TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

South East Trunk Road Unit

A985 Kincardine Bridge – Maintenance Schemes (Initial Marine Licence)

Habitats Regulations Appraisal

December 2021

Prepared for BEAR Scotland by Jacobs

experience that delivers

BEAR SCOTLAND

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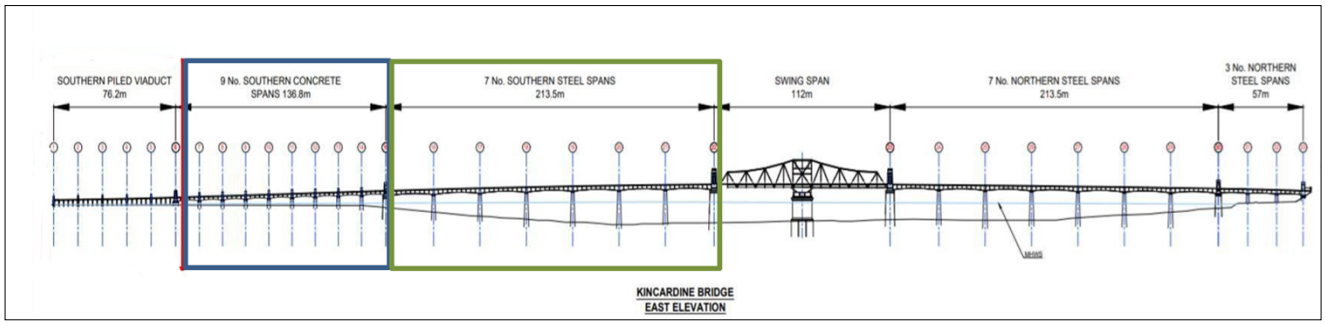

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1 Introduction

1.1 Background

1.1.1 In August 2020, BEAR Scotland was appointed the Operating Company for the Fifth Generation Term Maintenance (TMC) Contract for the South East Trunk Road Unit. This contract sees BEAR Scotland responsible for the management and maintenance of trunk road assets in the south east of Scotland until at least 2028.

1.1.2 The Kincardine Bridge crosses the Firth of Forth between Higgins Neuk in Falkirk Council area and the town of Kincardine in Fife Council area. The Kincardine Bridge is used to carry the A985 Kincardine – Rosyth Trunk Road over the Firth of Forth, via a two-lane single carriageway road. The Kincardine Bridge has segregated footways either side of the carriageway. The A985 connects to the A876 at the Higgins Neuk Roundabout which lies to the south-west of the Kincardine Bridge.

1.1.3 The Kincardine Bridge was opened in 1936 and is a Category A listed structure. The southern approach comprises a 24-span piled viaduct, 76.2m in length, followed by nine 15.2m concrete spans and seven 30.5m steel spans (Diagram 1). The north approach consists of three 19.0m steel spans and seven 30.5m steel spans (Diagram 1). The central swing span is formed of two open Warren girders symmetrically balanced upon a central pier. The swing span deck is formed of a reinforced concrete slab supported on steel baffle plates that span between longitudinal beams. The total length of the bridge is 822m. The southern piled viaduct is in very poor condition and is scheduled to be replaced in 2022.

