The Sizewell C Project

8.14 Water Framework Directive Compliance Assessment Report
Part 3 of 4

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SIZEWELL C PROJECT: WFD COMPLIANCE ASSESSMENT

PART 3: ASSOCIATED DEVELOPMENT SITES

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3.1 Introduction to Part 3

a) Introduction

3.1.1. SZC Co.[1] is currently developing proposals to build and operate a new nuclear power station comprising two UK European Pressurised Reactors™ (EPRs) at Sizewell in Suffolk, north of the existing Sizewell B power station: the 'Sizewell C Project'. This report provides part of an assessment of whether the Sizewell C Project is compliant with the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (SI 2017/407), which implement Directive of the European Parliament and Council (EC) 2000/60/EC establishing a framework for community action in the field of water policy (generally known as the Water Framework Directive (WFD)) in the UK.

3.1.2. The report is provided in support of SZC Co's Development Consent Order (DCO) application to the Planning Inspectorate and a separate application for a Water Discharge Activity (WDA) Environmental Permit to the Environment Agency for the Sizewell C Project.

3.1.3. The WFD Compliance Assessment is divided into four parts, as follows:

- **Part 1**: Introduction and method.
- **Part 2**: Main development site.
- **Part 3**: Associated development sites.
- **Part 4**: Cumulative effects assessment.

3.1.4. Part 3 of this document presents the results of the WFD Compliance Assessment for the activities associated with the Sizewell C Project's associated development sites. The process followed for the assessment is set out in the Methodology section provided in Part 1.

b) Structure of Part 3

3.1.5. This report is structured differently to **Part 2** for the main development site, in that each section presents the staged WFD assessment for an associated development site in its entirety. Each section therefore comprises:

[1] NNB Generation Company (SZC) Limited, whose registered office is at 90 Whitfield Street, London, W1T 4EZ; referred to in this document as 'SZC Co'.

- Scheme description: a detailed description of the proposed associated development components which could impact the water environment during the construction, operational and, where relevant, the removal and reinstatement phases.
- Stage 1 Screening: initial screening of water bodies potentially at risk and partitioning of the associated development proposals into activities for assessment.
- Stage 2 Scoping: identification of which water bodies and associated quality elements could be at risk.
- Stage 3 Compliance Assessment: for those water bodies and quality elements scoped in, detailed assessment to determine whether the scoped in activities could cause water body deterioration and whether this deterioration would have a significant non-temporary effect on the status of one or more WFD quality elements at water body level.
- Summary: summary of the main findings of the assessment and mitigation measures required, where relevant, to ensure compliance with the WFD.

3.1.6. The Sizewell C Project associated development sites are addressed as follows:

- **Section 3.4**: Northern park and ride.
- **Section 3.5**: Southern park and ride.
- **Section 3.6**: Two village bypass.
- **Section 3.7**: Sizewell link road.
- **Section 3.8**: Yoxford and other highway improvements.
- **Section 3.9**: Freight management facility.
- **Section 3.10**: Rail.

3.1.7. **Section 3.3** provides a summary of the proposed control measures that are common to all associated development sites.

3.2 Overview of associated development

3.2.1. The associated development sites are proximate to the Sizewell C main development site, which is located on the Suffolk Coast, approximately half way between Felixstowe and Lowestoft, to the north-east of the town of Leiston. The proposals for associated development, which are shown on **Figure 3.1**, include:

- Northern park and ride: a temporary park and ride facility to the north of the main development site at Darsham.
- Southern park and ride: a temporary park and ride facility to the south of the main development site at Wickham Market.
- Two village bypass: a new permanent 2.4km single carriageway road that would depart from the A12 to the south-west of Stratford St. Andrew before re-joining the A12 to the east of Farnham.
- Sizewell link road: a new permanent 6.8km single carriageway road which bypasses Middleton Moor and Theberton.
- Yoxford and other highways improvements: provision of a new permanent roundabout at the junction A12 and B1122 east of Yoxford and permanent improvements to existing highways (A12/B1119 junction and Saxmundham, A1094/B1069 junction south of Knodishall and A12/A144 junction south of Bramfield). This section also includes the proposed permanent safety measures at other sites (A140/B1078 junction west of Coddenham, B1078/B1079 junction east of Easton and Otley College).
- Freight management facility: a temporary facility with parking spaces for Heavy Goods Vehicles (HGVs) at a site close to the A12/A14 Seven Hills Junction.
- Rail: the part of the green rail route comprising a temporary rail extension of approximately 1.7 kilometres (km) from the junction with the existing Saxmundham to Leiston branch line and the Saxmundham to Leiston branch line upgrades.

3.2.2. Once the facility is no longer required, the following associated development sites will be removed: Northern park and ride, southern park and ride, freight management facility and rail extension route of the rail improvement works. The remaining associated development sites (Sizewell link road, two village bypass, Yoxford and other highways improvements and the Saxmundham to Leiston branch line upgrades) will be permanent.

3.3 Embedded control measures

a) Introduction

i. Terminology

3.3.1. The term ‘mitigation’ describes committed measures used to prevent or minimise adverse environmental effects. There are three types of mitigation considered for the Sizewell C project:

- Primary mitigation: This is often referred to as 'embedded mitigation' and includes modifications to the location or design of the development made during the pre-application phase that are an inherent part of the project, become a fundamental part of the design for which consent is sought, and do not require additional action to be taken.
- Secondary mitigation: This is often referred to as 'additional mitigation' and includes actions that will require further activity in order to achieve the anticipated outcome.
- Tertiary mitigation: This will be required regardless of any Environmental Impact Assessment (EIA), as it is imposed as a result of legislative requirements and/or standard sectoral practices.

3.3.2. In order to avoid confusion with the mitigation measures required under the WFD to deliver Good Ecological Potential (GEP) in Heavily Modified Water Bodies (HMWBs) as set out in the River Basin Management Plans (RBMPs), any additional primary, secondary and tertiary measures required to prevent impacts resulting from the Sizewell C Project on WFD parameters described in this report will be referred to as “control measures”.

ii. Code of Construction Practice

3.3.3. There are a number of control measures proposed that would be common to all associated development sites for the construction, operational and (where applicable) removal and reinstatement phases of the works. These common (tertiary) control measures largely derive from best practice and are outlined here to reduce duplication throughout the document. Where measures are specific to a site and/or phase, these are detailed within the relevant site section.

3.3.4. A **Code of Construction Practice** (**CoCP**) (Doc Ref. 8.11) has been developed to guide the proposed construction works on the main development site and the associated development sites. This document is in three parts and will accompany the DCO application as follows:

- **CoCP Part A**: Project wide controls: sets out the purpose and scope of the **CoCP** and describes the measures and procedures that are applicable across the project. Part A would be applied across all Sizewell C construction works.
- **CoCP Part B**: Main development site: describes the specific controls that apply to the main development site, and supplement and refine the controls set out in Part A. This part to the **CoCP** is outlined in Part 2 of this WFD Compliance Assessment.

- **CoCP Part C**: Offsite associated developments: describes the specific controls that apply to all the offsite associated development sites. Part C is specifically relevant to this part of the WFD Compliance Assessment.

3.3.5. The **CoCP** aims to provide a clear and consistent approach to the control of Sizewell C construction activities, and to minimise impacts on people and the environment. The measures set out in the **CoCP** document follow best practice guidance and industry standards and include activity-specific measures identified through the assessment of environmental impacts in the EIA for each topic.

3.3.6. Additionally, under the Environmental Management System (EMS) the **CoCP** requires that Contractors will prepare Construction Environmental Management Plans that would demonstrate the measures set out in the **CoCP** are put in place.

b) General measures applicable to all sites covering accidental pollution

3.3.7. The following sets out a summary of the measures set out within the **CoCP** Part C that are relevant to the WFD.

i. Environmental incident controls

3.3.8. In order to minimise the potential for environmental incidents from construction activities at the Sizewell C associated development sites, a series of preventive (i.e. risk reduction) measures will be adopted.

3.3.9. The contractors and site personnel must be familiar with the potential environmental impacts and risks posed by the construction work. Although many of these are set out in this **CoCP**, the contractors will ensure that they have a clear understanding of those risks that are relevant to their contract before they commence work.

3.3.10. Contractors will therefore need to carry out their own risk assessment and devise method statements and incident response plans to ensure that suitable and sufficient controls are in place to avoid pollution and harm to human health or environmental receptors at all times either on or off-site. These would take into account applicable legislation, the environment and planning requirements, and best practice and guidance (for example, the Environment Agency's Pollution Prevention Guidance notes and other good construction practice, including that published by CIRIA[2]).

[2] Environment Agency's Pollution Prevention Guidelines have been withdrawn, but still constitute relevant advice on good practice. Where stated, they should be referred to in the absence of alternative guidance documents.

3.3.11. All drainage proposals and contractor method statements must be in accordance with the design elements in the Environment Agency's Pollution Prevention Guidance notes and other good construction practice, including that published by CIRIA.

ii. Good construction practice

3.3.12. Good construction practice measures include, as far as feasible, minimising the storage of potentially polluting materials and substances (such as soil, fuel and chemicals), and locating storage areas:

- as far away as possible from high risk locations;
- as far away as possible from where there is a risk of damage by collision (e.g. from site traffic);
- not within 50m of a spring, well or borehole;
- not within 10m of a watercourse, ditch, drainage channel or flood plain;
- not where polluting materials or substances could enter an open drain or soak into unmade ground where it could pollute groundwater;
- not where a spill could run over hard ground to enter a watercourse or soak into unmade ground where it could pollute groundwater;
- not on roofs (materials can enter guttering, itself a pathway to the surface or groundwater environment);
- the creation of temporary drainage networks (e.g. temporary connection into combined sewer infrastructure) during interim periods during the construction of the permanent drainage system;
- use of silt traps used to capture suspended solids;
- use of appropriately designed, built and maintained oil storage and refuelling facilities; and
- use of oil/water separators.

iii. Storage, handling and disposal of waste

3.3.13. Waste would be segregated and stored in appropriate, covered containers which will be clearly marked as to their contents. The containers would be located away from drains and water courses.

iv. Spill kits

3.3.14. Spill kits would be provided on site and smaller kits will also accompany mobile plant, equipment and oil containers when taken to remote areas of the site.

3.3.15. Contractors would ensure that responsible personnel are suitably trained in the use of spillage response equipment and materials. If any equipment requires special training to use it, the contact details of staff members who are trained in its use must be identified on the equipment.

v. Watching briefs

3.3.16. Contractors would ensure that the following watching briefs are maintained:

- Contamination: Watching brief for further contamination to be maintained by trained personnel during the construction works to deal with potential additional 'chance finds' of contamination. In the event that 'chance finds' of additional contamination are discovered, the measures outlined in the **CoCP** (Doc Ref. 8.11) would be implemented.
- Ecology: Maintain a watching brief for the presence of ecological receptors and habitat.

vi. Site security

3.3.17. Access to the site would be controlled by SZC Co. to avoid trespass and vandalism which may result in pollution. All valves on storage tanks would be locked when not in use to avoid tampering by vandals. Wherever possible storage of materials would be out of sight and in locked containers.

vii. Environmental Incident Response Plan

3.3.18. Contractors would maintain an up-to-date record of all substances stored on-site, together with an indication of the maximum quantity likely to be stored. Any relevant Material Safety Data Sheets (MSDSs) and Control of Substances Hazardous to Health (COSHH) assessments shall also be held for any substances posing a risk to people and/or the environment (including waste materials).

3.3.19. Contractors would be required to produce an Environmental Incident Response Plan (EIRP) specific to their work showing all stores, bulk storage vessels, drums or containers intended for storing oils, chemicals or other potentially polluting materials. This would be a clear plan of the site showing layout and access details, along with a schematic representation

of the site drainage arrangements. Essential features that the plan will contain include:

- the layout of buildings and portacabins;
- access routes and meeting points for emergency services;
- the location of any on-site treatment facilities for trade effluent or domestic sewage;
- details of the potential environmental incidents, impacts and risks that the construction works pose and the control measures to mitigate those risks;
- areas or facilities used to store raw materials, products and wastes (include details of tank sizes and products stored);
- bunded areas, with details of products stored and estimated retention capacity;
- location of hydrants, 'fireboxes' and pollution prevention equipment and materials;
- any watercourse, spring or borehole, well located within or near the site;
- areas of porous or unmade ground;
- site drainage – foul, surface and trade effluent drainage systems including features such as:
  - inspection points to detect pollution;
  - oil separators/interceptors;
  - firewater/spillage containment systems;
  - balancing tanks;
  - pollution control devices (shut-off valves/penstocks fitted in drains);
  - sacrificial containment areas such as car parks; and
  - other areas suitable for portable storage tanks, for blocking drains and temporary.
- storage of firewater; and
- a brief description of how all the contractor's facilities operate and how the storage vessels will be labelled for easy identification.

c) Specific measures for specific WFD compliance parameters

3.3.20. The following sets out a summary of specific measures for specific WFD compliance parameters set out within the **CoCP** Part C.

i. Terrestrial ecology (including aquatic ecology)

3.3.21. **Table 3.1** sets out control measures that would be put in place to mitigate potential impacts relating to terrestrial ecology (including aquatic ecology) at all associated development sites.

Table 3.1 Control measures to mitigate potential impacts relevant to WFD compliance parameters

Receptor	Activity	Mitigation or Control Measure
Ecological Receptors	Appointment of ecologist	Appointment of an Ecological Clerk of Works, a specialist ecologist, or similarly competent person (referred to as an ECoW), who would be appointed to be responsible for overseeing on-site ecological mitigation and ensuring that measures are implemented.
Ecological Receptors	Controlling spread of and non native species	There is the potential for non-native species to be introduced during the construction phase. Contractors will be required to undertake a biosecurity risk assessment as part of the planning for the scheme and a management plan put in place to avoid potentially facilitating the spread of non-native species during construction.
Ecological Receptors	Pollution prevention	Standard pollution prevention control measures would be implemented to avoid any pollution risk to watercourses and sensitive habitats. Section covering groundwater and surface water has more detail.

ii. Soils and Agriculture

3.3.22. **Table 3.2** sets out control measures that would be put in place to mitigate potential impacts relating to soils and agriculture at all associated development sites.

Table 3.2 Control measures to mitigate potential impacts relevant to WFD compliance parameters

Receptor	Activity	Mitigation or Control Measure
Soils	Earthworks	Sustainable re-use of soils in line with the Construction Code of Practice for the Susatinable Use of soil on Construction Sites through the development of a Soil Resources Plan as part of the over-arching SMP.

Receptor	Activity	Mitigation or Control Measure
		Ensure soils are stripped and handled in the driest condition possible.
		Ensure protection of stockpiles from erosion and tracking over.
		Confining vehicle movements to defined haul routes until all the soil resource has been stripped.
Best and most versatile (BMV) agricultural land	Earthworks	Ensure appropriate re-use of soils with restoration to agricultural land, where set out on the landscape restoration plans , of a comparable grade to that prior to stripping. All monitoring and auditing to be undertaken in line with the SMP specifications.
		Create and maintain a register of land condition (soils, topography, drainage, boundary treatments etc.) to ensure the land can be restored to agricultural use where land take is required on a temporary basis.
Watercourses	Earthworks	All soils would be stored a minimum of 10m away from watercourses (or potential pathways to watercourses) and any potentially contaminated soil would be stored on an impermeable surface and covered to reduce leachate generation and potential migration to surface waters.

3.3.23. Monitoring of specific activities would be undertaken in line with the SMP requirements, to ensure that mitigation measures are effective, and that residual impacts would be not significant.

iii. Geology and land quality

3.3.24. **Table 3.3** sets out control measures that would be put in place to mitigate potential impacts relating to geology and land quality at all associated development sites.

Table 3.3 Control measures to mitigate potential impacts relevant to WFD compliance parameters

Receptor	Activity	Mitigation or Control Measure
Controlled water recptors, ecological receptors and soils	Earthworks/construction works	The appropriate design of foundations, concrete and other materials with respect to groundwater and the potential contamination on site. Concrete and cement mixing and washing areas would be situated at least 10m away from existing surface water receptors. These would incorporate settlement and recirculation systems to allow water to be re-used. All washing out of equipment would be undertaken in a contained area, and all water would be collected for off-site disposal.
		A contamination watching brief will be carried out by suitably qualified and experienced personnel when excavating areas of higher contamination risk.
		Earthworks would be undertaken in accordance with an appropriate materials management plan (MMP), with suitable validation sampling and testing completed as well as stockpile tracking.
		Storage and stockpiling of made ground and natural materials separately and where necessary on impermeable surfaces and covered depending on the level of contamination.
		Waste generated during the works would be managed in accordance with a site waste management plan.
		All temporary stockpiles would be managed to prevent soil erosion, windblown dust and surface water run-off by methods such as capping, sealing or covering stockpiles, fencing, hydroseeding, dampening down and avoiding over stockpiling to reduce compaction of soil and loss of integrity.
		The area and duration of soil exposure would be minimised and timely reinstatement of vegetation or hardstanding would be undertaken to prevent soil erosion and reduce temporary effects on soil compaction.
		Appropriate working methods would be implemented during construction to ensure that there is no surface water run-off from the works or any stockpiles into adjacent surface watercourses or leaching into underlying groundwater in accordance with best practice.
		Appropriate pollution incident control e.g. plant drip trays, bunding and spill kits would be implemented. Sand bags or stop logs would also be available for deployment on the outlets from the site drainage system in case of emergency

Receptor	Activity	Mitigation or Control Measure
		spillages.
		Implementation of appropriate and safe storage of fuel, oils and equipment during construction, e.g. all fuels, oils, lubricants and other chemicals would be stored in an impermeable bund with at least 110% of the stored capacity. All refuelling would take place in a dedicated impermeable area, using a bunded bowser. Biodegradable oils should be used where possible.
Controlled water recptors, ecological receptors and soils	Operation	Appropriate storage and disposal of wastes would be undertaken in accordance with current guidance.
		Good housekeeping of plant and equipment stored on site with regulary plant/equipment maintenance checks and regular audits.
		Maintenance excavations and earthworks would be undertaken in accordance with an appropriate MMP.
		Implementation of appropriate and safe storage of fuel, oils and equipment during construction, e.g. all fuels, oils, lubricants and other chemicals would be stored in an impermeable bund with at least 110% of the stored capacity. All refuelling would take place in a dedicated impermeable area, using a bunded bowser. Biodegradable oils should be used where possible.
		Spills, leaks and pollution incidents would be managed and cleaned up in accordance with with the Environment Agency's guidance and best practice.

3.3.25. A contamination watching brief would be required to be completed by suitably qualified, and experienced personnel, when excavating areas of higher contamination risk to ensure that mitigation measures are effective, and that residual impacts would be not significant.

3.3.26. In addition to the control measures outlined in **Table 3.3** for construction activities, the following mitigation would be undertaken prior to construction works:

- additional ground investigation would be undertaken to inform the final design of the proposed development, and to confirm the ground conditions and contamination status of the site; and
- remediation of soil and groundwater contamination would be undertaken prior to construction (e.g. source removal, treatment or capping) if deemed necessary.

iv. Groundwater and surface water

3.3.27. **Table 3.4** sets out control measures that would be put in place to mitigate potential impacts relating to groundwater and surface water at all associated development sites.

Table 3.4 Control measures to mitigate potential impacts relevant to WFD compliance parameters

Receptor	Activity	Mitigation or Control Measure
Controlled waters receptors (groundwater and surface water) Ecological receptors	Earthworks Construction works	A watching brief would be implemented during the works to identify the presence of any unforeseen contamination.
		A piling risk assessment would be undertaken to ensure that appropriate piling techniques are implemented at the site to minimise risks to groundwater.
		Earthworks would be undertaken in accordance with an appropriate materials management plan.
		Waste generated during the works would be managed in accordance with a site waste management plan.
		All temporary stockpiles would be managed to prevent soil erosion, windblown dust and surface water run-off by hydroseeding, water spraying and avoiding over stockpiling to reduce compaction of soil and loss of integrity.
		Appropriate working methods would be implemented during construction to ensure that there is no surface water run-off from the works or any stockpiles into adjacent surface watercourses or leaching into underlying groundwater in accordance with best practice.
		Appropriate pollution incident control e.g. plant drip trays and spill kits would be implemented.
		Appropriate and safe storage of fuel, oils and equipment would be implemented.
		Ensuring all site activities are carried out in accordance with the Environmental Permitting Regulations (England and Wales) 2016 and Water Resources Act 1991.
		The wheels of all vehicles would be washed before leaving site. It is assumed that the wheels of all vehicles delivering materials to site would be washed on departure from their point of origin.
		Concrete and cement mixing and washing areas would be situated at least 10m away from surface water receptors. These would incorporate settlement and recirculation systems to allow water to be re-used. All washing out of equipment would be undertaken in a contained area, and all water would be collected for off-site disposal.

Receptor	Activity	Mitigation or Control Measure
Controlled waters receptors (groundwater and surface water) Ecological receptors	Pre-construction works Construction works	A temporary drainage system would be implemented early in the construction phase. Construction phase water management zones would intercept surface water run off, sediment and contaminants from the construction compound and laydown areas, and incorporate sustainable drainage measures such as swales, filter drains, detention basins and soakaways to promote infiltration.
		It is proposed that construction drainage would be contained within the site, with drainage to ground. Only if full infiltration is not possible, would these systems discharge into the surface drainage network at Greenfield run-off rates to minimise the potential for impact.
		Foul sewage arising on site during construction will be tankered off site until the operational arrangements are in place.
		Drainage/flood prevention strategies will consider the ground conditions of the site, including the permeability of the strata and the level of on-site contamination.

3.3.28. In addition to the measures outlined in **Table 3.4**, the following would be undertaken prior to construction works:

- additional ground investigation would be undertaken to inform the final design of the proposed developments and to confirm the ground conditions and contamination status of the sites; and
- remediation of soil and groundwater contamination would be undertaken prior to construction (e.g. source removal, treatment or capping) if deemed necessary.

v. Invasive Non-native Species (INNS)

3.3.29. Any activities which use equipment that has been used on another site where INNS species are located could potentially be at risk of spreading INNS.

3.3.30. Section 14(2) of the Wildlife and Countryside Act 1981 (as amended) makes it illegal to plant or otherwise cause to grow in the wild any plant which is included in Part II of Schedule 9 of that Act.

3.3.31. Contractors would be required to undertake a biosecurity risk assessment to avoid potentially facilitating the spread of non-native species during construction.

3.3.32. A general strategy will be to establish a viable vegetation cover quickly, before invasive plant species can become established. Any invasive species that colonise an area during construction would be removed and disposed of as required.

3.3.33. Any imported soils would be subject to appropriate control processes to ensure they are free of any seeds/roots/stems of any invasive plant covered under the Wildlife and Countryside Act 1981 (as amended).

3.3.34. As a result, this risk is not considered further within this Part of the WFD Compliance Assessment.

d) Removal and reinstatement phase

3.3.35. At several of the associated development sites, the development would be removed and land restored to agricultural use following completion of the Sizewell C Project construction phase. These sites are:

- Northern park and ride.
- Southern park and ride.
- Proposed rail extension route.

- Freight management facility.

3.3.36. Any on-site utility services put in place as part of the construction would be removed once the site is no longer required.

3.3.37. At the proposed rail extension route, surface water/agricultural drains would be reinstated.

3.3.38. During removal and reinstatement, the construction control measures concerning surface water would be applied as necessary. A similar document to the **CoCP** (Doc Ref. 8.11) would be developed to ensure during removal, the works would not release sediment or contamination or increase surface water drainage to any nearby watercourses.

3.4 Northern Park and Ride

a) Introduction and project description

i. Overview of the proposals

3.4.1. Two park and ride facilities are proposed - one at Darsham for construction workers approaching Sizewell from the north on the A12 (see **Volume 3** of the **ES** (Doc Ref. 6.4)) and the other at Wickham Market for those approaching from the south on the A12 (see **Volume 4** of the **ES** (Doc Ref. 6.5)). Both park and ride facilities would also intercept traffic movements from locations west of the A12.

3.4.2. The construction workforce would be transported to and from the Sizewell C main development site by bus. Further detail on the park and ride facilities, in the context of the wider construction transport strategy, is provided in the project overview in **Volume 1** of the **ES** (Doc Ref. 6.2).

3.4.3. The northern park and ride site at Darsham comprises 27.9 hectares (ha) of predominantly agricultural land but also includes sections of the A12 and Willow Marsh Lane towards the north of the site. It is located west of the village of Darsham and west of the A12, to the east of the East Suffolk line and to the north of Darsham railway station (see **Figure 3.2**).

3.4.4. The proposed development would comprise:

- Car parking for up to 1,250 car parking spaces and up to 12 pick up only spaces, up to 10 spaces for minibuses/vans/buses, up to 80 motorcycle parking spaces, cycle shelters for approximately 20 bicycles, a bus terminus area including shelters, an amenity and welfare building (including toilets), security buildings (including an administration office) and a smoking shelter.

- Two landscape bunds and additional planting.
- Up to three infiltration basins, an existing pond (Pond 78) and nine swales forming part of the Sustainable Drainage System (SuDS).
- A temporary three arm roundabout on the A12, situated approximately 125m to the north of the existing Willow Marsh Lane junction, to access the site.
- Realignment of the A12 via the new temporary roundabout.
- A section of Willow Marsh Lane will be closed for vehicular traffic from the A12 but retained for use by non-motorised users and as a private vehicular access for White House Farm. A dropped kerb would be provided where Willow Marsh Lane meets the A12 to facilitate access for cycles and pedestrians only.
- An access road will run from the new roundabout through the centre of the site to the car parking areas and proposed buildings.
- Provision of a separate agricultural track, on the west side of the proposed roundabout, north of Willow Marsh Lane.
- Diversion to a 11 kilovolt (kV) UK Power Networks overhead power line, including undergrounding of the line.
- Other ancillary development, including signage, road markings, lighting, CCTV, and utilities.
- External areas including roadways, footways, landscapingand drainage infrastructure.

3.4.5. The masterplan for the northern park and ride is shown in **Figure 2.1** in **Chapter 2** of **Volume 3** of the **ES** (Doc Ref. 6.4). The masterplan is illustrative and shows an indicative arrangement that would fulfil the objectives of the proposed development. The proposed development would be controlled by parameters rather than providing a detailed design at this stage.

ii. Construction

3.4.6. It is expected that construction work for the proposed development would take place over a period of approximately 12–18 months and is expected to be operational within the early years of the Sizewell C Project construction programme as shown in the Indicative Phasing Schedule in the **Implementation Plan** appended to the **Planning Statement** (Doc Ref 8.4).

3.4.7. The construction process broadly comprises five overlapping phases, as follows:

- Phase 1: Enabling works (duration approximately two months) – this would include protection and diversion of utilities, site clearance, creation of temporary SuDS, earthworks, and the formation of a separate, secure and safe temporary haul route, accessing the site from the existing A12 at the junction with Willow Marsh Lane.
- Phase 2: Earthworks and excavation (duration approximately three months) – clearance of vegetation, levelling of the site to the south and west and roundabout site to the north, adjacent to the A12. Removal of top-soil and potentially sub-soil, in line with the **Outline Soils Management Plan**, provided in **Volume 2**, **Appendix 17C** of the **ES**. The excavated soil would form the proposed landscape bunds, which would be created to provide visual and acoustic screening early in this phase. A temporary construction compound, which would include a site management, and security office, materials and storage areas, site parking and internal site access routes, would then be formed behind the bunds with construction work (excavation and earthworks) able to begin at both the southern end of the site and on the roundabout to the north, adjacent to the A12. In parallel, SuDS would be installed, and security fencing would be installed around the operational areas of the proposed development, replacing any temporary fencing which enclosed the working area.
- Phase 3: Laying of materials for parking areas and internal circulation routes and construction of roundabout and A12 realignment (duration approximately nine months) – delivery and laying of base materials by truck to the parking and circulation route areas, and local movements by excavator and possibly bulldozer, some compaction of the base layers, drainage work and kerb work. Paving work is assumed to take place with concrete/stone cutting at various places around site. In parallel, similar work would be undertaken to construct the roundabout. Once the hardstanding for the southern parking area and the roundabout has been constructed, the construction compound would be moved to the southern parking area to allow for the laying of the central parking area. The new roundabout would be completed early in the stage and used for construction vehicle access to the site.
- Phase 4: Construction and fit out of buildings, and installation of utilities (duration approximately six months) – construction and fitting out of prefabricated modular buildings, installation of lighting, CCTV masts, water and power supply cables, and installation of bus shelters, barriers and signage. Pad foundations are expected be used for structures built on-site, no requirement for piling has been identified.
- Phase 5: Final surfacing (duration approximately three months) – construction of the final surface layer of the roundabout, approach roads, parking areas and circulation routes, and completion of access

including delivery, application and rolling finish layer to roundabout, car parking areas and access way, prior to completion of road markings and signage.

3.4.8. Early in the construction phase, bunds, swales and infiltration basins would be used as appropriate to ensure that surface water run-off would be contained within the site. To minimise disturbance of the existing pond would fall within a buffer zone a minimum of 10m from the eastern boundary. With the exception of fencing, no above ground buildings or structures will be within the buffer zone to assist in minimising any indirect impacts (e.g. from noise, lighting and human disturbance) on species using those habitats within and adjacent to the site.

3.4.9. Soil stripped as part of the works (in accordance with the **Outline Soils Management Plan** (see **Volume 2**, **Appendix 17C**) and materials generated from the earthworks and excavation would be re-used in landscaping bund formation for the proposed development, where suitable. It is not intended that any earthworks materials would be removed from the site. The stockpiled materials would be re-used during the removal and reinstatement phase.

3.4.10. Construction-stage foul drainage (e.g. from temporary welfare facilities) will be collected and tankered off site for appropriate treatment and disposal until the operational package treatment plant and sceptic tank are in place.

3.4.11. As outlined in **section 3.3**, the **CoCP** (Doc Ref. 8.11) sets out the measures and controls that SZC Co. will require its contractors to adopt during the construction and removal and reinstatement phases of the proposed development, where appropriate, and provides an outline of the environmental management plans that will be implemented on site.

iii. Operation

3.4.12. The proposed development would operate between 05:00 to 01:00 seven days a week.

3.4.13. The temporary roundabout on the A12 and access road would form the vehicular access to the site and would have a diameter of approximately 60m. The buildings on-site would comprise prefabricated modular units and would be temporary and single storey, to be removed following the construction of the Sizewell C main development site.

3.4.14. One-way directional newt fencing would be installed at the start of the construction phase around the perimeter of the car parking areas, swales and landscape bunds, and would be sited to prevent great crested newts from entering the site but allow them to leave should they accidentally gain

access. The existing pond (Pond 78) would be excluded from the main parking area and proposed SuDS network, ensuring that the existing pond is retained to enhance great crested newt habitat. Pond 78 will be retained within the proposed development and would be further protected from construction and operational impacts through the creation of a 3m high landscape bund along the north-west and southern boundaries, as well as falling within a 10m buffer zone between the site boundary and the landscape bund.

3.4.15. Two small pipes or culverts would be placed beneath the new access road to allow the passage of great crested newts underneath the road. One of these would be on the north side of the landscape bund, and one would be at the point at which the new access road meets Willow Marsh Lane. Great crested newts would be directed to the culverts by one-way directional newt fencing.

3.4.16. In terms of drainage features, during operation, the proposed development would comprise SuDS to attenuate surface water run-off and minimise sediment generation. The SuDS are anticipated to consist of approximately nine swales and up to three potential infiltration basins. The illustrative drainage plan, including the indicative design and position of the swales and infiltration basins, are shown in **Volume 3**, **Chapter 2**, **Figure 2.4** of the **ES**.

3.4.17. The proposed outline drainage strategy would be to drain the surface water run-off through infiltration techniques, such as heavy-duty permeable block paving, infiltration trenches and/or catchpit soakaways, with the infiltration basins and swales providing additional storage.

2.1.1 Permeable surfaces would be used where possible, e.g. in the main car parking area. Rainwater will percolate through the surface and be temporarily stored in the base of the paving and then be disposed to ground by infiltration. However, some surfaces, such as the access roads, will require impermeable surfaces.

2.1.2 Road paved areas and locations where there is a risk of potential highway run-off pollution will be designed to be impermeable. Rainfall run-off water will be removed from the surface via highway gullies, combined kerb drains and channels, etc. These will discharge into an underground drainage network which will outfall to swales and infiltration basin where the rainfall run-off will infiltrate to ground. If required, the underground drainage network will include a Class 1 Bypass Separator which will remove pollutants prior to discharge into the swales/infiltration basins.

2.1.3 Run-off from roofed areas would be drained via downpipes and collected in an underground drainage network. The run-off from roof areas will be

combined with run-off from paved areas either within the piped network (after run-off from the paved areas has passed through the bypass separator) or within the SuDS system.

2.1.4 Whilst it is proposed that all on-site surface water drainage would be infiltrated to ground, if infiltration testing indicates that this is not entirely possible there may be some discharge to the existing local ditch network. If 100% infiltration is not achievable, a controlled flow at greenfield rates to the watercourse may be required. All on-site water would pass through swales (and the bypass separator in the case of rainfall run-off from the impermeable areas) before being discharged to the local ditches.

3.4.18. Foul sewage from the operational facility would be treated on-site via a package treatment works, prior to its discharge to ground via the SuDS infrastructure. There would also be a septic tank serving the more isolated security booth, on the access road just south of Willow Marsh Lane, with field drain infiltration.

3.4.19. The **Outline Drainage Strategy** is described in more detail in **Volume 2**, **Chapter 2**, **Appendix 2A** of the **ES**.

iv. Removal and reinstatement

3.4.20. Once the need for the proposed development has ceased, the buildings and associated infrastructure, would be removed in accordance with a removal and reinstatement plan, which would allow for the potential re-use of the modular buildings and materials off-site. When the site has been cleared, the area would be returned to agricultural use and the A12 reinstated back to its original alignment. Temporary planting within the site would also need to be removed; hedgerows around the roundabout would be removed and re-planted along the original alignment of the A12.

