Christchurch Bay and Harbour FCERM Strategy

Water Framework Directive Assessment

Bournemouth, Christchurch and Poole Council

March 2024

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Quality information

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Glossary

Abbreviation	Description
AWB	Artificial Waterbody
BCP	Bournemouth, Christchurch and Poole Council
BMP	Beach Management Plan
BQE	Biological Quality Elements
EA	Environment Agency
FCERM	Flood and Coastal Erosion Risk Management
GEP	Good Ecological Potential
GES	Good Ecological Status
HMWB	Heavily Modified Waterbody
HTL	Hold the Line (SMP2 policy)
LNR	Local Nature Reserve
MR	Managed Realignment (SMP2 Policy)
NFDC	New Forest District Council
NNR	National Nature Reserve
ODU	Option Development Unit
RBD	River Basin District
RBMP	River Basin Management Plan
SAC	Special Area of Conservation (Habitats Directive)
SNCI	Site of Nature Conservation Importance
SMP2	Shoreline Management Plan
SoP	Standard of Protection
SPA	Special Protection Area (Birds Directive)
SPZ	Source Protection Zone
SMZ	Strategy Management Zone
TRaC	Transitional and Coastal Waterbody
WFD	Water Framework Directive

1. Introduction

1.1 Purpose of report

This report provides an assessment of the Flood and Coastal Erosion Risk Management (FCERM) Strategy (the 'Strategy') for the coastal frontage at Christchurch Bay & Harbour against the objectives of the *Water Framework Directive (WFD) 2000/60/EC* (Ref 1), according to the requirements of the Environment Agency (EA) document *Water Framework Directive assessment: estuarine and coastal waters* (Ref 2), *The Water Environment (Water Framework Directive) (England and Wales) Regulations* (Ref 3), the '*Water Framework Directive risk assessment - How to assess the risk of your activity*' (Ref 4) and '*Water Framework Directive assessment: estuarine and coastal waters*' (Ref 5). This WFD guidance for estuarine and coastal waters provides detailed supplementary guidance on how to assess the impacts of new modifications in the water environment to ensure compliance with the WFD in line with *'Assessing new modifications for compliance with WFD'*.

As a part of the Strategy, an assessment of the implications of the WFD Regulations is required. The requirements of the WFD need to be considered at all stages of the coastal planning process, by reference to the River Basin Management Plans (RBMPs).

Please note, the term 'surface water' and 'surface waters' within this report refers to coastal and transitional waters, rivers, streams or lakes, as defined by the WFD. It does not refer to surface water run-off or surface water ponding which may be caused by rainfall, which will be addressed separately by Surface Water Management Plans which will be developed at a later date (i.e. during scheme appraisal).

1.2 Context and Background

The Strategy extent is the coastal frontage between Hengistbury Head (immediately to the east of Hengistbury Head Long Groyne) and the landward (western) end of Hurst Spit. The Strategy extent is located on the south coast and encompasses the settlements of Christchurch, Highcliffe, Barton on Sea and Milford on Sea. The frontage is within the district areas of Bournemouth, Christchurch and Poole Council and New Forest District Council. Within Christchurch Harbour, the Strategy extent is to Tuckton Bridge on the River Stour and Knapp Mill on the River Avon (see Figure 1-1). To facilitate the option development and appraisal, the Strategy frontage was divided into six 'Strategy Management Zones' (SMZs) which were further split into eighteen 'Option Development Units' (ODUs).

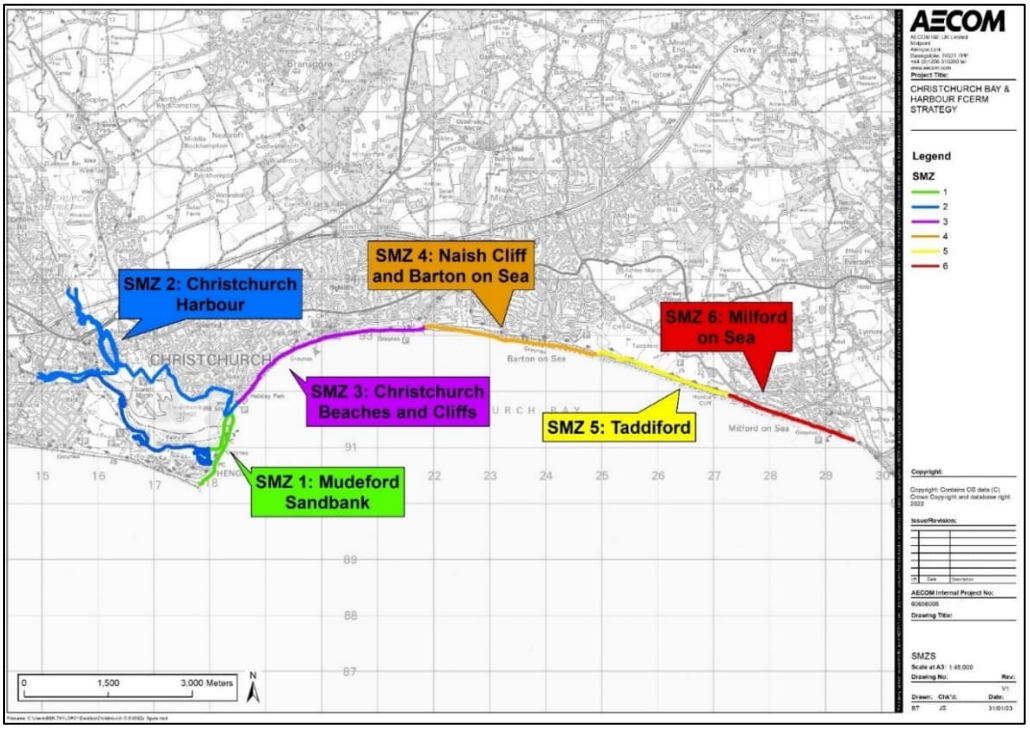

Figure 1-1 Location of the Strategy Management Zone's (SMZ)

Where there are sites protected under other European Union (EU) legislation (such as the Birds or Habitats Directives, Shellfish Waters Directive and others), the WFD aims for compliance with any relevant standards or objectives for these sites. Where a site is protected under another EU Directive, and the targets set by the WFD would be insufficient to meet the objectives of the other relevant environmental Directive, the more stringent targets would apply.

The Strategy area overlaps with several SPA, SSSI and Ramsar sites. Nationally and locally designated sites within the study area have not been assessed, as these are not covered by the remit of the WFD. The International Environmentally Designated Sites which could potentially be affected by the Strategy and connected to the water environment and WFD are shown in Table 1-1 below and the locations of the International designated sites are displayed in Figure 1-2. Further details are provided in Section 3, the Christchurch FCERM SEA Environmental Report (Ref. 20) and in the Habitats Regulations Assessment (HRA) screening report for the Strategy (Ref. 21).

Table 1-1 Designated Areas that could be affected by the Strategy (Ref 6)

Designation	Sites	Strategy SMZ
Ramsar	Solent and Southampton Water	SMZ 6 (Option Development Unit (ODU) 18)
	Avon Valley	SMZ 2 (ODUs 6, 7 and 9)
Special Area of Conservation (SAC)	Solent Maritime	SMZ 6 (ODU 16)
	River Avon	SMZ 2 (ODUs 6, 7 and 9)
	Dorset Heaths	SMZ 1 (ODU 1), SMZ 2 (ODU 3)
	Solent and Southampton Water	SMZ 6 (ODU 18)
	Dorset Heathlands	SMZ 1 (ODU 1), SMZ 2 (ODU 3)
	Avon Valley	SMZ 2 (ODUs 6, 7 and 9)
Site of Special Scientific Interest (SSSI)	Christchurch Harbour	SMZ 1 (ODUs 1 and 2) SMZ 2 (ODUs 3, 4, 5, 6, 7, 9, 10, and 11)
	Avon River (Bickton to Christchurch)	SMZ 2 (ODUs 6, 7 and 9)
	Highcliffe to Milford Cliffs SSSI	SMZ 3 (ODUs 12 and 13) SMZ 4 (ODU 14) SMZ 5 (ODU 15) and SMZ 6 (ODUs 16, 17 and 18)
	Purewell Meadows SSSI	SMZ 2 (ODU 9)
Local Nature Reserve (LNR)	Hengistbury Head	SMZ 1 (ODUs 1 and 2) SMZ 2 (ODUs 3 and 4)
	Stanpit Marsh	SMZ 2 (ODUs 6, 9 and 11)
	Steamer Point	SMZ 3 (ODUs 12 and 13)
	Milford on Sea	SMZ 6 (ODUs 16, 17 and 18)
	Sturt Pond	SMZ 6 (ODU 18)

Figure 1-2 Environmental designations of International importance (© Open Street Map Contributors)

The Strategy area is not designated as Shellfish Waters Directive area, however there are Shellfish Water Protection Areas adjacent to the eastern and western extent of the strategy area at Poole Bay and Pennington, as shown in Figure 1-3 (Ref 7). The WFD requires all protected shellfish areas to comply with their individual standards. The Shellfish Waters Directive (2006/113/EC) requires compliance with mandatory standards for parameters including dissolved oxygen, suspended solids, metals and other contaminants.

In terms of the designated harvesting area, the EC Regulation 853/2004 (which replaces the EU Shellfish Harvesting Directive 91/492/EC) aims to protect consumers of foods including shellfish, and is implemented in England by the Food Hygiene (England) Regulations 2006. The requirements of these regulations will also be considered. There are several bathing waters at Christchurch Harbour within the Strategy area, as shown by in Figure 1-3 with the potential to be impacted through any alteration to discharge points.

Figure 1-3 Designated bathing water and shellfish waters surrounding the Strategy area (© Open Street Map Contributors)

1.3 The Strategy

The aim of the Strategy is to provide an integrated plan for the Christchurch Bay & Harbour frontage to deliver sustainable and long-term management for coastal flood and erosion risks over the next 100 years. The Strategy is being developed collaboratively by AECOM, and officers of BCP Council, New Forest District Council (NFDC) and the EA. The objectives of the Strategy are to provide an assessment of the risks and opportunities associated with coastal processes and to develop a management framework to manage these risks and opportunities.

The leading options for the Strategy have been developed located across a spatial framework consisting of six Strategy Management Zones (SMZ's) and eighteen smaller Option Development Units (ODUs). During the option development and appraisal, a National Economic Leading Option (NELO) was identified for each ODU and in some ODUs a Local Aspiration Leading Option (LALO) was also identified. The NELOs were identified by following the EA's Flood and Coastal Erosion Risk Management Appraisal Guidance. LALOs take into account local opportunities and requirements which could deliver greater or wider benefits. Typically, the LALO options have higher costs than the NELO and therefore represent an aspirational option if funding can be secured.

1.3.1 Selection of leading options

The leading options for each ODU and their reasons for selection are outlined in Section 4 of this report. All potential Strategy options were considered during the development of the leading options and robust appraisal was undertaken to identify the leading options. The appraisal considered technical issues, economics, stakeholder interests, future developments and environmental impacts. The leading options that have been identified represent the lowest impact, most economic and above all most sustainable of the assessed options. It should be noted that all impacts will need to be explored in greater detail after the Strategy is completed at scheme level and changes to the approach may be made during scheme level appraisal. The Strategy Leading Option Report (AECOM, 2024) provides details of the leading option identification process.

1.3.2 Options appraisal

The impact of the leading options on the WFD environmental objectives set out in Section 1.3 should be considered. If any of the leading options in this Strategy are likely to cause deterioration, then suitable mitigation or alternative options should be considered. If impacts are still unavoidable and the Strategy is still likely to cause deterioration or prevent a waterbody from meeting its WFD objectives then it is necessary to consider the Article 4.7 condition which asks whether there are any significantly better environmental options.

1.4 The Water Framework Directive

The WFD, EC Directive 2000/60/EC, (Ref 1) aims to protect and enhance the quality of the water environment across all European Union (EU) member states. England and Wales have adopted the WFD as national law by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 3). Following the departure of the United Kingdom from the European Union these Regulations continue to apply until they are revoked or superseded by new legislation.

The WFD takes a holistic approach to the sustainable management of water by considering the interactions between freshwater bodies, groundwaters, transitional (estuarine) and coastal waters (TraC) and water-dependent ecosystems. Ecosystem quality is evaluated according to interactions between biological, physico-chemical and hydromorphological elements (or 'Quality Elements').

Under the WFD, 'Water bodies' are the basic management units and are defined as all or part of a river system or aquifer. Water bodies form part of larger River Basin Districts (RBD), for which River Basin Management Plans (RBMPs) are developed and environmental objectives are set. RBMPs are produced every six years, in accordance with the river basin management planning cycle. Cycle 2 plans were published in February 2016, and the most recent RBMP data available on the online Catchment Data Explorer is from 2019 Cycle 3 plans which were updated in August 2022.

The WFD requires water bodies to be classified according to their current condition (i.e. the 'Status' or 'Potential,' the latter applying for heavily modified and artificial water bodies) and to set a series of objectives for maintaining or improving conditions so that water bodies maintain or reach Good Status / Potential.

For Cycle 3, all waterbodies now fail their chemical status due to changing methods and an increased evidence base and are therefore not comparable to previous Cycle assessments. The four groups of global pollutants (uPBTs) causing these failures are polybrominated diphenyl ethers (PBDEs - a group of brominated flame retardants); mercury; certain polycyclic aromatic hydrocarbons (PAHs) and perfluorooctane sulfonate (PFOS) a group of per-and polyfluoroalkyl substances (PFAS) (Ref 5).

The EA is under a duty to exercise its relevant functions so as to best secure that the requirements of WFD for the achievement of environmental objectives are co-ordinated. The Planning Inspectorate's Advice Note 18 (Ref 4) summarises the overall aims and objectives of the WFD as to:

- Enhance the status and prevent further deterioration of surface water bodies, groundwater bodies and their ecosystems;
- Ensure progressive reduction of groundwater pollution;
- Reduce pollution of water, especially by Priority Substances and Certain Other Pollutants;
- Contribute to mitigating the effects of floods and droughts;
- Promote sustainable water use; and
- Achieve at least good surface water status for all surface water bodies and good chemical status in groundwater bodies by 2027 (or good ecological potential (GEP) in the case of artificial or heavily modified water bodies).

As a result, new developments that have the potential to impact on current or predicted WFD status are required to assess their compliance against the WFD objectives of the potentially affected water bodies. It must be demonstrated that there is no deterioration or prevention of future improvement against any WFD element for a designated waterbody. As such, this report presents the compliance assessment against the WFD objectives for the Strategy.

Regulation 33 of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (i.e. the WFD) states that, like other public bodies, local authorities have a statutory duty to "have regard to the River Basin Management Plan" and "any supplementary plans" covering proposed activities when exercising its functions. Local authorities must therefore reflect water body improvement priorities as outlined in RBMPs.

In determining whether a development is compliant or non-compliant with the WFD objectives for a water body, the EA and partnering organisations must also consider the conservation objectives of any Protected Areas (i.e. sites within the national site network or water dependent Sites of Special Scientific Interest) and adjacent WFD water bodies, where relevant (e.g. Ref 4).

2. Assessment Methodology

2.1 Guidance

Guidance on how to undertake WFD assessments can be found in the 'Water Framework Directive risk assessment - How to assess the risk of your activity' (Ref 4) and 'Water Framework Directive assessment: estuarine and coastal waters' (Ref 5). These guidance documents have informed the approach taken in this assessment.

The review of potential impacts to WFD objectives is mainly focussed on permanent effects to WFD waterbodies as temporary effects will be minimised where possible through the implementation of standard mitigation for construction works. It is anticipated that there will be temporary and localised water quality impacts due to construction works, these will be minimised by adopting sensitive construction techniques as set out in the EA's Pollution Prevention for businesses guidance. Any potential impacts to water quality as a result of construction will be controlled for the Strategy by a Construction Environmental Management Plan (CEMP) which should be supported by a Water Management Plan (WMP).

