.2.1a-e, Annex B** to aid in describing locations being referred to in this FRA.

3.2 Land use

3.2.1 The land uses present within and adjacent to the proposed DCO Order Limits comprise predominantly rural land in agricultural use. The UK Centre for Ecology and Hydrology (UKCEH) Land Cover Map 2015 (Rowland et al., 2017) defined the dominant land-use as arable and improved grassland. The onshore cable corridor avoids interaction with urban areas; though the onshore part of the proposed DCO Order Limits includes minor settlements Crossbush, Washington, and Buncton, the onshore cable corridor itself will be almost entirely on rural agricultural land and / or undeveloped open space.

3.3 Topography

3.3.1 The landfall location and southwestern portion of the proposed DCO Order Limits are situated within the low-lying lower River Arun floodplain, with elevations varying between 1-5m Above Ordnance Datum (AOD) between Climping and Broomhurst Farm, Crossbush.

3.3.2 The central portion of the proposed DCO Order Limits spans the South Downs, with elevations along the onshore cable corridor generally increasing in a northeast direction up to a peak elevation of 200m AOD at Sullington Hill.

3.3.3 As the onshore cable corridor crosses the watershed and into the River Adur catchment, elevations fall steadily along the route to a minimum of 5m AOD on the floodplain of the western branch of the River Adur. The topography across the remainder of the onshore cable corridor to the northeast varies from 8-10m AOD associated with lower lying ground on the Cowfold Stream floodplain, and up to 35m AOD on higher ground at Snakes Harbour Farm.

3.4 Hydrological setting

3.4.1 The proposed DCO Order Limits spans two hydrological catchments; the River Arun and River Adur, as indicated in **Figures 26.2.1** and **26.2.2, Annex B**. The landfall location and southwestern portion of the proposed DCO Order Limits adjacent to Littlehampton lie within the lower River Arun catchment, whilst the north eastern extent of the proposed DCO Order Limits are situated within the

River Adur catchment. The central portion of the proposed DCO Order Limits traverses the catchment watershed across the South Downs. No watercourses are present over this central section of the proposed DCO Order Limits, associated with the highly permeable chalk outcrop of the South Downs.

River Arun catchment

3.4.2 The Arun catchment covers an area of approximately 1,500km^2, and includes the Main Rivers Arun and Rother. The headwaters of the Arun rise near Horsham, in the area of St Leonard's Forest in the Weald, from which point the river flows initially west, turning south at Bucks Green towards the river mouth at Littlehampton.

3.4.3 The River Arun is subject to a major tidal flow with a range of 5m, and is tidal for approximately 40km inland, up to the tidal limit at Pallingham Lock (well upstream of the Proposed Development interaction with the watercourse adjacent to Littlehampton). There are two flow gauges within the River Arun catchment, situated on the River Arun at Pallingham, and River Rother at Hardham.

3.4.4 The landfall location and proposed DCO Order Limits intersect and cross the Ryebank Rife sub-catchment of the lower River Arun (See **Figure 26.2.1a-e, Annex B**, chainage 0.9km). The Ryebank Rife is an east-west orientated Main River which drains primarily agricultural land between Middleton-on-Sea and Yapton to the west. However, there is a gap in the Main River classification to the west of the proposed DCO Order Limits (there is a section of 'ordinary watercourse' between the two sections of Main River classifications). Review of elevation data for this area indicates that this gap in the Main River Classification corresponds to a topographic catchment divide, with an artificial channel cut (the section of ordinary watercourse) into the landscape to connect the headwaters of two small (originally separate) watercourses. This seems to be reflective of it appearing to have at least two outfalls, one directly to the sea (to the west of the proposed DCO Order Limits) and the other to the River Arun (to the east of the proposed DCO Order Limits).

3.4.5 The Western Section of Ryebank Rife (which the proposed DCO Order Limits does not interact with) drains the majority of the catchment, with the Main River turning sharply south towards the sea adjacent to 'Bairds Business Park Hobbs New Barn' located approximately 1.25km to the west of the proposed DCO Order Limits (far south west corner in **Figure 26.2.2, Annex B**. This outfalls directly to the sea on the beach located at the eastern edge of the settlement of Elmer approximately 2km to the west of the cable landfall location. The 'second' section of Ryebank Rife Main River is the one which interacts with the proposed DCO Order Limits. This is the smaller of the two topographic Ryebank Rife catchments mentioned in the paragraph above. The Ryebank Rife is reclassified as Main River from Climping Street (approximately 425m to the west of the proposed DCO Order Limits) to another outfall at Littlehampton Marina (approximately 300m to the east of the proposed DCO Order Limits). The location of the Ryebank Rife is indicated in **Figure 26.2.1a-e** and **Figure 26.2.2, Annex B**.

3.4.6 The proposed DCO Order Limits crosses onto the eastern bank of the River Arun approximately 1.1km upstream of the A259 crossing, and traverses across the lower portion of the Black Ditch sub-catchment as seen in **Figure 26.2.1a-e,**

Annex B. The Black Ditch rises at Northdown Farm to the east, and drains west along the northern edge of Littlehampton, joining the River Arun adjacent to Brook Barn Farm.

3.4.7 Northeast of Lyminster, the proposed DCO Order Limits crosses the South Downs and intersect the headwaters of the River Stor sub-catchment as seen in **Figure 26.2.1a-e, Annex B**. The River Stor rises from Chantry and Sullington Hill, and drains northwest towards its confluence with the River Arun at Pulborough.

3.4.8 The proposed DCO Order Limits crosses into the adjacent River Adur catchment east of Sullington Hill on the South Downs, at approximately 16.7km chainage.

River Adur catchment

Overview

3.4.9 The River Adur catchment covers an area of approximately 600km^2. The catchment has two distinct branches, and eastern and western branch, that join adjacent to Bines Green. The eastern branch rises near Ditchling Common, whilst the western branch rises near Slinfold.

3.4.10 The River Adur is tidal for some distance inland, with the tidal limit coinciding with the end of the Environment Agency flood defences on the western branch, and to the gauging station at Sakeham on the eastern branch. There is an additional gauge on the western branch at Hatterell Bridge, and Chess Stream at Chess Bridge.

Western branch

3.4.11 The western branch of the River Adur flows southeast from its source towards Coolham and is classified as a Main River downstream of the Coolham Road bridge. The River Adur is joined by the Honey Bridge Stream approximately 2.2km upstream from the confluence to the eastern branch.

3.4.12 The levels within the western branch of the River Adur are controlled by Merions penstock, approximately 100m upstream of the confluence. The Environment Agency has advised that the penstock boards are closed during summer to retain water in the upper catchment, whilst they remain open in the winter. The Environment Agency also advised that upstream of the penstock in winter, the floodplain is regularly inundated for long periods (two-three months).

3.4.13 The proposed DCO Order Limits intersects the headwaters of the Honey Bridge Stream between 22km chainage at Wiston as seen in **Figure 26.2.1, Annex B**. The Honey Bridge Stream is classified as main river downstream of Honey Bridge and flows northeast towards its confluence with the western branch of the River Adur.

3.4.14 Northeast of Wiston, the proposed DCO Order Limits crosses the Adur Western branch between 29km to 30km chainage, approximately 400m upstream from the confluence to the eastern branch of the river as seen in **Figure 26.2.1a-e, Annex B**.

Eastern branch

3.4.15 The eastern branch of the River Adur initially flows north and meanders west around World's End from its source. The River Adur is classified as a Main River downstream of Wintons Fishery, Folders Lane. The river continues west from Burgess Hill golf centre, turning southwest at Rice Bridge on the A23. It is joined by Cowfold Stream at Shermanbury Place draining from Cowfold to the north, before continuing southwest towards the confluence to the western branch of the River Adur.

3.4.16 Levels within the eastern branch of the River Adur are controlled by Chates Weir, approximately 100m upstream from the confluence. Similarly to the western branch, penstock boards are closed in summer to retain water in the upper catchment, and open during winter. The eastern branch of the River Adur is subject to significantly more flow than the western branch due to higher rates of runoff from the contributing catchment which is more developed. Floodplains on the eastern branch are also subject to long periods of inundation during the winter months, similar to the western branch of the river.

3.4.17 The proposed DCO Order Limits crosses into the eastern branch Adur catchment north of the 32km chainage point as seen in **Figure 26.2.1a-e, Annex B**. There is one crossing point across the Cowfold Stream, at 35km chainage point, east of Gratwicke Farm.

3.4.18 The proposed DCO Order Limits does not cross the eastern branch of the River Adur, although the existing National Grid Bolney substation is located approximately 800m north of the eastern branch of the River Adur.

Lower river

3.4.19 Downstream from the confluence of the two branches at Bines Green, the lower River Adur flows south through Upper Beeding to the mouth at Shoreham-by-Sea. The lower river is joined by several minor tributaries from the west, namely Northover Sewer, Wyckham Farm Stream, and Black Sewer.

3.4.20 The proposed DCO Order Limits intersects the headwaters of each of these tributaries between 24km to 29km chainage points as seen in **Figure 26.2.1a-e, Annex B**. Each of these watercourses flow east and into the lower river downstream of the confluence at Bines Green.

3.5 Flood defence assets

Coastal defences at Climping

3.5.1 Coastal defences are indicated at the landfall location at Climping, consisting of a shingle embankment. The Environment Agency advised (**Annex A**) that the embankment was 'over-washed' in February 2020 during Storm Ciara, and that subsequent engineering works were required to re-work the washed material to reform the shingle flood defence. Furthermore, the Environment Agency indicated in consultation relating to the PEIR Supplementary Information Report (RED, 2022) that further damage has occurred in November 2022, associated with storm conditions and above average high tides. Approximately 1m was lost from the original crest height, which the Environment Agency were in the process of restoring in early 2023.

3.5.2 The Environment Agency's strategy for the management of the Climping shingle embankment defences are set out in the Arun to Pagham Flood and Coastal Erosion Risk Management Strategy (Environment Agency, 2015). The strategy is 'do minimum', reflecting of the limited socio-economic benefits of the defence. It was identified that minor repairs would keep the defences economically viable for between 15 and 35 years, though some of the works needed were / are anticipated to be unaffordable.

3.5.3 The Environment Agency elaborated that the short-term strategy post-Storm Ciara remains to patch and repair for as long as possible with the financially limited budget available. However, Storm Ciara caused significant damage and deterioration is occurring quicker than originally anticipated in the strategy. The Environment Agency's preferred approach for the long-term management of this defence is to allow the shingle embankment to naturally realign to a more naturally sustainable position, which is expected to result in a shift of the coastline landwards. The practicalities of allowing this to occur are currently being investigated by the Environment Agency.

River defences

3.5.4 Flood defences also exist inland from the coast. Although the Environment Agency's Flood Map for Planning (**Figure 26.2.2, Annex B**) does not indicate any Areas Benefitting from Defences (ABD) in the vicinity of the proposed DCO Order Limits, a network of embankments exist along both the Arun and Adur rivers and their associated tributaries, as indicated in **Figure 26.2.2, Annex B**.

3.5.5 **Figure 26.2.2, Annex B** shows defences along the length of the lower Arun adjacent to Littlehampton. The Environment Agency's strategy is to sustain the existing defences along the River Arun between Arundel and Littlehampton (as set out in the Lower Tidal River Arun strategy report, Environment Agency 2012), whilst the strategy for the Black Ditch is to improve the flood risk management.

3.5.6 Defences are also shown along the River Adur western branch downstream of Pinlands Farm, along the length of the River Adur eastern branch and Cowfold Stream. According to the Environment Agency's Catchment Flood Management Plan for the River Adur (Environment Agency 2009a), the strategy for the Upper Adur (including both eastern and western branches), was to investigate removal of Environment Agency owned and maintained defence structures, with the aim of providing additional storage of water on the floodplain to reduce flood risk to downstream areas by restoring rivers and floodplains to a naturally functioning state.

3.6 Geology

Overview of geology

3.6.1 An overview of the geology along the route is presented in **Figure 26.4, Volume 3** of the ES (Document Reference: 6.3.26) (Solid geology) and **Figure 26.5, Volume**

3 (of the ES (Document Reference: 6.3.26) (Superficial geology) of **Chapter 26: Water environment, Volume 2** of the ES (Document Reference: 6.2.26). These indicate that the south western section of the onshore cable corridor (between chainage 0km and 18km in **Figure 26.2.1a-e, Annex B**) is predominantly underlain by solid geology comprising Chalk. The northeast section of the onshore cable route (between chainage 23km and 36km and including the remaining onshore cable corridor bifurcations to the onshore substation) is largely underlain by the clays of the Wealden Group, with no superficial overlying deposits. Between these two main solid geological features, and in distinct locations overlying them, are further solid and superficial geological features, as discussed further below.

Detailed geological description

3.6.2 From landfall to chainage 6km, the chalk is overlain by the superficial deposits of the River Arun valley, as indicated in **Figure 26.5, Volume 3** of the ES (Document Reference: 6.3.26). These largely comprise Alluvium (clay, silt and sand), but also include River Terrace sand and gravel and some brickearth superficial deposits at the fringes of the proposed DCO Order Limits in these first few km.

3.6.3 Between chainage 6km and 10km, a narrow east-west orientated band of Lambeth Group strata overlies the Chalk, as indicated in **Figure 26.4, Volume 3** of the ES (Document Reference: 6.3.26). The Lambeth Group comprises a complex of vertically and laterally varying gravels, sands, silts and clays.

3.6.4 The central portion of the proposed DCO Order Limits (chainage 10km to 17km) is predominantly underlain by the Chalk outcrop forming the higher elevated topography of the South Downs between Arundel and Washington, West Sussex. Superficial deposits in this area are largely absent, with narrow bands of Head clay, silt, sand and gravel deposits occurring along the base of the valleys. Some larger patches of superficial Clay-with-Flints Formation and Head clay, silt, sand and gravel deposits are present 2km to the north of Hammerpot, on the slopes and at the base of the South Downs. A chalk escarpment exists at Sullington Hill (chainage 17km), where the Chalk of the South Downs gives way to the 'Grey Chalk sub-group' which outcrops between chainage 16km and 17km.

3.6.5 At the northeast end of the proposed DCO Order Limits, the solid geology predominantly comprises the 'Weald Clay' of the Wealden Group (Chainage 23km to the onshore substation at Oakendene and existing National Grid Bolney substation), with superficial deposits are also largely absent. The Gault Formation (chainage 19km to 21km), the Lower Greensand Formation (chainage 20km to 23km) and the sandstone and siltstone members of the Wealden Group (around 32km chainage) are also present at the surface for short stretches. The occasional superficial deposits comprise patches of clay, silt, sand and gravel Head deposits and Alluvium clay, silt, sand and peat and River Terrace sand and gravel deposits. The Alluvium deposits follow the route of the River Adur floodplain and its associated tributaries.

3.7 Hydrogeology

3.7.1 The aquifer status of the geology along the onshore cable corridor has been sourced from the Department for Environment, Food and Rural Affairs (Defra)

Multi-Agency Geographic Information for the Countryside (MAGIC) website (Defra, 2023). An overview of the aquifer status along the proposed DCO Order Limits is provided in **Table 3-1**.

Table 3-1 Aquifer designations

Bedrock Geology	Chainage (km)	Aquifer Status	Vulnerability
Chalk	0-6 10-18.5	Principal	High
Lambeth Group	6-10	Secondary A	Medium – High
Gault and Upper Greensand Formation	18.5-21	Principal	High
Lower Greensand Group	21-23.5 27.5-28	Principal	High
Wealden Group	23.5-27.5 28-36[1]	Unproductive Strata	Low

Superficial Geology	Chainage (km)	Aquifer Status	Vulnerability
Alluvium	0-4.5	Secondary A	Medium – High
Brickearth	4.5-6	Secondary A	Medium – High

[1]The Wealden Group extends beyond chainage point 36km, and underlays the remainder of the proposed DCO Order Limits.

3.7.2 The 1:625,000 scale Hydrogeological map of England and Wales (BGS 2023b) indicates that groundwater level fluctuation is common within the top 80m of the Chalk from landfall to chainage point 18km. The map indicates groundwater levels as being typically around 0m AOD within the Chalk along the coastal area trending to between 30 and 60m AOD on the South Downs (over 100 metres below ground level (mbgl) at higher elevations). The 1:100,000 scale Hydrogeological map (BGS, 1978) shows that groundwater levels within the Chalk Formation within the vicinity of Hammerpot and Patching (chainage 9km to 10km) typically range between 5m AOD and 10m AOD (approximately 30m to 35m below ground level respectively) with groundwater flow to the south and south west towards the River Arun.

3.7.3 The Chalk of the South Downs forms a well-drained terrain with lime-dominated topsoils that are often very shallow and can sustain limited vegetation cover. Rain can easily infiltrate through the thin soils to the underlying Chalk aquifer, with groundwater emerging along a scarp-slope spring line further downgradient towards the lower reaches of the River Arun and River Adur catchments.

3.7.4 The 1:100,000 scale Hydrogeological map of the South Downs (BGS, 1978) indicates groundwater flow lines along the valleys, where higher Chalk transmissivity (permeability-dependent) is reported. Close to the River Arun and River Adur valleys the groundwater contours indicate flow towards the watercourses, but away from this influence groundwater flow is predominantly to the south towards the coast. Groundwater from the Chalk is likely to discharge into the river as baseflow at a relatively constant rate throughout much of the year. However, when groundwater levels rise groundwater flooding can occur, particularly in the broad Chalk valleys.

3.7.5 The 1:100,000 scale map indicates a clear divide in groundwater flow at the Chalk escarpment at Sullington Hill (chainage 19km). To the north and east of Sullington Hill groundwater levels within the Lower Greensand Formation fall from greater than 60m AOD near Green Farm to below 0m AOD near Buncton and Wiston (approximately between 100 to 20mbgl respectively), between chainage points 21km to 22km.

3.7.6 The online BGS GeoIndex Viewer (BGS, 2023c) describes the Weald Clay Formation in the north east of the proposed DCO Order Limits as being low permeability and generally having no groundwater except at shallow depths. The predominantly thick clayey sequence with subordinate sandstones may occasionally support domestic water supplies. The clays of the Wealden Group retards infiltration and are characterised by standing surface water features and higher rates of surface flow at times of heavy rainfall. Consequently, flow in the River Adur can respond rapidly to rainfall.

4. Description of the onshore elements of the Proposed Development

4.1 Overview

4.1.1 A full overview of the Proposed Development is provided in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4) and its accompanying Figures (**Figures 4-1 to 4-8, Volume 3** of the ES (Document Reference: 6.3.4)). For the purpose of this FRA, the following sub-sections provide a summary of the onshore elements of the Proposed Development pertinent from a flood risk perspective.

4.1.2 The key onshore elements of the Proposed Development consist of:

- a single landfall site near Climping, Arun District, connecting offshore and onshore cables using HDD installation techniques;
- buried onshore cables in a single corridor for the maximum route length of up to 38.8km using:
  - trenching and backfilling installation techniques; and
  - trenchless and open cut crossings.
- a new onshore substation, proposed near Cowfold, Horsham District, which will connect to an extension to the existing National Grid Bolney substation, Mid Sussex, via buried onshore cables; and
- extension to and additional infrastructure at the existing National Grid Bolney substation, Mid Sussex District to connect Rampion 2 to the national grid electrical network.

4.1.3 Since the original PEIR and FRSA were submitted in 2021 (RED, 2021), the Proposed Development has continued to evolve and be refined. Full details of the design changes are provided in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4). The main differences in the description of the Proposed Development outlined in the FRSA submitted alongside the PEIR (RED, 2021) and this FRA include:

- a single onshore substation site has been selected at Oakendene refined down from two onshore substation search areas presented in the PEIR (RED, 2021); and
- the onshore proposed DCO Order Limits have been refined to remove onshore cable route options and has been reduced in width.

4.2 Programme of development and lifetime

4.2.1 An indicative construction programme for the Proposed Development is presented in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4). The construction programme illustrates the anticipated duration of the major construction / installation elements. The anticipated maximum total construction duration is approximately four years. In summary:

- year 1 – earliest construction work commences (anticipated to be 2026); and
- year 5 – fully operational and connected to the National Grid (anticipated to be 2030).

4.2.2 The predicted lifetime of the completed Proposed Development is around 30 years. At the end of their life, the wind turbines generators (WTGs) will be removed from the seabed, and if wind power is still an essential requirement for our energy mix, they may be repowered with the latest technology of the day, but that will be subject to a new consent application at that time. At the decommissioning phase, it is anticipated that the onshore landfall transition joint bay and onshore cable circuits will be left buried in-situ with circuit ends being cut and sealed. The onshore substation may be used as a substation site after decommissioning of the Proposed Development, or it may be upgraded for use by other renewable energy generation projects (which would be subject to a separate planning application). The decommissioning duration of the onshore infrastructure may take the same amount of time as construction of the Proposed Development, up to four years, although this indicative timing may reduce.

4.3 Description of the permanent onshore infrastructure

Onshore cable corridor

4.3.1 The proposed DCO Order Limits runs from the landfall at Climping through to the onshore substation at Oakendene, and then onto the existing National Grid substation at Bolney.

4.3.2 Design refinement of the onshore elements since the Scoping stage is described in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4). This has involved a detailed review of land ownership, local environmental sensitivities (including flood risk) and technical construction challenges, through consultation and analysing data collected from surveys and site visits.

4.3.3 The process has resulted in the initial consideration of numerous onshore cable corridor options to avoid as many environmental sensitivities as possible. This has ensured that a sequential approach to locating the Proposed Development has been followed, with flood risk one of the multiple constraints and opportunities considered when deciding upon the final onshore cable corridor option taken forward.

4.3.4 The following sections present the maximum design assessment assumptions for the onshore elements of the Proposed Development.

Onshore cable design

4.3.5 The up to 275kV cable system along the onshore cable route will comprise four cable circuits in separate trenches. Each circuit will contain three Power Cables (HVACs) and two Fibre Optic Cables (FOCs) drawn through pre-installed ducts.

4.3.6 A maximum of 20 buried cables will run along the length of the onshore cable route from the landfall at Climping through to the new onshore substation at Oakendene. A maximum of 10 buried cables will subsequently run from the new onshore substation at Oakendene to connect into the existing National Grid Bolney substation.

4.3.7 The 400kV cable system between the new onshore substation at Oakendene and the existing National Grid Bolney substation will comprise two cable circuits in separate trenches. Each circuit will contain three Power Cables and two FOCs drawn through pre-installed ducts.

4.3.8 At regular intervals along the onshore cable corridor, joint bays will be constructed to enable onshore cable installation and cable jointing. The joint bays are subsurface structures with an associated subsurface link box and Fibre Optic junction box. These link boxes enable electrical checks and testing to be carried out on the cable system during operation (making use of FOCs which will be installed alongside the transmission cables for communication and monitoring purposes). It is understood that the joint bays will not have solid surfaces and will be backfilled with sand and soil. Joint bays will be finished level with the ground surface (no raised structure). Joint bays (and the onshore cable itself) are resilient to submergence once constructed (resilient to flooding). The landfall transition joint bay will also be resilient to flooding once constructed.

4.3.9 The locations of the joint bays will be determined during the detailed design phase. Typically, they are located every 750 to 950m however the location depends on factors such as needing to avoid surface features, crossings and bends.

4.3.10 At some locations along the onshore cable route where the cable circuits travel down relatively steep slopes, cable clamping will be applied to prevent high mechanical loads being transferred to the nearest adjacent joint (and resulting in failure). Cable clamping will be applied typically close to joint bay locations on the side of the downward slope. It is understood the clamping will involve the installation of a concrete block into an excavated pit below the planned burial depth of cable, and to which the cables will be clamped to via a series of metal cleats. Once installed, the ground above these clamping arrangements will be reinstated as per the same specification as the rest of the onshore cable route.

4.3.11 A permanent easement of 15m to 25m is anticipated for the constructed onshore cable (this may be wider at trenchless crossing points and joint bays).

Onshore substation

4.3.12 Design refinement of the onshore substation has been undertaken since the Scoping stage and is described in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4). This has involved a detailed review of land ownership, environmental and engineering challenges (including flood risk and surface water drainage), through consultation and analysis of data collected through surveys and site visits.

4.3.13 The new onshore substation will be located at Oakendene which is approximately 1.5km northwest of the existing National Grid Bolney substation. The purpose of the onshore substation is to increase the electrical voltage to the 400kV required to connect to the existing National Grid Bolney substation. **Figure 4.8, Volume 3** of the ES (Document Reference: 6.3.4) illustrates the location of the new onshore substation.

4.3.14 The overall built site footprint for the proposed onshore substation will be up to 6 hectares (ha) within the onshore substation site boundary (approximately 21ha). Some of the additional land will be used to provide associated necessary development, such as permanent drainage infrastructure and landscaping with the remainder returned to the landowner. The additional space will also be used to facilitate construction activities at the onshore substation.

4.3.15 The onshore substation will comprise electrical components and equipment necessary to connect the electricity generated by the Proposed Development to the existing network. Some equipment will be placed outdoors and other equipment will be housed in buildings or enclosures.

Existing National Grid Bolney substation extension

4.3.16 New infrastructure is required at the existing National Grid Bolney substation to provide a cable connection from the proposed onshore substation at Oakendene to the existing National Grid Bolney substation as the National Grid interface location.

4.3.17 There are two types of infrastructure being considered for installation that will require installation as part of the existing National Grid Bolney substation extension works: Air Insulated Substation (AIS); or Gas Insulated Substation (GIS). Only one of the existing National Grid Bolney substation extension options (AIS or GIS) will be required in the final Proposed Development, to be determined by National Grid Electricity Transmission (NGET). This FRA considers the maximum design scenario for both options.

4.3.18 More information on the details and design of the onshore elements can be found in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4).

4.4 Construction phase

Landfall

4.4.1 The location where the offshore cables come ashore is known as the ‘landfall’. The offshore cables will make ‘landfall’ at Climping Beach, to the west of Littlehampton Harbour. To avoid interaction with the sea defence, trenchless crossing technologies (discussed further in **paragraph 4.4.14**) will be used to cross under the beach and the shingle embankment coastal defence to the agricultural land beyond. Behind the landfall location (in the agricultural land), the offshore cables will be joined to the onshore cables, usually forming the first joint bay of the onshore cable corridor. The landfall works are anticipated to take around six months.

Onshore substation installation

4.4.2 Temporary construction activities for the onshore substation will take up to approximately three years and will include enabling works and construction works. Enabling works will prepare the onshore substation site ahead of construction and include vegetation clearance, stripping and storage of topsoil, installation of drainage systems, installation of a temporary construction compound, delivery of materials, plant, machinery and fuel, and any earthworks necessary for the installation of the substation foundations.

4.4.3 Construction works will involve:

- landscaping;
- installation of perimeter fencing;
- ground preparation works;
- installation of underground services and onshore substation foundations;
- construction of the control and switchgear buildings and plant buildings;
- construction of cable trenches;
- construction of ducts and pits;
- construction of the oil containment bund; and
- provision of utility supplies.

4.4.4 Once all temporary construction activities have been carried out, the electrical equipment will be installed, commissioned and tested for the performance of the connection between the offshore windfarm, the new onshore substation at Oakendene and the existing National Grid Bolney substation. Finally, the onshore substation site will be secured, and the temporary area returned to its original use and condition.

Existing National Grid Bolney substation extension works

4.4.5 Temporary construction activities for the existing National Grid Bolney substation extension will include enabling works and construction works, which are anticipated to take approximately 12 months in duration. Enabling works will prepare the site ahead of construction and include vegetation clearance, access road construction, installation of drainage systems, installation of a temporary construction compound, and delivery of materials, plant, machinery, and fuel.

4.4.6 A temporary construction compound will be required. This will be located along the temporary construction access on an area of existing hardstanding and will be approximately 3,500m^2 (0.35ha). This compound will occupy the same area for either AIS or GIS option.

4.4.7 The existing National Grid Bolney substation extension construction will take place during standard construction hours with a requirement only for local task lighting. Construction works for the AIS and GIS options are described in the steps below and are broadly similar, only steps 6 and 8 differ:

1. establishing a temporary construction compound;
2. building a temporary road from the temporary construction compound to the location of the permanent Bolney substation extension area;
3. potential re-routing of existing services buried close to the existing National Grid Bolney substation, where works are planned;
4. extension of the existing National Grid Bolney substation to NGET standards;
5. erection of new fencing along the newly established perimeter;
6. erection of switchgear bays:
   - AIS: erection of a two new AIS bays;
   - GIS: erection of a new steel frame GIS building containing two GIS bays;
7. removal of fencing from existing perimeter;
8. extension of busbars:
   - AIS: extension of the primary and secondary busbars within the existing National Grid Bolney substation to connect to the two new AIS bays; and
   - GIS: extension of the primary and secondary busbars within the existing National Grid Bolney substation to connect to the two new GIS bays.

4.4.8 Once all temporary construction activities have been carried out, the electrical equipment will be installed, commissioned, and tested for the performance of the connection between the new onshore substation at Oakendene and the existing National Grid Bolney substation. Finally, the existing National Grid Bolney substation extension site will be secured, and the temporary construction areas returned to its original use and condition.

Onshore cable construction

4.4.9 The standard temporary construction corridor will be up to 40m wide and consist of the trenches (in which the cables will be laid), excavated material (stockpiles) and a temporary construction haul road (often known as the running track). The temporary construction corridor may require widening beyond the standard width in predetermined locations to allow enough space for access / equipment at trenchless crossings and to avoid obstacles. The proposed DCO Order Limits have been defined considering this enlargement at potential locations. Sufficient space to provide temporary drainage infrastructure has also been included in the onshore part of the proposed DCO Order Limits. The standard width is reduced in certain locations for limited lengths as a result of constraints such as watercourses or woodland.

4.4.10 The temporary construction haul road (discussed further in **paragraph 4.4.19**) will enable the transportation of plant used for topsoil stripping, subsoil excavation and for delivery of cable duct and cement bound sand (CBS) fill material. This soil will be stored in bunds within the temporary construction corridor.

4.4.11 The temporary construction haul road (discussed further in **paragraph 4.4.19**) will enable the transportation of machinery used for topsoil stripping and subsoil excavation. This soil will be stored in bunds / stockpiles within the onshore temporary construction corridor. Typically, the topsoil stockpiles will be up to 8m wide and 4m high to avoid compaction from the weight of the soil. It is anticipated that a mechanical excavator will be used for these activities.

4.4.12 Trenches will be backfilled with the originally excavated material or CBS to the layer of the protective tiles / tape (use of CBS is dependent on soil thermal resistivity). Where required, a layer of stabilised backfill (likely sandy material) will be deposited for the purposes of protection under the cable ducts. Protective cover tiles / tape will be placed on top of the material to prevent the cable from being damaged. Any surplus material from excavation will be spread across the onshore cable corridor area. The topsoil material will be reinstated, and the land returned to its original use.

Permanent onshore cable crossings

4.4.13 The permanent onshore cable will need to cross a number of features along the onshore cable route, such as road, rail, water, footpaths and third party services. Each crossing will be individually reviewed / surveyed during detailed design (which will occur subsequent to gaining planning consent) to confirm the crossing methodology employed. Open cut trenching crossing methodology will predominantly be used. This involves the preparation of the crossing (damming / fluming / pumping in the case of watercourses) to allow the trenches to be excavated and ducts installed. The crossing area will be reinstated to the original form.

4.4.14 Trenchless crossings (likely to be HDD) will be used for Main Rivers, railways and roads that form part of the Strategic Highways Network.). Trenchless crossing methodologies are less intrusive from a crossing interaction and environmental aspect.

4.4.15 HDD as an example of a trenchless crossing method involves drilling a borehole from one location to another under feature being crossed. Following completion of the borehole, the ducts lengths are strung out and connected in a line of equal length to the crossing and pulled through. Each circuit will have separate HDDs.

4.4.16 The configuration and design assumptions of the trenchless crossings will be determined during the detailed design phase and are informed by the EIA process. All watercourse crossings will be designed to be at suitable depth for the size and depth of the watercourse, and will avoid interaction with flood defences as well (trenchless methods likely to be employed where formal flood defences exist).

4.4.17 Watercourse crossings will be subject to either Flood Risk Activity Permits (FRAP) from the Environment Agency (for Main Rivers), Ordinary Watercourse / Land Drainage consents from the LLFA (ordinary watercourses outside of the IDB district) or the Environment Agency (ordinary watercourses inside the IDB district).

4.4.18 A crossing matrix is provided as part of the ES in **Appendix 4.1: Crossing schedule, Volume 4** of the ES (Document Reference: 6.4.4.1).

Temporary construction access and haul road

4.4.19 Temporary construction access points are required along the proposed DCO Order Limits to allow the transportation of materials, equipment and personnel to and from the construction sites. These temporary construction access points will allow access to the onshore temporary construction corridor which will have a temporary construction haul road running along the length of the onshore cable corridor (often referred to as a running track), except for locations where there are trenchless or road crossings (for example, Main Rivers). The use of temporary culverts or bridges may be required where obstacles are encountered along the haul road, such as ordinary watercourses. At Main Rivers (and perhaps some larger ordinary watercourses too), no temporary crossing for the temporary construction haul road will be provided; access will be gained from either side.

4.4.20 The temporary construction haul road will comprise crushed aggregates and a geotextile membrane where the existing ground is not considered stable enough. Such 'stone' roads usually involve excavation and stockpiling of near surface soils nearby available for reinstatement once construction is complete. The stone road itself is then built up so it is raised above the surrounding ground level to facilitate drainage (and minimise the volume of soil needing excavation before the required depth of stone can be provided). In areas where it is anticipated that the raised stone haul road and associated stockpiles may cause an obstruction to flood water (for example, on the floodplain), then road mats (also often referred to as 'trackway') placed on the existing ground surface will be used instead (thus avoiding both the raised stone road and the associated stockpiles). The temporary construction haul road will be approximately 6m in width, occasionally increasing to 10m at its widest point. The temporary construction haul road will be used during installation works and construction activities and be removed prior to final reinstatement.

4.4.21 Potential temporary construction access points proposed along the onshore cable corridor will be based on suitability for the Proposed Development requirements, reduced environmental / social effects and connection to key road infrastructure. Existing access points and tracks have been utilised where possible.

Temporary construction compounds

4.4.22 Temporary construction compounds are required for:

- landfall works;
- trenchless crossings; and
- logistics compounds; storage of materials and equipment, also includes welfare facilities and office space as appropriate.

4.4.23 All temporary construction compounds are located within the proposed DCO Order Limits and are indicated in **Figure 26.2.1a-e, Annex B**.

4.4.24 Temporary construction compounds for trenchless crossings should fit within the standard 40m wide onshore temporary construction corridor, typically being 0.4ha in area. Temporary construction compounds for trenchless crossings are identifiable in **Figure 26.2.1a-e, Annex B** by their comparatively small footprint and location along the onshore cable corridor itself.

4.4.25 Along the onshore temporary construction corridor, five sites have been identified for temporary construction compounds. The temporary construction compounds are identifiable in **Figure 26.2.1a-e, Annex B** by their comparatively larger footprint (approximately 4ha each, compared to the trenchless (HDD) crossing compounds of 0.4ha) and location away from the onshore cable corridor. These are at the following chainage locations in **Figure 26.2.1a-e, Annex B**:

- a temporary construction compound near to the landfall at Climping (between chainage 1km to 2km);
- a temporary construction compound close to Washington, West Sussex (between chainage 19km and 20km);
- two temporary construction compound near Oakendene (at and adjacent to the onshore substation), and;
- a temporary construction compound at the existing National Grid Bolney substation.

Land drainage

4.4.26 Extensive areas of the proposed DCO Order Limits are served by land drainage (underground pipes to assist drainage of land prone to waterlogging). Construction works will be undertaken in fields where land drains are known to exist (by way of land drainage plans and landowners knowledge) and in areas where, although no plans are available, they are considered likely to exist. Construction works will be undertaken to retain the integrity of the existing land drainage systems.

4.4.27 Land drainage will also provide one of the environmental measures employed to manage surface water run-off arising from the construction works themselves, with the details to be determined subsequent to gaining planning consent, at the detailed design stage, based on a number of local variables including topography, existing land drainage and the location of an appropriate outfall point.

4.5 Operation and maintenance phase

4.5.1 The operational lifetime of the Proposed Development is expected to be around 30 years. The operation and maintenance phase activities can be divided into three main categories:

- scheduled maintenance;
- operation and unscheduled maintenance; and
- special maintenance in the event of major equipment breakdown and repairs.

4.5.2 Maintenance of the onshore cable is expected to be minimal. During the operation and maintenance phase, periodic testing of the onshore cable is likely to be required (every two to five years). This will require access to the joint bays and link boxes along the onshore cable corridor. This will involve attendance by up to three light vehicles, such as vans, in a day at any one location. The vehicles will gain access using existing field accesses and side accesses as agreed with landowners to reach the relevant sections of the onshore cable.

4.5.3 Monitoring of the onshore substation will be done remotely using CCTV technology. Unscheduled maintenance or emergency repair visits will typically involve a very small number of vehicles, typically light vans. Infrequently, equipment may be required to be replaced, then the use of an occasional heavy goods vehicle (HGV) may be utilised, depending on the nature of the repair. Inspection and minor servicing may be required for the electrical plant, but it is anticipated that the onshore substation will require minimal scheduled maintenance and operation and maintenance activities.

4.6 Decommissioning phase

4.6.1 At the end of the operational lifetime of the Proposed Development, it is anticipated that the onshore electrical cables will be left in-situ with ends cuts, sealed and buried to minimise environmental effects associated with removal.

4.6.2 The onshore substation may be used as a substation site after decommissioning of the Proposed Development or it may be upgraded for use by another offshore wind project. This will be subject to a separate planning application.

4.6.3 Should the onshore substation need to be decommissioned fully, however, the decommissioning works are likely to be undertaken in reverse to the sequence of construction works and involve similar levels of equipment. All relevant sites will be restored to their original states or made suitable for an alternative use. Further detail will be provided in the decommissioning plan.

4.6.4 The duration of the decommissioning phase may take the same amount of time as construction of the onshore infrastructure, up to four years, although this indicative timing may reduce.

4.7 Vulnerability classification

4.7.1 In accordance with NPS EN-1 (DECC, 2011a; DESNZ, 2023a), an FRA should consider the vulnerability of those using the site, including arrangements for safe access. The PPG (MHCLG, 2022) provides further guidance classifying vulnerability according to the type of development and vulnerability of its users (such as children or the elderly). Five vulnerability classes are identified in the PPG, ranging from essential infrastructure, through highly, more and less vulnerable, to water compatible. The compatibility of these vulnerability classes with respect to each Flood Zone are set out in Table 2 of the PPG (MHCLG, 2022), which is reproduced in **Table 4-1** and the accompanying table notes.

Table 4-1 Flood risk vulnerability and flood zone compatibility (Table 2 of the Planning Practice Guidance)

Flood Zones	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
1	✓	✓	✓	✓	✓
2	✓	Exception Test required	✓	✓	✓
3a †	Exception Test required †	✗	Exception Test required	✓	✓
3b *	Exception Test required *	✗	✗	✗	✓*

Key:
✓ Exception test is not required
✗ Development should not be permitted

"Notes to table 2:

- *This table does not show the application of the Sequential Test which should be applied first to guide development to the lowest flood risk areas; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea.*
- *The Sequential and Exception Tests do not need to be applied to those developments set out in National Planning Policy Framework footnote 56. The Sequential and Exception Tests should be applied to 'major' and 'non major' development.*
- *Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.*

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

** In Flood Zone 3b (functional floodplain) essential infrastructure that has passed the Exception Test, and water-compatible uses, should be designed and constructed to:*

- *remain operational and safe for users in times of flood;*
- *result in no net loss of floodplain storage;*
- *not impede water flows and not increase flood risk elsewhere."*

4.7.3 The development vulnerability classifications for the onshore elements of the Proposed Development including onshore cable and onshore substation are 'Essential Infrastructure'. Construction and enabling works are considered to be classified as 'Essential Infrastructure', whilst temporary construction compounds are considered to be 'Less Vulnerable' **Table 4-2**).

4.7.4 NPS EN-1 (DECC, 2011a; DESNZ, 2023a) only states that development should be steered to areas of lower flood risk, however Table 2 in the PPG (MHCLG, 2022) provides an assessment criterion for development compatibility in the context of flood risk. The application of the development appropriateness matrix to the Proposed Development is summarised in **Table 4-2** and the accompanying table notes, along with the development vulnerability as set out in the PPG.

Table 4-2 Application of the flood risk vulnerability and flood zone compatibility matrix to the Proposed Development

Development type	Flood risk vulnerability classification	Flood Zone(s)[1] in which this 'development' will occur	Flood risk vulnerability and flood zone 'compatibility'
Construction and Operation and maintenance phase			
Onshore cable corridor	Essential Infrastructure[4]	1 & 2	✓
		3a & 3b	Exception Test required
Onshore Oakendene substation	Essential Infrastructure[4]	1	✓
Existing National Grid Bolney substation extension	Essential Infrastructure[4]	1	✓
Temporary construction compounds (storage of materials and equipment, also includes welfare facilities and office space as appropriate)	Essential Infrastructure	1 & 2	✓
		1 & 2	✓

Development type	Flood risk vulnerability classification	Flood Zone(s)[1] in which this 'development' will occur	Flood risk vulnerability and flood zone 'compatibility'
Construction (and enabling) works (temporary construction access routes and onshore cable corridor working areas)	Essential Infrastructure[2]	3a & 3b	Exception Test required[3]
Watercourse crossings	Water compatible	1, 2, 3a and 3b	✓

Key:

✓ Development is appropriate

✗ Development should not be permitted

Table notes:

[1] Definition of flood zones is provided in **Table 1-2**.

[2] The PPG does not explicitly categorise the vulnerability of access routes and working areas to be used for construction purposes, therefore, given that these are for electricity transmission infrastructure it is considered that Essential Infrastructure is the most appropriate classification.

[3] See relevant notes to **Table 4-1**.

[4] The PPG (MHCLG, 2022) does not explicitly categorise the vulnerability of electricity transmission infrastructure, however it is considered that Essential Infrastructure is the most appropriate classification.

4.7.5 As shown in **Table 4-2**, the Proposed Development is compatible with the Flood Zones without the need to pass the Exception Test, with the exception of the construction and enabling works, and the onshore cable itself. Elements of these are to be located in Flood Zones 3a and 3b, for which the Exception Test must be passed for such 'development' to be considered compatible. The requirements of the Exception Test are set out in **Section 2.2**. Demonstration that the Proposed Development pass the Exception Test is provided in **Section 9.2**

4.7.6 It is worth noting that, in this case, the proposed temporary construction works (not usually considered to be development in themselves) in Flood Zones 3a and 3b are considered to be appropriate in this case, for a number of reasons. These include the limited amount of construction infrastructure proposed in Flood Zones 3a and 3b (temporary construction haul road and trenchless crossing compounds), its short-term presence, the infrastructure itself (such as temporary construction haul roads) will be flood resilient, and flood risk management measures will be incorporated to ensure that flood risk is not increased elsewhere. Similarly, the onshore cable itself (once constructed) will be buried and entirely flood resilient, with no potential to increase flood risk elsewhere, and thus is also considered appropriate in this case. In addition, the temporary construction compounds (storage of materials and equipment, also includes welfare facilities and office space as appropriate), will be sited in accordance with a sequential approach to avoid areas of high risk of flooding.

5. Flood sources

5.1 Screening of potential sources of flooding

5.1.1 All potential sources of flooding in and around the proposed DCO Order Limits have been considered. **Table 5-1** provides an initial screening of the potential sources of flood risk. Sources of flooding may combine (for example, a high tide coinciding with a river flood). These 'in-combination' events are also considered as part of this assessment (**Section 5.2**).