3.4.21. Phased removal and reinstatement of the site may be possible as worker numbers decrease, but this would not be determined until the facility is operational. It is expected that removal and reinstatement would take place within the final 24 months of the Sizewell C Project construction programme, as shown in the Indicative Phasing Schedule in the **Implementation Plan** appended to the **Planning Statement** (Doc Ref 8.4). It is anticipated that construction worker numbers, and construction vehicle movements would be similar during removal and reinstatement to those reported for construction.

3.4.22. It is anticipated that removal and site reinstatement would follow a programme broadly the reverse of construction. The measures set out in the **CoCP** (Doc Ref. 8.11) would be applied to this phase. Key activities would include, but are not limited to:

- Formation of demolition site compound.
- Demolition plant mobilisation and ceasing of operational traffic movements and closure of facilities.
- Demolition and removal of buildings and structures, and services.
- Breaking up of concrete and surfacing.
- Removal of utilities.
- Restoration of land.
- Management of waste and other materials.

v. Baseline for assessment

3.4.23. The current baseline conditions of any identified water bodies are considered appropriate for the duration of the construction, operation and removal phases at the northern park and ride site. This is because the construction phase is anticipated to last for approximately 12-18 months, and the site would only be operational during the construction of the main development site (9-12 years). The site would then be removed and reinstated over a further 24 month period following completion of construction at the main development site.

b) Stage 1: Screening

i. Purpose of this section

3.4.24. This section divides the proposed works into activities and identifies the WFD water bodies that could be at risk from these activities using the information included on water body extent in the Catchment Data Explorer (Ref. 3.2).

ii. Identification of activities

3.4.25. The works proposed for the northern park and ride site have been separated into activities in line with the requirements of the guidance produced by the Environment Agency (Ref. 3.3) and Planning Inspectorate (Ref. 3.4). These activities are listed in **Table 3.5**.

Table 3.5 Summary of northern park and ride activities

Reference Number	Activity	Sub activities included
Construction		
C1	Site preparation, earthworks and	Vegetation clearance, removal of topsoil, installation of drainage infrastructure, including SuDS, laying of base

Reference Number	Activity	Sub activities included
	construction	materials for parking areas and internal circulation routes, installation of final surface layers, construction of buildings and installation of utilities, and management of construction-stage surface water and foul drainage
Operation		
O1	Management of foul water and drainage	Operational use of the site and associated water management measures (including surface water drainage and foul water)
Removal and reinstatement		
R1	Removal and reinstatement	Demolition and removal of buildings and site infrastructure, reinstatement of agricultural land

iii. Water body identification

3.4.26. **Figure 3.3** shows the WFD water bodies that could be hydrologically connected to the proposed northern park and ride site. A screening exercise has been undertaken to identify which of the water bodies have the potential to be impacted by the park and ride activities, with water bodies being identified on the basis of hydrological connectivity to the proposed development site, following the methodology presented in **Part 1**.

3.4.27. In addition to WFD water body mapping, potential hydrological connectivity has been determined with reference to main rivers, ordinary watercourses and surface water flow routes that may not be shown on published mapping (identified using Environment Agency flood mapping). This process therefore considers the water bodies in whose catchments the proposed activities are located, and where relevant, connected water bodies upstream and downstream. Full details of the geology, hydrogeology and surface water details of the site are provided in **Chapter 12 of Volume 3** of the **ES** (Doc Ref. 6.4).

3.4.28. The site is located in the WFD Minsmere Old River catchment (see **Figure 3.2**). There is a small watercourse located to the south-west, which joins the Minsmere River approximately 1.2km to the south east of the site. The River Yox runs in a west-east direction approximately 1km to the south-east, eventually becoming a tributary of the Minsmere River.

3.4.29. An unnamed watercourse originates in the east of Martins Farm, to the north-west of the site. The watercourse crosses the East Suffolk line to the south of Willow Marsh Lane crossing and flows southwards along the

western boundary of the site. The channel crosses back beneath the East Suffolk line to the south of Little Nursery and flows to the west of Darsham rail station and ultimately joins the Minsmere Old River approximately 1.3km south east of the site. This watercourse receives surface water drainage from the site.

3.4.30. The surface watercourses in the area are typical of lowland, low energy drainage systems. Many of the channels are entirely artificial, and the natural channels have been extensively modified (probably to facilitate drainage and use of the surrounding marshland as grazing marsh).

3.4.31. A series of ponds are also located within and in close proximity to the site. The only pond within the site (Pond 78), is located within the woodland immediately to the west of Moate Hall. Several other pond features are shown on available online mapping in the grounds of Moate Hall, Darsham Cottage and White House Farm to the north, and a larger pond adjacent to the unnamed road to Darsham Old Hall to the south of the A12.

3.4.32. The site is located on the Waveney and East Suffolk Chalk and Crag groundwater body. The head deposits and the diamicton of the Lowestoft Formation are classified as Secondary Aquifers (Undifferentiated). The Crag Group bedrock underlying the site is classified as a Principal Aquifer. The Lowestoft Formation at the site is expected to be of relatively low permeability and, therefore, have a limited hydraulic connection to the underlying Crag groundwater. It is likely that there are perched water tables in permeable lenses within the Lowestoft Formation.

3.4.33. Given the local geology and the depth to groundwater, there is not considered to be a substantial connection between the groundwater and surrounding surface water features. There may be local interaction between discrete water bodies in the Lowestoft Formation (diamicton) aquifer and surface water.

3.4.34. The results of the screening exercise are included in **Table 3.6**.

Table 3.6 Results of screening assessment for the northern park and ride

Water body name and ID number	Type	Description	Screened in?	Justification
Minsmere Old River GB105035046270	River	Heavily modified for land drainage. Currently at Moderate Ecological Potential due to pressures on fish populations.	Yes	Screened in because the proposed activities are located within the catchment of this water body and, therefore, could affect its biology, hydromorphology and physico-chemistry.
Wenhaston Watercourse GB105035046010	River	Currently at moderate status due to pressures on invertebrates, dissolved oxygen and phosphate. This water body is not designated heavily modified or artificial	No	Screened out because the proposed activities have no direct hydrological connectivity with this water body and could therefore not affect its biology, hydromorphology and physico-chemistry.
Blyth (S) GB510503503700	Transitional	Heavily modified for flood and coastal protection. Currently at Moderate Ecological Potential due to elevated concentrations of dissolved inorganic nitrogen.	No	Screened out because the proposed activities have no direct hydrological connectivity with this water body and could therefore not affect its biology, hydromorphology and physico-chemistry.
Suffolk GB650503520002	Coastal	Heavily modified for flood protection and coast protection. Moderate Ecological Potential due to elevated concentrations of dissolved inorganic nitrogen.	No	Located downstream of the Minsmere Old River and Blyth (S). Screened out because the proposed activities are located >9km upstream of this water body and no mechanism for potential impacts to propagate downstream of the water body in which they take place has been identified.
Waveney & East Suffolk Chalk and Crag GB40501G400600	Groundwater	Currently at Poor Quantitative Status as a result of an unfavourable water balance and Poor Chemical Status due to diffuse pollution pressures and potential impacts on a Drinking Water Protected Area.	Yes	Screened in because the proposed activities are underlain by this water body and, therefore, could affect the quality and quantity of groundwater.

3.4.35. This demonstrates that the proposed development at the northern park and ride site could (theoretically) have an impact on the following water bodies:

- Minsmere Old River (GB105035046270).
- Waveney & East Suffolk Chalk and Crag (GB40501G400600).

3.4.36. **Appendix 3A** provides summary data for all water bodies relevant to **Part 3**. The data was provided by the Environment Agency in December 2018, with a further update in July 2019.

c) Stage 2: Scoping

i. Purpose of this section

3.4.37. This section presents the results of the scoping assessment undertaken on the water bodies identified in **Table 3.6**, using the methodology outlined in **Part 1**.

3.4.38. The assessment examines the potential for the activities identified to impact WFD water bodies and their quality elements ((b) below), any improvement and mitigation measures identified by the Environment Agency ((c) below), and any associated Protected Areas ((d) below). The results of the scoping stage determine which water bodies and quality elements require further assessment as part of the Stage 3 Compliance Assessment.

3.4.39. It may be possible for relatively straightforward reasons (e.g. no identifiable impact pathway) to scope out some scheme activities during Stage 2 of the assessment process. Where there is uncertainty over the potential for an activity to have an effect, a precautionary position has been taken, and the activity scoped in for further assessment.

ii. Impacts of project activities on water body quality elements

Assessment of potential mechanisms for impact

3.4.40. The scoping questions presented in **Part 1** have been applied to each water body individually for each of the construction, operational and removal and reinstatement stage activities listed in **Table 3.5**. The results of the scoping assessment are provided in **Appendix 3B** and summarised in **Table 3.7**.

Table 3.7 Activities with the potential to affect water body quality elements and status for the northern park and ride

Activity	Water body	Quality element scoping
Construction		
C1 Site preparation, earthworks and construction	Minsmere Old River	Hydromorphology: All elements (see **Appendix 3B**) scoped out because the **Outline Drainage Strategy** (**Volume 2, Appendix 2A** of the ES)**)**and the **CoCP** (Doc Ref. 8.11) include measures to prevent significant changes to hydrology and morphological conditions.
		Physico-chemistry: All elements scoped out because the **Outline Drainage Strategy** and the **CoCP** include measures to minimise the release of pollutants into the water environment.
		Biology: All elements scoped out scoped out because the **Outline Drainage Strategy** and the **CoCP** include measures to prevent significant changes to hydromorphology and physico-chemistry.
	Waveney & East Suffolk Chalk and Crag	Quantity: All elements scoped out because the overall volume of water discharging to ground is unlikely to significantly change.
		Quality: All elements scoped out scoped out because the **Outline Drainage Strategy** and the **CoCP** include measures to minimise the release of pollutants into the water environment.
Operation		
O1 Management of drainage and foul water	Minsmere Old River	Hydromorphology: All elements scoped out scoped out because the **Outline Drainage Strategy** includes measures to prevent significant changes to the hydrology and morphological conditions.
		Physico-chemistry: All elements scoped out because the **Outline Drainage Strategy** include measures to minimise the release of pollutants into the water environment.
		Biology: All elements scoped out because the **Outline Drainage Strategy** include measures to prevent significant changes to hydromorphology and physico-chemistry (as above).
	Waveney & East Suffolk	Quantity: All elements scoped out because the **Outline Drainage Strategy** includes measures to prevent

Activity	Water body	Quality element scoping
	Chalk and Crag	significant changes to the volume of water discharging to ground.
		Quality: All elements scoped out because the **Outline Drainage Strategy** would be designed to prevent the release of pollutants into the water environment.
Removal and reinstatement		
R1 Removal and reinstatement	Minsmere Old River	Hydromorphology: All elements scoped out because because the **Outline Drainage Strategy** and the **CoCP** include measures to prevent significant changes to the hydrology and morphological conditions.
		Physico-chemistry: All elements scoped out because the **Outline Drainage Strategy** and the **CoCP** include measures which would minimise the release of pollutants into the water environment.
		Biology: All elements scoped out because the **Outline Drainage Strategy** and the **CoCP** include measures which would prevent significant changes to hydromorphology and physico-chemistry.
	Waveney & East Suffolk Chalk and Crag	Quantity: All elements scoped out because the overall volume of water discharging to ground is unlikely to significantly change.
		Quality: All elements scoped out because the **Outline Drainage Strategy** and the **CoCP** include measures which would minimise the release of pollutants into the water environment.

3.4.41. **Table 3.7** demonstrates that the proposed construction and removal and reinstatement activities do not have the potential to directly or indirectly impact upon the quality element supported by the Minsmere Old River or Waveney & East Suffolk Chalk and Crag water bodies. This is because the potential impacts resulting from the construction and removal and reinstatement activities would be mitigated by the **Outline Drainage Strategy** (**Appendix 2A** of **Volume 2** of the **ES**) and the **CoCP** (Doc Ref 8.11).

3.4.42. **Table 3.7** also demonstrates that potential impacts resulting from the operation of the park and ride site would be mitigated by the **Outline Drainage Strategy** (**Appendix 2A** of **Volume 2** of the **ES**). Foul sewage from the administration and welfare buildings would be treated on-site via a package treatment works.

3.4.43. All quality elements, therefore, have been scoped out of further assessment for both water bodies.

iii. Impacts of project activities on River Basin Management Plan (RBMP) improvement and mitigation measures

RBMP measures applicable to each water body

3.4.44. The Environment Agency has not identified any RBMP improvement measures for the Waveney and East Suffolk Chalk and Crag groundwater body. Therefore, this water body is not considered further in this part of the assessment.

3.4.45. However, a range of RBMP mitigation measures that have already been implemented (in place) or are proposed for future implementation (not in place) have been identified for the heavily modified Minsmere Old River water body in the RBMP (see **Table 3.8**). Note that detailed definitions of these measures (including the pressures and impacts that they are used to address) are provided by the Environment Agency in their *Guide to Mitigation Measures in Artificial and Heavily Modified Water Bodies* (Ref. 3.5).

Table 3.8 Potential impacts of the northern park and ride on RBMP mitigation measures in the Minsmere Old River water body

Mitigation measure	Status	Potential impact
Vegetation control	In place	There are no mechanisms for project activities during construction, operation or removal and reinstatement to affect the delivery of the vegetation control measures that are in place in the water body.
Selective vegetation control	In place	
Vegetation control timing	In place	
Invasive species techniques	In place	Potential risks to INNS are considered in **section 2**.
Sediment management strategy	In place	Project activities during construction and removal and reinstatement (but not operation) have the potential to generate sediment. However, the drainage (as outlined in the **Outline Drainage Strategy**) would be designed to intercept sediment and surface runoff and prevent it leaving the boundaries of the site (**section 2**).
Remove obsolete structure	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the future implementation of measures to remove obsolete structures in the water body.
Remove or soften hard bank	Not in place	Project activities during construction, operation and removal and reinstatement would not introduce new hard bank protection or prevent the future implementation of measures to remove or soften hard bank protection in the water body.
Preserve or restore habitats	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the future implementation of measures to preserve or restore habitats in the water body. The establishment of a vegetated buffer strip along the edge of the watercourse that drains the site, could provide a limited opportunity to deliver this measure.
In-channel morphological diversity	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the future implementation of measures to increase morphological diversity in the water body.
Re-opening culverts	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent existing culverts on the water body being reopened in the future.
Alter culvert channel bed	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent alterations being made to the bed of existing culverts in the water body.
Flood bunds	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to affect the future implementation of measures to reduce the pressures caused by flood bunds in this water body.

Mitigation measure	Status	Potential impact
Set-back embankments	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the future implementation of measures to set back existing embankments in this water body.
Floodplain connectivity	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the future implementation of measures to improve floodplain connectivity in this water body.
Fish passes	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of measures to improve fish passage over existing structures in this water body.
Reduce fish entrainment	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of measures to reduce fish entrainment at existing structures in this water body.
Enhance ecology	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of measures to enhance ecology through structural modification in this water body.
Changes to locks, etc.	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of changes to the structure or operation of locks and other in-channel structures in this water body.
Retain habitats	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of measures to retain existing habitats during maintenance activities in this water body.
Maintain channel bed/margins	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of measures to maintain the channel bed and margins during maintenance activities in this water body. The establishment of a vegetated buffer strip along the edge of the watercourse that drains the site, could provide a limited opportunity to deliver this measure.
Woody debris	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of measures to retain woody debris during maintenance in this water body.
Water level management	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of water level management measures in this water body.
Align and attenuate flow	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of measures to align and attenuate flows in this water body. The use of SuDS measures to manage runoff from the site could provide a limited opportunity to deliver this measure.

Mitigation measure	Status	Potential impact
Educate landowners	Not in place	There is no mechanism for project activities during construction, operation and removal and reinstatement to prevent the implementation of measures to educate landowners in this water body catchment.

Assessment of potential mechanisms for impact

3.4.46. **Table 3.8** also presents an assessment of potential impacts of the activities associated with the northern park and ride on each RBMP mitigation measure. This demonstrates that the proposed activities would not counteract or adversely affect the delivery of the RBMP mitigation measures that are already in place in the Minsmere Old River and would not prevent the future implementation of the RBMP mitigation measures that are not yet in place. RBMP mitigation measures (either in place or not in place) do not, therefore, require further assessment in Stage 3.

iv. Impacts of project activities on Protected Areas

Protected Areas within each water body

3.4.47. Protected Areas within each of the WFD water bodies identified during the screening phase are listed in **Table 3.9** and shown on **Figure 3.4**.

Table 3.9 Summary of scoping assessment for Protected Areas

Water body	Protected Area name	Within 2km?
Minsmere Old River	Nitrates Directive – NVZ 411, 412, 415, 417, 661	Nitrate Vulnerable Zones (NVZs) 415, 417 and 661 are located within 2km of the site.
	Habitats Directive - Minsmere to Walberswick Heaths & Marshes Special Area of Conservation (SAC)	These *Natura 2000* sites are not located within 2km of the site.
	Wild Birds Directive - Minsmere-Walberswick Special Protection Area (SPA)	
Waveney & East Suffolk Chalk and Crag	Nitrates Directive – NVZ 78, 79, 166, 168	NVZ 166 is located within 2km of the site.
	WFD (formerly Surface Water Abstraction Directive) - Waveney and East Suffolk Chalk & Crag Drinking Water Protected Area	Not located within 2km of the site.

3.4.48. Note that although the Dew's Ponds Special Area of Conservation (SAC) (**Figure 3.4**) is located within 2km of the development site, it is situated within the catchment of the Wenhaston Watercourse (GB105035046010). The SAC, therefore, is not hydrologically connected to the proposed development and is not considered further in this assessment.

Assessment of potential mechanisms for impact

3.4.49. The *Clearing the Waters For All* (Ref. 3.3) guidance recommends further assessment of potential impacts on any Protected Areas that are within 2km of a proposed new project activity. This 2km Zone of Influence (ZOI) has been adopted herein across all water bodies for each project activity.

3.4.50. **Table 3.9** demonstrates that the *Natura 2000* Protected Areas associated with the scoped in water bodies are outside the 2km ZOI and, therefore, are not considered further.

3.4.51. With respect to NVZs 415, 417, 661 and 166, foul water generated on site could release nitrates and other nutrients if discharged, untreated to the water environment. However, all foul waters generated during construction, operation and removal and reinstatement would be contained and/or adequately treated to ensure that the project activities would not result in the release of significant quantities of nitrates and other nutrients.

3.4.52. Therefore, all Protected Areas have been scoped out of the assessment.

v. Stage 2 Summary

3.4.53. The above assessment demonstrates that project activities associated with the northern park and ride during construction, operation and removal and reinstatement would not have direct or indirect effects on the Minsmere Old River and Waveney & East Suffolk Chalk and Crag water bodies, or any other water bodies, that would be sufficient to cause deterioration in the status of the water body or Protected Areas located within the water bodies. Furthermore, the proposed project activities would not counteract or otherwise affect the delivery of mitigation measures (both in place and not in place) that have been identified in the RBMP.

3.4.54. Consequently, the proposed development has not been progressed to the Stage 3 detailed compliance assessment, and the northern park and ride is considered to be compliant with the requirements of the WFD.

3.5 Southern Park and Ride

a) Introduction and project description

i. Overview of the proposals

3.5.1. Two park and ride facilities are proposed - one at Darsham for construction workers approaching Sizewell from the north on the A12 and the other at Wickham Market for those approaching from the south on the A12 (see

Figure 3.5). Both park and ride facilities would also intercept traffic movements from locations west of the A12.

3.5.2. The workforce would be transported to and from the Sizewell C main development site by bus. Further detail on the park and ride facilities, in the context of the wider construction transport strategy, is provided in the project overview in **Volume 1** of the **ES** (Doc Ref. 6.2).

3.5.3. The site comprises approximately 26.4 ha of predominantly agricultural land and highway land located north-east of Wickham Market. The part of the site which would contain the parking and buildings, postal consolidation building and Traffic Incident Management Area (TIMA) is approximately 18ha in size is located to the east of the B1078/B1116, to the north of the A12. The remainder of the site encompasses a section of the A12 and an associated slip road where highway improvements are proposed to form the site access and associated signage and road markings would be provided.

3.5.4. The proposed development would comprise:

- Car parking for up to 1,250 car parking spaces, 10 spaces for minibuses/vans/buses, 80 motorcycle parking spaces, cycle shelters for up to 20 bicycles, a bus terminus area (including shelters), an amenity and welfare building (including toilets), security buildings (including an administration building), a smoking shelter, a postal consolidation building to handle and process deliveries, and a Traffic Incident Management Area (TIMA) at the north of the site to enable construction-related vehicles (including HGVs) to be held in the event of an incident within the Sizewell C main development site or external to the Sizewell C main development site on the local road network.
- Two landscape bunds and additional planting.
- Up to three infiltration ponds and up to seven swales forming part of the Sustainable Drainage System (SuDS).
- A proposed access point to the site from the existing slip road leading onto the A12.
- A temporary diversion of bridleway E-288/008/0 around the construction area for the proposed access road.
- Other ancillary development, including signage, road markings, lighting, CCTV and utilities.
- External areas including roadways, footways, landscaping and drainage infrastructure.

3.5.5. The proposed buildings on-site would comprise prefabricated modular units and would be temporary and single storey, to be removed following the construction of the Sizewell C main development site.

3.5.6. The masterplan for the southern park and ride is shown in **Figure 2.1** in **Chapter 2** of **Volume 4** of the **ES** (Doc. Ref 6.5). The masterplan is illustrative and shows an indicative arrangement that would fulfil the objectives of the proposed development. The proposed development would be controlled by parameters rather than providing a detailed design at this stage.

ii. Construction

3.5.7. It is expected that construction work for this facility would take place over a period of approximately 12 to 18 months and is expected to be operational within the early years of the Sizewell C Project construction programme as shown in the Indicative Phasing Schedule in the **Implementation Plan** appended to the **Planning Statement** (Doc Ref 8.4).

3.5.8. The construction process broadly comprises five overlapping phases, as follows:

- Phase 1: Preparation works (duration approximately one month) – formation of a secure and safe access to the site from the existing northbound slip road. This would include protection of utilities, site clearance, earthworks, road construction, surfacing, road markings and signage. Work on the site itself would then progress to clearance of vegetation, mobilisation of site compounds/cabins and boundary fencing to secure the site.
- Phase 2: Earthworks and excavation (duration approximately two months) – clearance of vegetation, levelling of the site, and removal of top-soil (and potentially subsoil) for bund formation, in line with the **Outline Soil Management Plan** (**Volume 2**, **Appendix 17C**). In parallel, SuDS would be installed and earthworks and excavation for the roundabout would be underway. During this phase, the proposed landscaping would be delivered to provide screening. Security fencing would be installed around the perimeter, replacing the temporary fencing which enclosed the working area.
- Phase 3: Laying of materials for parking areas and internal circulation route (duration approximately nine months) – delivery and laying of base materials by dump trucks to the parking and circulation route areas; local movements by excavators and possibly a bulldozer; some compaction of the base layers, drainage work and kerbstone work. Paving work is assumed to take place with concrete/stone cutting at various positions around site.

- Phase 4: Construction and fit out of buildings, and installation of utilities (duration approximately six months). Construction and fitting out of pre-fabricated modular buildings, installation of lighting, CCTV towers, water and power supply cables, installation of bus shelters, barriers and signage, and construction of the buildings. Pad foundations are expected be used for structures built on-site, no requirement for piling has been identified.
- Phase 5: Final surfacing (duration approximately three months) – construction of the final surface layer to parking areas and circulation routes, and completion of access (duration approximately three months) including delivery, application and rolling finish layer to car parking areas and access way.

3.5.9. Early in the construction phase, bunds, swales and infiltration basins would be used as appropriate to ensure that surface water run-off is contained within the site.

3.5.10. Soil stripped as part of the works in accordance with the **Outline Soils Management Plan** provided in **Volume 2**, **Chapter 17**, **Appendix 17C** of the **ES** and materials generated from the earthworks and excavation would be re-used in landscaping bund formation for the site, where suitable.

3.5.11. Foul sewage arising on site during construction from the temporary welfare facilities will be collected and tankered off site for appropriate treatment and disposal until the operational package treatment plant and septic tank are in place.

3.5.12. As outlined in **section 3.3**, the **CoCP** (Doc Ref. 8.11) sets out the measures and controls that SZC Co. will require its contractors to adopt during construction and removal and reinstatement phases of the proposed development, where appropriate, and provides an outline of the environmental management plans that will be implemented on-site.

iii. Operation

3.5.13. The proposed development would operate between 05:00 and 01:00 seven days a week.

3.5.14. In terms of drainage features during operation, the proposed development would comprise SuDS to attenuate surface water run-off and minimise sediment generation. The SuDS are anticipated to consist of approximately seven swales and approximately three potential infiltration basins. The illustrative drainage plan, including the indicative design and position of the swales and infiltration basins, are shown in **Volume 4**, **Chapter 2**, **Figure 2.4** of the **ES**.

3.5.15. The proposed drainage strategy for the proposed development would be to drain the surface water run-off to ground through infiltration techniques, such as heavy-duty permeable block paving, infiltration trenches, and/or catchpit soakaways, with the infiltration basins and swales providing additional storage. The swales and infiltration basins are part of the SuDS system which moves run-off around the site, allowing natural filtration and infiltration. Exceedance discharges are perceived to be small and infrequent and, in the unlikely event of an exceedance event, exceedance flows would be routed via the access roads to the lowest parts of the site.

3.5.16. Permeable surfaces would be used where possible, e.g. in the main car parking area. Rainwater will percolate through the surface and be temporarily stored in the base of the paving and then be disposed to ground by infiltration. However, some surfaces, such as the access roads, areas used by HGVs and the TIMA, will require impermeable surfaces.

3.5.17. Road paved areas and locations where there is a risk of potential highway run-off pollution will be designed to be impermeable. Rainfall run-off water will be removed from the surface via highway gullies, combined kerb drains and channels, etc. These will discharge into an underground drainage network which will outfall to swales and infiltration basin where the rainfall run-off will infiltrate to ground. If required the underground drainage network will include a Class 1 bypass separator which will remove pollutants prior to discharge into the swales/infiltration basins.

3.5.18. Run-off from roofed areas would be drained via downpipes and collected in an underground drainage network. The run-off from roof areas will be combined with run-off from paved areas either within the piped network (after run-off from the paved areas has passed through the bypass separator) or within the SuDS system.

3.5.19. Foul sewage from the operational facility would be treated on-site via a package treatment works, prior to its discharge by infiltration to ground via the SuDS infrastructure. There would also be a septic tank serving the more isolated security booth, on the access road at the entrance to the site, with field drain infiltration.

3.5.20. The Outline Drainage Strategy is described in more detail in **Volume 2**, **Appendix 2A** of the **ES.**

iv. Removal and reinstatement

3.5.21. Once the need for the facility has ceased, the site access, buildings and associated infrastructure would be removed in accordance with a demolition and restoration plan, which would maximise the potential for re-use of building, modules and materials. Temporary planting within the site

would also need to be removed; hedgerows along the access route would need to be removed and re-planted along the original hedgerow lines.

3.5.22. When the site has been cleared, the area would be returned to agricultural use. The A12 highway works to reduce the northbound carriageway to one lane, as described above, would however be retained.

3.5.23. Phased removal and reinstatement of the site may be possible as worker numbers decrease, but this would not be determined until the facility is operational this is still to be confirmed. It is expected that removal and reinstatement would take place within the final 24 months of the Sizewell C Project construction programme, as shown in the Indicative Phasing Schedule in the **Implementation Plan** appended to the **Planning Statement** (Doc Ref 8.4). It is anticipated that construction worker numbers, and construction vehicle movements would be similar during removal and reinstatement to those reported for construction.

3.5.24. It is anticipated that removal and site reinstatement would follow a programme broadly the reverse of construction. Key activities would include but are not limited to:

- Formation of demolition site compound.
- Demolition plant mobilisation and ceasing of operational traffic movements and closure of facilities.
- Removal of buildings, structures and services.
- Breaking up of concrete and surfacing.
- Restoration of land.
- Management of waste and other materials.

v. Baseline for assessment

3.5.25. The current baseline conditions of any identified water bodies are considered appropriate for the duration of the construction, operation and removal phases at the southern park and ride site. This is because the construction phase is anticipated to last for approximately 12-18 months, and the site would only be operational during the construction of the main development site (9-12 years). The site would then be removed and reinstated over a further 24 month period following completion of construction at the main development site.

b) Stage 1: Screening

i. Identification of activities

3.5.26. The works proposed for the southern park and ride have been separated into activities in line with the requirements of the guidance produced by the Environment Agency (Ref. 3.3) and Planning Inspectorate (Ref. 3.4). These are listed in **Table 3.10**.

Table 3.10 Summary of southern park and ride activities

Reference Number	Activity	Sub activities included
Construction		
C1	Site preparation, earthworks and construction	Vegetation clearance, removal of topsoil, installation of drainage infrastructure including SuDS, laying of base materials for parking areas and internal circulation routes, installation of final surface layers, construction of buildings and installation of utilities, and management of construction-stage surface water and foul drainage.
Operation		
O1	Management of drainage and foul water	Operational use of the site and associated water management measures (including for surface water and foul drainage).
Removal and reinstatement		
R1	Removal and reinstatement	Demolition and removal of buildings and site infrastructure, and reinstatement of agricultural land.

ii. Water body identification

3.5.27. **Figure 3.6** shows the WFD water bodies in the vicinity of the southern park and ride. A screening exercise has been undertaken to identify which of the water bodies have the potential to be impacted by the park and ride construction, operational and removal and reinstatement activities.

3.5.28. In addition to WFD water body mapping, potential hydrological connectivity has been determined with reference to main rivers, ordinary watercourses and surface water flow routes that may not be shown on published mapping (identified using Environment Agency flood mapping). This process therefore considers the water bodies in whose catchments the proposed

activities are located, and where relevant, connected water bodies upstream and downstream.

3.5.29. As shown in **Figure 3.6** the site is located on the watershed of two river catchments; the River Deben to the south-east and the River Ore to the north-west. The River Deben is located approximately 800m south-west of the proposed development site at its closest point. The B1116 road separates the site from this watercourse. The River Deben floodplain includes a network of drainage ditches and small storage reservoirs, located approximately 250m to the south of the site around Lower Hacheston, which lie between the primary river channel and the B1116. A tributary of the River Deben also flows in a southerly direction to the west of the B1116 and approximately 340m west of the site. This is an ordinary watercourse.

3.5.30. The River Ore is located approximately 480m north-east of the proposed development site at its closest point. The dismantled Great Eastern Railway and Marlesford Road separate the site and this watercourse. There are several ponds in the vicinity of the southern park and ride site, including one pond within the site boundary located to the south of Whin Belt, and two ponds adjacent to the north-west of the site in the unnamed woodland.

3.5.31. The site is located in the Waveney and East Suffolk Chalk and Crag groundwater body. The sand and gravel of the Lowestoft Formation in the east and west sections of the site is classified as a Secondary A Aquifer and the diamicton of the Lowestoft Formation in the centre of the site is classified as a Secondary Aquifer (undifferentiated). The Crag Group bedrock underlying the site is classified as a Principal Aquifer. The diamicton of the Lowestoft Formation at the site is expected to be of relatively low permeability and, therefore, have a limited hydraulic connection to the underlying Crag groundwater.

3.5.32. It is likely there are perched water tables in permeable lenses within the Lowestoft Formation. Given the local geology and assumed depth to groundwater it is not considered that there is a significant connection between groundwater and the surface water features identified. There may be local interaction between discrete water bodies in the Lowestoft Formation (diamicton) aquifer and surface water.

3.5.33. **Chapter 12** of **Volume 4** of the **ES** (Doc Ref. 6.5) confirms that there are no internationally or nationally designated ecological sites that are water dependent within the vicinity of the proposed development.

3.5.34. The results of the screening exercise are shown in **Table 3.11**. This demonstrates that the following water bodies could be impacted by the proposed development at the southern park and ride site:

- River Deben (Brandeston Bridge - Melton) (GB105035046310);
- River Ore (GB105035045970); and
- Waveney & East Suffolk Chalk and Crag (GB40501G400600).

3.5.35. **Appendix 3A** provides summary data for all water bodies relevant to **Part 3**. The data was provided by the Environment Agency in December 2018, with an update provided in July 2019.

Table 3.11 Results of screening assessment for the southern park and ride

Water body name and ID number	Type	Description	Screened in?	Justification
River Deben (Brandeston Bridge - Melton) GB105035046310	River	Heavily modified for Flood Protection. Currently at Moderate Ecological Potential due to mitigation measures assessment and high concentrations of phosphate.	Yes	Screened in because the proposed activities are located within the catchment of this water body and could therefore affect its biology, hydromorphology and physico-chemistry.
River Ore GB105035045970	River	Currently at Poor Ecological Status due to high phosphate concentrations and pressures on fish, macrophytes/ phytobenthos and the natural hydrological regime. Not designated heavily modified or artificial.	Yes	Screened in because the proposed activities are located within the catchment of this water body and could therefore affect its biology, hydromorphology and physico-chemistry.
Alde - Ore (d/s confluence) GB105035045950	River	Currently at Poor Ecological Status due to high phosphate concentrations, low dissolved oxygen concentrations and pressures on fish and the natural hydrological regime. Not designated heavily modified or artificial.	No	Located downstream of the River Ore. Screened out because the proposed activities are located >10km upstream of this water body and no mechanism for potential impacts to propagate downstream of the water body in which they take place has been identified.
Deben GB520503503900	Transitional	Heavily modified for flood protection. Currently at Moderate Ecological Potential due to elevated concentrations of dissolved inorganic nitrogen.	No	Located downstream of the River Deben. Screened out because the proposed activities are located >8km upstream of this water body and no mechanism for potential impacts to propagate downstream of the water body in which they take place has been identified.
Alde & Ore GB520503503800	Transitional	Heavily modified for flood protection. Currently at Moderate Ecological Potential due to elevated concentrations of dissolved inorganic nitrogen and pressures on the hydrological regime.	No	Located downstream of the Alde-Ore (downstream confluence). Screened out because the proposed activities are located >10km upstream of this water body and no mechanism for potential impacts to propagate downstream of the water body in which they take place has been identified.