2.2 Stepped Approach

A stepwise approach consisting of screening, scoping and impact assessment phases is generally followed to: (a) rationalise the levels of WFD assessment and impact mitigation that are required; and (b) verify that proposals meet the requirements of the WFD:

- **Stage 1 Screening**

  Screening identifies the zone of influence of a Strategy (in the context of this work), and if proposed activities pose a risk to the water environment. It is used to identify if there are activities that do not require further consideration for WFD objectives, for example activities which have been ongoing since before the current RBMP plan cycle and which have thus formed part of the baseline.

- **Stage 2: Scoping**

  Scoping is used to identify any potential impacts of the proposed activities to specific WFD receptors and their water quality elements. This involves review of WFD impact pathways, shortlisting which WFD water bodies and quality elements could or could not be affected by proposed activities, and collecting baseline information from the relevant RBMP on the status and objectives for each water body. Table 2-1 indicates WFD status elements that need to be considered by the WFD assessment.

- **Stage 3: Impact Assessment**

  This involves rationalised assessment of water bodies and quality elements that could be affected by proposed activities, in order to identify any areas of WFD non-compliance. Proposed activities are reviewed in terms of both positive and negative impacts, and the baseline mitigation measures, enhancements, and contributions to the WFD objectives described in the RBMP. Any proposed activities with potentially deleterious impacts are reviewed simultaneously with their corresponding mitigation proposals, to determine a net effect on WFD objectives.

2.3 Regulation 19, Article 4.7 Derogation

Where the potential for deterioration of water bodies is identified, and it is not possible to mitigate the impacts to a level where deterioration or failure to improve can be avoided, the project would need to be assessed in the context of Article 4.7 of the Directive. Where a derogation is necessary, Applicants will need to provide the necessary information to justify their case, bearing in mind that Applicants must always seek to avoid deterioration of the water environment. It is a matter for the Secretary of State to consider whether derogation under Article 4.7 is justified in relation to a Strategy. At this stage a derogation under Article 4.7 is not considered necessary.

The WFD status elements, from which to assess compliance with waterbodies, relevant to this study are shown in Table 2-1.

Table 2-1 Relevant WFD status elements from which to assess compliance in water bodies

Ecological status			
Biological status elements	Fish Invertebrates Macrophytes & phytobenthos combined		
Physio-chemical	Water temperature pH Dissolved oxygen Ammonia Reactive phosphorus (orthophosphate)		
Specific pollutants	2,4-dichlorophenol 2,4-dichlorophenoxyacetic acid 3,4 dichloroaniline Arsenic Benzyl butyl phthalate Carbendazim Chlorothalonil Chromium (III) (VI) Chlorine	Copper Cyanide Cypermethrin Diazinon Dimethoate Glyphosate Iron Linuron Manganese	Mecoprop Methiocarb Pendimethalin Permethrin Phenol Tetrachloroethane Toluene Triclosan Zinc
Chemical status			
Priority Substances, Priority Hazardous Substances and Other pollutants contributing to chemical status	Alachlor Anthracene Atrazine Benzene Benzo(a)-pyrene (BaP) Benzo(b)-fluor-anthene Benzo(k)-fluor-anthene Benzo(g,h,i)-perylene Brominated diphenylether Cadmium and its compounds Carbon tetrachloride Chlorfenvinphos C10-13 chloroalkanes Chlorpyrifos Cyclodiene pesticides isodrin	DDT total Para-para-DDT 1,2-dichloro-ethane Dichloro-methane Di(2-ethylhexyl)-phthalate (DEHP) Diuron Endosulphan Fluoranthene Hexachloro-benzene Hexachloro-butadiene Hexachloro-cyclohexane Indeno(1,2,3-cd)-pyrene Isoproturon Lead and its compounds	Mercury and its compounds Naphthalene Nickel and its compounds Nonylphenol Octylphenol Polyaromatic hydrocarbons (PAH) Pentachloro-benzene Pentachloro-phenol Simazine Tetrachloro-ethylene Tributyltin compounds Trichloro-benzenes Trichloro-ethylene Tricholoro-methane Trifluralin

2.4 Desk Study

A desk-based study was carried out to capture information pertaining to the Strategy to support the understanding of baseline conditions. A review of relevant information relating to the study area was undertaken to develop a baseline overview for waterbodies, and surrounding areas. The following data sources were used for the desk study:

- WFD status and objectives from the appropriate River Basin Management Plan for Cycle 3 data, available from the EA Catchment Data Explorer (Ref 5);
- Natural England Designated Sites View (Ref 6);
- Defra's Multi-agency geographical information for the countryside website (MAGIC) (Ref 7);
- Ordnance Survey Maps (Ref 9); and
- Joint Nature Conservation Committee, Special Areas of Conservation (Ref 10).

3. Waterbody baseline data

The first stage of the WFD assessment process is to collect the relevant data on the status of the scoped in waterbodies within the Strategy area. This stage also involves identifying if there are any internationally protected sites that could be impacted by the Strategy and any planned waterbody measures.

3.1 Waterbodies

There are three coastal or transitional waterbodies within the Strategy area: The Christchurch Harbour transitional waterbody (WFD ID GB520804315900), the Dorset / Hampshire Coastal Waterbody (WFD ID GB620705550000) and the Solent Coastal Waterbody (WFD ID GB650705150000).

There are also six surface waterbodies within the Strategy area, The Avon Hampshire (Lower) (WFD ID GB108043015842), the Stour (Lower) (WFD ID GB108043011040), Mude (WFD ID GB108043011020), Clockhouse Stream (WFD ID GB10804301101) Danes Stream (WFD ID GB107042011170) and Becton Bunny (WFD ID GB107042011260). These waterbodies have been considered in the assessment as the Strategy extends into these WFD catchments, considering potential downstream effects of the works all of these WFD waterbodies are immediately upstream of Christchurch Harbour or Dorset / Hampshire Coastal WFD waterbody which have been noted above. The zone of influence was set for the screening, which was the Strategy area, plus (for surface waters) one water body upstream and downstream of the Strategy area. This has been considered in order to identify water bodies that are potentially hydrologically connected to the Strategy and potential works associated with the Strategy that could cause direct impacts.

An initial review of the potential impact pathways from the Strategy leading options was undertaken to determine which of the waterbodies and related WFD objectives could potentially be affected by the Strategy. This review concluded that the Clockhouse Stream and Becton Bunny river waterbodies, and the Solent Coastal Waterbody could be scoped out of the assessment as the management policies proposed will not impact on these surface waterbodies. It is not anticipated that any of the proposed works will interact with these waterbodies, given that there is no pathway for the Strategy to impact upon these waterbodies (either due to location or activity) and therefore any potential impacts to the WFD objectives at these waterbodies has been ruled out. Therefore, these waterbodies will therefore not be considered further in this WFD assessment.

There are three groundwater bodies within the strategy area, the Lower Dorset Stour and Lower Hampshire Avon Groundwater body (WFD ID GB40802G805800), the SW Hants Barton Group Groundwater body (WFD ID GB40702G503500) and the SW Hants Solent Group Groundwater body (WFD ID GB40702G504000). The review was undertaken on groundwater bodies and concluded that they could be scoped out of the assessment, as the management options proposed will not impact any the groundwater bodies in the area as any defences are unlikely to intercept groundwater levels. There are also no Source Protection Zones (SPZ) defined within Strategy area. Therefore, groundwater has been scoped out of this WFD assessment. Further details regarding the scoping of groundwater bodies is provided in Section 5.2.

The two coastal and transitional waterbodies (Christchurch Harbour and Dorset / Hampshire), and four river waterbodies (Avon Hampshire (Lower), Stour (Lower), Mude and Danes Stream were considered to have the potential to be impacted by Strategy options and have therefore been screened into the assessment and relevant data collected for them.

Each of the waterbodies described above are shown on Figure 3-1. Those screened in are described in the following sections.

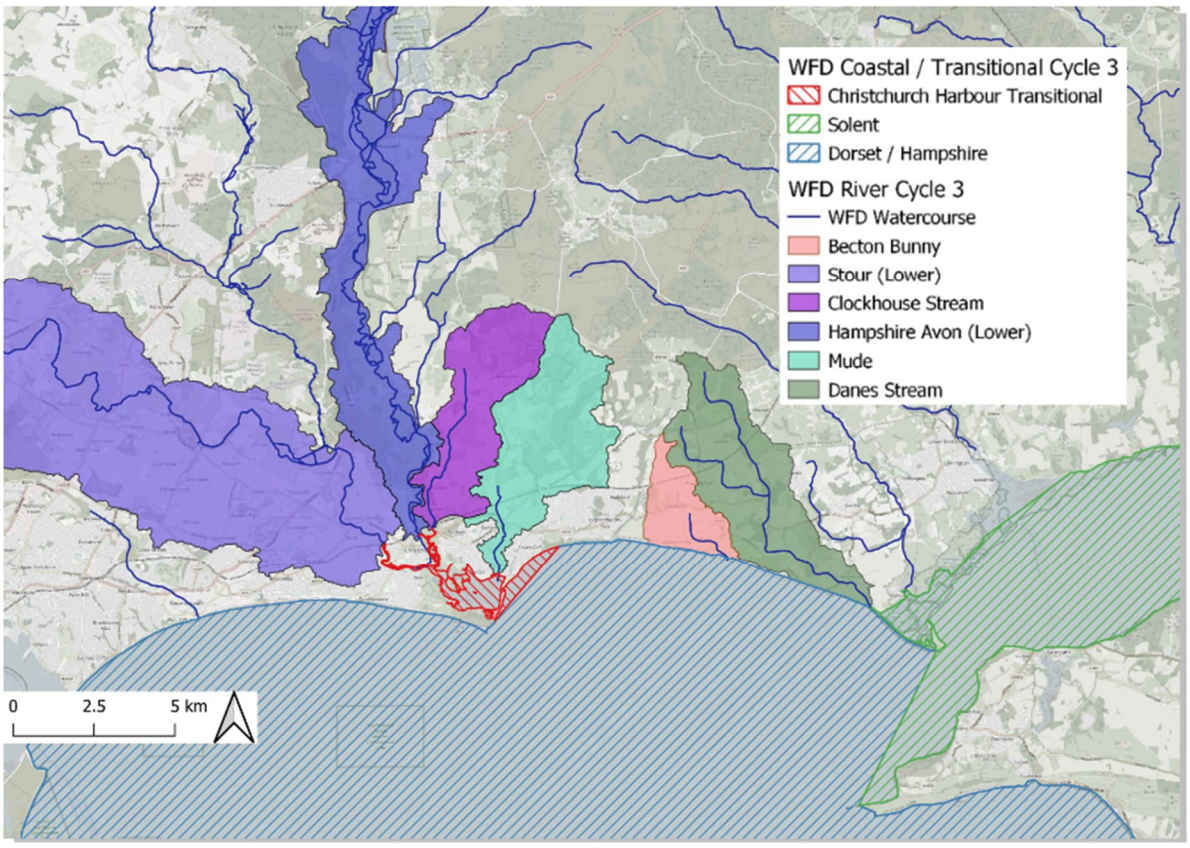

Figure 3-1 Water Framework Directive Waterbodies relevant to the Strategy area (© Open Street Map Contributors)

3.1.1 Christchurch Harbour Transitional Waterbody

Christchurch Harbour (WFD ID GB520804315900) is a transitional waterbody of 2.74 km^2 located in the county of Dorset on the southwest coast of England. It is a 'natural harbour' which is an area of the coast which is partly enclosed by land which gives protection and ensures deep enough water for anchorage. The harbour is separate from the Dorset / Hampshire Coastal Waterbody by Hengistbury Head East and Mudeford Sandbank which help provide shelter and reduce wave action in the bay. The entrance to Christchurch Harbour (known as 'the Run') is located at the northern end of Mudeford Sandbank and the southern end of Mudeford Quay. Mudeford Sandbank is an open breakwater which is based on a natural shingle spit.

The main rivers that drain into Christchurch Harbour are the Stour and the Avon. Smaller streams that also drain into the harbour are Purewell Stream, the River Mude and Bure Brook. The alluvial deposits deposited here have created a flat floodplain, saltmarshes and mudflats.

The WFD waterbody also includes part of Christchurch Bay from Mudeford Sandbank along to Avon Beach.

There is potential for this waterbody to be affected by the Strategy due to the proximity of works and construction of new sea defences within the waterbody.

3.1.2 Dorset / Hampshire Coastal Waterbody

Dorset / Hampshire (WFD ID GB620705550000) is a Coastal water of approximately 514 km^2 located off the coast of Dorset and Hampshire in the south of England. The waterbody spans the length of coast between Portland Bill in the west to approximately Hurst Beach in the east. The waterbody also covers the south west coast of the Isle of Wight.

Directly upstream of the waterbody is Christchurch Harbour and Poole Harbour and therefore there is a significant amount of navigation through the waterbody. Several other rivers drain into the coastal water including Becton Bunny, Bourne Stream, Swan, Atherfield Stream and Brightstone Streams.

There is potential for this waterbody to be impacted due to proposed work within close proximity immediately upstream of the Dorset / Hampshire Coastal Waterbody within all of the SMZ's. Proposed works have the potential to cause temporary or long term impacts to BQE within the coastal waterbody.

3.1.3 Hampshire Avon (Lower) River Waterbody

The Hampshire Avon (Lower) (WFD ID GB108043015842) waterbody is a freshwater WFD waterbody located directly upstream of Christchurch Harbour. The river is designated for a length of approximately 59 km and drains a catchment area of 34.3 km^2. The river forms part of the Avon Hampshire operational catchment and is not designated as artificial or heavily modified.

The river flows from Bickton in a southerly direction to Christchurch Harbour passing through predominantly agricultural land and improved grassland and adjacent to the urban areas of Ringwood and Christchurch. Directly upstream of the waterbody is the Hampshire Avon (Middle) waterbody which is predominated arable and horticulture land. The Hampshire Avon catchment is dominated by chalk geology and as such much of the Hampshire Avon exhibits chalk stream characteristics, however the Hampshire Avon (Lower) consists of mainly sand silt and clay bedrock geology and sedimentary superficial deposits. The Hampshire Avon (Lower) is designated as a SSSI for its whole length as part of the River Avon System SSSI.

There are proposed works within / adjacent to the River Avon itself at its confluence with Christchurch Harbour. Therefore the Strategy has the potential to impact upon BQE within the waterbody which are to be considered further.

3.1.4 Stour (Lower) River Waterbody

The Stour (Lower) (WFD ID GB108043011040) is a freshwater WFD waterbody which forms part of the wider Stour Dorset Operational Catchment. The waterbody begins immediately downstream of Wimborne Minster and flows in a general south easterly direction towards Christchurch Harbour. The waterbody flows for a length of approximately 28km draining an area of 72 km^2. The river is not designated as artificial or heavily modified and retains several natural features.

Immediately upstream is the Stour Middle (d/s Pimperne Brook) and Allen (Lower) waterbodies. The waterbody flows through areas of improved grassland adjacent to the urban areas of Poole, Bournemouth and Christchurch.

There are proposed works within / adjacent to the Stour (Lower) itself at its confluence with Christchurch Harbour. Therefore, the Strategy has the potential to impact upon BQE within the waterbody which are to be considered further.

3.1.5 Mude River Waterbody

The Mude River (WFD ID GB108043011020) flows into Christchurch Harbour at Mudeford and is located to the east of the River Avon. The waterbody is designated for a length of 3.2 km and drains a catchment area of 17.5 km^2 and is not designated as artificial or heavily modified. There are no WFD waterbodies located upstream of the Mude River.

There are proposed works within / adjacent to the Mude River at its confluence with Christchurch Harbour. Therefore, the Strategy has the potential to impact upon the WFD status of the waterbody and is to be considered further.

3.1.6 Danes Stream Waterbody

The Danes Stream (WFD ID: GB107042011170) flows into the Solent coastal waterbody, this waterbody catchment is located at the eastern extent of the Strategy. Danes Stream is designated for a length of 16.2 km and drains a total catchment area of 19.0 km^2, it is designated as heavily modified. There are no WFD waterbodies located upstream of Danes Stream.