Table 5-1 Initial screening of potential sources of flood risk

Flooding source	Comments	Source present
Tidal	There is a potential risk of flooding from tidal sources to portions of the proposed DCO Order Limits associated with the open coast at Climping (the landfall location) and within the lower River Arun catchment. The River Adur is also tidal where the proposed DCO Order Limits crosses the western branch of the river at Bines Green. Tidal flood sources are discussed further in **Section 5.2**.	✓
Fluvial	There is a potential flood risk from fluvial sources to parts of the proposed DCO Order Limits from the River Arun and River Adur, and their associated tributaries. Fluvial flood sources are discussed further in **Section 5.2**.	✓
Surface water	The Environment Agency's Risk of Flooding from Surface Water (RoFSW) mapping (Environment Agency, 2019) indicates regions of surface water flood risk to sections of the site, particularly in the northeast section of the proposed DCO Order Limits. Surface water flood sources are discussed further in **Section 5.3**.	✓
Sewer	Sewer networks are limited within the proposed DCO Order Limits due to the rural location of the majority of the Proposed Development. As a result, sewers are unlikely to constitute a significant source of flooding in their own right which can be distinguished from surface water flooding. This screening out of sewer flood sources is explained further in **Section 5.4**. Urban flood risk in general is	✕

Flooding source	Comments	Source present
	considered in the sub-section on surface water flood risk.	
Groundwater	The (BGS) Aquifer Designation dataset (BGS, 2023a) indicates that much of the proposed DCO Order Limits is underlain by principal aquifers (Chalk, Gault and Greensand). These are rocks that harbour significant volumes of groundwater, and therefore there is the potential for groundwater emergence. Groundwater flood sources are discussed further in **Section 5.5**.	✓
Artificial sources*	The Environment Agency's Risk of Flooding from Reservoirs mapping (Environment Agency, 2023c) indicates that areas of the proposed DCO Order Limits are at potential risk of flooding from reservoirs in the event of a failure. There are no canals within the vicinity of the proposed DCO Order Limits that are envisaged to pose a flood risk in the event of a failure. Artificial flood sources are discussed further in **Section 5.6**.	✓

* Flooding associated with water supplies (such as burst water mains) are not required to be assessed in FRAs.

5.2 Tidal and fluvial sources

Overview

5.2.1 The Environment Agency's Flood Zone map (**Figure 26.2.2, Annex B**) provides an indication of the likelihood of flooding from fluvial and tidal sources, with Flood Zones 1, 2, and 3 indicating a low, medium and high annual probability of flooding, respectively (any area not highlighted on these maps is Flood Zone 1). The most significant areas of Flood Zones 2 and 3 are located in the lower tidal reaches of the River Arun at the southwestern limit of the proposed DCO Order Limits, and on the River Adur and the Cowfold Stream on the north eastern end of the proposed DCO Order Limits. The central portion of the onshore cable corridor between Warningcamp and Ashurst sits within Flood Zone 1. An overview of the interaction with flood zones is provided in **Table 5-2**.

Table 5-2 The proposed DCO Order Limits interaction with Environment Agency Flood Zones

Flood Zone	Area of the proposed DCO Order Limits (ha)	Proportion of proposed DCO Order Limits Area (%)
1	442	65.8
2	118	17.6
3	111	16.6

5.2.2 A data request was made to the Environment Agency in 2021 for existing model data available for the proposed DCO Order Limits. Model results files and model reports from multiple studies were provided by the Environment Agency to inform this assessment, as listed in **Table 5-3**.

Table 5-3 Environment Agency flood models

Environment Agency flood model	Coverage
Atkins (2010) Lower Arun	Lower Tidal Arun (fluvial and tidal).
JBA Consulting (2012) Arun to Adur Coastal Model	Adur and Arun catchments.
Hyder Consulting (2011) Adur Eastern Branch	Adur Eastern Branch.
JBA Consulting (2017) Adur Eastern Branch	Adur Eastern Branch.
JBA Consulting (2008) JFLOW Improvements for Solent and South Downs Area	Adur and Arun catchments.
Atkins (2005) Adur Flood Mapping	Adur catchment.

5.2.3 The fluvial, tidal and coastal modelling results shared by the Environment Agency for the proposed DCO Order Limits are summarised in **Table 5-4**.

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Table 5-4 Model data summary

Modelling study	Location	Date	Source	Runs (% AEP)	Model outputs			Comments
					Extent	Depth	Hazard	
Lower Arun	Pallingham Weir – Sea	2010	Fluvial & Tidal	Fluvial: 20%, 5%, 1.33%, 1%, 1% + 20%, 0.1% Tidal: 50%, 20%, 10%, 1.33%, 0.5%, 0.1%, 50% (2110), 20% (2110), 5% (2110), 1% (2110), 0.5% (2110)	✓	✓	✓	1D/2D linked model. Model runs include both defended and undefended scenarios (no breach scenarios). It is understood that the combined fluvial and tidal model outputs constitute the Environment Agency flood zones on the Lower Arun.
Arun to Adur Coastal Model	Littlehampton – South Lancing	2012	Coastal	20%, 5%, 1.33%, 1%, 0.5%, 0.1%, 0.5% (2070), 0.5% (2115), 0.1% (2115)	✓	✓	✓	2D model. Model runs include both defended (overtopping) and undefended scenarios (no breach scenarios). The model extent extends to Priory Farm on the Lower Arun floodplain just south of Arundel.
Adur Eastern Branch	Ditchling Common – Bines Green	2011	Fluvial	20%, 2%, 1.33%, 1%, 1% + 20%, 0.4%, 0.1%	✓	✗	✗	1D only model. Model runs are all classified as ‘undefended’ since there are no formal raised defences along the Upper Adur. It is understood that the model outputs represent Environment Agency flood zones 2 and 3 for the majority of the Adur eastern branch and its tributaries.
		2017	Fluvial	1% + 35%, 1%, + 45%, 1% + 105%	✓	✓	✗	
JFLOW Improvements for Solent and South Downs area	Sussex Rifes, River Arun and River Adur	2009	Fluvial	1%, 0.1%	✓	✓	✗	2D model. The model outputs consist of 1% AEP and 0.1% AEP depth results only, and it is understood these constitute the Environment Agency flood zones on the Adur western branch. These results have been superseded by modelling studies discussed above elsewhere within the Adur and Arun catchments, and provide no advancement on the Environment Agency flood zones. Consequently, it is proposed that these results will only be utilised where no other model results are available (on the Adur western branch).

Modelling study	Location	Date	Source	Runs (% AEP)	Model outputs			Comments
					Extent	Depth	Hazard	
Adur Flood Mapping	Ditchling Common / Coolham – Sea (Adur catchment wide)	2005	Fluvial & Tidal	Fluvial: 50%, 20%, 10%, 4%, 2%, 1.33%, 1%, 1% + 20% Tidal: 1.33%, 0.5%, 0.5% + CC	✓	✗	✗	1D only model. Model outputs include fluvial only, tidal and combined model outputs. It is understood that only the tidal modelling outputs have been used to determine the Environment Agency flood zones on the Lower Adur. The fluvial modelling outputs have since been superseded by all modelling studies discussed above. The proposed DCO Order Limits does not interact with the section of the Lower Adur for which the tidal results would apply and consequently, these results have not been utilised for this assessment.

Tidal sources

Landfall

5.2.4 At the landfall location (Climping Beach), the primary source of flood risk will be directly from the sea. For this location, peak sea water levels have been sourced from the Environment Agency's Coastal Design Sea Levels database (Environment Agency, 2021a) and presented in **Table 5-5**. Flood risk hazard rating will be sourced from the Arun Coastal model. The flood risk hazard rating with respect to the Environment Agency Flood Zones from the 0.5 percent AEP present day defended scenario and 0.5 percent AEP (2070) defended scenario are shown in **Figures 26.2.3a and 26.2.3b, Annex B**. The present day outputs indicate 'Very High' (Danger for all) hazard rating at the landfall location (on the seaward side). The hazard rating on the landward side of the landfall location varies between Moderate (Danger for some) to Very High and is associated with overtopping of the Arun defences on the western bank (right-hand bank[1]), adjacent to Littlehampton. The 2070 outputs indicate a minor expansion in the extent of High and Very High hazard floodwater on the landward side of the sea defence, and a more significant increase in the extent of Low and Moderate hazard rating associated with shallow floodwater.

5.2.5 Peak extreme sea levels for extreme tidal events at Littlehampton Estuary (slightly higher than the offshore values opposite Climping Beach) for a 2017 base year are presented in **Table 5-5**. The potential impacts of climate change are set out in **Section 5.7**.

Table 5-5 Extreme sea level values at Littlehampton Estuary

Extreme sea level event (% AEP)	Peak sea level for a base year of 2017 (m AOD)
0.5	3.97
0.1	4.17

Notes: Littlehampton Estuary (4572_1) as a conservative estimate as it is slightly higher than the offshore value opposite Climping Beach.

River Arun catchment

5.2.6 The proposed DCO Order Limits between chainage points 0km to 4km (**Figure 26.2.2, Annex B**) is situated within the lower Arun floodplain and is at risk from combined tidal and fluvial flood risk (Flood Zones 2 and 3). This section of the Lower Arun floodplain is tidally dominant, as demonstrated through sensitivity testing carried out within the Lower Arun Modelling Study (Atkins, 2010) which concluded that tidal flooding is dominant between the sea and Burpham (north of Arundel and Warningcamp). Therefore, the entire region of the Arun floodplain over which the Proposed Development interacts with is tidally dominant. The tidal

[1] In hydrology, the banks of a watercourse are referred to as left or right-hand bank based on facing downstream (i.e. towards the sea).

outputs from the lower Arun model (Atkins, 2010) have since been superseded by the Arun coastal model (JBA Consulting, 2012), and therefore tidal flood risk outputs have been sourced from the more recent coastal modelling study.

5.2.7 The 0.5 percent AEP present day tidal hazard rating from the coastal modelling study is presented in **Figure 26.2.3a, Annex B**, overlying the Flood Zones to enable comparison with the undefended scenario. The results indicate that the western bank (right-hand bank) of the River Arun floodplain is the section at greatest risk from tidal flooding, with the hazard rated primarily at 'danger for all' (red in **Figure 26.2.3a, Annex B**) between the landfall location and the crossing point on the Arun at 2.1km chainage.

5.2.8 Between chainage points 2.1km to 2.8km (**Figure 26.2.2, Annex B**), the proposed DCO Order Limits passes through a region of Flood Zone 3 on the eastern bank (left-hand bank) of the River Arun. The 0.5 percent AEP tidal hazard rating in this section is notably less, varying between 'null' (clear in **Figure 26.2.3a, Annex B**, low hazard (green) and danger for some (yellow), with some isolated regions as 'danger for most' (orange) associated with deeper water within the drainage ditches. For this stretch of the River Arun, the hazard rating continues to be higher on the western bank (right-hand bank), with minimal overtopping occurring on the eastern bank (left-hand bank), thus sparing this section of the proposed DCO Order Limits from the higher hazard ratings seen elsewhere.

5.2.9 From chainage points 3.2km to 4km (**Figure 26.2.3a, Annex B**), the associated 0.5 percent AEP tidal hazard rating is predominantly 'danger for some' (yellow) and 'danger for most' (orange). The railway embankments near to the 3.2km chainage appear to be influencing the hazard rating, providing floodplain compartmentalisation separating the eastern floodplain between 2.1 and 2.8km (lower hazard) from the higher hazard between 3.2 and 4km.

River Adur catchment

5.2.10 Whilst the tidal limit of the River Adur extends to beyond the crossing location on the western branch (chainage 29km to 30km, **Figure 26.2.1a-e, Annex B**), the dominant source of flooding at this location is fluvial. Consequently, tidal flood risk has not been assessed on the River Adur catchment.

Fluvial sources

River Arun catchment

Overview

5.2.11 As discussed in **paragraph 5.2.6**, between the landfall location and chainage point 4km is at risk of combined fluvial and tidal flood risk within the River Arun floodplain. The risk of fluvial flooding from the River Arun for this section (chainage 0km to 4km) is sourced from the Lower Arun modelling study. Fluvial-only flood extents are shown in **Figure 26.2.4, Annex B** for the five percent AEP, one percent AEP and one percent AEP climate change (20 percent increase in peak fluvial flows) scenarios. The five percent AEP extent largely reflects the functional floodplain as indicated in the Arun District Council Strategic Flood Risk

Assessment (SFRA) (JBA Consulting, 2016, Appendix C) (the exception being downstream (to the south) of the A259 road, for which no flooding is indicated in the five percent AEP Lower Arun modelling results (discussed further in this section), but some flooding in the vicinity of Ferry Road is indicated in the SFRA flood map). The proposed DCO Order Limits between chainage 0km and 4km is discussed further below, from the landfall (0km) inland (to 4km) and shown in **Figure 26.2.4, Annex B**.

Ryebank Rife

5.2.12 The edge of the fluvial flood extent for the scenarios identified in **paragraph 5.2.11** and shown in **Figure 26.2.4, Annex B** coincides with A259 road bridge, which forms the downstream boundary of the Lower Arun model (Atkins, 2010). Consequently, there is no mapped risk of fluvial flooding (from the River Arun) from the landfall location (0km) to the A259 (chainage 1km). However, this region of the proposed DCO Order Limits (which is situated within the River Arun tidal floodplain) intersects the Ryebank Rife watercourse, which has not been explicitly modelled (perhaps due to the lack of receptors in the immediate vicinity to warrant watercourse-specific modelling). Therefore, there is a lack of available data with regards to the fluvial flood extent associated with the watercourse.

5.2.13 On this basis, a precautionary / conservative approach of the potential fluvial flood extent has been taken for this FRA. The conservative approach will assume that the fluvial extent extends to the edge of the tidal floodplain associated with the River Arun. It is worth noting however, that the proposed DCO Order Limits interacts with the second, shorter section of Ryebank Rife Main River classification (as discussed in **Section 3.4**) and therefore it is possible that the fluvial risk (from this watercourse) at this location is minimal (significantly less than the tidal extent) based on the upstream catchment size of approximately 2km^2.

River Arun

5.2.14 North of the A259 (chainage 1km) and extending to the crossing of the River Arun (chainage 2.1km) on the Arun western bank (right-hand bank), the onshore temporary construction corridor element of the proposed DCO Order Limits is situated predominantly outside of the present day one percent AEP fluvial extent (**Figure 26.2.4, Annex B**). However, the Lower Arun modelling (Atkins, 2010) indicates that this section of the proposed DCO Order Limits will be at risk of fluvial flooding via overtopping of the flood defences once an allowance for climate change (20 percent increase in fluvial flows) is considered. Access routes included within the proposed DCO Order Limits to the west (to provide access to the onshore cable corridor) intersect the five percent AEP fluvial extent, defined as Flood Zone 3b within the Arun District Council SFRA (JBA Consulting, 2016, Appendix C). Areas of the proposed DCO Order Limits in this area is located in Flood Zone 1, and are predicted to remain outside of the one percent AEP plus climate change (20 percent) extent. These include the temporary construction compound (as indicated in **Figure 26.2.1a-e, Annex B** near to the 1km chainage) and dedicated areas for stockpile storage located outside of the fluvial floodplain.

5.2.15 On the eastern bank (left-hand bank) of the River Arun (chainage 2.1km to 2.8km), the proposed DCO Order Limits is also at risk of fluvial flooding. This section is situated primarily within the one percent AEP present day and five percent AEP fluvial flood extents (**Figure 26.2.4, Annex B**).

5.2.16 From 2.8km to 3.2km, the proposed DCO Order Limits is predicted to remain dry during the various fluvial scenarios, including the one percent AEP plus climate change event (**Figure 26.2.4, Annex B**).

Black Ditch (and River Arun)

5.2.17 From chainage 3.2km to 4.6km (**Figure 26.2.4, Annex B**), the proposed DCO Order Limits is situated primarily within a region of fluvial flood risk partially associated with the Black Ditch. This section of the proposed DCO Order Limits is situated almost entirely within the one percent AEP present day extent (and thus entirely within the climate change extent), and partially within the five percent AEP extent (between chainage 3.2km to 3.8km and at several additional isolated locations).

5.2.18 From chainage 3.8km to 4.6km, the southern boundary of the proposed DCO Order Limits marginally intersect the one percent AEP (and higher) magnitude event, though the intersection extends 10-15m from the boundary only.

5.2.19 Beyond chainage 4.6km, the proposed DCO Order Limits emerges out of the River Arun and Black Ditch floodplains. The only exception to this relates to short section of the proposed DCO Order Limits between chainages 8.1km and 8.2km, and at 9.4km, respectively. At these points the proposed DCO Order Limits intersect short sections of Flood Zone 2 and 3 associated with tributaries and the upper reaches of the Black Ditch (**Figure 26.2.4, Annex B**).

South Downs

5.2.20 The central portion of the proposed DCO Order Limits from chainage points 9.4km to 29km spanning across the South Downs is situated entirely within Flood Zone 1 (**Figure 26.2.2, Annex B**), and subsequently not considered at risk from fluvial or tidal sources.

River Adur catchment

5.2.21 Sections of the northeast portion of the proposed DCO Order Limits are at risk primarily of fluvial flooding associated with the River Adur and Cowfold Stream. The proposed DCO Order Limits intersects Flood Zone 3 associated with the River Adur western branch between chainage points 29.1km to 29.4km adjacent to Bines Green, before crossing into the eastern Adur catchment (**Figure 26.2.2, Annex B**). The proposed DCO Order Limits further intersects Flood Zone 3 between chainage points 29.6km to 30km (primarily the southern and eastern edge of the proposed DCO Order Limits) and 30.5km to 31.1km on the River Adur eastern branch (the entire width of the proposed DCO Order Limits).

5.2.22 Finally, the proposed DCO Order Limits interact with Flood Zone 3 associated with the Cowfold Stream at the crossing location adjacent to Moatfield Farm between chainages 34.9km to 35km. There is further, albeit minor intersection with Flood Zone 2 adjacent to 34.3km and at 35.2km (the latter associated with an access track).

5.2.23 As outlined in **Table 5-3** and **Table 5-4**, the Environment Agency hold three fluvial and tidal flood models for the area of interest; one covering the Adur eastern branch completed in 2011, a JFLOW model covering the wider catchment completed in 2009 and a catchment wide model completed in 2005. Flood model results for the section of the proposed DCO Order Limits crossing the River Adur Western Branch at chainage points 29.1km to 29.4km have been sourced from the JFLOW model (when no other results are available), and from the River Adur Eastern Branch model elsewhere (where available), on the basis that this was a more-recent and more-detailed study.

5.2.24 The 5% AEP fluvial results available from the River Adur eastern branch model have been used to provide an indication of functional floodplain (Flood Zone 3b) on the eastern branch of the river. This is rather than using the functional floodplain extent as set out in the Horsham District Council SFRA (AECOM, 2020, Appendix 1 Figure 8D), which defined Flood Zone 3b using the four percent AEP results from the Adur Flood Mapping Study (Atkins, 2005). This is because the four percent AEP results indicate a functional floodplain extent which exceeds Flood Zone 2 determined in the more recent Hyder Consulting, 2011 study for the majority of the eastern branch of the River Adur. The results of the more-recent study are deemed to be more reliable on the basis of modelling advancements and the use of 2D modelling in the 2011 study allowing for higher resolution flood outputs. Portions of the proposed DCO Order Limits intersect Flood Zone 3b (as defined by the Hyder Consulting, 2011 study) at Bines Farm and Homelands Farm, and at crossing locations on the Cowfold Stream at Pooks Farm and Moatfield Farm.

5.2.25 An unnamed tributary of the Cowfold Stream flows west along the southern boundary of the Oakendene substation. Flood risk from this watercourse has been assessed considering the Environment Agency RoFSW (Environment Agency 2023b) mapping and discussed further in **Section 5.3**.

Model results summary

5.2.26 An overview of the relevant fluvial and tidal modelling along the proposed DCO Order Limits is provided in **Table 5-6**. Note, allowances for climate change are discussed further in **Section 5.7**.

Table 5-6 Model results summary

		Tidal		**Fluvial**	
Chainage (km)	**Location**	**Model**	**Flood risk overview / present day hazard rating**	**Model**	**Flood risk overview**
0	Landfall (seaward)	Arun Coastal	Open coast Danger for all	N/A	N/A

Chainage (km)	Location	Tidal Model	Flood risk overview / present day hazard rating	Fluvial Model	Flood risk overview
0 – 1	Landfall to A259	Arun Coastal	FZ1, 2 & 3 Hazard: null, danger for some / most / all	Lower Arun	Predominantly tidal, fluvial flood risk from the Ryebank Rife anticipated to be low given minimal upstream catchment.
1 – 2.1	A259 to Arun crossing	Arun Coastal	FZ1, 2 & 3 Hazard: null, danger for some / most / all	Lower Arun	Predominantly outside present-day 1% AEP extent, but in Climate Change (CC) extent. Some (access routes) in 5% AEP extent. Some in Flood Zone (FZ) 1.
2.1 – 2.8	Arun crossing to fields	Arun Coastal	FZ1, 2 & 3 Hazard: Null to danger for some / most	Lower Arun	Within 1% and 5% AEP extent (functional floodplain)
2.8 – 3.2	Fields to Brook Barn Farm	Arun Coastal	FZ1	Lower Arun	FZ1
3.2 – 4.6	Brook Barn Farm to Lyminster	Arun Coastal	FZ3 Hazard: Danger for some / most	Lower Arun	Predominantly within 1% AEP extent, some interaction with 5% AEP extent (functional floodplain)
4.6 – 9.4	Lyminster to Hammerpot	Lower Arun	Predominantly in FZ1. Fringing FZ2 & 3.	Lower Arun	Predominantly in FZ1. Minor interactions with FZ2 and FZ3

		Tidal		Fluvial	
Chainage (km)	**Location**	**Model**	**Flood risk overview / present day hazard rating**	**Model**	**Flood risk overview**
9.4 – 29.1	South Downs	N/A	FZ1	N/A	FZ1
29.1 – 29.4	Adur western branch crossing	N/A	N/A	JFLOW	FZ3
29.4 – 30	Bines Green	N/A	N/A	Adur Eastern Branch	FZ3
30 – 31.1	Homelands Farm	N/A	N/A	Adur Eastern Branch	FZ3 – a side floodplain of the River Adur associated with some minor tributaries
31.1 – 34.9	Shermanbury	N/A	N/A	Adur Eastern Branch	Primarily FZ1, minor interaction with FZ2 at 34.3km.
34.9 – 35	Cowfold Stream crossing	N/A	N/A	Adur Eastern Branch	FZ3
35 – 36.4	Cowfold Stream crossing to substation	N/A	N/A	Adur Eastern Branch	Primarily FZ1, minor interaction with FZ2 at 35.2km.
Onshore substation	Oakendene	N/A	N/A	Adur Eastern Branch	FZ1
Existing National Grid Bolney substation	Bolney	N/A	N/A	Adur Eastern Branch	FZ1

5.3 Surface water

5.3.1 Areas at risk of surface water flooding are defined by the Environment Agency's Risk of Flooding from Surface Water (RoFSW) map (Environment Agency 2023b), which is reproduced in **Figure 26.2.5a-e, Annex B** (covering the proposed DCO Order Limits) and **Figure 26.2.6a-b, Annex B** (the Oakendene onshore substation and existing National Grid Bolney substation extension). The RoFSW map defines flood risk from surface water for the:

- 3.33 percent AEP (high risk) rainfall event;
- Between the 3.33 percent AEP and one percent AEP (medium risk) rainfall events;
- Between the one percent AEP and 0.1 percent AEP (low risk) rainfall event; and
- Less than the 0.1 percent AEP (very low risk) rainfall event.

5.3.2 The RoFSW can be used to give an indication of the broad areas likely to be at risk of surface water flooding, as well as an estimation of the fluvial flood risk from minor tributaries of the Arun and Adur catchments not covered by the Environment Agency Flood Zones or the modelling discussed in **Section 5.2** above.

5.3.3 The interaction between the proposed DCO Order Limits and the RoFSW zones is shown in **Table 5-7**, which shows that the majority of the proposed DCO Order Limits (approximately 96 percent) is at low or very low risk of surface water flooding.

Table 5-7 Project interaction with RoFSW Zones

RoFSW Zone (AEP)	Risk	Area in each zone (ha)	Proportion of proposed DCO Order Limits (%)
3.33% (1 in 30)	High	10.5	1.6
3.33% - 1% (1 in 30 – 100)	Medium	17.4	2.6
1% - 0.1% (1 in 100 – 1,000)	Low	47.3	7.1
<0.1% (> 1 in 1,000)	Very Low	596.1	88.7

5.3.4 The mapping in **Figure 26.2.5a-e, Annex B** indicates that the risk of surface water flooding is generally low to very low for the southwestern and central portions of the proposed DCO Order Limits. This correlates to where the underlying geology is dominated by chalk (irrespective of whether there are overlying deposits) and the Gault and Upper and Lower Greensand Formations. The exceptions to this (in the south west portion of the onshore cable corridor) are associated with occasional watercourse crossings / valleys where the Chalk is overlain by the Thames Group (clay), such as close to the 6km chainage to the north of Lyminster and at various flowpath crossings between 7.4km and 8.5km chainage points near to Poling and Hammerpot (chainages indicated in **Figure 26.2.1a-e, Annex B**).

5.3.5 The mapping (**Figure 26.2.5a-e, Annex B** indicates regions at high risk in the northeast portion of the proposed DCO Order Limits, where the underlying geology is dominated by the Weald Clay (from chainage 24km onwards, as discussed in **Section 3.6**). The majority of surface water flood risk intersecting the proposed DCO Order Limits is associated with crossings of minor watercourses and tributaries of the River Adur and Cowfold Stream. Away from these watercourses, the risk is generally low.

5.3.6 As shown in **Figure 26.2.6a, Annex B** the risk of surface water flooding is generally low at the onshore substation at Oakendene (approximately 90 percent of the onshore substation area is at very low risk of flooding). However, there are several significant surface water flowpaths which intersect the onshore substation site, flowing from north to south and along the eastern boundary of the site within a ditch along Kent Street. The associated RoFSW risk is mapped as high (3.33 percent AEP) within the centre of each flowpath.

5.3.7 The interaction of the onshore substation at Oakendene with the RoFSW zones is presented in **Table 5-8**.

Table 5-8 Onshore substation percentage overlap with RoFSW Zones

	3.33% (1 in 30)	3.33% - 1% (1 in 30 – 100)	1% - 0.1% (1 in 100 – 1000)	<0.1% (>1 in 1000)
Oakendene onshore substation	0.8%	1.2%	7.5%	90.5%

5.3.8 The existing surface water flood risks at the onshore substation is discussed further in the run-on section (**paragraph 5.3.11**), along with any other locations along the proposed DCO Order Limits considered to be at potential risk from this source.

5.3.9 The RoFSW mapping at the existing National Grid Bolney substation extension is shown in **Figure 26.2.6b, Annex B**. A surface water flowpath intersects the main existing National Grid Bolney substation to the northwest of the proposed extension flowing from north to south. However, this flowpath is sufficiently far away from the proposed extension such that it will not pose a direct risk, and there are no other mapped surface water flowpath in the vicinity of the proposed extension.

5.3.10 Whilst there is an area of isolated high risk (<3.33 percent AEP) intersecting the extension works, this is not thought to be reflective of the current site and topographic conditions. Based on review of historic aerial imagery, it is understood that this area of surface water flood risk relates to a historic pond (which will naturally accumulate surface water) that was removed in association with previous extension works carried out between 2015-2018. Therefore, the underlying topography used within the RoFSW modelling pre-dates this development and does not provide an up-to-date overview of surface water flood risk at the site. From review of the latest topography at the site and incorporating the previous topographic changes, the risk of surface water flooding is thought to be low.

Run-on

Overview

5.3.11 Surface water run-on is run-off that originates from outside of a site that runs onto a site (run-on). This may then pond onsite or could take the form of a flow pathway which passes through the site. Run-on can be seen in the RoFSW mapping by flood extents that originate offsite which cross the proposed DCO Order Limits.

5.3.12 As described in **paragraph 5.3.9**, the RoFSW mapping presented in **Figure 26.2.5a-e, Annex B** indicates a number of locations at risk of surface water run-on along the proposed DCO Order Limits, particularly in the north eastern section. For example, **Figure 26.2.5a-e, Annex B** outlines some minor interaction between the temporary construction compound location at the Oakendene substation.

Onshore substation

5.3.13 A detailed overview of the onshore substation at Oakendene with respect to the RoFSW mapping is shown in **Figure 26.2.6a-b, Annex B**. The onshore substation at Oakendene is intersected by several surface water flowpaths as indicated in the RoFSW flood extents, with approximately 0.8 percent of the onshore substation footprint area at high risk of surface water flooding, as presented in **Table 5-8**. The surface water flowpaths evident in the 3.33 percent AEP extents drain south across the onshore substation site and into an Ordinary Watercourse (a small unnamed tributary of the Cowfold Stream) running along the southern boundary of the onshore substation site. In events of one percent AEP and greater, the southern boundary of the onshore substation is anticipated to be impacted by flooding from this unnamed tributary.

National Grid Bolney substation extension

5.3.14 As discussed in **paragraphs 5.3.9** and **5.3.10,** there are no noted surface water flowpaths intersecting the proposed extension works at the existing National Grid Bolney substation. An area of mapped isolated flood risk relates to a historic pond that was removed in association with previous extension works. The overall run-on to the extension area is therefore negligible.

Run-off

5.3.15 Elements of the development have the potential to increase the overall extent of lower permeability surfaces within the proposed DCO Order Limits. These are associated with the development of permanent hardstanding at the onshore substation at Oakendene and the existing National Grid Bolney substation extension[2], and temporary surfaces at temporary construction compounds and the temporary construction haul road / temporary construction accesses. In the absence of effective surface water management measures, this could lead to an increase in peak runoff rates (and volumes) and a consequent increase in flood risk for downstream receptors. This is discussed further in the context of specific aspects of the Proposed Development in **Sections 6.3** and **6.4**.

5.3.16 As discussed in **Section 8.1**, appropriate flood risk management measures have been secured, supported by suitable drainage strategies, to manage surface water for both the construction phase and for the permanent onshore substation and extension of the existing National Grid Bolney substation, covering both surface water run-off and surface water run-on (note that attenuation of run-on flows is not necessarily required). The provision of appropriate drainage infrastructure will ensure no increase in surface water flood risk as a consequence of the Proposed Development.

5.4 Sewer flooding

5.4.1 Sewer flooding occurs when intense rainfall overloads the sewer system capacity (surface water, foul or combined), and/or when sewers cannot discharge properly to watercourses due to high water levels. Sewer flooding can also be caused when problems such as blockages, collapses or equipment (such as pumps) failure occur in the sewerage system. Risk of flooding from sewers is likely to be limited to regions where extensive sewer systems exist (only where the proposed DCO Order Limits intersects urbanised areas).

5.4.2 Spatial records of historical sewer flooding incidents were requested from Southern Water, however, it was advised that they were unable to provide such details from their DG5 register citing Regulation 12(3) (personal data) of the *Environmental Information Regulations (2004)*. As a result, consideration of specific locations at risk of sewer flooding along the proposed DCO Order Limits is limited to that information provided on a postcode basis in the Arun District Council SFRA (JBA Consulting, 2016) and Horsham District Council SFRA (AECOM, 2020) discussed in this section.

5.4.3 Highest incidents of sewer flooding within the Arun District are typically recorded along the coastal front in Bognor Regis (west of the proposed landfall). The number of recorded incidents within the BN17 5 postcode, which includes the landfall location, is relatively high with 22 recorded incidents. However, the postcode also includes urban regions of Littlehampton, Horsemere Green and Atherington; to which these incidents are likely attributed to. The number of recorded incidents along the remainder of the proposed DCO Order Limits within the district is low, with seven and eight incidents recorded within the BN17 7 and BN18 9 postcodes, respectively.

[2] Permanent infrastructure considered to have the potential to affect surface runoff rates is limited to the onshore substation and extension works at the existing National Grid Bolney substation only. The joint bays associated with the onshore cable corridor are anticipated to be covered by natural material, and therefore no net impact to runoff rates is anticipated.

5.4.4 Within Horsham District Council, historical incidence along the proposed DCO Order Limits from Harrow Hill to Bolney is typically low since the region is predominantly rural. A relatively high number of incidents (26) are recorded at Ashington, situated to the north of the proposed DCO Order Limits that passes through Washington, West Sussex, but this is outside of the proposed DCO Order Limits.

5.4.5 No spatial indication of historical flooding incidents is provided within the Mid Sussex District Council SFRA (2015). However, given the predominantly rural location of the proposed DCO Order Limits that span into the Mid Sussex District, sewer flooding is not anticipated to be prevalent or pose a significant risk to the Proposed Development.

5.4.6 On this basis and given the predominantly rural location of the proposed DCO Order Limits, sewer flooding is not anticipated to pose a significant risk to the Proposed Development. Therefore, it is proposed flood risk from sewer sources is scoped out of further consideration in **Sections 6** and **8**. Urban flooding in general is covered in **Section 5.3**.

5.5 Groundwater

5.5.1 Shallow groundwater is likely to be encountered along sections of the onshore cable corridor. The southwest portion of the onshore cable corridor is underlain by chalk bedrock, classified as a primary aquifer harbouring large volumes of groundwater. The Horsham (AECOM, 2020), South Downs (Amec Foster Wheeler, 2017) and Arun District Council (JBA Consulting, 2016) SFRAs all indicate the potential for groundwater flooding within the districts.

5.5.2 The Arun District Council SFRA (JBA Consulting, 2016) covers the southwest portion of the onshore part of the proposed DCO Order Limits from the landfall location to close to Sullington Hill (chainage 17km in **Figure 26.2.1a-e, Annex B**). The report indicates several historical incidents of groundwater flooding within the district. Although all of these were recorded outside of the proposed DCO Order Limits, it is also worth noting that, given the sites rural location, any groundwater flooding onsite may not have been reported and/or recorded given the lack of receptors that will have been impacted. The Environment Agency's Areas Susceptible to Groundwater Flooding (AStGWF) map, as included in Appendix F of Arun District Council's SFRA (JBA Consulting, 2016), indicates High (>= 75 percent) susceptibility across the majority of the district and within the proposed DCO Order Limits.

5.5.3 An indicative depth to groundwater has been estimated across the chalk outcrop underlaying the South Downs between chainage points 6km and 18km to provide a greater understanding of groundwater levels in the region. This has been calculated within GIS software based on the chalk groundwater level contours shown in the 1:625,000 scale Hydrogeological map of England and Wales (BGS 2023b) and EA LiDAR data. The groundwater level contours are only indicated for the chalk bedrock, and hence the indicative depth to groundwater has only been produced for the region between chainage points 6km and 18km. However, elsewhere across the proposed DCO Order Limits the risk of groundwater flooding is anticipated to be either low as indicated by the various SFRA documents discussed in this section, or is coincident with low-lying floodplains where works will be programmed to occur in late summer / early autumn (where possible) to avoid interaction with known flooding periods (in accordance with commitment C-117 in the **Commitments Register** (Document Reference: 7.22) and discussed further in **Table 8-1**).

5.5.4 The indicative depth to groundwater for the southwest extent of the chalk outcrop between chainage points 6km and 10km is shown in **Figure 26.2.7a, Annex B**. The groundwater level is indicated as being at or close to the surface where the proposed DCO Order Limits pass northwest of Poling, between chainages 6km to 6.3km, which is coincident with a low-lying valley draining west to the River Arun. This is coincident with Appendix F of Arun District Council's SFRA (JBA Consulting, 2016), indicated High susceptibility across the wider River Arun Valley.

5.5.5 Following the provision of the PEIR (RED, 2021), further data was received from Arun District Council and Poling Parish Council relating to the presence of swallow holes adjacent to Poling and Hammerpot (between chainage points 7km to 9.5km). Further investigations concluded that there is a complex interaction between both surface water and groundwater mechanisms, but surface water flooding is deemed to be the dominant source and responsible for the overarching flood risk to the settlements of Poling and Hammerpot. Further detail on the hydrogeological context is provided in the **Appendix 26.4: Hydrogeological Risk Assessment, Volume 4** of the ES (Document Reference: 6.4.26.4).

5.5.6 Horsham District Council covers the majority of the proposed DCO Order Limits, from near Sullington Hill (chainage 17km) to the northeast limit at the existing National Grid Bolney substation that cross into the Mid Sussex District. The SFRA completed in 2020 (AECOM, 2020) indicates that there are no historic incidents of groundwater flooding recorded within the district. The AStGWF dataset is included within Appendix F and indicates that areas susceptible to risk of groundwater emergence within the proposed DCO Order Limits varies between 25 percent – 75 percent, with regions of higher susceptibility outside of the proposed DCO Order Limits to the south at Steyning, and further west at Pulborough and Amberley.

5.5.7 GeoSmart groundwater flood risk data is mapped in Figure 3B of the Horsham District Council SFRA (AECOM, 2020), providing a higher resolution indication of groundwater potential flood risk based on a 5m Digital Terrain Model (compared to the coarser AStGWF dataset). The dataset indicates a negligible risk across the majority of Horsham District and proposed DCO Order Limits, though regions of Low and Moderate risk coincident with the River Adur Valley are indicated. Several regions of High risk are mapped within the vicinity of the proposed DCO Order Limits at Washington, West Sussex. One of these appears to correlate with a Sand Pit quarry which the proposed DCO Order Limits passes round to the south (avoiding the area of highest risk).

5.5.8 However, Figure 3B of the Horsham District SFRA (AECOM, 2020) indicates that the proposed DCO Order Limits intersects with regions of high risk at the foot of Sullington Hill and Barnsfarm Hill at chainage points 18km to 19km. This location is at the foot of the chalk escarpment of the South Downs and in a dry valley (no watercourse at the ground surface) flanked by the two chalk escarpments on either side. The contours on the Ordnance Survey (OS) mapping (**Figure 26.2.1a-e, Annex B**) indicate a steady fall in ground levels along this valley to the north, along the proposed DCO Order Limits corridor, indicating that any emergent groundwater will likely drain away to the north, potentially along the onshore cable corridor itself, until it reached the small watercourse close to the 18km chainage point (**Figure 26.2.1a-e, Annex B**) (if it had not reinfiltrated before then).

5.5.9 The indicative depth to groundwater for the northeast extent of the chalk outcrop in this region between chainage points 14km and 20km is shown in **Figure 26.2.7b, Annex B**. The depth to groundwater is indicated as being shallow (less than 5m depth) between chainage 18.1km and 18.9km along the proposed DCO Order Limits. This region aligns well with the areas of high risk mapped in Figure 3B of the Horsham District SFRA (AECOM, 2020). It is worth noting, between chainage points 10km and 17km across the South Downs the indicative groundwater level is shown as being well below the ground level given the topography, and hence the depth to groundwater for this section has not been mapped.

5.5.10 The section of the proposed DCO Order Limits that spans into Mid Sussex District Council is a region of negligible risk (of groundwater flooding) indicated by the GeoSmart data, with some overlap with regions of <25 percent susceptibility mapped in the AStGWF dataset.

5.5.11 Based on the above information, groundwater emergence or interception of shallow groundwater along the onshore cable corridor is most likely to occur at the following locations:

- within the River Arun valley adjacent to Littlehampton and Lyminster. This coincides with areas at tidal and fluvial flood risk from landfall to chainage point 4km;
- within the low-lying valley draining to the River Arun, adjacent to Poling adjacent to chainage point 6km;
- where the onshore cable corridor passes through low ground / the dry valley at the foot of Sullington and Barnsfarm Hill (chalk escarpments), adjacent to Washington, West Sussex between chainage points 18km to 19km; and
- within the fluvial floodplain of the River Adur Valley adjacent to Bines Green, Partridge Green, Pooks Farm and Moatfield Farm, between chainage points 29km to 30km and at the crossing location on the Cowfold Stream. These locations coincide with areas at fluvial flood risk.

5.6 Artificial sources

5.6.1 The Environment Agency's Risk of Flooding from Reservoirs mapping (Environment Agency, 2021c) indicates that sections of the northeast portion of the proposed DCO Order Limits will be at risk of flooding in the event of reservoir embankment failures. Potential flood extents from Knepmill pond, situated on the western River Adur branch, and New Pond and Furnace Pool on the eastern branch of the River Adur intersect the onshore cable corridor at crossing locations on the Adur western branch between 29km to 30km chainage points, and the crossing of the Cowfold Stream at Moatfield Farm (**Figure 26.2.1a-e, Annex B**). These 'reservoir' flood extents are entirely confined to the fluvial floodplains of those watercourses in the vicinity of the proposed DCO Order Limits.

5.6.2 The likelihood of such a dam failure event occurring is considered to be extremely low, given that arrangements are in place under the *Reservoirs Act 1975* and the *Flood and Water Management Act 2010* to ensure that regular inspection and essential safety work is carried out. That said, breaches at these locations, whilst not exceeding Flood Zone 3 extents, could generate significant water depths and velocities in affected areas without warning in a very short time. Therefore, it is essential that this risk is factored into emergency planning procedures for the construction and decommissioning phases, as discussed further in **Section 8.2**.

5.6.3 Review of OS mapping at 1:25,000 scale suggests no additional impounded or raised waterbodies (any excluded from the Environment Agency reservoirs flooding extents) within the vicinity of the proposed DCO Order Limits that will be anticipated to pose a flood risk in the event of a failure of artificial sources.

5.7 Climate change

5.7.1 As detailed in **Section 2.2**, NPS EN-1, NPS EN-3 and NPS EN-5 (DECC, 2011a; 2011b; 2011c) specify the requirement for schemes to take into account the potential impacts of climate change over the lifetime of the Proposed Development. Given the activities proposed and the resulting risk, the approaches set out below are considered suitable and proportionate for the purposes of the FRA.

5.7.2 The Environment Agency provides guidance on climate change allowances to be applied in flood risk assessments (Environment Agency, 2022b), covering peak fluvial flows, peak rainfall intensity, sea level rise and offshore windspeed and wave height. Allowances for other flood sources are not provided or considered.

Proposed Development lifetime

5.7.3 The programme of the Proposed Development and its proposed lifetime were set out in **Section 4.2**. In summary, the construction phase is anticipated to take up to five years, with an operational lifetime of around 30 years and up to a further four years for decommissioning. Construction is currently anticipated to commence around 2026, so for simplicity, timeframes of up to 2030 for construction, 2060 for operation and 2065 for decommissioning have been assumed. This provides a degree of contingency in the climate change horizons to allow for any minor delays in programme between now and commissioning of the Proposed Development.

Credible maximum scenario

5.7.4 The PPG advises that for NSIPs, a credible maximum climate change scenario may need to be considered in the assessment of flood risk and that the relevant national policy should be consulted.

5.7.5 As outlined in **Table 2-2**, paragraphs 4.9.11 and 4.9.12 of the NPS EN-1 (DESNZ, 2023a) provide the relevant guidance with regards to consideration of the credible maximum scenario.

- *"Applicants should demonstrate that proposals have a high level of climate resilience built-in from the outset and should also demonstrate how proposals can be adapted over their predicted lifetimes to remain resilient to a credible* *maximum climate change scenario. These results should be considered alongside relevant research which is based on the climate change projections,"* and;

- *"Where energy infrastructure has safety critical elements (for example parts of new gas-fired power stations or some electricity sub-stations), the applicant should apply a credible maximum climate change scenario. It is appropriate to take a risk-averse approach with elements of infrastructure which are critical to the safety of its operation."*

5.7.6 The credible maximum scenario corresponds to the upper end allowance for peak river flow and rainfall intensity, and the H++ scenario for sea level rise.

5.7.7 For the assessment of flood risk during the operation and maintenance phase, the only location for which a climate change allowance is considered necessary will be at the permanent onshore substation at Oakendene. This is on the basis that the onshore cable will be resilient to flooding (being entirely buried), and there are no significant sources of flooding close to the existing National Grid Bolney substation extension (as discussed in **Section 6**).

5.7.8 The credible maximum scenario is therefore not considered applicable for the assessment of tidal *flood risk* to the project infrastructure. However, there is the potential for increased coastal erosion at the landfall location as a result of rising sea levels and exposure of cable infrastructure. This is considered further in **Section 7**.

5.7.9 Consideration of climate change in the assessment of flood risk to the onshore substation at Oakendene is discussed further in the following subsections and **Section 6**. In addition, the outline operational drainage plans prepared for the substation at Oakendene and National Grid Bolney substation extension (contained within the **Outline Operational Drainage Plan**, (Document Reference: 7.1) have considered the credible maximum Upper End climate change allowance for rainfall intensity in the initial sizing calculations for attenuation storage.

Fluvial climate change allowances

5.7.10 The Environment Agency's peak river flow climate change allowances for the Arun and Western Streams and Adur and Ouse management catchments (Environment Agency, 2022b) are reproduced in **Table 5-9**, together with the flood zone development vulnerability combination for which each applies.