Water body name and ID number	Type	Description	Screened in?	Justification
Suffolk GB650503520002	Coastal	Heavily modified for flood protection and coast protection. Moderate Ecological Potential due to elevated concentrations of dissolved inorganic nitrogen.	No	Located downstream of the Deben and Alde & Ore transitional water bodies. Screened out because the proposed activities are located >15km upstream of this water body and no mechanism for potential impacts to propagate downstream of the water body in which they take place has been identified.
Waveney & East Suffolk Chalk and Crag GB40501G400600	Groundwater	Currently at Poor Quantitative Status as a result of an unfavourable water balance and Poor Chemical Status due to diffuse pollution pressures and potential impacts on a Drinking Water Protected Area.	Yes	Screened in because the proposed activities are underlain by this water body and could therefore affect the quality and quantity of groundwater.

c) Stage 2: Scoping

i. Purpose of this section

3.5.36. This section presents the results of the scoping assessment undertaken on the water bodies identified in **section 3.5b)**, using the methodology outlined in **Part 1** and in **section 3.3a)**.

ii. Impacts of project activities on water body quality elements

Assessment of potential mechanisms for impact

3.5.37. The scoping questions presented in **Part 1** have been applied to each water body individually for each of the construction, operational and removal and reinstatement stage activities listed in **Table 3.10**. The results of the scoping assessment are provided in **Appendix 3C** and summarised in **Table 3.12**.

Table 3.12 Activities with the potential to affect water body quality elements and status at the southern park and ride

Activity	Water body	Quality element scoping
Construction		
C1 Site preparation, earthworks and construction	River Deben (Brandeston Bridge - Melton) River Ore	Hydromorphology: All elements (see **Appendix 3C**) scoped out because the **Outline Drainage Strategy** and the **CoCP** include measures to prevent significant changes to hydrology and morphological conditions
		Physico-chemistry: All elements scoped out because the **Outline Drainage Strategy** and the **CoCP** include measures to minimise the release of pollutants into the water environment
		Biology: All elements scoped out scoped out because the **Outline Drainage Strategy** and the **CoCP** include measures to prevent significant changes to hydromorphology and physico-chemistry
	Waveney & East Suffolk Chalk and Crag	Quantity: All elements scoped out because the overall volume of water discharging to ground is unlikely to significantly change
		Quality: All elements scoped out scoped out because the **Outline Drainage Strategy** and the **CoCP** include measures to minimise the release of pollutants into the water environment
Operation		
O1 Management of drainage	River Deben (Brandeston Bridge - Melton) River Ore	Hydromorphology: All elements scoped out scoped out because the **Outline Drainage Strategy** includes measures to to prevent significant changes to the hydrology and morphological conditions
		Physico-chemistry: All elements scoped out because the **Outline Drainage Strategy** includes measures to to minimise the release of pollutants into the water environment.
		Biology: All elements scoped out because the **Outline Drainage Strategy** includes measures to prevent significant changes to hydromorphology and physico-chemistry (as above)
	Waveney & East Suffolk	Quantity: All elements scoped out because the **Outline Drainage Strategy** includes measures to prevent

Activity	Water body	Quality element scoping
	Chalk and Crag	significant changes to the volume of water discharging to ground
		Quality: All elements scoped out because the **Outline Drainage Strategy** includes measures to prevent the release of pollutants into the water environment
Removal and reinstatement		
R1 Removal and reinstatement	River Deben (Brandeston Bridge - Melton) River Ore	Hydromorphology: All elements (see **Appendix 3C**) scoped out because the **Outline Drainage Strategy** and the **CoCP** include measures to prevent significant changes to hydrology and morphological conditions
		Physico-chemistry: All elements scoped out because the **Outline Drainage Strategy** and the **CoCP** include measures to minimise the release of pollutants into the water environment
		Biology: All elements scoped out scoped out because the **Outline Drainage Strategy** and the **CoCP** include measures to prevent significant changes to hydromorphology and physico-chemistry
	Waveney & East Suffolk Chalk and Crag	Quantity: All elements scoped out because the overall volume of water discharging to ground is unlikely to significantly change.
		Quality: All elements scoped out because control measures embedded in the Removal and Restoration Plan would sufficiently minimise the release of pollutants into the water environment.

3.5.38. **Table 3.12** demonstrates that the proposed construction and removal and reinstatement stage activities do not have the potential to directly or indirectly impact upon the quality elements in the River Deben (Brandeston Bridge - Melton), River Ore or Waveney & East Suffolk Chalk and Crag water bodies. This is because the potential impacts resulting from the construction and removal and reinstatement activities would be mitigated by the **Outline Drainage Strategy** (**Volume 2, Appendix 2A** of the **ES**) and the **CoCP** (Doc Ref. 8.11).

3.5.39. **Table 3.12** also demonstrates that potential impacts resulting from the operation of the park and ride site would be mitigated by the **Outline Drainage Strategy**. Foul sewage from the administration and welfare buildings would be treated on-site.

3.5.40. All quality elements, therefore, have been scoped out of the assessment for all three water bodies.

iii. Impacts of project activities on RBMP improvement and mitigation measures

RBMP measures applicable to each water body

3.5.41. The Environment Agency has not identified any improvement measures for the Waveney and East Suffolk Chalk and Crag groundwater body in the RBMP. This water body, therefore, is not considered further in this part of the assessment.

3.5.42. However, a range of mitigation measures that have either already been implemented or are proposed for future implementation have been identified for the heavily modified River Deben (Brandeston Bridge - Melton) in the RBMP (**Table 3.13**).

3.5.43. Furthermore, the Environment Agency has also identified a series of RBMP improvement measures for the River Ore Water body, which is not heavily modified (**Appendix 3A**). These are summarised in **Table 3.14**.

Table 3.13 Potential impacts from the southern park and ride on RBMP mitigation measures in the River Deben (Brandeston Bridge - Melton) water body

Mitigation measure	Status	Potential impact
Vegetation control	In place	There are no mechanisms for project activities during construction, operation or removal and reinstatement to affect the delivery of the vegetation control measures that are in place in the water body.
Selective vegetation control	In place	
Vegetation control timing	In place	
Invasive species techniques	In place	Potential risks to INNS are considered in **section 2**.
Retain habitats	In place	There are no mechanisms for project activities during construction and operation to prevent the future implementation of measures to retain habitats during vegetation and sediment management in the water body.
Sediment management strategy	In place	Project activities during construction and removal and reinstatement (but not operation) have the potential to generate sediment. However, the drainage (as set out in the **Outline Drainage Strategy** (**Appendix 2A** to **Volume 2** of the **ES**)) would be designed to intercept sediment and surface runoff and prevent it leaving the boundaries of the site (**section 3.3c.v**).
In-channel morphological diversity	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the future implementation of measures to increase morphological diversity in the water body.
Floodplain connectivity	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the future implementation of measures to improve floodplain connectivity in this water body.
Fish passes	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of measures to improve fish passage over existing structures in this water body.
Woody debris	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of measures to retain woody debris during maintenance in this water body.

Table 3.14 Potential impacts from the Southern Park and Ride on improvement measures in the River Ore water body

Improvement measure	Potential impact
Generic and water body action – field and crops (arable soils). To control or manage diffuse source inputs, reduce diffuse pollution at source.	Project activities during construction and removal and reinstatement (but not operation) have the potential to generate pollution. However, the drainage (as set out in the **Outline Drainage Strategy** (**Appendix 2A** to **Volume 2** of the **ES**)) would be designed to intercept sediment and surface runoff and prevent it leaving the boundaries of the site (cf. **section 3.3**). Therefore, there are no mechanisms for project activities to adversely impact on the implementation or effectiveness of this measure.
Generic and water body action – for surface run-off and drainage. To control or manage diffuse source inputs, reduce diffuse pollution pathways (i.e. control entry to the water environment)	As above. Therefore, there are no mechanisms for project activities to impact on the implementation or effectiveness of this measure.
Generic and water body action – increase in channel morphological diversity. To improve modified habitat, improvement to condition of channel/bed and/or banks/shoreline.	No pathway for effect exists. Given the location of the works away from the water body, no physical effects on the water body are anticipated.
Generic and water body action – point source phosphorus reduction. To control or manage point source inputs, mitigate/remediate point source impacts on receptor, install nutrient reduction.	Any foul discharges would be appropriately treated prior to discharge to ground and, therefore, would not directly contribute additional phosphorus to the River Ore (**section 3.5 c)**). Therefore, there are no mechanisms for project activities to impact on the implementation or effectiveness of this measure.
Habitat improvement – Local Catchment Partnership project to reduce impact of structures on watercourse	No pathway for effect exists. No physical structures are required as part of the proposed works on this water body.

Assessment of potential mechanisms for impact

3.5.44. **Table 3.13** and **Table 3.14** also present an assessment of potential impacts from the southern park and ride on each RBMP mitigation and improvement measure identified for the River Deben (Brandeston Bridge - Melton) and the River Ore.

3.5.45. **Table 3.13** demonstrates that the proposed activities associated with the southern park and ride would not counteract or adversely affect the delivery of the RBMP mitigation measures that are already in place in the River Deben and would not prevent the future implementation of the RBMP mitigation measures that are not yet in place. RBMP mitigation measures (either in place or not in place) therefore do not require further assessment in Stage 3.

3.5.46. **Table 3.14** demonstrates that the proposed activities would not prevent the future implementation of the RBMP improvement measures identified for the River Ore. RBMP improvement measures do not, therefore, require further assessment in Stage 3.

iv. Impacts of project activities on Protected Areas

Protected Areas within each water body

3.5.47. Protected Areas within each of the WFD water bodies identified as relevant to this site during the screening phase are listed in **Table 3.15** and shown in **Figure 3.7** against a 2km boundary.

Table 3.15 Summary of scoping assessment for Protected Areas

Water body	Protected area name	Within 2km?
River Ore	Nitrates Directive – NVZ 396, 419, 411	NVZ 419 and 411 are located within 2km.
Deben (Brandeston Bridge - Melton)	Habitats Directive - Deben Estuary SPA	Not located within 2km.
	Nitrates Directive - NVZ 409, 419, 411	NVZ 419 and 411 are located within 2km.
Waveney & East Suffolk Chalk and Crag	Nitrates Directive - NVZ 78, 79, 166, 168	NVZ 78 is located within 2km.
	WFD (formerly Surface Water Abstraction Directive) - Waveney and East Suffolk Chalk & Crag Drinking Water Protected Area	Not located within 2km.

Assessment of potential mechanisms for impact

3.5.48. **Table 3.15** demonstrates that some of the Protected Areas associated with these water bodies are outside the 2km ZOI and, therefore, have not been considered further in this assessment.

3.5.49. However, the following Protected Areas are located within 2km:

- River Ore: NVZ 411 and 419.
- River Deben (Brandeston Bridge - Melton): NVZ 411 and 419.
- Waveney & East Suffolk Chalk and Crag: NVZ 78.

3.5.50. Foul water generated on site could release nitrates and other nutrients if discharged, untreated to the water environment. However, all foul waters generated during construction, operation and removal and reinstatement would be contained and/or adequately treated to ensure that the project activities would not result in the release of significant quantities of nitrates and other nutrients. All Protected Areas have, therefore, been scoped out of the assessment.

v. Stage 2 Summary

3.5.51. The assessment demonstrates that proposed project activities during construction, operation and removal and reinstatement would not have direct or indirect effects on the River Ore, River Deben and Waveney & East Suffolk Chalk and Crag water bodies that are sufficient to cause deterioration in their status or the status of Protected Areas located within the water bodies. Furthermore, the proposed project activities would not counteract or otherwise affect the delivery of the RBMP improvement or mitigation measures (both in place and not in place) that have been identified for these water bodies. Therefore, the southern park and ride is considered to be compliant with the requirements of the WFD.

3.6 Two Village Bypass

a) Introduction and project description

i. Description

3.6.1. The site is approximately 54.8ha and comprises of primarily agricultural land as well as highway land and hard standing.

3.6.2. The proposed route of the two village bypass would comprise a new single carriageway, approximately 2.4km in length. The proposed route of the two village bypass would be 7.3m in width, with additional 1m hardstrips and 2.5m grassed verges. Swales approximately 3-3.5m wide would also be

proposed along the earthworks for the length of the proposed route of the two village bypass for highway drainage, except for the extent of the River Alde floodplain. The side roads off the two village bypass would be approximately 6m in width and would be of sufficient width so that vehicles could pass one another without the requirement for laybys.

3.6.3. The two village bypass has been split into three main sections as follows (see **Figure 3.8**):

- Western section – A12 / Tinker Brook to Pond Wood.
- Central section – Pond Wood to north of Farnham Hall.
- Eastern section – north of Farnham Hall to A12 / A1094 (Friday Street).

3.6.4. All dimensions are approximate. There is some flexibility during detailed design to alter the alignment of the route of the proposed two village bypass and proposed structures within defined limits set out on the **Work Plans** (Doc Ref. 2.3) (and reproduced in **Appendix 2A** of **Volume 5**) and described in **section 2.3** of **Chapter 2** of **Volume 5** (Doc Ref. 6.6).

Western section – A12 / Tinker Brook to Pond Wood

3.6.5. An illustrative master plan for this section is provided in **Figure 2.2** in **Chapter 2 of Volume 5** of the ES (Doc Ref. 6.6).

3.6.6. The route of the proposed two village bypass would connect to the A12, via a new roundabout located to the east of Parkgate Farm and Stratford Plantation. The route of the proposed two village bypass would rise on an embankment to cross the River Alde on an overbridge at approximately 7m in height above ground level. After crossing the River Alde, the route of the proposed two village bypass would continue in a north-easterly direction, intersecting Nuttery Belt and passing Pond Wood, and decreasing in height to grade level.

3.6.7. Key features of the two village bypass in the Western section include:

- A four-arm roundabout located to the east of Parkgate Farm and Stratford Plantation. The north-east and western arms would connect to the A12, the southern arm would provide a connection to Tinker Brook and the eastern arm would connect to the proposed route of the two village bypass. The A12 would be realigned over a length of approximately 450m to meet the new roundabout, and an approximate 300m section of Tinker Brook would also be realigned to accommodate existing access to the south, including access to Parkgate Farm.

- A crossing of the River Alde via an overbridge. The overbridge would be 60m in length and have two concrete intermediary piers. The bridge would be 7.5m in height above ground level to the road surface.
- Eight 5.4m long, 3m wide flood relief culverts proposed (four on either side of the River Alde overbridge) passing through the embankment within the width of the flood plain. There would also be two further culverts within the embankment, including:

– a culvert on the western side of the River Alde overbridge outside the floodplain extent (approximately 200m south-east from the existing A12), which would be approximately 5.4m by 3m and would allow an existing watercourse and livestock access track to pass beneath the road (on the alignment of an existing accommodation access track which would be diverted under the proposed bridge)); and
– a mammal migration culvert on the east side of the River Alde overbridge outside the floodplain extent (approximately 5.4m by 1.2m).

- Alterations to an accommodation access track connecting to Parkgate Farm. The accommodation access track would be diverted (for vehicular users) along the southern edge of the embankment, under the River Alde overbridge to connect to the existing accommodation access track to cross the River Alde at its existing crossing point to the north of the bypass. On the west side of the river, the access track (for all users) would be diverted south under the River Alde overbridge and around the southern edge of the embankment before connecting back to the existing track on the south site of the route of the bypass. Livestock would follow the existing accommodation access track through the new culvert on the western side of the River Alde overbridge to cross the River Alde at the existing crossing point and connect to the proposed access track diverted south under the River Alde overbridge. The proposed River Alde overbridge would maintain a headroom clearance of 6m from river bank level to the underside of the bridge to allow use of the track by agricultural vehicles. Non-motorised users (pedestrians, cyclists and equestrians) would also be able to pass beneath the bridge.
- Footpath E-243/001/0 would be permanently realigned approximately 25m to the east to cross the route of the two village bypass
- A staggered junction would be provided between Nuttery Belt and Pond Wood to maintain access on both sides of the route of the proposed two village bypass. On the south side, this includes the realignment of the accommodation access track from Pond Barn Cottages for approximately 75m. On the north side, the accommodation access track would be realigned for approximately 350m to provide access to Farnham Hall.

3.6.8. Signage and road markings would also be provided, as required.

Central section – Pond Wood to north of Farnham Hall

3.6.9. An illustrative masterplan for the Central section is provided on **Figure 2.3** in **Chapter 2 of Volume 5** of the **ES** (Doc Ref. 6.6).

3.6.10. The route of the proposed two village bypass would continue in north-easterly passing into a cutting for the length of this section, which would be approximately 4.5m in depth below ground level as it passes between Farnham Hall and Farnham Hall Farmhouse.

3.6.11. Key features of the two village bypass in the Central section include:

- On the south side of the route of the bypass, an access track would be provided for approximately 400m from Pond Barn Cottages to Farnham Hall Farmhouse to maintain access to the property.
- An overbridge would be provided across the route of the proposed two village bypass approximately 150m east of Farnham Hall, referred to as the 'Foxburrow Wood footbridge'. The Foxburrow Wood footbridge would be approximately 2.5m in height above ground level to the overbridge surface, approximately 7m in height above the route of the proposed two village bypass (maintaining the minimum headroom clearance of 5.7m). The proposed Foxburrow Wood footbridge would serve non-motorised users and not vehicles.
- Footpath E-243/003/0 would be permanently realigned to cross over the route of the proposed two village bypass via the proposed Foxburrow Wood footbridge, exiting along the western side of Foxburrow Wood. Footpath E-243/003/0 would ramp up to the proposed overbridge. Foxburrow Wood CWS ancient woodland will be retained in its entirety. A 15m buffer from proposed earthworks to the ancient woodland would be maintained.
- Footpaths E-243/003/0 and E243/011/0 (on the east side of the proposed route of the two village bypass) would be upgraded to a bridleway. However, other than the crossing, no physical changes would be required to footpaths E-243/003/0 and E243/011/0 to facilitate the change to a bridleway.

3.6.12. Signage and road markings would also be provided, as required.

Eastern section – north of Farnham Hall to A12 / A1094 (Friday Street)

3.6.13. An illustrative masterplan for the Eastern section is provided on **Figure 2.4** in **Chapter 2** of **Volume 5** of the ES (Doc Ref 6.6).

3.6.14. The route of the proposed two village bypass continues in a north-easterly direction, passing to the south-east of Mollett's Farm towards the A12 and A1094 (Friday Street) junction, rising to grade level.

3.6.15. Key features of the two village bypass in the Eastern section include:

- Footpath E-243/004/0 would be diverted south-west to cross over the route of the two village bypass on the proposed Foxburrow Wood footbridge.
- Footpath E-137/029/0 between Mollett's Farm and Friday Street Farm would be permanently realigned to cross the route of the bypass approximately 25m south of its existing alignment.
- A four-arm roundabout would be provided to allow the route of the proposed two village bypass to join the A12. The roundabout would replace the existing junction of the A12, with the A1094 (Friday Street). The A12 would be realigned over a length of approximately 600m to meet the north-west and north-east arms, with the route of the proposed two village bypass joining on the south-west arm. The A1094 (Friday Street) would be realigned over a length of approximately 150m to meet the proposed roundabout on the south-eastern arm. This section of the proposed route of the two village bypass moving east would rise to grade level on approach to the eastern roundabout.
- Footpath E-137/028/0 would be maintained on its existing alignment.

3.6.16. Signage and road markings would also be provided, as required.

ii. Construction

3.6.17. It is expected that construction work for the proposed development would take up to 24 months to complete, during the early years of construction of the Sizewell C Project.

3.6.18. The anticipated construction sequence would be:

- Preparatory works: site set up and clearance, including trees and hedgerows, the erection of temporary fencing on land required for construction and the creation of alternative access arrangements and rights of way, setting up of the temporary contractor compound including security, welfare facilities, compounds and temporary utilities.
- Construction works: earthworks, road construction and surfacing, breaking of hardstanding, construction of bridges and civil structures (including piling), utility and drainage installation, construction of pavements, kerbs, footways and paved areas, installation of permanent

fencing, road signs and marking, and road lighting, permanent connections to existing road networks, and landscaping.

3.6.19. Early in the construction phase, swales and infiltration basins would be used as appropriate to ensure that surface water run-off would be contained within the site.

3.6.20. Surface water runoff will be treated and disposed by infiltration. Foul water will be either treated and disposed by infiltration to ground or removed by tanker for treatment at designated licensed facility.

3.6.21. Earthworks would be designed to maximise cut and fill balance in order to prevent material being sent off-site. Furthermore, contractors would be required to investigate opportunities to minimise and reduce waste generation.

3.6.22. All construction works would be managed from a temporary contractor compound proposed at the eastern end of the bypass, west of the A12 / A1094 Friday Street roundabout. The temporary compound would include:

- Office and welfare facilities for staff and operatives.
- Parking for staff and operatives.
- Secure storage of construction plant.
- Laydown and storage of materials and components prior to installation and use.
- Secure storage containers for weather-sensitive and high-value materials (e.g. signalling equipment).
- Safe turning space for vehicles and plant.

3.6.23. Temporary site utilities comprising power, water, drainage and telecommunications would be provided as required. Following completion of construction, the land required for the temporary construction compound would be reinstated to its former condition as far as practicable.

3.6.24. Earthworks would be designed to maximise cut and fill balance in order to prevent material being sent off-site. Furthermore, contractors would be required to investigate opportunities to minimise and reduce waste generation.

3.6.25. A **CoCP** (Doc Ref. 8.11) sets out the measures and controls that SZC Co. will require its contractors to adopt during construction, where appropriate, and provides an outline of the environmental management plans that will be implemented on site.

iii. Operation

3.6.26. The route of the proposed two village bypass crosses the River Alde at a location where there is an extensive functional floodplain (1 in 20-year flood event) on either side of the watercourse. The route of the proposed two village bypass road would cross the river via a multi-span overbridge, allowing for the river to flow under the bypass beneath the proposed bridge. On either side of the River Alde, the embankment would form a causeway that would include flood relief culverts. There would also be a culvert on the western side of the River Alde overbridge (approximately 200m south-east from the existing A12), which would be 5.4m by 3m which will allow an existing watercourse and accommodation access track to pass beneath the road (on their existing alignment). A mammal culvert would be located on the eastern side of the overbridge and would be 5.4m wide.

3.6.27. SuDS would be implemented to attenuate surface water run-off and minimise sediment generation and provide water treatment. It is envisaged that surface water run-off would be contained within the site, with drainage to ground via infiltration using infiltration basins and swales.

3.6.28. Swales would be provided alongside the proposed route of the two village bypass road, except along the River Alde overbridge and along the embankment within the floodplain. The swales would attenuate and infiltrate to ground the surface water runoff.

3.6.29. It is envisaged that three infiltration basins would be located along the length of the route. The exact location, footprint and depth of the infiltration basins will be confirmed at the detailed design stage. The infiltration basins would be designed to cater for a 100 years flood event plus a 40% allowance for climate change.

3.6.30. The indicative locations, as shown on **Figures 2.1**, **2.2** and **2.4** in **Chapter 2** of **Volume 5** of the **ES** (Doc Ref. 6.6) for proposed infiltration basins, are within grassland on the south side of the western roundabout, south of the bypass to the east of Whin Covert, and south-east of the A12/Friday Street roundabout.

3.6.31. The swales and infiltration basins will provide a certain level of treatment for highway runoff. The adequacy of these facilities for removal of pollutants will be accessed as part of detailed design. If necessary additional treatment measures such as bypass separators will be provided.

3.6.32. Surface water from the roundabouts will be collected via gullies and discharged via an outfall drain to the adjacent infiltration basins.

3.6.33. It is envisaged that existing local drainage from surrounding fields would be culverted so that their use would continue and would not be impacted by the proposed development. Field drains located at the western end of the bypass, either side of the proposed River Alde overbridge, would be diverted along the base of the embankment to the River Alde where possible with additional/excess water culverted through the embankments.

3.6.34. The section of road between the eastern end of the embankment and the River Alde bridge would be drained either by underground drainage or drainage channel towards the bridge and then outfall with discharge into the river. Discharge would be fixed at greenfield rates and infrastructure for the removal of highway runoff pollutants provided, if required as determined at detailed design stage.

3.6.35. The section of road between the River Alde bridge and the western end of the embankment will be drained either by underground drainage or drainage channel to the west and then discharge into the infiltration basin.

3.6.36. The **Outline Drainage Strategy** is described in more detail in **Volume 2**, **Chapter 2**, **Appendix 2A** of the **ES** (Doc Ref. 6.3).

3.6.37. During operation, routine maintenance of the proposed development would be undertaken to maintain appropriate standards. This would include:

- Periodic inspection and maintenance of the SuDS to ensure the continued efficacy of the drainage system.
- Maintenance of vegetation along the highway boundary.
- Periodic maintenance activities such as resurfacing.

iv. Baseline for assessment

3.6.38. The current baseline conditions of any identified water bodies are considered appropriate for the duration of the construction phase at this site, because the bypass would need to be constructed and operational prior to the peak of construction at the main development site. Although the current baseline is also likely to be applicable to the operational phase, the permanent nature of the development means that this baseline could change in the future (e.g. water body status could change in response to natural variations or as a result of improvement or mitigation measures delivered by the Environment Agency and partner organisations). The potential future baseline will therefore be considered in Stage 3 if any scheme elements are scoped in to further assessment.

b) Stage 1: Screening

i. Identification of activities

3.6.39. The works proposed for the two village bypass site have been separated into activities in line with the requirements of the guidance produced by the Environment Agency (Ref. 3.3) and Planning Inspectorate (Ref. 3.4). These activities are listed in **Table 3.16**.

Table 3.16 Summary of two village bypass activities

Reference Number	Activity	Sub activities included
Construction		
C1	Site preparation, earthworks and construction	Vegetation clearance, removal of topsoil, surface materials, installation of drainage infrastructure (including SuDS) and flood compensation measures, laying of base materials and surfacing, management of construction-stage surface water and foul drainage. Import and storage of material from elsewhere.
C2	Construction of watercourse crossings	Construction of bridge across the River Alde, construction of culverts across ordinary watercourses.
Operation		
O1	Management of surface water drainage	Operational use of the site and associated water management measures for surface water.
O2	Presence of structure through which the River Alde will flow	Permanent presence of bridge across River Alde and enhanced flood plain measures. Permanent presence of culverts across other water courses.

ii. Water body identification

3.6.40. **Figure 3.9** shows the WFD water bodies that could be hydrologically connected to the proposed two village bypass. In addition to WFD water body mapping, potential hydrological connectivity has been determined with reference to main rivers, ordinary watercourses and surface water flow routes that may not be shown on published mapping (identified using Environment Agency flood mapping). This process therefore considers the

water bodies in whose catchments the proposed activities are located, and where relevant, connected water bodies upstream and downstream.

3.6.41. The proposed development is located on the floodplain of the River Alde before rising onto the watershed between the Rivers Alde and Fromus. The River Alde would be crossed by the proposed bypass, in the western area of the site, along with coastal and floodplain grazing marsh in the river floodplain and a number of other small watercourses (including two ordinary water courses), ditches and drains which drain to the River Alde.

3.6.42. There are also several ponds close to the proposed route of the two village bypass. The River Fromus is located approximately 1400m east of the site at its closest point and is separated from the proposed development by the East Suffolk line. The surface watercourses in the area are typical of lowland, low energy drainage systems. Many of the channels are entirely artificial, and the natural channels have been extensively modified (probably to facilitate drainage and use of the surrounding marshland as grazing marsh).

3.6.43. Online BGS mapping indicates that the superficial geology underlying the much of the site comprises diamicton (boulder clay) of the Lowestoft Formation, which is formed of a sheet of chalky till, together with outwash sands and gravels, silts and clays. The sand and gravel of the Lowestoft Formation are present to the west of site, adjacent to the junction with the A12, and as a strip to the north of the central areas of site, south of Farnham. The River Alde and the associated network of drains that intersect the site are underlain by alluvium. The sands and gravels support a Secondary A Aquifer, and the diamicton supports a Secondary Aquifer (Undifferentiated).

3.6.44. The bedrock geology beneath the site comprises of three different bedrock strata. The Chillesford Church Sand Member (CCSM) underlies the majority of the site. This is described as shallow-water marine and estuarine sands, gravels, silts and clay. The Red Crag Formation outcrops in the west of the site, underlying the River Alde and comprises of sands. The Crag Group underlies the north-east of the site and is described of shallow water marine and estuarine sands, gravel, silts and clays. The CCSM, Red Crag Formation and Crag Group underlying the site are classified as Principal Aquifers.

3.6.45. The Lowestoft Formation at the site is expected to be of relatively low permeability and have limited hydraulic connection to the underlying bedrock groundwater. It is likely there are perched water tables in permeable lenses within the Lowestoft Formation. It is unlikely that groundwater within the Lowestoft sand and gravel and diamicton aquifers has continuity with local surface water. However, groundwater may exist in

beds and lenses of more granular material within the alluvium and although it is possible that this water has hydraulic continuity with the River Alde, it is likely to be present as discontinuous lenses of perched groundwater.

3.6.46. Due to the granular and permeable nature of the Crag Group, it is likely that groundwater within the CCSM and Red Crag aquifers may be in hydraulic continuity. Due to the anticipated depth to the groundwater within the Crag Group, it is possible that the Principal Bedrock Aquifers are in hydraulic continuity with the River Alde, however, only where no low permeability overlying superficial deposits are present and where the Crag is present at a shallow depth below ground.

3.6.47. A review of the Multi-Agency Geographic Information for the Countryside website has confirmed that there are no internationally or nationally designated water dependent sites (including groundwater dependent terrestrial ecosystems) within 1km of the site (see **Chapter 11** of **Volume 5** of the **ES** (Doc Ref. 6.6)).

3.6.48. A screening exercise has been undertaken to identify which of the water bodies have the potential to be impacted by the bypass activities. The results of this exercise are included in **Table 3.17**.

Table 3.17 Results of screening assessment for the two village bypass

Water body name and ID number	Type	Description	Screened in?	Justification
River Alde GB105035046060	River	Currently at Poor Ecological Status due to hydromorphological pressures, low dissolved oxygen concentrations and pressures on fish, macrophytes and phytobenthos. This water body is not designated heavily modified or artificial.	Yes	Screened in because the proposals are partially located within the Alde catchment. The proposals require works over the River Alde by means of a new bridge and culverts on other water courses within the Alde catchment, and could therefore directly and indirectly impact upon the water body.
River Fromus GB105035045980	River	Currently at poor ecological status due to pressures on fish, invertebrates, dissolved oxygen and phosphate. This water body is not designated heavily modified or artificial.	Yes	Screened in because the proposed activities are partially located within the catchment of this water body.
Alde - Ore (d/s confluence) GB105035045950	River	Currently at Poor Ecological Status due to high phosphate concentrations, low dissolved oxygen concentrations and pressures on fish and the natural hydrological regime. Not designated heavily modified or artificial.	No	Located downstream of both the River Alde and the River Fromus. Screened out because the proposed activities are located approximately 1.5km upstream of this water body and no mechanism for potential impacts to propagate downstream of the water body in which they take place has been identified.
Alde & Ore GB520503503800	Transitional	Heavily modified for flood protection. Currently at Moderate Ecological Potential due to elevated concentrations of dissolved inorganic nitrogen and pressures on the hydrological regime.	No	Located downstream of the Alde-Ore (d/s confluence). Screened out because the proposed activities are located approximately 6km upstream of this water body and no mechanism for potential impacts to propagate downstream of the water body in which they take place has been identified
Waveney & East Suffolk Chalk and Crag GB40501G400600	Groundwater	Currently at Poor Quantitative Status as a result of an unfavourable water balance and Poor Chemical Status due	Yes	Screened in because the proposed activities are underlain by this water body.

Water body name and ID number	Type	Description	Screened in?	Justification
		to diffuse pollution pressures and potential impacts on a Drinking Water Protected Area.		

3.6.49. This demonstrates that the following water bodies could be impacted by the proposed development:

- River Alde (GB105035046060).
- River Fromus (GB105035045980).
- Waveney & East Suffolk Chalk and Crag (GB40501G400600).

3.6.50. **Appendix 3A** provides summary data for these water bodies and all water bodies relevant to Part 3. This data was provided by the Environment Agency in December 2018, with a further update in July 2019.

c) Stage 2: Scoping

i. Purpose of this section

3.6.51. This section presents the results of the scoping assessment undertaken on the water bodies identified in **section 3.6b)**, using the methodology outlined in **Part 1** and **section 3.3a)**.

ii. Impacts of project activities on water body quality elements

Water bodies considered in this assessment

3.6.52. The scoping questions presented in **Part 1** have been applied to each water body individually for each of the construction and operational stage activities listed in **Table 3.16**. The results of the scoping assessment are provided in **Appendix 3D** and summarised in **Table 3.18**.