There are proposed works within / adjacent to Danes Stream in ODU 18, therefore, the Strategy has the potential to impact upon the WFD status of the waterbody and is to be considered further.

3.1.7 Waterbody Status

The WFD waterbody status under cycle 3 (2019) is summarised in Table 3-1 below for the waterbodies which may be affected by the Strategy leading options, along with the breakdown of ecological and chemical Status and the ODUs that related to each waterbody.

Table 3-1 WFD status under cycle 3 (2019) for waterbodies within the Strategy area

Waterbody	Christchurch Harbour	Dorset /Hampshire	Hampshire Avon (Lower)	Stour (Lowers)	Mude	Danes Stream
Waterbody Type	Transitional	Coastal Water	River	River	River	River
WFD ID	GB520804315900	GB620705550000	GB108043015842	GB108043011040	GB108043011020	GB107042011170
Hydromorphological Status	Heavily modified	Not designated artificial or heavily modified	Not designated artificial or heavily modified	Not designated artificial or heavily modified	Not designated artificial or heavily modified	Heavily modified
Current Ecological Status	Moderate	Good	Moderate	Moderate	Good	Moderate
Biological Quality	Good	Good	Moderate	Good	Good	Moderate
Chemical Quality	Fail	Fail	Fail	Fail	Fail	Fail
Physio-chemical Quality	Moderate	Good	Good	Moderate	High	Good
Acid neutralising capacity	NA	NA	High	High	NA	NA
Ammonia	NA	NA	High	High	High	High
Phosphate	NA	NA	Good	Poor	High	Good
Temperature	NA	NA	Good	Good	High	High
pH	NA	NA	High	High	High	High
Biochemical oxygen demand	NA	NA	NA	NA	High	NA
Dissolved inorganic nitrogen	Moderate	Good	NA	NA	NA	NA
Dissolved oxygen	High	High	High	Good	High	High
ODUs	ODUs 1, 2, 3, 4, 5, 6, 9, 10, 11	ODUs 1, 2, 3, 11, 12, 13, 14, 15, 16, 17, 18	ODUs 6, 7, 9	ODU 4, 5	ODU 10	ODU18

The potentially affected waterbodies considered in Table 3-1 are all failing waterbodies with respect to chemical status, the South West River Basin Management Plan (RBMP) has set a series of measures for failing waterbodies to bring them up to Good Potential/ Status. Measures within the Stour catchment include catchment markets via water industry investment to reduce phosphate run-off and the Dorset Stour EA Catchment Strategy which has prioritised plans for works and locations. The Hampshire Avon catchment measures include building climate resilient communities, reducing runoff as well as removing fish and wildlife barriers. The aim of this is to achieve better connected priority habitats including wet woodland and rivers. The Lower Stour Flood Strategy is a measure listed on the South West River Basin District aiming to reduce flood risk in the Lower Stour catchment (Ref 12).

3.1.8 Definition of WFD features and issues

Reasons for Not Achieving Good (RNAGs) for the waterbodies have been reviewed. All waterbodies in Cycle 3 have failed their Chemical status due to a changing method and in increased evidence base. These have subsequently been left out of reasons below unless it is the only reason stated for each waterbody. The RNAGs and sectors contributing to the Christchurch Harbour waterbody are described in Table 3-2, as well as the Biological Quality Elements (BQE) and the waterbody classification and environmental objectives.

Table 3-2 Features and Issues to consider within the Strategy Area

Waterbody	BQE	RNAGs	Waterbody classification and environmental objectives
Christchurch Harbour	Macroalgae	Diffuse source pollution: a total of four pressures contributing to this issue have been identified. Two of them are under the Agriculture and rural land management sector to which the activities contributing are poor nutrient management. Point source pollution from wastewater. The sector contributing this issue is the Water Industry. The activities related to this issue are to be continuous Wastewater Treatment Works (WwTW).	Moderate with objective to achieve Moderate by 2015 due to disproportionate expense and burdens.
Dorset/ Hampshire	Invertebrates, Phytoplankton	Diffuse source pollution: one pressure contributes to this issue under the Agriculture and rural land management sector to which the activities contributing are poor nutrient management. Physical modification is listed as a pressure, however there are no details to what activity or sector contributes towards this as the sector is 'under investigation'. Natural mineralisation is a listed pressure which affects dissolved inorganic nitrogen, for which no sector is responsible. Nitrogen mineralization is the conversion of organic nitrogen to inorganic forms of nitrogen which is a part of the microbial degradation of nitrogen-rich organic matter.	Good status with objective to achieve Good status by 2021.
Hampshire Avon (Lower)	Fish, invertebrates, Macrophytes and Phytobenthos Combined	The only reason is due to the changing methods to which it failed its Chemical status. These classification elements are polybrominated diphenyl ethers (PBDE) and mercury and its compounds.	Moderate with the objective of achieving Good by 2027, low confidence due to disproportionate expense and burdens.
Stour (Lower)	Fish, invertebrates, Macrophytes and Phytobenthos Combined	Point source pollution: two pressures contribute to this issue under the Water Industry sector to which the activities contributing are sewage discharge (continuous). Diffuse source pollution: one pressure contributes to this issue under the Agriculture and rural land management sector to which the activities contributing are poor nutrient management	Moderate with objective to achieve Moderate by 2015 due to disproportionate expense and burdens.
Mude	Fish, invertebrates, Macrophytes and Phytobenthos Combined	The only reason is due to the changing methods to which it failed its Chemical status. These classification elements are polybrominated diphenyl ethers (PBDE) and mercury and its compounds.	Good with objective to achieve Good by 2015
Danes Stream	Polybrominated diphenyl ethers, mercury and its compounds, Macrophytes and Phytobenthos	Measures delivered to address reason, awaiting recovery and suspect data.	Moderate with the objective of Moderate by 2015 as Good status is prevented by Artificial/HMWB designated use.

3.2 Designated sites

Where there are sites protected under other European Union (EU) legislation (such as the Birds or Habitats Directives, Shellfish Waters Directive and others), the WFD aims for compliance with any relevant standards or objectives for these sites. Where a site is protected under another EU Directive, and the targets set by the WFD would be insufficient to meet the objectives of the other relevant environmental Directive, the more stringent targets would apply.

The Strategy area overlaps with several SAC, SPA, SSSI and Ramsar sites (Ref 10). The environmentally designated sites which could potentially be affected by the Strategy and connected to the water environment and WFD are described in Table 3-3. Figure 1-2 in Section 1 show their locations.

Table 3-3 Condition of Designated Areas that could be affected by the Strategy

Designation	Site	Condition / Status	Designated for…
Ramsar	Solent and Southampton Water	Designated	The site extends from Hurst Spit to Gilkicker Point along the south coast of Hampshire and along the north coast of the Isle of Wight. The site qualifies under the following aspects of the Ramsar Convention: • Criterion 1a - contains good and representative e.g. of wetland habitats characteristic of the biogeographical region including saline lagoons, saltmarshes, estuaries and reefs; • Criterion 2a - supports important assemblage of rare plants and invertebrates (including 39 red data book (RDB) invertebrates and 8 RDB plants); • Criterion 2c - important staging area for migratory waterfowl (notably black-tailed godwit Limosa limosa); • Criterion 3a - regularly supports over 20,000 waterfowl in winter. The site also qualifies under Criterion 3c for the same reasons as those given for SPA qualification under Article 4.2 above
	Avon Valley	Designated	The boundaries of the Ramsar Site largely follow those of the Avon Valley SPA. The site qualifies under: • Criterion 1a – a greater range of habitats than any other chalk river in Britain including fens and mires, lowland wet grassland and small areas of woodland. The diversity of habitats supports a notable assemblage of breeding wetland birds and provides roosting and feeding areas for an important assemblage of wintering wildfowl; • Criterion 2a – supports a diverse assemblages of wetland plants and animals, including several nationally rare species, including two wetland RDB plants and four wetland RDB invertebrate species; The site also qualifies under Criterion 3c for the same reasons as those given for SPA qualification under Articles 4.2 and 4.3 of the Birds Directive.
Special Area of Conservation (SAC)	Solent Maritime	Grade A/B/C	Annex I habitats that are a primary reason for selection of this site: • H1130 Estuaries grade A/B. Comprises of a major estuary with four coastal plain estuaries and four bar-built estuaries • H1320 Spartina swards (Spartinion maritimae) grade A/C. Cordgrass swards – the only site in the UK for smooth cord-grass Spartina alterniflora in the UK, and is one of the only two sites where significant amounts of small cord-grass S. maritima are found • H1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) grade B. The second largest aggregation in the south and south-west of England, composed of large areas of saltmarsh
	River Avon	Grade A/B	The River Avon is a large, lowland river system with sections running through chalk and clay. Annex I habitats that are a primary reason for selection of this site: • 3260 Water courses of plain to montane levels with the *Ranunculion fluitantis and Callitricho-Batrachion* vegetation • 7230 Alkaline fens • 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae)*

Designation	Site	Condition / Status	Designated for…
	Dorset Heaths	Grade A/B/C	This site extends into the western boundary of the Strategy area at Hengistbury Head. Annex I habitats that are a primary reason for selection of this site: • 4010 Northern Atlantic wet heaths with *Erica tetralix* • 4020 Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix* • 4030 European dry heaths
Special Protection Area (SPA)	Solent and Dorset Coast	Grade C	This site encompasses four existing SPAs, including the Solent and Southampton Water SPA. It includes sub-tidal areas which are not encompassed by the other SPAs. Species that are a primary reason for selection of this site: • A195 Sterna Albifrons • A193 Sterna Hirundo • A191 Sterna Sandvicensis
	Solent and Southampton Water	Grade A/B/C	This site extends from Hurst Spit to Lee-on-the-Solent, along the south coast of Hampshire and the north coast of the Isle of Wight. Species that are a primary reason for selection of this site: • A052 Anas crecca • A675 Branta bernicla bernicla • A137 Charadrius hiaticula • A176 Larus melanocephalus • A616 Limosa limosa islandica • A195 Sterna albifrons • A192 Sterna dougallii • A193 Sterna hirundo • A191 Sterna sandvicensis
	Dorset Heathlands	Grade A/B/C	Species that are a primary reason for selection of this site: • A224 Caprimulgus europaeus • A082 Circus cyaneus • A098 Falco columbarius • A246 Lullula arborea • A302 Sylvia undata
	Avon Valley		This site encompasses the lower reaches of the River Avon and its floodplain between Bickton and Christchurch. It supports a nationally important assemblage of breeding wetland birds and is especially important for breeding waders associated with lowland wet grassland. The site qualifies under:

Designation	Site	Condition / Status	Designated for…
			• Article 4.1 for supporting nationally important numbers of Annex 1 species Bewick swan (Cygnus bewickii), an average of 156 in the five year period 1988/89 to 1992/93, representing 2.2% of the population; • Article 4.2 for supporting internationally important wintering populations of gadwall (Anas strepera) and nationally important wintering populations of the white fronted geese (Anser albifrons albifrons), pochard (Aythya ferina) and coot (Fulica atra).
Site of Special Scientific Interest (SSSI)	Christchurch Harbour	Favourable (80.56%) Unfavourable – Recovering (19.44%)	A 352 ha site designated both for its biological and geological interest. The varied habitats include saltmarsh, wet meadows, drier grassland, heath, sand dune, B woodland and scrub. This site is rich in invertebrates, with 260 species of beetle recorded as well as a number of nationally rare hoverflies and dragonfly. The site is also important for supporting a number of rare breeding and wintering bird species.
	Avon River (Bickton to Christchurch)	Favourable (59.34%) Unfavourable – Recovering (26.81%) Unfavourable – no change (6.06%) Unfavourable – Declining (7.79%)	A 1403 ha biological interest site which stretches from Christchurch in Dorset to Bickton in Hampshire. The varied habitats include saltmarsh, wet meadows, drier grassland, heath, sand dune, woodland and scrub. This site is rich in invertebrates, with 260 species of beetle recorded as well as a number of nationally rare hoverflies and dragonfly. The site is also important for supporting several rare breeding and wintering bird species.
	Highcliffe to Milford Cliffs SSSI	Favourable (44.02%) Unfavourable – no change (55.98%)	A 110 ha geological interest site which stretches along the south coast of England from Christchurch in Dorset to Milford on Sea in Hampshire
	Purewell Meadows SSSI	Unfavourable recovering (100%)	A biological interest site. A 14ha nature reserve with a series of 10ha wet meadows within the River Avon floodplain.
(LNR)	Hengistbury Head	Designated	This site comprises a range of habitats including heathland, woodland, reedbed, saltmarsh and sand dunes. It is located at the western end of the Strategy area, with Christchurch Harbour immediately to the north.
	Stanpit Marsh	Designated	This site is designated for grazing marsh and is located at the north side of Christchurch Harbour. It features salt marsh, reed beds, freshwater marsh, gravel estuarine banks and sandy scrub.
	Steamer Point	Designated	This site is designated for broadleaf woodland, pond and grassland habitats. It is located between Highcliffe Castle and Friar's Cliff on the Christchurch coastline,
	Milford on Sea	Designated	This site is designated for its ancient woodland with a large meadow in the Western corner, which follows the Dane Stream.
	Sturt Pond	Designated	This site is located at Hurst Road, Milford on Sea. It includes the reed beds either side of the Dane Stream, the tidal Sturt Pond, lagoons and saltmarsh

3.2.1 Designated Shellfish Waters

The Strategy area borders designated Shellfish Waters Directive areas, as shown in Figure 1-3 in Section 1 and listed in Table 3-4. The WFD requires all protected shellfish areas to comply with their individual standards. The Shellfish Waters Directive (2006/113/EC) requires compliance with mandatory standards for parameters including dissolved oxygen, suspended solids, metals and other contaminants.

In terms of the designated harvesting area, the EC Regulation 853/2004 (which replaces the EU Shellfish Harvesting Directive 91/492/EC) aims to protect consumers of foods including shellfish and is implemented in England by the Food Hygiene (England) Regulations 2006. The nearest Harvesting Area lies within Poole Harbour so is therefore not considered further in this assessment as it is outside the Strategy Area.

Table 3-4 Shellfish Protected Waters within the Strategy Area

Site Name	Waterbodies classified by this site	Cycle 2 Classification Items
Pennington	Solent Coastal Waterbody	Good – High
Yarmouth	Solent Coastal Waterbody and Lymington Transitional Waterbody	Not monitored

3.2.2 Designated Bathing Waters

There are four designated bathing waters within the Strategy area, as shown on Figure 1-3 in Section 1 and listed below in Table 3-5.

Table 3-5 Designated Bathing Waters (Ref 15)

Site Name	Waterbodies classified by this site	Classification
Christchurch Avon Beach	Christchurch Harbour Transitional Waterbody	Excellent
Christchurch Friar`s Cliff	Christchurch Harbour Transitional Waterbody	Excellent
Christchurch Highcliffe Castle	Christchurch Harbour Transitional Waterbody and Dorset / Hampshire Coastal Waterbody	Excellent
Christchurch Mudeford Sandbank East	Christchurch Harbour Transitional Waterbody and Dorset / Hampshire Coastal Waterbody	Excellent

3.3 Fish

The closest freshwater fish monitoring location upstream of the strategy extent is Hatchpool at Great Weir on the main stem of the River Avon at NGR: SZ 15518 93970. Between 2018 and 2023 both Atlantic salmon and European eels were recorded at this location (Ref 16) which is approximately 2 km upstream of Christchurch Harbour.

The closest freshwater fish monitoring location on the River Stour is at Throop d/s Glens Weir at NGR: SZ 11978 95518. Similar to the River Avon, Atlantic salmon and European eels/ elvers have been recorded at this location on the River Stour between 2018 and 2023 (Ref 16).