Table 5-9 Peak river flow climate change allowances

Allowance	Management Catchment	2015 to 2039 (construction to 2030)	2040 to 2069 (operation to 2060)	Relevant Flood Zone and development vulnerability combination guidance
Upper end	Adur and Ouse	40%	57%	Some NSIPs are required to consider a credible maximum climate change scenario, as set out in the NPS EN-1 and PPG (DECC, 2011a; MHCLG, 2022), where necessary. As explained in the paragraphs above, such requirements are deemed necessary for the assessment of flood risk to the onshore substation only.
	Arun and Western Streams	27%	36%	
Higher central	Adur and Ouse	23%	28%	Essential infrastructure in Flood Zones 2, 3a and 3b. Less vulnerable development in Flood Zones 2 and 3a – for designing safe access, escape routes and places of refuge (less vulnerable development is not permitted in Flood Zone 3b). Floodplain storage compensation – where affected areas contain essential infrastructure.
	Arun and Western Streams	16%	19%	

Allowance	Management Catchment	2015 to 2039 (construction to 2030)	2040 to 2069 (operation to 2060)	Relevant Flood Zone and development vulnerability combination guidance
Central	Adur and Ouse	16%	23%	Less vulnerable development in Flood Zones 2 and 3a (for all development types except Essential Infrastructure). Water compatible in Flood Zones 2 and 3a and 3b. Floodplain storage compensation – use the central allowance in most cases, or the higher central allowance when the affected areas contain essential infrastructure.
	Arun and Western Streams	11%	16%	

5.7.11 The potential impacts of climate change were assessed as part of the Lower tidal River Arun (20 percent) (Atkins, 2010) and River Adur eastern branch (35 percent and 45 percent) (JBA Consulting, 2017) modelling studies. Climate change allowances applied in each modelling study were presumably appropriate for the purpose of each study and at the time. Where results are needed but are only available from the JFlow model, the 0.1 percent AEP extents (Flood Zone 2) are used as a proxy for the one percent AEP plus climate change scenarios, if upon review the results are deemed appropriate / the best available. Where no fluvial modelling exists (smaller watercourses), the 0.1 percent AEP RoFSW extents have been used as a proxy for the fluvial risk during the one percent AEP plus climate change event. The fluvial model climate change allowances applied to the various elements of the Proposed Development are presented in **Table 5-10**.

Table 5-10 Available climate change model outputs and current NPPF guidance

Phase	Years	Development element	Flood risk vulnerability classification	Recommended climate change allowance	Model outputs available
Construction	2025 to 2030	Temporary construction compounds Construction (and enabling) works	Essential Infrastructure	16% (Arun 23% (Adur)	Lower Arun 1% AEP 20% Adur Eastern Branch 1% AEP 35% Adur JFLOW 0.1% AEP Minor watercourses 0.1% AEP extent from the RoFSW
		Watercourse crossings	Water compatible	11% (Arun) 16% (Adur)	
Operation and maintenance	2030 to 2060	Onshore cable corridor	Essential Infrastructure	19% (Arun) 28% (Adur)	N/A – development element will be resilient to flooding
		Onshore substation at Oakendene	Essential Infrastructure	57% (Adur)	Minor watercourses 0.1% AEP extent from the RoFSW
		National Grid Bolney substation extension	Essential Infrastructure	57% (Adur)	Minor watercourses 0.1% AEP extent from the RoFSW

Phase	Years	Development element	Flood risk vulnerability classification	Recommended climate change allowance	Model outputs available
Decommissioning	2060 to 2064	Onshore cable corridor	Essential Infrastructure	19% (Arun) 28% (Adur)	Lower Arun 0.1% AEP Adur Eastern Branch 1% AEP 45% Adur JFLOW 0.1% AEP Minor watercourses 0.1% AEP extent from the RoFSW
		Onshore substation (Oakendene and existing National Grid Bolney substation extension)	Essential Infrastructure	57% (Adur)	Minor watercourses 0.1% AEP extent from the RoFSW

5.7.12 For assessment of fluvial flood risk during the construction phase, the 20 percent uplift and 35 percent uplift results will be used in the River Arun and River Adur floodplains, respectively. These uplifts exceed the recommended climate change allowances of 16 percent and 23 percent and will therefore ensure a conservative approach. In addition, an approach of avoiding construction works in Flood Zone 2 (0.1 percent AEP) wherever possible has been applied in the River Adur catchment, which is assumed to exceed the fluvial one percent AEP plus 25 percent extent.

5.7.13 For the assessment of fluvial risk during the operation and maintenance phase, the only locations for which a climate change allowance is considered necessary are at the permanent onshore substation at Oakendene and existing National Grid Bolney substation extension, on the basis that the onshore cable will be resilient to flooding (being entirely buried).

5.7.14 No detailed site-specific hydraulic modelling has been undertaken at this stage to support the FRA. Instead, as agreed with WSCC (as the LLFA) and Mid Sussex District Council (as the LPA), fluvial flood risk has been assessed at the onshore substation using the RoFSW data. The onshore substation footprint has been sited outside of the 0.1 percent AEP flood extent (defined by the RoFSW) which is considered suitably precautionary as a proxy for the one percent AEP plus 28 percent flood extent from the minor watercourses involved (see meeting minutes for 01 April 2022, **Annex A**).

5.7.15 As noted in **paragraph 5.7.4** above, consideration of a credible maximum scenario is applicable for the assessment of flood risk to the onshore substation at Oakendene and existing National Grid Bolney substation extension. For fluvial flood risk, this corresponds to the 57 percent allowance. Consideration of the credible maximum scenario is addressed further in **Section 6**.

Tidal climate change allowances

5.7.16 **Table 5-11** outlines the recommended annual sea level rise allowances for the south east river basin district, and the anticipated total sea level rise for the construction, operation and maintenance, and decommissioning phases of the Proposed Development. Current guidance from the Environment Agency recommends using both the higher central and upper end allowances to understand the range of potential impact.

5.7.17 As outlined in **paragraphs 5.7.4** to **5.7.9** , the credible maximum climate change (H++) scenario is not considered necessary in this case given that the onshore elements of the Proposed Development will be resilient to flooding (buried cables, etc.) or located distant from tidal sources (onshore substation at Oakendene and the existing National Grid Bolney substation extension). The risk of increased coastal erosion (as a result of sea level rise) is considered further in **Section 7**.

Table 5-11 Sea level climate change allowances for the south east river basin district (mm per year)

Allowance	Annual sea level rise (mm/year)		Total sea level rise (mm)		
	2000 to 2035 (mm)	2036 to 2065 (mm)	2030 (construction)	2060 (operation and maintenance)	2065 (de-commissioning)
Upper end	6.9	11.3	89.7	406.7	463.2
Higher central	5.7	8.7	74.1	320.1	363.6

Note: Values calculated using a base year of 2017, to facilitate addition to the extreme peak sea level estimates provided in **Table 5-12**.

5.7.18 For context, the sea level allowances presented in **Table 5-11** have been applied to the extreme peak sea level values presented previously for Littlehampton Estuary, to provide an indication of potential extreme water levels at the coast in the future which are presented in **Table 5-12**.

Table 5-12 Extreme peak sea level values at Littlehampton Estuary, including climate change

Extreme sea level event (% AEP)	Peak sea level (m AOD)						
	2017	2030		2060		2065	
		Higher central	Upper end	Higher central	Upper end	Higher central	Upper end
0.5	3.97	4.04	4.06	4.29	4.38	4.33	4.43
0.1	4.17	4.24	4.26	4.49	4.58	4.61	4.72

Notes: Base values from Littlehampton Estuary (4572_1) have been used as a conservative estimate as it is slightly higher than the offshore value opposite Climping Beach.

5.7.19 It is worth noting that application of the uplifts should not be directly applied to water levels experienced in the floodplains further upriver, as it would overestimate the risk. Instead, model results should be used.

5.7.20 The potential impacts of climate change were assessed as part of the Lower tidal River Arun (Atkins, 2010) and Arun Coastal modelling (JBA Consulting, 2012) studies. The Arun coastal model includes 2070 and 2115 uplift scenarios applied to the 'present-day' 0.5 percent AEP extreme sea level at the time of the study, understood to be sourced from the CFB dataset. These correspond to uplifts of +0.49m and +1.12m respectively, and final extreme sea levels of 4.44m AOD and

5.07m AOD. The modelled 0.5 percent AEP 2070 event therefore provides a suitable estimate of the 0.5 percent AEP 2065 event, in line with current sea level rise guidance. The tidal model outputs from the Lower tidal River Arun model apply a 2110 future sea level estimate to assess the potential impact of climate change to the 0.5 percent AEP event. However, no detail is provided as to the level this equates to.

5.7.21 On the basis that the onshore cable infrastructure will be flood resilient once constructed (entirely buried), tidal flooding will not pose a risk during the operation and maintenance phase at Climping or in the floodplain of the River Arun (consideration of the 2060 climate change allowance is not necessary).

5.7.22 For the assessment of tidal flood risk during the construction phase (for which an increase in peak water level of 0.14m would apply if using a base year of 2010, reflective of the date of the Lower Arun modelling), it is proposed that the present day flood hazard map for the River Arun tidal floodplain provides a more appropriate indication of the potential tidal flood risks than the 2070 or 2110 model results (for which uplifts of 0.49m and greater were applied). This approach is considered to be appropriate provided a precautionary approach is taken in the subsequent assessment to ensure sufficient consideration is given for the potential for higher risks and hazard that could occur in 2030 than is indicated in the 'present day' results.

5.7.23 An example of a precautionary approach in the subsequent assessment is as follows: the onshore cable corridor already passes through an area indicated as 'danger to all' in the present day flood hazard map. As such, appropriate flood risk management measures will already be necessary to safeguard works through areas at risk from the highest hazard rating (danger for all). A precautionary approach could involve applying similar measures to all locations in the tidal floodplain (even those currently indicated to be at lower risk in the present day mapping). Given the infrequency of tidal flood events, the implications of such a precautionary approach may be minimal in practice (flood response in the event of receiving a flood warning for example), and therefore acceptable to the developer / contractor. Another approach (where the above was overly precautionary) could be to apply a hazard rating one greater than indicated in the present day model results (other than in areas of 'null' hazard which would be assumed to remain the same). Where necessary for the assessment to support the FRA, an appropriate precautionary approach will be used for the consideration of flood hazard.

5.7.24 For the decommissioning phase (up to 2065), the Arun coastal model 0.5 percent AEP defended event with 2070 climate change uplift scenario (an uplift of +0.49m and extreme sea level of 4.44m AOD) is considered suitable and shown in **Figure 26.2.3b, Annex B**. The flood extent associated with such an event is largely comparable to the present day 0.1 percent AEP undefended event, such as Flood Zone 2, but covering a slightly larger extent in a few areas, including near the landfall (chainage 0km) and the temporary Climping construction compound near to the 1km chainage.

Pluvial sources

5.7.25 Pluvial climate change allowances are defined for the Arun and Western Streams and Adur and Ouse management catchments similarly to the fluvial climate change allowances and shown in **Table 5-13**.

Table 5-13 Pluvial climate change allowances

		1% AEP climate change allowance	
Allowance	Management Catchment	2015 to 2039 (construction to 2030)	2040 to 2069 (operation to 2060)
Upper End	Arun and Western Streams	45%	45%
	Adur and Ouse	45%	45%
Central	Arun and Western Streams	20%	25%
	Adur and Ouse	20%	25%

5.7.26 The RoFSW dataset has been used as a primary means of assessing surface water flood risk. The dataset does not include a specific scenario to determine the impact of climate change on surface water flood risk. However, it is possible to use the 0.1 percent AEP mapped outputs as a proxy as to the potential impacts of climate change associated with the one percent AEP plus climate change event, which is deemed sufficient to inform the assessment of flood risk for the Construction, operation and maintenance, and Decommissioning Phases of the Proposed Development.

5.7.27 For the outline operational drainage plans prepared to support the DCO application for the onshore substation at Oakendene and existing National Grid Bolney substation extension (contained within the **Outline Operational Drainage Plan**, (Document Reference: 7.1), the upper end (credible maximum) allowance of 45 percent has been considered in the attenuation volume requirements as a precautionary approach, as explained in the outline plans. Climate change requirements and further drainage modelling will be undertaken for the detailed drainage design, post-granting of DCO consent.

Groundwater sources

5.7.28 No specific guidance is provided for the effects of climate change on groundwater levels. However, it is anticipated that sea level rise associated with climate change in the future will lead to a rise in average groundwater levels in adjacent coastal aquifer systems (Environment Agency, 2018).

5.7.29 Drier and warmer summers associated with climate change may lead to a shortening of the groundwater recharge season, though this may be compensated in part by an increase in winter rainfall (UK Groundwater Forum, 2019). The impacts of climate change on groundwater in the UK therefore may include:

- long-term decline in groundwater storage;
- increased frequency and severity of groundwater droughts;
- increased frequency and severity of groundwater related floods; and
- saline intrusion in coastal aquifers due to sea level rise and resource reduction.

5.7.30 Further variability in groundwater levels in the future could result from changes in abstraction (for example associated with water supply and/or irrigation), particularly in aquifers that support high yield (and thus could present the greatest groundwater flood risk).

5.7.31 If seasonally high groundwater levels are encountered as a result of increased winter rainfall, groundwater intrusion may impact onshore cable corridor construction. However, no allowance for climate change has been considered for the construction phase given the short timeframe to completion.

5.7.32 The onshore cable itself is considered resilient to flooding and the onshore substation is underlain by clay. As a result, no allowance for climate change is required with respect to this permanent onshore infrastructure.

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6. Assessment of flood risk

6.1 Introduction

6.1.1 The potential flood sources are set out in **Section 5** and this Section identifies the potential receptors that could be at risk (both to and from the Proposed Development) and provides the general approach to the assessment.

6.2 Receptors scoped out

6.2.1 Flood risk associated with the operation and maintenance phase (permanent onshore infrastructure) is limited to the onshore substation. The onshore cable and associated joint bays and cable clamping infrastructure are scoped out of the assessment from a flood risk perspective. This applies to any flood risk to the infrastructure itself, as well as any risks arising from the presence of the infrastructure. This scoping out is on the basis that the onshore cable and associated joint bays will be flood resilient, finished level with the ground surface in areas at risk of flooding and covered with natural material (see Flood Risk Management Measures in **Section 8**). These embedded environmental measures will ensure that the infrastructure will not be liable to physical or structural damage from flood water or from debris carried by floodwater, will not pose an obstruction to water flow nor loss of floodplain storage and / or conveyance; and cause no net impact on runoff rates or volumes.

6.3 Receptors scoped in

6.3.1 Five broad groups of receptors have been identified for consideration, as summarised in **Table 6-1**. The first four (ID1, ID2, ID3 and ID4) are related to the Proposed Development itself, and the fourth group (ID5) comprises third party property and infrastructure within the vicinity of the proposed DCO Order Limits. Third party receptors identified through initial analysis of locations of potential impact are displayed in **Figures 26.2.4** and **26.2.5, Annex B**.

6.3.2 The risk of potential future exposure of the landfall infrastructure at the coastline has not been considered as a ‘flood risk’ receptor. Instead, this has been addressed explicitly in the Coastal Change Vulnerability Assessment (CCVA) outlined in **Section 7**, and thus has not been considered further in this Section.

Table 6-1 Potential flood receptors

ID	Title	Description	Vulnerability	Duration	Comments
ID1	Construction and enabling works and temporary infrastructure	Personnel, plant and temporary infrastructure associated with construction works	Essential Infrastructure	Construction phase and decommissioning phase	Some receptors located within FZ2 and FZ3, potential risks from fluvial, tidal, surface water, groundwater and artificial flooding.
ID2	Permanent onshore infrastructure	Onshore substation electrical and civil infrastructure (Oakendene substation)	Essential Infrastructure	Operation and maintenance phase	Substation is situated within Flood Zone 1. Potential risks from surface water, groundwater and fluvial (ordinary watercourse) sources.
ID3	Permanent onshore infrastructure	Onshore substation electrical and civil infrastructure (existing National Grid Bolney substation extension)	Essential Infrastructure	Operation and maintenance phase	Existing National Grid Bolney substation and extension are situated within Flood Zone 1. Potential risks from surface water, and groundwater (there are no ordinary watercourses nearby that would pose a fluvial flood risk).

ID	Title	Description	Vulnerability	Duration	Comments
ID4	Operation and maintenance phase maintenance activities and temporary infrastructure	Personnel, plant and temporary infrastructure associated with regular inspection and periodic maintenance activities	Essential Infrastructure	Short periods throughout operation and maintenance phase	Some receptors located within FZ2 and FZ3, potential risks from fluvial, tidal, surface water, groundwater and artificial sources.
ID5	Offsite third-party receptors	Third-party property and infrastructure in and around the proposed DCO Order Limits	Variable	Construction and operation and maintenance and decommissioning phase	Five potential off-site receptors with varying vulnerability have been identified as being at potential increased risk of fluvial and tidal flooding as a result of the Proposed Development, if appropriate measures to address such risks were not incorporated into the design. Four potential receptors with varying vulnerability have been identified potential increased risk due to changes in surface water.

Table notes: Essential Infrastructure includes temporary construction access routes and working areas.

6.4 Risks during the construction phase

6.4.1 The majority of potential flood risks associated with the Proposed Development will occur during the construction phase. Potential risks associated with tidal and fluvial, pluvial, groundwater and artificial flood sources have been discussed in the separate sub-sections (**paragraphs 6.4.3** to **6.4.40**).

6.4.2 It is worth noting that construction works will be phased according to programme requirements and therefore only sections of the proposed DCO Order Limits will be subject to construction works at any one time as a consequence. Reinstatement will be undertaken as soon as works are complete, meaning that the duration of any temporary risks and impacts identified below are likely to be shorter than the overall construction programme of approximately four years in total.

Combined tidal and fluvial flood risk

6.4.3 During the construction phase there is the potential for:

- temporary loss of floodplain storage;
- compartmentalisation of the floodplain; and / or
- changes to watercourse flow conveyance as a consequence of the development of temporary infrastructure in and around watercourses and in floodplain areas.

6.4.4 The potential impacts of the Proposed Development on fluvial and tidal flood mechanisms are first discussed, before this section concludes with an assessment of the consequences of these impacts on flood risk receptors.

Loss of floodplain storage

6.4.5 The creation of temporary raised structures in the fluvial floodplain during construction works, such as raised stone haul road(s) and associated stockpiles of topsoil, could lead to a loss of floodplain storage and thus an increase in water levels elsewhere. The potential for such impacts in the tidal floodplain is considered to be negligible, due to the extreme volume of water associated with the sea far exceeding the potential for lost floodplain storage and as agreed with stakeholders in a meeting held on 9 November 2020 (see meeting minutes in **Annex A,** agenda item 15).

6.4.6 The general approach will be to keep raised structures (stockpiles and raised stone haul road) to a minimum in the fluvial floodplain, and to avoid them entirely in those areas where potential third-party receptors have been identified that could be impacted. This will be achieved by temporary stockpiling ‘excess’ excavated soil to outside of the fluvial floodplain, as agreed with the Environment Agency in a meeting held on 22 March 2022 (see meeting minutes in **Annex A,** agenda item 7).

6.4.7 ‘Excess’ soil is that equivalent to the material (for example, stone) imported into the floodplain (to create the haul road, for example). This is on the basis that the void created by the groundworks (for example, topsoil strip) offsets the loss of floodplain volume of the resulting stockpile. The exception being where the void is being backfilled with material that has been imported into the floodplain. For the Contractor(s), the simple rule will be that for each tipper truck bringing material into the floodplain (stone to create the haul road for example), it should leave the floodplain with an equivalent load of soil (to be stockpiled outside of the floodplain), that is, no truck should leave the floodplain empty (such a journey would imply a loss of floodplain storage).

6.4.8 The need to minimise the creation of raised structures and offset the loss of floodplain storage (by transferring excess soils to outside of the fluvial floodplain) applies to all fluvial floodplains, including for ordinary watercourses indicated in the RoFSW mapping. In most cases, the transfer of soil may only be for relatively short distances, associated with the limited floodplain extent. The need to transfer excess soil for longer distances will primarily apply to the IDB area (through which trenchless approaches cannot avoid the fluvial floodplain entirely).

6.4.9 Alternatively, use of temporary trackway or similar for the temporary construction haul road in the floodplain could avoid the need for import of any material to create the haul road entirely. This will avoid the need to excavate any soil at all, thus avoiding the need to transfer 'excess' soil to outside of the floodplain. However, given the potentially soft ground conditions in the floodplain, whilst the use of trackway would be preferred (from an environmental impact and flood risk perspective at least) overall, it is possible that trackway would still require a stone-based footing, and thus may not offer sufficient benefits to be worth considering by the contractor.

Compartmentalisation of the floodplain

6.4.10 The presence of the proposed construction phase infrastructure within the floodplain has the potential to compartmentalise the floodplain, or in other words affect the conveyance or movement of flood waters across the floodplain and thus affect flood extent and depths at the local scale. This effect will only occur where the flood depths are equal to or less than raised features (such as temporary construction haul road and soil stockpiles). The provision of regular gaps in stockpiles will minimise the risk of such compartmentalisation occurring.

6.4.11 The specification of appropriately sized culverts at watercourse crossing points will ensure that the conveyance capacity of the ditch network is maintained, or indeed may be improved where culverts of insufficient capacity are upgraded.

Watercourse flow conveyance

6.4.12 If not appropriately designed, the new and upgraded watercourse crossings that are required for temporary construction access have the potential to adversely affect flow conveyance within the affected watercourses and therefore to influence flood depths.

6.4.13 Temporary watercourse crossings required for the temporary construction haul road will employ a mixture of clear span bridges (for designated chalk streams and watercourses supporting water voles) and culverts which will be sized based on crossing specific requirements (size of watercourse, capacity of nearby culverts up and downstream, and flood risk) to ensure flow conveyance is maintained. No temporary watercourse crossings are proposed for locations to be crossed using trenchless techniques (for the cable), that is, no temporary crossings of Main Rivers are proposed.

6.4.14 Theoretically, direct disturbance of watercourses and / or deposition of sediment arising from temporary construction activities in watercourses could also reduce flow conveyance and potentially increase flood risk. A range of construction phase measures will be implemented to control silt-laden runoff from working areas and minimise direct channel disturbance which are set out in **Chapter 26: Water environment, Volume 2 o**f the ES (Document Reference: 6.2.26).

6.4.15 Given the requirement to obtain permits and consents for all watercourse crossings and the proposed implementation of measures to minimise impacts on watercourses during the construction phase, it is concluded that the Proposed Development is unlikely to increase flood risk through impacts on watercourse conveyance.

Risk to construction activities and temporary infrastructure (ID1)

6.4.16 The construction activities that will be carried out in the working areas located within the floodplain areas throughout the proposed DCO Order Limits are considered to be at risk of combined fluvial and / or tidal flooding. This particularly involves the presence of construction personnel and plant in these areas. The preparation of an appropriate emergency response plan for flood events will ensure that these risks are avoided or minimised to an acceptable level. The flood response and evacuation plan will include the following elements:

- areas at risk of flooding should be clearly marked on site access plans, including details of Environment Agency Flood Warning Areas;
- evacuation routes from flood risk areas should be clearly defined;
- the circumstances under which evacuation of flood risk areas will take place should be specified. It is suggested that appropriate triggers for evacuation might be receipt of a Met Office Severe Weather Warning for heavy rain or an Environment Agency Flood Warning for the area (construction works may be suspended in such weather in any case, reducing the likelihood of occupation at such times of elevated flood risk); and
- those items of plant and equipment that could be left in-situ without risk of damage or causing pollution should be identified, together with those items that should be evacuated, provided sufficient notice is provided and it is safe to do so.

Risk to third-party receptors (ID5)

6.4.17 Five potential off-site third party receptor locations (each location may have multiple receptors associated with it) have been identified that could potentially be at increased risk of tidal and / or fluvial flooding as a result of the Proposed Development in the absence of appropriate embedded environmental measures (appropriate environmental measures have been set out in **Section 8**). These are shown in **Figure 26.2.7a-b, Annex B**. All of those identified are located in or on the edge of the Arun IDB District. No potential receptors were identified within the

River Adur catchment on the basis that the proposed approach is to avoid construction works in the floodplains by undertaking trenchless approaches where possible (and a lack of receptors nearby where not possible. An approach has been sought which aims to avoid impacts to any of the receptors through incorporation of appropriate embedded environmental measures into the design of the Proposed Development.

6.4.18 Receptors identified are shown in **Figure 26.2.7a-b, Annex B** and include:

- residential properties within Atherington;
- The Mill, Climping;
- Climping Park;
- Brookside Caravan Park, and;
- residential and mixed-use properties on Church Lane, Lyminster.

6.4.19 On the basis of the embedded environmental measures outlined in **Table 8-1** to address floodplain storage, compartmentalisation and watercourse conveyance (C-131 and C-175), it is anticipated that there will be negligible change in the risk of fluvial or tidal flooding to third party receptors as a result of temporary construction activities associated with the Proposed Development.

Surface water flood risk

Risk to construction activities and temporary infrastructure (ID1)

6.4.20 As shown in **Figure 26.2.5a-e, Annex B**, some aspects of the proposed DCO Order Limits intersect existing surface runoff flow routes. Such flow routes could pose a risk to construction activities, particularly given the nature of surface water flooding that is often driven by intense, short duration high intensity rainfall with limited warning time.

6.4.21 In general, the surface water flood extents appear to be coincident with the channel networks along the onshore cable corridor, indicating a general low risk of surface water flooding. However, regions of high-risk areas are more prevalent in the north eastern section of the proposed DCO Order Limits. Mapping indicates that the north eastern section of the proposed DCO Order Limits is traversed by a number of a surface runoff pathways and minor watercourses draining into the River Arun and Cowfold Stream. Regions of high risk are also mapped intersecting the temporary construction compounds at Washington and the Oakendene substation.

6.4.22 Appropriate flood risk management measures (see **Table 8-1**) should avoid any significant issues associated with surface water runoff pathways, minor watercourses and regions of high risk identified above. For example, appropriate sizing of temporary construction haul road culverts and bridges based on crossing specific requirements will ensure existing conveyance capacity is maintained. In any case, even if surface water flooding were to occur in these areas of the temporary construction site, this will be of short duration and limited extent, and temporary construction activities, plant and infrastructure could be expected to be resilient to this type of flooding.

6.4.23 It is concluded that the surface water flood risk to construction workers is minor and deemed to be of lower significance than the combined flood risk arising from fluvial and tidal sources. Therefore, provided the generic embedded environmental measures recommended to address drainage and flood risk requirements are implemented as set out in **Section 8**, no further location-specific measures to address surface water flood risk anticipated to be required.

Risk to third-party receptors (ID5)

6.4.24 Four third party receptors have been identified that could potentially be at increased risk of surface water flooding as a result of the Proposed Development and in the absence of appropriate flood risk management measures. Receptors have been identified primarily based on review of the Environment Agency RoFSW mapping as presented in **Figure 26.2.5a-e, Annex B**.

6.4.25 In addition, consultation received from Poling Parish Council outlined concerns over the potential impact to surface water flood risk to Poling Street and at Hammerpot, both of which have a history of surface water flood risk and fragile drainage infrastructure. The proposed DCO Order Limits intersect several low lying drainage ditches and flowpaths (ultimately draining to the Black Ditch) immediately west (downstream) of Poling, in addition to crossing Poling Street which is a mapped surface water flowpath in **Figure 26.2.5a-e, Annex B**.

6.4.26 Third-party receptors are displayed in **Figure 26.2.9, Annex B** and include:

- residential properties on Poling Street, Poling;
- mixed-use properties on Sandhill Lane, Washington;
- residential properties at Millford Grange, Washington, and;
- Yokenclose Barn, Bines Green.

6.4.27 The development of temporary construction haul roads and areas of hardstanding (required to progress construction works) will result in a reduction in permeability in the proposed DCO Order Limits. However, as outlined in **Section 4**, the temporary construction haul road and temporary construction / logistics compounds will be developed with aggregate surfaces that will still allow infiltration of incident rainfall.

6.4.28 In addition, many of the proposed temporary construction access routes (to reach the onshore temporary construction corridor) will either comprise or follow the route of existing access tracks. Where existing access routes or tracks are already of sufficient structural capability, these will be utilised without modification. Otherwise, they will be upgraded. Where completely new temporary construction access tracks are required, these will be in place only for as long as required to provide temporary construction access, after which the ground will be reinstated to its pre-development condition, meaning that any localised change to the existing surface run-off regime will be short-lived.

6.4.29 Furthermore, the new access track surfaces will be widely dispersed, meaning that infiltration of incident rainfall will be locally displaced, rather than leading to an overall increase in runoff rates. Where there is considered to be an elevated risk of surface runoff occurring, for instance where tracks traverse sloping ground, shallow infiltration trenches will be installed to allow any runoff to be captured and to promote infiltration to ground. It is therefore considered that any localised increases in surface runoff generated from new temporary construction access tracks and hardstanding can be adequately controlled by standard construction best practice.

6.4.30 The embedded environmental measures noted in **Table 8-1** to mitigate the risk of floodplain compartmentalisation, ensuring that there are regular gaps in temporary soil stockpile embankments (C-132), combined with cross-drainage beneath raised sections of access tracks, will ensure that existing surface runoff pathways are not significantly disrupted by temporary construction access infrastructure (C-175 and C-179). Gaps and cross drainage will be sited with due consideration for the surface water flow pathways indicated in **Figure 26.2.5a-e, Annex B**.

6.4.31 As discussed in **Section 4**, dewatering of excavations may be required. In order to ensure such works do not result in an increase in flood risk downstream water from excavations will preferably be discharged to ground and allowed to infiltrate. Where this is not possible, and direct discharge to a watercourse is necessary, this could conceivably increase downstream water levels and flows. Dewatering will therefore be suspended if there are any fluvial flood alerts or warnings in place in those watercourses downstream. Such events would coincide with heavy rainfall, during which works may cease in any case.

6.4.32 To support construction works, it is anticipated that three temporary construction logistics compounds will be required for the duration of the onshore cable corridor construction phase. There will also be temporary construction compounds in the vicinity of the landfall and new onshore substation. Any new areas of temporary hardstanding will be constructed using semi-permeable compacted aggregate to maintain permeability and run-off rates, with additional drainage measures to address any difference. Existing drainage infrastructure will be utilised wherever possible, where this exists, with upgrades as necessary. Temporary drainage arrangements, in accordance with sustainable drainage system (SuDS) principles, will be provided where existing drainage infrastructure is not available or unsuitable.

6.4.33 Provided that the measures described above to control runoff and to ensure that existing surface runoff pathways are not disrupted are in place during construction activities, it is considered that there will be no increase in surface water flood risk to third party receptors.

6.4.34 Once temporary construction activities are complete, all temporary construction haul roads, compounds, access tracks and hardstanding will be removed and the ground re-instated to its pre-development condition.

Groundwater flood risk

Risk to construction activities and temporary infrastructure (ID1)

6.4.35 Initial investigations undertaken thus far indicates that portions of the proposed DCO Order Limits could be liable to groundwater flooding at the surface, particularly where there are significant drops in elevation. As shown in the indicative depth to groundwater mapping presented in **Figure 26.2.7a, Annex B,** regions of shallow groundwater are anticipated at the edges of the South Downs and Chalk escarpment adjacent to Hammerpot and at the base of Sullington Hill at the northern end of the escarpment.

6.4.36 There is also potential for shallow groundwater to be encountered during excavations for the onshore cable corridor construction, particularly in valley floor locations in the River Adur and River Arun catchments. These excavations may require dewatering to facilitate construction. There is a potential risk to construction personnel and equipment working in excavations at or below the water table level. This will be controlled by pumping under normal circumstances.

Risk to third-party receptors (ID5)

6.4.37 No third-party groundwater flood risk receptors have been identified on the grounds that there is no potential pathway for the development to change groundwater flood risk at these receptors.

Artificial flood risk

Risk to construction activities and temporary infrastructure (ID1)

6.4.38 There could be a potential risk to life to construction workers working in any of the areas at risk in the event of a reservoir failure, given that there is likely to be limited warning. However, the overall risk to the Proposed Development has been assessed as low because of the very low likelihood of occurrence due to the inspection and maintenance works required of such structures and the general approach of employing trenchless crossing techniques (avoiding the floodplain entirely) wherever possible. The risk of reservoir failure should be factored into the emergency response plan for flood events to minimise risks further.

6.4.39 Environmental measures embedded into the design of the Proposed Development to address risks from the fluvial flooding will also serve a dual purpose of managing risks associated with reservoir failures too, provided appropriate emergency response (in response to warning of reservoir failure) is also accounted for.

Risk to third-party receptors (ID5)

6.4.40 The Proposed Development are unlikely to affect the severity of a reservoir failure to other parties given the volumes of water involved in an uncontrolled release and given that mapped regions of risk intersect the proposed DCO Order Limits only at main river crossings where trenchless crossing method (such as HDD) is anticipated to be used.

6.5 Risks during the operation and maintenance phase

Overview

6.5.1 As discussed in **Section 6.2**, the only aspects of the permanent onshore infrastructure that sit above ground and considered vulnerable to flooding is the onshore substation (ID2). The onshore cable itself (including joint bays and cable clamping infrastructure) will be entirely underground and resilient to flooding.

Risk to permanent infrastructure – Oakendene substation electrical and civil infrastructure (ID2)

6.5.2 The onshore substation at Oakendene is situated within Flood Zone 1. A stream (an unnamed ordinary watercourse tributary of the Cowfold Stream) passes along the southern boundary of the onshore substation site (though not mapped within the Environment Agency Flood Zones). A sequential approach to the layout of the substation has been undertaken, whereby the most vulnerable elements of the substation are located in the areas at lowest risk.

6.5.3 Regions of high risk of surface water flooding are anticipated within the onshore substation footprint, coincident with several surface water flowpaths which drain from north to south across the site. In the absence of appropriate mitigation, aspects of the onshore substation and associated infrastructure may be at risk of flooding from both surface water run-on and run-off.

6.5.4 An outline operational drainage plan has been prepared for the onshore substation at Oakendene and included in the **Outline Operational Drainage Plan** (Document Reference: 7.1). The accompanying landscape plan (**Appendix D**, **Design and Access Statement** (Document Reference: 5.8) and **Appendix A of the Operational Drainage Plan** (Document Reference: 7.1)) outlines the proposed SuDS strategy for the onshore substation. The proposed strategy will capture, convey and manage both surface water run-on coming onto the site as indicated in **Figure 26.2.6a, Annex B,** and attenuation of surface water run-off, up to the 100 year plus climate change event.

6.5.5 Furthermore, the onshore substation will adhere to the National Grid target guidance for flood protection (National Grid 2016), providing flood resilience to a level equivalent of the 0.1 percent AEP plus climate change event in addition to a 300mm freeboard allowance, as outlined in the **Design and Access Statement** (Document Reference: 5.8) and in accordance with DCO Requirements for “Detailed design approval transmission substation” in the **draft DCO** (Document Reference: 3.1). This design standard is anticipated to exceed that considering the one percent AEP event and credible maximum climate change (upper end) scenario, discussed in **Section 5.7**. This will ensure continued operation during an extreme flood and in accordance with the NPS EN-1 (DECC, 2011a; DESNZ, 2023a) requirement outlined in **Table 2-1**.

6.5.6 The final design and sizing of the flood and drainage mitigation measures will be determined at the detailed drainage design stage, in accordance with the DCO requirements for surface (and foul) water drainage in the **draft DCO** (Document Reference: 3.1). The Operational Drainage Plan will be developed in accordance with the **Outline Operational Drainage Plan** (Document Reference: 7.1) and in liaison with WSCC (as the LLFA). An overview of potential mitigation measures for permanent infrastructure is provided in **Section 8.3**.

6.5.7 The risk of groundwater flooding at the onshore substation is considered very low. The site is situated within an area mapped as negligible risk in the Horsham

District Council SFRA (AECOM, 2020). In addition, there are no flood sensitive elements of the substation envisaged to be at or below ground level.

6.5.8 The onshore substation site is situated outside of mapped regions of reservoir flood risk, and no other raised waterbodies have been identified within the vicinity of the onshore substation site. Consequently, the onshore substation is not considered at risk of flooding from artificial sources.

Risk to permanent infrastructure – existing National Grid Bolney substation extension electrical and civil infrastructure (ID3)

6.5.9 The existing National Grid Bolney substation and proposed extension are situated in Flood Zone 1, and there are no watercourses within the vicinity of the site.

6.5.10 Whilst a surface water flowpath intersects the wider existing National Grid Bolney substation to the northwest of the proposed extension as part of the Proposed Development, as detailed in **paragraph 5.3.10** the risk of surface water flood risk at the proposed extension is thought to be low.

6.5.11 An **Outline Operational Drainage Plan** (Document Reference:7.1) has been prepared and is included as part of the DCO Application. The final design and sizing of the mitigation measures in terms of SuDS (if required) will be determined at the detailed drainage design stage, in accordance with the DCO requirement for surface (and foul) water drainage in the **draft DCO** (Document Reference: 3.1). The detailed drainage strategy will be developed in accordance with the outline drainage strategy presented in **Outline Operational Drainage Plan** (Document Reference: 7.1).

6.5.12 The National Grid target guidance for flood protection providing flood resilience to the 0.1 percent AEP plus climate change allowance and 300mm freeboard will similarly be applied. However, given the minimal surface water (and fluvial) flood risk concerns at the extension site it is thought that no significant resilience or flood protection measures would be required to achieve this.

6.5.13 The risk of groundwater flooding at the site is considered very low. The site is situated within an area mapped as negligible risk in the Mid Sussex District Council SFRA (AECOM, 2020). In addition, there are no flood sensitive elements of the development envisaged to be at or below ground level.

6.5.14 The proposed existing National Grid Bolney Substation extension site is situated outside of mapped regions of reservoir flood risk, and no other raised waterbodies have been identified within the vicinity of the site. Consequently, the existing National Grid Bolney Substation extension works is not considered at risk of flooding from artificial sources.

Risk to operation and maintenance phase maintenance activities and temporary infra-structure (ID4)

6.5.15 Once construction of the onshore cable corridor is completed, inspections to sections of the onshore cable during the operation and maintenance phase may be required by vehicle or on foot. Personnel carrying out inspections could be at risk of flooding in areas where a fluvial, tidal, surface water, groundwater or artificial risk has been identified. It is recommended that a flood response and evacuation plan similar to that proposed for the construction work in **Section 8.2** be incorporated into inspection procedures to mitigate this risk.

Risk to third party receptors (ID5)

6.5.16 The onshore substation at Oakendene and extension works at the existing National Gid Bolney substation will include areas of hardstanding with the potential to increase runoff rates (albeit sites may be developed with aggregate surfaces that will still allow infiltration of incident rainfall). Outline operation drainage strategies have been prepared in accordance with SuDS principles within the **Outline Operational Drainage Plan** (Document Reference: 7.1), with the flood risk requirement to retain runoff discharges to predevelopment rates and volumes (or appropriate control to achieve the same effect). A detailed Operational Drainage Plan will be developed post-DCO consent, in accordance with the DCO requirements for surface (and foul) water drainage in the DCO (Oakendene Substation and existing National Grid Bolney Substation).

6.5.17 No additional risk to third party receptors has been considered from fluvial, tidal, groundwater or artificial sources, on the basis that there are no aspects of the permanent development considered to have the potential to impact the existing risk.

6.6 Risks during the decommissioning phase

6.6.1 Risks during the decommissioning phase will be similar to those encountered during the construction phase, outlined in **Section 6.4**. Indeed, in many locations the risks will be less because of the reduced level of works associated with decommissioning compared to construction. For example, it is proposed that the onshore cable will remain in situ, with just the end caps sealed off. This will therefore result in reduced excavation and stockpiling of soils, thus reducing the need for movement and storage of soils outside of the floodplain. Reduced works in the floodplains will therefore reduce the opportunities for workers to physically be present in areas of flood risk, as well as reduced potential for impacts on third party receptors.

6.6.2 The flood risk information which is available to inform this assessment (for example, tidal flood modelling for the River Arun for 2070, as discussed in **Section 5.7** and shown in **Figure 26.2.3b, Annex B**) indicates that flood extents will not be significantly larger than the present day Flood Zone 2 extents, such that sufficient land outside of the flood extent to provide mitigation will still be available to implement similar measures as proposed for the construction phase. On this basis, it is anticipated that there will not be any flood risk obstacles during the decommissioning phase that could not be overcome with similar mitigation / environmental measures (for the most part at a reduced scale and / or frequency) as will be implemented during the construction phase.

6.6.3 It is however, recommended that re-assessment of flood risk is undertaken prior to decommissioning works commencing, to ensure that the best available flood risk information is considered at the time, to thus inform appropriately scaled measures. For example, if climate change occurs as anticipated, the flood hazard baseline will be altered compared to that which will apply during the construction phase – flood events may have occurred in the intervening years which could provide additional insight on the likelihood and consequence of flood events. Any identification of higher level of risk could be addressed through more stringent mitigation, such as a more precautious emergency flood plan for example. For other measures, those that require physical intervention on the ground (such as surface water management) sufficient space has been provided in the proposed DCO Order Limits to allow for such flexibility of implementing potentially larger intervention measures in the future, to account for greater rainfall intensity for example arising from a changing climate.

6.6.4 It is therefore concluded that, given that sufficient space has been provided in the proposed DCO Order Limits to mitigate effects during the construction phase (with some contingency for uncertainty and the potential impacts of climate change), there will not be any flood risk obstacles during the decommissioning phase that could not be overcome.

7. Coastal Change Vulnerability Assessment

7.1 Context

7.1.1 This Section provides a coastal change vulnerability assessment, as described in the NPPF (MHCLG, 2021). This assessment covers the onshore elements of the Proposed Development landward of MHWS. Assessment of risks and impacts seaward of MHWS are covered in the offshore assessment(s), and specifically **ES Chapter 6: Coastal Processes, Volume 2** of the ES (Document Reference: 6.2.6), in which coastal processes, including the future coastal alignment has been considered in more detail.

7.1.2 The intent of this assessment is to demonstrate that the Proposed Development will not impair the ability of communities and the natural environment to adapt sustainably to the impacts of a changing climate; will be safe through its planned lifetime, without increasing risk to life or property, or requiring new or improved coastal defences; and will not affect the natural balance and stability of the coast or exacerbate the rate of shoreline change to the extent that changes to the coast are increased nearby or elsewhere.

7.1.3 A coastal change vulnerability assessment is required when applications for development are in a Coastal Change Management Area (CCMA). Whilst the Rampion 2 landfall location is not currently within a defined CCMA, the short-term Environment Agency strategy post-Storm Ciara (**paragraphs 3.5.1** to **3.5.3**) remains to patch and repair for as long as possible with the financially limited budget available. The preferred approach for the long-term management of the current shingle embankment is to allow the naturally realignment to a more naturally sustainable position, which is expected to result in a shift of the coastline landwards.

7.1.4 As stated in the PPG (MHCLG, 2022), a CCMA should be defined where the shoreline management plan is anything other than to hold or advance the line. Therefore, for the purposes of this assessment the landfall location is considered to be within a CCMA.

7.2 Coastal morphological regime

Present day setting and historic evolution

7.2.1 A full overview of the coastal change impact on the morphological regime can be found in **Appendix 6.1: Coastal processes technical report: Baseline description, Volume 4** of the ES (Document Reference: 6.4.6.1). The following provides a summary to provide context for the coastal change vulnerability assessment (**Section 7.4)**.

7.2.2 The landfall at Climping has a beach consisting of mixed sand and shingle sediment with a 1:7.5 slope to the sand foreshore and sediment transport in an easterly direction. Sand dunes span for just over a kilometre immediately to the east of the landfall. A series of timber groynes are in place as well as a failed seawall in the immediate location where the cable will make landfall (Environment Agency, 2017).

7.2.3 The baseline setting as described in **Appendix 6.1: Coastal processes technical report: Baseline description** of the ES (Document Reference: 6.4.6.1) draws upon the Environment Agency panel report (2020a), which provides a detailed characterisation of the frontage between Poole Place and the River Arun:

- Longshore transport is dominated by west to east movement due to the dominant south westerly waves.
- Sediment arriving from the west currently passes through the frontage and builds up at the River Arun training wall, although some bypassing occurs, as evidenced by the need to regularly dredge sand and shingle from the mouth of the River Arun to maintain a clear channel. This material is currently recycled onto the Climping frontage by the Environment Agency as part of their maintenance works.
- Wave records show that swell waves are important and longer period waves from the southwest have resulted in overwashing of the shingle ridge where it fronts lower lying land.
- The plan shape of the current frontage is highly likely to be the result of a response to coastal management rather than variations in natural processes or geological resistance. Maps dating back to 1813 show that groynes have been present along this section of the frontage for over 200 years, locally holding material and thereby reducing erosion, whilst starving adjacent stretches. This has created a coastline shape that includes several 'back-steps'.
- As approaches to coastal management have evolved over time, so has the plan shape: these changes are indicated by the exposure of undulating field wall foundation levels, which suggest that the frontage has been eroded in the past (at least prior to 1887 OS mapping) but has since accreted.
- For over 200 years the coast west of the dune section at the landfall has been held in much the same position, with the beach in front of the dunes growing seaward in response to continued sediment transport, with sediment being retained by the presence of the western training arm of the river Arun. This has allowed the development of the slightly higher dunes, developing over what is likely to have been a lower shingle ridge.
- It is likely that the chalk bedrock provides some resistance to erosion and there is little evidence of foreshore lowering from either the beach profiles (which cover the medium-term), or historic mapping, which do not show any significant change in the position of mean low water. Based on available evidence it is considered that the lower intertidal and subtidal are highly likely to change very slowly.