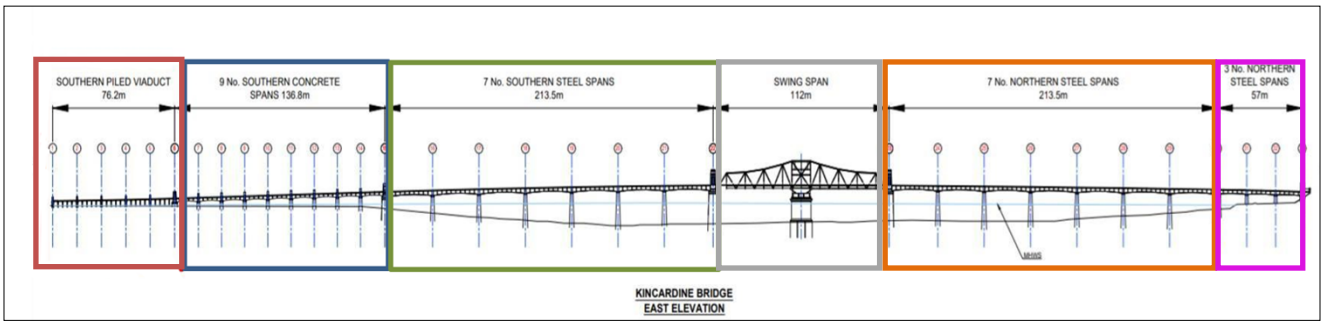


Diagram 1: East Elevation of Kincardine Bridge

1.1.4 Amey, on behalf of Transport Scotland, previously obtained a Marine Licence for maintenance and improvement works on the Kincardine Bridge. This licence (Licence Number 05709/16/0) was obtained on 29 February 2016 and was valid for a period of four years, expiring 28 February 2020. A new Marine Licence is required to cover proposed maintenance at the Kincardine Bridge in 2022. The current programme indicates that the licence will be determined in May 2022 and it is anticipated it will cover required maintenance works for a period of one year from this date. For maintenance works beyond this licence period, a further Marine Licence will be required (a separate application, and environmental documents are in preparation for this licence).

1.1.5 The proposed maintenance works are not directly connected with, or essential for, the management of any European or Ramsar site.

1.2 The Bern Convention, Habitats Directive, Habitats Regulations and European/Ramsar Sites

1.2.1 The Habitats Regulations (Conservation (Natural Habitats, &c.) Regulations 1994) translated the European Union Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive[1]) into UK legislation to protect sites that are internationally important for threatened habitats and species (European Sites), and to create a legal framework for species requiring strict protection.

1.2.2 The Habitats Regulations have been amended in Scotland, most recently in 2019 as a result of the UK leaving the EU (Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019). This latest amendment ensures that the requirements of the Habitats Directive and the Birds Directive (European Union Council Directive 2009/147/EC) continue to be relevant to the management of European sites, so that the sites are both protected and that they continue to operate as originally intended.

1.2.3 European Sites are Special Protection Areas (SPAs) (classified under the Birds Directive) and Special Areas of Conservation (SACs) (classified under the Habitats Directive) and form part of an international network of protected sites. Prior to leaving the EU, Scotland's sites contributed to the Natura network and now form part of the Emerald Network[2], spanning Europe and into Africa.

1.2.4 This HRA is presented under the aegis of Regulation 48 of the Habitats Regulations, which transposes the requirements of Article 6(3) of the Habitats Directive.

1.2.5 The Habitats Regulations continue to require that an Appropriate Assessment (AA) be undertaken by a Competent Authority where any plan or project not directly connected with or necessary to the management of the European/Ramsar site (i.e. a SAC or SPA, or proposed SAC/SPA, or a Ramsar site), is likely to have a significant effect either individually or in combination with other plans or projects. HRA refers to the process that provides the Competent Authority with the information to enable them to make an AA determination. The HRA provides data concerning site integrity, and the AA must be undertaken 'in view of the site's conservation objectives'. With respect to this HRA for these investigations, the Competent Authority will be Transport Scotland, with their Statutory Nature Conservation Body (SNCB) for consultation being NatureScot [3].

[1] The Habitats Directive was adopted in 1992 by the European Community (as was) as the Community's response to the Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention).

[2] The Emerald Network was launched by the Council of Europe as part of its work under the Bern Convention.

[3] Note that Scotland's nature agency, NatureScot, was known as Scottish Natural Heritage (SNH) prior to August 2020. Within this document, all references to the organisation in the text and documents cited are provided with the name appropriate to the time at which the document was published or communication received, however the organisations are one and the same.

1.2.6 Whilst not a European site designation, wetland sites designated under the Convention on Wetlands of International Importance, known as Ramsar sites, are also relevant as they are afforded the same level of protection as European sites under domestic policy and treated in the same way as the UK site network. Most Ramsar sites in Scotland are either designated SPAs or SACs although not always sharing the same qualifying interests (NatureScot, 2021a).

1.2.7 A programme of works has been provided by BEAR Scotland to inform this HRA, setting out the routine and non-routine works expected to be undertaken during the licence period (Appendix A). It details the expected activities, timing, duration/frequency, and equipment required. The AA undertaken within this HRA is based on this programme of works. As such, if the Operating Company or Contractor changes the programme of works (excluding changes to routine maintenance where the activities are generally covered within the routine maintenance section) the changes will have to undergo an HRA process to demonstrate there are no additional likely significant effects which could lead to adverse effect on site integrity of European/Ramsar sites from the changes, and that the conclusion of this HRA is still valid.

1.3 The HRA Process

1.3.1 The HRA process establishes whether the proposal:

- is directly connected with or necessary for site management for nature conservation;
- is likely to have a significant effect on the site; and
- will adversely affect the site's integrity.