4. Proposed Leading Options and Works

4.1 Section Overview

The option appraisal for the Strategy has been undertaken across a spatial framework comprised of six Strategy Management Zones (SMZs) and eighteen smaller Option Development Units (ODUs). A map showing the SMZ locations is provided in Figure 1-1. The Strategy Option Development Unit Report (Ref 17) provides further details of the development of the spatial framework for the appraisal.

The aim of this stage of the assessment is to collect information on the proposed leading options. The leading options, selected from the appraisal process discussed within Christchurch Bay and Harbour FCERM Strategy: Leading Options Report, are summarised below for each Strategy Management Zone (SMZ). The information within this section is set out in the Christchurch Bay and Harbour FCERM Strategy: Leading Options Report (Ref 18) and summarised below for each ODU. The options have been described through the whole appraisal period which consists of epoch 1 (2024-2044), epoch 2 (2044-2074) and epoch 3 (2074-2124).

4.2 Strategy Management Zone 1 – Mudeford Sandbank (ODU's 1 - 2)

In ODUs 1 and 2 it is important to sustain the service of the existing defences as uncontrolled erosion / movement of Mudeford Sandbank could have uncertain impacts on the wider morphology of the area, potentially impacting flood risk, navigation, sediment transport and buried services in the vicinity. There is not an economic case to do anything other than Do Minimum on both ODUs and therefore this has been selected as the NELO. However, if funding can be secured, the LALO options will maintain the existing standard of service over the course of the appraisal period. In ODU 1 the LALO is Managed Realignment and in ODU 2 the LALO is Maintain with Adaptation. These leading options are described in more detail in Table 4-1.

Table 4-1 Strategy Management Zone 1 (ODUs 1-2) - Details of Leading Option

Epoch	Option	ODU1	ODU2
Epoch 1 (2024 – 2044)	NELO	**Do Minimum** – which involves small scale repairs to existing defences.	**Do Minimum –** which involves small scale repairs to existing defences.
	LALO	**Managed realignment** – which involves the maintaining of existing defences at the toe of the cliff through proactive maintenance and refurbishments.	**Maintain with adaption -** Ongoing repair and capital refurbishment of existing seawall, rock groynes and rock revetment alongside beach recycling on the Sandbank. Property level protection to properties at risk on the Sandbank
Epoch 2 (2044 – 2074)	NELO	Continued small scale repairs to existing defences (although it is unlikely the service life could be extended this far).	Continued small scale repairs to existing defences (although it is unlikely the service life could be extended this far).
	LALO	Regular refurbishments to take place throughout the remainder of the appraisal period.	Ongoing repairs, refurbishment and beach recycling throughout the appraisal period.
Epoch 3 (2074 – 2124)	NELO	Continued small scale repairs to existing defences (although it is unlikely the service life could be extended this far).	Continued small scale repairs to existing defences (although it is unlikely the service life could be extended this far).
	LALO	Regular refurbishments to take place throughout the remainder of the appraisal period.	Beach nourishment to take place from epoch 3 alongside continued repairs and refurbishment.

4.3 Strategy Management Zone 2 – Christchurch Harbour (ODU's 3 - 11)

In ODUs 3-10 the main risk is from tidal flooding to properties and other assets. Where there is an economic case, the leading options are generally focussed on upgrading the SoP provided by defences in these locations. This could be achieved by raising existing defences or constructing new defences as required. Different timings are recommended for defence upgrades based on a range of factors such as the onset of risk and the residual life of existing defences. Another risk in ODUs 3-10 is historic landfill sites and the potentially contaminated materials that could be exposed should these locations be undefended and erode. Currently there is very little known about the materials or the potential contamination status of the historic landfill sites and further investigations are recommended following the Strategy to improve the understanding. The different approaches to managing the key risks in SMZ 2 (with respect to timings and cost) have been explored in the appraisal and are picked up in the leading options.

In ODU 11 it is important to sustain the service of the existing quay walls as erosion / damage to the quay could lead to more widespread morphological changes and impact flood risk elsewhere in the area.

At ODU3 the leading NELO and LALO are Adaption and Resilience A and Adaption and Resilience C respectively. AT ODU4 the NELO and LALO are Sustain C and Sustain B respectively. In both ODU 3 and ODU 4, the NELO options do not involve defending the historic landfill sites in these locations due to affordability and the Do Nothing / Do Minimum scenario would progress in the areas of the historic landfill. Therefore, there is a risk that there could be erosion of these areas in the future. The aspiration in both ODU 3 and ODU 4 is to deliver the LALO options (should funding be secured) and the LALO options in both of these units would defend the historic landfill sites, which would prevent erosion from occurring.

The NELO at ODU5 is Improve D-F compared with Improve A-C as the leading LALO. At ODU6, ODU7, ODU9 and ODU10 the NELA are Adaption / Resilience, Improve A, Sustain A and Improve A respectively, no leading LALO has been selected at these ODUs. The NELO options here would defend historic landfill sites in ODU 5, ODU 9 and ODU 10.

At ODU11 the leading NELO is Do Minimum and the leading LALO is Adaption / Resilience. The leading options are described in Table 4-2.

Table 4-2 Strategy Management Zone 2 (ODUs 3-11) - Details of Leading Option

Epoch	Option	ODU3	ODU4	ODU5	ODU6	ODU7	ODU9	ODU10	ODU11
Epoch 1 (2024 – 2044)	NELO	**Adaption and resilience A** – In epoch 1 this includes property level protection and investigation of options to create / restore saltmarsh.	**Sustain C -** Includes patchwork repairs and raising and lengthening of existing setback embankment defence.	**Improve D-F –** involves maintaining existing defences in epoch 1.	**Adaption / Resilience –** Involves property protection throughout the appraisal period and maintaining existing quay walls	**Improve A –** maintaining existing defences in epoch 1 (upgrade works to begin in epoch 2)	**Sustain A –** In Epoch one this options includes investigating opportunities to restore saltmarsh habitats and maintaining existing defences.	**Improve A –** Property level protection measures and existing quay wall maintenance / capital refurbishment in epoch 1.	**Do Minimum –** small scale repairs to existing defences
	LALO	**Adaption and resilience C –** Similar to above with the addition of new erosion defences at Hengistbury Head and Wick historic landfill site.	**Sustain B -** Involves undertaking repeat capital refurbishments of the existing quay wall in the west part of the unit as well as raising and lengthening of the existing setback embankment defence.	**Improve A-C –** involves upgrading the defences, likely within the footprint of existing structures in epoch 1.	N/A	N/A	N/A	N/A	**Adaption / Resilience** – Maintaining existing quay walls and property level protection.
Epoch 2 (2044 – 2074)	NELO	Property level protection and potential options for saltmarsh restoration will be explored throughout the appraisal period.	Continue to raise / lengthen setback embankment defence over time as sea levels rise.	Upgrading the defences, likely within the existing footprint will take place in epoch 2.	Continued property protection and maintenance.	Raise defences / new defences to a 2124 SoP.	Constructing new flood defences in epoch 2 and raising and lengthening over time to keep pace with rising sea levels.	Property level protection measures and continued maintenance / refurbishment to existing quay wall in epoch 2.	Continued small scale repairs to existing defences.
	LALO	Continued property level protection and maintenance of new defences that have been constructed in epoch 1.	Continue to raise / lengthen setback embankment defence over time as sea levels rise. Repeat capital refurbishments of existing quay wall to continue.	Ongoing maintenance will take place throughout the appraisal period.	N/A	N/A	N/A	N/A	Continued maintenance and refurbishment of the quay walls and property level protection.
Epoch 3 (2074 – 2124)	NELO	Property level protection and potential options for saltmarsh restoration will be explored	Continue to raise / lengthen setback embankment defence over time as sea levels rise.	Ongoing maintenance will take place throughout the appraisal period.	Continued property protection and maintenance.	Ongoing maintenance of raised defences	Improving defences over time to keep pace with rising sea levels.	Constructing new defences in epoch 3 to a 2124 SoP	Continued small scale repairs to existing defences.

Epoch	Option	ODU3	ODU4	ODU5	ODU6	ODU7	ODU9	ODU10	ODU11
		throughout the appraisal period.							
	LALO	Same measures to continue throughout appraisal period.	Continue to raise / lengthen setback embankment defence over time as sea levels rise. Repeat capital refurbishments of existing quay wall to continue.	Ongoing maintenance will take place throughout the appraisal period.	N/A	N/A	N/A	N/A	Continued maintenance and refurbishment of the quay walls and property level protection.

4.4 Strategy Management Zone 3 – Christchurch Beaches and Cliffs (ODU's 12 - 13)

In ODUs 12-18, along this open coast part of the Strategy frontage the leading options are underpinned by a series of strategically placed beach nourishment interventions over time. The placement locations have been identified to provide an immediate benefit to the placement location but also to provide a long-term benefit to areas downdrift over the Strategy period. The leading options recommend beach nourishment is undertaken in ODU 12, ODU 13 at various points over the next 100 years. The beach nourishment will ensure that the beach can continue to provide an integral part of the overall defence system along the open coast. However, in some locations it would need to be supplemented with additional hard defence structures.

The NELO and LALO at ODU12 are Improve A and Improve C respectively and the NELO and LALO at ODU13 are Improve C and Improve A respectively. The leading options are described in Table 4-3.

Table 4-3 Strategy Management Zone 3 (ODUs 12-13) - Details of Leading Option

Epoch	Option	ODU12	ODU13
Epoch 1 (2024 – 2044)	NELO	**Improve A** – Refurbishing the existing defences.	**Improve C -** Construction of new rock armour defences to prevent outflanking of the existing defences.
	LALO	**Improve C –** Defence upgrades including raising the seawall and promenade area at the back of the beach, rock groynes and also undertaking beach nourishment.	**Improve A -** Construction of new rock armour defences to prevent outflanking of the existing defences.
Epoch 2 (2044 – 2074)	NELO	Defence upgrades including raising of the seawall at Avon beach and new rock groynes as well as beach nourishment.	Existing defences maintained / refurbished.
	LALO	Ongoing beach management and defence maintenance.	Beach nourishment undertaken from epoch 2 alongside refurbishment of existing defences.
Epoch 3 (2074 – 2124)	NELO	Ongoing beach management and defence maintenance.	Beach nourishment to take place from epoch 3 alongside continued repairs and refurbishment.
	LALO	Ongoing beach management and defence maintenance.	Further beach nourishment / management to take place from epoch 3 alongside continued repairs and refurbishment.

4.5 Strategy Management Zone 4 – Naish Cliff and Barton on Sea (ODU 14)

In ODU14 the leading option consists of managed realignment to reduce the rate of erosion to the part of the ODU14 frontage with properties located at the clifftop. This would be achieved through a combination of improved cliff drainage, cliff toe protection and refurbishment of existing groynes within the existing footprint of the defences.

At ODU14 the leading NELO is Managed Realignment A as described in Table 4-4.

Table 4-4 Strategy Management Zone 4 (ODU 14) - Details of Leading Option

Epoch	Option	ODU14
Epoch 1 (2024 – 2044)	NELO	**Manged realignment A –** From epoch 1 there will be construction of new toe defences (rock revetment), cliff drainage / stabilisation and refurbishment of existing rock revetment / groynes
Epoch 2 (2044 – 2074)	NELO	Ongoing maintenance / refurbishments of defences
Epoch 3 (2074 – 2124)	NELO	Ongoing maintenance / refurbishments of defences

4.6 Strategy Management Zone 5 – Taddiford (ODU 15)

The economic appraisal provisionally identified the Do Nothing option as being the National Economic Leading Option. The social appraisal and SEA have not identified any major negative impacts associated with this option and therefore it is confirmed as the National Economic Leading Option. This approach aligns with the SMP policy for the area.

There are no viable alternative options from an economic perspective and therefore a Local Aspirational Leading Option has not been selected. However, if opportunities arise to undertake beach nourishment as part of a wider scheme, then this would not be discouraged from a technical perspective as it would likely provide benefit to broader areas in the Strategy frontage.

The Do Nothing scenario is a 'walk away' scenario whereby any maintenance of FCERM assets or defences is not undertaken and beach management is not undertaken. With the Do Nothing scenario, the cliffs would continue to erode over time, likely increasing in pace in response to sea level rise. This option is in line with the SMP policy and is the current management approach for this location. As the cliffs erode this option may involve ensuring health and safety compliance – e.g. restricting access to unsafe zones / clearance of debris etc. It may also be necessary to make safe the rock structure that is currently protecting the decommissioned outfall if this were to fail.

4.7 Strategy Management Zone 6 – Milford on Sea (ODU 16 – 18)

SMZ 6 is an exposed, open coast environment. Hurst Spit is located immediately to the east of the zone. At the root of Hurst Spit at its west end (immediately to the east of the ODU 18 boundary) there is a large rock revetment. This provides an anchor / strong point in the coastline for both the Milford on Sea frontage and also Hurst Spit.

The appraisal of options for managing Hurst Spit is being developed by an adjacent coastal Strategy, the Hurst Spit to Lymington Coastal Strategy (HS2L) which is currently in development and is being led by the EA. The interaction between SMZ 6 and Hurst Spit has been a key consideration for the option appraisal in this location. Both project teams are collaborating on the development of options for the spit to ensure a joined up and cohesive approach is recommended. It has been agreed that the baseline stance for the appraisal in SMZ 6 is that the revetment at the root of Hurst Spit will be kept in place throughout the duration of the Strategy appraisal period.

There are a variety of defences in SMZ 6 including concrete seawalls, a rock revetment and groynes (rock and timber), primarily in ODUs 17 and 18. ODU 16 is largely undefended with beach huts located at the top of the beach / cliff toe. A significant failure of the seawall occurred recently at ODU 17 at Westover and emergency works have since been undertaken to stabilise the wall.

The NELO and LALO at ODU16 is Managed realignment C and Managed realignment A & B respectively. At ODU17 the NELO is Improve C and the LALO is improve A-B and at ODU18 the NELO is Improve A. The leading options for the SMZ are set out in Table 4-5.

Table 4-5 Strategy Management Zone 6 (ODUs 16-18) - Details of Leading Option

Epoch	Option	ODU16	ODU17	ODU18
Epoch 1 (2024 – 2044)	NELO	**Managed Realignment C** – which involves maintenance of existing defences in epoch 1.	**Improve C –** which involves maintaining / refurbishing existing defences in epoch 1.	**Improve A –** large scale beach nourishment, seawall upgrade, groyne upgrades from epoch 1.
	LALO	**Managed realignment A & B –** beach nourishment and construction of local strong point undertaken from epoch 1 / towards start of epoch 2	**Improve A & B -** Upgraded rock revetment, groyne construction from epoch 1 / towards start of epoch 2	N/A
Epoch 2 (2044 – 2074)	NELO	**Managed realignment C –** involves beach nourishment and construction of local strong point in mid-point of epoch 2	**Improve C -** Upgraded rock revetment, groyne construction from epoch 2.	Construction of set back defences and property level protection to manage flood risk. Maintenance and ongoing beach management.

Epoch	Option	ODU16	ODU17	ODU18
	LALO	Ongoing beach management and defence maintenance.	Ongoing maintenance / refurbishments of defences.	N/A
Epoch 3 (2074 – 2124)	NELO	Ongoing beach management and defence maintenance	Ongoing maintenance / refurbishments of defences.	Maintenance and ongoing beach management.
	LALO	Ongoing beach management and defence maintenance.	Ongoing maintenance / refurbishments of defences.	N/A

4.8 Summary of leading options

The leading NELO and LALO options for all ODUs are summarised and described in Table 4-6 below.