7.2.4 Damage to the Mill Road embankment has incrementally increased from 2006, but especially since Storm Imogen (2018), and Storm Ciara (2020). This caused severe damage to the coastal defences which prompted the Environment Agency to reform the original shingle embankment, as detailed in **Section 3.5: Flood defence assets**.

7.3 Future coastal erosion

7.3.1 The first step of a coastal change vulnerability assessment is to understand the potential coastal evolution scenarios that could occur during the lifetime of the Proposed Development (as per **Section 5.7**, the lifetime of the Proposed Development is anticipated to be to 2060). The only location in which the Proposed Development is anticipated to interact with coastal evolution is at the landfall location, at Climping Beach frontage.

7.3.2 The Environment Agency geomorphological studies (2020a; 2020b) assessed the likelihood of different coastal evolution scenarios across the frontage. These geomorphological studies were informed by opinions provided a number of expert panel members, who each predicted the potential future coastlines for a 50-year epoch (2070), as reproduced in **Figure 6.1.9** of **Appendix 6.1: Coastal processes technical report: Baseline description, Volume 4** of the ES (Document Reference: 6.4.6.1). It is understood that the evolution scenarios provided by the panel members included consideration of likely sea level rise over the analysis period of 10-50 years.

7.3.3 It is noted in **Appendix 6.1: Coastal processes technical report: Baseline description, Volume 4** of the ES (Document Reference: 6.4.6.1) that coastal response to sea level rise will be extremely complex: rates of change in shoreline position will be dependent upon a wide range of factors including hinterland topography, geology and sediment supply, the latter of which may well vary in response to changing patterns of erosion and nearshore sediment transport resulting from sea level rise.

7.3.4 As set out in **Appendix 6.1: Coastal processes technical report: Baseline description, Volume 4** of the ES (Document Reference: 6.4.6.1), along the landfall frontage the future shoreline position will be determined by water levels and sediment availability rather than erosion. Under current conditions, water overwashing the shingle barrier will flood the low-lying area to the north, all the way to the River Arun where ground levels are at about 1 to 1.5 metres Above Ordnance Datum (mODN), but the water will flow out into the River Arun as the tide falls. In future, it is possible that a permanent channel may develop through the low-lying area. However, there is currently insufficient information and certainty to form a robust prediction and it is therefore equally possible that there will still be a continuous shingle barrier of different height and volume, which will roll landwards as a feature of the frontage.

7.3.5 It is also noted that the information set out in the Environment Agency expert geomorphological panel report (Environment Agency, 2020a) was provided before the severe breaching event in February 2020 associated with Storm Ciara. In light of this, an updated note was produced by the Environment Agency reviewing observed change against the 10-year predictions previously set out (Environment Agency, 2020b). Given the more rapid failure of the Climping car park walls (at the western end through the gap between the tank trap blocks and the continued erosion of the clay on which the wall is founded) the assumed stability of this section over the next few years is no longer valid. The outlines of future beach positions at the eastern end of the car park are therefore likely to shift westwards.

7.3.6 However, as confirmed via a meeting held with the Environment Agency in March 2023 (**Appendix A**), this short-term change is thought by the Environment Agency to have no consequence to the validity of the future estimated coastlines further east at the landfall location.

7.4 Assessment

7.4.1 The policy requirements as outlined in the NPS EN-1 (DECC, 2011a; DESNZ, 2023a), NPPF (MHCLG, 2021) and accompanying PPG (MHCLG, 2022) relating to the impact of the Proposed Development to the geomorphological regime and landfall morphology have been considered in **Chapter 6: Coastal processes, Volume 2** of the ES (Document Reference: 6.2.6).

7.4.2 **Chapter 6: Coastal processes, Volume 2** of the ES (Document Reference: 6.2.6) concludes that wind farm construction and operation and maintenance activities will not significantly impact coastal morphology and offshore sediment transport, and therefore, the development will not increase the risk of coastal flooding and erosion. **Chapter 6: Coastal processes, Volume 2** of the ES (Document Reference: 6.2.6) concludes that no additional explicit mitigation for coastal flooding and erosion is required.

7.4.3 The Environment Agency geomorphological reports (2020a and 2020b), as summarised in **Section 7.3**, have been used as a basis to assess the future risk of coastal change to the onshore development (being considered in this onshore coastal change vulnerability assessment). The risk relates specifically to the potential exposure of the landfall cables and associated joint bay due to further coastal erosion.

7.4.4 Whilst there is noted uncertainty with regards to the anticipated future coastlines presented, a sequential approach has been considered to locate the landfall transitional joint bay on the landward side of the most extreme of these estimates.

7.4.5 The landfall transitional joint bay is sited landward of the most conservative future coastline estimate. Further ground investigation will be undertaken at the landfall location post-granting of DCO, as outlined in commitment C-247 (in the **Outline Code of Construction Practice (CoCP)** (Document Reference: 7.2)) and **Commitments Register** (Document Reference: 7.22)) and secured through DCO Requirement 23 for the CoCP, to inform the exact siting and detailed design of the landfall transition joint bay and associated apparatus. This will be used to inform a coastal erosion and future beach profile assessment, which in turn will identify the need for and design of any further mitigation and adaptive measures to help minimise the vulnerability of these assets from future coastal erosion and flooding and considering the H++ estimate for future sea level rise (in accordance with the requirements for NSIPs outlined in **Section 5.7**).

7.4.6 On the basis of the assessment undertaken in **Chapter 6: Coastal processes, Volume 2** of the ES (Document Reference: 6.2.6) and commitment C-247 (**Commitments Register** (Document Reference: 7.22)), which secures a coastal erosion and future beach profile assessment via the **Outline CoCP** (Document Reference: 7.2) (**Table 5-9** of the **Outline CoCP** and DCO Requirement 18), the coastal vulnerability of the Proposed Development is considered to be low, for which further mitigation would be identified and implemented post-granting of DCO consent as necessary.

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8. Flood risk management

8.1 Delivery of embedded environmental measures

8.1.1 A number of embedded environmental measures relating to flood risk management are identified in **Table 8-1**. These embedded environmental measures address all potential flood risks to all potential receptors identified. The embedded environmental measures are secured in the **Commitments Register** (Document Reference: 7.22)) and a register ID is provided in **Table 8-1**.

8.1.2 The majority of the embedded environmental measures are secured via DCO Requirement(s), such as (for the construction phase) the **Outline CoCP** (Document Reference: 7.2). The **Outline CoCP** (Document Reference: 7.2) sets out the environmental management and construction principles that will be implemented as part of the Proposed Development, including embedded environmental measures relating to flood risk management. It is worth noting that some of the embedded environmental measures in **Table 8-1** serve environmental management as well as flood risk, for example the commitment to providing SuDS (No. 2, C-73) will address water quality as well as water quantity matters.

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Table 8-1 Embedded environmental measures relating to flood risk management

No.	Proposed Development element	Embedded environmental measure	Reason	Commitments Register ID
1	All works	Construction and permanent development in floodplains will be avoided wherever possible. Where this is not possible environmental measures will be developed to ensure the works are National Policy Statement compliant, including a sequential approach to siting of infrastructure and passing the Exception Test where appropriate.	To ensure a sequential approach to development is taken and the Exception Test is passed where necessary.	C-75
2	All works	Drainage design to manage, attenuate and, if necessary, treat surface water run-off will be included in all elements of temporary and permanent infrastructure. These will be designed in accordance with Sustainable Drainage (SuDS) principles including allowances for climate change and discharged at pre-development rates. Where the development intersects overland flow pathways or areas of known surface water flooding appropriate measures will be embedded into the design.	To retain predevelopment runoff rates (and water quality control).	C-73
3	Construction works near watercourses	Any works within 5m of any watercourse in the Internal Drainage Board (IDB) district will be subject to consent from the Environment Agency. Any works within 8m of a non-tidal Main River or 16m for a tidal Main River will be subject to consent from the Environment Agency (the majority of the Main Rivers are tidal for the majority of the cable route). Work within banktop of any other watercourse (not main river and outside of IDB) will require consent from the Lead Local Flood Authority (LLFA).	To minimise the risk of any impacts to watercourses, including impacting flood flow conveyance.	C-182

No.	Proposed Development element	Embedded environmental measure	Reason	Commitments Register ID
4	Construction works near watercourses	A standoff distance (distance to be determined based on biodiversity and pollution control considerations) will be applied from watercourse bank tops (other than for watercourse crossings) to account for potential issues such as water vole burrows, otter holts and pollution control.	To minimise the risk of any impacts to watercourses, including impacting flood flow conveyance.	C-135
5	Soil stockpiles	During construction, no soil stockpiles will be stored within 8m of Ordinary Watercourses, within 8m of a non-tidal Main River, and within 16m of a tidal Main River.	To minimise any impacts on flood flow conveyance, and to maintain access for watercourse maintenance.	C-130
6	Soil stockpiles	Where potential flood risk receptors could be impacted by a loss of floodplain storage and/or impacts on floodplain conveyance, the loss will be addressed through soil stockpiles (associated with both the cable construction and the temporary haul road) being located outside of the fluvial floodplain wherever possible. Where not possible, further assessment has been undertaken in the Flood Risk Assessment (FRA) and further measures (such as C-119, C-132 and C-133) have been proposed to address this where necessary.	To prevent any increase in water levels as a result of loss of floodplain storage volume in the vicinity of identified receptors.	C-131
7	Soil stockpiles	Soil stockpiles in the tidal floodplain will have regular gaps to prevent floodplain compartmentalisation. Soil stockpiles will have a maximum bund to gap ratio of 4:1. The worst case scenario will be a continuous length of embankment up to 80m, that is, with 20m gaps at 80m intervals.	To prevent floodplain compartmentalisation.	C-132

No.	Proposed Development element	Embedded environmental measure	Reason	Commitments Register ID
8	Soil stockpiles	Stockpile gaps will be located at topographic low points to preserve existing flow paths.	To maintain existing surface water flow paths.	C-179
9	Soil stockpiles	Where stockpiles are placed on both sides of the access routes/haul road the gaps will coincide.	To maintain connectivity of flow paths.	C-180
10	Soil stockpiles	Stockpiles will be present for the shortest practicable timeframe, with stockpiles being reinstated as the construction work progresses in order to minimise areas of exposed soil and any associated silt laden run-off. Stockpiles which remain present for six months or longer will be seeded to encourage stabilisation.	To prevent sedimentation of watercourses. To prevent loss of topsoil in a major flood event, thereby reducing the availability of material for reinstatement.	C-133
11	Temporary construction haul road and access routes	In the fluvial floodplain temporary trackway (rather than raised stone roads) will be considered for the temporary haul road and access routes wherever practicable.	To minimise the loss of floodplain storage associated with raised stone temporary construction haul road/access routes and associated temporary soil stockpiles.	C-119
12	Temporary construction haul road, access routes	Where use of trackway is not possible and potential flood risk receptors could be impacted, access routes (and working areas) in the fluvial floodplain will be as close to ground level as possible to avoid impacting flood flow conveyance and loss of	To minimise loss of floodplain storage. To avoid disrupting flow paths and	C-175

No.	Proposed Development element	Embedded environmental measure	Reason	Commitments Register ID
	(and working areas)	floodplain storage (a slight raised surface is often required to allow for drainage).	compartmentalising the floodplain. To retain natural surface water flow routes.	
13	Temporary construction haul road (and working areas)	Stone access routes / haul road and working areas will be constructed of semi-permeable aggregate material (similar to compounds as per C-129), where practical.	To retain the existing infiltration characteristics and runoff rate (to avoid the need for attenuation throughout the route of the running track.	C-120
14	Temporary construction haul road (and working areas)	Run-off from access routes/haul road and working areas to be allowed to infiltrate wherever possible.	To retain the existing runoff rate.	C-121
15	Temporary construction haul road and access routes	Access roads will have cross drainage provided where necessary at topographic low points.	To retain natural surface water flow paths.	C-181
16	Temporary construction haul road and working areas	Post construction, the work area will be reinstated to pre-existing conditions as far as reasonably practical in line with the Outline Materials Management Plan (MMP) (C-69) and Defra 2009 Code of Construction Practice for the Sustainable Use of Soils on Construction Sites PB13298	To return the temporary construction haul road, access routes and working areas to a natural condition, in terms of their rainfall	C-7

No.	Proposed Development element	Embedded environmental measure	Reason	Commitments Register ID
			infiltration and runoff generation characteristics.	
17	Temporary construction working areas	During construction, dewatering activities (of excavations) will be halted if a flood alert or flood warning is in place downstream, in order to minimise any impacts on flood flow conveyance and to maintain access for watercourse maintenance.	To prevent any increase in flood risk downstream.	C-134
18	Temporary construction compounds	Compounds will be surfaced with semi-permeable aggregate material (similar to access roads as per C-120), where practical, with the exception of fuel storage areas and similar where pollution containment in the event of a spillage is the priority. Areas of construction compounds that are used for fuel storage, and plant maintenance and refuelling will be surfaced with fully impermeable materials to prevent any infiltration of contaminated runoff and contain bunding in line with C-8 and C-167.	To retain predevelopment runoff rates in previously undeveloped areas (and pollution control).	C-129
19	Landfall	The subsea export cable ducts will be drilled underneath the beach using horizontal directional drilling (HDD) techniques.	To maintain the structural integrity of the flood defence and avoid additional engineering works.	C-43

No.	Proposed Development element	Embedded environmental measure	Reason	Commitments Register ID
20	Watercourse crossings (permanent for onshore cable)	All permanent onshore cable crossings will pass beneath the bed of watercourses (no within bank crossings). Sufficient depth between the bed of the watercourse and the top of the cable (whether trenchless or open cut) will be provided to ensure no potential for exposure of cable due to scour.	Maintain existing conveyance capacity and minimise risk of blockage.	C-122
21	Watercourse crossings (permanent for onshore cable)	Main rivers, watercourses, railways, and roads that form part of the Strategic Highways Network will be crossed by Horizontal Directional Drill (HDD) or other trenchless technology where this represents the best environment solution and is financially and technically feasible (see C-17).	Maintain existing conveyance capacity and minimise risk of blockage.	C-5
22	Watercourse crossings (permanent for onshore cable)	Where the cable route crosses an Environment Agency flood defence, trenchless methodologies will be used.	To maintain the structural integrity of the flood defence and avoid additional engineering works.	C-125
23	Watercourse crossings (permanent for onshore cable)	Starter (and exit) pits for Horizontal Directional Drilling (HDD) and other trenchless technologies will be micro-sited outside of the floodplain where possible (by moving the pit further away from watercourses).	Minimise the potential flood risk to trenchless crossing activities during construction.	C-123
24	Watercourse crossings (permanent for onshore cable)	Where start and/or exit pits for Horizontal Directional Drilling (HDD) and other trenchless technologies are located within in the floodplain the Contractor will develop procedures as part of the Emergency Response Plan (ERP) to be enacted.	Minimise the potential flood risk to trenchless crossing activities during construction.	C-124

No.	Proposed Development element	Embedded environmental measure	Reason	Commitments Register ID
25	Watercourse crossings (permanent for onshore cable)	Details of the proposed trenchless watercourse crossing techniques will be discussed with the Environment Agency at the detailed design stage. The depth of the trenchless crossing will be such that the river bed and watercourse is undisturbed by construction activities. Specific construction method statements will be prepared.	Maintain existing conveyance capacity and minimise risk of blockage.	C-138
26	Watercourse crossings (permanent for onshore cable)	Where trenchless techniques are not required or are not practical, watercourses may be crossed by open cut techniques (with flows overpumped around the working area). Appropriate environmental permits or land drainage consents will be applied for works from the Environment Agency (for example, for Main Rivers, works on or near sea defences/flood defence structures or in a flood plain) or from the Lead Local Flood Authority (LLFA) (for ordinary watercourse crossings) (see C-5).	Maintain existing conveyance capacity and minimise risk of blockage.	C-17
27	Watercourse crossings (permanent for onshore cable and temporary for construction haul road)	Culverting activities and construction of cable circuit crossings will take place during periods of normal to low flow conditions to avoid conveyance-related flood risk effects.	To avoid interaction with known flooding periods and to facilitate efficient construction.	C-139
28	Watercourse crossings (temporary for	Minor watercourses (where open cut techniques are proposed for the permanent cable crossings) will also have temporary crossings for the haul road to provide vehicular access along	Maintain existing conveyance capacity and	C-126

No.	Proposed Development element	Embedded environmental measure	Reason	Commitments Register ID
	construction haul road)	the route. A mixture of culverts and/or clear span bridges could be employed based on crossing specific requirements (size of watercourse and flood risk). These will be subject to permits and consents with the Environment Agency and Lead Local Flood Authority (LLFA).	minimise risk of blockage.	
29	Watercourse crossings (temporary for construction haul road)	Temporary watercourse crossings will not be provided for the haul road where the cable crossing will be trenchless. Vehicular access will use existing public highways and bridges.	Maintain existing conveyance capacity and minimise risk of blockage.	C-127
30	Temporary watercourse crossings (for temporary construction haul road)	Any temporary crossings will be in place for the minimal time possible.	Maintain existing conveyance capacity and minimise risk of blockage.	C-128
31	Temporary watercourse crossings (for temporary construction haul road)	To enable access during construction, temporary clear span bridges will be used for those temporary watercourse crossings too wide or deep to be crossed using culverts.	To minimise the loss of channel capacity (and to prevent in channel or bankside disturbance where there are ecological requirements to do so).	C-145

No.	Proposed Development element	Embedded environmental measure	Reason	Commitments Register ID
32	Temporary watercourse crossings (for temporary construction haul road)	For temporary watercourse crossings, where culverts are to be used, these will be appropriately sized to maintain existing flow conveyance. Where existing culverts already exist nearby, similarly sized culverts may be suitable.	Maintain existing conveyance capacity.	C-176
33	Temporary watercourse crossings (for temporary construction haul road)	Where feasible multiple pipes will not be used for culverts of temporary watercourse crossings (culverts should have a single pipe/opening of an appropriate size for the watercourse cross section).	Maintain existing conveyance capacity and minimise the risk of blockage.	C-177
34	Temporary watercourse crossings (for temporary construction haul road)	Circular culverts for temporary watercourse crossings to have concrete bedding in locations where ground conditions suggest that settlement could occur, such as the Internal Drainage Board (IDB) district.	To prevent settling of the culvert and resultant loss of flow capacity.	C-178
35	All works and temporary construction access routes in Flood Zones 2 and 3	Emergency Response Plans (ERPs) for flood events will be prepared for all construction activities, working areas, access and egress routes in floodplain areas (tidal and fluvial).	To minimise the risk to construction staff who may be working within the floodplain, or may need to cross it to access / egress the part of the proposed DCO	C-118

No.	Proposed Development element	Embedded environmental measure	Reason	Commitments Register ID
			Order Limits they are working in. To minimise the risk of contamination of flood water. To minimise the loss of non-flood resistant plant and materials.	
36	Programme of construction works in the floodplain	Works on areas identified as floodplain (Flood Zones 2 and 3) will be programmed to avoid the period between October and February inclusive to avoid disturbance of waterbirds, and where possible, will be programmed to occur in late summer/ early autumn, to avoid interaction with known flooding periods to minimise the potential for displacement of floodwater.	To avoid interaction with known flooding periods and to facilitate efficient construction.	C-117
37	Permanent onshore cable	In the fluvial floodplain and at surface water flow pathways, the permanent cable will be completely buried, with the land above reinstated to pre-construction ground levels (some mounding may be appropriate to allow for settlement).	To minimise loss of floodplain storage. To avoid disrupting flow paths and compartmentalising the floodplain. To retain natural surface water flow routes.	C-154

No.	Proposed Development element	Embedded environmental measure	Reason	Commitments Register ID
38	Permanent joint bays	Joint bays will be completely buried, with the land above reinstated to pre-construction ground level, with the exception of link box chambers where access will be required from ground level (via manholes). Once constructed joint bays and link box chambers will be resilient to flooding.	To minimise loss of floodplain storage. To avoid disrupting flow paths and compartmentalising the floodplain. To retain natural surface water flow routes.	C-9
39	Permanent onshore cable and joint bays	All sub-surface infrastructure will be designed to retain sub-surface flow pathways to avoid any localised increases in groundwater flooding.	To retain natural sub-surface water flow paths and thus avoid impacting groundwater flood risk.	C-74
40	All works	The contractor(s) for construction, operation and maintenance and decommissioning will use a short to medium range weather forecasting service from the Met Office, or other approved meteorological data and weather forecast provider, to inform short to medium-term programme management of activities, including implementation of necessary environmental control and/or impact mitigation measures with respect to climate conditions and extreme weather events. The contractor(s) will register with the Environment Agency's flood warning service in areas of flood risk. The contractor(s) will use this information to ensure that relevant measures, including those within the Code of Construction Practice and an Environmental Management System (EMS), are implemented and, as appropriate, consider	To ensure that construction, operation and maintenance contractors in the floodplain are suitably aware of any extant flood risk.	C-184

No.	Proposed Development element	Embedded environmental measure	Reason	Commitments Register ID
		additional measures to ensure the resilience of the programme during extreme weather events.		
41	Operation and maintenance	Risk Assessment Method Statement (RAMS) will be used as part of operating procedures to plan operation and maintenance activities. For example, the RAMS will include measures for working in increasingly high temperatures, prolonged wet weather and set out adequate planning for extreme weather events such as flooding and wildfire.	To ensure that operation and maintenance contractors in the floodplain are suitably aware of any extant flood risk.	C-237
42	Permanent onshore substation	The design will adhere to guidance for flood protection for new substations, which is for flood resilience to the 0.1% AEP (1 in 1,000) event plus climate change, plus a further 300mm.	To ensure safe development and resilience to flooding.	C-230
43	Permanent joint bays	RED will undertake ground investigation at the landfall site at the post-DCO application stage. This will be carried out to inform the exact siting and detailed design of the Transition Joint Bay and associated apparatus. In addition, this will inform a 'coastal erosion and future beach profile estimation assessment', which in turn will inform the need for and design of any further mitigation and adaptive measures to help minimise the vulnerability of these assets from future coastal erosion and tidal flooding.	To ensure robust design and minimise the vulnerability of the assets from future coastal erosion and flooding.	C-247

8.1.3 Additional embedded environmental measures relating to temporary watercourse crossing for the temporary construction haul road (relating to ecology rather than flood risk) are included in the **Commitments Register** (Document Reference: 7.22)) but not included here as the primary purpose does not directly relate to flood risk, notably commitment C-64, which includes continuation of bed material through the culvert and 'isolation works' (to facilitate construction of the temporary culvert) being kept to as short a duration as possible (for the benefit of ecology).

8.1.4 Similarly, a number of additional embedded environmental measures relating to drainage, primarily standard practice to protect the water environment are included in the **Commitments Register** (Document Reference: 7.22)), for example commitment C-140, which includes temporary cut off drains, where necessary, to capture run-off originating from upgradient areas before it reaches the construction works.

8.1.5 Further detail and discussion on specific flood risk management measures and how those identified relate to the phases of the Proposed Development are provided in **Section 8.2** to **8.7**.

8.2 Emergency response plan for flood events

8.2.1 Emergency Response Plan(s) for Flood Events will be prepared for all working areas located in Flood Zones 2 and 3, as stated in commitment C-118. This / these will also cover those working areas that are accessed via Flood Zones 2 and/or 3, to/from which access / egress could be compromised during a flood event.

8.2.2 Details of emergency responses for different parts of the Proposed Development will be developed by the contractor prior to commencement of construction in that area. The plan will detail the procedure to be followed if flooding of the construction site is expected:

- **personnel to evacuate the working areas at risk of flooding** – this is the primary safety consideration, and is the highest priority in the unlikely event that there is insufficient time to undertake the following activities;
- **making the site safe prior to evacuation** – this will include appropriate storage of equipment and materials, securing items to prevent them being mobilised in, or causing pollution of flood water; and
- **removal of critical plant and equipment from at risk areas** – this may be removal of critical plant and equipment from the temporary construction haul roads or working areas and could include raising critical items above the design flood level or removing them from the floodplain completely to one of the temporary construction compounds.

8.2.3 To expedite response upon receiving an alert / warning, the following elements should be specified in the Emergency Response Plan:

- areas at risk of flooding should be clearly marked on site access plans, including details of Environment Agency Flood Warning Areas;
- evacuation routes from flood risk areas should be clearly defined;

- the circumstances under which different responses will be implemented should be specified, with an escalation of response associated with increasing levels of danger. For example, a ‘be prepared’ alert may be raised upon receipt of an Environment Agency Flood Alert or a Met Office Severe Weather Warning for heavy rain, followed by an ‘evacuate’ order upon receipt of an Environment Agency Flood Warning, or at the discretion of the site Health, Safety, Security and Environment (HSSE) Manager, based upon an appraisal of local conditions; and
- those items of plant and equipment that could be left in-situ without risk of damage or causing pollution should be identified, together with those items that should be evacuated, provided sufficient notice is provided and it is safe to do so.

8.2.4 In addition, as discussed in **Table 8-1**, dewatering activities to a watercourse should be ceased when a Flood Alert or Flood Warning is received for an area downstream.

8.2.5 For any given area of construction, the flood response and evacuation plan(s) for that area should be finalised before commencement of works onsite. All personnel should be briefed on the contents of the plan as part of the site induction process. The Emergency Response Plan for Flood Events is secured through DCO Requirement 23 via the **Outline CoCP** (Document Reference: 7.2).

8.2.6 A risk-based approach to groundwater flooding during the construction works has been taken to address the risk of groundwater flooding. It will be the responsibility of RED and the appointed contractor to monitor the Environment Agency groundwater flood warning system to inform the timing of construction works in areas identified at elevated risk of groundwater flooding. This will be incorporated and enacted through the emergency response plan for flood events.

8.2.7 Where extreme groundwater flooding is encountered or forecast via the Environment Agency warning system (groundwater flooding at the surface for several weeks), it is recommended no works within the affected areas will take place.

8.3 Construction phase

8.3.1 As outlined in **Section 6**, the majority of potential flood risks identified will occur during the construction phase. Embedded environmental measures to manage flood risks for this phase are outlined in **Table 8-1**. A summary of key embedded environmental measures to address the sources, pathways and receptors identified thus far in this assessment are set out in **Table 8-2**.

Table 8-2 Summary of selected key flood risk management measures to address specific mechanisms during the construction phase

Flood mechanism	Summary of selected key flood risk management measures
Tidal, fluvial and artificial sources	• Emergency Response Plan for Flood Events (evacuation) (C-118). • The statutory authorities' permitting and consenting regimes will be adhered to (C-17).
Fluvial	• No in-channel crossings for the permanent onshore cable (all crossings beneath the bed of watercourses) (C-122). • Trenchless crossing techniques for permanent Main River crossings (and under flood defences) (C-5). • No temporary crossings for Main Rivers. • Clear span bridges to be used for temporary crossings too wide or deep to be crossing using for temporary culverts (C-126). • Temporary culverts to be sized to maintain existing flow conveyance (C-176). • Stand-off distances from watercourses (other than crossings) (C-135).
Fluvial – Arun	• Temporary stockpiles to be stored outside of the fluvial floodplain (where potential receptors could be impacted) (C-131). • Avoidance of raised stone roads where possible (use trackway or road level as close to the ground surface as possible) (C-119).
Fluvial – Adur	• Trenchless crossing techniques to avoid interaction with the floodplain, where possible (currently anticipated that trenchless techniques can span under the floodplains of the Adur (and Main River tributaries), thus minimising construction works in Flood Zone 2 or Flood Zone 3 (C-123). • Temporary stockpiles to be stored outside of the fluvial floodplain (where potential receptors could be impacted) (C-131). • Avoidance of raised stone roads where possible (use trackway or road level as close to the ground surface as possible) (C-119).

Flood mechanism	Summary of selected key flood risk management measures
Tidal – Arun	• Gaps in stockpiles to prevent floodplain compartmentalisation (C-132).
Surface water run-on and run-off	• SuDS for all elements of the temporary and permanent development (C-73). • Gaps in temporary soil stockpiles and cross drainage at topographic low points (C-179). • Use of semi-permeable material for temporary construction haul road and working areas to minimise run-off rates and volumes (C-120). • Infiltration as the preferred means of discharge. • Reinstatement post-construction (C-133).
Groundwater	• Sub-surface onshore infrastructure to be designed to retain sub-surface flow pathways (C-74). • RED and the appointed contractor will be responsible for monitoring and taking into account information on the Environment Agency groundwater flood risk warnings. This will be incorporated into the Emergency Response Plan for Flood Events (C-184, C-118).

Notes: Not an exhaustive list, summary of key measures only for ease of reference – see **Table 8-1** for full list of flood risk management measures and full wording of embedded environmental measures.

8.4 Operation and maintenance phase

8.4.1 As outlined in **Section 6.5**, flood risks associated with the operation and maintenance phase of the Proposed Development are limited to the onshore substation and surface water flood risk. The length of the onshore cable and associated joint bays are considered to be entirely flood resilient and will have no impact of floodplain storage or flow conveyance, following implementation of the specific embedded environmental measures proposed in relation to the onshore cable corridor and associated infrastructure (commitments C-9, C-74 and C-154).

8.4.2 Surface water flood risk to the onshore substation at Oakendene and extension to the existing National Grid Bolney substation has been addressed through the preparation of outline operational drainage strategies within the **Outline Operational Drainage Plan** (Document Reference: 7.1), demonstrating how surface water run-on and runoff can be managed sustainably on site.

8.4.3 The outline operational drainage strategies have been developed to limit site discharge rates to greenfield QBAR rates and/or 2 l/s (whichever is greater) and using a conservative design standard of one percent AEP plus 45 percent climate change (based on the Upper End allowance for peak rainfall intensity for the Adur and Ouse management catchment).

8.4.4 A precautionary approach with regards to treatment requirements, considering high pollution hazard (whether or not that is later identified to be appropriate in practice) and using the Simple Index Approach set out in the CIRIA SuDS Manual. A number of potential treatment measures have been identified which in combination will exceed the indices identified, to ensure flexibility for delivery is available at the subsequent detailed design stage.

8.4.5 Final selection of appropriate drainage measures will be outlined in the preparation of the (detailed) Operational Drainage Plan (commitment C-73 and DCO Requirements in the **draft DCO** (Document Reference: 3.1) – 'Surface and foul water drainage')).

8.4.6 In addition, the Oakendene substation design will adhere to the National Grid target guidance for flood protection (National Grid 2016), providing flood resilience to a level equivalent of the 0.1% AEP flood level plus an allowance for climate change and 300mm freeboard. This is in accordance with the **Design and Access Statement** (Document Reference: 5.8) and the DCO requirement for 'Detailed design approval transmission substation' in the **draft DCO** (Document Reference: 3.1).

8.4.7 Any additional risks (if any are identified) will be addressed through the **Operational Drainage Plan** ((Document Reference: 7.1) – DCO Requirements 18 and 19). Options for mitigation include:

- raising of any flood sensitive components of new infrastructure sufficiently above existing ground levels such that if flooding does occur operation of the onshore substation remains unaffected;
- profiling of ground levels within the onshore substation site to divert overland flow away from flood sensitive infrastructure and into the drainage infrastructure;
- micro-siting of any flood sensitive infrastructure away from areas of greatest risk; and
- ensuring suitable SuDS are provided as part of the final onshore substation design, including managing surface water run-on / areas at risk of surface water flooding.

8.5 Maintenance works

8.5.1 As outlined in **Section 6.5**, periodic testing to sections of the onshore cable may be required by vehicle or on foot during the operation and maintenance phase. Personnel carrying out inspections could be at risk of flooding in areas where a fluvial, tidal, surface water, groundwater or artificial risk has been identified.

8.5.2 Embedded environmental measure C-184 outlines that contractors will register with the Environment Agency's flood warning service and ensure that relevant measures are implemented.

8.5.3 In addition, commitment C-237 further ensures that RAMS for operation and maintenance activities set out adequate planning to respond to flood events.

8.6 Decommissioning phase

8.6.1 With respect to the decommissioning phase, similar measures as employed during the construction phase will be required, albeit likely at a reduced scale owing to the proposed approach of leaving the cables in the ground and only sealing the end caps. As a result, the space needed for measures such as stockpile storage will be reduced compared to the construction phase, which will offset the minor (and occasional) predicted increase in flood extent (due to the effects of climate change) at the proposed soil storage locations in Flood Zone 1. The onshore substation is located in Flood Zone 1 and are likely to remain at low risk (other than from surface water, which will be managed through appropriately sized drainage design) throughout their lifetime, including the decommissioning phase. Construction drainage measures similar to those employed during construction will be employed during decommissioning works.

8.6.2 Specification of future measures will need to take account of the changes in the flood hazard baseline relating to climate change, land use change and the planning and regulatory requirements prevailing at the time, as well as being reflective of the works to be undertaken (and the methodology), once these are known. If necessary, more stringent mitigation could be implemented to address the risks associated with such future works, to be identified through an appropriate assessment to be undertaken at the time; it is not anticipated that there will be any insurmountable flood risk obstacles to decommissioning that could not be overcome.

8.7 Residual risk

8.7.1 Residual risk is that which remains after the flood risk management measures set out above in **Table 8-1** have been taken into account. As already identified, construction staff undertaking construction works in the floodplain (or accessing / egressing other areas of the proposed DCO Order Limits via the floodplain) will be at residual risk in the event of a flood that either overtopped the banks/raised defences, or the embankments failed (a breach).

8.7.2 The Emergency Response Plan for Flood Events will address this residual risk, and therefore upon implementation of the flood risk management measures set out in **Table 8-1**, the residual risk to all potential receptors is considered to be low. The implementation of the Emergency Response Plan for Flood Events will ensure that the risk to them is as low as is reasonably practicable, and appropriate for their vulnerability (Essential Infrastructure, as detailed in **Section 4.7**). Such an approach is considered to be proportionate to the risk and appropriate to the scale, nature and location of the Proposed Development.

8.7.3 Residual risk at the Oakendene onshore substation will effectively be incorporated into the design considerations through the consideration of National Grid's target guidance, as explained in **Section 6.5**. The final detailed design of the onshore substation will also consider the credible maximum climate change scenario (upper end allowance of 57 percent for the Adur and Ouse management catchment) to address the residual risk of climate change impacts.

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9. Planning requirements

9.1 Sequential Test

9.1.1 As required by the Sequential Test, a sequential, risk-based approach has been taken in siting the Proposed Development to steer it to areas with the lowest risk of flooding in the first instance, taking all sources of flood risk and climate change into account.

9.1.2 The primary driver for the Proposed Development needing to pass through areas at medium and higher flood risk is the wider need for the development in this general location (Climping to Bolney), as in **paragraphs 9.1.3** to **9.1.16.** A sequential approach to flood risk then informed the determination of the onshore cable corridor (and thus proposed DCO Order Limits) between the landfall at Climping and the existing National Grid Bolney substation to ensure that the Proposed Development and associated temporary construction infrastructure and works will be sited in areas of lower flood risk if possible. This sequential approach ensured that those elements of the Proposed Development considered to be at greatest vulnerability to flood risk (and coastal change) (such as the landfall, temporary construction compounds, the onshore substation and existing National Grid Bolney substation extension), have been steered towards the areas of lowest risk wherever possible. These drivers and the process for determination of the proposed DCO Order Limits are discussed further in **paragraphs 9.1.6** to **9.1.40**.

The need for the Proposed Development at this location

9.1.3 The context and need for the Proposed Development and rationale for the site selection is provided in **Chapter 3: Alternatives, Volume 2** of the ES (Document Reference: 6.2.3).

9.1.4 In the context of the Sequential Test for the onshore elements of the Proposed Development, the primary driver for the onshore cable corridor was driven by the available options for landfall and then connection to the wider National Grid network, which in turn were driven by the offshore array site selection for the offshore windfarm.

9.1.5 A summary of the site selection process for the offshore array area and grid connection site are provided in **paragraphs 9.1.6** to **9.1.11** , which set the bounds for the onshore cable corridor and onshore substation development aspects.

Offshore array area selection

9.1.6 The site selection process for the offshore array area is detailed in **Section 3.2** of **Chapter 3: Alternatives, Volume 2** of the ES (Document Reference: 6.2.3), and summarised in **paragraphs 9.1.7** to **9.1.11**.

9.1.7 Rampion 1 Offshore Wind Farm was developed following The Crown Estate's (TCE's) Round 3 offshore wind leasing programme launched in 2008. The Round 3 area within which Rampion 1 was brought forward (Zone 6, in the English

Channel) was one of nine Zones identified following a process of national, strategic level planning, and represented a critical component of the UK's response to meeting international and national renewable energy targets and commitments.

9.1.8 In 2018, TCE invited the owners of existing Round 3 wind farms to consider potential extensions of those schemes. Rampion Offshore Wind Limited (the owner of Rampion 1) applied to TCE for an extension to Rampion 1 through this wind farm extension leasing process. Following the outcome of TCE's plan-led Habitats Regulations Assessment (HRA), a new company RED, the Applicant, was set up and was awarded the development rights for Rampion 2 in September 2019.

9.1.9 As part of the offshore wind farm site selection process for Rampion 2, detailed assessments and evaluations of potential developable areas were undertaken to ensure the best possible site could be brought forward. This considered the following areas:

- sites in proximity to the existing development under the TCE Extensions Round process;
- the remaining parts of the TCE Round 3, Zone 6 area which comprises:
  - residual areas not included within the Rampion 1 Application at the time of TCE Round 3 in 2013; and
  - the additional areas consented as part of the Rampion 1, but which were not developed as part of the original Rampion 1 scheme.

9.1.10 Substantial progress has been made in the offshore wind industry in the period since the Rampion 1 design was optimised in 2014. This includes advances in project economics, technology and understanding such as construction approaches, design, and social and environmental effects.

9.1.11 A re-evaluation of areas within the wider Zone 6, and the surplus part of the area consented under the Rampion 1 DCO, was therefore carried out to identify areas which may now be suitable for the development of Rampion 2. One of TCE criteria for extension projects states that "*The proposed extension must share a boundary with the existing wind farm*" (TCE, 2017).

Grid connection

9.1.12 The site selection process covering the onshore elements of the Proposed Development (grid connection, landfall and onshore cable route) is detailed in **Sections 3.3** and **3.4** of **Chapter 3: Alternatives, Volume 2** of the ES (Document Reference: 6.2.3).

9.1.13 A total of six potential grid connection locations were initially considered prior to the Scoping stage in 2020. A grid connection options appraisal process was carried out in parallel with site selection activities for the landfall and onshore cable corridor which considered a number of potential grid connection points.

9.1.14 It was confirmed prior to the Scoping stage, that any economically viable project would exceed the capacity that could be connected into the distribution system. An electrical connection feasibility study was conducted by National Grid at RED's request, entitled ‘Feasibility Study for the connection of up to 1,200MW of Rampion Extension Project’ (dated July 2020). The study also established the electrical capacity (megawatts) likely to be available on the transmission system on the desired project timescales and identified what localised and wider system upgrades will be needed for each of the substations considered.

9.1.15 National Grid considered the three most likely substation candidates in terms of location and distance to be:

- Bolney, Mid Sussex, where the existing Rampion Offshore Wind Farm connects into the grid;
- Lovedean, Hampshire, approximately 64.8km west of Bolney; and
- Ninfield, East Sussex, approximately 51.4km east of Bolney.

9.1.16 National Grid’s Connections Infrastructure Option Notice (CION) process followed this feasibility study. This proposed the grid connection point at Bolney on the basis that this was the most economic and efficient grid connection location which meets the required capacity and Proposed Development timeframes. The site selection process for the chosen grid connection is summarised in **Sections 3.3** of **Chapter 3: Alternatives, Volume 2** of the ES (Document Reference: 6.2.3). The chosen grid connection is described in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4)..

Landfall

9.1.17 The Sussex coastline is heavily developed, in particular the central conurbation extending from Worthing in the west, through Lancing, Shoreham, Portslade, Hove and Brighton in the east. To the east of Brighton vertical cliffs rise providing a significant barrier to available landing points until east of Newhaven.

9.1.18 This led to all but one of the landfall options falling outside of this central conurbation area. There had been other options within this area that were considered but discounted for the Rampion 1 project.

9.1.19 The criteria for a suitable landfall includes sufficient physical space onshore, for the onshore cabling, transition joint bays and Horizontal Directional Drilling (HDD) drilling rig and construction logistical operations, and an unconstrained inshore area for when export cable laying vessels will come in close to shore.

9.1.20 In addition, as well as sufficient physical space at the landfall itself, it is crucial that there is a workable onwards route towards the eventual grid connection point. There were some locations with open space at the coast, such as Goring Gap, which then had a built environment barrier slightly further inland, thereby not providing a feasible onward route towards the grid connection point.

Sequential approach

9.1.21 The onshore cable route and siting of the onshore substation have been determined following options appraisal undertaken in a number of stages. The onshore cable corridor and onshore substation selection and refinement process is detailed in **Section 3.4** of **Chapter 3: Alternatives, Volume 2** of the ES (Document Reference: 6.2.3) and summarised in **paragraphs 9.1.22** to **9.1.40**.

Onshore cable corridor selection process

9.1.22 Following the Scoping stage in 2020 (RED, 2020) at which point the chosen landfall location was fixed, the onshore cable route was further refined to reduce the number of options being considered.

9.1.23 The design refinement process delivering the onshore elements of the Proposed Development, which was presented at the first Statutory Consultation exercise in July 2021 (RED, 2021), was informed by several multi-disciplined activities. These brought together engineering, environmental (including flood risk), land ownership and stakeholder concerns and sensitivities to propose, appraise and reduce alternatives within the Scoping Boundary.

9.1.24 When refining the proposed onshore cable corridor location, the following high-level guiding principles were identified:

- selection of the shortest onshore cable route to minimise environmental effects through Proposed Development footprint between the landfall at Climping and potential onshore substation search areas near Bolney;
- minimising disruption by considering the proximity to residential properties;
- avoidance of key sensitive features where possible by the early adoption of commitments outlined in the Commitments Register, and;
- minimising disruption to sensitive features where possible by the early adoption of commitments outlined in the Commitments Register.

9.1.25 These high-level principles covered the sequential approach to flood risk, whereby lower flood risk options were identified as preferable wherever possible. Onshore cable corridor design refinement workshops interrogated technical, environmental and land ownership pinch points along the potential onshore cable corridor, incorporating a review of stakeholder concerns to propose, appraise and reduce alternatives.

9.1.26 As set out in **Section 6.5**, once constructed, the onshore cable once operational will not cause significant effects on the water environment (be it flood risk or other water effects) and therefore flood risk was not a primary differentiator between the various onshore cable corridor options.

9.1.27 The Proposed Development has been determined minimising the interaction with flood zones associated with the River Arun and River Adur catchments wherever possible. Other environmental and technical constraints have dictated that alternative routes to further minimise interaction have not always been possible.

9.1.28 The southwestern portion of the onshore cable corridor is sited unavoidably within Flood Zones 2 and 3 associated with the River Arun. The landfall location is bounded by regions of developed areas to the east and west, and therefore is the only feasible location for the offshore cable to make landfall.

Onshore substation

9.1.29 The onshore substation search area options have been refined following a sequential approach.

9.1.30 Prior to Scoping, the National Grid interface point location for Rampion 2 was confirmed to be National Grid's existing substation at Bolney in West Sussex (as described in **Section 3.3**). In order to connect the transmission cable to the electricity network, a new onshore substation is required, which was identified to be located on land in proximity (up to circa 5km) to the existing National Grid Bolney substation.