Table 3.18 Activities with the potential to affect water body quality elements and status associated with the two village bypass

Activity	Water body	Quality element scoping
Construction		
C1 Site preparation, earthworks and construction	River Alde River Fromus	Hydromorphology: All elements (see **Appendix D**) scoped out because the **Outline Drainage Strategy** and the **CoCP** include measures to prevent significant changes to hydrology and morphological conditions
		Physico-chemistry: All elements scoped out because the **Outline Drainage Strategy** and the **CoCP** include measures to minimise the release of pollutants into the water environment
		Biology: All elements scoped out scoped out because the **Outline Drainage Strategy** and the **CoCP** include measures to prevent significant changes to hydromorphology and physico-chemistry
	Waveney & East Suffolk Chalk and Crag	Quantity: All elements scoped out because the overall volume of water discharging to ground is unlikely to significantly change
		Quality: All elements scoped out scoped out because the **Outline Drainage Strategy** and the **CoCP** include measures to minimise the release of pollutants into the water environment
C2 Construction of watercourse crossings	River Alde	Hydromorphology: Scoped in (see **Appendix 3D**) because the construction of the bridge across the River Alde and culverts across ordinary watercourses could impact on hydromorphology in the River Alde water body/catchment.
		Physico-chemistry: All elements scoped out because the **Outline Drainage Strategy** and the **CoCP** include measures to minimise the release of pollutants into the water environment
		Biology: Scoped in as effects on hydromorphology could effect biology.
	River Fromus	Hydromorphology: All elements (see **Appendix 3D**) scoped out because control measures set out in the **CoCP** would prevent significant changes to the hydrology and morphological conditions.

Activity	Water body	Quality element scoping
		Physico-chemistry: All elements scoped out because control measures set out in the **CoCP** would sufficiently minimise the release of pollutants into the water environment.
		Biology: All elements scoped out because control measures set out in the **CoCP** would prevent significant changes to hydromorphology and physico-chemistry.
	Waveney & East Suffolk Chalk and Crag	Quantity: All elements scoped out because the overall volume of water discharging to ground is unlikely to significantly change.
		Quality: All elements scoped out because control measures set out in the **CoCP** would sufficiently minimise the release of pollutants into the water environment.
Operation		
O1 Management of drainage	River Alde River Fromus	Hydromorphology: All elements scoped out scoped out because the **Outline Drainage Strategy** includes measures to prevent significant changes to the hydrology and morphological conditions
		Physico-chemistry: All elements scoped out because the **Outline Drainage Strategy** includes measures to minimise the release of pollutants into the water environment. Additionally, foul water would be discharged to existing sewer
		Biology: All elements scoped out because the **Outline Drainage Strategy** includes measures to prevent significant changes to hydromorphology and physico-chemistry (as above)
	Waveney & East Suffolk Chalk and Crag	Quantity: All elements scoped out because the **Outline Drainage Strategy** includes measures to prevent significant changes to the volume of water discharging to ground
		Quality: All elements scoped out because the **Outline Drainage Strategy** includes measures which would prevent the release of pollutants into the water environment

Activity	Water body	Quality element scoping
O2 Permanent presence of bridge over the River Alde and culverts over other watercourses	River Alde	Hydromorphology: Scoped in (see **Appendix 3D**) because the construction of culverts and bridge could impact on hydromorphology in the River Alde water body/catchment.
		Physico-chemistry: All elements scoped out scoped out because the **Outline Drainage Strategy** includes measures which sufficiently minimise the release of pollutants into the water environment.
		Biology: Scoped in as effects on hydromorphology could effect biology.
	River Fromus	Hydromorphology: All elements scoped out scoped out because the **Outline Drainage Strategy** includes measures which would prevent significant changes to the hydrology and morphological conditions.
		Physico-chemistry: All elements scoped out scoped out because the **Outline Drainage Strategy** includes measures which would sufficiently minimise the release of pollutants into the water environment.
		Biology: All elements scoped out scoped out because the **Outline Drainage Strategy** includes measures which would prevent significant changes to hydromorphology and physico-chemistry.
	Waveney & East Suffolk Chalk and Crag	Quantity: All elements scoped out scoped out because the **Outline Drainage Strategy** includes measures which would prevent significant changes to the volume of water discharging to ground.
		Quality: All elements scoped out scoped out because the **Outline Drainage Strategy** includes measures which would sufficiently minimise the release of pollutants into the water environment.

3.6.53. **Table 3.18** demonstrates that the proposed construction activities have the potential to directly and indirectly impact upon more than one quality element supported by two of water bodies considered in the assessment. That is:

- C2 Construction of bridge and culverts: this activity could have direct effects on the hydromorphology and biology of the River Alde and ordinary watercourses within its catchment. The activity could also result in indirect effects on the downstream River Alde – Ore (d/s confluence) water body.

3.6.54. **Table 3.18** also demonstrates that the proposed operational activities have the potential to directly or indirectly impact upon more than one quality element supported by these water bodies. That is:

- O2 Permanent presence of bridge across the River Alde and culverts over other water courses: this activity could directly affect the hydromorphology and biology of the River Alde and watercourses. The activity could also result in indirect effects on the downstream River Alde – Ore (d/s confluence) water body.

3.6.55. The potential impacts of these activities on each water body are, therefore, considered in more detail in Stage 3.

iii. Impacts of project activities on RBMP improvement and mitigation measures

RBMP measures applicable to each water body

3.6.56. The Environment Agency has not identified any RBMP improvement measures for the Waveney and East Suffolk Chalk and Crag groundwater body. This water body is not, therefore, considered further in this part of the assessment. However, a range of improvement measures have been identified for the non-heavily modified River Fromus and River Alde water bodies in the RBMP (included in **Table 3.19**).

Table 3.19 Potential impacts of the two village bypass on proposed improvement measures for the River Fromus and River Alde

Improvement measures	Potential impact
River Fromus	
Generic action – field and crops (arable soils). To control or manage diffuse source inputs, reduce diffuse pollution at source.	The **Outline Drainage Strategy** includes measures to ensure diffuse pollution is controlled at source. No potential pathway for effect identified.
Generic action – field and crop – nutrients/other rural nutrient sources. To control or manage diffuse source inputs, reduce diffuse pollution at source.	
Generic action – field and crop livestock. To control or manage diffuse source inputs. Reduce diffuse pollution at source.	
Generic action - field and crop pesticides. To control or manage diffuse source inputs, reduce diffuse pollution at source.	
Generic action for surface run-off and drainage. To control or manage diffuse source inputs, reduce diffuse pollution pathways (i.e. control entry to the water environment)	
Generic barriers to migration. To improve modified habitat, removal or easement of barriers to fish migration, enable fish passage (i.e. fish pass)	No pathway for effect identified.
Generic increase in channel morphological diversity. To improve modified habitat, improvement to condition of channel/bed and/or banks/shoreline, increase in-channel morphological diversity.	
Generic point source P reduction. To control or manage point source inputs, mitigate/remediate point source impacts on receptor, install nutrient reduction.	The **Outline Drainage Strategy** sets out measures to ensure diffuse pollution is controlled at source. No potential pathway for effect identified.
Generic tree planting. To improve modified habitats, vegetation management, plant new vegetation.	The proposed development would not prevent tree planting or similar improvement measures. No pathway for effect identified.
WB – enable fish pass. To improve modified habitats, removal or easement of barriers to fish migration, enable fish passage (e.g. fish pass)	No pathway for effect identified.
WB – field and crop – arable soils. To control or manage diffuse source inputs, reduce diffuse pollution at source.	The **Outline Drainage Strategy** includes measures to ensure diffuse pollution is controlled at source. No potential pathway for effect identified.
WB – field and crop livestock. To control or manage diffuse source inputs, reduce	

Improvement measures	Potential impact
diffuse pollution at source.	
WB field and crop pesticides. To control or manage diffuse pollution, reduce diffuse pollution at source.	
WB – increase in channel morphological diversity. To improve modified habitat, improvement to condition of channel/bed and/or banks/shoreline.	No pathway for effect identified.
WB – other nutrient sources. To control or manage diffuse source inputs, reduce diffuse pollution at source.	The **Outline Drainage Strategy** include measures to ensure diffuse pollution is controlled at source. No potential pathway for effect identified.
WB – surface run-off and drainage. To control or manage diffuse source inputs, reduce diffuse pollution pathways (i.e. control entry to water environment)	
WB – tree planting. To improve modified habitat, vegetation management, plant new vegetation.	The proposed development would not prevent tree planting or similar improvement measures. No pathway for effect identified.
WB – Specific point source phosphorus improvement	The **Outline Drainage Strategy** includes measures to ensure diffuse pollution is controlled at source. No potential pathway for effect identified.
River Alde	
Generic action for surface runoff and drainage (to control or manage diffuse source inputs, reduce diffuse pollution pathways and surface run-off and drainage management.	The **Outline Drainage Strategy** includes measures to ensure diffuse pollution is controlled at source. No potential pathway for effect identified.
Generic barriers to migration (to improve modified habitat, removal or easement of barriers to fish migration, enable fish passage)	There is the potential that the River Alde crossing and culverts could impact on fish migration. As a result, this improvement measure is scoped in for further assessment.
Generic increase in channel morphological diversity (to improve modified habitat, improvement to condition/bed and/or banks/shoreline)	There is the potential that the River Alde crossing and culverts could impact on hydromorphology (and therefore habitats) during both construction and operation. Scoped in for further assessment.
Habitat improvement (to improve habitat, improvement to condition of channel/bed and/or banks/shoreline, increase in channel morphological diversity	
River restoration of Benhall (to improve modified habitat, improvement to condition of channel bed and /or banks/shoreline)	No pathway for effect identified.
Enable fish passage (to improve modified habitat, removal or easement of barriers	There is the potential the River Alde crossing and culverts could impact on fish migration. As a result, this improvement measure is scoped in for further

Improvement measures	Potential impact
to fish migration, enable fish passage)	assessment.
Specific increase in channel morphological diversity (to improve modified habitats, improvement to condition of channel bed and/or banks/shoreline, increase in-channel morphological diversity)	There is the potential that the River Alde crossing and culverts could impact on hydromorphology (and therefore habitats) during both construction and operation. Scoped in for further assessment.
Specific measure – surface run off and drainage (to control or manage diffuse source inputs, reduce diffuse pollution pathways, surface run-off and drainage management)	The **Outline Drainage Strategy** includes measures to ensure diffuse pollution is controlled at source. No potential pathway for effect identified.

Assessment of potential mechanisms for impact

3.6.57. An assessment of potential impacts from the associated development site on the RBMP improvement measures is also presented in **Table 3.19.** This demonstrates that none of the RBMP improvement measures for the River Fromus would be impacted by the construction and/or operation of the two village bypass. However, the following RBMP measures in the River Alde catchment have been identified as being at risk and are, therefore, scoped in for further assessment:

- Generic and specific actions: barriers to migration (to improve modified habitat, removal or easement of barriers to fish migration, enable fish passage).
- Generic and specific actions: increase in channel morphological diversity (to improve modified habitat, improvement to condition/bed and/or banks/shoreline).
- Habitat improvement (to improve habitat, improvement to condition of channel/bed and/or banks/shoreline, increase in channel morphological diversity).

iv. Impacts of project activities on Protected Areas

Protected Areas in each water body

3.6.58. Protected Areas within each of the WFD water bodies identified during the screening phase are listed in **Table 3.20** and shown in **Figure 3. 10** against a 2km boundary.

Table 3.20 Summary of scoping assessment for Protected Areas

Water body	Protected area name	Located within 2km?
River Alde	Nitrates Directive - NVZ 396, 411, 417, 415, 412	411 and 412 located within 2km
Fromus	Nitrates Directive - NVZ 411, 415,412	411 and 412 located within 2km
Waveney & East Suffolk Chalk and Crag	Nitrates Directive - NVZ 78, 79, 166, 168	78 within 2km
	WFD (formerly Surface Water Abstraction Directive) - Waveney and East Suffolk Chalk & Crag Drinking Water Protected Area	Not located within 2km of the proposed development.

Assessment of potential mechanisms for impact

3.6.59. The following areas protected under other Directives are located within 2km of the proposed activities:

- River Alde: NVZ 411 and 412.
- River Fromus: NVZ 411 and 412.
- Waveney and East Suffolk Chalk and Crag: NVZ 78.

3.6.60. Foul water generated on site during construction could release nitrates and other nutrients if discharged, untreated to the water environment. However, all foul waters would be contained and/or adequately treated to ensure that the project activities would not result in the release of significant quantities of nitrates and other nutrients.

3.6.61. All Protected Areas have, therefore, been scoped out of requiring further assessment.

v. Stage 2 Summary

3.6.62. The assessment demonstrates that the majority of the proposed project activities during the construction and operation of the two village bypass would not have any direct or indirect effects on the River Alde, River Fromus or Waveney & East Suffolk Chalk and Crag water bodies that are sufficient to cause deterioration in their status or the status of Protected Areas located within the water bodies.

3.6.63. However, the construction and operation of watercourse crossings has the potential to affect the hydromorphology and biology of the River Alde and counteract or otherwise affect the delivery of three RBMP improvement measures (removal or easement of barriers to fish migration, increase in-channel morphological diversity, and habitat improvements) identified for the water body. The potential impacts of these activities, therefore, has been considered in more detail in **section 5.4**.

d) Stage 3: Detailed Assessment

i. Purpose of this section

3.6.64. This section presents the results of the detailed compliance assessment undertaken on the water bodies identified in **section 3.6b) ii** of this report, using the method outlined in **Part 1**. This assessment determines whether the activities and/or components of the proposed two village bypass that have been put forward from the Stage 2 scoping assessment would cause deterioration and whether this deterioration would have a significant non-

temporary effect on the status of one or more WFD quality elements at water body level.

ii. Baseline environment

Current baseline

3.6.65. As described in the two village bypass **River Corridor Survey** (**Volume 5**, **Appendix 12A** of the **ES** (Doc Ref. 6.6)), the River Alde in this reach is a typical lowland meandering, low energy river (**Plate 3.1**). The gently sloping banks (approximately 30°) are stable, range between 0.5m and 2m in height, and are composed of fine sediments. There is little evidence of historical channel modification in the reach. The bed substrate is also dominated by fine sediments. Sediment deposition is, therefore, likely to be the dominant process during lower flows, with transport processes becoming more significant during higher energy flows. Parkgate Farm Drain and Whin Covert Drain are both straightened watercourses with uniform, resectioned banks, a silt substrate and very low energy flows (**Plate 3.1**).

3.6.66. WFD classification data (**Appendix 3A**) suggests that populations of fish and macrophytes are under pressure from diffuse source pollution and barriers to ecological continuity. However, invertebrate populations meet the requirements for high status.

3.6.67. A phase 1 habitat survey was undertaken to inform the ES and is presented in **Chapter 7** and **Appendix 7A** of **Volume 5** of the **ES** (Doc Ref. 6.6). The survey identified the River Alde and a series of ditch systems within the site. Ten ditches were recorded within the site boundary. The majority of these ditches were predominantly dry at the time of the survey.

3.6.68. One National Vegetation Classification (NVC) community was recorded within the River Alde; S14 *Sparganium erectum* swamp community. The vegetation present within the southern part of the site comprised the *Phalaris arundinacea* sub-community, while the northern part of the river supports the *Sparganium erectum* sub-community. The riparian zone was dominated by tall ruderal species. Two NVC communities were recorded within the ditches surveyed, S7 - *Carex acutiformis* community and M23 - *Juncus effusus/acutiflorus*. The bankside vegetation comprised predominately tall ruderal species.

Plate 3.1 Character photographs of the River Alde

River Alde upstream of the proposed bypass

River Alde downstream of the proposed bypass

Parkgate Farm Drain

Whin Covert Drain

3.6.69. The vegetation present within the S7 *Carex acutiformis* community comprised abundant lesser pond-sedge (*Carex acutiformis*). Other species associated with this community such as soft-rush (*Juncus effuses*) and water mint (*Mentha aquatica*) were also present, albeit at lower frequencies. Although lesser pond-sedge is a lowland species, this community is still considered uncommon in the south of Britain. This community is, however, degraded with other common species such as *Juncus* species (**Appendix 7A** of **Volume 5** of the **ES** (Doc Ref. 6.6)).

3.6.70. Targeted sampling of ditches and other water bodies and riparian habitat was undertaken to assess the importance of the water bodies within the study area for both aquatic and terrestrial invertebrates. The Site Quality

Index (SQI) score (calculated to enable a semi-quantitative evaluation of invertebrate conservation value on a site level) recorded for the combined aquatic and terrestrial invertebrate fauna was 3.5, indicating a site of moderate invertebrate value (**Appendix 7A** of **Volume 5** of the **ES** (Doc Ref. 6.6)). However, Community Conservation Index (CCI) scores (a means of assessing the conservation value of aquatic invertebrate assemblages) for the River Alde samples indicated high conservation value, whilst the aquatic fauna in the ditch network was classed as being of moderate conservation value (**Appendix 7A** of **Volume 5** of the **ES** (Doc Ref. 6.6)).

Potential future baseline

3.6.71. As the proposed two village bypass would be permanent, there is potential that the current baseline condition of the River Alde and its tributaries could change in the future.

3.6.72. Predicted climate changes under UKCP18 are likely to result in wetter winters, drier summers and a greater number of convectional rain storms. This means that the hydrology of the river water bodies could change, with higher winter flows, lower summer flows and a greater number of storm-related flood flows. This in turn could result in changes to the geomorphology of the river systems, with increased geomorphological activity (e.g. channel adjustment) occurring in response to larger storm events. However, the stable geomorphological characteristics that currently dominate the River Alde and its tributaries, and the extensively modified nature of these channels, mean that significant hydromorphological adjustments are unlikely to occur during the operation of the proposed development.

3.6.73. Any future initiatives to improve geomorphology and in-channel habitats undertaken by the Environment Agency and partner organisations to meet WFD status objectives could deliver localised improvements to hydromorphology, physico-chemistry and biology (e.g. through measures to reduce the supply of fine sediment and nutrients from diffuse catchment sources). However, the extensively modified and low energy nature of the surface drainage network means that significant improvements are likely to be spatially constrained to areas where direct interventions have been applied. This means that the primary pressures on biology in the River Alde water body are unlikely to change significantly during the operational lifetime of the proposed development. The assessments presented in the subsequent sections therefore assess potential impacts resulting from the operational phase against current baseline conditions.

iii. Activity C2: Construction of watercourse crossings

Introduction

3.6.74. Construction of the two village bypass would require the construction of an overbridge across the River Alde, and includes a portal culvert across Parkgate Farm Drain as well as 8 flood relief (portal) culverts, one of which crosses Whin Covert Drain. As outlined in **section 3.6c)**, this could affect the hydromorphology and biology and affect three improvement measures (removal or easement of barriers to fish migration, increase in-channel morphological diversity, and habitat improvements) identified for the River Alde. In addition, there is also potential for any changes to hydromorphology to affect the downstream water body (the Alde-Ore (d/s confluence)).

Potential impacts on water body status

3.6.75. The overbridge would be 60m long with approximately 6m clearance above the floodplain. The structure would incorporate two intermediate piers, separated by a span of 20m. The bridge deck would have a width of approximately 15m. The overbridge would be supported by abutments offset at least 8m away from the river banks.

3.6.76. The offset between the river banks and bridge abutments means that there would be no direct interaction between the bridge and the current river channel and associated riparian habitats. Furthermore, there would be considerable space for natural channel adjustments to occur in the future (noting that rates of channel change in this low-energy reach are expected to be low, see **Volume 5, Appendix 12A** (Doc Ref. 6.6)). This means that there is no mechanism for construction (or operation) of the overbridge to affect the hydromorphology and biology of the water body.

3.6.77. However, Parkgate Farm Drain and Whin Covert Drain would both be crossed using portal culverts with a width of 5.4m and a height of 3m. The culvert on Parkgate Farm Drain would have a length of 45m, while the culvert on Whin Covert Drain would be 70m long. Portal culverts are three sided structures that do not incorporate the base of a traditional culvert. The dimensions of the culverts mean that they would be offset from the banks of the minor watercourses and would not directly impact upon their hydromorphology; natural hydromorphological processes such as flow conveyance and sediment transport would be undisturbed. Furthermore, the design of the culverts means that they would not present a barrier to the free movement of fish and other aquatic organisms in the two small watercourses.

3.6.78. Temporary works during culvert installation (e.g. temporary dams to allow culverts to be installed in dry conditions) could result in reduced flow and sediment conveyance, create upstream impoundment, affect patterns of erosion and sedimentation, impede river continuity, increase turbidity and potentially encourage fine sedimentation on a short section of the bed upstream. Changes to flow conditions could also result in a reduction in the dissolved oxygen concentrations supported in the watercourses upstream of the impoundment. These activities could, therefore, reduce the physical habitat value of the watercourse for aquatic plants, invertebrates and fish species locally. However, these impacts would be temporary (i.e. confined to the duration of construction) and would reverse once the temporary impounding structures are removed (i.e. as a result of natural bed scour and sediment transport processes, which would remobilise any accumulations of unconsolidated fine sediments once the normal flow regime has been reinstated).

3.6.79. The temporary dams required during culvert installation could also act as a barrier to the movement of fish and other aquatic organisms (including migrating eels and spawning fish). However, impacts are only anticipated when barriers are in place in the channel (i.e. during trenching and the installation of temporary crossing structures), and river continuity would be restored once temporary barriers were removed. Furthermore, the changes to morphological conditions resulting from construction activities are not considered sufficient to result in any significant changes to supporting conditions (i.e. physical habitats) for the biological quality elements supported in the river.

3.6.80. The construction compound would be located to the east of the site, approximately 1.1km away from sensitive surface water habitats such as the River Alde and its floodplain.

3.6.81. Overall, the low energy nature of the drainage system means that any impacts are expected to be confined to the working area and, as such, are not considered likely to propagate upstream or downstream or affect the wider water body. Therefore, the effects are not predicted to be sufficient to result in deterioration in the status of any hydromorphological quality elements or the biological quality elements that they support. Note that potential effects of the permanent presence of the new culverts are considered separately under Activity O2 below.

Potential impacts on RBMP improvement measures

3.6.82. The proposed construction of an overbridge across the River Alde and culverts on two smaller watercourses which drain into it could affect the delivery of three improvement measures identified for the water body in the RBMP, as set out below.

- Removal or easement of barriers to fish migration: temporary activities during installation of the overbridge on the River Alde and the culverts on the minor watercourses could affect the movement of fish populations in the water body. However, the works would be temporary, and any effects would be reversible once the works were removed. These activities are not, therefore, predicted to prevent the implementation or otherwise counteract the effects of this improvement measure.
- Increase in-channel morphological diversity: although it may not be possible to deliver the measure within the footprint of the proposed construction activities, this footprint is limited to small areas of the Parkgate Farm Drain and Whin Covert Drain; which are both largely artificial channels with very limited morphological diversity (**Volume 5, Appendix 12A** of the **ES** (Doc Ref. 6.6)). Furthermore, the proposed activities would not prevent the implementation of this measure elsewhere in the water body.
- Habitat improvements: although temporary construction activities have the potential to limit the delivery of habitat improvements within the construction footprint, they would be temporary and, once removed, would no longer constrain habitat improvements. These activities are not, therefore, predicted to prevent the implementation or otherwise counteract the effects of this improvement measure.

Summary of impacts on water body status

3.6.83. The previous sections demonstrate that, although the proposed construction activities could result in temporary and/or highly localised effects on hydromorphology and biology, any changes are not considered to be sufficient to result in deterioration in the status of any quality elements in the River Alde (within or between status classes). Furthermore, any effects on improvement measures identified for the water body would not prevent the implementation or counteract the effects of these measures. This means that these construction stage activities would not result in deterioration in the status of this river water body or prevent WFD objectives being achieved in this water body in the future.

3.6.84. Because any impacts on the hydromorphology and biology of the River Alde are not considered to be sufficient to result in deterioration in water body status, it can also be concluded that the proposed activities will not impact upon the status of the connected water body downstream (Alde-Ore downstream of confluence).

iv. Activity O2: Presence of permanent bridge and culverts

Introduction

3.6.85. The operational two village bypass would require the permanent presence of a single span overbridge across the River Alde, an embankment across the floodplain, and culverts across on two smaller watercourses (Parkgate Farm Drain and Whin Covert Drain). As outlined in **section 3.6**, this could affect the hydromorphology and biology of and three improvement measures for the River Alde (removal or easement of barriers to fish migration, increase in-channel morphological diversity, and habitat improvements). In addition, there is also potential for any changes to hydromorphology to affect the downstream water body (the Alde-Ore (d/s confluence)).

Potential impacts on water body status

3.6.86. The main channel of the River Alde would be crossed by an overbridge, with a length of 60m and a clearance of approximately 6m above the floodplain. The overbridge would be supported by two intermediate piers, separated by a span on 20m. The intermediate piers would be offset from the banks of the River Alde by approximately 8m. The bridge deck would have a width of approximately 15m. On either side of the River Alde, the embankment would form a causeway that would include flood arch culverts on the floodplain with a width of 5.4m and a height of 3m. In addition, Parkgate Farm Drain and Whin Covert Drain would both be crossed using portal culverts with a width of 5.4m and a height of 3m. The culvert on Parkgate Farm Drain would have a length of 45m, while the culvert on Whin Covert Drain would be 70m long.

3.6.87. The proposed overbridge would have no direct interaction with the River Alde itself while flows are confined to within the banks. However, the permanent presence of an embankment across the floodplain of the River Alde would act as a barrier to the free movement of water across the floodplain during periods of higher (out of bank) flow. Existing natural flow paths would be disrupted, with water movement restricted to within the bridge aperture and the flood relief culverts on the floodplain. The concentration of flood water within these apertures could result in increased scour in the channel of the main River Alde and adjacent to the floodplain culverts. However, the large size of the span means that, although upstream water levels could change by up to 100mm), there would not be a significant change in flow velocities. Hence there would be minimal risk of increased scour or any other geomorphological adjustments occurring in the River Alde (see the modelling report, included in the **Two Village Bypass Flood Risk Assessment** (Doc Ref. 5.5)).

3.6.88. Furthermore, the design of the River Alde crossing would preserve the natural integrity of the banks of the river bed, banks and riparian zone, and minimise shading effects (**Appendix 7A** of **Volume 5** of the **ES** (Doc Ref 6.6)) the risk of significant change to biological quality elements in the main River Alde is therefore considered to be minimal.

3.6.89. The operational presence of culverts on Parkgate Farm Drain and Whin Covert Drain could result in reduced flow and sediment conveyance (thereby limiting river continuity), create upstream impoundment, and affect patterns of erosion and sedimentation (e.g. by encouraging upstream sedimentation and downstream erosion). These activities could, therefore, reduce the physical habitat value of the watercourse for aquatic plants, invertebrates and fish species locally. Furthermore, the presence of in-channel structures could act as a barrier to the free movement of fish and other aquatic organisms (including migrating eels and spawning fish).

3.6.90. The portal culverts on Parkgate Farm Drain and Whin Covert Drain would be three sided structures that do not incorporate the base of a traditional culvert. The dimensions of the culverts mean that they would be offset from the banks of the minor watercourses and would not directly impact upon their hydromorphology; natural hydromorphological processes such as flow conveyance and sediment transport would be undisturbed. Furthermore, the design of the culverts means that they would not present a barrier to the free movement of fish and other aquatic organisms in the two small watercourses.

3.6.91. Furthermore, SuDS infrastructure (proposed as swales and infiltration basins) would be installed along the length of the highway. SuDS would minimise surface water run-off and prevent diffuse pollution from sediment and other pollutants arising. Bypass separators and silt traps would be incorporated within the drainage design where considered necessary. The swales would attenuate and convey surface water run-off at a rate not exceeding existing green field run-off rates.

3.6.92. This means that the operational culverts would not result in any significant changes to the hydromorphology, physico-chemistry or biology in the River Alde water body.

Potential impacts on RBMP improvement measures

3.6.93. The proposed overbridge across the River Alde and culverts on two minor connected watercourses could potentially affect the delivery of three improvement measures identified for the water body in the RBMP, as set out below.

- Removal or easement of barriers to fish migration: the overbridge across the main channel of the River Alde would not directly interact with the river and, therefore, would not affect fish passage in the water body. Furthermore, the culverts on Parkgate Farm Drain and Whin Covert Drain would be designed to ensure that they do not prevent significant barriers to fish passage. These activities are not, therefore, predicted to prevent the implementation or otherwise counteract the effects of this improvement measure.
- Increase in-channel morphological diversity: the presence of culverts would result in the physical modification of short reaches of the Parkgate Farm Drain and Whin Covert Drain. However, these are both largely artificial channels with very limited morphological diversity (**Volume 5, Appendix 12A** of the **ES** (Doc Ref. 6.6)), and their modification would not affect the main river. The proposed activities, therefore, would not prevent the implementation of this measure elsewhere in the water body.
- Habitat improvements: as set out above, the presence of the overbridge would not directly interact with the River Alde and would not therefore constrain the implementation of measures to improve in-channel habitats. Furthermore, the presence of culverts on Parkgate Farm Drain and Whin Covert Drain would not prevent the delivery of habitat improvements in these watercourses outside of the culvert footprints or elsewhere in the water body.

Summary of impacts on water body status

3.6.94. The previous sections demonstrate that, although the proposed operational activities would result in localised effects on hydromorphology and biology, these changes are not to be predicted sufficient to result in deterioration in the status of any quality elements in the River Alde (within or between status classes). Furthermore, any effects on improvement measures identified for the water body would not prevent the implementation or counteract the effects of the improvement measures identified in the RBMP. This means that these activities would not result in deterioration in the status of this river water body or prevent WFD objectives being achieved in this water body in the future.

3.6.95. Because any impacts on the hydromorphology and biology of the River Alde are not considered to be sufficient to result in deterioration in water body status, it can also be concluded that the proposed activities will not impact upon the status of the connected water body downstream (Alde-Ore downstream of confluence).

v. Stage 3 summary

3.6.96. The assessment presented in the previous sections demonstrates that the construction of watercourse crossings and the permanent presence of the bridge and culverts would not result in deterioration in the hydromorphology and biology of the River Alde or connected water bodies. Furthermore, the proposed activities would not and counteract or prevent the implementation of improvement measures identified for the water body.

3.6.97. The two village bypass is therefore considered to be compliant with the requirements of the WFD.

3.7 Sizewell Link Road

a) Introduction and scheme description

i. Description

3.7.1. The Sizewell link road would comprise a new, permanent, 6.8km single carriageway road which begins at the A12 south of Yoxford, bypasses Middleton Moor and Theberton before joining the B1122 (see **Figure 3.11**).

3.7.2. The site covers approximately 101ha of land, comprising agricultural and highway land. The proposed road would be 7.3m wide with additional 1m hardstrips and 2.5m wide verges. Along the route of the Sizewell link road, there would be swales approximately 3.5m wide for highway drainage.

3.7.3. The road starts at the A12 south of Yoxford, bypasses Middleton Moor and Theberton before joining the B1122 to the west of the main development site. The Sizewell link road has been divided into six main areas, as set out in **Table 3.21**. All dimensions are approximate. There is some flexibility during detailed design to alter the alignment of the route of the proposed Sizewell link road and proposed structures within defined limited set out on the **Work Plans** (Doc Ref. 2.3) (and reproduced in **Appendix 2A** of **Volume 6**) and described in **section 2.3** of **Chapter 2** of **Volume 6** (Doc Ref. 6.7).