Table 4-6 Leading options considered in this assessment

ODU	NELO	LALO
1	**Do minimum** Small scale maintenance to existing defences (patch and repair).	**Managed Realignment** Maintain toe defences and undertake beach recycling from epoch 1. Erosion of cliff would be controlled but not stopped entirely
2	**Do minimum** Small scale maintenance to existing defences (patch and repair).	**Maintain with Adaptation** Sustain the FCERM service of the Sandbank by holding its form over time and aiming to keep it broadly in its current position. Achieved through beach nourishment and defence maintenance. Property level protection to permanent properties on the Sandbank.
3	**Adaptation / Resilience A** Property level protection to properties at risk. Historic landfill site would remain undefended.	**Adaptation / Resilience C** As per Adaptation / Resilience A, but with localised erosion defences to the access road to Hengistbury Head and around Wick historic landfill site
4	**Sustain C** Raise and lengthen existing setback embankment defence from epoch 1, and then progressively over time to keep pace with sea level rise. Frontline quay wall may fail in the future which could lead to erosion of historic landfill.	**Sustain B** As per Sustain C, however, repeat maintenance / refurbishments would also be undertaken on the frontline quay wall to prevent erosion of historic landfill
5	**Improve D-F (alignment to be decided)** Raise height of defences to improve SoP from epoch 2. Maintain / replace frontline defence adjacent to historic landfill site at the Quomps	**Improve A-C (alignment to be decided)** As per Improve D-F, except defence height would be raised in epoch 1 rather than epoch 2
6	**Adaptation / Resilience** Maintain frontline defences and undertake property level protection to properties at risk of flooding	- -
7	**Improve A** Construct new defences and raising overtime to keep pace with sea level rise in epoch 2. A combination of new frontline quay walls and upgraded setback defences with the Frontline structure defences being built as close to / within the footprint of the existing quay walls.	- -
9	**Sustain A** Construct new defences in epoch 2 then lengthening and raising over time. Deployable flood defences such as flood gates. Defences would follow the existing defence alignment in the north part of the unit adjacent to the River Avon and then new defences around Stanpit historic landfill site. Saltmarsh enhancement and creation.	- -
10	**Improve A**	-

ODU	NELO	LALO
	Property level protection to properties at risk in epochs 1 and 2. Deployable flood defences such as flood gates. Construct new flood defences in epoch 3 to increase the SoP against flooding. Capital refurbishments of quay wall. Saltmarsh enhancement / restoration.	-
11	**Do minimum**	**Adaptation / Resilience**
	Small scale maintenance to existing quay wall and setback defences (patch and repair)	Capital refurbishments to existing defences and maintenance to quay. Also implement property level protection as required to reduce risk on a property-by-property basis.
12	**Improve A**	**Improve C**
	Maintain / refurbish existing defences from epoch 1. Undertake beach nourishment from epoch 2 as well as new rock groynes and raising Avon Beach seawall. Localised property level protection in epoch 3 to manage flood risk. Seawall at Avon beach would be raised.	As per Improve A but undertake defence upgrades sooner and also undertake broader public realm enhancements (such as promenade raising).
13	**Improve C**	**Improve A**
	In epoch 1 construct rock armour defence at east end of unit to reduce outflanking risk. In epoch 1 and 2 maintain existing defences and undertake beach recycling. From epoch 3 undertake beach nourishment, construct new rock groynes and refurbish defences.	As per Improve C, except the beach nourishment in epoch 3 would be brought forward to be undertaken from epoch 2. New rock groynes from epoch 3
14	**Managed Realignment A**	**-**
	Improved toe defences and cliff stabilisation / drainage in the area between Marine Drive West and the eastern end of Barton on Sea from epoch 1. This would help to slow rates of cliff top recession but not stop it entirely. Also includes refurbishing of existing groynes within the existing footprint.	-
15	**Do Nothing**	-
	No defence maintenance or beach management undertaken. Undertake H&S activities following cliff erosion events to make safe public spaces.	-
16	**Managed Realignment C**	**Managed Realignment A or B**
	From second half of epoch 2 undertake beach nourishment and construct local strong point to control rate of cliff erosion. Cliff top recession would still occur, but intent would be to prevent it reaching Cliff Road.	As per Managed Realignment C, except beach nourishment and strong point would be constructed much sooner, in either epoch 1 (Managed Realignment A) or start of epoch 2 (Managed Realignment B)
17	**Improve C**	**Improve A or B**
	Refurbish existing cliff toe defences in epoch 1. From second half of epoch 2 upgrade defences at cliff toe.	As per Improve C, except toe defence improvements would be constructed much sooner, in either epoch 1 (Managed Realignment A) or start of epoch 2 (Managed Realignment B)
18	**Improve A**	**-**
	Upgrade seawall, construct new beach control structures (e.g. groynes) and undertake beach nourishment from epoch 1. Construct setback tidal flood defences at eastern end of Milford on Sea to reduce risk of flooding from Sturt Pond direction in epoch 2.	-

5. WFD Screening

5.1 Section Overview

The purpose of the WFD screening stage as outlined in PINS Advice Note 18 (Ref. 3) is to identify a zone of influence of the Strategy and to determine whether that influence has the potential to adversely impact upon WFD water body receptors; this approach has been taken in this assessment and is outlined in this section.

The zone of influence was set for the screening, which was the Strategy area, plus (for surface waters) one water body upstream and downstream of the Strategy area. This has been considered in order to identify water bodies that are potentially hydrologically connected to the Strategy and potential works associated with the Strategy that could cause direct impacts.

The screening stage also identifies specific activities of the Strategy that could affect receptor water bodies' WFD status and carries them forward to subsequent stages of the assessment process. Justification is provided where water body receptors are screened out and are not carried forward through the assessment. Water bodies or activities screened 'out' of the assessment are therefore not considered further at the impact assessment stage.

5.2 Screening of WFD Waterbodies

The Strategy interacts with a number of WFD waterbodies. WFD Screening of these water bodies is provided in Table 5-1 (also discussed in Section 2). Other surface water features, such as smaller tributaries, that may be impacted by the Strategy are considered in this assessment in the context of the wider WFD waterbody catchments.

Table 5-1 Screening of WFD Water Bodies Potentially Impacted by the Strategy

Waterbody Type	Water Body ID	Screening Outcome	Justification
Transitional	Christchurch Harbour	In	These waterbodies may be directly or indirectly impacted by the Strategy due to a range of activities that would interact with the waterbodies during construction, operation, and decommissioning phases of the Strategy. It is considered that there is potential to impact on WFD element status for these waterbodies and so are screened into the assessment.
Coastal Water	Dorset /Hampshire	In	
River	Avon Hampshire (Lower)	In	
River	Stour (Lower)	In	
River	Mude	In	
River	Danes Stream	In	
River	Clockhouse Stream	Out	No proposed components of the Strategy will interact directly with the waterbody
Coastal Water	Solent	Out	
River	Becton Bunny	Out	
Groundwater Body	Lower Dorset Stour and Lower Hampshire Avon	Out	
Groundwater Body	SW Hants Barton Group	Out	The review was undertaken on groundwater bodies and concluded that they could scoped out of the assessment, as the management options proposed will not impact any the groundwater bodies in the area, as any defences are unlikely to intercept groundwater levels. There are also no Source Protection Zones (SPZ) defined within Strategy area. Therefore, groundwater has been scoped out of this WFD assessment.
Groundwater Body	SW Hants Solent Group	Out	

5.3 Screening of Activities

As described in Section 1: Background, the Strategy comprises a number of activities that present a potential risk to the WFD status of water bodies. These components and activities are listed in Table 5-2 together with a screening assessment.

In terms of the preliminary assessment of deterioration, there are certain activities that are considered by the EA not to require assessment as they are unlikely to cause deterioration or result in a waterbody failing to achieve WFD status/potential objectives. These activities include:

- A self-service licence activity;
- Maintaining pumps at pumping stations;
- Removing blockages or obstacles like litter or debris within 10 of an existing structure to maintain flow;
- Replacing or removing existing pipes, cables or services crossing over a water body – but not including any new structure or supports, or new bed or bank reinforcement;
- 'Over water' replacement or repairs to, for example bridge, pier and jetty surfaces – if you minimise bank or bed disturbance;
- Re-pointing (block work structures);
- Void filling ('solid structures');
- Re-positioning (rock or rubble or block work structures);
- Replacing elements (not whole structure);
- Re-facing;
- Skimming/covering;
- Vermin control;
- Temporary flood defences;
- Beach re-profiling; and
- Beach recycling.

Table 5-2 Screening of the Strategy's development activities against WFD quality elements

Activity	Relevant Option		Waterbodies affected	Screening Outcome
	NELO	LALO		
Small scale patch and repair maintenance of defences	ODU1, ODU2, ODU 3, ODU 4, ODU 5, ODU 6, ODU 7, ODU 9, ODU 10, ODU11, ODU 12, ODU13, ODU 14, ODU 16, ODU 17, ODU 18	ODU1, ODU2, ODU3, ODU 4, ODU 5, ODU 11, ODU 12, ODU13, ODU 16, ODU 17	Dorset / Hampshire Coastal Christchurch TraC, Avon Hampshire (Lower), Stour (Lower), River Mude	Screened out – will cause no permanent change to any waterbody, surface water quality or biology elements and are activities that the EA classify as 'low risk'.
Maintenance / refurbishment of defences (i.e. repositioning, fully replacing elements of structure)	ODU5, ODU6, ODU10, ODU12, ODU13, ODU14, ODU17	ODU1, ODU2, ODU4, ODU5, ODU11, ODU12, ODU17	Dorset / Hampshire Coastal, Christchurch TraC, Avon Hampshire (Lower), Stour (Lower), River Mude	Screened out –will cause no permanent change to any waterbody, surface water quality or biology elements and are activities that the EA classify as 'low risk'.
Property level protection	ODU3, ODU5, ODU6, ODU10, ODU12, ODU18	ODU2, ODU3, ODU5, ODU11, ODU12	Dorset / Hampshire Coastal Christchurch TraC, Avon Hampshire (Lower), Stour (Lower), River Mude	Screened out – will cause no permanent change to any waterbody, surface water quality or biology elements as will be set back within the footprint of existing defences.
Raise height of defences	ODU4, ODU5, ODU9, ODU10, ODU12, ODU14, ODU 17, ODU 18	ODU4, ODU5, ODU12, ODU17	Dorset / Hampshire Coastal, Christchurch TraC, Stour (Lower), Avon Hampshire (Lower) River Mude, Danes Stream	Screen in – material excavation, operation of plant and machinery has the potential to impact surface water quality elements. Will not affect hydromorphology elements. Existing defences in 9 and 10 that would be raised are adjacent to intertidal saltmarsh and mudflat habitat and holding the position of these defences in the future could result in coastal squeeze.
Lengthen existing defences in Christchurch Harbour (setback)	ODU4, ODU5	ODU4, ODU5	Christchurch TraC, Stour (Lower)	Screen in – material excavation, operation of plant and machinery has the potential to impact on surface water quality.
Lengthen defences / new defences in Christchurch Harbour (frontline)	ODU 7, ODU9	ODU 3	Christchurch TraC, Avon Hampshire (Lower), Dorset / Hampshire Coastal	Screen in – material excavation, operation of plant and machinery has the potential to impact surface water quality and hydromorphology elements. New defences in ODU 7 could result in an increased defence footprint which could result in habitat loss. Defences in ODU 3 and ODU 9 would be adjacent to existing intertidal saltmarsh / mudflat habitat and could result in coastal squeeze.

Activity	Relevant Option		Waterbodies affected	Screening Outcome
	NELO	LALO		
Flood gates and quay access points construction	ODU5, ODU9	ODU5	Christchurch TraC Stour (Lower) Avon Hampshire (Lower)	Screened in –material excavation, operation of plant and machinery has the potential to impact surface water quality and hydromorphology elements.
Construct / upgrade defences along open coast (typically groynes, rock revetments, seawalls)	ODU12, ODU13, ODU14, ODU16, ODU17, ODU18	ODU12, ODU13, ODU16, ODU17	Dorset / Hampshire Coastal	Screen in - material excavation, operation of plant and machinery has the potential to impact of surface water quality and hydromorphology elements. Potential for increased footprint of defences which has the potential to impact WFD waterbodies.
Saltmarsh enhancement /restoration	ODU3, ODU9, ODU10	ODU3	Christchurch TraC Avon Hampshire (Lower) River Mude	Screened in – potential positive benefits to WFD objectives due to saltmarsh creation / restoration.
Beach recycling	ODU13	ODU1, ODU2, ODU13	Dorset / Hampshire Coastal Christchurch TraC	Screened out –will cause no permanent change to any waterbody, surface water quality or biology elements and are activities that the EA classify as ‘low risk’.
Beach nourishment	ODU12, ODU13, ODU16, ODU18	ODU 2, ODU12, ODU13, ODU16	Dorset / Hampshire Coastal Christchurch TraC	Screened in - material excavation, operation of plant and machinery has the potential to impact of surface water quality and hydromorphology elements.
Cliff stabilisation and drainage	ODU14	-	Dorset / Hampshire Coastal	Screened in – changes to drainage and construction of stabilisation measures have the potential to impact water quality and hydromorphology elements.

6. WFD Scoping

6.1 Overview

The WFD scoping stage, as outlined in PINS Advice Note 18 (Ref 4), defines the level of detail required for further WFD assessment. This includes identifying risks to the WFD receptors and their quality elements (e.g. biological, physico-chemical, and hydromorphological) from the Strategy's activities.

The two coastal and transitional waterbodies screened in, have the potential to be impacted by Strategy options and relevant data has been collected for them. This involves identifying the Biological Quality Elements (BQE) within the waterbodies. Morphological and water quality changes have been screened in as there is potential for minor or temporary construction impacts to the morphological regime or the water quality.

Phytoplankton are photosynthetic organisms that live free-floating within the water column. They are included as a BQE as they are an indicator organism for the levels of nutrients within the water. Seasonal changes that result in algae blooms during March to May and a second smaller peak between August and October (in temperate altitudes) are thought to be largely driven by anthropogenic influences such as nutrient rich runoff near outfalls from rivers, agriculture runoff or coastal sewage treatment works. Changes in phytoplankton populations therefore usually occur on a large spatial scale and it is unlikely that localised changes to water depth, turbidity and thermal regime (linked to water depth in this case) could result in community changes in the immediate and sheltered coastal fringe. Therefore, it is not considered that the leading Strategy options will impact on phytoplankton significantly at the waterbody level, thus this BQE will not be considered any further.

Macroalgae are photosynthetic, nonvascular plants commonly known as seaweeds. Seaweeds are adapted to the present conditions along the coastline and will therefore be susceptible to changes in current velocity, abrasion/sediment dynamics or salinity levels. However, it is unlikely that any policy type will result in any significant changes at the waterbody level and the Strategy activities are therefore not considered any further with respect to potential impacts to macroalgae.

Benthic/macro invertebrates that inhabit the coastal fringe will be sensitive to changes in their habitat structure, such as changes in the plant (macroalgae and macrophyte) communities. Changes to plant communities, through changes in current velocity, abrasion/sediment dynamics or salinity levels as discussed above, could impact on the invertebrates living within the plant communities. Benthic/macro invertebrates could also be directly affected by such changes as well as any changes in the connectivity with the riparian zone, to the defence footprint and the beach water table. These impacts will be explored in greater detail at scheme level.

There are several watercourses which flow into the coastal waterbodies into the Strategy area, the significant watercourses being the rivers Stour and Avon, which flow into Christchurch Harbour, which are both important salmonid fisheries and are designated as such under the Freshwater Fisheries Directive (Ref 14). It is therefore considered to be appropriate to assess the possible impacts of the Strategy on migration routes for fish. There could be some localised impacts on fish communities from changing sediment patterns (movements, quantities, type and changing current patterns influencing fish habitat), which will therefore be assessed further.

6.3 Coastal Waters

The scoping of the Strategy activities against key WFD quality elements for coastal waters are summarised in Table 6-1 below.