9.1.31 Following the Scoping stage, more detailed site selection work was undertaken to appraise seven onshore substation search area options within the Scoping Boundary. Onshore substation search area refinement workshops interrogated technical, environmental and land ownership issues at each of the seven sites, incorporating a review of stakeholder concerns to appraise and reduce the number of options. Following further design work, three of these onshore substation search areas were discounted.

9.1.32 A comparative analysis exercise was performed on the four remaining onshore substation search area options to facilitate a clear and robust approach to reducing the number of options considered in the PEIR (RED, 2021), informed by environmental constraints mapping, stakeholder consultation, land ownership and technical site surveys.

9.1.33 As a result of this exercise one further onshore substation search area (Star Road) was discounted from any further consideration in the PEIR (RED, 2021). This is adjacent to an industrial estate in the village of Partridge Green. Considering the flood risk constraints on the site (amongst other environmental concerns), the developable area of the search area was considered too small.

9.1.34 RED carried out a non-statutory consultation exercise from 14 January 2021 to 11 February 2021. This was a virtual exhibition to raise awareness of the Proposed Development, the development process, and share information on the emerging design process inviting feedback from stakeholders. At this point in the design evolution process, three onshore substation options remained (Wineham Lane South, Wineham Lane North and Bolney Lane/Kent Street), and these were presented during this consultation exercise.

9.1.35 As a result of non-statutory consultation feedback and the proximity to sensitive receptors (ancient woodland and a listed building), Wineham Lane South onshore substation search area was removed from the PEIR Assessment Boundary.

9.1.36 Of the two potential onshore substation search areas remaining and identified in the PEIR (RED, 2021), the Wineham Lane North onshore substation search area was identified to be marginally preferable from a flood risk sequential approach perspective on the basis of approximately 97 percent of the onshore search area being at low or very low risk of surface water flooding compared to 90 percent for the Bolney Road/Kent Street (Oakendene) onshore substation search area. In addition, the surface water flow pathway at the Wineham Lane North onshore substation search area primarily runs along the northern edge of the land parcel, whereas existing overland flow pathways crosses through the centre of the Bolney Road/Kent Street (Oakendene) onshore substation search area.

9.1.37 However, both onshore substation search areas originally considered are located in Flood Zone 1 and are not at risk from any other flood source. It was concluded in the PEIR (RED, 2021) that it will also be possible to capture and convey surface water flow pathways in formal surface water management structures such that the risk at both sites will be comparable with respect to surface water flood risk, provided appropriate mitigation is implemented to achieve this. On this basis, the preference in terms of flood risk sequential approach for the two identified onshore substation search areas was considered to be marginal.

9.1.38 The final selection of the Oakendene onshore substation (at marginally higher surface water flood risk than the Wineham Lane North substation search area option) has therefore been driven by other technical and engineering constraints. However, the onshore substation site is situated in Flood Zone 1 and considered to be at a comparable level of surface water flood risk, with the incorporation of suitable flood risk management and drainage measures as outlined in **Section 8**, and is thus concluded to have been determined appropriately via a sequential approach.

9.1.39 Suitable drainage and mitigation measures have been identified in the **Outline Operational Drainage Plan** (Document Reference: 7.1), to demonstrate how surface water run-on and runoff can be managed sustainably on site. Therefore, the Sequential Test is considered satisfied.

9.1.40 It is concluded that the Sequential Test is considered passed due to:

- the flood resilient nature of the onshore elements of the Proposed Development, with respect to **Section 6.2**; and
- wherever possible, the Proposed Development and associated temporary infrastructure has been sited in areas of lower flood risk, with full consideration of lower risk options before the development proposals were finalised.

9.2 Application of the Exception Test

9.2.1 The Exception Test is described in **Section 2.2**. This Section sets out the evidence to demonstrate that the Exception Test is passed.

Wider sustainability benefits

9.2.2 Part 1 of the Exception Test requires the Proposed Development to provide wider sustainability benefits to the community that outweigh flood risk. As stated in NPS EN-1 (DECC, 2011a; DESNZ, 2023a), this will include the benefits (including need), for the Proposed Development.

9.2.3 The benefits of the Proposed Development are outlined in **Section 5.4** of the **Planning Statement** (Document Reference: 5.7) and summarised here in **paragraphs 9.2.4** to **9.2.6**.

9.2.4 The Proposed Development will generate around 1,200MW of renewable electricity. This additional generating capacity will contribute towards meeting the urgent need for new energy infrastructure in the UK, provide enhanced energy security, support the economic priorities of the UK Government and, critically, make an important contribution to decarbonisation of the UK economy. The Proposed Development type is recognised as being a critical national priority in NPS EN-1 and NPS EN-3 (DESNZ, 2023a and 2023b), for which there is an urgent need to deliver.

9.2.5 The Proposed Development will continue to offset greenhouse gas (GHG) emissions until 2050, and therefore make a positive contribution the UK Government target to reach net zero emissions in 2050. The Proposed Development is assessed as ‘paying back’ the GHG emissions emitted during its lifetime in less than a year (approximately 10 months).

9.2.6 The Proposed Development will deliver a range of other environmental, social and economic benefits that are material. These benefits include:

- **Environmental benefits**: RED has made a commitment to deliver Biodiversity Net Gain (BNG) of at least ten percent for all onshore and intertidal (above the low water mark) habitats subject to permanent or temporary losses as a result of the construction and operation of the Proposed Development.
- **Social and economic benefits**: The potential employment during construction at the UK level is equivalent to 4,040 full time equivalent (FTE) jobs per annum. In the operational phase it is expected that there will be 40-50 direct FTE and approximately 500 FTE jobs arising from supply chain expenditure supported across the UK. The overall level of supply chain expenditure retained by local businesses is anticipated to generate around £30.1 million (in 2019-pricing) for the Sussex economy (over a construction period of up to four years). The expenditure retained locally is estimated to support around 80 FTE jobs over the construction phase. In the operational phase potential direct, indirect and supply chain jobs based within Sussex will equate to 100-110 jobs. This, in turn, will support the aims and objectives of local economic strategies.

9.2.7 It is therefore concluded that this element of the Exception Test is considered passed.

Flood risk

9.2.8 Part 2 of the Exception Test requires that the FRA must demonstrate that the Proposed Development 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. This has been covered in this assessment and discussed further in **paragraphs 9.2.9** to **9.2.13**.

9.2.9 As set out in **Table 4-2**, construction (and enabling) works and the onshore cable itself are considered to be Essential Infrastructure, and thus are appropriate in Flood Zones 1 and 2, but require the Exception Test to be passed in order to be considered ‘appropriate’ development in Flood Zones 3a and 3b.

9.2.10 The onshore cable corridor intersects Flood Zone 3 in numerous locations as shown in **Figure 26.2.2, Annex B**. However, as described in **Section 6.2**, the onshore cable infrastructure is resilient to flooding, will not pose a safety risk, and will not cause an increase in flood risk elsewhere. It is concluded that the location of the cable in Flood Zones 3a and 3b is consistent with Exception Test requirements.

9.2.11 With respect to the construction and enabling works that will occur in Flood Zones 3a and 3b, both the works themselves, and the temporary construction infrastructure (temporary construction access tracks and working areas) should be considered. The safety of the construction workers will be ensured through effective implementation of the Emergency Response Plan for Flood Events (**Section 8.2,** measure C-118), together with the standard approach to works programming, which requires that certain works are not undertaken during inclement weather and programmed to occur during summer/autumn where possible (measure C-117).

9.2.12 In terms of the temporary construction infrastructure, this will itself be resilient to occasional flooding. Furthermore, the construction phase infrastructure to be located Flood Zone 3 will only be in place for only a limited period owing to the owing to the limited construction period of four years, which will reduce the likelihood of the temporary construction structures being present at the time of a flood. With respect to flood risk elsewhere, the location specific measures proposed in **Section 8.1** will ensure that the flood risk to third party receptors will not be increased.

9.2.13 It is concluded that the placement of temporary construction phase infrastructure in Flood Zone 3a and 3b is consistent with Exception Test requirements, and that the Exception Test will be able to be passed for the ES.

9.3 Functional floodplain

9.3.1 As set out in **Section 6.2**, such effects on floodplain storage and flows have been scoped out of the assessment on the basis that the onshore cable corridor infrastructure in areas of flood risk will be designed and reinstated to have negligible effect on the risk or displacement of water since there will be no permanent above ground features that may pose a material change to water flow.

9.4 Coastal change vulnerability assessment

9.4.1 As set out in **Section 7,** a coastal change vulnerability assessment has been undertaken in accordance with the guidance set out in the NPS EN-1 (DECC, 2011a; DESNZ, 2023a), NPPF (MHCLG, 2021) and accompanying PPG (MHCLG, 2022).

9.4.2 The risk of the Proposed Development to the coastal geomorphological processes has been considered in detail in **Appendix 6.1: Coastal processes technical report: Baseline description, Volume 4** of the ES (Document Reference: 6.4.6.1) and is considered to be low.

9.4.3 The geomorphological reports from the Environment Agency (2020a and 2020b) describe the coastal evolution and recession of the coast at the landfall location and as a basis to inform the risk of future coastal erosion to landfall infrastructure. Whilst there is noted uncertainty with respect to this section of coastline, the landfall transitional joint bay is sited landward of the most conservative future coastline estimate.

9.4.4 Further ground investigation will be carried out at the landfall location post-DCO submission, as outlined in commitment C-247 (**Commitments Register** (Document Reference: 7.22)) and secured with DCO Requirement 8 with the **Outline CoCP** (Document Reference: 7.2). This will inform the exact siting and detailed design taking into account geotechnical considerations and future coastal erosion. The investigation will identify the need for and design of any further mitigation and adaptive measures to help minimise the vulnerability of assets from future coastal erosion and flooding.

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10. Summary and conclusions

10.1 Summary

10.1.1 This FRA provides an overview of the potential flood risks to the onshore elements of the Proposed Development, including its construction, and its potential impact elsewhere. Both flood risks 'to' and flood risks 'from' the Proposed Development are considered.

10.1.2 This FRA has been prepared in accordance with the extant NPS EN-1 (DECC, 2011a) which sets out planning policy with regard to NSIPs in the energy sector, and NPS EN-3 (DECC, 2011b) and NPS EN-5 (DECC, 2011c) which cover renewable energy infrastructure and electricity transmission and distribution, respectively. The FRA has also considered the revised draft 2023 NPS documents (DESNZ 2023a; DESNZ 2023b and DESNZ 2023c), which include further specific flood risk guidance.

10.1.3 Reference has also been made to the NPPF (MHCLG, 2021) and associated PPG (MHCLG, 2022) where relevant for additional guidance regarding flood risk and development, as appropriate. Consultation with key stakeholders, including the Environment Agency, and West Sussex County Council (the LLFA) has also informed the development of this FRA.

10.1.4 With due consideration of the temporary nature of many of the Proposed Development, which is only required during construction of the onshore cable corridor, the approach taken in this FRA is considered to be proportionate to the risk and appropriate to the scale, nature and location of the Proposed Development.

10.1.5 All flood risks associated with the construction, and operation and maintenance of the onshore cable corridor and onshore substation have all been considered. Sections of the onshore cable corridor traverse the low-lying lower River Arun floodplain, and the River Adur catchment.

10.1.6 In terms of the permanent onshore development, the onshore substation at Oakendene and extension to the existing National Grid Bolney substation are the only aspects of the permanent infrastructure that will be situated above ground. Both the onshore substation at Oakendene and existing National Grid Bolney substation extension works are situated in Flood Zone 1. Surface water run-on and run-off (as well as the potential for flooding from minor nearby ordinary watercourses) have been considered in the outline operational drainage plans in the **Outline Operational Drainage Plan** (Document Reference: 7.1) for the onshore substation at Oakendene and existing National Grid Bolney substation extension respectively, and will be considered further at detailed design stage when preparing the Operational Drainage Plan.

10.1.7 All permanent infrastructure associated with the onshore cable will be buried and flood resilient. In combination with the appropriate embedded environmental measures set out in **Section 8** (to avoid any permanent raised structures associated with the buried onshore cable), the operational elements of the Proposed Development are anticipated to have a negligible impact on flood risk.

10.1.8 For the construction phase, flood risk receptors include the temporary construction activities themselves (including workers), plus third-party receptors for which flood risk could (in the absence of appropriate measures) be increased as a result of the works. Flood risks associated with fluvial, tidal, surface water, groundwater and artificial sources have been identified as being potentially significant during the construction phase of the Proposed Development. Similar risks will also apply during periodic operation and maintenance phase.

10.1.9 A number of flood risk management measures are proposed (detailed in **Table 8-1**) in order to mitigate the potential flood risks associated with the construction phase of the Proposed Development. These are summarised below.

- SuDS will be employed to manage surface water, for all elements of the temporary and permanent development, areas of temporary hardstanding, such as temporary construction access tracks, working areas and compounds will be constructed with semi-permeable aggregate surfaces, and infiltration will be encouraged where appropriate (C-73 and C-140).
- Permanent onshore cable crossings to minimise impacts on watercourses, such as no in-channel crossings (all crossings beneath the bed of watercourses, C-122), use of trenchless techniques for crossing Main Rivers (and under flood defences) and spanning floodplains where possible (for example in the River Adur catchment, C-5).
- Temporary crossings to minimise impacts on watercourses, such as no temporary crossings for Main Rivers, clear span bridges to be used for temporary crossings too wide or deep to be crossed using temporary culverts, and where temporary culverts are to be used these will be appropriately sized to maintain existing flow conveyance and be in place for the minimal time possible (C-126).
- Wherever possible, the creation of raised structures, such as stone haul / temporary construction access roads and stockpiles, will be avoided in the fluvial floodplain. Trackway will be used or the road level will be kept as close to the ground surface as possible and soil stockpiles will be located outside of the fluvial floodplain wherever practicable (C-119 and C-175).
- Measures will be taken to mitigate against any potential effects of temporary soil stockpiles on flood risk, such as provision of gaps in topographic low points and at regular 4:1 intervals to allow water to flow (C-132).
- Reinstatement post-construction with the land above reinstated to pre-construction ground level (in the fluvial floodplain in particular, C-154).
- Temporary construction compounds will be located in Flood Zone 1 and runoff rates from these areas will be limited to pre-development rates using appropriate sustainable drainage measures, delivered through site-specific drainage strategies incorporating SuDS principles (C-73).
- Stand-off distances from watercourses (both temporary construction works in general and for stockpiling of topsoil) other than for watercourse crossings (C-135 and C-130).

- Preparation of an Emergency Response Plans for Flood Event for construction activities located in floodplain areas, and those areas outside of the floodplain that require access / egress through it (C-118).

10.1.10 During the operation and maintenance phase, there will also be a minor flood risk to site operatives during any maintenance activities. As outlined in **Section 8.5**, embedded environmental measures have been included to ensure that appointed contractors consider the Environment Agency flood warnings for any work within the floodplain and enact accordingly. These operation and maintenance procedures will be updated throughout the operational lifetime of the Proposed Development, reflective of the flood risk understanding and warning arrangements at the time of the works.

10.2 Conclusions

10.2.1 It is concluded that the Proposed Development, with the flood risk management measures described above (**Table 8-1** and **paragraph 10.1.9**) in place, will not be subject to an unacceptable level of flood risk, nor will it increase flood risk elsewhere. It will not result in a net loss of functional floodplain storage or impede water flows.

10.2.2 Sufficient evidence to demonstrate that the Sequential Test has been passed has is provided, and that a sequential approach has been applied within the proposed DCO Order Limits such that the vulnerable land uses will be located in Flood Zone 1 (and taking account of other sources of flooding too). In accordance with the guidance in the NPPF (MHCLG, 2021), the Proposed Development is appropriate for the flood zone classification and where necessary the Exception Test is considered to be passed.

10.2.3 Suitable flood risk management measures have been identified to address the risks identified, including residual risks, including the preparation of Emergency Response Plan for Flood Events to address residual risks (C-118), the use of SuDS to manage surface water (C-73 and C-140) and a range of measures to ensure risks and impacts during the construction phase are managed appropriately. The operational development will be resilient to the most extreme climate change allowances that are considered feasible over the development's lifetime, and therefore the identification of future adaptation measures considered unlikely to be necessary.

10.2.4 With consideration of the temporary nature of many of the onshore elements of the Proposed Development, the approach undertaken in this FRA is considered to be proportionate to the risk and appropriate to the scale, nature and location of the Proposed Development.

10.2.5 In conclusion, this assessment demonstrates that the requirements of NPS EN-1, NPS EN-3 and NPS EN-5 (DECC, 2011a; 2011b; 2011c; DESNZ, 2023a; 2023b; 2023c) and the NPPF (MHCLG, 2021) and its associated PPG (MHCLG, 2022) with respect to flood risk have been met. The flood risk management measures identified in the **Commitments Register** (Document Reference: 7.22)) are secured through DCO Requirements.

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11. Glossary of terms and abbreviations

Term (Acronym)	Definition
ABD	Areas Benefitting from Defences
AEP	Annual Exceedance Probability
Air Insulated Substation (AIS)	Consist of components where active parts on high voltage are located outside open to the atmosphere.
AOD	Above Ordnance Datum
AStGWF	Areas Susceptible to Groundwater Flooding
Baseline Conditions	The environment as it appears (or would appear) immediately prior to the implementation of the Proposed Development together with any known or foreseeable future changes that will take place before completion of the Proposed Development.
BGS	British Geological Survey
CBS	Cement bound sand
CCMA	Coastal Change Management Area
CCVA	Coastal Change Vulnerability Assessment
CION	Connections Infrastructure Option Notice
Code of Construction Practice (CoCP)	The code sets out the standards and procedures to which developers and contractors must adhere to when undertaking construction of major projects. This will assist with managing the environmental impacts and will identify the main responsibilities and requirements of developers and contractors in constructing their projects.
Development Consent Order (DCO)	This is the means of obtaining permission for developments categorised as Nationally Significant Infrastructure Projects, under the Planning Act 2008.

Term (Acronym)	Definition
Development Consent Order (DCO) Application	An application for consent under the Planning Act 2008 to undertake a Nationally Significant Infrastructure Project made to the Planning Inspectorate who will consider the application and make a recommendation to the Secretary of State, who will decide on whether development consent should be granted for the Proposed Development.
DECC	Department of Energy and Climate Change
DESNZ	Department for Energy Security and Net Zero
Defra	Department for Environment, Food and Rural Affairs
Environmental Impact Assessment (EIA)	The process of evaluating the likely significant environmental effects of a proposed project or development over and above the existing circumstances (or 'baseline').
EPP	Evidence Plan Process
Environmental Statement (ES)	The written output presenting the full findings of the Environmental Impact Assessment.
ERP	Emergency Response Plan
ETG	Expert Topic Group
EU	European Union
FOC	Fibre Optic Cable
FRA	Flood Risk Assessment
FRAP	Flood Risk Activity Permits
FRSA	Flood Risk Screening Assessment
FTE	Full Time Equivalent
FZ	Flood Zone

Term (Acronym)	Definition
Gas Insulated Substation (GIS)	Gas insulated substation consist of components where active parts on high voltage potential are insulated in pipes filled with gas and located within a building.
Horizontal Directional Drill (HDD)	An engineering technique avoiding open trenches.
HGV	Heavy Goods Vehicle
HRA	Habitats Regulations Assessment
IDB	Internal Drainage Board
IDD	Internal Drainage District
km	kilometre
LLFA	Lead Local Flood Authority
mgbl	metres below ground level
MHCLG	Ministry of Housing, Communities & Local Government
MHWS	Mean High Water Springs
N/A	Not applicable
NGET	National Grid Electricity Transmission
NGR	National Grid Reference
NPPF	National Planning Policy Framework
NPS(s)	National Policy Statement(s)
NSIP	Nationally Significant Infrastructure Project
PEIR	Preliminary Environmental Information Report

Term (Acronym)	Definition
PPG	Planning Practice Guidance
Proposed Development	The development that is subject to the application for development consent, as described in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4).
Rampion 1	The existing Rampion Offshore Wind Farm located in the English Channel in off the south coast of England.
RAMS	Risk Assessment Method Statement
RBMP	River Basin Management Plan
RED	Rampion Extension Development Limited
RoFSW	Risk of Flooding from Surface Water
SDNPA	South Downs National Park Authority
SFRA	Strategic Flood Risk Assessment
SoCG	Statement of Common Ground
SuDS	Sustainable Drainage System
TCE	The Crown Estate
UK	United Kingdom
UKCEH	United Kingdom Centre for Ecology and Hydrology
WSCC	West Sussex County Council
WTGs	Wind Turbine Generators

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Annex A
Meeting minutes

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Meeting Minutes

Date: 09/11/2020 – 14:00 **Meeting at:** Teams

Subject / purpose:

Consultation meeting on Climping Sea Flood Defences, Internal Drainage Board and general flood risk matters

Attendees:

[redacted]SB) (Environment Agency) - Planning Officer for Rampion 2
(AJ) (Environment Agency) - Partnership and Strategic Overview (flood risk)
[redacted]RF) (Environment Agency) - Catchment engineer (flood risk assets) - South Downs area - Operations and Maintenance
[redacted] (RC) (Wood) – Flood Risk Assessment

Apologies:

[redacted] (GD) (Wood) – Water Environment Assessment technical lead

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Meeting Minutes:

1 **Introduction**
SB confirmed that she is the Environment Agency's planning contact for the Rampion 2 project.
RF advised that his role includes the management of the Climping Sea defences.
AJ advised that he will be reviewing the flood risk elements of the project. He has experience from working on Rampion 1. His role also includes the River Arun Internal Drainage Board (IDB) consents.
RC advised that he is a flood risk assessment and sustainable drainage specialist working on the Rampion 2 project.
GD apologies. RC will defer to GD for matters relating to the wider Water Environment assessment beyond flood risk and drainage.

2 **Selection of landfall location at Climping**
AJ and RF agreed in principle with the selection of Climping for the landfall location. This is on the basis that there are no other reasonably available locations along that stretch of coast to make landfall that are not already developed (other options would involve trying to thread the cable through or under areas of existing built development. RC welcomed this support for the

selected landfall location, which will be of relevance for the Sequential Test as the location of the cable route through the floodplain behind the sea defence is necessary if the landfall is to be located there.

3 **Climping Sea Defences and Strategy**
RF provided a background to the sea defences in the vicinity of the proposed landfall location for the cable (the section between the Climping Beach Site of Special Scientific Interest (SSSI) in the east and the beach fronting car park in the west).

4 Overview of the defence: This section of sea defence at the proposed landfall and to the west (the straight section) is formed by a shingle beach, which has been formed into a non-natural shingle embankment (which is actively managed to provide a 1 in 200 year standard of protection at present). This section of defence is considered to be 'very vulnerable', not just to overtopping, but also erosion and natural coastal realignment - the coast wants to be further inland. For further context, the road to the west of the proposed landfall location which now leads out to sea used to lead to further properties which have been lost to the sea over the years. The lowest point of this vulnerable defence corresponds with the preferred location for the proposed landfall. To the immediate east of the proposed landfall (including the SSSI) the defence is formed by a natural shingle bank. This is considered to be the most sustainable type of defence in the area. It is expected to be present for the long term.

5 Long term Strategy for the defence: Flood and Coastal Risk Management Strategy completed in 2015 for Climping (the rest of the strategy was completed in 2012). The landfall is in the Arun to Pagham section (Climping flood cell). The Climping frontage posed a particular challenge, with particular interest from the community, which includes properties at risk of tidal flooding. The long term strategy is to allow natural processes to reform the non-natural section into a natural embankment (including at the landfall) similar to that already present immediately to the east. This would result in a shift of the coastline landwards (natural realignment). The Environment Agency has estimates for where the new shoreline frontage will be. A geomorphological report (2019/2020) for informing the community as to how the frontage will look once the Environment Agency stop maintaining the defence has been prepared. RF believes that this has been released to the public and thus could be released to the Rampion 2 project, albeit the Environment Agency would likely request that this is treated as confidential if provided. **Action 1: SB/RF to investigate sharing the geomorphological report for the future Climping shoreline with the Rampion 2 project.** **SB/RF**

6	Short term Strategy for the defence: In the meantime, the 2015 strategy was to maintain (patch and repair) that stretch of vulnerable coastal defence for as long as possible with the financially limited budget available. The budget is limited as the justification for large expenditure is not there – the social and economic benefits of the sea defence are limited. Analysis was undertaken at the time to justify this approach. **Action 2: SB/RF to send information on the 2015 strategy (covering both the long and short term strategy for the Climping shingle defences).**	**SB/RF**
7	Storm Keira: The approach of patch and repair was expected to extend the life of the existing defence in its present location to between 15 and 30 years depending on the weather, but with the acknowledgement that one big storm could do irreparable damage to the defences. Unfortunately, this occurred in February 2020 when Storm Keira resulted in the shingle defence being 'overwashed' (not a breach).	
8	Post-Storm Kiera: Works to reform the defence were undertaken following Storm Keira. This involved pushing the shingle to reform the embankment. Further shingle 'recycling' has occurred to improve the defence in the last month (and the car park to the west too). Shingle beach now provides a Standard of Protection similar to before Storm Keira. The defence is more-landward than it was before Storm Kier, which is considered to be a more sustainable position. RF advised that they have LiDAR for the recently completed works to the defence. **Action 3: SB to investigate sharing the LiDAR information on the shingle defence with the Rampion 2 project.**	**SB**
9	The shingle defence is not impermeable. Recent high tides led to water seeping through and ponding behind – this then drains away to the north to the Ryebank Rife (an Environment Agency Main River).	
10	**Micro-siting of landfall location** In light of the vulnerability of the defence at the preferred landfall location, RC enquired about the value in shifting the landfall slightly further to the east, so the landfall passed beneath the existing natural shingle embankment. RF advised that this is a stable defence but of the same type (shingle). No major concerns were raised against such an approach, but no preference for this either. Only that it would not require such a setback distance as the defence is more 'stable'/less liable for realignment further inland. RF and AJ acknowledged the presence of the SSSI further to the east, to be avoided. RC noted that the interface with/standoff distance from the SSSI would be a question for Natural England, addressed by the Terrestrial ecology team. AJ also mentioned the potential for archaeology on the beach (metal detectorists).	

11 **Location of the Transition Joint Bay with respect to the Climping Defence**
RC described how a transition joint bay (TJB) will be required behind the defence to join the offshore cables to the onshore cables (different type of cables). SB enquired how far behind the coast would the TJB would be and whether these would be at risk if the defence moved inland via the natural realignment discussed previously. RF and AJ advised that siting the TJB set back by 50m to 100m might be sufficient. RC advised that the TJB is likely to be resilient to flooding, so provided the coastal realignment matter can be resolved, the flood risk to the TJB itself should not be a significant concern.

12 **Flood cell behind the Climping defences – including Rope Walk community**
As discussed previously, in the medium to longer term, there is a high likelihood that Environment Agency will cease maintenance of the existing coastal frontage where the landfall is proposed. The defence will continue to deteriorate over time, including the standard of protection provided by the defence to the land behind (less than 1 in 200 standard of protection in the future). This will result in an increase in flood risk in the Climping flood cell through which the proposed cable route will need to pass. The flood cell covers the land between the A259 (Ferry Road) and the River Arun (South of the west bank) and includes some houses, some permanent static caravans and the Rope Walk community

13 RF advised that the strategy identified that defences are needed on both sides, to protect the community against flooding propagating from both the river and the sea frontage. Unfortunately, such an approach is uneconomic according to the existing Government funding mechanism. The Environment Agency continue to investigate options, with the Environment Agency and the community currently looking for other ways to protect the area. The community would welcome a contribution from the Rampion 2 project to help fund flood defence improvements. **Action 4: SB/RF to send information on the strategy for the Rope Walk community/Climping Flood Cell**. **SB/RF**

14 **Existing property adjacent to the SSSI and the Golf Course**
RF advised that another community issue associated with the Environment Agency's long-term strategy for natural realignment is that posed by the private access road along the existing sea defence frontage. The residential property to the east of the landfall (next to the Golf course) is accessed via the track along the existing sea defence. This currently requires a four-wheel drive to access. The owner would be interested in any options that facilitated a new permanent access. RC advised that a number of potential options to gain construction access to the landfall location are being investigated, but could not confirm whether these were temporary or permanent. One potential route could be alongside the cable route itself from Ferry Road.

RF highlighted that the Environment Agency would be supportive of any approach that facilitated an alternative access for this property that avoided access along the shingle sea defence.

15 **Flood Risk Assessment in the tidal and fluvial floodplains**
It was agreed that loss of floodplain storage due to any temporary raised structures would not require compensation in the tidal floodplain. However, any loss of floodplain volume in the fluvial floodplain would require assessment and potentially compensation if any receptors were identified at increased flood risk as a result. AJ suggested that the fluvial extents in the tidal floodplain between Littlehampton and Climping are likely to be less extensive than the tidal extents, thus reducing the potential for flood risk impacts.
AJ advised that Ryebank Rife discharges via the marina and is thus is subject to tidelocking – it can only discharge when the Arun is at low tide.

16 **Other flood defences**
RC queried whether there are any other flood defences present along the route, defences that might not be to the 100 or 200 year standard of protection necessary for inclusion in the online Flood Map for Planning. AJ advised that they are not aware of any additional inland defences. Reference was also made to the Lower Tidal River Arun Flood Risk Strategy, which is publicly available.

17 **Watercourse crossings**
AJ advised that, alongside flood risk, ecological considerations may also apply with respect to the crossing type. For example, below bed (trenchless) crossings would likely be preferred where there is a particularly valuable (ecologically) stream.

18 **Permits and consents**
AJ advised that the Environment Agency would issue Flood Risk Activity Permits (FRAPs) for the Main Rivers and Land Drainage/Flood Defence Consents for the watercourses in the Arun IDB District (discussed further below). It is the Environment Agency's preference for permits/consents to be grouped (multiple crossings in one application) for efficiency. For example, one permit for 4-5 watercourses with the same crossing type. RC advised that this will likely be welcomed by the contractor, once the project reaches that stage, likely post-gaining planning consent.

19 **Internal Drainage Board**
A discussion was held on the Arun IDB District. AJ advised that the Environment Agency are the IDB body, but have been in the process of trying to dissolve the District.

20 RC queried the existence of byelaws and whether these apply to 'maintained' drains in the district. AJ confirmed the existence of the West Sussex Internal Drainage Board Byelaws, but that these are 50 to 60 years old and are not referred to often.

AJ advised that there are not specific 'maintained' watercourses that the byelaws apply to. Any works within 5m of any watercourse bank top within the district require consent, i.e. the need for consent applies to all the drains, whether they are maintained or not. The consents for the IDB area are not anticipated to be complex on the basis that the IDB is not providing a flood purpose here - it is for land drainage. **AJ**
AJ advised that some ditches are quite deep and quite wide (lowland drainage). Historically work was undertaken on the main drains, but works can be undertaken on any drain. AJ pointed out that irrespective of the presence of the IDB, the ultimate responsibility for maintaining watercourses rests with the riparian owner.
AJ has paper copies of maps with named watercourses and drains. **Action 5: AJ to provide copies of the IDB maps (which name the watercourses and drains)**.

21 **Tidal limit of River Arun**
The River Arun is a tidal river for some distance inland. It has a major tidal flow with a range of 16m. The tidal limit is at Pallingham Lock (20km inland, beyond Pulborough).

22 **River Adur**
The River Adur is also a tidal river for some distance inland. This extends upstream beyond the confluence of the east and west branches of the River Adur. South (downstream) of the confluence the river is known as the River Adur Tidal, but the tidal extent extends upstream.
The West Branch of the River Adur is tidal to beyond Bines Green. The tidal limit coincides with the end of the Environment Agency flood defences shown in the Flood Map for Planning. Just upstream of the confluence is Merions Penstock on the West Branch. Upstream of this the floodplain is regularly inundated during winter for a long duration (2-3 months). The penstock boards are closed in summer to retain water in the upper catchment. The gates are open in winter. Pinlands Farm
The East Branch of the River Adur is tidal to the gauging Station near St Giles Church at Shermanbury, but only that far during the largest tides. Water is not saline that far upstream. Just upstream of the confluence is Chates Weir on East Branch. As per the West Branch, upstream of this the floodplain is regularly inundated during winter for a long duration (2-3 months). The penstock boards are closed in summer to retain water in the upper catchment. The gates are open in winter. The East Branch is subject to significantly more flow than the west branch due to higher rates of run-off from the contributing catchment which is more developed.

23 RC queried the long term flood risk strategy for the River Adur. AJ advised that this would likely involve maintenance of defences, but that the Environment Agency are also looking into managed realignment at selected locations. RC requested further information on this where such managed realignment **AJ and/or SB**

could coincide with the proposed cable route. AJ advised that a strategy report is not available. **Action 6: AJ and/or SB to provide information on any known plans for managed realignment (discussion was focussing on the River Adur catchment) where this might coincide with the proposed cable route.**

24 **Timing of cable construction works**
AJ provided advice on timing of cable construction works. AJ recommended that works in the floodplains is undertaken in late summer/autumn because the watercourses regularly flood in winter for durations of months at a time. The largest of floods are equally likely to occur in the summer, but the duration of summer floods are short (days) rather than months. RC enquired whether this advice applied to the smaller watercourses as well. AJ advised that there is less certainty for the smaller watercourses as these are visited less often.

25 AJ also noted that late summer/early autumn timing for works in and around watercourses/floodplains would avoid bird nesting and fish spawning seasons. Also potential water vole habitat. An example of where this timing recommendation would apply would be where the cable route passes Merions.

26 **AOB**
SB and AJ queried whether there is a way to join up with the existing Rampion 1 route up near Bolney. RC advised that this is a matter the designers have likely considered (when considering route options and alternatives) and not something he can advise on.

27 SB welcomes opportunity to discuss groundwater Source Protection Zones SPZs. RC advised that this would be a matter for the Water Environment technical lead for the project, i.e. GD.

28 SB also advised that funding is in place for future flood risk consultation to occur as necessary on the Rampion 2 project. RC welcomed the opportunity for further consultation if the project team has any further questions, but otherwise the next consultation would likely be on the content of the flood risk screening report (rather than a full risk assessment) to accompany the PEIR, to provide the Environment Agency with an idea of what to expect.

Actions Summary

- SB/RF to investigate sharing the geomorphological report for the future Climping shoreline with the Rampion 2 project.
- SB/RF to send information on the strategy (covering both the long and short term strategy for the Climping shingle defences).
- SB to investigate sharing the LiDAR information on the shingle defence with the Rampion 2 project.

- SB/RF to send information on the strategy for the Rope Walk community/Climping Flood Cell.
- AJ to provide copies of the IDB maps (which name the watercourses and drains)
- AJ and/or SB to provide information on any known plans for managed realignment (discussion was focussing on the River Adur catchment) where this might coincide with the proposed cable route.

Meeting Minutes

Date: 22 March 2022 14:30 – 15.30 **Meeting at:** Online – Microsoft Teams

Subject / purpose:

Rampion 2 – Flood risk – onshore construction activities in the floodplain

Attendees:

[redacted]ampion Extension Development Limited (RED) (AB)
[redacted]ED (MH)
[redacted]Vood Group UK Limited (Wood) (GD)
[redacted]e – Wood (RC)
[redacted]ki – Wood (JZ)
[redacted] Wood (PH)
[redacted]ood (IM)
[redacted] – Wood (BR)
[redacted] Environment Agency (SB)
[redacted]Environment Agency (TL)

Apologies:

None

Actions summary	
Rampion 2 Project Team (GD) to provide TL with a visual representation of the construction proposals in the floodplain, where the soil strip and excavations would occur, where would the stockpiles be located.	**GD**
GD/RC to provide TL with map of locations of stone temporary construction haul roads and material being moved and a visual representation of the potential changes being made.	**GD/RC**
Rampion 2 Engineering team (IM/PH) to confirm what permanent development would be created, including any permanent roads.	**IM/PH**
RC and JZ to check with the project team and revert to SB to confirm whether flood risk activity permits will be disapplied at DCO Application submission.	**RC/JZ**

Topic of discussion:	Actions
1 **Welcome and introductions** JZ introduced the meeting. 2 **Project update** JZ noted that the formal consultation has currently reopened due to missed addresses in the postal leafleting campaign. This will run for 9 weeks from 7 February 2022 until 11 April 2022. The responses from the initial consultation have been analysed and are feeding into the ongoing design change process, as will the responses received from the re-opened consultation. There will be further targeted formal consultation in Q2 2022 which will focus on proposed revisions to the Preliminary Environmental Information Report (PEIR) Assessment Boundary. The date of this will be advised in due course. All consultation responses will feed into ongoing refinement of the onshore part of the PEIR Assessment Boundary and the removal of optionality to reach a final Development Consent Order (DCO) Application Assessment Boundary. Onshore winter and spring survey work is currently being undertaken in line with the survey programme. **Programme movement** Indicative timing of the DCO Application submission is now expected to be in late summer 2022 rather than Q1 2022 previously communicated. This will be updated in due course. 3 **Rampion 2 PEIR proposals and high-level refresh** RC shared a map (PEIR Figure 27.2.2 ‘Flood Map for Planning’) as shown on the accompanying slides (Slides 4-7). The onshore cable corridor crosses Environment Agency flood zones at the southern extent (landfall) and at the north-eastern extent near both of the proposed onshore substation search areas. There are no flood zones in the central sections of the onshore cable corridor which extend across the South Downs National Park area. RC highlighted the area of focus for this meeting – the Arun Internal Drainage Board (IDB) district. This is at the southern extent (landfall) of the onshore cable corridor, with the chainage starting at 0km and extending to approximately 6km. RC pointed out that the flood zones associated with the River Adur (at the north-eastern extent of the onshore cable corridor) are narrow in comparison to the section of the onshore cable corridor through the IDB, with lots of available	

space nearby outside of the floodplain in which construction activities could be undertaken.

4 Fluvial flood maps

RC provided a quick update on the PEIR approach on the Flood Risk Screening Assessment (FRSA). This was a recap of what had previously been discussed and agreed at the earlier PEIR stage with SB, Adrian Jackson and Richard Fuller (Environment Agency).

RC noted that ahead of PEIR on 6 November 2020, the Environment Agency advised that loss of floodplain storage in the tidal floodplain was not a concern, but loss of floodplain storage in the fluvial floodplain would need to be considered. RC presented PEIR Figure 27.2.4 'Fluvial Flood Extents Littlehampton' (Slide 8) which shows the Environment Agency's Lower Arun modelling study flood extents, covering 5% Annual Exceedance Probability (AEP), 1% AEP and 1% AEP plus climate change allowances (+20% increase in peak fluvial flow). RC outlined that based on the latest guidance this 20% would cover the climate change allowance needed for the lifetime of the development, whilst also reminding the Environment Agency that the only permanent above ground development would be the onshore substation at the north-eastern extent of the Proposed Development, with the cabling all underground and flood resilient once constructed.

To provide a refresh of the fluvial flood scenarios, RC presented a series of zoomed in images of PEIR Figure 27.2.4 Fluvial Flood Extents (as shown on slide 8), highlighting the extent at various sections and for various events. RC noted that the 1% AEP plus climate change scenario is shown extensively between the 1km and 2km chainage areas. There is a short section of Flood Zone 1 (between sections of the railway line and near Brookbarn Farm) which is outside the fluvial (and tidal) flood extents. There is also an extensive overlap with the 5% AEP fluvial flood extent throughout the IDB district, associated with the functional floodplain.

RC noted that where the PEIR Assessment Boundary protrudes from the swathe that this represents construction access areas. RC also noted that temporary construction compounds are located outside of the fluvial and tidal flood plain areas.

RC noted that main rivers (and other major linear infrastructure such as railway lines and major roads) would be crossed via trenchless methods, such as Horizontal Directional Drill (HDD). RC noted that temporary trenchless crossing compounds have been located outside of the floodplain wherever possible simply to minimise flood risk during the construction phase as much as possible. However, this was not possible in the IDB district, due to the extensive extent of the floodplain at that location. Consequently, the trenchless crossing compounds near the 2km and 3km chainages would be within the floodplain.

5 PEIR – potential flood risks

RC provided a brief summary of the approach taken in the PEIR FRSA, with regard to the loss of fluvial floodplain storage. It was identified in the FRSA that temporary raised structures in the fluvial floodplain during construction works could lead to a loss of floodplain storage and thus an increase in water levels elsewhere. Whereas the potential for such impacts in the tidal floodplain is considered to be negligible due to the extreme volume of water associated with the sea exceeding the potential lost floodplain storage. RC outlined that this approach was agreed with Adrian Jackson prior to the PEIR on 6 November 2020, and no suggestion was made by the Environment Agency that this should be reconsidered.

6 Wording of PEIR commitments

RC provided a refresh on the various flood risk measures which were included in the PEIR FRSA to address the fluvial flood risk associated with construction activities in the floodplain. RC drew particular attention to PEIR commitments C-6, C-11 and C-12. These commitments included keeping raised structures (such as stockpiles or raised stone haul roads) to a minimum in the fluvial floodplain and to avoid them entirely in those areas where potential third-party receptors have been identified that could be impacted (see point 9). At PEIR stage, it was identified that this would be achieved by the temporary stockpiling of excavated soil to the outside of the fluvial floodplain and/or using trackway (or similar) for the temporary construction haul road, where possible. This approach was primarily identified to address the potential risks in the IDB area through which trenchless crossings cannot avoid the fluvial floodplain entirely. Along the rest of the onshore cable corridor, it is easier to keep excavated soils out of the floodplain areas, either because trenchless crossings would cross from one side of the floodplain to the other, and/or the floodplain is sufficiently narrow such that areas in Flood Zone 1 is available nearby for soil storage. RC noted that the PEIR FRSA highlighted that, if necessary, because of any challenges in adhering to these flood risk measures, further assessment could be undertaken in the final Flood Risk Assessment (FRA) to accompany the Environmental Statement (ES). This further assessment would focus on specific receptors identified to be at risk (and any additional receptors identified following the original PEIR).

RC also outlined that the PEIR FRSA included a range of other commitments relating to soil stockpiles. These included:

- having regular gaps in the tidal floodplain to prevent compartmentalisation;
- gaps at topographic low points; and

- ensuring that no stockpiles are stored within 8m of an ordinary watercourse, within 8m of a non-tidal main river and within 16m of a tidal main river.

7 **Reasons for revisiting PEIR commitments**

RC advised that the flood risk measures as set out in FRSA Appendix 27.2, Table 7.1 at PEIR were now being reconsidered in light of further design information, improved understanding of wider engineering considerations, and other environmental constraints. Whilst trackway will remain a preference wherever possible, the anticipated size of the plant means that stone temporary construction haul roads are likely to be required where the ground is softer, including in the IDB floodplain. The contractor would likely need to provide a stone underlay for any trackway, thus negating the reason for using the trackway.

There is also a need to avoid unnecessary soil movements across significant distances to reduce other environmental impacts. Based on experience, a challenge from Natural England is anticipated on the need for moving soils significant distances, which would inherently require additional handling of soils.

Further challenges relate to construction vehicle movements associated with movement of all soil stockpiles outside of the floodplain:

- Traffic impacts (heavy goods vehicles (HGVs) potentially using the public highway to transport soil outside of the floodplain);
- Air quality and emissions;
- The requirement for a larger temporary construction haul road or a haul road with more frequent passing places (which in turn, requires the movement of even more soil to create the larger haul road); and
- Safety. The new onshore cable corridor options being considered since PEIR stage involve additional HGV crossings and temporary construction access to reach areas outside of the floodplain. Construction vehicle movements to transport soils outside of the floodplain will increase HGV traffic and thus the risk of accidents.