Table 3.21 Description of Sizewell link road

Area	Description	Key features
Area 1– from the A12 to land to the west of the East Suffolk line.	The route of the proposed Sizewell link road would connect to the A12, via a new roundabout located approximately 180m north of The Red House Farm, south of Yoxford. The proposed road would continue in a north-easterly direction at existing ground level towards the East Suffolk line. This section of the proposed road would be approximately 1.5 km in length.	• A new three arm roundabout on the A12, located approximately 180m north of The Red House Farm. The A12 would be realigned for approximately 200m on both sides to join the north and south arms, with the eastern arm providing the junction for the proposed route of the Sizewell link road.
Area 2 – from land west of the East Suffolk line to Littlemoor Road.	The route of the proposed road would continue in an easterly direction for approximately 1.2 km, crossing over the existing East Suffolk Line, intersecting Littlemore Road, and then continuing towards Middleton Moor and Fordley Road.	• A single span bridge, approximately 50m in length, to cross over the East Suffolk line. At the point of the crossing, the East Suffolk line is in an approximately 6m deep cutting. The proposed road would rise up and cross the railway bridge on a 2.5m embankment to provide sufficient headroom as required by Network Rail. • Diversion of Footpaths E-584/016/0 and E396/014/0.
Area 3 – from Littlemore Road to east of Fordley Road (including link to B1122 west of Middleton Moor).	The route of the proposed road would continue in an easterly direction towards Littlemoor Road and Fordley Road. A road link is proposed from the proposed Sizewell link road to the B1122, west of Middleton Moor. The proposed Sizewell link road would be at grade level until it meets the Middleton Moor link, after which it would be on an approximate 3.5m high embankment for approximately 200m.	• A ghost island junction and a new link road (referred to as the 'Middleton Moor link'), from the proposed route of the Sizewell link road, to the B1122, to the west of Middleton Moor. Littlemore Road would be stopped up where it is intersected by the route of the Sizewell link road. • A new three arm-roundabout and realignment of the B1122 over a length of approximately 300m to meet the new Middleton Moor link road. The junction layout between this Middleton Moor link road and the existing B1122 would be designed to accommodate Abnormal Indivisible Load vehicles (AILs). • Realignment of Fordley Road on the south side of the proposed route of the Sizewell link road so northbound traffic could join the new road. However, Fordley Road

Area	Description	Key features
	From Fordley Road, the route of the Sizewell link road, turns south easterly to run broadly parallel to the B1122 to the south of Hawthorn Road, for approximately 1.3km. Due to the gentle undulating topography, the proposed road would alternate between being in cutting, up to 3.5m deep, and on an embankment, up to a 4m high.	would be stopped up on the north side of the proposed route of the Sizewell link road. • Diversion of Footpath E-396/017/0. • At Fordley Road, the Middleton Watercourse would be diverted approximately 15m to the west and would pass beneath the Sizewell link road via a portal culvert, 5.4m wide and 1.2m above bank level. A flood relief culvert 2.4m wide and 1.0m high will be provided alongside the culvert to ensure no increase in flood risk in the area upstream of the crossing.
Area 4 – from east of Fordley Road to land to the west of Theberton.	The route continues in an easterly direction. South of Coronation Cottages, the route of the proposed Sizewell link road would run along a 2.5m embankment and head in a south-east direction crossing Plumtreehills Covert in a 1m cutting. The route would continue along a low embankment with a new priority junction at Pretty Road where the road would descend into a cutting. towards Moat Road.	• Provision of a staggered crossroads ghost island junction to give access to Trust Farm located to the south and to the existing B1122 to the north. The junctions are approximately 50m apart. • Provision of access road from the south side of the route of the proposed Sizewell link road to Hawthorn Cottages. • Realignment of Hawthorn Road for approximately 150m to meet the proposed route of the Sizewell link road. However, Hawthorn Road would be stopped up on the north side of the proposed route of the Sizewell link road. • Crossing of an unnamed watercourse approximately 500m west of Trust Farm a portal culvert, 5.4m wide and 1.2m above bank level, would be provided where the route of the proposed Sizewell link road crosses the watercourse. • Two crossings of an unnamed watercourse where the route of the Sizewell link road crosses Hawthorn Road a portal culvert will also be provided, and where the new junction to existing Hawthorn Road crosses the watercourse, it will be crossed via a 5.4m wide by 1.2m high (above bank level) portal culvert. A flood relief culvert 2.4m wide and 1.0m high will be provided alongside both culverts to ensure no increase in

Area	Description	Key features
		flood risk in the area upstream of the crossing. •
Area 5 – from land to the west of Theberton to the south of Theberton.	The route would continue at ground level with a new junction to provide access to Theberton and would re-join the B1122 on a low embankment adjacent to Brown's Plantation.	• A new ghost island junction would be formed with an extension of the B1125 and reconfiguration of the existing B1122 to form suitable new junctions. This includes a provision of a new link road between the route of the proposed Sizewell link road. • A portal culvert, 5.4m wide and 1.2m above bank level, would be provided where the route of the proposed Sizewell link road crosses an unnamed watercourse approximately 200m north west of the existing Pretty Road. Approximately 15m south of the culvert, a flood relief basin would be provided. • A new overbridge, single span, up to 44m long which would carry non-motorised users only (pedestrians, cyclists, equestrians) over Pretty Road. • Diversion of Footpaths E-396/015/0, E-515/005/0, E-515/003/0, E-515/004/0, E-515/007/0 and E-515/013/0. • A portal culvert, 5.4m wide and 1.2m above bank level, would be provided where the route of the proposed Sizewell link road crosses Theberton Watercourse, approximately 450m east of the existing Pretty Road.
Area 6 – from south of Theberton to re-joining the B1122 adjacent to Brown's Plantation	The route of the proposed Sizewell link road would continue on from Pretty Road for approximately 1.5km, curving east and intersecting Moat Road before joining the B1122 south of Browns Plantation. The route would alternate from being on an embankment, up to 2.5m high and passing within a cutting up to 2.5m deep.	• A new junction to Moat Road would be provided to maintain access to the existing properties including Theberton Grange and Moat House. The access road to Theberton Grange would be realigned for approximately 300m. • A new junction to provide access to Theberton to the north, where approximately 500m of the B1122 would be realigned, with the route of the Sizewell link road joining the southern section of the B1122. • Diversion of Footpath E-515/013/0.

Area	Description	Key features
		• An extension of the existing 600mm culvert crossing of the B1122 would be provided beneath the Sizewell link road; • A flood relief culvert provided to maintain an existing surface water overland flow path, approximately 2.4m wide by 1m high, crossed by the route of the Sizewell link road on the south-east side of Brown's Plantation.

ii. Construction

3.7.4. It is expected that the proposed development would take approximately 24 months to construction, during the early years of construction of the Sizewell C Project. The construction sequence would broadly follow the steps as below:

- Preparatory works: site set up and clearance including trees and hedgerows, including erection of temporary fencing on land required for construction and creation of alternative access arrangements and rights of way, setting up of temporary construction of site security, welfare facilities, temporary contractor compounds and temporary utilities.
- Construction works: earthworks, road construction and surfacing, breaking of hardstanding, construction of bridges and civil structures, utility and drainage installation, construction of pavements, kerbs, footways and paved areas, installation of permanent fencing, road signs and marking, and road lighting, permanent connections to existing road networks, and landscaping.

3.7.5. The overbridge which crosses the East Suffolk line would be constructed through pre-fabricated steel bridge deck elements, which would be transported to site for assembly.

3.7.6. Piling would be required for the construction of the proposed East Suffolk line railway bridge and the proposed Pretty Road overbridge.

3.7.7. Working areas within the site would be secured with fencing. Early in the construction phase, swales and infiltration basins would be used as appropriate to ensure that surface water run-off would be contained within the site.

3.7.8. Three temporary contractor compounds will be required in various locations along the route as follows:

- Area 1 adjacent to the A12 at the western end of the site. The compound would be approximately 270m by 170m and would comprise site welfare facilities, office space, plant and materials store.
- Area 2 located on both sites to the East Suffolk Line where it would be crossed by the new link road. The compound would be approximately 240m by 140m on west side of the East Suffolk line and 160m by 70m on east side, and would comprise site welfare facilities, office space, plant and materials store.
- Area 2 to the west side of the proposed Middleton Moor road link north to the B1122. The compound would be approximately 420m by 120m

and would comprise site welfare facilities, office space, plant and materials store.

3.7.9. Temporary site utilities comprising power, water, drainage and telecommunications would be provided as required. Surface water runoff will be treated and disposed by infiltration. Foul water will be either treated and disposed by infiltration to ground or removed by tanker for treatment at designated licensed facility.

3.7.10. Earthworks would be designed to maximise cut and fill balance in order to prevent material being sent off-site. Furthermore, contractors would be required to investigate opportunities to minimise and reduce waste generation.

3.7.11. A **CoCP** (Doc Ref. 8.11) sets out the measures and controls that SZC Co. will require its contractors to adopt during construction and removal and reinstatement phases of the proposed development, where appropriate, and provides an outline of the environmental management plans that will be implemented on site.

3.7.12. Following completion of construction, the land required for the temporary construction compounds would be reinstated to its former condition as far as practicable.

iii. Operation

3.7.13. SuDS would be implemented to attenuate surface water run-off and minimise sediment generation and provide water treatment. It is envisaged that surface water run-off would be contained within the site, with drainage to ground via infiltration using infiltration basins and swales, wherever feasible. **Figures 2.1** to **2.7**, for Areas 1-6 illustrate the indicative drainage plan for the site in **Chapter 2** of **Volume 6** of the **ES** (Doc Ref. 6.7).

3.7.14. It is envisaged that 11 infiltration basins would be located along the length of the site, as described in the site masterplan above. Surface water from the roundabouts will be collected via gullies and discharge via an outfall drain to the adjacent basins. The exact location, footprint and depth to the confirmed at the detailed design stage. The infiltration basins would be designed to cater for a 100 years flood event plus a 40% allowance for climate change.

3.7.15. Swales would be provided along the length of the route of the Sizewell link road, up to 3.5m wide. The swales would attenuate and infiltrate to ground the surface water runoff.

3.7.16. Additionally, six flood relief basins are proposed near the proposed culverts; these flood relief basins would be designed to cater for a 100 years flood event plus a 40% allowance for climate change.

3.7.17. Additional water draining from the road infrastructure for treatment of surface water runoff such as bypass separators for removal of silt and hydrocarbons would be provided in addition to the infiltration basins and swales would pass through appropriate drainage, including the incorporation of SuDS and petrol/oil interceptors, as where necessary.

3.7.18. The **Outline Drainage Strategy** is described in more detail in **Volume 2**, **Appendix 2A** of the **ES** (Doc Ref. 6.3).

3.7.19. Routine maintenance of the proposed development would be undertaken as required to maintain the appropriate standards. Vegetation along the highway boundary will be maintained by the highway authority during operation of the site. The condition of road signs and road markings would be checked, and where necessary, cleaned or replaced or road markings refreshed. Periodically, maintenance activities such as resurfacing may also be required.

iv. Baseline for assessment

3.7.20. The current baseline conditions of any identified water bodies are considered appropriate for the duration of the construction phase at this site, because the link road would need to be constructed and operational prior to the peak of construction at the main development site. Although the current baseline is also likely to be applicable to the operational phase, the permanent nature of the development means that this baseline could change in the future (e.g. water body status could change in response to natural variations or as a result of improvement or mitigation measures delivered by the Environment Agency and partner organisations). The potential future baseline will therefore be considered in Stage 3 if any scheme elements are scoped in to further assessment.

b) Stage 1: Screening

i. Identification of activities

3.7.21. The works proposed for Sizewell link road have been separated into activities in line with the requirements of guidance produced by the Environment Agency (Ref. 3.3) and Planning Inspectorate (Ref. 3.4). These activities are listed in **Table 3.22**.

Table 3.22 Summary of Sizewell link road activities

Reference Number	Activity	Sub activities included
Construction		
C1	Site preparation, earthworks and construction	Vegetation clearance, removal of topsoil, surface materials, installation of drainage infrastructure including SuDS, laying of base materials and surfacing, management of construction-stage surface water and foul drainage from compounds
C2	Construction of watercourse crossings	Crossing of two unnamed watercourses (one in Area 4 and one is Area 5) which would be culverted below the proposed road
Operation		
O1	Management of drainage	Operational use of the site and associated water management measures (including surface water)
O2	Presence of watercourse crossings	Crossing of two unnamed watercourses (one in Area 4 and one is Area 5) which would be culverted below the proposed road

ii. Water body identification

3.7.22. **Figure 3.12** shows the WFD water bodies that could be hydrologically connected to the proposed Sizewell link road site. A screening exercise has been undertaken to identify which of the water bodies have the potential to be impacted by the proposed activities.

3.7.23. In addition to WFD water body mapping, potential hydrological connectivity has been determined with reference to main rivers, ordinary watercourses and surface water flow routes that may not be shown on published mapping (identified using Environment Agency flood mapping). This process therefore considers the water bodies in whose catchments the proposed activities are located, and where relevant, connected water bodies upstream and downstream.

3.7.24. The Minsmere Old River is located approximately 2km north-east of the proposed development at its closest point. The existing B1122 road separates the proposed development from this watercourse; however, several tributaries of the Minsmere Old River would be intersected by the proposed link road:

- The Middleton Watercourse, a designated Main River flows parallel to Fordley Road where it passes through the site, underneath the B1122 and then through Middleton to where it joins the Minsmere River.
- The Theberton Watercourse, a designated Main River flows in a north-easterly direction through the eastern section of the site towards its confluence with Minsmere Old River.
- An unnamed watercourse located to the north of the proposed development that currently flows underneath the B1122 between the villages of Yoxford and Middleton Moor. The watercourse flows in the northerly direction to its confluence with the River Yox.
- An unnamed watercourse that passes through the site to the east of Fordley Road and flows north to its confluence with the Middleton Watercourse, immediately downstream of the B1122.
- An unnamed watercourse that flows through the site on two occasions between Hawthorn Road and Pretty Road. This watercourse flows in a north-easterly direction through an arm of the Walberswick Heaths and Marshes SSSI to its confluence with the Minsmere Old River.

3.7.25. There is also a surface drain located to the south of the western end of the site. This drain flows south, parallel to the A12 to its confluence with the River Fromus.

3.7.26. The proposed link road is located on the Waveney and East Suffolk Chalk and Crag groundwater body. The Crag Group bedrock underlying the route corridor is classified as a Principal Aquifer. The Lowestoft Formation supports two Secondary aquifers; a Secondary (undifferentiated) aquifer in head and diamicton, and a Secondary A Aquifer in a layer of sands and gravels. The Lowestoft Formation along the route corridor is expected to be of relatively low permeability and have a limited hydraulic connection to the underlying Crag groundwater. It is likely there are perched water tables in permeable lenses within the Lowestoft Formation. Given the local geology and depth to the groundwater, a connection between groundwater and surrounding surface water features is not predicted.

3.7.27. A review of the Multi-Agency Geographic Information for the Countryside website has confirmed that the lower reaches of the Minsmere Old River system have been designated for its nature conservation value (see **Chapter 12** of **Volume 6** of the **ES** (Doc Ref. 6.7). Furthermore, the eastern parts of the surface water drainage network comprise the nationally and internationally designated Minsmere to Walberswick Heaths and Marshes SSSI, Special Area of Conservation (SAC), Special Protected Area (SPA) and Ramsar site. These sites are directly downstream of the site. The proposed development has the potential to be a source of

pollution with a direct pathway to this sensitive receptor (see **Chapter 12** of **Volume 6** of the **ES** (Doc Ref. 6.7).

3.7.28. The results of the screening exercise are provided in **Table 3.23**.

Table 3.23 Results of screening assessment for the Sizewell link road

Water body name and ID number	Type	Description	Screened in?	Justification
Minsmere Old River GB105035046270	River	Heavily modified for land drainage. Currently at Moderate Ecological Potential due to pressures on fish populations.	Yes	Screened in because the majority of the proposed activities are located within the catchment of this water body and could therefore affect its biology, hydromorphology and physico-chemistry.
River Fromus GB105035045980	River	Currently at poor ecological status due to pressures on fish, invertebrates, dissolved oxygen and phosphate. This water body is not designated heavily modified or artificial	No	Screened out because the area of proposed development is very small in comparison to the water body catchment (0.016km^2, 0.04%), is located on the watershed and is not connected to any identified flow paths that connect to the drainage network.
Alde - Ore (d/s confluence) GB105035045950	River	Currently at Poor Ecological Status due to high phosphate concentrations, low dissolved oxygen concentrations and pressures on fish and the natural hydrological regime. Not designated heavily modified or artificial.	No	Located downstream of the River Fromus. Screened out because the proposed activities are located approximately 10km upstream of this water body and no mechanism for potential impacts to propagate downstream of the water body in which they take place has been identified.
Alde & Ore GB520503503800	Transitional	Heavily modified for flood protection. Currently at Moderate Ecological Potential due to elevated concentrations of dissolved inorganic nitrogen and pressures on the hydrological regime.	No	Located downstream of the Alde-Ore (d/s confluence). Screened out because the proposed activities are located approximately 12km upstream of this water body and no mechanism for potential impacts to propagate downstream of the water body in which they take place has been identified.
Suffolk GB650503520002	Coastal	Heavily modified for flood protection use and coast protection use. Moderate Ecological Potential due to pressures on dissolved inorganic nitrogen.	No	Located downstream of the Minsmere Old River and Alde & Ore transitional water body. Screened out because the proposed activities are located >30km upstream of this water body and no mechanism for potential impacts to propagate downstream of the water body in which they take place has been identified.

Water body name and ID number	Type	Description	Screened in?	Justification
Waveney & East Suffolk Chalk and Crag GB40501G400600	Groundwater	Currently at Poor Quantitative Status as a result of an unfavourable water balance and Poor Chemical Status due to diffuse pollution pressures and potential impacts on a Drinking Water Protected Area.	Yes	Screened in because the proposed activities are underlain by this water body and could therefore affect the quality and quantity of groundwater.

3.7.29. This demonstrates that the following water bodies could be impacted by the proposed development:

- Minsmere Old River (GB105035046270).
- Waveney & East Suffolk Chalk and Crag (GB40501G400600).

3.7.30. **Appendix 3A** provides summary data for these water bodies and all water bodies relevant to Part 3. The data was provided by the Environment Agency in December 2018, with an update in July 2019.

c) Stage 2: Scoping

i. Purpose of this section

3.7.31. This section presents the results of the scoping assessment undertaken on the water bodies identified in **section 3.7b) ii**, using the methodology outlined in **Part 1**.

ii. Impacts of project activities on water body quality elements

Assessment of potential mechanisms for impact

3.7.32. The scoping questions presented in Part 1 have been applied to each water body individually for each of the construction and operational activities listed in **Table 3.22**. The results of the scoping assessment are provided in **Appendix 3E** and summarised in **Table 3.24**.

Table 3.24 Activities with the potential to affect water body quality elements and status at the Sizewell link road

Activity	Water body	Quality element scoping
Construction		
C1 Site preparation, earthworks and construction	Minsmere Old River	Hydromorphology: All elements (see **Appendix 3E**) scoped out because the **CoCP** (Doc Ref. 8.11) and **Outline Drainage Strategy** (**Appendix 2A** of **Volume 2** of the **ES**) include measures be designed to prevent significant changes to the hydrology and morphological conditions.
		Physico-chemistry: All elements scoped out because the **CoCP** and **Outline Drainage Strategy** include measures to sufficiently minimise the release of pollutants into the water environment.
		Biology: All elements scoped out because the **CoCP** and **Outline Drainage Strategy** include measures to reduce significant changes to hydromorphology and physico-chemistry.
	Waveney and East Suffolk Chalk and Crag	Quantity: All elements scoped out because the overall volume of water discharging to ground is unlikely to significantly change.
		Quality: All elements scoped out because the **CoCP** and **Outline Drainage Strategy** include measures to sufficiently minimise the release of pollutants into the water environment.
C2 Construction of watercourse crossings	Minsmere Old River	Hydromorphology: There is the potential for the realignment and culverting of minor watercourses in the water body catchment to alter the hydrological regime, change morphological conditions and disrupt river continuity. This is therefore scoped in for further assessment.
		Physico-chemistry: All elements scoped out because the **CoCP** and **Outline Drainage Strategy** include measures to prevent the release of pollutants into the water environment.
		Biology: The potential effects on hydromorphological quality elements could impact on biological quality elements, for example, by impeding fish passage and changing the quality of in-channel habitats. This is therefore scoped in for further assessment.
	Waveney and East	Quantity: All elements scoped out because the overall volume of water discharging to ground is unlikely to significantly

Activity	Water body	Quality element scoping
	Suffolk Chalk and Crag	change.
		Quality: All elements scoped out because the **CoCP** and **Outline Drainage Strategy** include measures to sufficiently minimise the release of pollutants into the water environment.
Operation		
O1 Management of drainage	Minsmere Old River	Hydromorphology: All elements scoped out because the **Outline Drainage Strategy** includes measures to prevent significant changes to the hydrology and morphological conditions.
		Physico-chemistry: All elements scoped out because the **Outline Drainage Strategy** includes measures to sufficiently minimise the release of pollutants into the water environment.
		Biology: All elements scoped out because the **Outline Drainage Strategy** includes measures to prevent significant changes to hydromorphology and physico-chemistry.
	Waveney and East Suffolk Chalk and Crag	Quantity: All elements scoped out because the **Outline Drainage Strategy** includes measures to prevent significant changes to the volume of water discharging to ground.
		Quality:All elements scoped out because the **Outline Drainage Strategy** includes measures to sufficiently minimise the release of pollutants into the water environment.
O2 Presence of culvert structures	Minsmere Old River	Hydromorphology: There is the potential for the realignment and culverting of tributaries of the main water body catchment to alter the hydrological regime, change morphological conditions and disrupt river continuity. This is therefore scoped in for further assessment.
		Physico-chemistry: All elements scoped out because the **Outline Drainage Strategy** includes measures to prevent the release of pollutants into the water environment.
		Biology: The potential effects on hydromorphological quality elements could impact on biological quality elements, for example, by impeding fish passage and changing the quality of in-channel habitats. This is therefore scoped in for further

Activity	Water body	Quality element scoping
		assessment.
	Waveney and East Suffolk Chalk and Crag	Quantity: All elements scoped out because the overall volume of water discharging to ground is unlikely to significantly change.
		Quality: All elements scoped out because the **Outline Drainage Strategy** includes measures to sufficiently minimise the release of pollutants into the water environment.
		Physico-chemistry: All elements scoped out because the **Outline Drainage Strategy** includes measures would be designed to prevent the release of pollutants into the water environment.
		Biology: The potential effects on hydromorphological quality elements could have an impact on biological quality elements. This is therefore scoped in for further assessment.

3.7.33. **Table 3.24** demonstrates that the proposed construction activities have the potential to have a direct impact upon more than one quality element supported by the water bodies that were screened in to the assessment in **section 3.7b) ii**, as follows:

- C2 Construction of watercourse crossings: this activity could have direct effects on the hydromorphology and biology of tributaries to the Minsmere Old River.

3.7.34. **Table 3.24** also demonstrates that the proposed operational activities have the potential to have a direct impact upon more than one quality element supported by these water bodies:

- O2 Presence of watercourse crossings: this activity could directly affect the hydromorphology and biology of the tributaries to the Minsmere Old River.

3.7.35. The potential impacts of these activities on each water body are, therefore, considered in more detail in Stage 3.

iii. Impacts of project activities on RBMP improvement and mitigation measures

RBMP measures applicable to each water body

3.7.36. The Environment Agency has not identified any RBMP improvement measures for the Waveney and East Suffolk Chalk and Crag groundwater body. This water body is not, therefore, considered further in this part of the assessment. However, a range of RBMP mitigation measures that have either already been implemented or are proposed for future implementation have been identified for the Minsmere Old River (**Table 3.25**).

Table 3.25 Potential impacts from the Sizewell link road on RBMP mitigation measures in the Minsmere Old River water body

Mitigation measure	Status	Potential impact
Vegetation control	In place	There are no mechanisms for project activities during construction or operation to affect the delivery of the vegetation control measures that are in place in the water body.
Selective vegetation control	In place	
Vegetation control timing	In place	
Invasive species techniques	In place	Potential risks from INNS are considered in **section 3.3c)**.
Sediment management strategy	In place	Project activities during construction have the potential to generate sediment. The **CoCP** and **Outline Drainage Strategy** include measures to prevent significant changes to water bodies.
Remove obsolete structure	Not in place	There are no mechanisms for project activities during construction and operation to prevent the future implementation of measures to remove obsolete structures in the water body.
Remove or soften hard bank	Not in place	The installation of culverts would introduce new hard bank protection on minor watercourses within the Minsmere Old River water body, which has the potential to affect delivery of this measure.
Preserve or restore habitats	Not in place	The installation of culverts could locally affect habitats in minor watercourses within the Minsmere Old River water body, which has the potential to affect delivery of this measure.
In-channel morphological diversity	Not in place	The installation of culverts could locally affect in-channel morphological diversity in minor watercourses within the Minsmere Old River water body, which has the potential to affect delivery of this measure.
Re-opening culverts	Not in place	There are no mechanisms for project activities during construction and operation to prevent existing culverts on the water body being reopened in the future.
Alter culvert channel bed	Not in place	There are no mechanisms for project activities during construction and to prevent alterations being made to the bed of existing culverts in the water body.
Flood bunds	Not in place	There are no mechanisms for project activities during construction and operation to affect the future implementation of measures to reduce the pressures caused by flood bunds in this water body.
Set-back embankments	Not in place	There are no mechanisms for project activities during construction and operation to prevent the future implementation of measures to set back existing embankments in this water body.
Floodplain connectivity	Not in place	There are no mechanisms for project activities during construction and operation to prevent the future

Mitigation measure	Status	Potential impact
		implementation of measures to improve floodplain connectivity in this water body.
Fish passes	Not in place	There are no mechanisms for project activities during construction and operation to prevent the implementation of measures to improve fish passage over existing structures in this water body.
Reduce fish entrainment	Not in place	There are no mechanisms for project activities during construction and operation to prevent the implementation of measures to reduce fish entrainment at existing structures in this water body.
Enhance ecology	Not in place	The installation of culverts could locally affect in-channel habitats in minor watercourses within the Minsmere Old River water body, which has the potential to affect delivery of this measure.
Changes to locks, etc.	Not in place	There are no mechanisms for project activities during construction and operation to prevent the implementation of changes to the structure or operation of locks and other in-channel structures in this water body.
Retain habitats	Not in place	There are no mechanisms for project activities during construction and operation to prevent the implementation of measures to retain existing habitats during maintenance activities in this water body.
Maintain channel bed/margins	Not in place	There are no mechanisms for project activities during construction and operation to prevent the implementation of measures to maintain the channel bed and margins during maintenance activities in this water body.
Woody debris	Not in place	There are no mechanisms for project activities during construction and operation to prevent the implementation of measures to retain woody debris during maintenance in this water body.
Water level management	Not in place	There are no mechanisms for project activities during construction and operation to prevent the implementation of water level management measures in this water body.
Align and attenuate flow	Not in place	There are no mechanisms for project activities construction and operation to prevent the implementation of measures to align and attenuate flows in this water body. The use of SuDS measures to manage runoff from the site could potentially provide a limited opportunity to deliver this measure.
Educate landowners	Not in place	There is no mechanism for project activities during construction and operation to prevent the implementation of measures to educate landowners in this water body.

Assessment of potential mechanisms for impact

3.7.37. An assessment of potential impacts on the Minsmere Old River RBMP mitigation measures is also presented in **Table 3.25**. This demonstrates that the majority of the RBMP measures would not be impacted by the construction and operation of the Sizewell link road. However, the future implementation of the following RBMP mitigation measures (not currently in place) in the Minsmere Old River catchment have been identified as being potentially at risk and they are, therefore, scoped in for further assessment:

- Remove or soften hard bank.
- Preserve or restore habitats.
- In-channel morphological diversity.
- Enhance ecology.

iv. Impacts of project activities on Protected Areas

Protected Areas within each water body

3.7.38. Protected Areas within each of the WFD water bodies identified during the screening phase are listed in **Table 3.26** and shown in **Figure 3.13** against the 2km boundary.

Table 3.26 Summary of scoping assessment for Protected Areas

Water body	Protected area name	Within 2km?
Minsmere Old River	Nitrates Directive - NVZ - 411, 412, 415, 417, 661	NVZ 415, 412 and 661 are located within 2km
	Habitats Directive - Minsmere to Walberswick Heaths & Marshes SAC	Both located within 2km
	Habitats Directive Minsmere-Walberswick SPA and Ramsar	
Waveney & East Suffolk Chalk and Crag	Nitrates Directive - 78, 79, 166, 168	NVZ 166 and 78 are located within 2km.
	WFD (formerly Surface Water Abstraction Directive) Waveney and East Suffolk Chalk & Crag Drinking Water	Not located within 2km.

Assessment of potential mechanisms for impact

3.7.39. The Natura 2000 Protected Areas; Minsmere to Walberswick Heaths and Marshes Special Area of Conservation (SAC) and Special Protection Area (SPA) are located within the 2km ZOI. WFD compliance assessments require the consideration of the potential effects on WFD quality elements (hydromorphological, physico-chemical, chemical and biological), many of which support ecological interest features for which the Natura 2000 Protected Areas are designated. The **Shadow Habitats Regulations Assessment Report** (**HRA**) (Doc Ref. 5.10) therefore builds on the output of this assessment to assess the potential effects on designated site interest features. Therefore, to avoid duplication with the **Shadow HRA**, impacts on the designated site interest features themselves are not considered here.

3.7.40. The following areas protected under other Directives are located within 2km of the proposed activities:

- Minsmere Old River: NVZ 415, 412 and 661.
- Waveney & East Suffolk Chalk and Crag NVZ 166 and 78.

3.7.41. Foul water generated in construction site compounds could release nitrates and other nutrients if discharged, untreated to the water environment. However, all foul waters generated during construction would be contained and/or adequately treated to ensure that the project activities would not result in the release of significant quantities of nitrates and other nutrients.

3.7.42. All Protected Areas have, therefore, been scoped out of this assessment.

v. Stage 2 Summary

3.7.43. The assessment demonstrates that the majority of the proposed project activities during construction and operation of the Sizewell link road would not have any direct or indirect effects on the Minsmere Old River or Waveney & East Suffolk Chalk and Crag water bodies that would be sufficient to cause deterioration in their status or the status of Protected Areas located within the water bodies.

3.7.44. However, the construction and operation have the potential to affect the hydromorphology and biology of the Minsmere Old River and counteract or otherwise affect the delivery of four mitigation measures (remove or soften hard bank, preserve or restore habitats. in-channel morphological diversity and enhance ecology) identified for the water body. The potential impacts of these activities, therefore, are considered in more detail in **section 3.7d)**.

d) Stage 3: Detailed Assessment

i. Purpose of this section

3.7.45. This section presents the results of the detailed compliance assessment undertaken on the water bodies identified in **section 3.7c)** of this report, using the method outlined in **Part 1**. This assessment determines whether the activities and/or components of the proposed Sizewell link road that have been brought forward from the Stage 2 scoping assessment would cause deterioration of the Minsmere Old River water body and whether such deterioration would have a significant non-temporary effect on the status of one or more WFD quality elements at a water body level.

ii. Baseline environment

Current baseline

3.7.46. The main channel of the Minsmere Old River is located approximately 2km to the north-east of the proposed development at its closest point, with major barriers such as the existing B1122 road between the two. However, the proposed development would intersect with several tributaries of the Minsmere Old River at seven locations:

- The Middleton Watercourse (**Plate 3.2**) flows parallel to Fordley Road where it passes through the site, underneath the B1122 and then through Middleton to where it joins the Minsmere Old River. The watercourse is designated as a main river by the Environment Agency. The watercourse would be crossed once by the proposed link road, and a second crossing would be required to facilitate the diversion of Fordley Road. Part of the channel would also be realigned to accommodate the revised road layout.
- The Theberton Watercourse (**Plate 3.2**) flows in the northerly direction through the eastern section of the site. The watercourse is designated as a main river by the Environment Agency and would be crossed once by the proposed link road.
- Three unnamed tributaries of the Minsmere Old River would also be intersected by the proposed development. These are all ordinary watercourses, and each would be crossed by the proposed link road.

3.7.47. Many of the channels are entirely artificial, and the natural channels have been extensively modified for land drainage purposes. Sediment deposition and, when flows have sufficient energy, transport are likely to be the dominant fluvial processes which operate in the Minsmere Old River.

3.7.48. Of the ten watercourses, nine were surveyed as part of the Phase 1 habitats survey (see **Volume 6**, **Chapter 7** of the **ES** (Doc Ref.6.7)). All were dry at the time of the Phase 1 habitat survey and most of the ditches were cleared of all aquatic and marginal vegetation.

3.7.49. WFD classification data (**Appendix 3A**) suggests that populations of fish and are under pressure due to the presence of barriers to ecological continuity and physical modifications for land management.

Plate 3.2 The Middleton and Theberton Watercourses

Middleton Watercourse

Theberton Watercourse

Potential future baseline

3.7.50. As the proposed Sizewell link road would be permanent, there is potential that the current baseline conditions of the surface watercourses that drain into the Minsmere Old River could change in the future.

3.7.51. Predicted climate changes under UKCP18 are likely to result in wetter winters, drier summers and a greater number of convectional rain storms. This means that the hydrology of the river water bodies could change, with higher winter flows, lower summer flows and a greater number of storm-related flood flows. This in turn could result in changes to the geomorphology of the river systems, with increased geomorphological activity (e.g. channel adjustment) occurring in response to larger storm events. However, the stable geomorphological characteristics that currently dominate the Minsmere Old River and its tributaries, and the extensively modified nature of these channels, mean that significant hydromorphological adjustments are unlikely to occur during the operation of the proposed development.

3.7.52. Any future initiatives to improve geomorphology, river continuity, fish passage and in-channel habitats undertaken by the Environment Agency and partner organisations to meet WFD status objectives could deliver localised improvements to hydromorphology and biology. However, the extensively modified and low energy nature of the surface drainage network means that significant improvements are likely to be spatially constrained to areas where direct interventions have been applied.

3.7.53. This means that the primary pressures on biology in the Minsmere Old River water body (e.g. physical modifications resulting from land drainage and in-channel barriers) are unlikely to change significantly during the operational lifetime of the proposed development. There assessments presented in the subsequent sections therefore assess potential impacts resulting from the operational phase against current baseline conditions.

iii. Activity C2: Construction of watercourse crossings

Introduction

3.7.54. Construction of the Sizewell link road would require the construction of a series of culverts across minor watercourses which drain into the Minsmere Old River and the diversion of a short reach of one of these watercourses. As outlined in **section 3.7c)**, this could affect the hydromorphology and biology of the Minsmere Old River and affect four mitigation measures identified for the water body.

Potential impacts on water body status

3.7.55. Middleton Watercourse, Theberton Watercourse and unnamed ordinary watercourses along the proposed road route would be crossed by portal culverts (**Figure 3.12** in this volume and **Figures 2.2 to 2.7** in **Chapter 2, Volume 6** of the **ES**). The portal culverts would have a width of 5.4m and height of 1.2m above the bank top.

3.7.56. Portal culverts are three sided structures that do not incorporate the base of a traditional culvert. The dimensions of the culverts mean that they would be offset from the banks of the minor watercourses and would not directly impact upon their hydromorphology; natural hydromorphological processes such as flow conveyance and sediment transport would be undisturbed. Furthermore, the design of the culverts means that they would not present a barrier to the free movement of fish and other aquatic organisms in the watercourses that they would cross.

3.7.57. The realignment of 15m of the Middleton Watercourse would directly disturb the bed and banks of the watercourse and result in the direct loss of natural geomorphological features within the footprint of the works. However, the

extensively resectioned nature of the existing channel and the limited extent of the proposed realignment means that any changes to the watercourse are unlikely to be sufficient to result in significant reduction in hydromorphological quality or a change in habitat conditions (**Volume 6**, **Chapter 7** and **Chapter 12** (Doc Ref. 6.7)).