1.3.2 If the assessment cannot ascertain that the proposal would not adversely affect site integrity and yet the Competent Authority still wish to consent the proposal, a consideration of alternative solutions is required. If no alternative solutions are available, a proposal may be carried out for Imperative Reasons of Overriding Public Interest as indicated by Article 49 of the Habitats Regulations. As stated in Article 53 of the Habitats Regulations, where this is the case 'the Secretary of State shall secure that any necessary compensatory measures are taken to ensure that the overall coherence of Natura 2000 is protected' (The Conservation (Natural Habitats, &c.) Regulations 1994).

1.3.3 The four stages of the HRA process are as follows:

- Stage One – Screening (should be undertaken in all cases).
- Stage Two – Appropriate Assessment.
- Stage Three – Alternative Solutions.
- Stage Four – Imperative Reasons of Overriding Public Importance (IROPI) and including, in certain circumstances, compensatory measures.

1.3.4 It should be noted that not all stages may be necessary in the HRA process. If the screening stage determines that a plan or project is unlikely to have significant effects on a European/Ramsar site, subsequent stages are not required.

Stage One: Screening

1.3.5 Screening identifies the potential effects on a European/Ramsar site from a project or plan, either alone or in combination with other projects or plans, and considers whether these effects are likely to be significant.

1.3.6 The screening assessment is a test of the 'likelihood' of effects occurring rather than a 'certainty' of effects occurring. Following the UK's departure from the European Union, rulings from the European Court of Justice remain in force as though made by the Supreme Court (NatureScot, 2021b). On that basis, in accordance with the Waddenzee Judgement (European Court of Justice case C-127/02), a likely significant effect is one that cannot be ruled out on the basis of objective information. This is underpinned by the precautionary principle which is enshrined in law in the Habitats Directive, and the test of something as being "*beyond reasonable scientific doubt*", as presented in the Waddenzee Judgement. Paragraph 49 of the same judgement adds *"…where a plan or project… is likely to undermine the site's conservation objectives, it must be considered likely to have a significant effect on that site. The assessment of that risk must be made in the light inter alia of the characteristics and specific environmental conditions of the site concerned by such a plan or project*". The Sweetman case (European Court of Justice C-258/11) reinforced and further refined the Waddenzee Judgement ruling that 'the question is simply whether the plan or project concerned is capable of having an effect. It is in that sense that the English 'likely to' should be understood.'

1.3.7 The People Over Wind Judgement (European Court of Justice C-323/17) (SNH, 2019) clarifies the stage in the HRA process when mitigation measures can be taken into account when assessing impacts on a European site. The ruling is that: "…*in order to determine whether it is necessary to carry out, subsequently, an appropriate assessment of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site*."

Stage Two: Appropriate Assessment (AA)

1.3.8 If the Stage One Screening process determines that the project or plan (either solely or in combination) is associated with impacts which are likely to have a significant effect upon a European/Ramsar site, the HRA proceeds to Stage Two.

1.3.9 An AA considers the effect of the project or plan, either alone or in combination with other projects or plans, on the integrity of the European/Ramsar site, with respect to the site's structure and function, and its conservation objectives. Under the provisions of Article 48 of the Habitats Regulations the objective is to ascertain that the integrity of the site will not be adversely affected.

1.3.10 Site integrity is defined as "*the coherence of the site's ecological structure and function across its whole area, or the habitats, complex of habitats or populations of species for which the site is or will be classified*" (European Commission, 2000a). The decision as to

whether a site is not adversely affected focuses on and is limited to the conservation objectives for the site (European Commission 2000a, 2018).

1.3.11 In carrying out an AA, mitigation measures, aimed at minimising or avoiding the negative effect of a plan or project during its operation or after its completion, may be considered as an integral part of the plan or project (European Commission 2000a, 2018). The Competent Authority has to be certain that the mitigation proposed would remove/avoid the negative effects of the plan or project. It must be clear, therefore, what the mitigation measures are, how they would reduce or avoid the effects, and the details of how and by whom they would be implemented/managed, and the timescale involved. In addition, the mitigation measures would require monitoring and enforcement, and procedures to rectify effects where measures have not been successful.

Stage Four: Imperative Reasons of Overriding Public Importance (IROPI)

1.3.12 Where no alternative solutions exist and where adverse effects remain, an assessment is undertaken of the IROPI to determine whether a project or plan should proceed. Where it is determined that there are IROPI it would be necessary to design, implement, manage and monitor compensation measures "to offset the negative impact of a project and to provide compensation corresponding precisely to the negative effects".