Consideration 1 – topsoil

RC set out the thinking behind the suggestion that topsoil should not need to be moved to outside of the fluvial floodplain. RC provided background to assist with the discussion. RC advised that one of the first construction activities along each section of the onshore cable corridor will be a topsoil strip to minimise impacts on the soil. A separate commitment (C-11) at PEIR stage covers this (i.e. not a flood risk related one). The topsoil is usually placed

alongside the location it was stripped from to facilitate rapid and accurate replacement of soils to the same location it was taken from upon the completion of construction works. It is anticipated that one of Natural England's primary concerns will be the condition of the soil and its return to its original location. Therefore, RC proposed the following approaches for agreement with the Environment Agency: i. The void created by the topsoil strip effectively offsets the volume of the resulting stockpile. As the stockpile would have gaps in it, the water could reach the void where the topsoil used to be. As such, the storage of the topsoil strip in the floodplain should not reduce the amount of overall flood storage, i.e. no requirement to relocate topsoil from the floodplain. ii. The impacts of floodplain conveyance associated with topsoil would be negligible on the basis of regular gaps in the stockpiles to facilitate floodplain flow. TL advised that he understood the theory behind what was being put forward but advised that he would like to take the question away before providing an opinion. TL advised that further information on the construction proposals would be beneficial in informing the Environment Agency's opinion. TL advised that the timescales involved will influence his decision. RC and IM confirmed a 300mm topsoil strip along the width of the onshore construction working area (approximately 30m wide) would likely be required. The working area would include a temporary construction haul road and trenches. In terms of timescale, the approach would be to undertake the strip, install the temporary construction haul road alongside undertaking the onshore cable trenching. The Contractor would lay ducts within the trenches and reinstate the soils over the ducts. These works generally proceed in sections of approximately 800m to 1km in length, between onshore cable joint bays. The onshore joint bays are then revisited at a later date to pull the cable through the ducts. This process would be in the order of a couple months in duration, for standard onshore trenching activities. Trenchless crossing activities (e.g. at locations like the River Arun and railway crossings) would take longer than standard onshore trenching activities but could be scheduled to effectively reduce the amount of time that soil is stored. The temporary construction haul road would stay in place until the onshore cable had been strung through the ducts, and in places provides access for the next section of construction. This potentially requires the temporary construction haul road to remain in place for a number of months to a year. TL advised that evidence to prove that the approach proposed would not impact the existing flood storage situation would be	**Rampion 2 Project Team (GD) to provide TL with a visual representation of the construction proposals in the floodplain, where the soil strip and excavations would occur, where would the stockpiles be located.**

required. RC asked TL for further clarification on what this evidence might look like. Also highlighting that the approach proposed intends to demonstrate that, by design, no impacts would occur and thus no modelling or calculations would be required (as there would be no loss to calculate). TL requested that information be compiled to provide a visual representation and that this should cover the following: • how the floodplain could be amended; • where the topsoil strip would happen; • where would the volume go; and • where would it be moved to would inform his advice/position. TL outlined that the amount of evidence required would likely be dependent on the floodplains in question and surrounding receptors, so this would need to be considered. TL would consult colleagues to get further steer on any evidence requirements, and any shared experiences from the Rampion 1 project for instance.	**GD/RC to provide TL with map of locations of stone temporary construction haul roads and material being moved and a visual representation of the potential changes being made.** **Rampion 2 Engineering team (IM/PH) to confirm if any permanent roads are planned.**
Consideration 2 – trenches RC set out the thinking behind the suggestion that soil from cable trenches topsoil should not need to be moved to outside of the fluvial floodplain, and provided background to assist with the discussion. After the topsoil has been stripped and temporary construction haul road created for the 800m to 1km section to be worked on, the cable trenches are then progressed incrementally, usually in 10m sections at a time. Four parallel circuit trenches were indicated at PEIR stage, which for each 10m section would be excavated in turn, ducts laid and backfilling as they go. At any one time there might only be one trench of limited length (10m) open at any one time, with very limited associated soil stockpile volumes, consistent with that taken out of the trench. The associated stockpiles would be open for very short timeframes, being backfilled over the same or the next day. It follows that relocating such small scale and very temporary stockpiles to outside of the floodplain to outside of the floodplain would not be proportionate to the risk. This is both unnecessary and impractical when considering the HGV movements that would be required. Soil will be returned no sooner than it had been relocated in most cases. RC proposed the following approach on the basis of the above: i. The void created by the trench excavation offsets the volume of the resulting stockpile. ii. Movement of soils excavated from cable trenches to outside of the floodplain is unnecessary and/or inappropriate.	

TL agreed with this approach in principle. TL noted that an emergency flood response plan would be appropriate. TL elaborated that it would be the standard sort of things like flood warnings and having a plan in place to mitigate for any forecasted flood events. RC confirmed that the PEIR (2021) has already committed to providing an emergency plan.	
Consideration 3 – stockpiles associated with the temporary construction haul road	
For the FRSA at PEIR stage in November 2020, it was agreed that if temporary trackway can be used for the temporary construction haul road, then the impact of this on floodplain and storage would be negligible. There were no objections to this approach in Section (S42) Consultation responses. However, due to heavy construction plant, it is unlikely that trackway would be suitable for the soft ground conditions in the IDB floodplain and a stone temporary construction haul road (and access roads) may be required.	
RC set out the thinking behind the suggestion that only soil stockpiles associated with the temporary construction haul road would need to be moved to outside of the fluvial floodplain (assuming agreement on Considerations 1 & 2 above). RC proposed the following approach: i. The volume of material requiring movement to outside of the floodplain (to avoid loss of floodplain storage) would be equal to that imported to create the stone temporary construction haul road.	**Rampion 2 Engineering team to confirm what permanent development would be created, including any permanent roads**.
TL agreed that this 'level for level' type approach is in theory sensible, but again requested further information on the timescale, location and visual representation of the construction works before providing a final position. RC advised that the stone temporary construction haul roads would be in place for a matter of months but could be in the region of a year in some locations where access to the next section is gained through the preceding one(s).	
TL reiterated that any change in the topography of the landscape could cause changes in flood water levels and that this should be taken into consideration. RC noted that, in line with the PEIR commitments, the height of the stone temporary construction haul road above the surrounding ground level would be minimised (acknowledging that some elevation would be needed for drainage off of the surface). TL acknowledged that on this consideration (3) it is unlikely that the topographic landscape would be changing much on the basis that material is being taken out of the floodplain and replaced with a different type of material. On this point TL noted that he would have greater concerns related to consideration (1) relating to the temporary changes in levels.	**RC and JZ to check with the project team and revert to SB to confirm whether flood risk activity permits will be disapplied at**
TL asked if there were any plans for permanent roads to be created to access infrastructure. RC's understanding is that all roads would	

be temporary, and the only permanent works would be the cables and the substation. the Rampion 2 Engineering team will confirm this.

DCO Application submission.

Temporary construction compounds

In relation to temporary construction compounds, RC also confirmed that they have all been steered outside of the floodplain. Generally, development has followed the sequential test at each stage to avoid proposals across existing flood risk areas as much as possible. TL confirmed that this type of approach follows the Environment Agency's advice.

Disapplication of environmental permits and consents

TL noted that Flood Risk Activity Permit(s) (FRAP) would be required, and perhaps IDB consents too. TL noted that the River Arun was an unusual situation in that the Environment Agency are the acting IDB. Therefore, in theory IDB consents would also be granted/needed by the Environment Agency. TL said whether this will be necessary is really an internal question for the Environment Agency to resolve. TL advised that a better understanding of the proposals would help inform the Environment Agency's position on this. SB queried whether the project intends to disapply environmental permits and consents as part of the DCO. RC and JZ advised that we would have to check with the wider project team, noting that this may not have been decided.

TL advised that due to the similar nature of the three considerations, they could be covered under a single permit. RC confirmed that the three items had only been separated in this way to facilitate discussion and agreement on the proposed approach to assessment for this meeting.

8 **Review commitments/measures**

If these considerations are agreed upon, the outcome would be a review of selected PEIR commitments, specifically:

- C-131: Soil stockpiles;
- C-119: Temporary construction haul road and access routes; and
- C-175: Temporary construction haul road, access routes (and working areas).

It is anticipated that only minimal changes to the wording of the commitments would be required, to change the circumstances under which soil movement would be required. TL agreed that this review would take place after the Rampion 2 Engineering team have provided the requested information above.

9 **Receptors in the floodplain at PEIR stage**

For potential future use, if required, RC shared a plan showing the fluvial and tidal receptors in the River Arun floodplain identified at the PEIR stage. These were identified at PEIR stage solely in case further assessment was needed at Environmental Statement stage (i.e., still may not be subject to detailed assessment in the Environmental Statement if detailed assessment is agreed to be unnecessary). If the proposed approach set out in this meeting cannot be agreed, (for example, if Natural England objected to the relocation of any soil outside of the floodplain whatsoever) then these would be potential receptors at which potential impacts would be considered in greater detail. In that situation, the types of activities proposed would be looked at in more detail, along with pathways to understand whether the effects would reach the receptors. TL confirmed that those flood risk receptors (in Slide 21) were the types of places he would consider and but added that existing highways should be considered. TL added that there are a number of large roads planned in the area that should also be considered, for example the A27 Arundel Bypass and the Lyminster Bypass.

10 **Actions and AOB**

The group confirmed the actions from the meeting.

No other business was raised.

Meeting Minutes

Date: 1 April 2022 10:30-11.30am **Meeting at:** Online – Microsoft Teams

Subject / purpose:

Targeted stakeholder meeting to discuss local sources of flood risk

Attendees:

[redacted] RWE, electrical engineer (AB)
Wood, water environment assessment lead (GD)
Wood, project engineer (IM)
– Wood, EIA co-ordinator (JZ)
– West Sussex County Council, LLFA (KM)
– Mid Sussex District Council, flood officer (NJ)
-RWE (PW), electrical engineer
– Wood, project engineer (PH)
– Wood, flood risk assessment and sustainable drainage lead(RC)

Apologies:

[redacted] RWE

Actions summary	
KM to contact EA to determine watercourse consenting details for the Internal Drainage Board area.KM agreed to share the outcome of discussions with the Environment Agency in relation to consents for watercourses in the IDB district.	**KM**
RC confirmed the action to provide the LiDAR map and to provide further information for the ditches on the substation sites.	**RC (actioned on 22/06/22)**
GD confirmed the action to include definitions of land drains in future reports.	**GD**
Wood agreed to check and communicate which districts the substation option sites are in (MSDC or Horsham Council).	**GD actioned - Bolney Rd/ Kent Street Substation Option lies within HDC and the Wineham Lane North Option lies within MSDC**

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`Topic of Discussion	Actions
1 **Welcome and introductions** JZ introduced the meeting.	
2 **Project update** JZ provided a project update, including an updated project programme, the timeframe for the reopening of the formal consultation, the design change review process in response to consultation information received and the upcoming targeted onshore infrastructure formal consultation on proposed changes to the PEIR Assessment Boundary.	
3 **Cable route proposals and drainage considerations** ***Headline comments from the FRSA shared at PEIR stage*** RC noted a general lack of comments from stakeholders relating to the Flood Risk Screening Assessment (FRSA) as provided in support of the Section 42 consultation (PEIR). RC queried whether this was due to the FRSA not having been reviewed, or general satisfaction with the document . KM confirmed that West Sussex County Council (WSCC) have reviewed the PEIR with respect to flood risk and confirmed there are no major concerns from a County perspective. KM advised that this position is on the basis that much of the impacts on flood risk and drainage would be temporary and watercourse crossings in the Rampion 1 construction went well. Particular interest will be paid to areas of the potential cable corridor route that may interact with possible surface water flooding. NJ added that there were no major concerns from Mid Sussex District Council (MSDC), however, it is important to note that most of the proposed red line is not within the MSDC area, and that any advice provided needed to be viewed in this context. NJ advised that MSDC interest will predominantly focus on the Wineham Lane substation option site as (for the most part) Wineham Lane itself forms the western boundary of the MSDC area. KM and NJ suggested another meeting be arranged so that the flood officer from Horsham District Council could attend and provide their views (the Bolney Road/Kent Street substation option site is within Horsham District Council). This was held on 22/06/22. ***Temporary onshore construction corridor*** GD refreshed the group on the PEIR proposals which will be subject to further refinement as the design evolves. In summary, a direct buried cable will be constructed inside a temporary construction corridor comprised of trenches in which cables will be laid, stockpiles of excavated materials and a temporary haul road, used to transport materials in the corridor. The PEIR stated that the corridor would be approximately 50m wide, although ongoing refinement work is likely to	

reduce this to approximately 40m. GD shared an illustration of a standard cable corridor, which can be found in the accompanying slides. Space to provide temporary drainage infrastructure has been included in the onshore part of the PEIR Assessment Boundary. ***Construction methodologies*** Trenches will be backfilled with originally excavated material and some stabilised backfill and Cement Bound Sand (CBS) to protect the ducts. The trenched will be laid, backfilled and reinstated along regular sections (typically 600m-1,000m) in as short a timeframe as practicable. For ordinary watercourse crossings, open cut crossing methodologies (such as damming and overpumping) will be predominantly used during trench excavation and duct installation. For crossing of major rivers or major roads/rail networks trenchless methodologies, such as HDD, will be used. Where possible, these HDD crossings would be from outside the floodplain on one side to outside on the other. ***The onshore cable corridor*** RC shared maps of the proposed onshore cable corridor route, which can be seen on the accompanying slides. The Weald clay area is likely to be the area of most interest in terms of local flood risk due to the number of watercourses in the area and the potential for runoff due to the underlying geology and soils. KM added that most of the flooding risk would be associated with the River Adur, which would be the remit of the Environment Agency (EA). With respect to surface water, KM advised that the WSCC comments on the PEIR (and FRSA) were based on previous flood events rather than the theoretical scenarios as presented in the Environment Agency's flood map for surface water (and as presented in the FRSA). ***Drainage good practice = embedded environmental measures*** GD refreshed the group in the Water Environment chapter of the PEIR, and particularly the embedded measures for drainage good practice, which were included in the draft Code of Construction Practice. Drainage measures to manage, attenuate and, if necessary, treat runoff will be included in all elements of temporary and permanent infrastructure. The main requirement for treatment along the temporary construction corridor would for managing silt/sediment in run-off. GD gave an overview of the potential options available to manage surface water during construction, including temporary cut off drains installed upgradient and parallel to trenchlines to minimise the amount of clean run-on and groundwater that reaches the trench and stockpiles. The drains would discharge to local drainage ditches as appropriate, but be allowed to infiltrate wherever possible. Anything dewatered from the trenches and any unclean site runoff will be captured and treated accordingly (with filter drains, swales, silt busters and/or silt netting etc.) before being discharged to ground or surface water. **Construction drainage discussion**	**Wood held a meeting on 22nd June with WSCC, Arun Council and Horsham Council to discuss level of detail required for**

Continued…

RC advised that the construction contractor will develop the details and methods of construction, including drainage, within the framework of what is presented in the ES, after the DCO has been granted. Thus, it is important to understand the expectations of stakeholders are for construction drainage in order to provide this framework, as well as to understand the level of detail required for DCO Application. This question can be answered in a future meeting that also includes Horsham Council. Martin Brightwell was given as the contact for Horsham.	**construction drainage at DCO Application.**
RC reiterated that these works are temporary and will be progressed in sections. On this basis, it is anticipated that engineered solutions would be both disproportionate and impractical based on the timeframes they would be required (and likelihood of being required during their short lifetime). The use of methods such as filter drains and/or swales paired with silt fencing are considered cost-effective and appropriate methods which could be rapidly implemented by the construction contractor. Additional measures such as silt busters could be optionally added if the Ecological Clerk of Works (ECoW) deemed necessary based on observations on-site.	
RC & GD advised that the anticipated corridor width of 40m would be narrower in some places (e.g. areas with ecological constraints) and wider in other areas (e.g. where HDD is occurring). Importantly, there is a general drive across the project to narrow the construction corridor (and red line) as much as possible to minimise landowner interactions and environmental impacts. However, we are conscious that space needs to be retained to enable construction drainage measures to be effectively implemented, so we are trying to strike that balance in determining appropriate approaches to construction drainage, whilst minimising impacts of construction footprint overall.	
KM noted that what has been presented in this meeting covers as much as can be said at this point in time. It is encouraging that drainage will be assessed on a needs basis as construction starts, with the contractor being supported by environmental personnel. It is very likely that flow routes will be cut off while excavating the trenches, but this will not be every location. Therefore, some locations will need drainage as described and others will not.	**Wood to include definition of land drain in all reports.**
Land drainage	
GD advised that land drainage systems will be maintained so they continue to function during construction and reinstated upon completion of works with care.	
NJ asked for clarification on the term "land drain" as it can mean buried pipes or shallow ditches installed by farmers. RC & KM confirmed that buried pipes within agricultural fields are being discussed in this case. NJ requested that all reports clearly state the definition of land drain as buried pipes, as there are landowners in Mid Sussex that refer to ditches as land drains. RC agreed this is useful to include such a definition.	
RC advised that, in the Flood Risk Assessment and the Water Environment chapter, land drains will be referenced but not considered as a major flood risk as this is likely to be addressed elsewhere in the ES, such as the Land Use chapter. This is because the impact of disrupted land drainage would be to impact agricultural land quality rather than the water environment and/or the built environment.	

KM asked if the locations of existing land drainage systems would be known in advance of excavation. GD reiterated the position set out in the PEIR, which is that surveys of land drains are not being undertaken pre-application submission and would likely happen post-application but prior to the works commencing.

KM noted that if a trench excavation severs land drainage then there is the potential for significant risk of water flowing into the trench. RC highlighted the filter drains being proposed (to be included within the fenceline at both sides of the route) would intercept the land drainage as well as surface water.

KM was concerned with what happens to the filter drain afterwards if the field drain flow has been interrupted. RC advised that the filter drains would likely be removed and the land drainage reinstated. RC noted that construction engineers generally advise that the new systems installed are usually an improvement, being in better condition than the existing systems, which may be in poor condition and require replacement/maintenance in any case.

Phasing of cable corridor

PH clarified that the 600m-1,000m cable trench corridor referred to in the PEIR refers to the area of the cable corridor in which the topsoil will be cleared to one side, the fencing erected, a haul road put in place and so on. In terms of open trench itself, the usual approach is for approximately 100m of cable trench to be cut each day (usually in 10m sections), i.e. not a 600m+ length trenched in one go. KM asked what happens to surplus material at the end of the day as there is a small risk of stockpiles of excess material interrupting flow paths. RC noted that there are PEIR commitments to avoid stockpiling in floodplains and to leave gaps in the stockpiles to allow water to flow through. RC noted that, because of the anticipated 10m at one time approach, the stockpiles associated with trenching works would be limited in footprint at any given time, and very temporary in nature.

NJ asked for clarification on the cut off ditches etc. Would these be constructed for the entire 600-1,000m area or just the 100m sections? RC & PH confirmed that it would be for the entire 600-1,000m area and that the ditches would be installed before the construction of the haul road, to ensure drainage is in place ahead of use of the haul road for cable construction.

NJ asked how long the temporary drainage would be in place for, to help understand the maintenance requirements. RC noted that temporary drainage is likely to remain in place for a matter of months, because the cables would be installed in the ducts at a later date (sometime after the trenching to install the ducts is complete. Only once the cables are in place (and tested) would the land be reinstated and the temporary drainage be removed. RC noted that the need for maintenance would depend upon how wet the weather is - if the weather is consistently dry, perhaps no maintenance will be required, whereas if the weather is particularly wet then multiple instances of maintenance could be required. The need for maintenance would be a decision made by the contractor (who would be on-site throughout construction), informed by on-site observations by the ECoW.

Summary points on construction drainage

KM confirmed that WSCC are happy with the embedded measures proposed for construction drainage and the level of detail. KM advised that details of the monitoring regime to assess maintenance requirements would be welcome, but otherwise there are no concerns with the approach at this time.

RC queried whether there were any insights from Rampion 1 or equivalent projects that would be useful. KM advised that Horsham Council and Arun Council representatives are best placed to advise as they were more involved with Rampion 1 than WSCC, but as far as he recalled the only issues related to reinstatement of the cable running through Worthing Borough rather than the construction methods.

4 **Onshore substation proposals and drainage considerations**

Overview of proposals 0.

GD refreshed the group on the permanent substation information included in the PEIR. Two potential option sites were considered in the PEIR, of which one would be assessed in the ES for the DCO application:

- Bolney Road/Kent Street; and
- Wineham Lane North.

The permanent built footprint is anticipated to be approximately 6ha, with a wider red line boundary included to accommodate construction activities and to provide associated environmental measures where necessary (such as drainage, screening, planting etc). We anticipate that an Outline Operational Drainage Strategy (OODS) will be part of, or will accompany, the Flood Risk Assessment (FRA) at the ES stage for the selected onshore substation. RC added that a substation design is not anticipated to be included as part of the DCO Application, so the OODS will be limited in what it can present. It will be more high-level and will set the parameters of what the design should account for and achieve within the space available. The drainage design would be developed alongside the design of the sub-station, which is anticipated to occur post-receipt of consent.

Comments relevant to both sub-stations

RC shared the Environment Agency Risk of Flooding from Surface Water (RoFSW) Flood Maps for both substation option sites, as were included in the PEIR. This can be found on the accompanying slides.

RC refreshed the group on the approach taken to fluvial flood risk at and adjacent to the option sites in the PEIR , which was to use the 0.1% (1 in 1,000) AEP extent as a proxy for the 1% AEP (1 in 100) + climate change extent. RC asked at what point would concerns be raised about the proximity of permanent development to the watercourse and surface water flood extents. KM & NJ advised that they would be satisfied with the built development avoiding anything within the 0.1% AEP (1 in 1,000) extent, and that it is also generally best to avoid development within 5m at the top of bank of any watercourse, although if deemed necessary this can be reduced to 3.5m.

The substation’s drainage provides an opportunity for a variety of permanent sub-features, although the location and extent of these will be subject to other constraints. In terms of attenuation, it is anticipated that this can be achieved as an inherent part of the design - to ensure electrical safety, sub-stations are constructed within a “box” filled with gravel. Where the underlaying ground is

permeable this is effectively a large soakaway. In this area, underlain by clay, run-off will likely not soakaway and would need to be collected and discharged. As such, attenuation is provided within the footprint of the substation, unlikely requiring any further attenuation features. Whatever else might be needed would probably have a minimal footprint, maybe for some final treatment before discharge and to convey run-off to nearby watercourses. With reference to the prospect of watercourses on-site being 'lost' as part of the substation development, KM advised that the preferred option would always be to leave the watercourse in situ and bridge over them. RC advised that this could be challenging if the watercourse bisected the 'box' discussed earlier, but that the degree to which existing watercourses would be lost is not currently known as the substation design is not currently known. KM added that there needs to be an understanding of what may drain into such watercourses from outside of the site as well. RC suggested that, where there is an upstream catchment, options could include rerouting around the substation footprint, or account for the inflow in the drainage design of the substation (the scale of the upstream catchment would influence the ability to achieve this). ***Wineham Lane North*** NJ advised that the north south orientated ditch bisecting the Wineham Lane North site is identified as the upstream section of Bolney Sewer in Ordnance Survey map data. NJ advised that it flows south to north, before turning east and heading along the northern site boundary. NJ expressed concern at the prospect of the upstream section of this watercourse being lost to development, citing concern at the potential impact this could have on drainage on-site and in the wider area. NJ recommended that the site be investigated to ascertain the characteristics of the stream. NJ confirmed that the concern relates to the loss of function of the watercourse in providing drainage, and not the loss of the watercourse itself (i.e. not a Water Framework Directive (WFD) concern). NJ noted that the north-south section of Bolney Sewer is not indicated in the surface water flood map. RC advised that this is because this part of the sewer does not have a natural topographic catchment draining to it- the upstream part of the topographic catchment continues to the west along the northern site boundary. On this basis, RC advised that we anticipate that the drainage system for the substation can be designed accordingly to account for the lost part of the watercourse. NJ advised that if a stream or ditch is found on site, MSDC would be very hesitant to allow it to be built over without any evidence that this would not affect groundwater flow. RC suggested that LiDAR data demonstrating the limited (and/or lack of) catchment draining to this section of watercourse and thus (anticipated) limited function it performs could provide the evidence requested, and agreed to provide a map showing this. NJ agreed this is a good starting point, and once the amount of land draining towards the watercourse is understood, then it can be ascertained if this will be an issue. NJ agreed that the drainage installed in the site may need to account for the lost section of watercourse. RC noted that to the West and South of the site, the surface water flood map indicates negligible run-on flow pathways (even during the 0.1% AEP (1 in 1,000) event) for which minimal, if any, measures would be needed. There is one that can be seen intersecting the "Wineham Lane North" label on the map, which could be	**Wood to provide LiDAR map. This was presented in a follow up meeting with WSCC, HDC and ADC on 22nd June 2022.**

captured in a cut-off drain that routes it around the boundary or could just be accounted for in the on-site drainage system.

Bolney Road/Kent Street

NJ advised that this site is located in Horsham rather than MSDC. KM noted that input from the flood officer at Horsham Council should be sought.

Wood to provide further information for the ditches on the Bolney Road/Kent Street substation site. This was presented in a follow up meeting with WSCC, HDC and ADC on 22nd June 2022.

RC noted that this site presents more challenges from a water environment perspective than the Wineham Lane North option site, but none that are considered to be insurmountable. RC highlighted the surface water flow run-on pathway from the north, with water ponding on the Northern side of Bolney Road, which the mapping indicates would eventually spill over a low point in the road and proceed into the centre of the Northern site boundary. The mapping indicates that this run-on water would then proceed southwards through the site before turning towards the Eastern site boundary and continuing Southwards along the Eastern site boundary, ultimately towards the stream (a tributary of Cowfold Stream) running along the southern boundary of the site.

RC noted that a good proportion of the flood extent indicated would come from rain falling on the site itself, that some appears to be running onto the site from the North. RC advised that it is anticipated that this can be addressed through on-site drainage measures, with the water run-on being captured in the northern part of the site and either attenuated and/or routed around any substation proposals in new formal drainage channels/features. Such an approach, separate to the drainage of rainwater falling on the sub-station itself, could provide betterment to flood risk both onsite (enabling development in areas currently indicated to be at risk of surface water flooding) and offsite if sufficient attenuation is provided to reduce the rate of flow through the site.

KM advised that more information would be required on the proposals for this site, including If the capacity remains the same from the basin diverting around the site, the approach outlined should be fine in principle.

With respect to the potential for watercourses onsite to be lost, the 2 ditches bisecting the site were highlighted for discussion. KM noted that the existing ditches are likely to be only taking water off the fields, but this would need to be ascertained. KM advised that it is preferred to avoid filling in ditches, on the basis that insufficient consideration of their function has proven ‘costly’ in the past. KM suggested that the design could consider retention of the ditch and discharge into it. RC noted that, due to the anticipated footprint of the substation ‘box’ at approximately 6ha, it is anticipated that at least one ditch would likely need to be ‘lost’. RC agreed to provide LiDAR data will help to determine the nature of the catchment.

. RC suggested that loss of the ditch could be accounted for in the design - the drainage for the substation would account for any rainfall falling on the substation site itself and that any upstream catchment for lost watercourse/ditches would be re-provided or accounted for. RC also noted that the suggested SuDS would provide an opportunity to offset the loss of biodiversity habitat associated with any lost ditches.

RC presented the understanding of flood risk associated with the tributary watercourse of Cowfold Stream on the southern site boundary, and shared the

surface water flood map of the entire contributing catchment to provide context. Advice in relation to flood risk from this stream was recorded above.	
Permits and consents	
KM advised that WSCC do not grant watercourse consents, as this is done by the districts and boroughs. South Downs National Park would do the same, delegating the consenting to Arun District Council (ADC). KM advised that a conversation needs to be had with the Environment Agency to see if the minor ditches in the Internal Drainage Board area would be consented by the EA or if they would delegate to ADC. KM agreed to have this conversation with the EA prior to the next meeting and share the information obtained.	**KM to contact EA to determine watercourse consenting details for the Internal Drainage Board area.**
5 **Actions and AOB**	
Wood agreed to check and communicate which districts the substation option sites are in (MSDC or Horsham Council). JZ confirmed that Martin Brightwell at Horsham Council should be included in future meetings. KM added that Paul Cann from Arun District Council (ADC) should also be included as the cable route starts there. RC noted that most of the cable corridor in Arun was located in the Internal Drainage Board area, which is managed by the Environment Agency, but acknowledged that there are likely to be sections of the corridor that would fall under ADC's remit and agreed to include them in future meetings.	**Wood checked and the Bolney Rd/ Kent Street Substation Option lies within HDC and the Wineham Lane North Option lies within MSDC.**
KM agreed to share the outcome of discussions with the Environment Agency in relation to consents for watercourses in the IDB district. RC confirmed the action to provide the LiDAR map and to provide further information for the ditches on the substation sites. GD confirmed the action to include definitions of land drains in future reports.	**Wood have provided further information on the LiDAR map and information on the Bolney Rd/ Kent Street ditches. This was presented in a follow up meeting with WSCC, HDC and ADC on 22nd June 2022.**

Meeting Minutes

Date: 22 June 2022 10:00am **Meeting at:** Online – Microsoft Teams

Subject / purpose:

Targeted stakeholder meeting to discuss local sources of flood risk and drainage

Attendees:

Guy Douglas – Wood, water environment assessment lead (GD)
Jozef Zapytowski – Wood, EIA co-ordinator (JZ)
Kevin Macknay – West Sussex County Council, drainage and flood lead (KM)
Martin Brightwell – Horsham District Council, Drainage engineer strategic planning (MB)
Paul Cann – Arun District Council, Principal drainage engineer (PC)
Fruzsina Kemenes – RWE, Onshore consents manager (FK)
Richard Cartlidge – Wood, flood risk assessment and sustainable drainage lead (RC)

Actions summary	
MB and PC to formally feedback on the FRSA, letting Wood know when they can expect feedback by. The FRSA Appendix 27.2 is saved https://rampion2.com/wp-content/uploads/2021/07/Rampion-2-PEIR-Volume-4-Chapter-27-Water-Environment-Appendices.pdf	**MB/ PC**
Wood to check and if necessary, update PEIR commitments at the ES reporting stage regarding watercourse crossing protocols.	**GD/RC**
MB to provide a layer with drainage assets (at the post DCO application stage).	**MB**

Topic of discussion	Actions
1 **Welcome and introductions** RC introduced the meeting. 2 **Project update** FK provided a project update, including an updated project programme, the timeframe for the reopening of the formal consultation, and progress made on the design evolution process for the DCO application. 3 **Cable route proposals and drainage considerations** ***Temporary onshore construction corridor*** GD refreshed the group on the PEIR proposals including the onshore construction corridor proposals. FK noted that crossing methodologies were recorded in a crossing schedule at PEIR and will be in the upcoming consultation. PC and MB both expressed that their last involvement had been at screening stage and had not seen or reviewed the PEIR, including the Flood Risk Screening Assessment (FRSA). ***Ordinary Watercourse Consents*** RC talked through the project and route in more detail to provide further flood risk information. Regarding the Arun valley PC asked whether RC was familiar with the EA IDB area in the Arun DC. RC confirmed he was. KM clarified that within the Arun IDB area that the EA would be responsible for issuing Ordinary Watercourse Consents (OWCs) whereas Arun DC would be responsible for OWCs outside of the IDB area within their district. ***Headline comments from the FRSA shared at PEIR stage*** RC talked through the entire the route and potential sources of flood risk. RC advised that a decision on selection for the substation site from the 2 x option sites presented at PEIR was imminent. RC advised that the Oakendene sub-station would be covered in this meeting, being in the Horsham District; the Wineham Lane North substation option site had been covered in an earlier meeting with Mid Sussex DC. ***Construction drainage good practice – embedded environmental measures*** GD and RC summarised key embedded measures for construction drainage good practice presented in the PEIR water environment chapter and FRSA. RC & GD clarified a variety of options for construction drainage. RC advised that space needed to be secured to provide optionality. RC noted that other disciplines want construction works to be minimised as much as possible so for	

Topic of discussion	Actions
drainage we would like to determine what can be provided within that minimal footprint. The Rampion 2 team asked for feedback on options presented, whether this type of information aligned with their expectations and if there were any lessons learnt from Rampion 1. KM noted that on Rampion 1 overall there were no flooding issues from a construction perspective that he was aware of, as temporary arrangements were dealt with by the contractor and that it didn’t give West Sussex County Council major concerns. MB agreed he didn’t have any issues regarding the contactors and the site work for Rampion 1. RC advised that the details of the construction drainage would be decided by the contractor, based upon the framework of options agreed through the application. It was agreed that this approach of providing the contractor with a ‘toolbox’ of construction drainage options they could use, with the various tools agreed in advance by the stakeholders through the planning regime, was an appropriate approach. PC expressed a preference for swales due to the ease at which they can be removed and because check dams work well on sloped ground. RC pointed out that filter drains can also provide interception of land drainage, so should be retained in the toolkit. RC advised that the intent is to retain flexibility for the contractor to decide based on site-specific locations and requirements. RC also noted that land drainage requirements would be addressed post-construction, likely involving reinstatement of land drains over the permanent cable corridor (rather than diversion). GD advised that cables would generally be around 1.2m below ground level. KM asked how long it would take to construct the cable route. FK noted that although the maximum parameter is up to 4 years it would be done in sections, and an analogous project in Lincolnshire with a longer route was around 2.5 years of works. RC also noted seasonal constraints, and that commitments had already been made to avoid specific areas such as the Arun IBD and floodplains in general during wetter periods. The group raised no issues with this approach. **4. Onshore substation proposals** GD ran through the proposals for the onshore substation focussing on the Bolney Road/Kent Street (Oakendene) option. RC advised that a conceptual approach to substation drainage will likely be proposed at application stage on the basis that a design for the substation is unlikely to be included as part of the application.	

Topic of discussion	Actions
RC talked through the Risk of Flooding from Surface Water (RoSWF) maps to identify potential sources of flood risk. The flood risk from the southern watercourse which is a tributary of the Cowfold stream was discussed. RC noted that, to date, the Environment Agency's 0.1% AEP surface water flood extent had been used as the area for the substation footprint to avoid. RC asked for feedback on this approach. MB advised that as long as the substation was positioned outside the 0.1% AEP surface water flood extent, he would not be concerned. MB advised that HDC records of historical flooding indicated that no flood incidents at Bolney Rd or Kent St had been recorded. RC outlined his preliminary thoughts on a conceptual drainage strategy for the Oakendene sub-station, including options for a SuDS basin and a formalised channel in combination with the gravel onsite acting as a storage area and small-scale treatment features. The operational drainage strategy will talk about these types of things which the Contractor will decide where to put within the footprint. The design will come once the consent has been granted. MB agreed with this type of approach and advised that a 2 stage approach would be more than sufficient. RC talked through LiDAR topographical analysis to illustrate the limited contributing catchments/sub catchments to the sub catchments noting these areas would be what is used for sizing any SuDS features to control surface water run on pathways to site. The group raised no issues with such an approach.	
5. AOB and Actions MB noted that through Storrington /Washington area (near the A283) previous issues with overland flow and land drainage and that within Horsham DC. PC advised that in the Arun valley there is high groundwater and a strong tidal influence. GD showed the group the weblinks to the Rampion 2 consultation site. PC and MB were asked to look at the documents and provide any formal feedback ASAP. RC asked the group to look at Table 7.1 by way of priority. PC and MB noted that they both had resourcing constraints so could not commit to review timescales. RC talked through Table 27.7 on the key embedded flood risk management measures. PC noted that Arun DC had a preference for open span crossings and the utilization of existing crosses where possible. RC confirmed that the engineers would use existing crossings where appropriate but that the intention was to use culverts due to works being temporary. Open span bridges will be used where watercourses are too wide or deep for crossing or if there is an ecological driver from the biodiversity team.	**MB and PC to formally feedback on the FRSA, letting Wood know when they can expect feedback by. The FRSA Appendix 27.2 is saved https://rampion2.com/wp-content/uploads/2021/07/Rampion-2-PEIR-Volume-4-Chapter-27-Water-Environment-Appendices.pdf** **Table 7.1 is on page 83 within the FRSA document (pdf page 154 of 415)**

Topic of discussion	Actions
PC noted for watercourse crossings Arun DC ask for a metre from the hard bed (i.e. not the slit level) of watercourses and the ducting of the cables and marker posts (for H & S reasons). MB said they expect the same and that Rampion 1 had marking protocols. RC said that the Rampion 2 would check the existing commitments.	**Wood to check and if necessary update PEIR commitments at the ES reporting stage.**
PC noted that Arun DC need as much time as possible for dealing with land drainage consents (at the post application stage).	
PC has provided GIS of drainage assets across the whole district of Arun DC. MB will provide a similar dataset for Horsham DC at a later post application stage.	**MB to provide a layer with drainage assets (at the post DCO application stage).**
PC and MB asked who their district council contacts had been during consultation. It has since been identified by RWE as Mathew Porter at Horsham DC and Neil Crowther at Arun DC.	

Annex B
Figures

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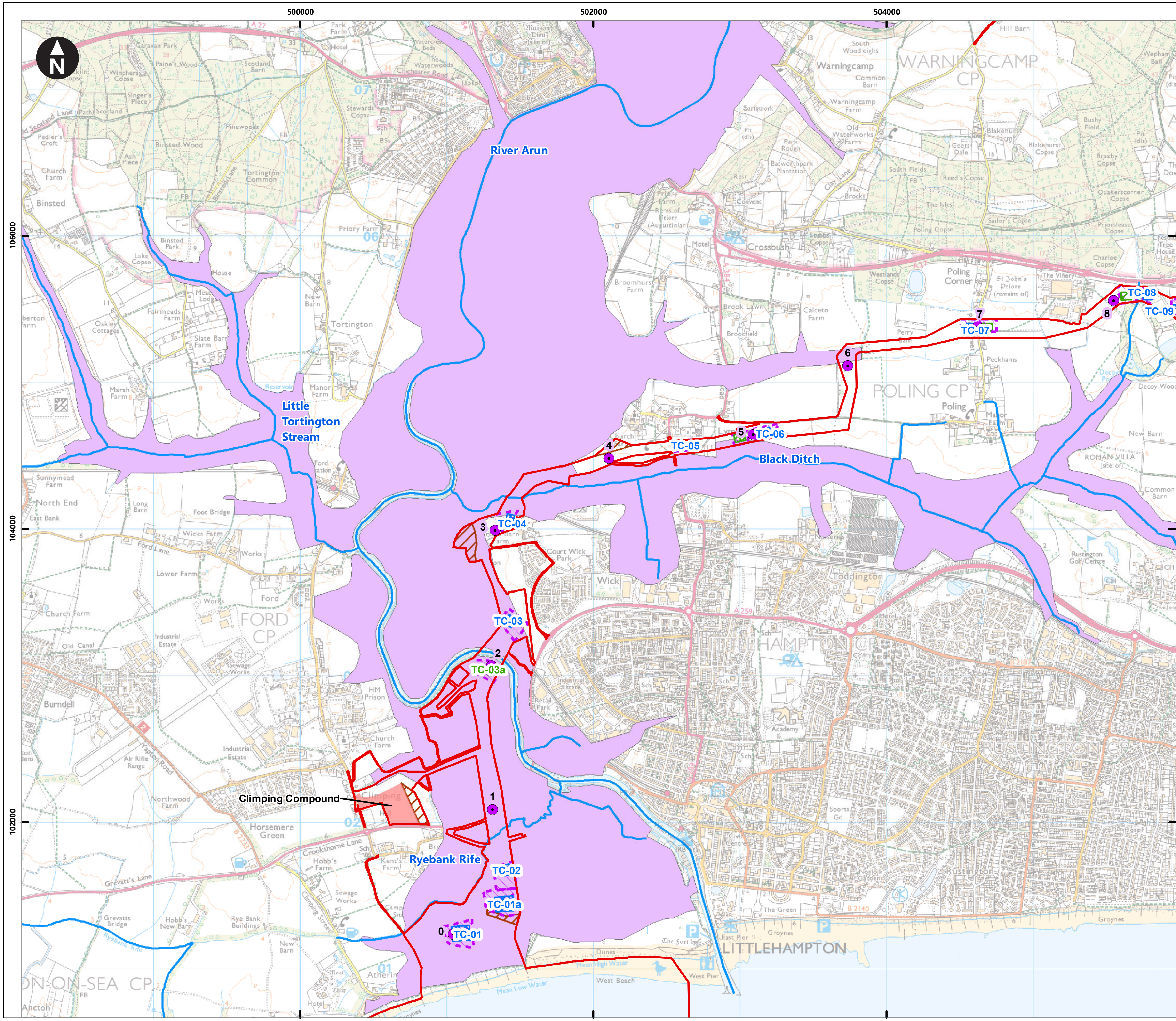
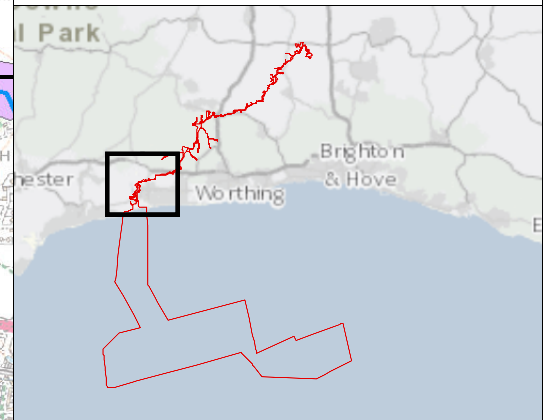


Key

- Proposed DCO Order Limits
- Temporary construction compounds
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Temporary soil storage
- Main rivers
- Arun Internal Drainage District

Onshore cable route KM points

- Indicative onshore cable route



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

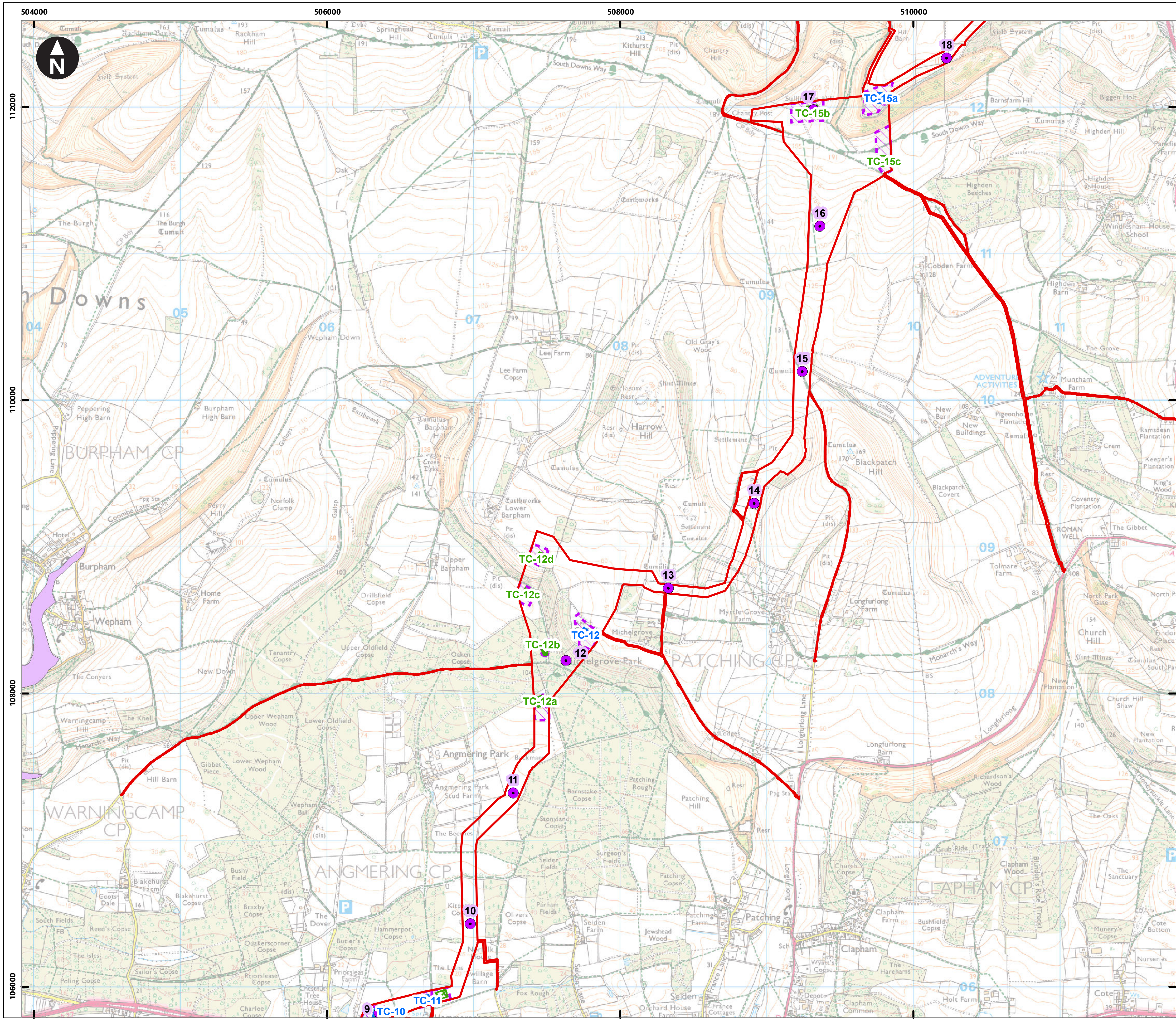
Figure 26.2.1a Water Environment

Flood Risk Assessment

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OY-5351	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	COLLJ	DOUGG	27/07/2023	Final