Table 6-1 WFD scoping of the Strategies activities against WFD quality elements for Coastal Waters

WFD Quality Element	Potential Risk to Receptor (Yes/No)	Scoping Outcome Reasoning
Biological Quality Elements		
Invertebrates	Yes	Screened in – Potential impacts to invertebrates within coastal waters due to changes in the connectivity with the riparian zone, changes in current velocity, abrasion/sediment dynamics may affect light or salinity levels affecting benthic invertebrate communities.
Phytoplankton	No	Screened out – Changes in phytoplankton populations usually occur on a large spatial scale and it is unlikely that localised changes to water depth, turbidity, and thermal regime (linked to water depth in this case) would result in community changes in the immediate and sheltered coastal fringe. Therefore, it is not considered that the leading Strategy options will impact on phytoplankton significantly at the waterbody level, thus this BQE will not be considered any further.
Physico-chemical Quality Elements		
Dissolved inorganic nitrogen (DIN)	No	Screened out – Excavation of sediments for beach nourishment and other construction activities could result in increased suspended solids concentration in the coastal water and thus increased dissolved inorganic nitrogen concentrations, however, would only occur temporarily within a local area, and due to the scale of works any further impacts would be diluted through the waterbody. Any proposed works would not introduce new sources of DIN hence impacts are assumed to be temporary.
Dissolved oxygen	No	Screened out – hydrographic and geomorphic processes could influence dissolved oxygen by increasing turbidity thus affecting oxygenating plants within coastal waters, however, would only occur temporarily within a local area as further impacts would be diluted through the waterbody.
Hydromorphological Quality Elements		
Morphology	Yes	Screened in as construction and refurbishment of coastal structures could impact erosion and accretion within coastal waters.

6.4 Transitional Waters

The scoping of the Strategy activities against key WFD quality elements for transitional waters are summarised in Table 6-2 below.

Table 6-2 WFD scoping of the Strategies activities against WFD quality elements for Transitional Waters

WFD Quality Element	Potential Risk to Receptor (Yes/No)	Scoping Outcome Reasoning
Biological Quality Elements		
Macroalgae	No	Screened out – it is unlikely that any policy type will result in significant changes at the waterbody level and is therefore not considered any further with respect to macroalgae.

WFD Quality Element	Potential Risk to Receptor (Yes/No)	Scoping Outcome Reasoning
Physico-chemical Quality Elements		
Dissolved inorganic nitrogen	No	Screened out – Excavation of sediments for construction activities could result in increased suspended solids concentration in the transitional waters and thus increased dissolved inorganic nitrogen concentrations, however, this would only occur temporarily within a local area, and due to the scale of works any further impacts would be diluted through the waterbody. Any proposed works would not introduce new sources of DIN hence impacts are assumed to be temporary.
Dissolved oxygen	Yes	Screened in – hydrographic and geomorphic processes could influence dissolved oxygen by increasing turbidity thus affecting oxygenating plants within transitional waters.
Hydromorphological Quality Elements		
Hydrological regime	Yes	Screened in – coastal structures may impact the hydrological regime by impacting flows and currents within the transitional environment.

6.5 Surface waterbodies

The activities carried out as part of the Strategy have been scoped against key WFD quality elements for surface waters has been summarised in Table 6-3.

Table 6-3 WFD scoping of the Strategies activities against WFD quality elements for rivers

WFD Quality Element	Potential Risk to Receptor (Yes/No)	Scoping Outcome Reasoning
Biological Quality Elements		
Fish	Yes	There could be some localised impacts on fish communities, e.g. due to changing sediment patterns (movements, quantities, type and changing current patterns influencing fish habitat), which therefore requires further assessment.
Invertebrates	Yes	Screened in - Potential impacts to invertebrates within rivers due to changes in the connectivity with the riparian zone, changes in current velocity, abrasion/sediment dynamics may affect light or salinity levels affecting benthic invertebrate communities.
Macrophytes and phytobenthos	Yes	Screened in - Potential impacts to macrophytes and phytobenthos within rivers due to changes in the connectivity with the riparian zone, changes in current velocity, abrasion/sediment dynamics may affect light or salinity levels affecting benthic invertebrate communities.
Physico-chemical Quality Elements		
Acid Neutralising Capacity (ANC)	No	Screened out – no anticipated impacts to ANC of freshwater rivers.
Ammonia	Yes	Screened out – Excavation of sediments for construction activities could result in increased suspended solids concentration in the surface waters and thus increased ammonia concentrations, however, this would only occur temporarily within a local area, and due to the scale of works any further impacts would be diluted through the waterbody.
Dissolved oxygen	Yes	Screened in – hydrographic and geomorphic processes could influence dissolved oxygen by increasing turbidity thus affecting oxygenating plants within surface waters
Phosphate	No	Screened out – Excavation of sediments for construction activities could result in increased suspended solids concentration in the surface waters and thus increased phosphate concentrations, however, this would only occur

WFD Quality Element	Potential Risk to Receptor (Yes/No)	Scoping Outcome Reasoning
		temporarily within a local area, and due to the scale of works any further impacts would be diluted through the waterbody.
Temperature	No	Screened out – Works undertaken are unlikely to impact upon temperature of rivers.
pH	No	Screened out – Works undertaken are unlikely to impact upon temperature of rivers.
Hydromorphological Quality Elements		
Quantity and dynamics of water flow	Yes	Screened in – Some activities have the potential to impact quantity and dynamics of water flow in rivers.
Connection to groundwater bodies	No	Screened out – No proposed works will impact connectivity of rivers to groundwater bodies.
River continuity	Yes	Screened in – New flood defences and beach nourishment may impact river continuity.
River depth and width variation	Yes	Screened in – New construction may impact river depth and width variation.
Structure and substrate of the riverbed	Yes	Screened in – Changes to sediment erosion and accretion dynamics may impact the structure and substrate of riverbeds further upstream.
Structure of the riparian Zone	Yes	Screened in – some works have the potential to impact the structure of Riparian zones for rivers.

7. Preliminary WFD Assessment

7.1 Section Overview

The aim of this stage is to assess the leading options of the Strategy and determine if further assessment is required due to the Strategy having potential impacts on the WFD objectives. If it is envisaged that no deterioration will occur across any of the WFD quality elements as a result of the leading options and that they will not prevent the waterbody from meeting its status or potential objectives, then no further WFD compliance assessment is required. The following step by step process is used in the following preliminary assessment for each of the leading Strategy options for each of the SMZs:

7.2 Strategy Management Zone 1 (ODUs 1-2)

7.2.1 Assessment of deterioration

The leading NELO at ODU 1 (Do Minimum) consists of smaller scale patch repairs-maintenance through the appraisal period as and when required. The leading LALO at ODU 1 (Managed Realignment) involves refurbishment and maintenance of the existing toe defences in this location which is likely to involve repositioning (rock structures). Beach recycling would also be undertaken as part of the LALO option, as and when required. Maintenance of existing defence structures and beach recycling is not considered an activity that would cause change or deterioration to WFD objectives, see section 5.3 for the screening of activities. Therefore, this option does not require further assessment as it is considered a low-risk activity by the EA.

At ODU2 the NELO leading option (Do Minimum) consists of smaller scale patch repairs-maintenance through the appraisal period as and when required. The leading LALO at ODU 2 (Maintain with Adaptation) involves refurbishment and maintenance of the existing seawall, rock groynes and rock revetment as well as property level protection. Maintenance will occur throughout the appraisal period with beach nourishment planned in epoch 3. Maintenance of existing structures and property level protection has been screened out of further assessment as this activity should not cause permanent changes to any water quality elements. However beach nourishment scheduled in epoch 3 requires further assessment.

7.2.2 Cumulative impacts/sensitive habitats

ODUs 1 and 2 sit adjacent to Christchurch Harbour SSSI, Dorset Heathland SPA and Dorset Heath SAC. The leading options include for repairs and refurbishment of existing sea defences (within the existing footprint) and ODU 2 includes beach nourishment. The beach nourishment planned at SMZ1 has the potential to cause temporary water quality issues within Christchurch Harbour SSSI due to movement of sediments and the potential to cause impacts on habitat.

7.3 Strategy Management Zone 2 (ODUs 3-11)

7.3.1 Assessment of deterioration

The NELO at ODU3 (Adaptation / Resilience A) involves property level protection to properties at risk. This part of the option does not require further assessment as the works will be carried out at individual property level thus not having an impact on the waterbodies or their WFD objectives. However, with the NELO option, there is potential that there could be erosion of historic landfill as the historic landfill area at Wick would remain undefended in the future. The LALO at ODU 3 (Adaptation / Resilience C) includes property level protection (scoped out) but also the construction of new erosion defences at Wick historic landfill site and adjacent to the access road at Hengistbury Head. The construction of new coastal defences as part of the LALO option would prevent erosion of the landfill and access road, but also has the potential to impact WFD objectives because there is a risk of coastal squeeze of intertidal habitat in the future. Both the NELO and LALO options require further assessment. Opportunities to create / restore saltmarsh habitat form part of the leading options in this unit. This could help compensate potential loss of saltmarsh due to coastal squeeze in this unit and elsewhere in the harbour.

At ODU4 the NELO (Sustain C) is to raise and lengthen the existing setback embankment defence from epoch 1, then progressively over time keep pace with rising sea levels. As part of the NELO option, the existing frontline quay wall would not be refurbished in the future and there is a risk that if this defences fails then erosion of the historic landfill site located behind the quay wall could occur. The LALO in ODU 4 (Sustain B) would be the same as the NELO option, but with the addition of maintenance to the frontline quay wall to prevent erosion of historic landfill in the future. For the LALO option increasing the height and lengthening of the existing setback defences

would involve material excavation and the operation of plant and machinery which has the potential to impact surface water quality elements. Both the NELO and LALO options have potential to impact water quality elements and therefore require further assessment.

The NELO and LALO for ODU5 (Improve D-F and Improve A-C) require further assessment as they includes raising the height and length of defences which may impact WFD objectives and designated sites. Any lengthening of defences would be setback (landward) of the shoreline and raising of frontline defences would be expected to be within the footprint of existing defences given the ample space available in this location to achieve this. Other activities undertaken at ODU5 such as maintaining frontline defences do not require further assessment as they are considered a low risk activity.

The NELO option at ODU6 (Adaptation / Resilience) is to maintain frontline defences and undertake property protection, this does not require further assessment as both activities are considered low risk and would not permanently impact on surface waterbody quality elements.

The leading option NELO option at ODU7 (Improve A) and ODU9 (Sustain A) involve construction of new defences / raising existing defences from epoch 2. Based on the current understanding of what the defence upgrades may involve, the construction of new sea defences / raising defences requires further assessment in both of these units due to potential effects of construction and plant operation on surface water quality elements and the effects of new structures on morphology. In ODU 9 there is potential for the defences at Stanpit to lead to coastal squeeze in the future with anticipated sea level rise as erosion of the historic landfill sites would be prevented which would prevent saltmarsh habitat from migrating inland. Recognising this, the leading NELO option at ODU9 will explore opportunities to enhance / restore the saltmarsh habitat in the future. Without the proposed defences there is a risk that the historic landfill site located at Stanpit could erode, releasing potentially contaminated materials into the environment.

The leading NELO option at ODU10 (Improve A) consists of maintaining the frontline quay within the existing structure footprint, given that this will be carried out within the existing footprint of flood defences it does not require further assessment. The property level protection also included in this option does not require further assessment as this would be within property boundaries. Raising the height of the flood defences in epoch 3 will require further assessment due to potential for impacts on WFD objectives of new structures. Maintaining the position of the existing defences in ODU 10 in the future could result in coastal squeeze of the adjacent intertidal habitats that are present in this location.

The NELO (Do Minimum) and LALO (Adaptation / Resilience) leading options in ODU11 consist of maintenance / refurbishment of the existing defences and quay walls, with property protection also included in the LALO. These options are screened out of further assessment as no change or deterioration of WFD objectives is anticipated.

7.3.2 Cumulative impacts/sensitive habitats

The majority of SMZ2 borders Christchurch Harbour SSSI and the Solent and Dorset coast SPA. ODU6, ODU7 and the northern sections of ODU9 also border Avon Valley SSSI, River Avon SAC, Avon Valley SPA and Avon Valley Ramsar. The construction of new defences / improving the existing defences at ODU3, ODU9 and ODU 10 may result in coastal squeeze within the Christchurch harbour designated sites and the Avon Valley designated sites (ODU 9 only) and therefore requires a detailed assessment.

In ODU 7, there is uncertainty as to exactly how the defences in epoch 2 would be constructed due to space constraints. It is possible that there could be a limited amount of encroachment into the designated sites but this will need to be explored during scheme design and appraisal. The intent set out in the Strategy is for any further appraisal / design work to avoid / minimise any potential encroachment.

7.4 Strategy Management Zone 3 (ODUs 12-13)

7.4.1 Assessment of deterioration

In ODU 12 the NELO (Improve A) and LALO (Improve C) leading options require further assessment due to large beach nourishment, construction of new groynes and raising of the seawall at Avon Beach from epoch 2.

At ODU 13 the NELO (Improve C) and LALO (Improve A) leading options are relatively similar, however beach nourishment would be bought forward to epoch 2 rather than epoch 3. Both options require further assessment given that beach nourishment will take place which could cause impacts to WFD objectives unless suitable mitigation is in place. New defences would also be constructed as part of these options which requires assessment.

7.4.2 Cumulative impacts/sensitive habitats

This SMZ is adjacent to the Solent and Dorset coast SPA and as such may impact upon its designated status. Beach nourishment will occur at both ODUs and thus require further assessment as they may impact the designated site due to movement of material / turbidity.

7.5 Strategy Management Zone 4 (ODUs 14)

7.5.1 Assessment of deterioration

The NELO at ODU14 (Managed Realignment A) is to improve toe defences and cliff stabilisation with targeted improvements made to drainage in the area between Marine Drive West and the eastern end of Barton on Sea.. This option requires further assessment due to the risks of new / higher defences and changes to drainage impacting upon hydromorphology and BQE within surface waterbodies. Refurbishing existing defences (such as groynes / rock revetment) within the existing footprint of the defences does not require further assessment.

7.5.2 Cumulative impacts/sensitive habitats

This SMZ is adjacent to the Solent and Dorset coast SPA and as such may impact upon its designated status.

7.6 Strategy Management Zone 5 (ODUs 15)

7.6.1 Assessment of deterioration

Does not require further assessment as no capital works will take place only public safety measures following cliff erosion events.

7.7 Strategy Management Zone 6 (ODUs 16-18)

7.7.1 Assessment of deterioration

At ODU 16 the NELO leading option (Managed Realignment C) and the LALO leading option (Managed Realignment A/B) include beach nourishment and construction of a local strong point to control rate of cliff erosion. This requires further assessment due to potential for beach nourishment to cause impacts to water quality elements and construction of new defences.

At ODU 17 both the NELO leading option (Improve C) and LALO options (Improve A/B) require further assessment as they involve the construction of upgraded defence structures at the cliff toe in either epoch 1 or 2.

At ODU 18 the NELO leading option (Improve A) requires further assessment due to the construction of upgraded defences as well as beach nourishment, which has the potential to impact the WFD objectives.

7.7.2 Cumulative impacts/sensitive habitats

ODU 16 is adjacent to Highcliffe to Milford Cliffs SSSI and SMZ6 is adjacent to the Solent and Dorset Coast SPA, beach nourishment at this site has the capacity to impact the designated site by causing excessive turbidity when material is moved / deposited.

7.8 Summary

The outcome of the preliminary assessment is summarised for all ODUs in Table 7-1 below.

Table 7-1 SMZ / ODUs requiring further assessment

SMZ	ODU	Reason
1	ODU2	Beach nourishment undertaken from epoch 3 at ODU2 with potential impacts to WFD objectives.
2	ODU3, ODU4, ODU 5, ODU7, ODU9 and ODU10	Potential impacts to morphological and/or water quality elements due to raising and lengthening flood defences / construction of new defences / historic landfill.
3	ODU12, ODU13	Potential impacts to surface water elements due to construction of new defences and beach nourishment.
4	ODU14	Potential impacts to surface water elements due to construction of new defences.
5	-	-
6	ODU16, ODU17 and ODU18	Potential impacts to surface water elements due to construction of new flood defences and beach nourishment.