3.7.58. Temporary works during culvert installation and channel realignment (e.g. temporary dams to allow culverts to be installed or realignment to be undertaken in dry conditions) could result in reduced flow and sediment conveyance, create upstream impoundment, affect patterns of erosion and sedimentation, impede river continuity, increase turbidity and potentially encourage fine sedimentation on a short section of the bed upstream. Changes to flow conditions could also result in a reduction in the dissolved oxygen concentrations supported in the watercourses upstream of the impoundment. These activities could, therefore, reduce the physical habitat value of the watercourse for aquatic plants, invertebrates and fish species locally. However, these impacts would be temporary (i.e. confined to the duration of construction) and would reverse once the temporary impounding structures are removed (i.e. as a result of natural bed scour and sediment transport processes, which would remobilise any accumulations of unconsolidated fine sediments once the normal flow regime has been reinstated).

3.7.59. The temporary dams required during culvert installation could also act as a barrier to the movement of fish and other aquatic organisms (including migrating eels and spawning fish). However, impacts are only anticipated when barriers are in place in the channel (i.e. during trenching and the installation of temporary crossing structures), and river continuity would be restored once temporary barriers were removed. Furthermore, the changes to morphological conditions resulting from construction activities are not considered sufficient to result in any significant changes to supporting conditions (i.e. physical habitats) for the biological quality elements supported in the river.

3.7.60. Overall, the low energy nature of the drainage system means that any impacts are expected to be confined to the working area and, as such, are not considered likely to propagate upstream or downstream or affect the wider Minsmere Old River water body. Therefore, the effects are not predicted to be sufficient to result in deterioration in the status of any hydromorphological quality elements or the biological quality elements that they support. Note that potential effects of the permanent presence of the new culverts are considered separately under Activity O2 below.

Potential impacts on mitigation measures

3.7.61. The proposed construction of culverts across Middleton Watercourse, Theberton Watercourse and several unnamed watercourses which all drain into the Minsmere Old River could potentially affect the delivery of four mitigation measures identified for the water body in the RBMP: remove or soften hard bank protection, increase in-channel morphological diversity, preserve or restore habitats and enhance ecology.

3.7.62. However, the proposed construction activities would not directly interact with the main channel of the Minsmere Old River, with the works confined to watercourses which drain into the main water body. Furthermore, construction-stage impacts within these minor watercourses would be restricted to within the footprint of the temporary works and only affect a small proportion of each watercourse during the construction period. This means that the proposed activities would not limit the implementation of measures to renaturalise the Minsmere Old River or other connected watercourses which drain into the water body.

Summary of impacts on water body status

3.7.63. The previous sections demonstrate that, although the proposed construction activities could result in temporary and/or highly localised effects on hydromorphology and biology, the changes are not predicted to be sufficient to result in deterioration of the status of any quality elements in the Minsmere Old River (within or between status classes). Furthermore, any effects would not prevent the implementation or counteract the effects of the mitigation measures identified in the RBMP. This means that these construction stage activities would not result in deterioration in the status of this river water body or prevent WFD objectives being achieved in this water body in the future.

iv. Activity O2: Presence of watercourse crossings

Introduction

3.7.64. The operational phase of the Sizewell link road would require the presence of six culverts across minor watercourses which drain into the Minsmere Old River (one on the Middleton Watercourse, one on Theberton Watercourse, and four on unnamed tributaries). As outlined in **section 3.7c)**, this could affect the hydromorphology and biology of the Minsmere Old River and four proposed mitigation measures identified for the water body.

Potential impacts on water body status

3.7.65. The portal culverts across the minor watercourses would have a maximum width of 5.4m and a height of 1.2m above the bank top. The operational presence of the culverts could result in reduced flow and sediment conveyance (thereby limiting river continuity), create upstream impoundment, and affect patterns of erosion and sedimentation (e.g. by encouraging upstream sedimentation and downstream erosion). These activities could, therefore, reduce the physical habitat value of the watercourses for aquatic plants, invertebrates and fish species locally. Furthermore, the presence of in-channel structures could act as a barrier to the free movement of fish and other aquatic organisms (including migrating eels and spawning fish).

3.7.66. The portal culverts would be three-sided structures that do not incorporate the base of a traditional culvert. The dimensions of the culverts mean that they would be offset from the banks of the minor watercourses and would not directly impact upon their hydromorphology; natural hydromorphological processes such as flow conveyance and sediment transport would be undisturbed. Furthermore, the design of the culverts means that they would not present a barrier to the free movement of fish and other aquatic organisms in the two small watercourses.

3.7.67. SuDS infrastructure (proposed as swales and infiltration basins) would be installed along the length of the proposed route of the Sizewell link road. SuDS would minimise surface water run-off and prevent diffuse pollution from sediment and other pollutants arising. Bypass separators and silt traps would be incorporated within the drainage design where necessary. The swales would attenuate and convey surface water run-off at a rate not exceeding existing green field run-off rates.

3.7.68. This means that the operational culverts would not result in any significant changes to the hydromorphology, physico-chemistry or biology in the River Alde water body.

Potential impacts on mitigation measures

3.7.69. The proposed portal culverts across watercourses which drain into the Minsmere Old River could potentially affect the delivery of four mitigation measures identified for the water body in the RBMP: remove or soften hard bank protection, increase in-channel morphological diversity, preserve or restore habitats and enhance ecology.

3.7.70. However, as described above, the proposed operational activities would not directly interact with the main channel of the Minsmere Old River, with any permanent impacts confined to watercourses which drain into the main

water body. Furthermore, operational impacts within these minor watercourses would be restricted to within the footprint of the temporary works and, therefore, only affect a small proportion of each watercourse during the operational period. This means that the proposed activities would not limit the implementation of measures to renaturalise the Minsmere Old River or other connected watercourses which drain into the water body.

Summary of impacts on water body status

3.7.71. The previous sections demonstrate that, although the proposed operational activities could result in highly localised effects on hydromorphology and biology, any changes are not predicted to be sufficient to result in deterioration in the status of any quality elements in the River Alde (within or between status classes). Furthermore, any effects on mitigation measures identified in the RBMP would not prevent the implementation or counteract the effects of these measures. This means that these activities would not result in deterioration in the status of this river water body or prevent WFD objectives being achieved in this water body in the future.

v. Stage 3 summary

3.7.72. The assessment presented in the previous sections demonstrates that the construction and operation of watercourse crossings would not result in deterioration in the hydromorphology and biology of the Minsmere Old River or any other water body. Furthermore, the proposed activities would not counteract or prevent the implementation of improvement measures identified for the water body.

3.7.73. The Sizewell link road is, therefore, considered to be compliant with the requirements of the WFD.

3.8 Yoxford and other highway improvements

a) Introduction and project description

i. Overview of the proposals

3.8.1. Four locations have been identified where there is a need to provide highway improvement works:

- A12 and B1122 east of Yoxford – provision of a new roundabout at the junction (referred to as the 'Yoxford roundabout').
- A1094/B1069 junction south of Knodishall – improvements of visibility splays and provision of signage and road markings. Speed limit reduction.

- A12/A144 junction south of Bramfield – provision of central reservation island and waiting area.
- A12/B1119 junction at Saxmundham – improvements of visibility splays, alteration of the B1119 at the junction with the A12 and provision of signage and road markings.

3.8.2. Road safety analysis has also identified potential highway safety issues at two other sites where highway safety measures are proposed to be secured by an obligation in the Section 106 Agreement (see the **Section 106 Heads of Terms** appended to the Planning Statement (Doc. Ref. 8.4):

- B1078/B1079 junction east of Easton and Otley College – improvements of visibility splays and provision of signage and road markings.
- A140/B1078 junction west of Coddenham – improvements of visibility splays and provision of signage and road markings.

3.8.3. All proposed improvement works at the four identified sites and all safety measures at the two identified sites would be retained following the completion of the Sizewell C main development site as permanent features.

3.8.4. All dimensions are approximate. There is some flexibility during detailed design to alter the alignment of the proposed Yoxford roundabout within defined limits set out in the Work Plans (Doc Ref. 2.3) (and reproduced in **Appendix 2B** of **Volume 7**) and described in **section 2.8** of **Chapter 2** of **Volume 7** (Doc Ref. 6.8).

A12 and B1122 Yoxford roundabout

3.8.5. The A12 and B1122 Junction is located to the east of Yoxford. This site is approximately 2.9 ha. The proposed Yoxford roundabout would be a three-arm roundabout and would replace the existing ghost island for this junction to the east of Yoxford.

3.8.6. The new roundabout would be approximately 90m north of the existing junction and would be built largely on grazing land adjacent to the A12 (**Figure 3.14**). It would have a diameter of 60m and would include a realignment of the A12 in order to connect to the roundabout. The A12 realignment would measure approximately 120m in length to the north and 160m to the south. The roundabout would be in a cutting of approximately 2m deep to the east of the roundabout which becomes shallower where it ties-in to the B1122 to the south-east.

3.8.7. The B1122 would also be realigned to join the proposed roundabout via a new section of road which would cross the existing agricultural land in a

north westerly direction. The B1122 realignment would be approximately 220m in length.

3.8.8. The new sections of the A12 leading in to the A12 and B1122 Yoxford roundabout would be 7.3m in width, with the B1122 approach road 6m wide. All three of the approaches would flare to create additional width at their respective give way lines at the proposed A12/B1122 Yoxford roundabout.

3.8.9. As part of the works, a new access road, measuring approximately 75m in length, would be provided off the realigned B1122 to the south of the roundabout to maintain access to the row of houses south of the junction including Pinn's Piece and Rookery Lodge, as well as Public Right of Way (PRoW) E-584/020/0.

Other highways improvements and safety measures

3.8.10. The construction of Sizewell C would generate additional vehicular traffic on the local highway and transport networks. To limit the adverse effects, and address capacity and safety issues, the following measures have been proposed to ease congestion.

Improvements at the A12/A144 junction south of Bramfield

3.8.11. The A12 and A144 junction is situated to the south of Bramfield. The site would be approximately 1.2ha.

3.8.12. The proposed improvements to the A12 and A144 junction would comprise:

- Provision of a physical central reservation island and waiting area.
- Widening of the A12 from approximately 8m to approximately 10m, to facilitate the provision of the central reservation island and waiting area.
- Provision of pedestrian walkways and dropped kerbs to the east of the A12 and on the junction.
- Provision of a verge, approximately 350m in length to the south-east of the site, east of the A12.

3.8.13. It is likely that the works would result in 0.3ha of agricultural land being required permanently.

Minor safety improvements at other sites

3.8.14. Two junctions require minor safety improvements as described further in **Table 3.27** below.

Table 3.27 Description of highway improvements

Highway improvement	Description
Improvements at the A1094 and B1069 junction south of Knodishall	The A1094 and B1069 junction is situated to the south of Knodishall. The site area would be approximately 1.5ha. The improvements to the junction of the A1094 and B1069 near Knodishall would take place over a length of approximately 1km on the A1094 and approximately 250m on the B1069 and adjacent land around the existing junction. Improvements include vegetation maintenance to improve visibility and provision of signage and road markings.
Improvements at the A12/B1119 junction at Saxmundham	The A12 and B1119 junction is situated to the west of Saxmundham. The site area would be approximately 0.9ha. Alteration of the B1119 would be required including widening the east bound approach lane at the junction (by 2.8m) and widening of the north bound right turn approach lane by 1.5m for 55m. Alteration of the existing drainage along the B1119 at the junction, comprising realignment of the drains within existing highway verges adjacent the proposed kerb line realignments to accommodate the change in junction layout would also be required. All alterations to be kept within the existing road footprint, with changes only made to verges.

Safety measures at other sites

3.8.15. The anticipated works at the two sites where safety measures are proposed (the B1078 and B1079 junction east of Easton and Otley College and the A140 and B1078 junction west of Coddenham) include maintenance of vegetation along the highway boundary to improve visibility and provision of signage and road markings. No breaking ground is required.

ii. Construction

Yoxford roundabout

3.8.16. The proposed development is estimated to take up to nine months to construct and work would start at the beginning of the early years of the Sizewell C construction period.

3.8.17. The anticipated construction sequence would comprise of the following stages:

- Site set up and clearance.
- Earthworks.
- Drainage.
- Pavements.
- Kerbs, footways and paved areas.
- Fencing.

- Traffic signs.
- Road lighting.

3.8.18. A temporary contractor compound would be constructed in the field immediately to the north the B1122. Foul sewage arising on site during construction will be tankered off site for appropriate treatment.

Improvements at the A12/A144 junction south of Bramfield

3.8.19. It is envisaged construction works would take approximately six months.

3.8.20. Vegetation clearance and changes to the existing drainage at the site would be required. No stand-alone construction compound would be required as it is anticipated that the contractor would be managed by the northern park and ride site. Following completion of construction operations agricultural land required temporarily would be reinstated to its former condition, where possible.

Minor improvements at other sites

3.8.21. The proposed construction methodologies for the other highway improvement schemes are summarised in Error! Reference source not found.**Table 3.28**.

Table 3.28 Summary of construction requirements for each highway improvement

Highway improvement	Construction requirements
Improvements at the A1094 and B1069 junction south of Knodishall	Construction works would be less than a month. No construction compound required. The works proposed would not involve any diversions of local public rights of way and would be set within the existing presence of road infrastructure.
Improvements at the A12/B1119 junction at Saxmundham	The works would require the use of an estimated twelve HGVs and would be undertaken by approximately 10 workers. No construction compound would be required but localised, temporary traffic measures would be required during construction. Works would be one month in duration.

Safety measures at other sites

3.8.22. In respect of the two sites where safety measures are proposed (the B1078 and B1079 junction east of Easton and Otley College and the A140 and B1078 junction west of Coddenham), it is anticipated that construction works would be less than a month and that no construction compound would be required.

3.8.23. Following completion of construction operations agricultural land required temporarily would be reinstated to its former condition, where possible.

3.8.24. The **CoCP** (Doc Ref. 8.11) sets out the measures and controls that SZC Co. will require its contractors to adopt during construction and removal and reinstatement phases of the proposed development, where appropriate, and provides an outline of the environmental management plans that will be implemented on site.

iii. Operation

Yoxford roundabout

3.8.25. Upon completion of construction, the Yoxford roundabout would remain in place as a permanent improvement to the highway network.

3.8.26. SuDS would be implemented to attenuate surface water run-off and minimise sediment generation and it is envisaged that the drainage system would consist of channels, kerb drains or gullies that would remove surface water run-off. Underground drains would convey the run-off to an infiltration basin located between the proposed roundabout and the proposed access road to the south. The infiltration basin would hold the run-off and discharge run-off through infiltration to ground. The use of petrol/oil interceptors and silt traps would be incorporated within the drainage design where considered necessary.

3.8.27. The proposed drainage would result in a reduction in surface water runoff which currently flows along the existing A12 into Yoxford at Brook Street where it is removed by the existing highway drainage network.

3.8.28. In the unlikely event that ground conditions prevent full use of infiltration to ground, the infiltration basin would become a combined infiltration and attenuation basin. Runoff which does not infiltrate would discharge at a controlled flow rate lower than the current rate of run-off into Yoxford to the existing highway drainage network, the detailed design of which is to be agreed with the Highway Authority.

3.8.29. The **Outline Drainage Strategy** is described in more detail in **Volume 2**, **Appendix 2A** of the **ES** (Doc Ref. 6.3).

Other highways improvements and safety measures

3.8.30. Improvements at the A12 and A144 junction south of Bramfield would require changes to the existing drainage to facilitate the proposed road widening. For the other sites, vegetation along the highway boundary would be maintained during operation of each site.

iv. Removal and reinstatement

3.8.31. Post construction, the A12/B1122 Yoxford roundabout and other highways improvements as well as the safety measures would remain in place as permanent improvements to the highway network. As a result, there would be no removal and reinstatement phase for any of these proposals.

v. Baseline for assessment

3.8.32. The current baseline conditions of any identified water bodies are considered appropriate for the duration of the construction phase at this site, because the highways improvements would need to be constructed and operational prior to the peak of construction at the main development site. Although the current baseline is also likely to be applicable to the operational phase, the permanent nature of the development means that this baseline could change in the future (e.g. water body status could change in response to natural variations or as a result of improvement or mitigation measures delivered by the Environment Agency and partner organisations). The potential future baseline will therefore be considered in Stage 3 if any scheme elements are scoped in to further assessment.

b) Stage 1: Screening

i. Identification of activities

3.8.33. The description provided in **section 3.8a)** demonstrates that there are a wide range of activities associated with the proposed highways improvements and safety measures. Because many of the proposed improvements and safety measures would be limited to non-invasive activities such as vegetation clearance, the installation of new signage and changes to road markings, they are unlikely to impact upon any type of water receptors considered under the WFD.

3.8.34. Activities from each component of the proposed highways improvements and safety measures, therefore, were subjected to an initial screening exercise, whereby potential impact pathways on water receptors were identified. If a potential pathway was identified, the proposed improvement was divided into activities for scoping as per the methodology presented in **Part 1**. The proposed improvement works sites and proposed safety measures sites are assessed together for the purposes of this screening exercise and are summarised in **Table 3.29**.

Table 3.29 Screening exercise to identify whether the proposed improvements and safety measures could have an effect on water receptors

Highways improvement / safety measure	Water body details	Potential effect on water receptors?	Screened in?
Yoxford roundabout	The proposed roundabout is located in the Minsmere Old River catchment. The River Yox, a tributary of the Minsmere River, is located adjacent to the site boundary at its closest point. There are several ponds in the vicinity of the site, including one pond to the north-east of the site boundary. A sewage treatment works is located north-east of the proposed A12/B1122 roundabout, between the site and the River Yox. The site is located on the Waveney and East Suffolk Chalk and Crag groundwater body. Online BGS mapping indicates that the majority of the site is not underlain by superficial deposits. Part of the northern section of the site is underlain by the Head Formation which is made up of clay, silt, sand and gravel. Off-site, alluvial deposits associated with the River Yox are present to the north, with diamicton and sands and gravels of the Lowestoft Formation also present within the study area. The bedrock geology beneath the site comprises of the Crag Group which is made up of shallow water marine and estuarine sands, gravels, silts and clays. The Environment Agency classifies the superficial Head Deposits in the north of the site as Secondary Aquifer (undifferentiated) and the Crag Group bedrock underlying the site as a Principal Aquifer. Given the local geology and depth to groundwater, there is considered to be a potential hydraulic connection between groundwater and surrounding surface water features within the study area where superficial deposits of the Lowestoft Formation (diamicton) are absent. It is therefore considered that there is a potential hydraulic connectivity between the River Yox and its tributaries and the underlying alluvial and Crag aquifers (**Chapter 12** of **Volume 7** of the **ES (**Doc Ref 6.8).	Construction activities and permanent changes to local drainage could potentially impact the water environment.	Yes
A12/A144 junction south of Bramfield	The road junction is located on the watershed of three adjoining river catchments; Wenhaston Watercourse, Minsmere Old River and the Dunwich River. The Dunwich River the Darsham Watercourse (a tributary of Minsmere Old River) are located in the vicinity of the proposed site boundary. There are also a number of surface water ponds in the vicinity of the proposed site boundary. The site is underlain by the groundwater features described above for the Yoxford roundabout.	Construction activities and permanent changes to local drainage could potentially impact the water environment.	Yes

Highways improvement / safety measure	Water body details	Potential effect on water receptors?	Screened in?
B1078/B1079 east of Easton and Otley College	The River Lark is situated approximately 10m north east of the junction. The site is underlain by the groundwater features described above for the Yoxford roundabout.	Minor works required including vegetation clearance and signage addition. The minor junction improvement works for the A12/B119 Saxmundham junction would involve slight widening however, all works would be undertaken within the highway's boundary and would not create a mechanism by which groundwater and surface water receptors would be impacted. Unlikely to be a significant risk to the water environment.	No
A1094/B1069 south of Knodishall	The road junction of the A1094 and B1069 is located in the River Alde catchment. There are a number of drainage ditches and a small tributary of the River Alde located to the south of the junction. The site is underlain by the groundwater features described above for the Yoxford roundabout.		
A140/B1078 west of Coddenham	The River Gipping is located approximately 78m south east of the junction. The site is underlain by the groundwater features described above for the Yoxford roundabout.		
A12/B119 Saxmundham	A tributary of the River Fromus flows approximately 35m to the east of the road. The site is underlain by the groundwater features described above for the Yoxford roundabout.		

3.8.35. This demonstrates that the highway improvements proposed at the junctions A1094/B1069 and A12/B119 and the safety measures proposed at the junctions B1078/B1079 and A140/B1078 are unlikely to present a risk to the water environment, given the nature and small scale of the proposed works. Therefore, they are not considered further in this assessment.

3.8.36. The two remaining elements of the proposed highways improvements (Yoxford roundabout and A12/A144 junction south of Bramfield improvements) would require more significant construction activity and the presence of permanent infrastructure that could affect the water environment. These elements have therefore been separated into activities in line with the requirements of the guidance produced by the Environment Agency (Ref. 3.3) and Planning Inspectorate (Ref. 3.4). These are listed in **Table 3.30**.

Table 3.30 Summary of Yoxford Roundabout and A12/A144 junction south of Bramfield activities

Reference Number	Activity	Sub activities included
Construction		
C1	Site preparation, earthworks and construction at Yoxford roundabout	Vegetation clearance, removal of topsoil, installation of drainage infrastructure including SuDS, surfacing, management of construction-stage surface water and foul drainage.
C2	Site preparation, earthworks and construction at A12/A144 junction south of Bramfield	Vegetation clearance, removal of topsoil, installation of drainage infrastructure including SuDS, surfacing, management of construction-stage surface water and foul drainage.
Operation		
O1	Surface water management at Yoxford Roundabout	Management of surface water during the permanent operation of the roundabout.
O2	Surface water management at A12/A144 junction south of Bramfield	Management of surface water during the permanent operation of the road junction.

ii. Water body identification

3.8.37. **Figure 3.15** shows the WFD water bodies in the vicinity of the Yoxford Roundabout and A12/A144 junction south of Bramfield proposed works

3.8.38. In addition to WFD water body mapping, potential hydrological connectivity has been determined with reference to main rivers, ordinary watercourses and surface water flow routes that may not be shown on published mapping (identified using Environment Agency flood mapping). This process therefore considers the water bodies in whose catchments the proposed activities are located, and where relevant, connected water bodies upstream and downstream. A screening exercise has been undertaken to identify which of the water bodies have the potential to be impacted by the activities.

3.8.39. The results of this exercise are shown in **Table 3.31**.

Table 3.31 Results of screening assessment for the Yoxford Roundabout and A12/A144 junction south of Bramfield

Water body name and ID number	Type	Description	Screened in?	Justification
Minsmere Old River GB105035046270	River	Heavily modified for land drainage. Currently at Moderate Ecological Potential due to pressures on fish populations. Approximately 0.24km^2 of the catchment falls within the main development site boundary, with the remainder of the 70.1km^2 catchment located to the north and west of the site	Yes	Screened in because the proposed activities associated with the Yoxford roundabout and A12/A144 junction south of Bramfield are wholly or partially located within the catchment of this water body and could therefore affect its biology, hydromorphology and physico-chemistry.
Wenhaston Watercourse GB105035046010	River	Currently at moderate status due to pressures on invertebrates, dissolved oxygen and phosphate. This water body is not designated heavily modified or artificial	No	Screened out because the proposed activities associated with the A12/A144 junction south of Bramfield would be confined to a very small proportion of the water body catchment (0.002km^2, 0.01%), are located on the watershed and are not connected to any identified flow paths that connect to the drainage network.
River Fromus GB105035045980	River	Currently at poor ecological status due to pressures on fish, invertebrates, dissolved oxygen and phosphate. This water body is not designated heavily modified or artificial.	No	Although upgrades to the A12/B119 junction at Saxmundham would take place in this catchment, these have been screened out of the assessment as described in **Table 3.29**.
River Lark GB105035040360	River	Currently at moderate ecological status due to high concentrations of phosphates and low concentrations of dissolved oxygen. This water body is not designated heavily modified or artificial.	No	Although safety measures to the B1078/B1079 junction east of Easton and Otley College would take place in this catchment, these have been screened out of the assessment as described in **Table 3.29**.
Coddenham Watercourse GB105035046100	River	Currently at good ecological status. This water body is not designated heavily modified or artificial.	No	Although safety measures to the A140/B1078 junction west of Coddenham would take place in this catchment, these have been screened out of the assessment as described in **Table 3.29**.
Blyth (S)	Transitional	Heavily modified for flood and coastal	No	Screened out because the proposed activities associated with

Water body name and ID number	Type	Description	Screened in?	Justification
GB510503503700		protection. Currently at Moderate Ecological Potential due to elevated concentrations of dissolved inorganic nitrogen.		the A12/A144 junction south of Bramfield would be confined to a very small proportion of the water body catchment (0.005km^2, 0.01%), are located on the watershed and are not connected to any identified flow paths that connect to the drainage network. Note that the Dunwich River catchment is too small (<5km^2) to be classified as a river water body in its own right. It is therefore considered to form part of the downstream water body (i.e. this water body) for the purposes of this assessment.
Alde & Ore GB520503503800	Transitional	Heavily modified for flood protection. Currently at Moderate Ecological Potential due to elevated concentrations of dissolved inorganic nitrogen and pressures on the hydrological regime.	No	Although upgrades to the A1094/B1069 junction south of Knodishall would take place in this catchment, these have been screened out of the assessment as described in **Table 3.29**.
Suffolk GB650503520002	Coastal	Heavily modified for flood protection use and coast protection use. Moderate Ecological Potential due to pressures on dissolved inorganic nitrogen.	No	Located downstream of the Minsmere Old River and Blyth (S) transitional water body. Screened out because the proposed activities are located >10km upstream of this water body and no mechanism for potential impacts to propagate downstream of the water body in which they take place has been identified.
Waveney & East Suffolk Chalk and Crag GB40501G400600	Groundwater	Currently at Poor Quantitative Status as a result of an unfavourable water balance and Poor Chemical Status due to diffuse pollution pressures and potential impacts on a Drinking Water Protected Area.	Yes	Screened in because the proposed activities associated with the Yoxford roundabout and A12/A144 junction south of Bramfield are located within the catchment of this water body and could therefore affect its biology, hydromorphology and physico-chemistry.

3.8.40. This demonstrates that the following water bodies could be impacted by the proposed activities:

- Minsmere Old River (GB105035046270) (Yoxford Roundabout and A12/A144 junction south of Bramfield).
- Waveney & East Suffolk Chalk and Crag (GB40501G400600) (Yoxford Roundabout and A12/A144 junction South of Bramfield).

3.8.41. **Appendix 3A** provides summary data for all water bodies relevant to **Part 3**. The data was provided by the Environment Agency in December 2018, with a further update in July 2019.

c) Stage 2: Scoping

i. Purpose of this section

3.8.42. This section presents the results of the scoping assessment undertaken on the water bodies identified in **section 3.8b)**, using the methodology outlined in **Part 1**.

ii. Impacts of project activities on water body quality elements

Assessment of potential mechanisms for impact

3.8.43. The scoping questions presented in **Part 1** have been applied to each water body individually for the construction and operational stage activities for both the Yoxford roundabout and the A12/A144 junction south of Bramfield. The results of the scoping assessment are provided in **Appendix 3F** and summarised in **Table 3.32**.

3.8.44. **Table 3.12** demonstrates that the proposed construction and operational activities do not have the potential to directly or indirectly have an impact upon the quality elements supported by the Minsmere Old River or the Waveney & East Suffolk Chalk and Crag ground water body. This is because the potential impacts resulting from construction and operation activities would be mitigated through the application of a suite of measures to manage pollution, sediment supply and construction stage drainage (as set out in the **CoCP** (Doc Ref. 8.11) and summarised in **section 3.3**) and the **Outline Drainage Strategy** (**Appendix 2A** of **Volume 2** of the **ES** (Doc. Ref 6.3)).

3.8.45. All quality elements have, therefore, been scoped out of further assessment for all four water bodies for both the Yoxford Roundabout and A12/A144 junction south of Bramfield.

Table 3.32 Activities at the Yoxford Roundabout and A12/A144 junction south of Bramfield with the potential to affect water body quality elements and status

Activity	Water body	Quality element scoping
Construction		
C1 Site preparation, earthworks and construction at Yoxford roundabout	Minsmere Old River	Hydromorphology: All elements scoped out because the **CoCP** and **Outline Drainage Strategy** include measures to prevent significant changes to the hydrology and morphological conditions.
		Physico-chemistry: All elements scoped out because the **CoCP** and **Outline Drainage Strategy** include measures to to sufficiently minimise the release of pollutants into the water environment.
		Biology: All elements scoped out because the **CoCP** and **Outline Drainage Strategy** include measures to prevent significant changes to hydromorphology and physico-chemistry.
	Waveney and East Suffolk Chalk and Crag	Quantity: All elements scoped out because the overall volume of water discharging to ground is unlikely to significantly change.
		Quality: All elements scoped out because the **CoCP** and **Outline Drainage Strategy** include measures to sufficiently minimise the release of pollutants into the water environment.
C2 Site preparation, earthworks and construction at A12/A144 junction south of Bramfield	Minsmere Old River	Hydromorphology: All elements scoped out because the **CoCP** and **Outline Drainage Strategy** include measures to prevent significant changes to the hydrology and morphological conditions.
		Physico-chemistry: All elements scoped out because control measures in the **CoCP** would sufficiently minimise the release of pollutants into the water environment.
		Biology: All elements scoped out because the **CoCP** and **Outline Drainage Strategy** include measures to prevent significant changes to hydromorphology and physico-chemistry.
	Waveney and East Suffolk Chalk and	Quantity: All elements scoped out because the overall volume of water discharging to ground is unlikely to significantly change.

Activity	Water body	Quality element scoping
	Crag	Quality: All elements scoped out because the **CoCP** and **Outline Drainage Strategy** include measures to sufficiently minimise the release of pollutants into the water environment.
Operation		
O1 Surface water management at Yoxford Roundabout	Minsmere Old River	Hydromorphology: All elements scoped out because the **Outline Drainage Strategy** includes measures to prevent significant changes to the hydrology and morphological conditions.
		Physico-chemistry: All elements scoped out because the **Outline Drainage Strategy** includes measures to sufficiently minimise the release of pollutants into the water environment.
		Biology: All elements scoped out because the **Outline Drainage Strategy** includes measures to prevent significant changes to hydromorphology and physico-chemistry.
	Waveney and East Suffolk Chalk and Crag	Quantity: All elements scoped out because the overall volume of water discharging to ground is unlikely to significantly change.
		Quality: All elements scoped out because the **Outline Drainage Strategy** includes measures to sufficiently minimise the release of pollutants into the water environment.
O2 Surface water management at A12/A144 junction south of Bramfield	Minsmere Old River	Hydromorphology: All elements scoped out because the **Outline Drainage Strategy** includes measures to would prevent significant changes to the hydrology and morphological conditions.
		Physico-chemistry: All elements scoped out because the **Outline Drainage Strategy** includes measures to sufficiently minimise the release of pollutants into the water environment.
		Biology: All elements scoped out because the **Outline Drainage Strategy** includes measures to prevent significant changes to hydromorphology and physico-chemistry.
	Waveney and East Suffolk Chalk and	Quantity: All elements scoped out because the overall volume of water discharging to ground is unlikely to significantly change.

Activity	Water body	Quality element scoping
	Crag	Quality: All elements scoped out because the **Outline Drainage Strategy** includes measures to sufficiently minimise the release of pollutants into the water environment.

iii. Impacts of project activities on RBMP improvement and mitigation measures

RBMP measures applicable to each water body

3.8.46. The Environment Agency has not identified any RBMP improvement measures for the Waveney and East Suffolk Chalk and Crag groundwater body. Therefore this water body is not considered further in this part of the assessment.

3.8.47. A range of RBMP mitigation measures (both in place and not in place) have been identified for the Minsmere Old River water body (**Table 3.33**). This includes those that have already been implemented and those that are proposed for future implementation.

Assessment of potential mechanisms for impact

3.8.48. An assessment of potential impacts from the proposed development on the RBMP measures identified for the Minsmere Old River is presented **Table 3.33**. This demonstrates that the proposed activities would not counteract or adversely affect the delivery of RBMP mitigation measures that are already in place in the two water bodies and would not prevent the future implementation of the RBMP mitigation measures that are not yet in place. RBMP mitigation measures therefore do not require further assessment in Stage 3.