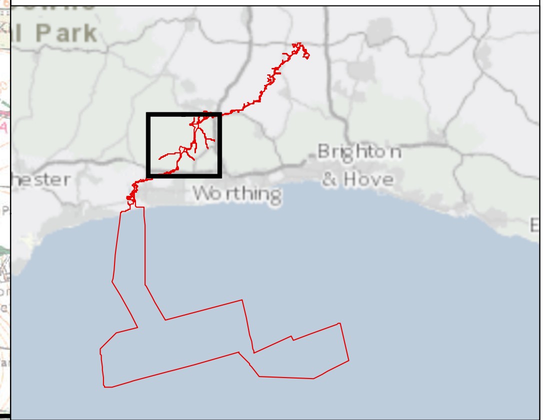


Key

- Proposed DCO Order Limits
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Arun Internal Drainage District

Onshore cable route KM points

- Indicative onshore cable route



Kilometres

0 0.125 0.25 0.5 0.75 1

1:25,000

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

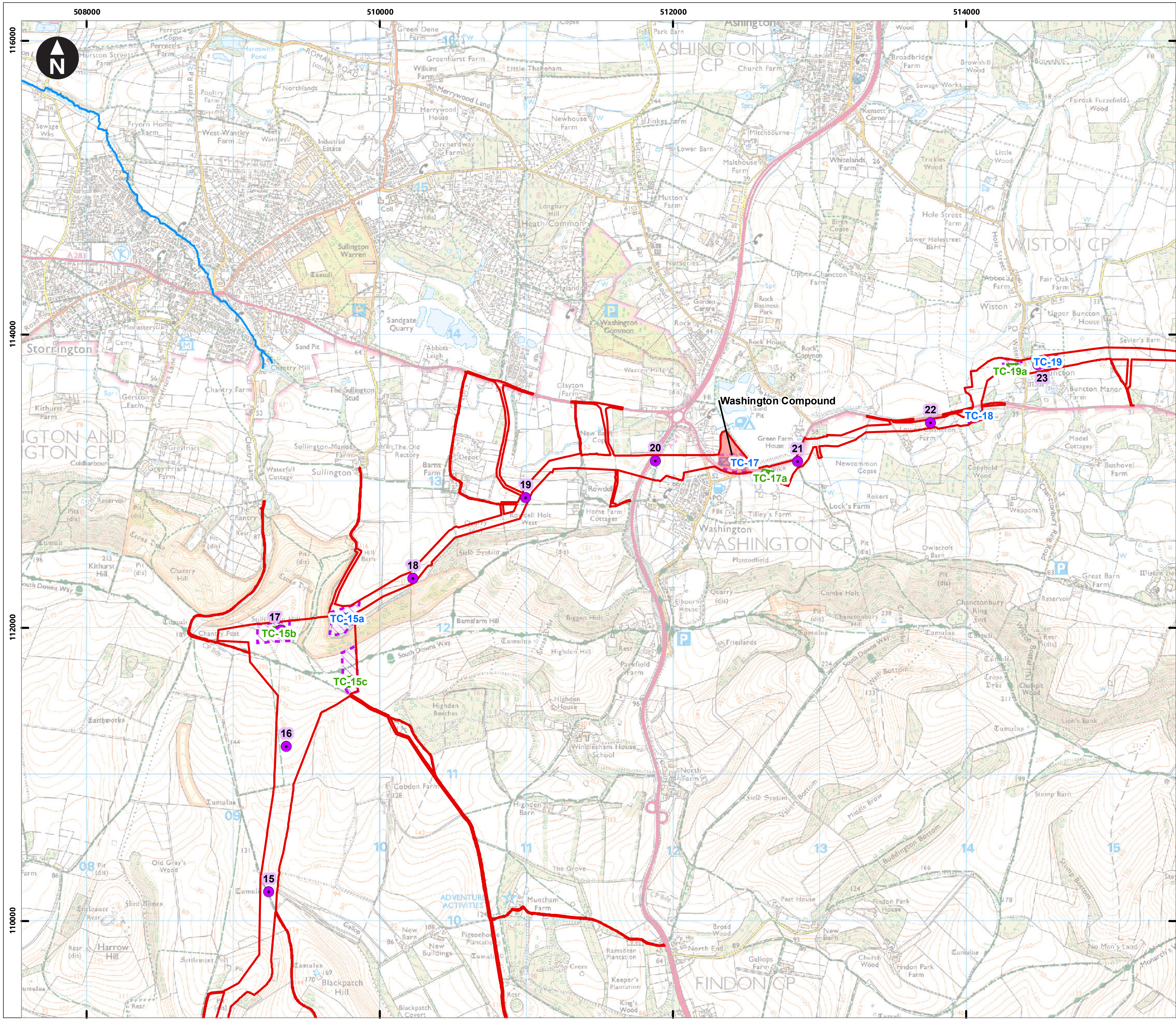
Figure 26.2.1b Water Environment

Flood Risk Assessment

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OY-5351	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	COLLJ	DOUGG	27/07/2023	Final

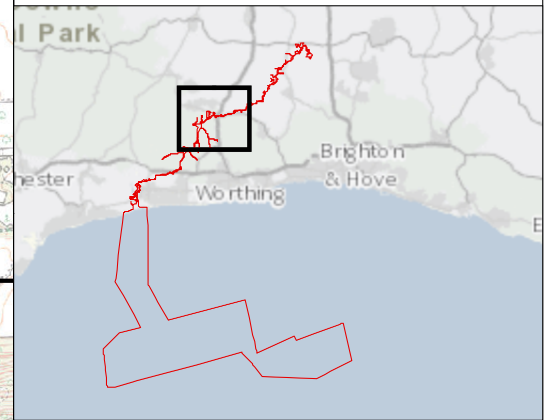


Key

- Proposed DCO Order Limits
- Temporary construction compounds
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Main rivers

Onshore cable route KM points

- Indicative onshore cable route



Kilometres

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1:25,000

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

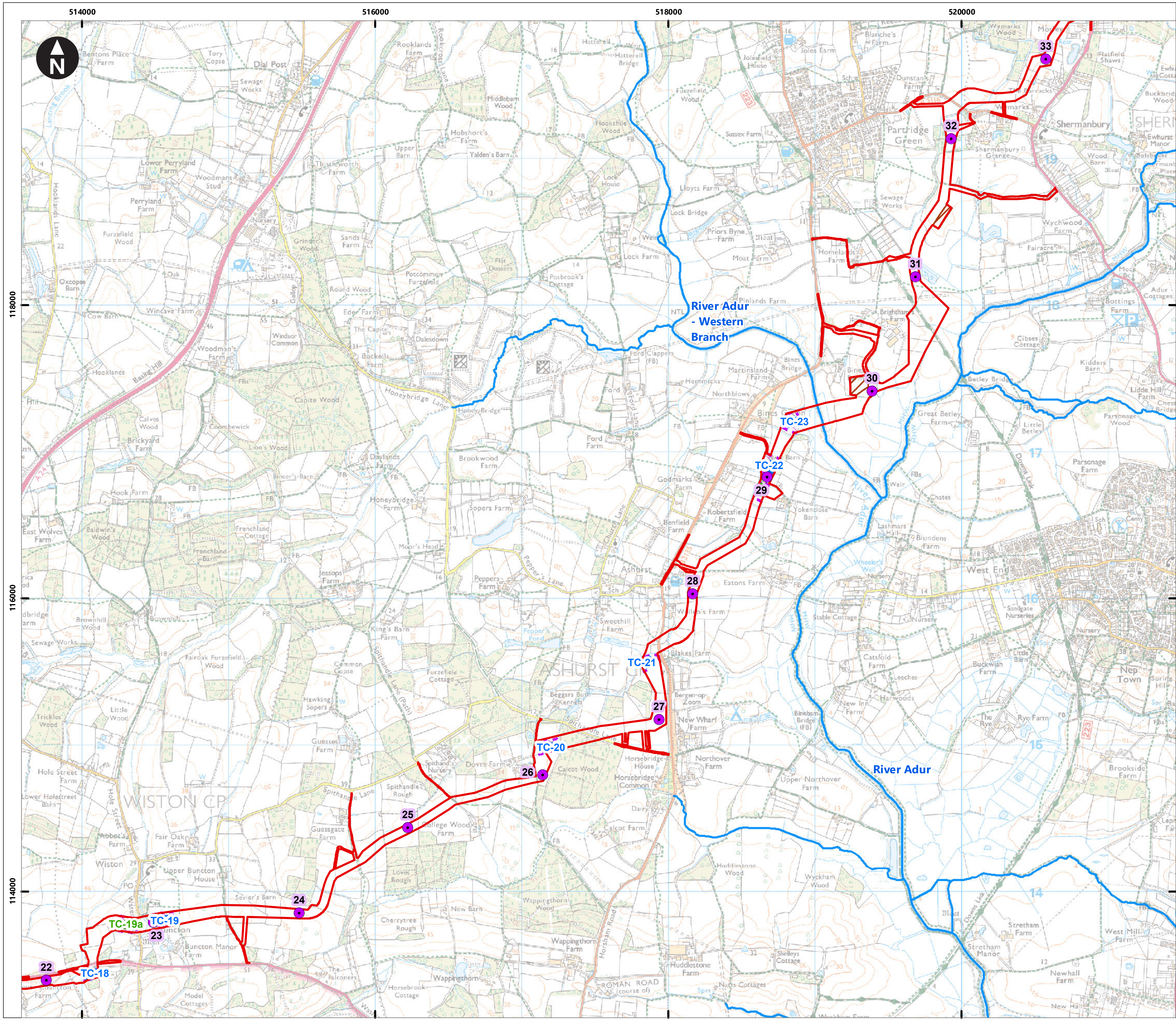
Figure 26.2.1c Water Environment

Flood Risk Assessment

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OY-5351	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	COLLJ	DOUGG	27/07/2023	Final



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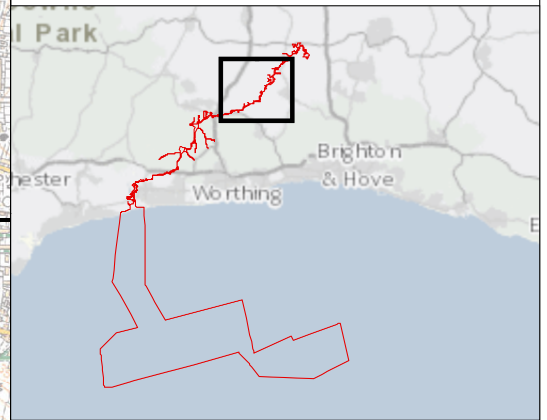
Key

- Proposed DCO Order Limits
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Temporary soil storage
- Main rivers

Onshore cable route KM points

- Indicative onshore cable route



Kilometres
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1:25,000

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

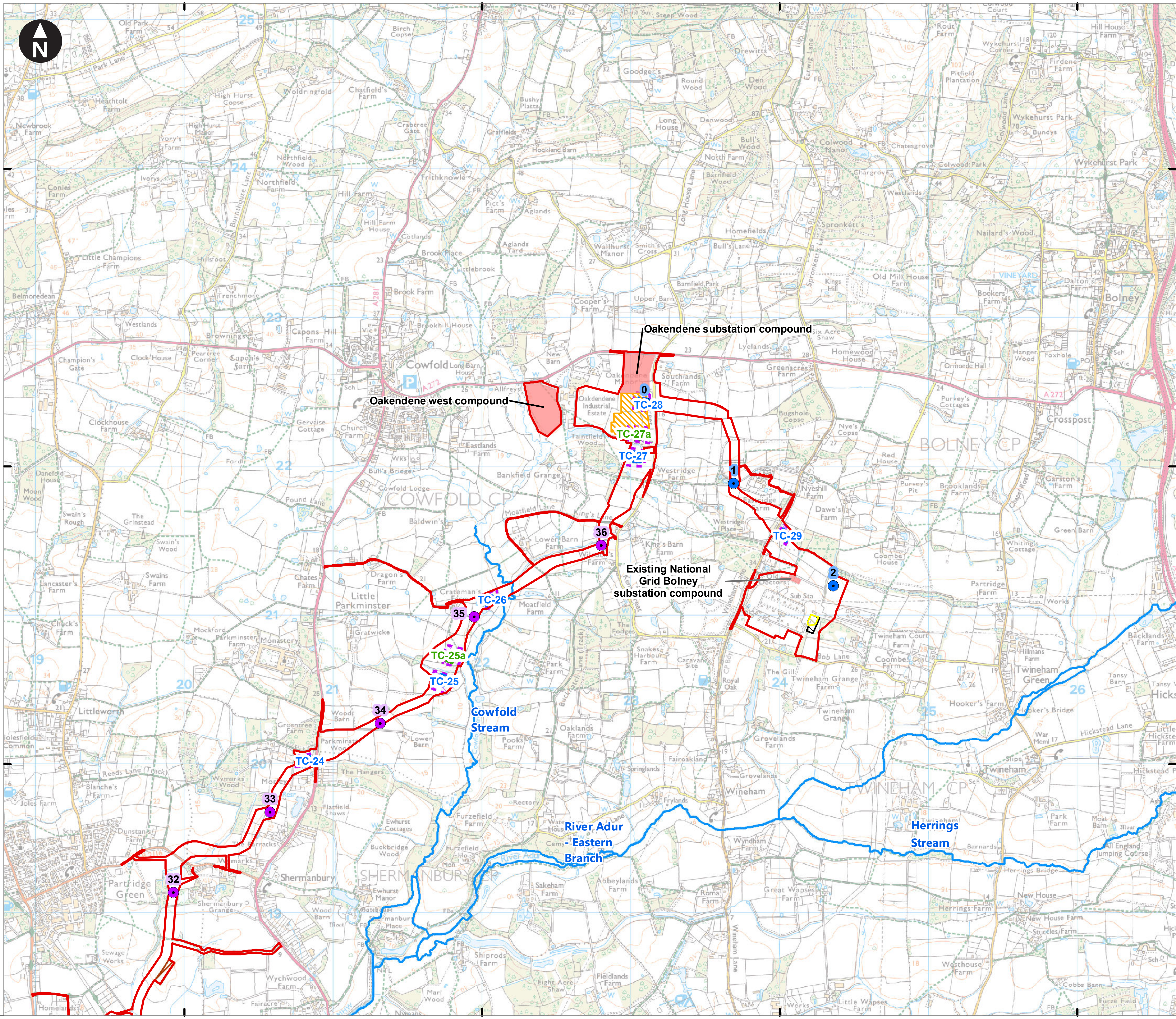
Rampion 2 Offshore Wind Farm

Figure 26.2.1d Water Environment

Flood Risk Assessment

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OY-5351				1.0
Company: WSP	Drawn By: COLLJ	Chk/Aprvd: DOUGG	Drawn Date: 27/07/2023	Status: Final

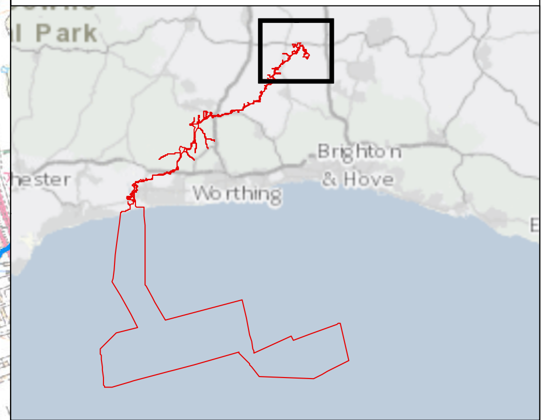


Key

- Proposed DCO Order Limits
- Onshore substation site
- Temporary construction compounds
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Bolney Substation extension (GIS)
- Bolney Substation extension (AIS)
- Temporary soil storage
- Main rivers

Onshore cable route KM points

- Onshore Substation connection
- Indicative onshore cable route



Kilometres
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1:25,000
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 26.2.1e Water Environment

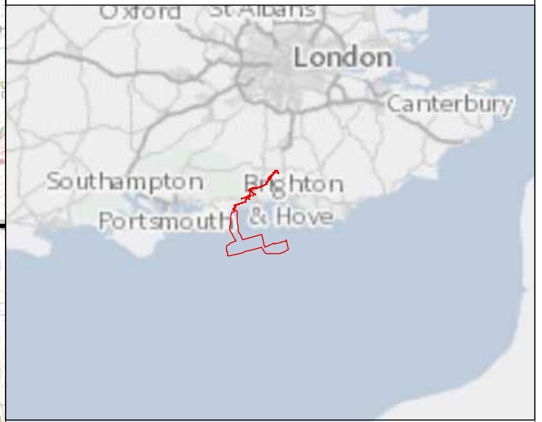
Flood Risk Assessment

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OY-5351				1.0
Company: WSP	Drawn By: COLLJ	Chk/Aprvd: DOUGG	Drawn Date: 27/07/2023	Status: Final

Key

- Proposed DCO Order Limits
- Onshore substation site
- Bolney Substation extension (GIS)
- Bolney Substation extension (AIS)
- Temporary construction compounds
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Temporary soil storage
- Main rivers
- Flood Zone 3
- Flood Zone 2
- Areas Benefitting from Flood Defences
- Flood Storage Areas
- Spatial Flood Defences



Kilometres
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1:85,000
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

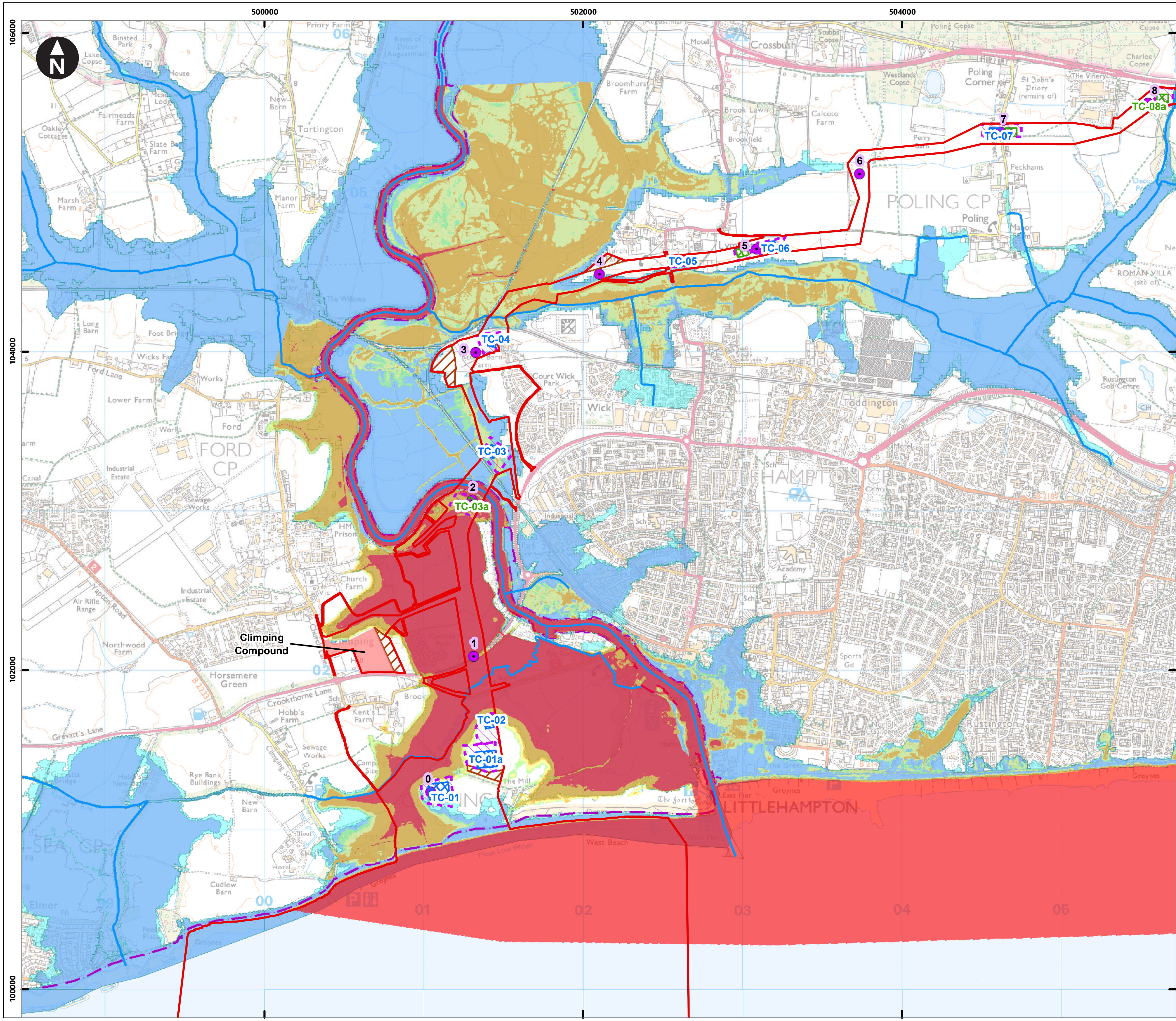
Figure 26.2.2 Flood map for planning overview

Flood Risk Assessment

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OY-5174	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	COLLJ	DOUGG	15/07/2023	FINAL



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Key

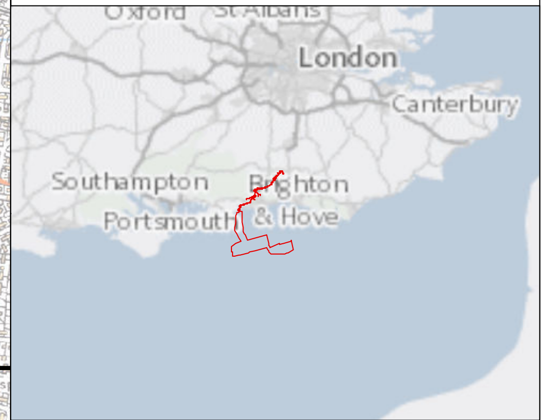
- Proposed DCO Order Limits
- Temporary construction compounds
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Temporary soil storage
- Main rivers
- Flood Storage Areas
- Spatial Flood Defences
- Areas Benefitting from Flood Defences
- Flood Zone 3
- Flood Zone 2

0.5% AEP tidal max hazard

- Null
- Low hazard
- Danger for some
- Danger for most
- Danger for all

Onshore cable route KM points

- Indicative onshore cable route



Kilometres
0 0.125 0.25 0.5 0.75 1
1:23,000
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

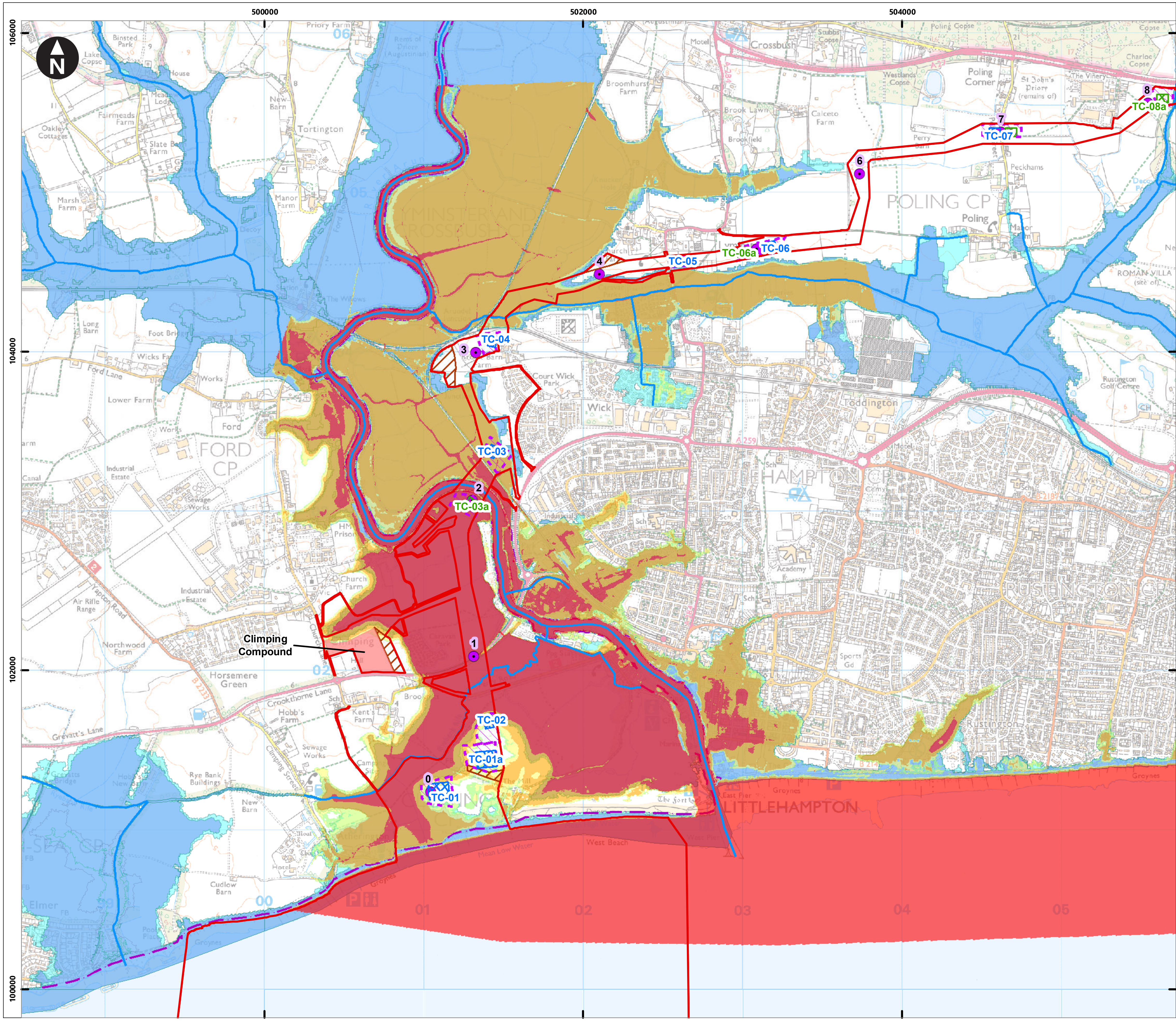
Figure 26.2.3a Tidal flood risk: Littlehampton (present)

Flood Risk Assessment

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OY-7220a	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	COLLJ	DOUGG	27/07/2023	FINAL



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Key

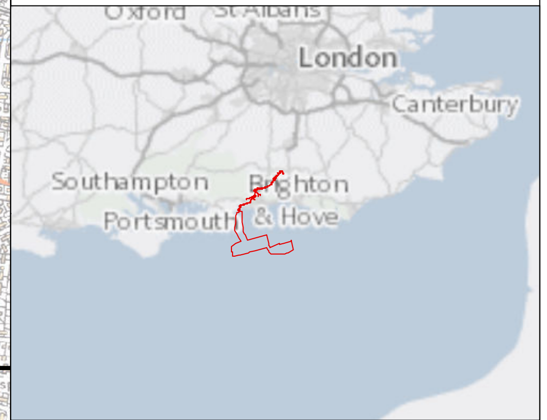
- Proposed DCO Order Limits
- Temporary construction compounds
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Temporary soil storage
- Main rivers
- Flood Storage Areas
- Spatial Flood Defences
- Areas Benefitting from Flood Defences
- Flood Zone 3
- Flood Zone 2

0.5% AEP (2070) tidal max hazard

- Null
- Low hazard
- Danger for some
- Danger for most
- Danger for all

Onshore cable route KM points

- Indicative onshore cable route



Kilometres
0 0.125 0.25 0.5 0.75 1
1:23,000
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 26.2.3b Tidal flood risk: Littlehampton (2070)

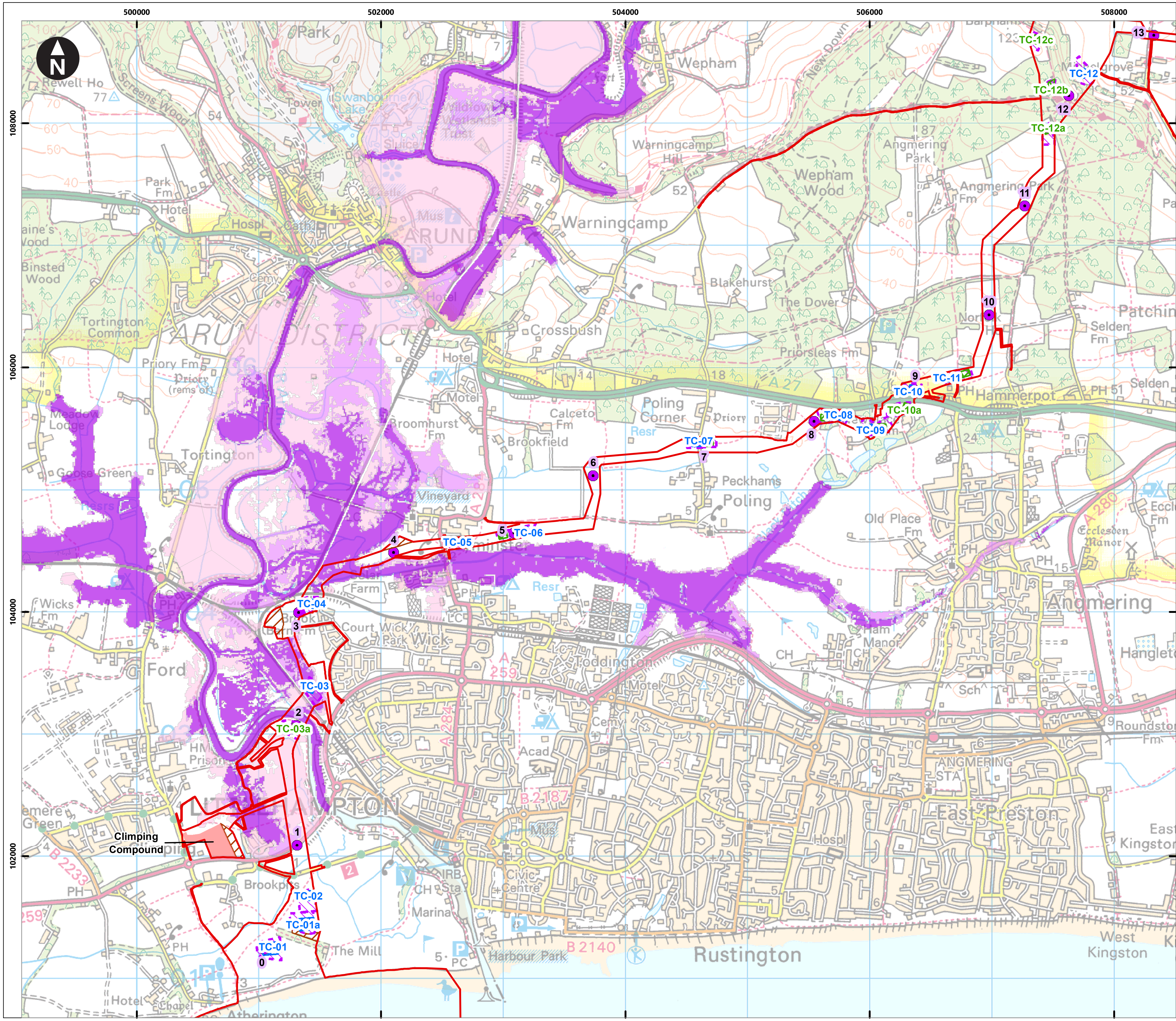
Flood Risk Assessment

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OY-7220b				1.0
Company: WSP	Drawn By: COLLJ	Chk/Aprvd: DOUGG	Drawn Date: 27/07/2023	Status: FINAL

Document uncontrolled when printed

ISO A3 Landscape



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Key

- Proposed DCO Order Limits
- Temporary construction compounds
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Temporary soil storage

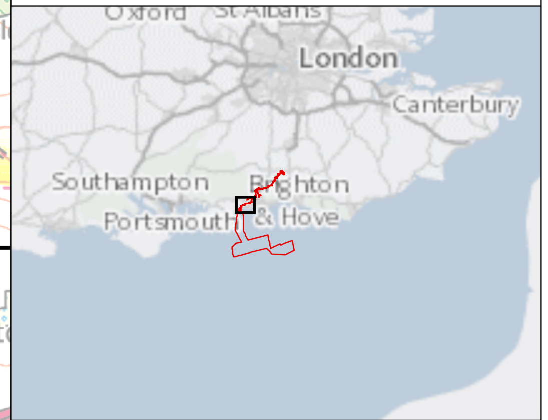
Onshore cable route KM points

- Indicative onshore cable route

Fluvial flood extents (defended)

- 5% AEP
- 1% AEP
- 1% AEP climate change

Note. Defended fluvial flood extents have been sourced from the Environment Agency's Lower Arun modelling study (Atkins 2010). The processed fluvial flood extents provided with this study had been truncated to the A259 road bridge (at the 1km chainage point), hence have been replicated as such in this Figure, with no fluvial flood risk mapped in the floodplain south of this point. A precautionary approach to the assessment of fluvial flood risk in this area is discussed in Paragraphs 5.2.12 and 5.2.13 of the FRA.



Kilometres
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1:30,000
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

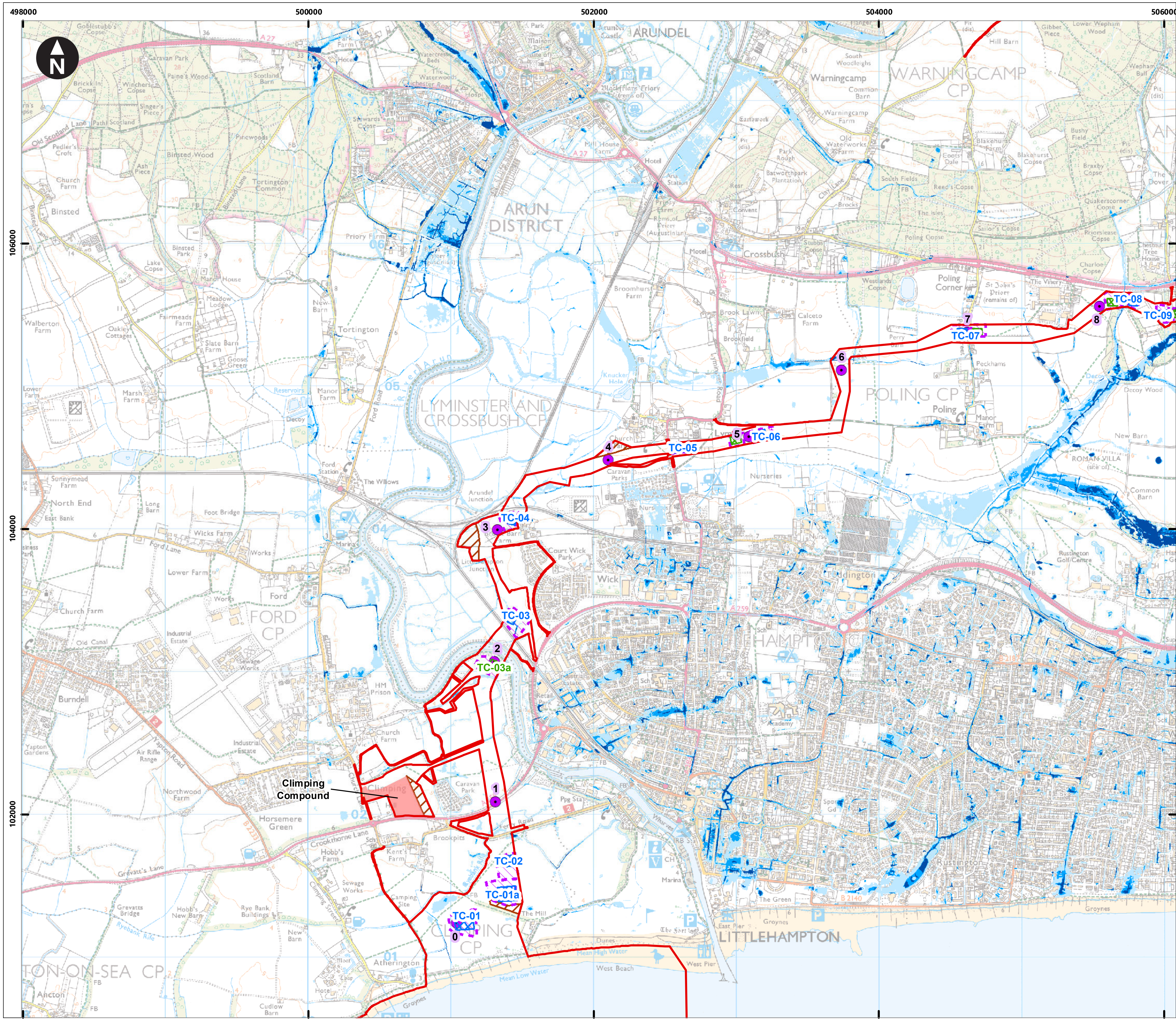
Figure 26.2.4 Fluvial flood extents: Littlehampton

Flood Risk Assessment

System Identifier:	Version:
42285-WSPE-EX-ON-FG-OY-8056	2.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	DOUGG	22/05/2024	FINAL

Document uncontrolled when printed ISO A3 Landscape



Key

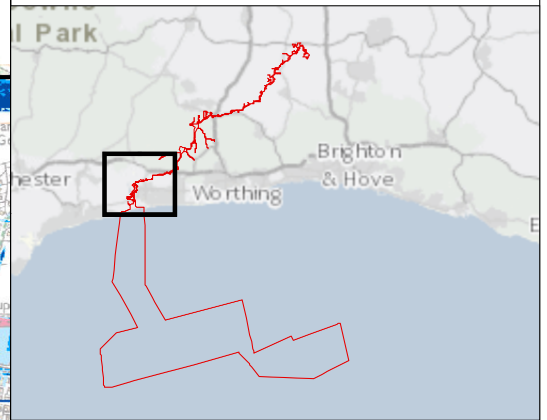
- Proposed DCO Order Limits
- Temporary construction compounds
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound
- Trenchless Crossing (TC) limits of
- Temporary soil storage

Onshore cable route KM points

- Indicative onshore cable route

Risk of Flooding from Surface Water flood

- > 3.33% AEP - High risk of surface water
- 1%- 3.3% AEP - Medium risk of surface
- 0.1 - 1% AEP - Low risk of surface water



Kilometres

0 0.125 0.25 0.5 0.75 1

1:25,681

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

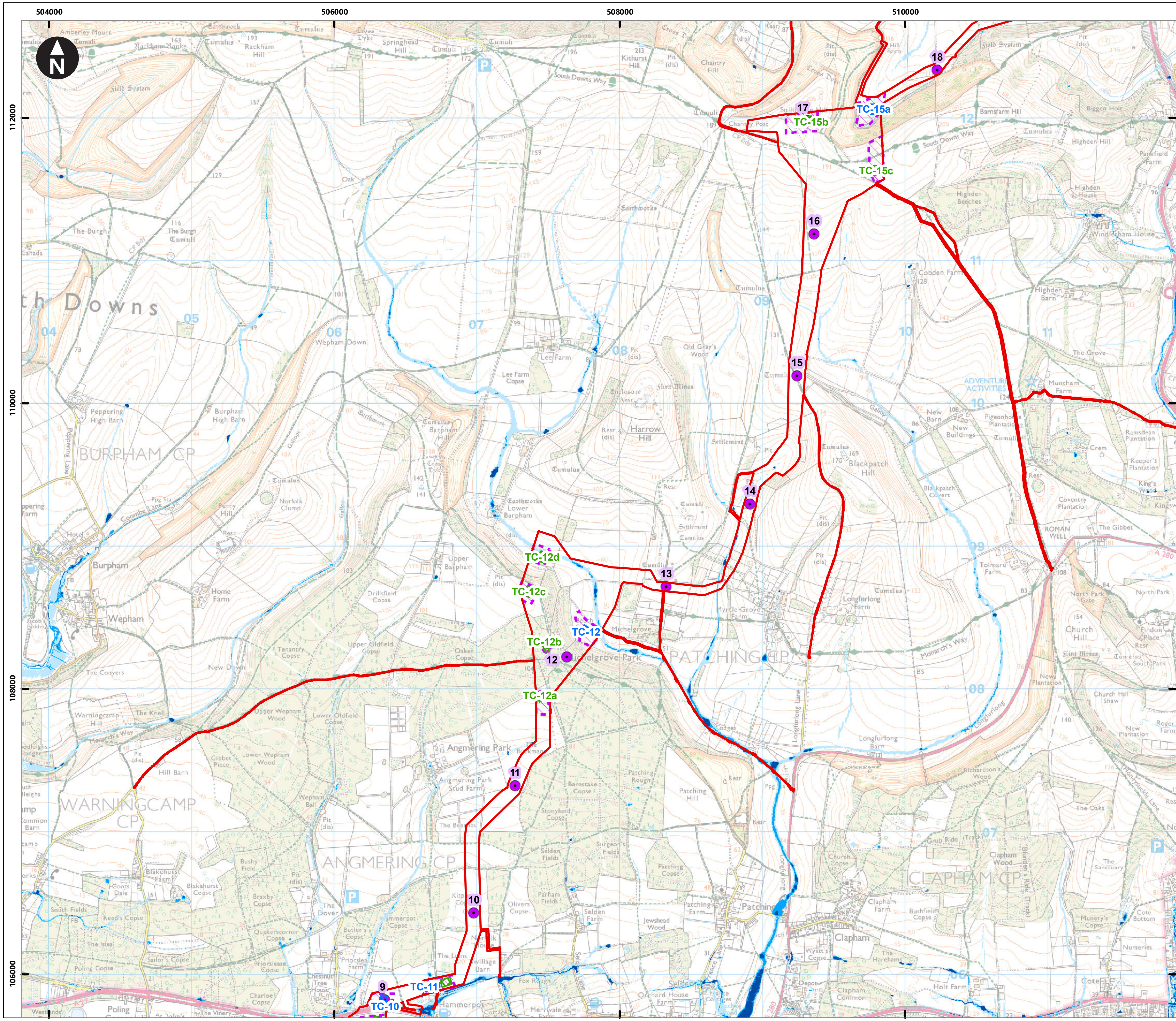
Figure 26.2.5a Risk of flooding from surface water extents: Overview

Flood Risk Assessment

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OY-2911	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	COLLJ	DOUGG	27/07/2023	Final



Key

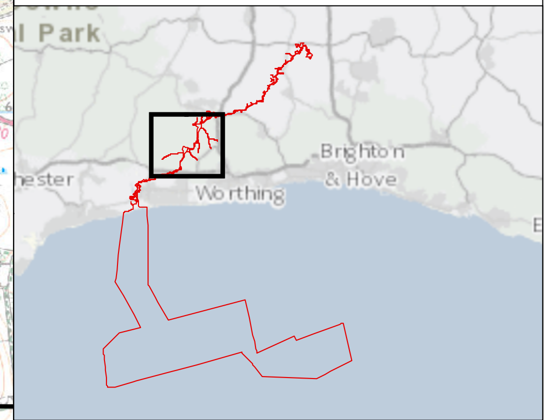
- Proposed DCO Order Limits
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound
- Trenchless Crossing (TC) limits of

Onshore cable route KM points

- Indicative onshore cable route

Risk of Flooding from Surface Water flood

- > 3.33% AEP - High risk of surface water
- 1%- 3.3% AEP - Medium risk of surface
- 0.1 - 1% AEP - Low risk of surface water