8. Impact Assessment

8.1 Section Overview

If any of the leading options in the Strategy have reached this stage of the assessment, then they have either been identified during the preliminary assessment as potentially causing deterioration in WFD status/potential or preventing a waterbody from meeting its ecological objectives. In the case of this Strategy, the leading options in the following ODUs have reached this stage and have been subject to an impact assessment as set out in Table 7-1.

The leading NELO and LALO options for these management units may not meet WFD objectives on their own, or may have the potential to cause a failure of WFD objective when considered in combination with other ODUs within the Strategy area. Appendix A provides a summary of the ODUs and the conclusion of the preliminary and impact assessment.

8.2 Will the strategy cause deterioration or prevent the achievement of GEP

In order to protect the residential and commercial properties and critical infrastructure within the ODUs highlighted, construction by upgrading or improving the defences are essential. Hard defences are proposed at several ODUs which would replace the existing defences, which is often varying in type, condition and standard. At other locations it is proposed that the existing sea defences will be raised and lengthened over time to keep up with rising sea levels thus increasing the footprint of the existing defence structures.

The construction of hard defences such as rock groynes and seawalls could reduce morphological and ecological diversity. Beach narrowing and steepening and a reduction in the non-designated area may result from increased tide heights resulting from climate change.

In ODUs 3, 7, 12, 13, 14, 16, 17 and 18 the new defences / upgraded defences (raised and/or lengthening) proposed in these areas have the potential to result in a loss of habitat of designated sites. The impacts of this will be mitigated by including a commitment to avoid an increased footprint into European sites where possible, and extending the defences landward rather than into any coastal zones. The scale of any habitat loss must be quantified at the scheme level through detailed design, and mitigation must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses. Where possible any lengthening of defences will be done so without encroaching into designated areas.

It is anticipated that for most ODUs there **may** be localised water quality impacts as a result of construction works, although these are likely to be minimal and should be further reduced by adopting sensitive construction techniques as set out in the EA's Pollution prevention for businesses guidance. In addition, works should be timed to avoid sensitive times such as bird breeding seasons. It is assumed that impacts resulting from construction are unlikely to cause a permanent change in the ecological potential of the impacted waterbodies.

Bacteria can settle within the sediment, for example in the vicinity of outfalls and marinas, therefore, to prevent any impact on bathing water quality within the Strategy area construction work should not be carried out up to 48 hours after the discharge via an outfall, once the exposure risk has reduced. Construction can also be carried out to avoid sensitive periods and construction methods adopted to avoid the uncontrolled release of sediments and contamination, for example silt curtains.

Beach nourishment is proposed at ODUs 2, 12, 13, 16 and 18 with the aim of stabilising beach volumes and providing further support against rising sea and tidal levels. Large scale beach nourishment could alter the currents and sediment transport within the Dorset / Hampshire Coastal waterbody potentially affecting local ecology. It is anticipated that this would be a temporary impact on water quality. The scheme appraisal / design will consider impacts and include appropriate mitigation. All beach nourishment materials should come from licenced dredged areas which will have had environmental studies undertaken to confirm acceptable environmental impacts. The materials used for beach nourishment will also likely have similar grading of material to the existing beaches to limit changes to undesired sediment transport.

There are potential adverse impacts on fish and the migratory route for salmonids due to construction noise and disturbance which are anticipated at all ODUs. The effects of which will be mitigated by adopting techniques such as silent piling, silt curtains and seasonal working.

At ODU3 and ODU4 with the NELO options there is potential for erosion of historic landfill sites to occur in the future, which could result in the release of potentially contaminated materials into the environment and waterbody. At ODU 3 the historic landfill site at Wick is currently undefended and due to affordability the NELO option does not include provision for constructing a defence to defend this area in the future. At ODU 4, the NELO option does not include provision for refurbishing the existing frontline quay wall in the future. There is therefore the potential for this wall to fail in the future, which could lead to erosion of the historic landfill that is located behind it. At both ODU 3 and ODU 4, the aspiration set out in the Strategy is to deliver the LALO options, but this will be subject to acquiring the required funding. The LALO option in ODU 3 would involve constructing small scale erosion defences around the historic landfill site to prevent it from eroding. The LALO option in ODU 4 would involve refurbishing / maintaining the existing frontline quay wall to extend its service life and to prevent erosion. Both the LALO options significantly reduce the risk of erosion to the historic landfill sites in these locations. Following the Strategy, further investigation is required to establish the contamination status of the landfill sites so that an informed decision can be made as to the potential impacts of these areas eroding in the future.

As part of SMZ 1 and SMZ 2 there are future works adjacent to intertidal mudflat and saltmarsh habitat within Christchurch harbour which may result in intertidal habitat loss in the future due to coastal squeeze. This could occur at ODU 3 (LALO option), ODU 9 (NELO option) and ODU 10 (NELO option) which are adjacent to intertidal habitats and include new defences or maintaining / improving the existing defences. Loss of habitat should be identified and quantified at scheme level when more information is known on the exact defence alignments. The appropriate compensatory habitat will also need to be agreed with the competent authority at this stage. In ODU 3 and ODU 9 the defences that are recommended as part of the leading options are included in the options to prevent erosion of historic landfill sites, which if undefended could release potentially contaminated materials into the water environment in the future. Each of the options in ODUs 3, 9 and 10 includes a provision to explore opportunities for saltmarsh creation / restoration in the area. This could include placing of dredge material so that the rate of accretion matches sea level rise, saltmarsh planting, fencing or alternative methods.

8.3 Summary

It is considered that in the context of the wider Christchurch Harbour, Dorset / Hampshire Coastal, River Avon, River Stour and River Mude waterbodies, potential impacts of the strategy options on ecological elements will be localised for the most part. Some activities such as beach nourishment and increasing the footprint of the existing defences have undergone an impact assessment and mitigation has been identified to negate the potential impacts on WFD objectives (see suggested mitigation for each ODU in Appendix A). Therefore, with the mitigation outlined, the strategy options are unlikely to cause deterioration and prevent the achievement of GEP within the waterbodies as a whole.

8.4 Impacts on other waterbodies

This assessment has included all landward water bodies that have the potential to be impacted by the leading strategy options and the adjacent coastal water body. It has been determined through identifying in-combination effects that these waterbodies will not be impacted.

9. Conclusion and Compliance Statement

9.1 Water Framework Directive Conclusion

A summary of potential strategy impacts and mitigation is provided in Table 9-1. It is concluded that there are potential impacts on waterbodies within the strategy area, however they are anticipated to be minimal for the most part. Where potential impacts have been identified mitigation has been proposed to negate these impacts.

The Strategy aspiration is to deliver the LALO options where they have been identified. This includes in ODUs 3 and 4 where the LALO options would prevent erosion of historic landfill sites. The alternative NELO options in these locations would not prevent potential erosion of historic landfill sites, and an adverse impact to water quality could therefore occur if the LALO options are not delivered here (subject to the contamination status of the historic landfill materials). Little is currently known on the contaminated status of these sites so therefore it is proposed that investigations are undertaken after the Strategy to assess this to better inform future decision making.

9.2 Potential construction impacts and mitigation

For all ODUs, there may be localised water quality impacts as a result of construction works, although it is anticipated that this will be minimal and can be further reduced with sensitive construction techniques and reference to the EA's Pollution prevention for business guidance. Impacts resulting from construction are unlikely to cause a permanent change in the ecological potential of the waterbody. Bacteria can settle within the sediment, for example in the vicinity of outfalls and marinas, therefore, to prevent any impact on bathing water quality within the Strategy area, construction work will be carried out at least 2 days after the discharge via an outfall, once the exposure risk has reduced. Construction can also be carried out to avoid sensitive periods and construction methods adopted to avoid the uncontrolled release of sediments and contamination, for example silt curtains.

Table 9-1 WFD Summary Impact

Potential impacts of strategy on WFD Objectives	SMZ (ODU)	Waterbodies impacted?	Proposed mitigation / Enhancement Option	Any post mitigation impacts resulting in potential failure of WFD objectives?	Wider protected area impacts?
Potential for deterioration as a result of the loss of intertidal habitat resulting from direct land take due to increased footprints.	SMZ 2 (ODU3 and ODU7); SMZ 3 (ODU12 and ODU13); SMZ 4 (ODU14); SMZ 6 (ODU 16, 17 and 18)	Coastal Dorset/ Hampshire, Christchurch Harbour, River Stour & River Avon, Danes Stream	The strategy includes a commitment to avoid an increased footprint into European sites where possible. The scale of any habitat loss into European sites must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required then it must be secured and agreed with the competent authority. If mitigation within the European sites at the study site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses.	No	None
Potential for deterioration of intertidal habitats due to coastal squeeze in defended areas	SMZ 2 (ODUs 3, 9 and 10);	Coastal Dorset / Hampshire, Christchurch Harbour,	The scale of any habitat loss must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required then it must be secured and agreed with the competent authority. If mitigation within the European sites at the study site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses.	No	None
Potential for deterioration in morphological and ecological diversity due to construction of hard defences and increasing the size of existing defences.	SMZ 2 (ODUs 3, 4, 5, 7, 9, 10); SMZ 3 (ODUs 12 and 13); SMZ 4 (ODU14); SMZ 6 (ODUs 16, 17 and 18)	Coastal Dorset/ Hampshire, Christchurch Harbour, River Stour & River Avon, Danes Stream	The strategy includes a commitment to replace frontline defences within the existing footprint where possible which will limit morphological impacts. Alignments of new defences will be appraised at scheme level and will aim to avoid increases in defence footprint into European sites. If encroachment is unavoidable then appropriate habitat compensation will be provided at scheme level as required, either in the European sites at the study site or as part of the Regional Habitat Compensation Programme.	No	None
Potential for positive impacts on biodiversity due to saltmarsh restoration	SMZ 2 (ODUs 3, 9 and 10)	Christchurch Harbour	Any saltmarsh restoration is likely to provide benefits to the WFD objectives and therefore does not require mitigation.	No	None
Potential for temporary deterioration in water quality during the construction new defences / maintenance	All (except ODU15)	Coastal Dorset/ Hampshire, Christchurch Harbour, River Stour & River Avon	Impact is anticipated to be minimal, but it can be further reduced with sensitive construction techniques and reference to the EA's Pollution prevention for business guidance.	No	None
Potential for adverse impacts on fish and the migratory route for salmonids due to construction noise and disturbance	All (except ODU15)	Coastal Dorset/ Hampshire, Christchurch Harbour, River Stour & River Avon	For future schemes , the seasonal nature of salmonids should be considered through impact assessments of activities such as piling. Techniques such as silent piling, silt curtains and seasonal working should be utilised to mitigate potential impacts.	No	None

Potential impacts of strategy on WFD Objectives	SMZ (ODU)	Waterbodies impacted?	Proposed mitigation / Enhancement Option	Any post mitigation impacts resulting in potential failure of WFD objectives?	Wider protected area impacts?
Potential for longer term deterioration of water quality due to beach nourishment in coastal areas.	SMZ 1 (ODU2); SMZ 3 (ODUs 12 and 13); SMZ 6 (ODUs 16 and 18)	Coastal Dorset/ Hampshire	Mitigation to be considered further and implemented during scheme appraisal / design / construction plan and all beach nourishment materials to come from licenced dredged areas which will have had environmental studies undertaken to confirm acceptable environmental impacts.	No	None
Potential for impacts to water quality as a result of erosion risk to historic landfill sites	SMZ 2 (ODU3 and ODU4)	Christchurch Harbour, River Stour	Deliver the LALO options in these units to prevent erosion of the historic landfill. Carry out further investigations into the contamination status of the historic landfill, if it is found that the erosion of the site will cause adverse impacts to water quality this would be a further environmental driver for the LALO options.	Unlikely if LALO option delivered	Potentially

10. References

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Ref 16. Environment Agency. (2021). Ecology and Fish Data Explorer. Available: EA Ecology & Fish Data Explorer

Ref 17. AECOM. (2022) Strategy Option Development Report

Ref 18. AECOM. (2023) Christchurch Bay & Harbour FCERM Strategy Leading Options Report

Ref 19. DEFRA and Environment Agency. (2023) Pollution prevention for businesses.

Ref 20. AECOM (2023) Strategic Environmental Assessment Report

Ref 21. AECOM (2023) Habitats Regulations and Marine Conservation Zone Screening Assessment report

Appendix A ODU Strategy Water Framework Directive Summary

Table 10-1 Strategy Water Framework Directive Summary

ODU	Option	2024-2044			2044 - 2074			2074 - 2124		
		Leading option	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**
1	NELO	**Do Minimum** – small scale patch repairs to existing defences	No change or deterioration of WFD objectives	NA	Continued small scale patch repairs to existing defences	No change or deterioration of WFD objectives	NA	Continued small scale patch repairs to existing defences	No change or deterioration of WFD objectives	NA
	LALO	**Managed realignment** - through maintenance / refurbishment of existing structures.	No change or deterioration of WFD objectives	NA	Regular refurbishments to take place throughout the remainder of the appraisal period	No change or deterioration of WFD objectives	NA	Regular refurbishments to take place throughout the remainder of the appraisal period	No change or deterioration of WFD objectives	NA
2	NELO	**Do Minimum** – small scale patch repairs to existing defences	No change or deterioration of WFD objectives	NA	Do Minimum – small scale patch repairs to existing defences	No change or deterioration of WFD objectives	NA	Do Minimum – small scale patch repairs to existing defences	No change or deterioration of WFD objectives	NA
	LALO	**Maintain with Adaptation** - Ongoing repair and capital refurbishment, beach recycling and property level protection.	No change or deterioration of WFD objectives	NA	Ongoing repair and capital refurbishment, beach recycling and property level protection.	No change or deterioration of WFD objectives	NA	Beach nourishment and continued maintenance / refurbishment of defences.	Possible failure of WFD objective due to beach nourishment.	Impacts to WFD objectives to be mitigated through appropriate design as part of scheme appraisal. Beach nourishment materials to come from licenced dredged areas which will have had environmental studies undertaken to confirm acceptable environmental impacts.

ODU	Option	2024-2044			2044 - 2074			2074 - 2124		
		Leading option	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**
3	**NELO**	**Adaptation and Resilience A -** Property level protection, explore options for saltmarsh restoration.	Potential for impacts to water quality due to historic landfill site at Wick remaining undefended.	The Strategy sets out a LALO option here that would defend the historic landfill site from erosion. It is the aspiration to deliver the LALO option. Further studies into the contamination status of the historic landfill site should still be undertaken to inform future decision making. If the historic landfill material is deemed to be a risk for causing contamination to adjacent waterbodies, then this emphasises the importance of delivering the LALO option / or considering alternatives such as remediation.	Property level protection, explore options for saltmarsh restoration.	Potential for impacts to water quality due to historic landfill site at Wick remaining undefended.	The Strategy sets out a LALO option here that would defend the historic landfill site from erosion. It is the aspiration to deliver the LALO option. Further studies into the contamination status of the historic landfill site should still be undertaken to inform future decision making. If the historic landfill material is deemed to be a risk for causing contamination to adjacent waterbodies, then this emphasises the importance of delivering the LALO option / or considering alternatives such as remediation.	Property level protection, explore options for saltmarsh restoration.	Potential for impacts to water quality due to historic landfill site at Wick remaining undefended.	The Strategy sets out a LALO option here that would defend the historic landfill site from erosion. It is the aspiration to deliver the LALO option. Further studies into the contamination status of the historic landfill site should still be undertaken to inform future decision making. If the historic landfill material is deemed to be a risk for causing contamination to adjacent waterbodies, then this emphasises the importance of delivering the LALO option / or considering alternatives such as remediation.