Table 3.33 RBMP mitigation measures for Minsmere Old River for the Yoxford roundabout and A12/A144 junction south of Bramfield

Mitigation measure	Status	Potential Impact
Selective vegetation control	In place	There are no mechanisms for project activities at either site during construction or operation to affect the delivery of the vegetation control measures that are in place in the water body.
Vegetation control	In place	
Vegetation control timing	In place	
Invasive species techniques	In place	Potential risks from INNS are considered in **section 3.3**.
Sediment management strategy	In place	Project activities during construction at both sites have the potential to generate sediment. However, the **CoCP** and **Outline Drainage Strategy** includes measures to remove these effects. No mechanism for effect.
Remove obsolete structure	Not in place	There are no mechanisms for project activities at either site during construction and operation to prevent the future implementation of measures to remove obsolete structures in the water body.
Remove or soften hard bank	Not in place	Project activities during construction and operation at both sites would not introduce new hard bank protection or prevent the future implementation of measures to remove or soften hard bank protection in the water body.
Preserve or restore habitats	Not in place	There are no mechanisms for project activities at either site during construction and operation to prevent the future implementation of measures to preserve or restore habitats in the water body.
In-channel morphological diversity	Not in place	There are no mechanisms for project activities at either site during construction and operation to prevent the future implementation of measures to increase morphological diversity in the water body.
Re-opening culverts	Not in place	There are no mechanisms for project activities at either site during construction and operation to prevent existing culverts on the water body being reopened in the future.
Alter culvert channel bed	Not in place	There are no mechanisms for project activities at either site during construction and operation to prevent alterations being made to the bed of existing culverts in the water body.
Flood bunds	Not in place	There are no mechanisms for project activities at either site during construction and operation to affect the future implementation of measures to reduce the pressures caused by flood bunds in this water body.
Set-back embankments	Not in place	There are no mechanisms for project activities at either site during construction and operation to prevent the future implementation of measures to set back existing embankments in this water body.
Floodplain connectivity	Not in place	There are no mechanisms for project activities at either site during construction and operation to prevent the future implementation of measures to improve floodplain connectivity in this water body.
Fish passes	Not in place	There are no mechanisms for project activities at either site during construction and operation to prevent the

Mitigation measure	Status	Potential Impact
		implementation of measures to improve fish passage over existing structures in this water body.
Reduce fish entrainment	Not in place	There are no mechanisms for project activities at either site during construction and operation to prevent the implementation of measures to reduce fish entrainment at existing structures in this water body.
Enhance ecology	Not in place	There are no mechanisms for project activities at either site during construction and operation to prevent the implementation of measures to enhance ecology through structural modification in this water body.
Changes to locks, etc.	Not in place	There are no mechanisms for project activities at either site during construction and operation to prevent the implementation of changes to the structure or operation of locks and other in-channel structures in this water body.
Retain habitats	Not in place	There are no mechanisms for project activities at either site during construction and operation to prevent the implementation of measures to retain existing habitats during maintenance activities in this water body.
Maintain channel bed/margins	Not in place	There are no mechanisms for project activities at either site during construction and operation to prevent the implementation of measures to maintain the channel bed and margins during maintenance activities in this water body.
Woody debris	Not in place	There are no mechanisms for project activities at either site during construction and operation to prevent the implementation of measures to retain woody debris during maintenance in this water body.
Water level management	Not in place	There are no mechanisms for project activities at either site during construction and operation to prevent the implementation of water level management measures in this water body.
Align and attenuate flow	Not in place	There are no mechanisms for project activities at either site during construction and operation to prevent the implementation of measures to align and attenuate flows in this water body. The use of SuDS measures to manage runoff from the site could provide a limited opportunity to deliver this measure.
Educate landowners	Not in place	There are no mechanisms for project activities at either site during construction and operation to prevent the implementation of measures to educate landowners in this water body catchment.

iv. Impacts of project activities on Protected Areas

Protected Areas within each water body

3.8.49. Protected Areas within each of the WFD water bodies identified during the screening phase are listed in **Table 3.34** and shown in **Figure 3.16** against the 2km boundary.

Table 3.34 Summary of scoping assessment for Protected Areas

Project element	Water body	Protected Area name	Within 2km?
Yoxford Roundabout	Minsmere Old River	Nitrates Directive – NVZs 411, 412, 415, 417, 661	NVZs 412 and 415 within 2km
		Habitats Directive - Minsmere to Walberswick Heaths & Marshes SAC	Not within 2km
		Minsmere-Walberswick SPA and Ramsar	
	Waveney & East Suffolk Chalk and Crag	Nitrates Directive – NVZs 78, 79, 166, 168	166 within 2km
		WFD (formerly Surface Water Abstraction Directive) - Waveney and East Suffolk Chalk & Crag Drinking Water	Not within 2km
A12/A144 junction South of Bramfield	Minsmere Old River	Nitrates Directive – NVZs 411, 412, 415, 417, 661	417 and 661 within 2km
		Habitats Directive - Minsmere to Walberswick Heaths & Marshes SAC	Not within 2km
		Minsmere-Walberswick SPA	Not within 2km
	Waveney & East Suffolk Chalk and Crag	Nitrates Directive – NZVs 78, 79, 166, 168	166 is within 2km

Assessment of potential mechanisms for impact

3.8.50. **Table 3.34** demonstrates the following Protected Areas are located within 2km:

- Minsmere Old River: NVZ 412, 415, 417 and 661.

3.8.51. Foul water generated in construction site compounds could release nitrates and other nutrients if discharged, untreated to the water environment. However, all foul waters generated during construction would be contained and/or adequately treated to ensure that the project activities would not result in the release of significant quantities of nitrates and other nutrients.

3.8.52. All Protected Areas have therefore been scoped out of the assessment.

v. Stage 2 Summary

3.8.53. The assessment demonstrates that proposed project activities during construction and operation would not have direct or indirect effects on the Minsmere Old River and Waveney & East Suffolk Chalk and Crag water bodies that would be sufficient to cause deterioration in the status of the water body or Protected Areas located within the water bodies. Furthermore, the proposed project activities would not counteract or otherwise affect the delivery of the mitigation or improvement measures that have been identified in the RBMPs for these water bodies.

3.8.54. This means that the project would not have non-temporary impacts on water body status that are sufficient to result in the deterioration of these water bodies. Furthermore, the project would not prevent any water body status objectives being achieved in the future.

3.8.55. The proposed highway improvements and safety measures are, therefore, considered to be compliant with the requirements of the WFD.

3.9 Freight Management Facility

a) Introduction and project description

i. Description

3.9.1. The freight management facility site is approximately 11ha in total and predominantly comprises agricultural land with some highways land along Felixstowe Road. The site is located to the south-east of the A12 and A14 junction south-east of Ipswich, and is bounded by the A14 to the north, Felixstowe Road to the south, and agricultural land to the east and west (see **Figure 3.17**). The proposed development would comprise:

- Parking spaces for approximately 150 HGVs, including up to six covered HGV spaces for screen and search activities, and up to 12 car parking spaces for staff and visitors, up to one accessible space, up to ten spaces for minibuses/vans, up to four motorcycle spaces, covered and cycle shelters for up to ten bicycles.
- Ancillary buildings and structures including an amenity and welfare building, a security building, a security booth and a smoking shelter.
- Three landscape bunds and additional planting. Up to four swales, including adjacent to the highway, and geo-cellular storage structures beneath two of the landscape bunds forming part of the sustainable drainage system (SuDS).

- A ghost island junction on Felixstowe Road at the access to the site, which allows right turning traffic from the east to enter the site without blocking westbound traffic using Felixstowe Road.
- Other ancillary development, including signage, road markings, lighting, CCTV, and utilities.
- External areas including roadways, footways, landscaping and drainage infrastructure.

3.9.2. The proposed buildings on-site would comprise prefabricated modular units and would be temporary and single storey, to be removed following the construction of the Sizewell C main development site.

3.9.3. The masterplan for the freight management facility is shown in **Figure 2.1** in **Chapter 2** of **Volume 8** of the **ES** (Doc Ref. 6.9). The masterplan is illustrative and shows an indicative arrangement that would fulfil the objectives of the proposed development. The proposed development would be controlled by parameters rather than providing a detailed design at this stage.

ii. Construction

3.9.4. It is expected that construction work for this facility would take place over a period of approximately 12 to 18 months and is expected to be operational within the early years of the Sizewell C Project construction programme as shown in the Indicative Phasing Schedule in the **Implementation Plan** appended to the **Planning Statement** (Doc Ref 8.4).

3.9.5. The construction programme broadly comprises five overlapping phases, as follows:

- Phase 1: enabling preparation works (duration approximately one month) would start with the formation of a secure and safe access to the site from Felixstowe Road. This would include protection of utilities, site clearance, earthworks, road construction, surfacing, road markings, and signage. Work on the site itself would then progress to clearance of vegetation, mobilisation of site compounds/cabins and boundary fencing to secure the site.
- Phase 2: earthworks and excavation (duration approximately three months) would comprise removal of topsoil (and potentially subsoil) in accordance with the **Outline Soil Management Plan** (**Volume 2, Appendix 17C** of the **ES**) (Doc Ref. 6.3). The proposed geo-cellular storage structure would be installed beneath the landscape bunds during this phase.

- Phase 3: laying of concrete pavement for HGV parking areas and internal circulation route (duration approximately nine months), including: the delivery of and laying of base materials by dump trucks to the parking and circulation route areas; local movements by excavators and possibly a bulldozer; some compaction of the base layers; drainage work including potential cutting of pipes; and kerbstone work. Paving work is assumed to take place with concrete/stone cutting at various places around site.
- Phase 4: construction and fit out of buildings, and installation of utilities (duration approximately six months) – construction and fitting out of pre-fabricated modular buildings, installation of lighting, CCTV poles, water and power supply cables, installation of structures, barriers and signage, construction of the buildings. Pad foundations are expected to be used for structures built on-site; no requirement for piling has been identified.
- Phase 5: final surfacing (duration approximately one month), including construction of the final surface layer to the access road including delivery, application, and rolling surface course.

3.9.6. Early in the construction phase, landscape bunds and swales would be used as appropriate to ensure that surface water run-off would be contained within the site; this will also include the placement of geo-cellular soakaway structures beneath landscape bunds.

3.9.7. Soil stripped in line with the **Outline Soil Management Plan** (**Volume 2**, **Appendix 17C** of the **ES**) (Doc Ref. 6.3) as part of the works and materials generated from the earthworks and excavation, would be re-used in landscaping bund formation, where suitable.

3.9.8. It is envisaged that construction drainage would be contained within the site through the implementation of temporary SuDS early in the construction phase. Foul sewage arising on-site during construction from the temporary welfare facilities will be collected and tankered off site until the operational package treatment plant is in place.

3.9.9. As outlined in **section 3.3**, the **CoCP** (Doc Ref. 8.11) sets out the measures and controls that SZC Co. will require its contractors to adopt during the construction and removal and reinstatement phases of the proposed development.

iii. Operation

3.9.10. The proposed development would be operational for a minimum of 7.5 hours a day for five days a week, to a maximum of 24 hours a day seven days a week during the peak construction period (anticipated to be in 2028) of the Sizewell C main development site.

3.9.11. SuDS would be implemented to allow surface water runoff to infiltrate into the ground. These features would be removed as part of the removal and reinstatement phase.

3.9.12. A swale would be constructed along the northern boundary and part of the eastern boundary of the site to ensure that on-site surface water run-off is contained within the site. The western section of this swale would be lined to stop infiltration and remainder would be unlined to allow infiltration into the underlying strata. These measures would also ensure that off-site run-off that would otherwise enter the site is captured. Further swales are proposed along the southern side of Felixstowe Road and either side of the site entrance.

3.9.13. Geo-cellular storage structures would be installed beneath two of the landscape bunds to attenuate water and regulate water flows within the site.

3.9.14. Water falling onto impermeable surfaces (for example the access roads and areas used by HGVs) would pass through a bypass separator which would remove pollutants prior to discharge into the SuDS infrastructure.

3.9.15. Foul sewage from the amenity and welfare buildings would be treated on-site. Effluent would either pass through a septic tank or a package treatment works prior to being discharged into the SuDS infrastructure.

3.9.16. The **Outline Drainage Strategy** is described in more detail in **Volume 2**, **Chapter 2**, **Appendix 2A** of the **ES** (Doc Ref. 6.3).

iv. Removal and reinstatement

3.9.17. Once the need for the freight management facility has ceased, the buildings and associated infrastructure (including SuDS) would be removed in accordance with a removal and reinstatement plan, which would maximise the potential for re-use of buildings, modules and materials.

3.9.18. When the site has been cleared, and any hedgerow reinstated, the area would be returned to agricultural use. The site access would be removed as part of the removal and reinstatement works at the site. However, the widened Felixstowe Road would remain in place, but the road markings and signage for the access to the site would be removed during the removal and reinstatement phase.

3.9.19. It is expected that removal and reinstatement would take place within the final 24 months of the Sizewell C construction programme, as shown in the Indicative Phasing Schedule in the **Implementation Plan** appended to the **Planning Statement** (Doc Ref 8.4). It is anticipated that construction

worker numbers and construction vehicle movements during removal and reinstatement would be similar to those for construction.

3.9.20. Key activities would include but are not limited to:

- Formation of demolition site compound.
- Demolition plant mobilisation and traffic movements.
- Demolition and removal of temporary structures and services.
- Breaking up of concrete and surfacing.
- Removal of utilities.
- Management of waste and other materials.
- Environmental management.

v. Baseline for assessment

3.9.21. The current baseline conditions of any identified water bodies are considered appropriate for the duration of the construction, operation and removal and reinstatement phases at this site. This is because the construction phase is anticipated to last for approximately 12-18 months, and the site would only be operational during the construction of the main development site (9-12 years). The site would then be removed and reinstated over a further 24 month period following completion of construction at the main development site.

b) Stage 1: Screening

i. Identification of activities

3.9.22. The works proposed for freight management facility have been separated into 'activities' in line with the requirements of guidance produced by the Environment Agency (Ref. 3.3) and Planning Inspectorate (Ref. 3.4). These are listed in **Table 3.35**.

Table 3.35 Summary of freight management facility activities

Reference Number	Activity	Sub activities included
Construction		
C1	Site preparation, earthworks and construction	Vegetation clearance, removal of topsoil, installation of drainage infrastructure including SuDS, laying of base materials for parking areas and internal circulation routes, installation of final surface layers, construction of buildings and installation of utilities, management of construction-stage surface water and foul drainage.

Reference Number	Activity	Sub activities included
Operation		
O1	Management of drainage	Operational use of the site and associated water management measures (including surface water and foul drainage).
Removal and reinstatement		
R1	Removal and reinstatement	Demolition and removal of buildings and site infrastructure, reinstatement of agricultural land.

ii. Water body identification

3.9.23. **Figure 3.18** shows the WFD water bodies that could be hydrologically connected to the proposed freight management facility site. In addition to WFD water body mapping, potential hydrological connectivity has been determined with reference to main rivers, ordinary watercourses and surface water flow routes that may not be shown on published mapping (identified using Environment Agency flood mapping). This process therefore considers the water bodies in whose catchments the proposed activities are located, and where relevant, connected water bodies upstream and downstream.

3.9.24. **Figure 3.18** indicates that the freight management facility is located close to a surface water flow route that eventually connects with a small watercourse that flows into the Orwell transitional water body. This was defined as a water body called the Orwell (tidal) (GB105035040420) in the 2009 RBMP but is no longer designated as a water body in its own right. As a result of the review in 2015, many of these smaller water bodies were subsumed into the larger marine water body catchments to become more logical management units (Ref. 3.2). This small water body was allocated to the Orwell transitional water body catchment (GB520503613601). Given the size and nature of the water body, and following consultation with the Environment Agency, it was considered appropriate to undertake the screening exercise on the basis of compliance parameters against which it was assessed in 2009 as well as those for the larger Orwell where appropriate.

3.9.25. A raised balancing pond to manage drainage from the A14 is located immediately adjacent to the northern boundary of the site. A second balancing pond is located within the A14/A12 roundabout to the north-west of the site. Manor Ponds is located approximately 400m south-west of the site.

3.9.26. The site is also underlain by the Felixstowe Peninsula Crag and Chalk groundwater body. The Kesgrave Catchment Subgroup (sands and gravels) is classified as a Secondary A Aquifer. The Crag Group bedrock in classified as a Principal Aquifer.

3.9.27. Given the local geology and assumed depth to groundwater of 5 to 10mbgl it is considered that there is not a substantial connection between groundwater and the surface water features identified on site. There may be a local interaction between discrete water bodies in the Kesgrave Catchment Subgroup and surface water in areas where Made Ground is not present.

3.9.28. Given the depth to the Crag deposits, it is considered unlikely that there will be a hydraulic connection between the underlying bedrock and surface water on site, however, where the Crag outcrops to the south of the site, there is the potential that the Crag is in hydraulic continuity with Manor Ponds, its associated watercourses and the nearby fen meadow habitat (**Chapter 12** of **Volume 8** (Doc Ref. 6.9)).

3.9.29. The Nacton Meadows Site of Special Scientific Interest (SSSI) is located approximately 900m south-west of the site. The SSSI is a fen-meadow habitat and is likely to have a degree of dependence on groundwater and surface water.

3.9.30. The results of the screening exercise are presented in **Table 3.37**.

3.9.31. This demonstrates that the following water bodies could be impacted by the proposed development:

- 2009 river water body named 'Orwell (Tidal)' (GB105035040420) located within the larger transitional water body Orwell (GB520503613601).
- Felixstowe Peninsula Crag & Chalk (GB40501G401800).

3.9.32. **Appendix 3A** provides summary data for all water bodies relevant to Part 3. The data was provided by the Environment Agency in December 2018, with a further update in July 2019. The 2009 data for the Orwell (tidal) water body is presented in **Table 3.36** and was taken from the 2009 Anglian RBMP.

Table 3.36 2009 compliance data for the Orwell (Tidal) water body

Compliance parameter		2009 assessment
Overall status		Moderate
Ecological status		Moderate (uncertain)
Supporting conditions	Quantity and dynamics of flow	Does not support good
	Morphology	Supports good
Chemical status		Does not require assessment
Designated A/HMWB		No

Table 3.37 Results of screening assessment for the Freight Management Facility

Water body name and ID number	Type	Description	Screened in?	Justification
Bucklesham Mill River GB105035040280	River	Currently at Poor Ecological Status due to modifications to the hydrological regime (abstraction for public water supply and agricultural use) and resulting pressures on fish.	No	Screened out because the proposed activities are not located within the water body catchment and no mechanism for impact has been identified.
2009 river water body named 'Orwell (Tidal)' GB105035040420 located within the larger transitional water body Orwell GB520503613601	Transitional	Currently at Moderate Ecological potential and good chemical status. Moderate ecological potential is due to angiosperms, invertebrates and dissolved inorganic nitrogen. Heavily modified for coastal and flood protection.	Yes	Screened in because the proposed activities are located within a flow pathway which could impact on a small surface water course and could therefore affect its biology, hydromorphology and physico-chemistry. The catchment is too small (<5km^2) to be classified as a river water body in its own right. As a result of the review in 2015, it is now part of the larger transitional Orwell water body.
Suffolk GB650503520002	Coastal	Heavily modified for flood protection use and coast protection use. Moderate Ecological Potential due to pressures on dissolved inorganic nitrogen.	No	Screened out because the proposed activities are located at a terrestrial site that is not directly hydrologically connected to this water body and no mechanism for impact has been identified.
Felixstowe Peninsula Crag & Chalk GB40501G401800	Groundwater	Classified as being of Good Quantitative and Poor Chemical Status, with an overall water body classification of Poor. The poor chemical status has been attributed to impacts from agriculture as evidence by elevated nitrate concentration in groundwater.	Yes	Screened in because the proposed activities are underlain by this water body and could therefore affect the quality and quantity of groundwater.

c) Stage 2: Scoping

i. Purpose of this section

3.9.33. This section presents the results of the scoping assessment undertaken on the water bodies identified in **section 3.9b)**, using the methodology outlined in **Part 1**.

ii. Impacts of project activities on water body quality elements

Assessment of potential mechanisms for impact

3.9.34. The scoping questions presented in **Part 1** have been applied to each water body individually for each of the construction, operational and removal and restoration stage activities listed in **Table 3.35**. The results of the scoping assessment are provided in **Appendix 3G** and summarised in **Table 3.38**.

Table 3.38 Activities with the potential to affect water body quality elements and status at the Freight Management Site

Activity	Water body	Quality element scoping
Construction		
C1 Site preparation, earthworks and construction	Orwell	Hydromorphology: All elements (see **Appendix 3G**) scoped out because the **CoCP** (Doc Ref. 8.11) and **Outline Drainage Strategy** (**Appendix 2A** of **Volume 2** of the **ES**) include measures to prevent significant changes to the hydrology and morphological conditions.
		Physico-chemistry: All elements scoped out because the **CoCP** and **Outline Drainage Strategy** include measures to sufficiently minimise the release of pollutants into the water environment.
		Biology: All elements scoped out because the **CoCP** and **Outline Drainage Strategy** include measures to prevent significant changes to hydromorphology and physico-chemistry.
	Felixstowe Peninsula Crag & Chalk	Quantity: All elements scoped out because the overall volume of water discharging to ground is unlikely to significantly change.
		Quality: All elements scoped out the **CoCP** and **Outline Drainage Strategy** include measures to sufficiently minimise the release of pollutants into the water environment.
Operation		
O1 Management of drainage	Orwell	Hydromorphology: All elements scoped out because the **Outline Drainage Strategy** includes measures to prevent significant changes to the hydrology and morphological conditions.
		Physico-chemistry: All elements scoped out because the **Outline Drainage Strategy** includes measures to sufficiently minimise the release of pollutants into the water environment.
		Biology: All elements scoped out because because the **Outline Drainage Strategy** includes measures to prevent significant changes to hydromorphology and physico-chemistry.
	Felixstowe	Quantity: All elements scoped out because the **Outline Drainage Strategy** includes measures to prevent significant changes

Activity	Water body	Quality element scoping
	Peninsula Crag & Chalk	to the volume of water discharging to ground.
		Quality: All elements scoped out because the **Outline Drainage Strategy** includes measures to sufficiently minimise the release of pollutants into the water environment.
Removal and reinstatement		
R1 Removal and reinstatement	Orwell	Hydromorphology: All elements scoped out because the **Outline Drainage Strategy** includes measures to would prevent significant changes to the hydrology and morphological conditions.
		Physico-chemistry: All elements scoped out because the **Outline Drainage Strategy** includes measures to sufficiently minimise the release of pollutants into the water environment.
		Biology: All elements scoped out because the **Outline Drainage Strategy** includes measures to would prevent significant changes to the hydrology and morphological conditions and therefore potenital risks to biology.
	Felixstowe Peninsula Crag & Chalk	Quantity: All elements scoped out because the **Outline Drainage Strategy** includes measures to prevent changes to the volume of water discharging to ground.
		Quality: All elements scoped out out because the **Outline Drainage Strategy** includes measures to sufficiently minimise the release of pollutants into the water environment.

3.9.35. **Table 3.38** demonstrates that the proposed construction, operational and removal and reinstatement stage activities do not have the potential to directly or indirectly impact upon the quality element supported by the Orwell and Felixstowe Peninsula Crag & Chalk water bodies. This is because the potential impacts resulting from the construction and removal and reinstatement activities would be mitigated through the measures in the **CoCP** (Doc Ref. 8.11) and **Outline Drainage Strategy** (**Appendix 2A** of **Volume 2** of the **ES**).

3.9.36. **Table 3.38** also demonstrates that potential impacts resulting from the operation of the freight management facility would be mitigated by the design measures included in f the **Outline Drainage Strategy** (**Appendix 2A** of **Volume 2** of the **ES**).

3.9.37. All project activities, therefore, have been scoped out of further assessment for both water bodies at this stage.

iii. Impacts of project activities on RBMP improvement and mitigation measures

RBMP measures applicable to each water body

3.9.38. There are no RBMP mitigation measures specifically relevant for the smaller surface water course. The ones for the Orwell relate to dredging and disposal which are not relevant. As a result, RBMP mitigation measures for the surface water bodies are scoped out of the assessment.

3.9.39. The Felixstowe Peninsula Crag & Chalk groundwater body has a list of improvement measures in the RBMP. These are summarised in **Table 3.39**.

Table 3.39 Potential impact of the Freight Management Facility on RBMP improvement measures for Felixstowe Peninsula Crag and Chalk

Improvement measure	Potential impact
Generic and water body specific: Field and Crop – Arable soils (control or manage diffuse pollution sources, reduce diffuse pollution)	The **CoCP** and **Outline Drainage Strategy** include measures to reduce diffuse pollution at source for all three phases of the freight management facility. As a result, no impacts on these improvement measures are predicted.
Generic and water body specific: Field and Crop – Livestock (control or manage diffuse pollution sources, reduce diffuse pollution)	
Generic and water body specific: Field & Crop - Nutrients/Other Rural sources (control or manage diffuse pollution sources, reduce diffuse pollution)	
Generic and water body specific: Surface run-off and drainage livestock (control or manage diffuse pollution, reduce diffuse pollution pathways)	

Assessment of potential mechanisms for impact

3.9.40. **Table 3.39** also presents an assessment of potential impacts from the freight management facility on each RBMP improvement measure. This demonstrates that the proposed activities would not counteract or adversely affect the delivery of the improvement measures to be made in the Felixstowe Peninsula Crag and Chalk groundwater body. RBMP improvement measures, therefore, do not require further assessment in Stage 3.

iv. Impacts of project activities on Protected Areas

Protected Areas within each water body

3.9.41. Protected Areas within each of the WFD water bodies identified during the screening phase are listed in **Table 3.40** and shown in **Figure 3.19** against the 2km boundary.

Table 3.40 List of Protected Areas within each WFD water body

Water body	Protected Area Driver	Within 2km?
Orwell	Nitrates Directive - NVZ 410	Not located within 2km of the proposed development.
	Habitats Directive - Stour and Orwell Estuaries SPA and Ramsar site	This *Natura 2000* site is located within 2km
Felixstowe Peninsula Crag & Chalk	Nitrates Directive – NVZ 78	NZV 78 is located within 2km of the proposed development.
	WFD (formerly Surface Water Abstraction Directive) – Felixstowe Peninsula Crag & Chalk	Not located within 2km of the proposed development.

Assessment of potential mechanisms for impact

3.9.42. **Table 3.40** demonstrates that the Natura 2000 Protected Areas; Stour and Orwell Estuaries SPA and Ramsar site are located within the 2km ZOI. WFD compliance assessments require the consideration of the potential effects on WFD quality elements (hydromorphological, physico-chemical, chemical and biological), many of which support ecological interest features for which the Natura 2000 Protected Areas are designated. The **Shadow HRA Report** (Doc Ref. 5.10) therefore builds on the output of this assessment to assess the potential effects on designated site interest features. Therefore, to avoid duplication with the Shadow HRA, impacts on the designated site interest features themselves are not considered here.

3.9.43. With respect to NVZs, foul water generated on site could release nitrates and other nutrients if discharged untreated to the water environment.

3.9.44. Foul water generated in construction site compounds and during operation could release nitrates and other nutrients if discharged, untreated to the water environment. However, all foul waters generated would be contained and/or adequately treated to ensure that the project activities would not result in the release of significant quantities of nitrates and other nutrients.

3.9.45. As such, no mechanism to impact upon these NVZs has been identified. Therefore, all Protected Areas have been scoped out of further assessment in Stage 3.

v. Stage 2 Summary

3.9.46. The assessment demonstrates that project activities during construction, operation and removal and reinstatement would not have direct or indirect effects on the Orwell and Felixstowe Peninsula Crag & Chalk water bodies that would be sufficient to cause deterioration in the status of the water body or Protected Areas located within the water bodies. Furthermore, the proposed project activities would not counteract or otherwise affect the delivery of the improvement measures that have been identified in the RBMPs for the groundwater body.

3.9.47. This means that the project would not have non-temporary impacts on water body status that are sufficient to result in the deterioration of these water bodies. Furthermore, the project would not prevent any water body status objectives being achieved in the future.

3.9.48. Consequently, no elements of the proposed development have been progressed to Stage 3 detailed compliance assessment, and the freight management facility is considered to be compliant with the requirements of the WFD.

3.10 Rail

a) Introduction and project description

i. Overview of proposals

3.10.1. The green rail route in its entirety comprises a temporary rail extension of approximately 4.5km from the existing Saxmundham to Leiston branch line to a terminal within the main development site. The proposed rail extension route comprises the section approximately 1.8 km in length from a junction with the existing Saxmundham to Leiston branch line to the proposed B1122 (Abbey Road) level crossing inclusive. The 2.7km part of the rail extension route between the proposed B1122 (Abbey Road) level crossing and the terminal within the main development site is detailed in **Part 2** of this WFD compliance assessment.

3.10.2. Proposed rail improvement works are also required to the existing track and level crossings on the Saxmundham to Leiston branch to accommodate up to three freight trains (six movements) per day once the proposed green rail route is operational.

3.10.3. Once the proposed green rail route (including the proposed rail extension route) is no longer required for the construction of the Sizewell C Project, it would be removed, and the land reinstated. However, the proposed rail improvement works would be permanent.

Proposed rail extension route

3.10.4. The element of works considered within this Part of the WFD compliance assessment is the 1.8km section (approximately) from Saxmundham Road up to and including a temporary level crossing on the B1122 (Abbey Road) and land required for the temporary construction compound required in association with the construction of this level crossing. The remainder of the proposed rail extension route forms part of the Sizewell C main development site and is detailed in **Part 2** of this WFD compliance assessment.

3.10.5. The proposed rail extension route is comprised of two main sections, further details of which are provided below:

- Saxmundham Road to Buckleswood Road (including the Buckleswood Road level crossing); and
- Buckleswood Road to B1122 (Abbey Road) (including the B1122 (Abbey Road) level crossing).

3.10.6. Where the proposed rail extension route is in the cutting, drainage infrastructure would collect runoff from both sides of the track and cutting. Swales are proposed to the north of the proposed rail extension route (between the landscape bund and the track), up to 1m wide and located 200 millimetres (mm) below the base of the sub-ballast. Runoff which does not infiltrate will pass though the sub-ballast to the swales.

3.10.7. Where the rail extension route is at grade or on an embankment, the drainage infrastructure would be designed to collect runoff from the track and any overland flow which is interrupted by the embankment or track. Swales would be provided on the north side of the track (between the landscape bund and the track), with side slopes at a gradient of one in three and a width of 1m at base. The base of the swales would be 200mm below the base of the sub-ballast if the track is on the level or at the toe of the embankment.

3.10.8. There is also the potential for a larger infiltration basin proposed at the eastern end of the site, between the proposed rail extension route and the landscape bund to the south, to provide for additional temporary surface water storage if required.

Saxmundham Road to Buckleswood Road rail (including level crossing)

3.10.9. The proposed rail extension route would connect into the existing Saxmundham to Leiston branch line via a new junction approximately 500m east of the Saxmundham Road level crossing and approximately 230m south of Buckles Wood. This section would be approximately 400m long and at grade. A new turnout will be installed at the point where the rail extension route joins the existing Saxmundham to Leiston branch line.

3.10.10. Key features include:

- A landscaped bund of 2m in height (from existing ground level), running alongside the north of the rail extension route, which would help provide visual screening.
- A temporary automated level crossing where the proposed rail extension crosses Buckleswood Road.
- The diversion of Footpath E-363/003/0 via the Buckleswood Road level crossing. The diversion route would be approximately 500m in length.

3.10.11. The proposed rail extension would be one-track only at the location of the level crossing and it would not be electrified.

3.10.12. The existing highway on Buckleswood Road would be widened to approximately 6m for a distance of approximately 15m beyond the stop line on each approach to the level crossing.

Buckleswood Road to B1122 (Abbey Road) (including level crossing)

3.10.13. From Buckleswood Road, the rail extension route would continue further north-eastwards through open countryside and farmland to the south of Abbey Lane. This section would be approximately 1.4km long with elements at grade, on embankments up to 2.5m high (above ground level) and in cuttings to a depth of up to 3.5m.

3.10.14. Key features include:

- A landscaped bund approximately 2m in height (above ground level), running alongside the north of the rail extension route, and a second bund (also approximately 2m high) to the south of the rail extension at the eastern end of the green rail route, west of the B1122 (Abbey Road).

- A temporary level crossing where the rail extension route meets the B1122 (Abbey Road).
- Modifications to the B1122 (Abbey Road) to incorporate the level crossing.
- The permanent realignment of Lover's Lane and relocation of its junction with the B1122 (Abbey Road), which forms part of the Sizewell C main development site, is detailed further in in **Part 2** of this WFD compliance assessment and **Volume 2** of the **ES**.
- The diversion of two footpaths to utilise the B1122 (Abbey Road) level crossing.

3.10.15. The rail extension route will be one-track only at the location of the level crossing and it would not be electrified.

3.10.16. The modifications to the B1122 (Abbey Road) required to facilitate the level crossing would comprise waiting areas on each side of the rail extension for pedestrians, cyclists and horses.

3.10.17. To the west of the B1122 the route cuts across two public footpaths. These are E-363/006/0 linking Westward Ho and Abbey Lane, and E-363/010/0 passing alongside the second Leiston Abbey site linking the B1122 (Abbey Road) and Abbey Lane. The footpaths would be diverted eastwards to the proposed B1122 (Abbey Road) level crossing before heading back westwards and re-joining the original alignment.

Proposed rail improvement works

3.10.18. Following a review of the condition of the track on the Saxmundham to Leiston branch line by Network Rail, a need to upgrade the track to accommodate the number freight movements required for the integrated freight strategy was identified:

- Track replacement on the Saxmundham to Leiston branch line.
- Upgrade works to up to eight level crossings on the branch line.

3.10.19. All of the rail infrastructure upgrades to the Saxmundham to Leiston branch line would be retained following completion of the construction of Sizewell C.

Track replacement on the Saxmundham to Leiston branch line

3.10.20. The proposed track replacement on the Saxmundham to Leiston branch line comprises the renewal of the entire length of track from Saxmundham junction up to the Sizewell level crossing in Leiston, using new ballast, flat bottom continuously welded rail on concrete sleepers. Further investigation

is required to determine whether the entire length of track from Saxmundham junction up to the Sizewell level crossing requires upgrading. However, as part of the **Draft DCO** (Doc Ref 3.1)**,** the replacement of the entirety of this length of track is proposed so that the full replacement work can be carried out should it prove necessary. As such, the replacement of the entire track up to the Sizewell level crossing has been assumed to ensure that it assesses a 'worst case' scenario.

3.10.21. Where the Saxmundham to Leiston branch line meets the East Suffolk line, junction improvements are proposed to allow for a faster, quieter and more reliable transfer of trains between the lines (as requested by Network Rail). This would require upgrading the existing junction and provision of an additional crossover on existing Network Rail land, providing a legacy benefit to passenger and freight travel at the junction.

Upgrade works to level crossings

3.10.22. Trains bringing materials for the construction of the Sizewell C main development site would travel along the East Suffolk line as far as Saxmundham and then crossover to the Saxmundham to Leiston branch line towards Leiston.

3.10.23. There are nine operational level crossings on the Saxmundham to Leiston branch line between the Saxmundham junction and Sizewell Halt. However, Sizewell Halt will not be used for the delivery of freight by rail, with delivery of freight in the early years being to a temporary rail terminal at the Land East of Eastlands Industrial Estate (LEEIE), as detailed in **Volume 2** of this **ES**. Therefore, no upgrades will be required to the Sizewell level crossing at King George's Avenue. The locations of the eight level crossings to be upgraded are listed below, with those identified for upgrades more substantial than miniature stop light crossings (and thus requiring additional land for the works) shown in **Figure 3.20** and outlined in **Table 3.41**.