Kilometres

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1:25,681

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

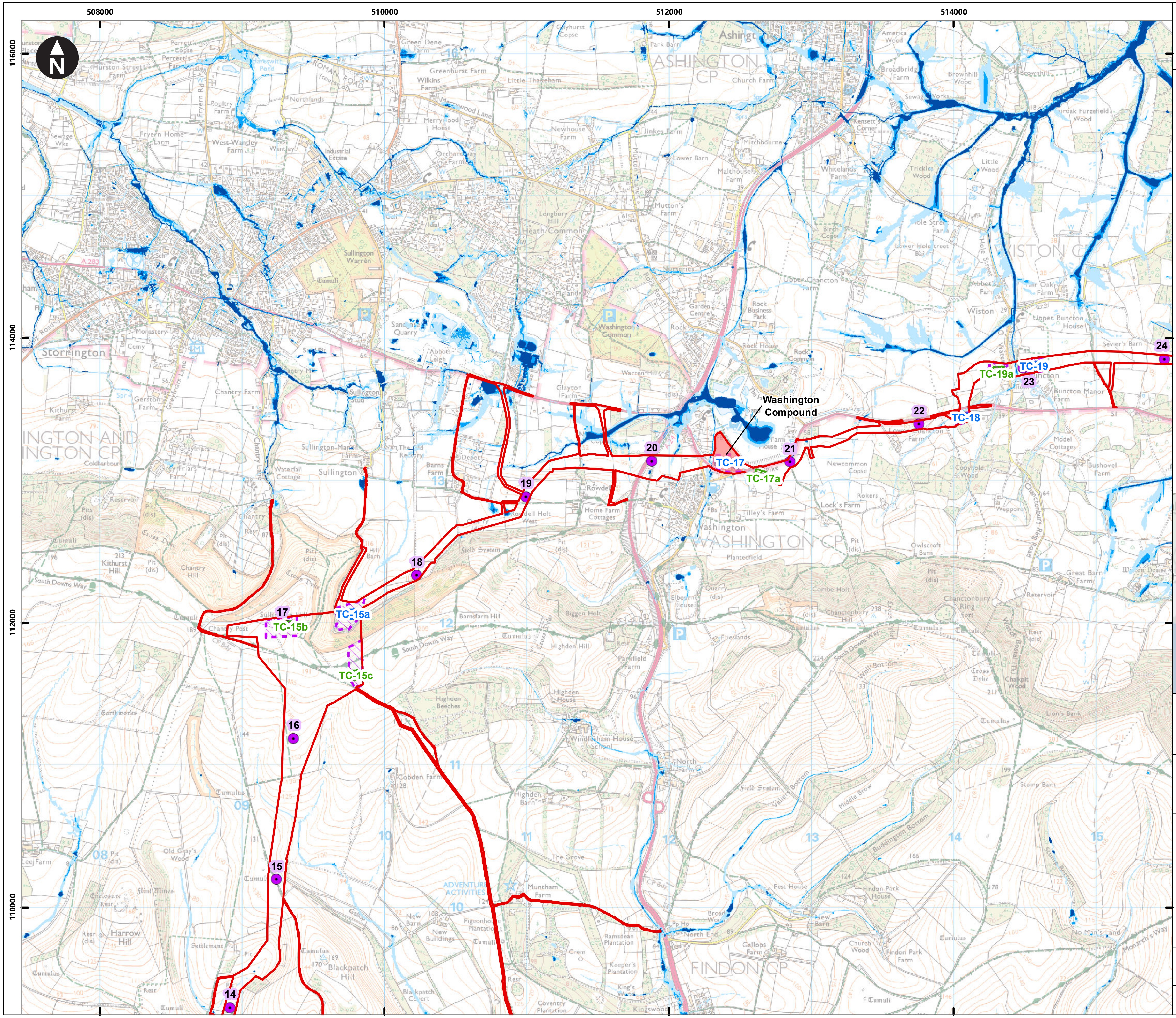
Rampion 2 Offshore Wind Farm

Figure 26.2.5b Risk of flooding from surface water extents: Overview

Flood Risk Assessment

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OY-2911				1.0
Company: WSP	Drawn By: COLLJ	Chk/Aprvd: DOUGG	Drawn Date: 27/07/2023	Status: Final



Key

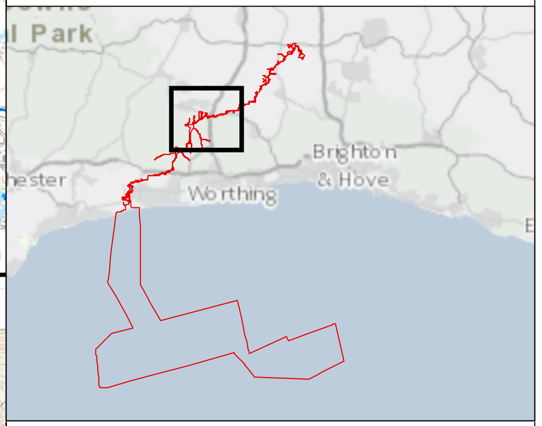
- Proposed DCO Order Limits
- Temporary construction compounds
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation

Onshore cable route KM points

- Indicative onshore cable route

Risk of Flooding from Surface Water flood extent

- > 3.33% AEP - High risk of surface water flooding
- 1%- 3.3% AEP - Medium risk of surface water flooding
- 0.1 - 1% AEP - Low risk of surface water flooding



Kilometres
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1:25,681
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

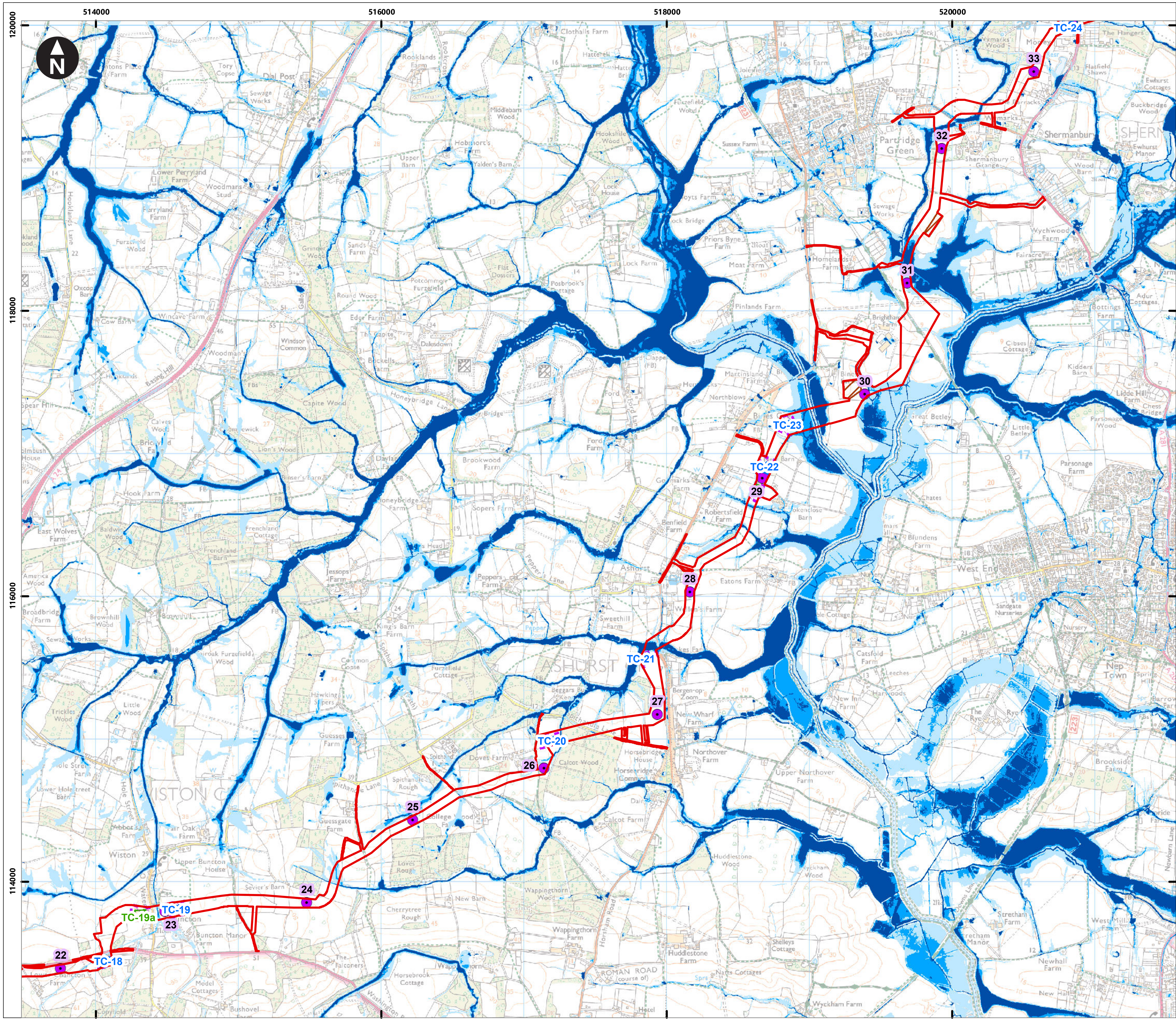
Figure 26.2.5c Risk of flooding from surface water extents: Overview

Flood Risk Assessment

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OY-2911	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	COLLJ	DOUGG	27/07/2023	Final



Key

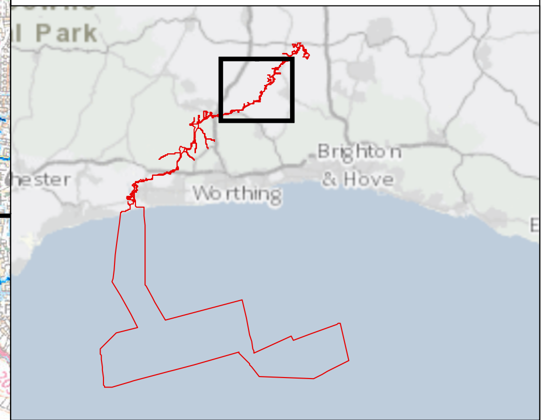
- Proposed DCO Order Limits
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Temporary soil storage

Onshore cable route KM points

- Indicative onshore cable route

Risk of Flooding from Surface Water flood extent

- > 3.33% AEP - High risk of surface water flooding
- 1%- 3.3% AEP - Medium risk of surface water flooding
- 0.1 - 1% AEP - Low risk of surface water flooding



Kilometres
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1:25,681
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

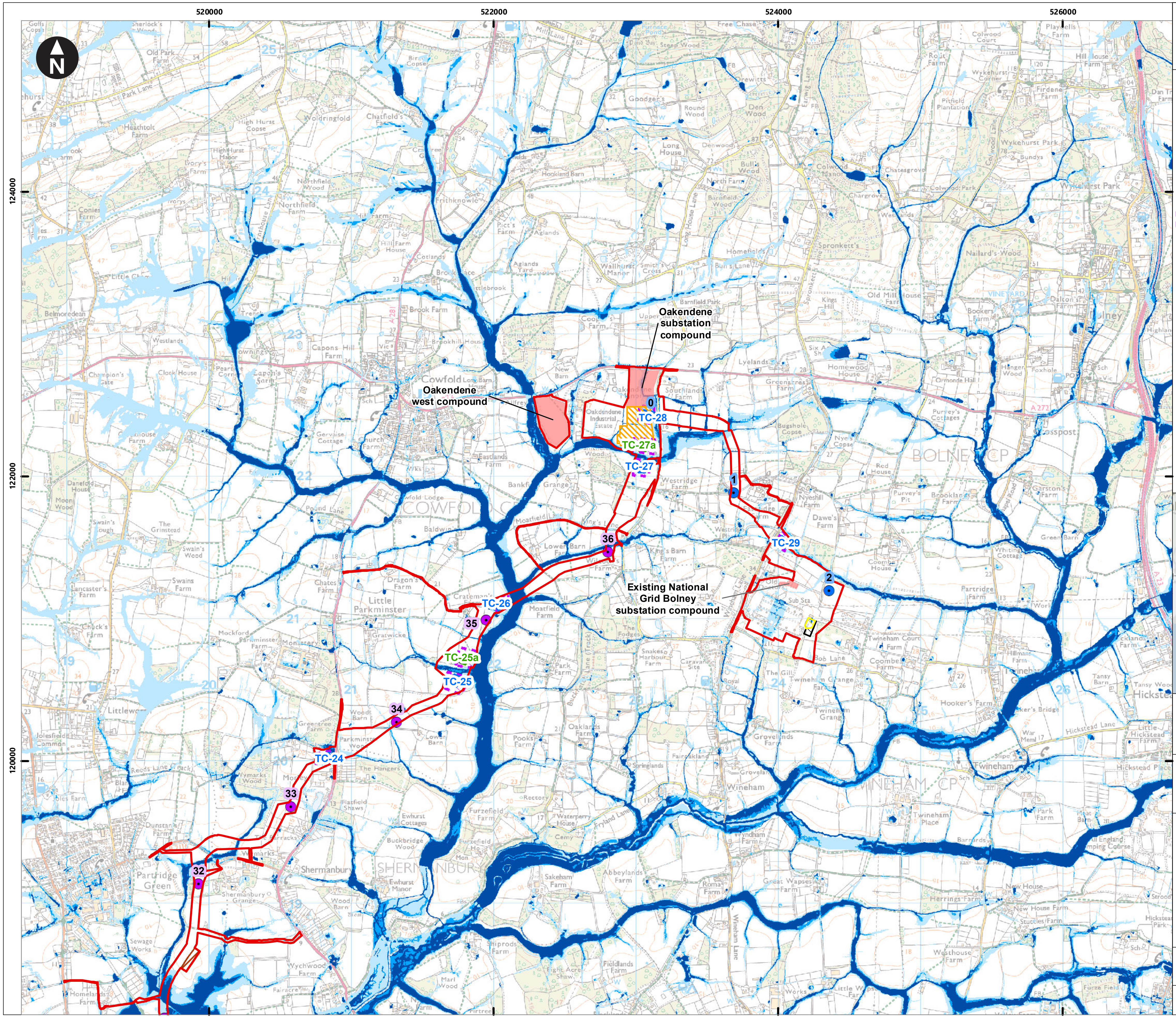
Figure 26.2.5d Risk of flooding from surface water extents: Overview

Flood Risk Assessment

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OY-2911	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	COLLJ	DOUGG	27/07/2023	Final



Key

- Proposed DCO Order Limits
- Onshore substation site
- Temporary construction compounds
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Bolney Substation extension (GIS)
- Bolney Substation extension (AIS)
- Temporary soil storage

Onshore cable route KM points

- Onshore Substation connection
- Indicative onshore cable route

Risk of Flooding from Surface Water flood extent

- > 3.33% AEP - High risk of surface water flooding
- 1%- 3.3% AEP - Medium risk of surface water flooding
- 0.1 - 1% AEP - Low risk of surface water flooding

Kilometres
0 0.125 0.25 0.5 0.75 1

1:25,681
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

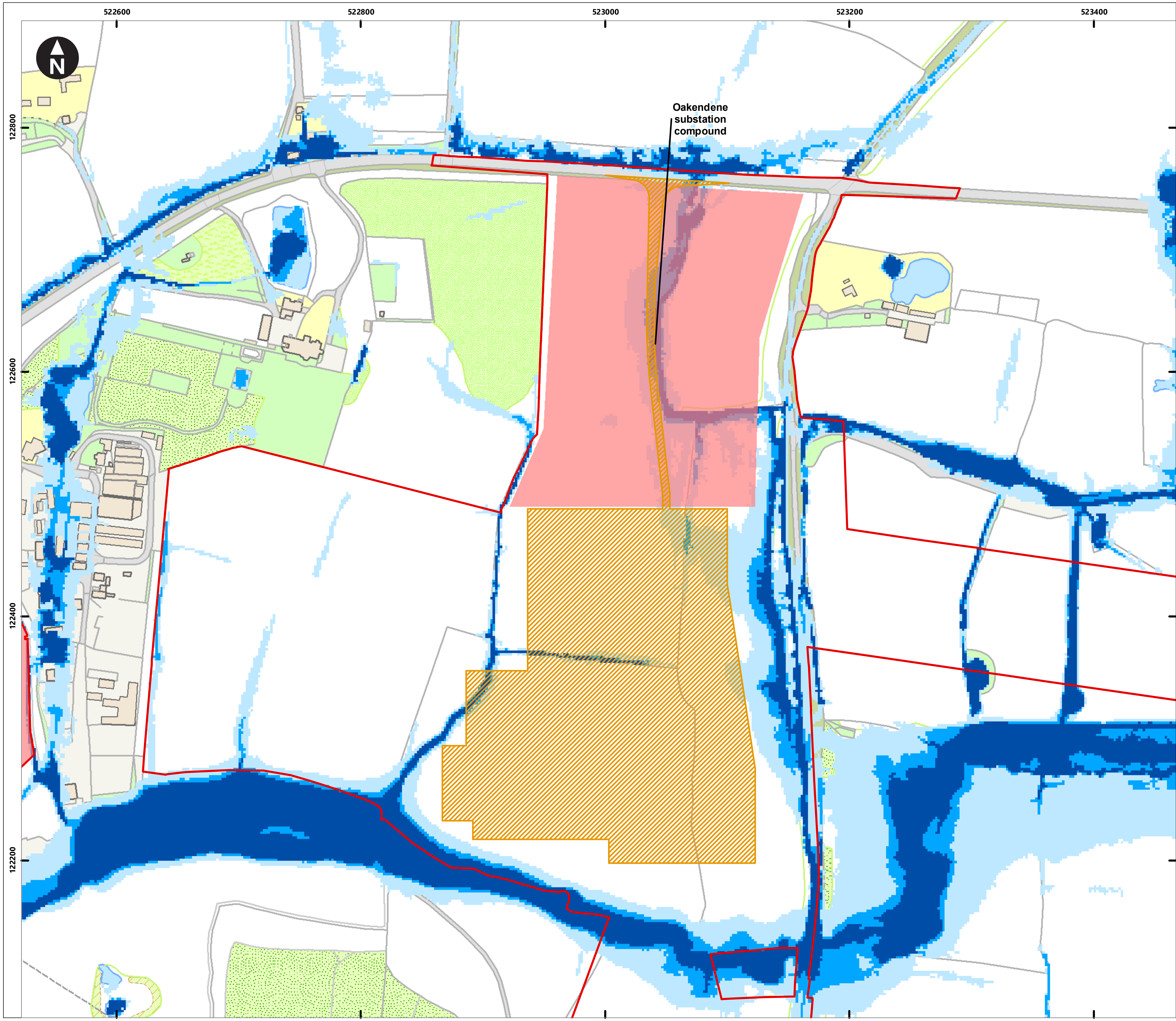
Rampion 2 Offshore Wind Farm

Figure 26.2.5e Risk of flooding from surface water extents: Overview

Flood Risk Assessment

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OY-2911				1.0
Company: WSP	Drawn By: COLLJ	Chk/Aprvd: DOUGG	Drawn Date: 27/07/2023	Status: Final

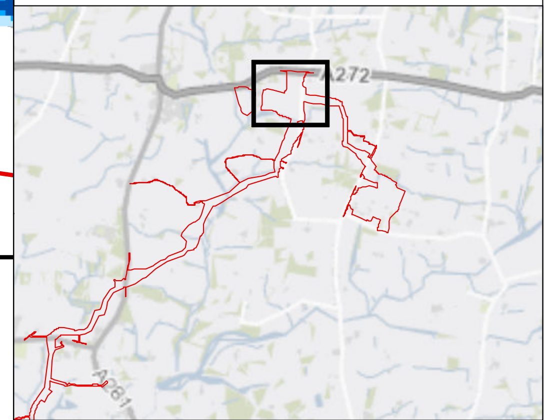


Key

- Proposed DCO Order Limits
- Onshore substation site
- Temporary construction compound

Risk of Flooding from Surface Water flood

- > 3.33% AEP - High risk of surface
- 1%- 3.3% AEP - Medium risk of
- 0.1 - 1% AEP - Low risk of surface



Meters

0 12.5 25 50 75 100

1:3,000

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

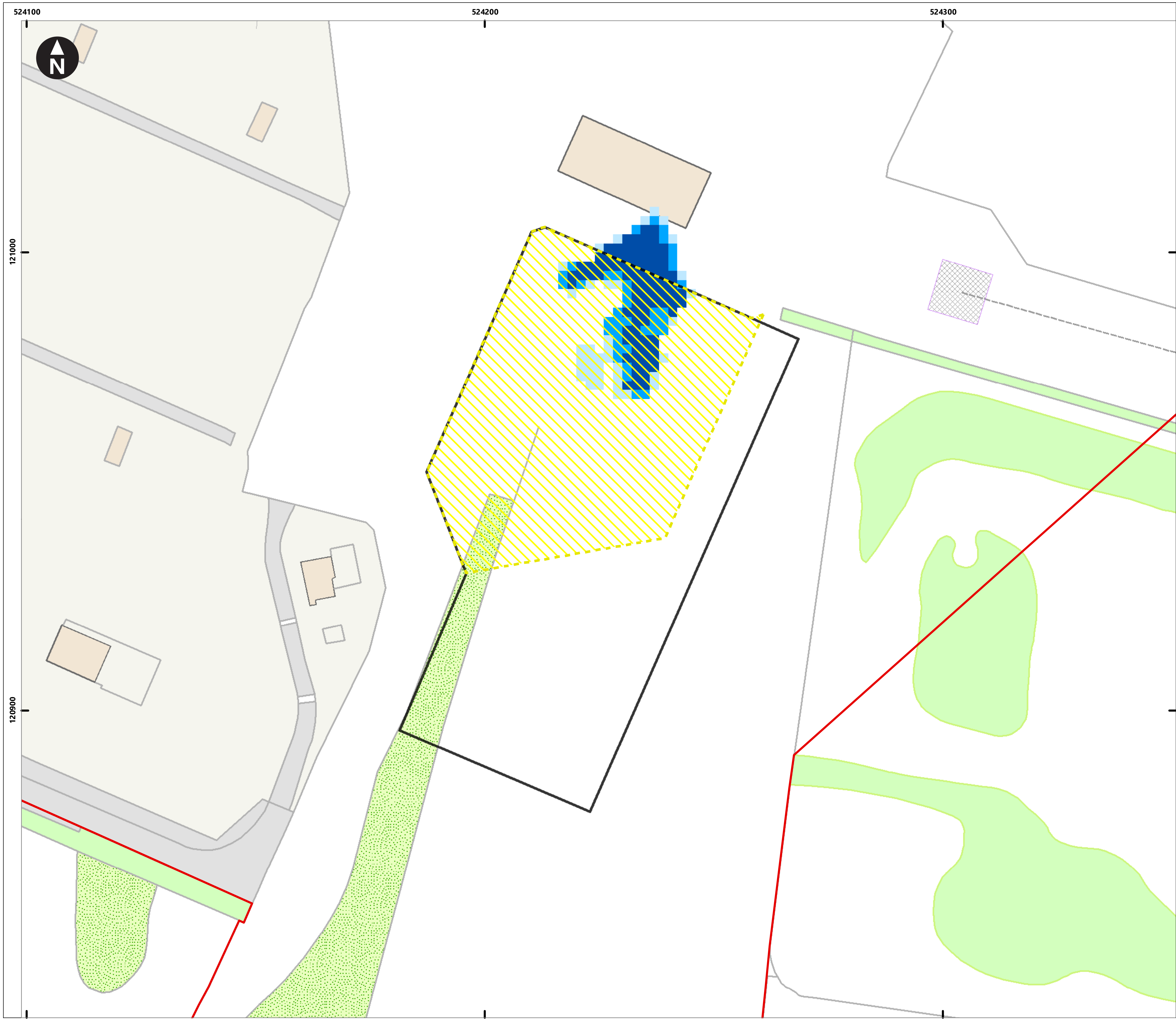
Figure 26.2.6a Risk of flooding from surface water extents: Oakendene substation site

Flood Risk Assessment

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OY-7808	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	COLLJ	DOUGG	27/07/2023	Final



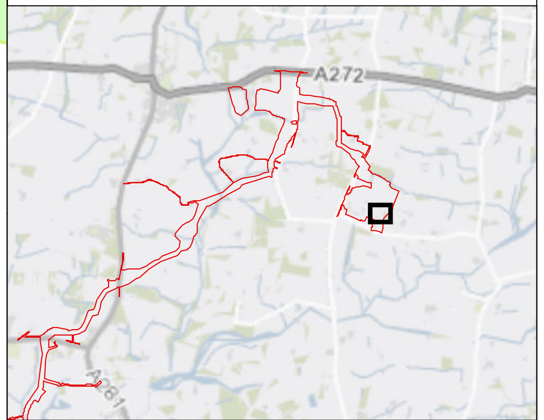
Key

- Proposed DCO Order Limits
- Existing National Grid Bolney substation extension (GIS)
- Existing National Grid Bolney substation extension (AIS)

Risk of Flooding from Surface Water flood extent

- > 3.33% AEP - High risk of surface water flooding
- 1%- 3.3% AEP - Medium risk of surface water flooding
- 0.1 - 1% AEP - Low risk of surface water flooding

AIS = Air Insulated Switchgear
GIS = Gas Insulated Switchgear



Meters
0 4.25 8.5 17 25.5 34

1:800

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

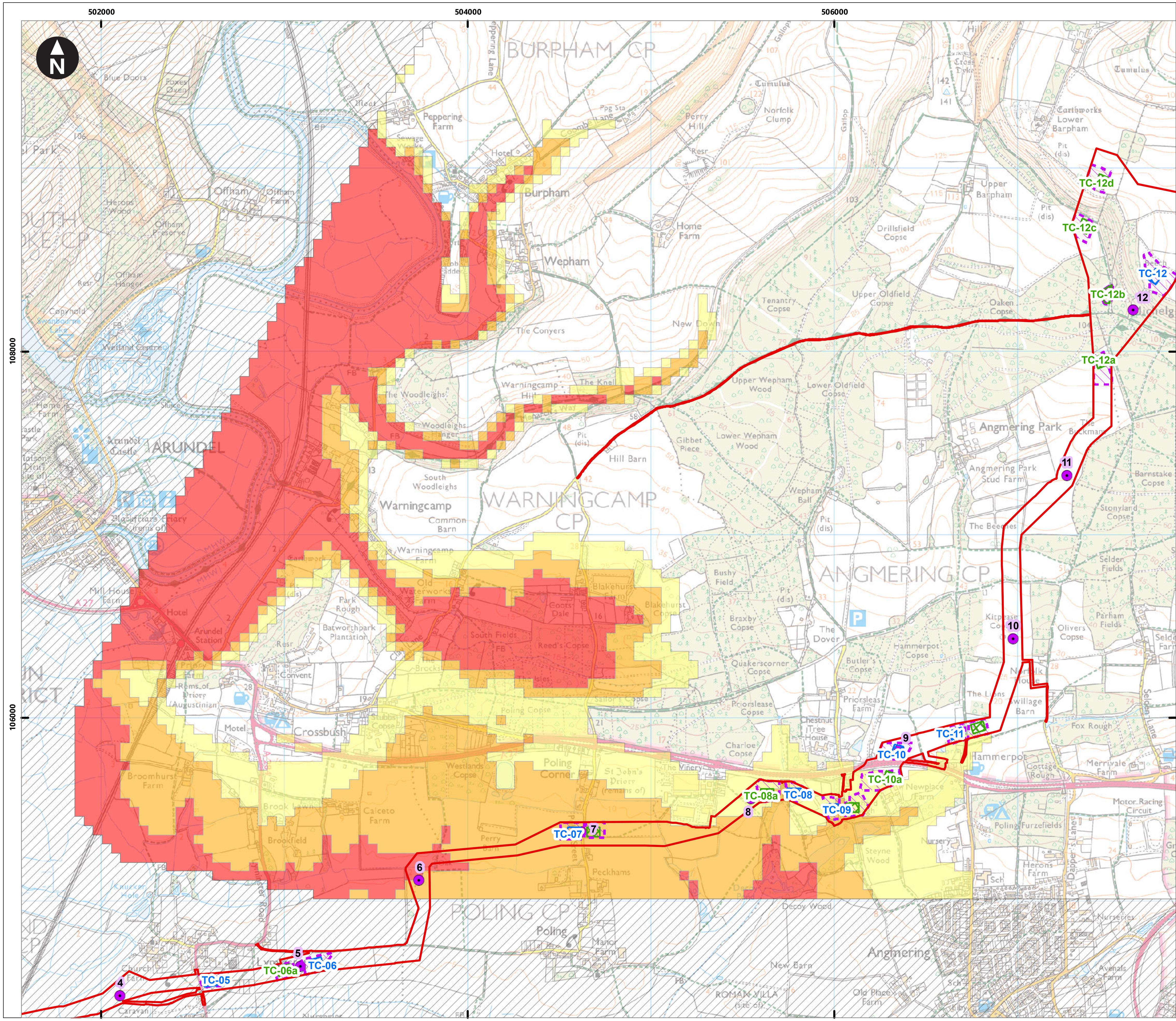
Rampion 2 Offshore Wind Farm

Figure 26.2.6b Risk of flooding from surface water extents: Bolney substation extension

Flood Risk Assessment

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OY-7808				1.0
Company: WSP	Drawn By: COLLJ	Chk/Aprvd: DOUGG	Drawn Date: 27/07/2023	Status: Final



Key

- Proposed DCO Order Limits
- Temporary construction compounds
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation

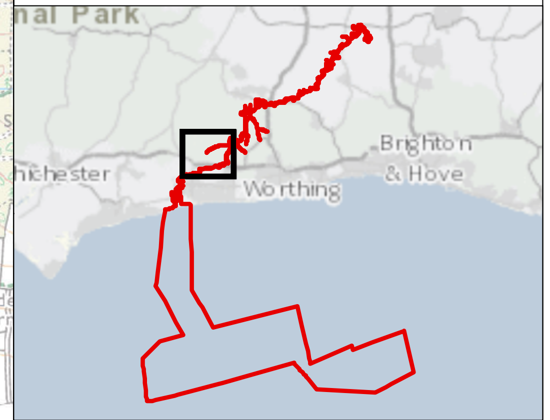
Onshore cable route KM points

- Indicative onshore cable route

Indicative risk of groundwater emergence

- High
- Moderate
- Low
- Very Low
- No data

Note. Based on the depth to groundwater calculated from groundwater level contours in the chalk and surrounding aquifers (sourced from Hydrogeological Map of the South Downs and Adjacent Parts of the Weald, BGS 1978) and LiDAR data (sourced from the Environment Agency 2020).



Kilometres
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1:20,000
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

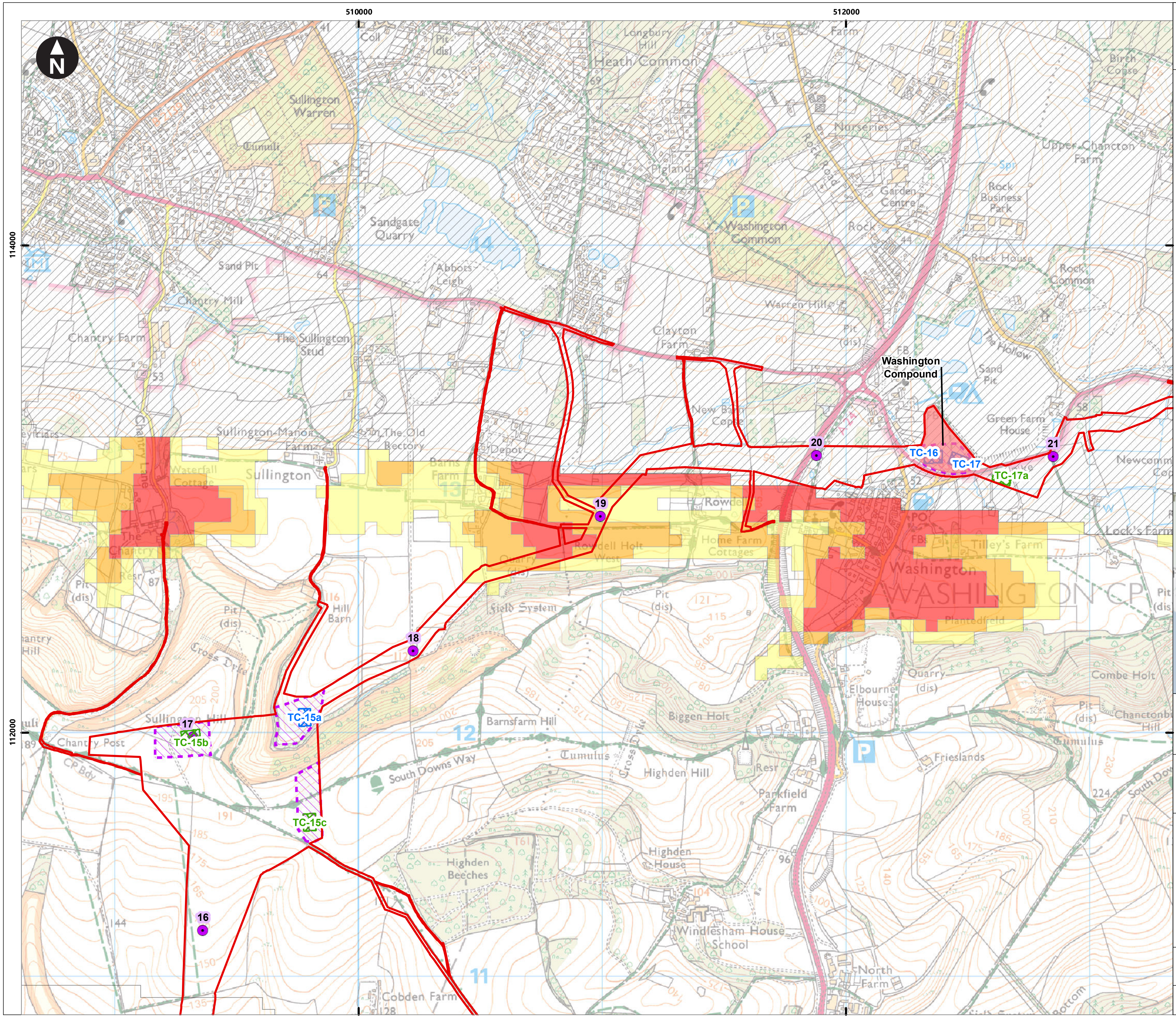
Figure 26.2.7a Areas at potential risk of groundwater emergence

Flood Risk Assessment

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OY-7214	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	COLLJ	DOUGG	27/07/2023	FINAL



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Key

- Proposed DCO Order Limits
- Temporary construction compounds
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation

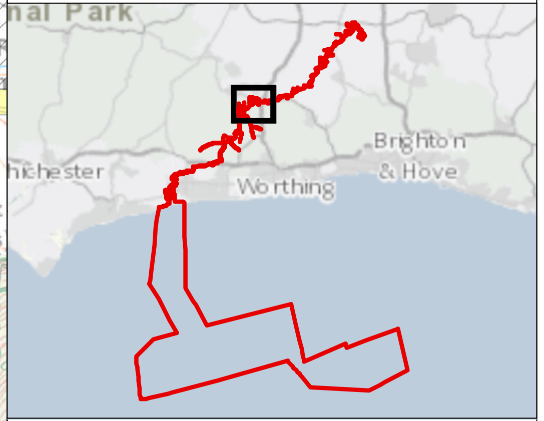
Onshore cable route KM points

- Indicative onshore cable route

Indicative risk of groundwater emergence

- High
- Moderate
- Low
- Very Low
- No data

Note. Based on the depth to groundwater calculated from groundwater level contours in the chalk and surrounding aquifers (sourced from Hydrogeological Map of the South Downs and Adjacent Parts of the Weald, BGS 1978) and LiDAR data (sourced from the Environment Agency 2020).



Kilometres
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1:15,000
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 26.2.7b Areas at potential risk of groundwater emergence

Flood Risk Assessment

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OY-7214	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	COLLJ	DOUGG	27/07/2023	FINAL

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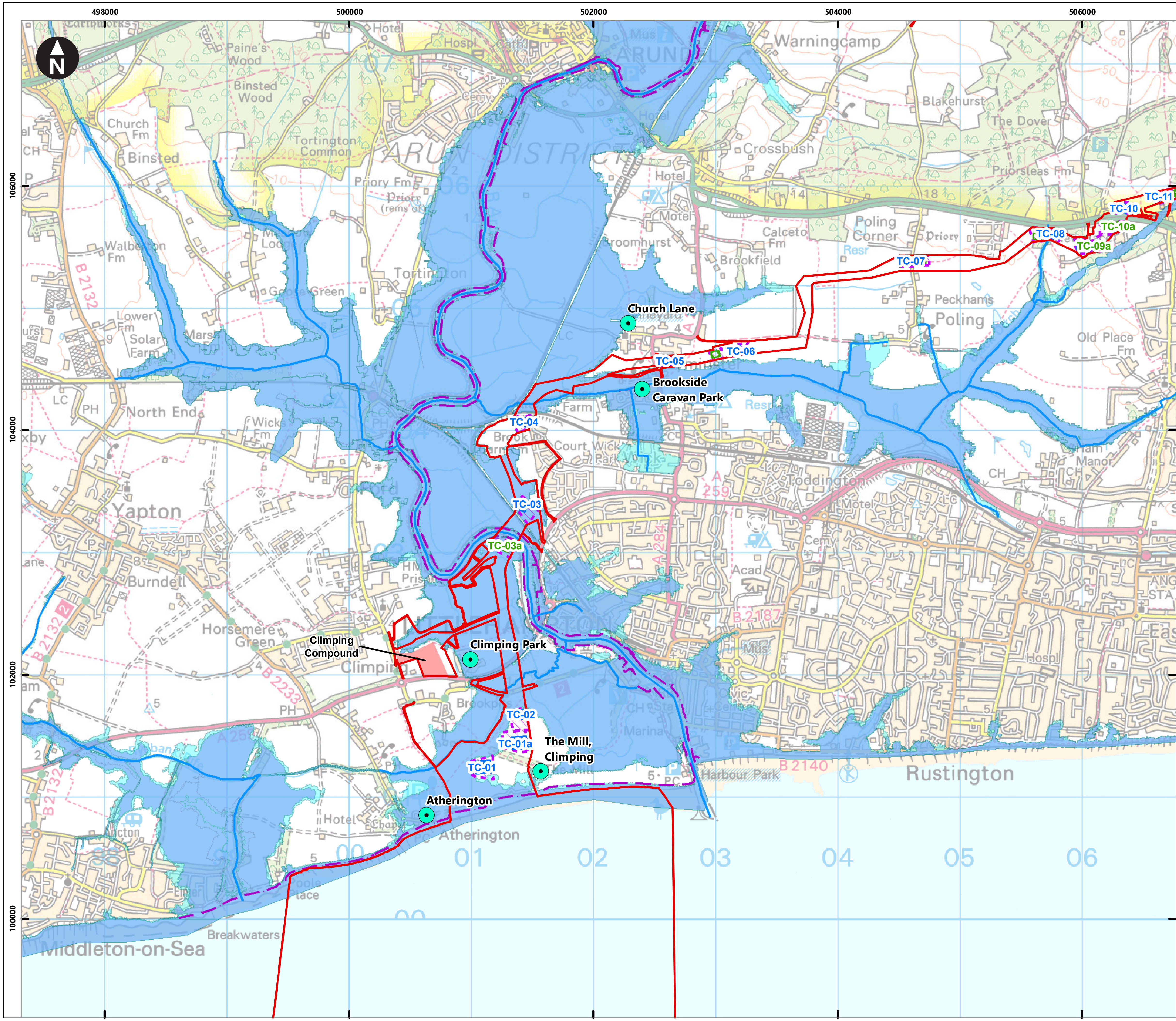

Key

- Proposed DCO Order Limits
- Temporary construction compounds
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Main rivers
- Flood Storage Areas
- Spatial Flood Defences
- Areas Benefiting from Flood Defences
- Flood Zone 3
- Flood Zone 2
- Fluvial & Tidal Receptors

Kilometres
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1:30,000
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

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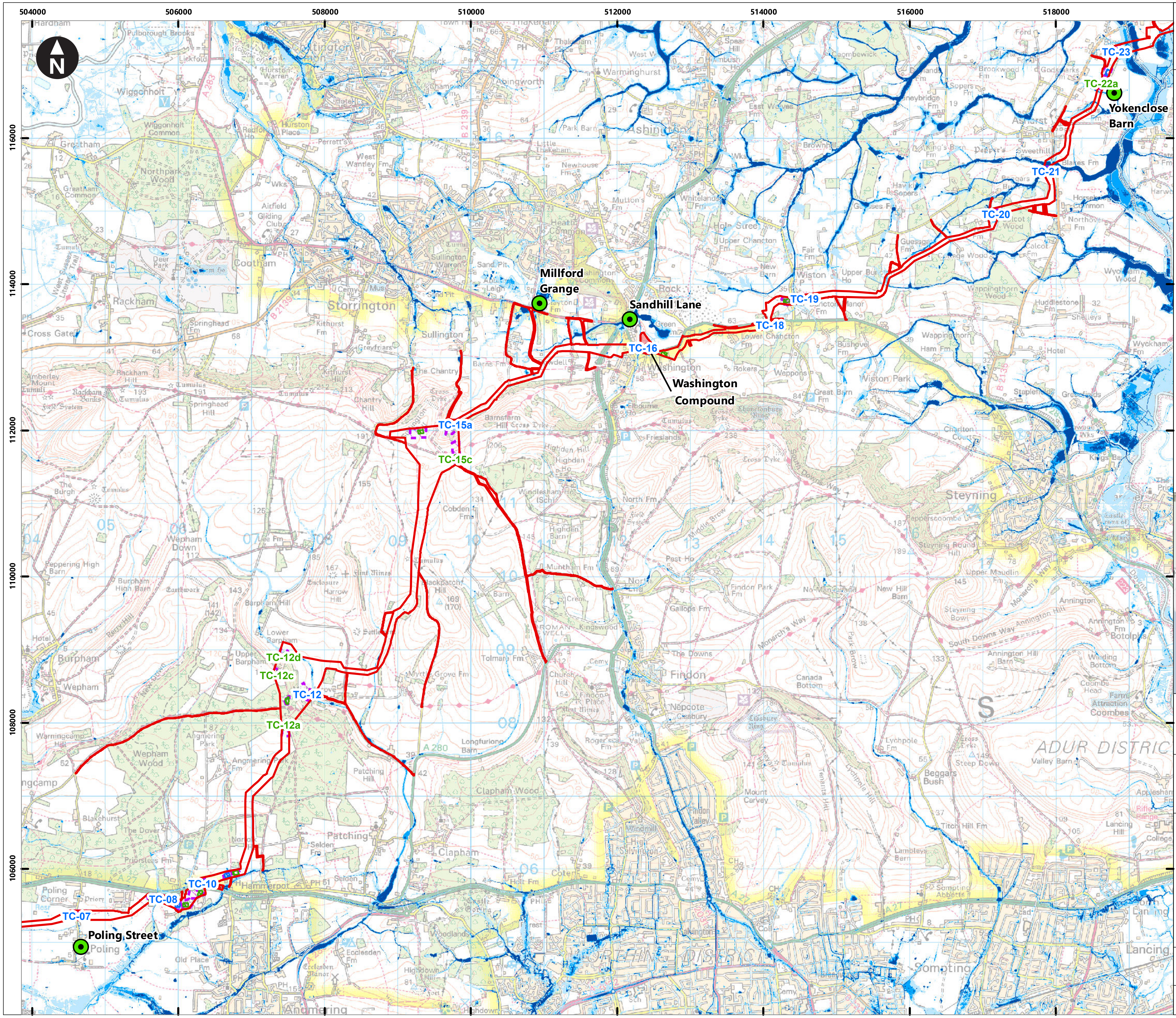
Figure 26.2.8 Fluvial and tidal flood risk receptors

Flood Risk Assessment

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OY-5810				1.0
Company: WSP	Drawn By: COLLJ	Chk/Aprvd: DOUGG	Drawn Date: 27/07/2023	Status: FINAL

 ISO A3 Landscape

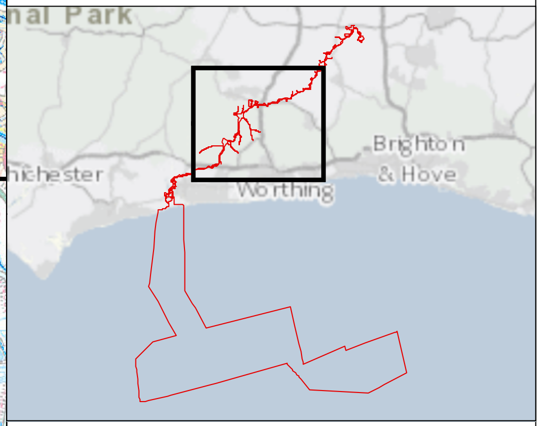


Key

- Proposed DCO Order Limits
- Temporary construction compounds
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation

Risk of Flooding from Surface Water flood extent

- > 3.33% AEP - High risk of surface water flooding
- 1%- 3.3% AEP - Medium risk of surface water flooding
- 0.1 - 1% AEP - Low risk of surface water flooding
- Surface water receptors



Kilometres

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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 26.2.9 Surface water flood risk receptors

Flood Risk Assessment

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OY-1682				1.0
Company: WSP	Drawn By: COLLJ	Chk/Aprvd: DOUGG	Drawn Date: 27/07/2023	Status: Final