ODU	Option	2024-2044			2044 - 2074			2074 - 2124		
		Leading option	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**
	LALO	**Adaptation and Resilience C -** Property level protection, explore options for saltmarsh restoration, addition of new erosion defences.	Possible failure of WFD objective due to construction of new defences - increased footprint leading to impacts and potential future coastal squeeze.	The scale of any habitat loss must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses. Opportunities for intertidal enhancement / restoration also explored as part of the option.	Property level protection, explore options for saltmarsh restoration and maintenance of the erosion defences.	Possible failure of WFD objective due to construction of new defences - potential future coastal squeeze	The scale of any habitat loss must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses. Opportunities for intertidal enhancement / restoration also explored as part of the option.	Property level protection, explore options for saltmarsh restoration and maintenance of the erosion defences	Possible failure of WFD objective due to construction of new defences - potential future coastal squeeze	The scale of any habitat loss must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses. Opportunities for intertidal enhancement / restoration also explored as part of the option.

ODU	Option	2024-2044			2044 - 2074			2074 - 2124		
		Leading option	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**
4	**NELO**	**Sustain C -** Patchwork repair and raising and lengthening of existing setback embankment. Setback defence is landward.	Potential for impacts to water quality due to potential erosion risk to historic landfill site if frontline quay wall fails.	The erosion risk to the historic landfill site would be avoided by undertaking the LALO option in ODU 4. Delivering the LALO option is the aspiration of the Strategy here. Further studies into the contamination status of the historic landfill site should still be undertaken to inform future decision making. If the historic landfill material is deemed to be a risk for causing contamination to adjacent waterbodies, then this emphasises the importance of delivering the LALO option / or considering alternatives such as remediation. Modifications to setback structures not expected to lead to impacts or morphological / ecological deterioration but should be considered further during scheme appraisal.	Lengthening and raising of existing setback embankment in response to sea level rise. Setback defence is landward.	Potential for impacts to water quality due to erosion of historic landfill site if frontline quay wall fails.	The erosion risk to the historic landfill site would be avoided by undertaking the LALO option in ODU 4. Delivering the LALO option is the aspiration of the Strategy here. Further studies into the contamination status of the historic landfill site should still be undertaken to inform future decision making. If the historic landfill material is deemed to be a risk for causing contamination to adjacent waterbodies, then this emphasises the importance of delivering the LALO option / or considering alternatives such as remediation. Modifications to setback structures not expected to lead to impacts or morphological / ecological deterioration but should be considered further during scheme appraisal.	Lengthening and raising of existing setback embankment in response to sea level rise. Setback defence is landward.	Potential for impacts to water quality due to erosion of historic landfill site if frontline quay wall fails.	The erosion risk to the historic landfill site would be avoided by undertaking the LALO option in ODU 4. Delivering the LALO option is the aspiration of the Strategy here. Further studies into the contamination status of the historic landfill site should still be undertaken to inform future decision making. If the historic landfill material is deemed to be a risk for causing contamination to adjacent waterbodies, then this emphasises the importance of delivering the LALO option / or considering alternatives such as remediation. Modifications to setback structures not expected to lead to impacts or morphological / ecological deterioration but should be considered further during scheme appraisal.

ODU	Option	2024-2044			2044 - 2074			2074 - 2124		
		Leading option	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**
	LALO	**Sustain B -** Refurbishment of existing quay wall, lengthening and raising of existing setback embankment	No change or deterioration of WFD objectives.	Maintenance of frontline quay wall not likely to lead to deterioration. Modifications to setback structures not expected to lead to impacts or morphological / ecological deterioration but should be considered further during scheme appraisal.	Ongoing maintenance / refurbishment of quay wall. Lengthening and raising of existing setback embankment.	No change or deterioration of WFD objectives.	Maintenance of frontline quay wall not likely to lead to deterioration. Modifications to setback structures not expected to lead to impacts or morphological / ecological deterioration but should be considered further during scheme appraisal.	Ongoing maintenance / refurbishment of quay wall. Lengthening and raising of existing setback embankment.	No change or deterioration of WFD objectives.	Maintenance of frontline quay wall not likely to lead to deterioration. Modifications to setback structures not expected to lead to impacts or morphological / ecological deterioration but should be considered further during scheme appraisal.
5	**NELO**	**Improve D-F -** Maintain existing defences.	No change or deterioration of WFD objectives	NA	Upgrade defences – raising / lengthening.	No change or deterioration of WFD objectives.	Along the frontline structures the upgrades would be within footprint of existing defences which would not be expected to lead to morphological changes or long term ecological impacts. Modifications to setback structures not expected to lead to impacts or morphological / ecological deterioration but should be considered further during scheme appraisal.	Ongoing maintenance	No change or deterioration of WFD objectives	NA

ODU	Option	2024-2044			2044 - 2074			2074 - 2124		
		Leading option	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**
	LALO	**Improve A-C -** Upgrade defences – raising / lengthening.	No change or deterioration of WFD objectives.	Along the frontline structures the upgrades would be within footprint of existing defences which would not be expected to lead to morphological changes or long term ecological impacts. Modifications to setback structures not expected to lead to impacts or morphological / ecological deterioration but should be considered further during scheme appraisal.	Ongoing maintenance	No change or deterioration of WFD objectives	NA	Ongoing maintenance	No change or deterioration of WFD objectives	NA
6	**NELO**	**Adaptation / Resilience -** Property level protection and quay wall maintenance	No change or deterioration of WFD objectives	NA	Property level protection and quay wall maintenance	No change or deterioration of WFD objectives	NA	Property level protection and quay wall maintenance	No change or deterioration of WFD objectives	NA
7	**NELO**	**Improve A –** maintenance of existing defences	No change or deterioration of WFD objectives	NA	Constructing new defences / raising existing defences. Unclear at this stage as to whether encroachment into designated areas may be needed. To be confirmed at scheme stage.	Possible failure of WFD objective due to increased footprint of defences – ecological / habitat loss and morphological impacts.	The scale of any habitat loss must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses.	Maintaining the defences and also undertaking additional lengthening/raising to keep pace with sea level rise. Unclear at this stage as to whether encroachment into designated areas may be needed. To be confirmed at scheme stage.	Possible failure of WFD objective due to increased footprint of defences – ecological / habitat loss and morphological impacts.	The scale of any habitat loss must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses.

ODU	Option	2024-2044			2044 - 2074			2074 - 2124		
		Leading option	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**
9	NELO	**Sustain A -** Investigate opportunities to enhance / restore the saltmarsh habitat in the future and maintaining existing defences.	No change or deterioration of WFD objectives	NA	Constructing new flood / erosion defences around urban area and historic landfill site. Continue with saltmarsh restoration / enhancement opportunities.	Possible failure of WFD objective due to coastal squeeze.	New defences expected to be within footprint of existing so direct habitat loss / morphological issues not anticipated. However the scale of any habitat loss from coastal squeeze must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses. Opportunities for intertidal enhancement / restoration also explored as part of the option.	Raising the flood defences to keep pace with sea level rise. Continue with saltmarsh restoration / enhancement opportunities.	Possible failure of WFD objective due to coastal squeeze.	New defences expected to be within footprint of existing so direct habitat loss / morphological issues not anticipated. However the scale of any habitat loss from coastal squeeze must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses. Opportunities for intertidal enhancement / restoration also explored as part of the option.

ODU	Option	2024-2044			2044 - 2074			2074 - 2124		
		Leading option	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**
10	NELO	**Improve A -** Property Level protection measures, existing quay wall maintenance / refurbishment	No change or deterioration of WFD objectives	NA	Continued property Level protection measures, existing quay wall maintenance / refurbishment	No change or deterioration of WFD objectives	NA	Construct new flood defences	Possible failure of WFD objective due to coastal squeeze.	New defences expected to be within footprint of existing so direct habitat loss / morphological issues not anticipated. However the scale of any habitat loss from coastal squeeze must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses. Opportunities for intertidal enhancement / restoration also explored as part of the option.

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11	**NELO**	Do Minimum – small scale patch-repair maintenance	No change or deterioration of WFD objectives	NA	Small scale patch-repair maintenance	No change or deterioration of WFD objectives	NA	Small scale patch-repair maintenance	No change or deterioration of WFD objectives	NA
	LALO	**Adaptation / Resilience -** Maintaining existing quay walls and property level protection.	No change or deterioration of WFD objectives	NA	Maintaining existing quay walls and property level protection.	No change or deterioration of WFD objectives	NA	Maintaining existing quay walls and property level protection.	No change or deterioration of WFD objectives	NA

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12	**NELO**	**Improve A -** Refurbishing the existing linear defences.	No change or deterioration of WFD objectives	NA	Large scale beach nourishment, construction of new rock groynes, raising seawall at Avon beach.	Possible failure of WFD objective due to beach nourishment / new defences.	Impacts to WFD objectives to be mitigated through appropriate design as part of scheme appraisal. Beach nourishment materials to come from licenced dredged areas which will have had environmental studies undertaken to confirm acceptable environmental impacts. Alignments of new defences will be appraised at scheme level and will aim to avoid increases in footprint. The scale of any habitat loss must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses.	Ongoing beach management	Possible failure of WFD objective due to beach nourishment	Impacts to WFD objectives to be mitigated through appropriate design as part of scheme appraisal. Beach nourishment materials to come from licenced dredged areas which will have had environmental studies undertaken to confirm acceptable environmental impacts

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	LALO	**Improve C -** Large scale beach nourishment, construction of new rock groynes, raising seawall at Avon beach.	Possible failure of WFD objective due to beach nourishment / new defences.	Impacts to WFD objectives to be mitigated through appropriate design as part of scheme appraisal. Beach nourishment materials to come from licenced dredged areas which will have had environmental studies undertaken to confirm acceptable environmental impacts. Alignments of new defences will be appraised at scheme level and will aim to avoid increases in footprint. The scale of any habitat loss must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses.	Ongoing beach management and defence maintenance	Possible failure of WFD objective due to beach nourishment	Impacts to WFD objectives to be mitigated through appropriate design as part of scheme appraisal. Beach nourishment materials to come from licenced dredged areas which will have had environmental studies undertaken to confirm acceptable environmental impacts	Ongoing beach management and defence maintenance	Possible failure of WFD objective due to beach nourishment	Impacts to WFD objectives to be mitigated through appropriate design as part of scheme appraisal. Beach nourishment materials to come from licenced dredged areas which will have had environmental studies undertaken to confirm acceptable environmental impacts

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13	NELO	**Improve C -** Construction of new rock armour defences to prevent outflanking of the existing defences.	Possible failure of WFD objective due to new defences	Alignments of new defences will be appraised at scheme level and will aim to avoid increases in footprint. The scale of any habitat loss must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses.	Existing defences refurbished / maintained	No change or deterioration of WFD objectives	NA	Beach nourishment undertaken alongside continued maintenance of defences.	Possible failure of WFD objective due to beach nourishment	Impacts to WFD objectives to be mitigated through appropriate design as part of scheme appraisal. Beach nourishment materials to come from licenced dredged areas which will have had environmental studies undertaken to confirm acceptable environmental
	LALO	**Improve A -** Construction of new rock armour defences to prevent outflanking of the existing defences.	Possible failure of WFD objective due to new defences	Alignments of new defences will be appraised at scheme level and will aim to avoid increases in footprint. The scale of any habitat loss must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses.	Existing defences refurbished and beach nourishment.	Possible failure of WFD objective due to beach nourishment	Impacts to WFD objectives to be mitigated through appropriate design as part of scheme appraisal. Beach nourishment materials to come from licenced dredged areas which will have had environmental studies undertaken to confirm acceptable environmental	Further beach nourishment undertaken and maintenance of defences	Possible failure of WFD objective due to beach nourishment	Impacts to WFD objectives to be mitigated through appropriate design as part of scheme appraisal. Beach nourishment materials to come from licenced dredged areas which will have had environmental studies undertaken to confirm acceptable environmental

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14	NELO	**Managed Realignment A** - New toe defences and cliff drainage / stabilisation, construction of rock revetment, refurbishment of existing rock revetment.	Possible failure of WFD objective due to new defences.	Alignments of new defences will be appraised at scheme level and will aim to avoid increases in footprint. The scale of any habitat loss must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses. Drainage impacts expected to be localised and unlikely to impact surface waterbodies.	Ongoing maintenance	No change or deterioration of WFD objectives	NA	Ongoing maintenance / refurbishments	No change or deterioration of WFD objectives	NA

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15	**NELO**	**Do Nothing**	No change or deterioration of WFD objectives	NA	Do Nothing	No change or deterioration of WFD objectives	NA	Do Nothing	No change or deterioration of WFD objectives	NA

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		Leading option	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**
16	**NELO**	**Managed Realignment C –** maintenance of existing defences	No change or deterioration of WFD objectives	NA	Beach nourishment and construction of local strong point	Possible failure of WFD objective due to beach nourishment and new defences	For beach nourishment, the impacts to WFD objectives to be mitigated through appropriate design as part of scheme appraisal. Beach nourishment materials to come from licenced dredged areas which will have had environmental studies undertaken to confirm acceptable environmental impacts. Alignments of new defences will be appraised at scheme level and will aim to avoid increases in footprint. The scale of any habitat loss must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses.	Maintain defences and ongoing beach management	No change or deterioration of WFD objectives	NA

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		Leading option	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**
	LALO	**Managed Realignment A / B -** Beach nourishment and construction of local strong point	Possible failure of WFD objective due to beach nourishment and new defences	For beach nourishment, the impacts to WFD objectives to be mitigated through appropriate design as part of scheme appraisal. Beach nourishment materials to come from licenced dredged areas which will have had environmental studies undertaken to confirm acceptable environmental impacts. Alignments of new defences will be appraised at scheme level and will aim to avoid increases in footprint. The scale of any habitat loss must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses.	Maintain defences and ongoing beach management	No change or deterioration of WFD objectives	NA	Maintain defences and ongoing beach management	No change or deterioration of WFD objectives	NA

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		Leading option	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**	**Leading option**	**Preliminary Assessment**	**Impact Assessment Conclusion**
17	**NELO**	**Improve C –** maintaining / refurbishing existing defences	No change or deterioration of WFD objectives	NA	Upgraded rock revetment, groyne construction	Possible failure of WFD objective due to new defences	Alignments of new defences will be appraised at scheme level and will aim to avoid increases in footprint. The scale of any habitat loss must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses.	Ongoing maintenance	No change or deterioration of WFD objectives	NA
	LALO	**Improve A / B -** Upgraded rock revetment, groyne construction	Possible failure of WFD objective	Alignments of new defences will be appraised at scheme level and will aim to avoid increases in footprint. The scale of any habitat loss must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses.	Ongoing maintenance	No change or deterioration of WFD objectives	NA	Ongoing maintenance	No change or deterioration of WFD objectives	NA

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18	**NELO**	**Improve A -** Capital beach nourishment, seawall / groyne upgrade	Possible failure of WFD objective due to new defences and beach nourishment	Impacts to WFD objectives to be mitigated through appropriate design as part of scheme appraisal. Beach nourishment materials to come from licenced dredged areas which will have had environmental studies undertaken to confirm acceptable environmental impacts. Alignments of new defences will be appraised at scheme level and will aim to avoid increases in footprint. The scale of any habitat loss must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses.	Ongoing beach nourishment and defence maintenance. Construction of setback defences at Sturt Pond (Danes Stream) and property level protection.	Possible failure of WFD objective due to new defences adjacent to Danes Stream and beach nourishment	Impacts to WFD objectives to be mitigated through appropriate design as part of scheme appraisal. Beach nourishment materials to come from licenced dredged areas which will have had environmental studies undertaken to confirm acceptable environmental impacts. Alignments of new setback defences will be appraised at scheme level and will aim to avoid increases in footprint. The scale of any habitat loss must be quantified at the scheme level through detailed design. If mitigation / habitat compensation is required it must be secured and agreed with the competent authority. If mitigation within European site is not possible the Regional Habitat Compensation Programme would need to take account of any additional habitat losses.	Ongoing beach nourishment and defence maintenance	Possible failure of WFD objective due to beach nourishment	Impacts to WFD objectives to be mitigated through appropriate design as part of scheme appraisal. Beach nourishment materials to come from licenced dredged areas which will have had environmental studies undertaken to confirm acceptable environmental

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