Table 3.41 Summary of level crossing works

Crossing ID	Crossing name	Proposed change	Description of changes
SWC48	Bratts Black House	Upgrade to Miniature stop light (MSL).	Miniature stop lights would be placed on the right hand side of each gate. New level crossing decking panels would be added and fencing
SWC49	Knodishall	Upgrade to Automatic barrier crossing locally monitored	Install two barriers of approximately 3.6m in the nearside corners. Footways (1m wide) on both sides of the crossing to be installed.

Crossing ID	Crossing name	Proposed change	Description of changes
		(ABCL).	
SWC50	West House	Upgrade to ABCL.	Two barriers of 3.6m would be installed to the south-west and north-east of the crossing. Footways (1m wide) on both sides of the crossing to be installed.
SWC51	Snowdens	Upgrade to MSL.	Miniature stop lights would be placed on the right hand side of each gate. New level crossing decking panels would be added and fencing
SWC52	Saxmundham Road	Upgrade to ABCL.	Two barriers of 4.1m would be installed to the south-west and north-east of the crossing. Footways (1m wide) on both sides of the crossing to be installed.
SWC53	Buckles Wood	Upgrade to MSL.	Miniature stop lights would be placed on the right hand side of each approach and yellow decking panels would be added. An extended anti-slip surface would be added. Fencing.
SWC54	Summerhill	Upgrade to MSL.	Miniature stop lights would be placed on the right hand side of each approach and yellow decking panels would be added. An extended anti-slip surface would be added. Fencing.
SWC55	Leiston	Upgrade to Train crew operated crossing (TOB).	Three barriers of 6.6m and one barrier of 8.6m would be used in the four corners.

ii. Construction

3.10.24. Construction is envisaged to tale circa 18 months and is expected to be operational within the first two years of the Sizewell C Project construction programme as shown in the Indicative Phasing Schedule in the **Implementation Plan** appended to the **Planning Statement** (Doc Ref 8.4). Construction for the proposed rail extension route would be managed from two compounds; a primary temporary construction compound, located within the Sizewell C main development site at the eastern end of the green rail route, and a secondary temporary construction compound at the western end of the proposed rail extension route. The secondary compound at the western end of the proposed rail extension route would also act as the main compound for the proposed rail improvement works on the Saxmundham to Leiston branch line.

3.10.25. The branch line would have four satellite construction compounds located at the following level crossing upgrade sites:

- Knodishall.
- West House.
- Saxmundham Road.
- Leiston.

3.10.26. Two additional temporary compounds, one for each of the new level crossings at Buckleswood Road and the B1122 (Abbey Road), would be set up for the construction and removal and reinstatement phases of these temporary level crossings.

3.10.27. As outlined in **section 3.3**, the **CoCP** (Doc Ref. 8.11) sets out the measures and controls that SZC Co. will require its contractors to adopt during construction and removal and reinstatement phases of the proposed development, where appropriate, and provides an outline of the environmental management plans that will be implemented on site.

Proposed rail extension route

3.10.28. Following initial site clearance and enabling works (including vegetation clearance and erection of temporary worksite fencing), the rail extension route would be constructed in two principal phases:

- Earthworks: Construction of the earthworks to support the trackform and construction of a temporary haul road.
- Track installation: Installation of the track which would link the Sizewell C main development site to the existing Saxmundham to Leiston branch line.

3.10.29. Earthworks would take approximately three to four months to complete and would involve the movement of material as required to create the necessary cutting and embankments along the route. The proposed landscape bunds would be constructed from the excess cut and fill material with additional material imported from the cutting for the part of the green rail route which lies within Sizewell C main development site if necessary.

3.10.30. Following the completion of earthworks along the proposed rail extension route corridor, a temporary haul road would be constructed, and track drainage and culverts would be installed followed by the laying of railway ballast to construct the track bed.

3.10.31. The next stage of works, track installation would consist of track laying activities which is expected to take up to five months.

3.10.32. It is envisaged that materials to the site would be delivered via one rail ballast train per day (based on assumed ballast construction productivity rate) to the junction of the proposed turnout on the Saxmundham to Leiston branch line. The rails and ballast would be delivered on the Saxmundham to Leiston branch line and unloaded at the western end of the site. Other materials (such as switches and crossings) would be transported by an HGV flatbed via Lover's Lane and the temporary haul route to the turnout worksite if they are unable to be transported by rail.

3.10.33. The new track construction train would be deployed from the Saxmundham to Leiston branch line and would commence track construction beyond the turnout, laying sleepers, moving rails into final position and clipping the rail to sleepers. Following use of the NTC train, auto-ballast trains would be deployed from the Saxmundham to Leiston branch line to lay top-ballast along the length of the rail extension route.

3.10.34. A tamper train would then be run over the section of newly ballasted rail to lift the rails and stabilise/compact the ballast following which a stabiliser train would be run over the newly laid track to provide a final compaction.

3.10.35. SuDS would be implemented early in the construction period and would intercept site run-off before infiltrating it to ground. The proposed SuDS would also prevent the supply of sediment and other contaminants into the surface drainage network.

B1122 (Abbey Road) level crossing

3.10.36. Construction of the B1122 (Abbey Road) level crossing would take up to five months and would be completed within nine months of the construction of the proposed rail extension route commencing. The level crossing would be constructed in isolation from the rest of the rail extension. It is envisaged that it would be constructed as follows:

- Temporary construction compound and access established within the Sizewell C main development site.
- Offline construction of Lover's Lane realignment and temporary realignment of the B1122 (Abbey Road), including necessary earthworks and paving. Traffic would then be diverted on the new temporary alignment.
- Excavation of the track alignment for the length of the B1122 (Abbey Road) level crossing only.
- Level crossing equipment installed (including foundations, communications and power cables, structures, barriers, traffic signals).
- Track (ballast, sleepers and rails) installed.

- Signalling equipment installed (including communications and power cables, signals).
- Lighting and CCTV installed.
- Level crossing panels installed across track.
- Permanent highway reinstated and commissioned.

3.10.37. The level crossing at B1122 (Abbey Road) involves the construction of a temporary highway alignment to avoid long-term road closures during construction. The temporary highway alignment will be approximately 300m in length and 5m wide, including the connections to the existing highway. A temporary construction compound would be established on site to manage the construction of the B1122 (Abbey Road) level crossing.

Buckleswood Road level crossing

3.10.38. The construction of the Buckleswood Road level crossing and temporary construction compound will take approximately five to six months, with the highway realignment taking approximately two and a half months. The level crossing will be constructed in isolation, independent from the construction of the rest of the rail extension route. The rest of the route, on either side of the level crossing, will be constructed thereafter.

3.10.39. It is envisaged that the construction of the Buckleswood Road level crossing would be constructed as follows:

- Construction compound and access established south of Buckleswood Road.
- Temporary realignment of Buckleswood Road, including necessary earthworks and paving. Traffic would then be diverted on the new temporary alignment.
- Excavation of the track alignment for the length to include the Buckleswood Road level crossing.
- Level crossing equipment installed (including foundations, communications and power cables, structures, barriers, traffic signals).
- Track (ballast, sleepers and rails) installed. A total length of 60m of track will be installed, centred on the level crossing.
- Signalling equipment installed (including communications and power cables, signals).
- Level crossing panels installed across track.
- Lighting and CCTV installed.
- Permanent highway reinstated and commissioned.

3.10.40. The level crossing construction would also involve the construction of a temporary highway alignment to avoid long-term road closures during construction. The temporary highway alignment will be approximately 300m in length and 5m wide, including the connections to the existing highway. A temporary construction compound would be established on site to manage the construction of the Buckleswood Road level crossing.

Proposed rail improvement works

3.10.41. At the level crossings, the scope and extent of construction would generally comprise limited works confined to the existing rail and highways boundaries wherever possible. On the four level crossings where the upgrades are more substantial that an MSL crossing, additional land would be required temporarily to form satellite compounds to undertake the works. The satellite compounds are detailed further below.

3.10.42. On the Saxmundham to Leiston branch line, some maintenance works to existing culverts may be required. This is likely to include bracing but would not require works to the watercourse itself. These works would form part of Network Rail's standard asset management procedures to ensure operational maintenance of the existing branch line. Therefore, this work does not form part of the DCO proposals.

3.10.43. It is anticipated that all of the proposed works to the Saxmundham to Leiston branch line would take approximately nine months to complete and are expected to be operational within the first year of the Sizewell C Project construction programme.

3.10.44. The upgrade works to MSL crossings at Bratts Black House, Snowdens, Buckle's Wood, and Summerhill would each take between four and six weeks. The MSL upgrade works would include:

- Hand digging for the bases.
- Installation of posts using concrete mixers or pre-cast base.
- Testing and commissioning.

3.10.45. At the other level crossing sites, construction works would be up to six months in duration and could be taken in parallel.

3.10.46. The upgrade works would include:

- installation of level crossing equipment (foundations, power cables, barriers, traffic signals);
- installation of associated signalling equipment; and

- fitting suitable panels to the level crossing deck.

3.10.47. To facilitate the delivery of the proposed rail improvement works, the temporary western construction compound located off Buckleswood Road, which forms part of the proposed rail extension route, would be used as the main compound for the works. Whilst the temporary western compound would be the main base for the construction of the proposed rail improvement works, four satellite compounds on the Saxmundham to Leiston branch line would be used as bases to manage specific works on a particular level crossing site, with only minimal facilities required. These satellite compounds would be managed from the western compound.

3.10.48. Materials and components for the proposed rail improvement works to the existing level crossings would be stored trackside. The parking and comfort facility would be stored on geotextile matting without the need to remove topsoil from the satellite compounds. The western compound would provide a more substantial welfare facility for staff to use on extended breaks.

iii. Operation

3.10.49. SuDS would be implemented for the operation of the proposed rail extension route. Whilst the rail extension route is located within Flood Zone 1, it is anticipated that drainage would be required along the rail extension route that would collect and hold runoff on a temporary basis, allowing infiltration to ground over time. This would ensure track stability and durability throughout operation and also to ensure that there would be no flooding which could prevent operation.

3.10.50. Periodic inspection and maintenance of the drainage infrastructure would be required to ensure the continued efficacy of the surface water drainage system.

3.10.51. Rail track drainage systems shall comply with the Network Rail – NR/L2/CIV/005 (Ref. 2.2) Drainage Systems Manual. This Network Rail standard includes mandatory requirements for track drainage design.

3.10.52. Where collector drains and carrier drains are used to convey surface water away from the rail, the surface water shall be treated in swales and infiltration trenches adjacent to the track.

3.10.53. The **Outline Drainage Strategy** is described in more detail in **Volume 2**, **Chapter 2**, **Appendix 2A** of this **ES** (Doc Ref. 6.3).

iv. Removal and reinstatement

Proposed rail extension route

3.10.54. Once the proposed rail extension route is no longer required, it would be removed, including the track bed and level crossings, and the site reinstated to agricultural use, with the temporary level crossings reinstated to highway.

3.10.55. This would generate some vehicle movements associated with the earthworks, though these would generally be along the line of the route rather than on public roads. These effects would be comparable in nature and duration to those of the proposed rail extension route construction phase. However, they would take place towards the end of the Sizewell C development construction phase when large-scale earthworks and movements of freight would be lower compared to the period when the proposed rail extension route would be constructed.

3.10.56. Following removal of the rail extension route, any highway that has been diverted or stopped up as a requirement of the proposed development would be reinstated and the level crossings removed. The relocated junction of the B1122 and Lover's Lane would remain in place.

3.10.57. It is expected that removal and reinstatement would take place within the final 24 months of the Sizewell C Project construction programme, as shown in the Indicative Phasing Schedule in the **Implementation Plan** (appended to the **Planning Statement**), and would be undertaken as follows:

- Designate the railway as non-operational and work on or near the track will be under Principal Contractor's construction railway rules.
- Re-establish site boundary fencing as necessary.
- Remove lineside fencing, where possible unbolt transoms, burn-off posts and remove foundations with excavators, and transport to recycling centre by road.
- Re-establish haul roads.
- Cut and unclip rails, and transport rails west using rail/road excavators.
- Excavate ballast and load onto tipper trucks and transport to a site transfer area adjacent to the Saxmundham to Leiston branch line rail access area for onward transfer to recycling centre by rail.
- Excavate crushed rock sub-base and load onto tipper trucks – transport to a site transfer area adjacent to the Saxmundham to Leiston branch line rail access area for onward transfer to recycling centre by rail.

- Remove any geotextiles and transport to a site transfer area for onward transfer to recycling centre by road.
- Fill cuttings/excavate embankments and grade for reinstatement.
- Reinstate topsoil and landscape – reseeding and replanting in accordance with the **Outline Soil Management Plan** (**Volume 2**, **Appendix 17C**) (Doc Ref. 6.3).

3.10.58. The railway line and Buckleswood Road and B1122 (Abbey Road) level crossings would be decommissioned and removed. For the level crossings this would involve:

- Construction compounds and access.
- Temporary realignment of the B1122 (Abbey Road)/Buckleswood Road, including necessary earthworks and paving.
- Disconnecting all power and communications cables from the level crossing and associated signalling equipment;
- Removal of level crossing equipment, including panels, barriers, traffic signals, obstacle detection systems. Wherever possible, this equipment will be reused elsewhere on the rail network or recycled.
- Removal of the track (rail, sleepers, ballast and sub-grade); and
- Reinstatement of the permanent highway surface and vegetation and removal and reinstatement of temporary compounds to agricultural use.

3.10.59. Following completion of operations, all agricultural land taken temporarily would be reinstated to its former use. Topsoil would be restored in line with the **Outline Soil Management Plan** (**Appendix 17C** of **Volume 2, Chapter 17** of the **ES** (Doc Ref. 6.3)). Permanent surface water/agricultural drains would be reinstated. During the removal and reinstatement phase, the construction mitigation measures concerning surface water would be applied as necessary in accordance with the **CoCP** (Doc Ref. 8.11).

Proposed rail improvement works

3.10.60. All of the rail infrastructure upgrades to the Saxmundham to Leiston branch line would be retained following completion of the construction of Sizewell C main development site. Therefore, there would be no removal and reinstatement phase for these proposals.

v. Baseline for assessment

3.10.61. The current baseline conditions of any identified water bodies are considered appropriate for the duration of the construction phase of both the temporary rail extension and rail improvements. The current baseline is

also considered to be appropriate for the operation and removal and reinstatement phases of the rail extension because it would need to be fully operational in advance of the peak of construction at the main development site and would be removed following completion of construction activities.

3.10.62. Although the current baseline is also likely to be applicable to the operational phase of the rail improvement works, the permanent nature means that the baseline could change in the future (e.g. water body status could change in response to natural variations or as a result of improvement or mitigation measures delivered by the Environment Agency and partner organisations). The potential future baseline will therefore be considered in Stage 3 if any scheme elements are scoped in to further assessment.

b) Stage 1: Screening

i. Identification of activities

3.10.63. The description provided in **section 3.10a)** demonstrates that there are a wide range of activities associated with the proposed rail improvements. Because many would be limited to minor works to upgrade existing infrastructure, they are unlikely to impact upon any type of water receptors considered under the WFD.

3.10.64. Activities from each component of the proposed rail improvements have, therefore, been subjected to an initial screening exercise. If a potential pathway was identified, the proposed improvement was divided into activities for assessment as per the methodology presented in **Part 1**. The outputs of this exercise are summarised in **Table 3.42**.

Table 3.42 Summary of site screening phase for the proposed rail improvement works

Rail improvement	Potential effect on water receptors?	Screened in?
Rail extension part of the Green Rail Route	Construction activities and permanent changes to local drainage could potentially impact the water environment.	Yes
Rail improvements: Saxmundham to Leiston branch line upgrades: Track replacement	Replacement of the track would involve only shallow excavation and will all take place within the extent of the existing line. The track replacement will be completed to current best practice and would meet Network Rail standards for freight transport. Drainage and the management of contaminants via accidental release will be managed through the measures in the **Outline Drainage Strategy** and **CoCP**. The assessment for effects on controlled waters from on-site contamination carried out in **Chapter 11** of **Volume 9** of the **ES** and its appendices identified a negligible effect to all controlled waters. There will therefore be no effect on	No

Rail improvement	Potential effect on water receptors?	Screened in?
	groundwater and surface water bodies.	
Rail improvements: Saxmundham to Leiston branch line upgrades: Upgrade works to level crossings	Minor upgrading works to existing crossings such as addition of barriers and stop lights. Confined to the existing rail and highways boundaries wherever possible. Unlikely to be a significant risk to the water environment.	No

3.10.65. This demonstrates that minor works to renew existing track and upgrading of existing crossings are considered unlikely to present a risk to the water environment given the nature and small scale of the proposed works. They are, therefore, not considered further in this assessment.

3.10.66. The proposed rail extension route would require more significant construction that could affect the water environment. This part of the proposed development has, therefore, been separated into activities in line with the requirements of the guidance produced by the Environment Agency (Ref. 3.3) and Planning Inspectorate (Ref. 3.4). These activities are listed in **Table 3.43**.

Table 3.43 Summary of the proposed rail extension route activities

Reference Number	Activity	Sub activities included
Construction		
C1	Site preparation, earthworks and construction	Earthworks, level crossings, landscaped bunds, embankments, drainage infrastructure including SuDS.
Operation		
O1	Management of drainage	Operational use of the site and associated water management measures.
Removal and reinstatement		
R1	Removal and reinstatement	Removal of site infrastructure, removal of track and ballast, reinstatement of agricultural land.

ii. Water body identification

3.10.67. **Figure 3.21** shows the WFD water bodies that could be hydrologically connected to the proposed rail improvements. In addition to WFD water body mapping, potential hydrological connectivity has been determined with

reference to main rivers, ordinary watercourses and surface water flow routes that may not be shown on published mapping (identified using Environment Agency flood mapping). This process therefore considers the water bodies in whose catchments the proposed activities are located, and where relevant, connected water bodies upstream and downstream.

3.10.68. The majority of the proposed rail extension route is located within the Leiston Beck catchment. A series of ditches cross the site, which in turn feed the upper reaches of the Leiston Beck to the east of the B1122 (Abbey Road). The upper reaches of the channel are classed as ordinary watercourses, whilst the main river limit is at Lover's Lane, approximately 950m from the site. The WFD reported reach of the Leiston Beck aligns with the main river. Both the B1122 Abbey Road and Lover's Lane separate the proposed rail extension from this watercourse. There are no permanent ponds in the vicinity of the proposed rail extension. The drainage network on the site is largely manmade, albeit formalising what would most likely have been ephemeral water features.

3.10.69. The Hundred River, which is a designated main river, is approximately 740m to the west of the site.

3.10.70. The proposed rail extension route is located on the Waveney and East Suffolk Chalk and Crag groundwater body. The site is underlain by a Principal Aquifer in the Crag Group bedrock. The superficial deposits of the Lowestoft Till Formation which overlie the bedrock supports a Secondary A Aquifer and a Secondary (Undifferentiated) Aquifer. The diamicton of the Lowestoft formation at the site is expected to be of relatively low permeability and therefore have a limited hydraulic connection to the underlying Crag groundwater. It is likely that there are perched water tables in permeable lenses within the Lowestoft Formation. Given the local geology and depth to groundwater there is not considered to be a substantial connection between groundwater and surrounding surface water features.

3.10.71. The Sizewell Marshes Site of Special Scientific Interest (SSSI) is located approximately 950m east of the site. The SSSI is a Groundwater Dependent Terrestrial Ecosystem and hydrologically linked to the site via the Leiston Drain. In addition, the Aldhurst Farm habitat creation scheme is located approximately 500m to the east of the site.

3.10.72. A screening exercise has been undertaken to identify which of the water bodies have the potential to be impacted by the activities. The results of this exercise are included in **Table 3.44**.

Table 3.44 Results of screening assessment for the proposed rail extension route

Water body name and ID number	Type	Description	Screened in?	Justification
Leiston Beck GB105035046271	River	Heavily modified for land drainage. Currently at Moderate Ecological Potential due to pressures on hydromorphology and high phosphate concentrations.	Yes	Screened in because the proposed rail extension route would be located partly within the catchment of this water body and could therefore affect its biology, hydromorphology and physico-chemistry.
Minsmere Old River GB105035046270	River	Heavily modified for land drainage. Currently at Moderate Ecological Potential due to pressures on fish populations. Approximately 0.24km^2 of the catchment falls within the main development site boundary, with the remainder of the 70.1km^2 catchment located to the north and west of the site	No	Screened out because the proposed rail extension route is not located within this water body catchment.
Hundred River GB105035046260	River	Heavily modified for flood protection. Currently at Moderate Ecological Potential due to hydromorphological modifications, low dissolved oxygen and moderate phosphate concentrations, and pressures on fish populations.	No	Screened out because the proposed rail extension route would be confined to a very small proportion of the water body catchment (0.016km^2, 0.06%), are located on the watershed and are not connected to any identified flow paths that connect to the drainage network. Note that although several branch line upgrades would also take place in this catchment, these have been screened out of the assessment as described in **Table 9.2**.
River Fromus GB105035045980	River	Currently at poor ecological status due to pressures on fish, invertebrates, dissolved oxygen and phosphate. This water body is not designated heavily modified or artificial.	No	Although branch line upgrades would take place in this catchment, these have been screened out of the assessment as described in **Table 9.2**.
Suffolk GB650503520002	Coastal	Heavily modified for flood protection use and coast protection use. Moderate Ecological Potential due to pressures on dissolved inorganic nitrogen.	No	Screened out because the proposed rail extension route is located a significant distance upstream of this water body and could therefore not affect its

Water body name and ID number	Type	Description	Screened in?	Justification
				biology, hydromorphology and physico-chemistry to any noticeable extent.
Waveney & East Suffolk Chalk and Crag GB40501G400600	Groundwater	Currently at Poor Quantitative Status as a result of an unfavourable water balance and Poor Chemical Status due to diffuse pollution pressures and potential impacts on a Drinking Water Protected Area.	Yes	Screened in because the proposed rail extension route is underlain by this water body and could therefore affect the quality and quantity of groundwater.

3.10.73. This demonstrates that the following water bodies could potentially be impacted by the proposed rail extension route:

- Leiston Beck (GB105035046271).
- Waveney & East Suffolk Chalk and Crag (GB40501G400600).

3.10.74. **Appendix 3A** provides summary data for these water bodies and all water bodies relevant to **Part 3**. The data was provided by the Environment Agency in December 2018, with a further update in July 2019.

c) Stage 2: Scoping

i. Purpose of this section

3.10.75. This section presents the results of the scoping assessment undertaken on the water bodies identified in **section 3.10b)**, using the method outlined in **Part 1.**

ii. Impacts of project activities on water body quality elements

Assessment of potential mechanisms for impact

3.10.76. The scoping questions presented in Part 1 have been applied to each water body individually for each of the construction, operational and removal and reinstatement-stage activities listed in **Table 3.43**. The results of the scoping assessment are provided in **Appendix 3H** and summarised in **Table 3.44**.

Table 3.45 Activities with the potential to affect water body quality elements and status at the proposed rail extension route

Activity	Water body	Quality element scoping
Construction		
C1 Site preparation, earthworks and construction	Leiston Beck	Hydromorphology: All elements (see **Appendix 3H**) scoped out because the **CoCP** (Doc Ref. 8.11) and the **Outline Drainage Strategy** (**Appendix 2A** of **Volume 2** of the **ES**) include measures to prevent significant changes to the hydrology and morphological conditions.
		Physico-chemistry: All elements scoped out because the **CoCP** and the **Outline Drainage Strategy** include measures to prevent sufficiently minimise the release of pollutants into the water environment.
		Biology: All elements scoped out because the **CoCP** and the **Outline Drainage Strategy** include measures to prevent significant changes to hydromorphology and physico-chemistry.
	Waveney & East Suffolk Chalk and Crag	Quantity: All elements scoped out because the overall volume of water discharging to ground is unlikely to significantly change.
		Quality: All elements scoped out because the **CoCP** and the **Outline Drainage Strategy** include measures to sufficiently minimise the release of pollutants into the water environment.
Operation		
O1 Management of drainage	Leiston Beck	Hydromorphology: All elements scoped out because the **Outline Drainage Strategy** includes measures to prevent significant changes to the hydrology and morphological conditions
		Physico-chemistry: All elements scoped out because because the **Outline Drainage Strategy** includes measures to sufficiently minimise the release of pollutants into the water environment
		Biology: All elements scoped out because the **Outline Drainage Strategy** includes measures to prevent significant changes to hydromorphology and physico-chemistry
	Waveney & East	Quantity: All elements scoped out because because the **Outline Drainage Strategy** includes measures to prevent significant

Activity	Water body	Quality element scoping
	Suffolk Chalk and Crag	changes to the volume of water discharging to ground
		Quality: All elements scoped out because because the **Outline Drainage Strategy** includes measures to sufficiently minimise the release of pollutants into the water environment
Removal and reinstatement		
R1 Removal and reinstatement	Leiston Beck	Hydromorphology: All elements scoped out because the **CoCP** and the **Outline Drainage Strategy** include measures to prevent significant changes to the hydrology and morphological conditions
		Physico-chemistry: All elements scoped out because the **CoCP** and the **Outline Drainage Strategy** include measures to sufficiently minimise the release of pollutants into the water environment
		Biology: All elements scoped out because the **CoCP** and the **Outline Drainage Strategy** include measures to prevent significant changes to hydromorphology and physico-chemistry.
	Waveney & East Suffolk Chalk and Crag	Quantity: All elements scoped out because the overall volume of water discharging to ground is unlikely to significantly change
		Quality: All elements scoped out because the **CoCP** and the **Outline Drainage Strategy** include measures would be designed to sufficiently minimise the release of pollutants into the water environment

3.10.77. **Table 3.45** demonstrates that the proposed construction and removal and reinstatement stage activities do not have the potential to directly or indirectly impact upon the quality element supported by the Leiston Beck or Waveney & East Suffolk Chalk and Crag water bodies. This is because the potential impacts resulting from the construction and removal and reinstatement activities would be mitigated through the measures included in the **Outline Drainage Strategy** (**Appendix 2A** of **Volume 2** of the **ES**) and **CoCP** (Doc Ref. 8.11) summarised in **section 2.4**.

3.10.78. **Table 3.45** also demonstrates that potential impacts resulting from the operation would be mitigated by the design measures included in the **Outline Drainage Strategy** (**Appendix 2A** of **Volume 2** of the **ES**).

3.10.79. All quality elements have, therefore, have been scoped out of further assessment.

iii. Impacts of project activities on RBMP improvement and mitigation measures

RBMP measures applicable to each water body

3.10.80. The Environment Agency has not identified any RBMP improvement measures for the Waveney and East Suffolk Chalk and Crag groundwater body. This water body is not, therefore, considered further in this part of the assessment.

3.10.81. However, a range of RBMP mitigation measures that have already been implemented (in place) or are proposed for future implementation (not in place) have been identified for the Leiston Beck water body (included in **Table 3.45**).

Table 3.46 Potential impact of the rail extension on RBMP mitigation measures in Leiston Beck

Measure	Status	Potential impact
Remove obsolete structure	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the future implementation of measures to remove obsolete structures in the water body.
Remove or soften hard bank	Not in place	Project activities during construction, operation and removal and reinstatement would not introduce new hard bank protection or prevent the future implementation of measures to remove or soften hard bank protection in the water body.
Preserve or restore habitats	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the future implementation of measures to preserve or restore habitats in the water body. The establishment of a vegetated buffer strip along the edge of the watercourse that drains the site could potentially provide a limited opportunity to deliver this measure.
In-channel morphological diversity	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the future implementation of measures to increase morphological diversity in the water body.
Re-opening culverts	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent existing culverts on the water body being reopened in the future.
Alter culvert channel bed	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent alterations being made to the bed of existing culverts in the water body.
Flood bunds	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to affect the future implementation of measures to reduce the pressures caused by flood bunds in this water body.
Set-back embankments	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the future implementation of measures to set back existing embankments in this water body.
Floodplain connectivity	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the future implementation of measures to improve floodplain connectivity in this water body.
Fish passes	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of measures to improve fish passage over existing structures in this water body.
Reduce fish entrainment	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of measures to reduce fish entrainment at existing structures in this water body.

Measure	Status	Potential impact
Enhance ecology	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of measures to enhance ecology through structural modification in this water body.
Changes to locks, etc.	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of changes to the structure or operation of locks and other in-channel structures in this water body.
Vegetation control	Not in place	There are no mechanisms for project activities during construction, operation or removal and reinstatement to affect the delivery of the vegetation control measures that are in place in the water body.
Selective vegetation control	Not in place	
Vegetation control timing	Not in place	
Invasive species techniques	Not in place	Potential risks from INNS are considered in **section 3.3b)**.
Retain habitats	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of measures to retain existing habitats during maintenance activities in this water body.
Sediment management strategy	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of measures to manage sediment.
Maintain channel bed/margins	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of measures to maintain the channel bed and margins during maintenance activities in this water body. The establishment of a vegetated buffer strip along the edge of the watercourse that drains the site could provide a limited opportunity to deliver this measure.
Woody debris	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of measures to retain woody debris during maintenance in this water body.
Water level management	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of water level management measures in this water body.
Align and attenuate flow	Not in	There are no mechanisms for project activities during construction, operation and removal and reinstatement to

Measure	Status	Potential impact
	place	prevent the implementation of measures to align and attenuate flows in this water body. The use of SuDS measures to manage runoff from the site could potentially provide a limited opportunity to deliver this measure.
Educate landowners	Not in place	There are no mechanisms for project activities during construction, operation and removal and reinstatement to prevent the implementation of measures to educate landowners in this water body.

Assessment of potential mechanisms for impact

3.10.82. **Table 3.45** also presents an assessment of potential impacts from the proposed rail extension route on each RBMP mitigation measures and confirms that the proposed rail extension route would not prevent the future implementation of the mitigation measures that are not yet in place in the Leiston Beck water body. RBMP mitigation measures therefore, do not require further assessment in Stage 3.

iv. Impacts of project activities on Protected Areas

Protected Areas in each water body

3.10.83. Protected Areas within each of the WFD water bodies identified during the screening phase are listed in **Table 3.46** and shown in **Figure 3.22** against the 2km boundary.

Table 3.47 List of Protected Areas within each WFD water body

Water body	Protected Area Name	Within 2km?
Leiston Beck	Nitrates Directive - NVZs 415, 661	NVZ 661 is located within 2km
	Habitats and Species Directive - Minsmere to Walberswick Heaths & Marshes SAC, SPA and Ramsar site	Not located within 2km of the proposed development.
	Conservation of Wild Birds Directive - Minsmere-Walberswick SPA and Ramsar	Located within 2km
Waveney & East Suffolk Chalk and Crag	Nitrates Directive NVZs 78, 79, 166, 168	Not located within 2km of the proposed development.
	WFD (formerly Surface Water Abstraction Directive) - Waveney and East Suffolk Chalk & Crag Drinking Water Protected Area	Not located within 2km of the proposed development.

Assessment of potential mechanisms for impact

3.10.84. **Table 3.46** demonstrates that a large proportion of the Protected Areas associated with the water bodies are outside the 2km ZOI and, therefore, have not been considered further in this assessment. The proposed rail extension route is, however, located within 2km of the Minsmere and Walberswick SPA.

3.10.85. WFD compliance assessments require the consideration of the potential effects on WFD quality elements (hydromorphological, physico-chemical, chemical and biological), many of which support ecological interest features for which the Natura 2000 Protected Areas are designated. The **Shadow**

HRA Report (Doc Ref. 5.10) therefore builds on the output of this assessment to assess the potential effects on designated site interest features. Therefore, to avoid duplication with the Shadow HRA, impacts on the designated site interest features themselves are not considered here.

3.10.86. With respect to NVZs, foul water generated on site could release nitrates and other nutrients if discharged untreated to the water environment.

3.10.87. Foul water generated in construction site compounds and during operation could release nitrates and other nutrients if discharged, untreated to the water environment. However, all foul waters generated during construction and operation would be contained and/or adequately treated to ensure that the project activities would not result in the release of significant quantities of nitrates and other nutrients.

v. Stage 2 Summary

3.10.88. The assessment demonstrates that project activities during construction, operation and removal and reinstatement would not have direct or indirect effects on the Leiston Beck and Waveney & East Suffolk Chalk and Crag water bodies that are sufficient to cause deterioration in the status of the water body or Protected Areas located within the water bodies. Furthermore, the proposed rail extension route would not counteract or otherwise affect the delivery of the mitigation measures (both in place and not in place) that have been identified in the RBMP for these water bodies.

3.10.89. Consequently, no elements of the proposed rail extension route have been progressed to the Stage 3 detailed compliance assessment. Rail improvements are therefore considered to be compliant with the requirements of the WFD.

References

3.1 Parliament of the United Kingdom, The Control of Pollution (Oil Storage) (England) Regulations (London, 2001)

3.2 Environment Agency. Catchment Data Explorer (undated) (Online) Available from: http://environment.data.gov.uk/catchment-planning/ (accessed 05/02/19).

3.3 Environment Agency. Clearing the Waters for All. Water Framework Directive assessment: estuarine and coastal waters. How to assess the impact of your activity in estuarine and coastal waters for the Water Framework Directive (WFD). 2016. (Online) Available from https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters (accessed 29/05/19).

3.4 Planning Inspectorate. Advice note 18: The Water Framework Directive. London: Planning Inspectorate. 2017.

3.5 Environment Agency. Guide to Mitigation Measures in Artificial and Heavily Modified Water Bodies. Bristol: Environment Agency. 2015.