1.4 Guidance

1.4.1 In undertaking this HRA the following guidance was referred to:

- Assessing Connectivity with Special Protection Areas (SPAs) (SNH, 2016a);
- Habitats Regulations Appraisal (HRA) on the Firth of Forth: A Guide for developers and regulators (SNH, 2016b);
- Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (European Commission, 2000a);
- Communication from the Commission on the Precautionary Principle (European Commission, 2000b);
- Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Commission, 2001);
- Guidelines on the Implementation of the Birds and Habitats Directives in Estuaries and Coastal Zones with particular attention port development and dredging (European Commission, 2011);
- Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (European Commission, 2018);
- Habitats Regulations Appraisal of Plans: Guidance for Plan-making Bodies in Scotland, Version 3.0 January 2015 (David Tyldesley and Associates, 2015);
- NatureScot Website: Habitats Regulations Appraisal (HRA) (NatureScot, 2021c); and
- Policy Note on The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019 (Scottish Government, 2019a).

1.5 Structure of this Report

1.5.1 This HRA fulfils the requirements of Article 48 of the Habitats Regulations and covers the first two stages of the HRA process: Stage One (Screening) and Stage Two (Appropriate Assessment). The other stages of the HRA process (Alternative Solutions or IROPI) are briefly described in Section 1.3 (The HRA Process). These stages are required under Article 49 of the Habitats Regulations where preliminary investigations reach negative conclusions and consent from the competent authority is still sought.

1.5.2 An assessment of the Scheme in combination with other plans and projects is provided in Section 5 (In-Combination Assessment).

1.5.3 Data used to inform the assessment is presented in Appendix B (Bird Data).

1.6 Desk Study and Consultation

1.6.1 This HRA is informed by Wetland Bird Survey (WeBS) data provided by the British Trust for Ornithology (BTO). In addition, existing relevant literature and data was reviewed to inform this assessment, including:

- Transport Scotland (2020a) A985 Kincardine Bridge Environmental Impact Assessment Report;
- Transport Scotland (2020b) A985 Kincardine Bridge Habitats Regulations Appraisal;
- Transport Scotland (2021a). A985 Kincardine Bridge -20/NSE/1203/020 Concrete & 20/NSE/1203/010 Steel Investigations. Habitats Regulations Appraisal; and
- Transport Scotland (2021b). A985 Kincardine Bridge Southern Piled Viaduct (SPV) Propping System Repairs. Habitats Regulations Appraisal.

1.6.2 Consultation has been undertaken with Marine Scotland regarding the application for a Marine Licence.

1.6.3 During consultation on the SPV Propping System Repairs (Transport Scotland, 2021b), NatureScot confirmed that the advice provided to Transport Scotland on the Kincardine Bridge Piled Viaduct Refurbishment Scheme, and the mitigation proposed to be secured, could be ported directly across to inform the Marine Licence process, as appropriate. Consequently, the approach to assessment and mitigation follows that adopted for the A985 Kincardine Bridge Habitats Regulations Appraisal (Transport Scotland, 2020b).

2 The Proposed Works

2.1 Existing Conditions

2.1.1 The Kincardine Bridge crosses the Firth of Forth between Higgins Neuk in Falkirk Council area and the town of Kincardine in Fife Council area. It is located between approximate grid references NS 92012 86890 and NS 92858 87305. The bridge is currently used to carry the A985 trunk road over the Firth of Forth via a two-lane single carriageway road with a speed restriction of 30mph.

2.1.2 The Firth of Forth SPA, Ramsar site and Site of Special Scientific Interest (SSSI) cover the intertidal area and saltmarsh habitats within the footprint of, and adjacent to, the Proposed Works.

2.2 Programme of Works

2.2.1 The Programme of Works, including descriptions of the works is included in Appendix A. An overview of the Proposed Works is outlined in Table 1 below. The Proposed Works will be completed prior to the A985 Kincardine Bridge SPV Replacement Scheme.

Table 1: Overview of Programme of Works

Name of Works Item	Estimated Year of Works	Estimated Duration/Timing and Working Arrangements
SPV propping system repairs	2022	• 7 weeks • Daytime working hours: 08:00 – 17:00. • Possible lane closures for material deliveries which will be done during night-time
SPV concrete repairs	2022	• 7 weeks • Daytime working hours: 08:00 – 17:00. • Possible requirement for temporary daytime lane closures for material and equipment deliveries/removals.
Installation of navigation lights	2022	• 2 weeks • Daytime working hours: 08:00 – 17:00. • Temporary northbound footway closures for material deliveries and installation of lighting units.
Asbestos Containing Material (ACM) removal from the swing span	2022	• Duration unknown, commencing in summer 2022. • Full encapsulation of the working areas will be required.
Decommissioning of unused elements	2022	• Duration unknown, commencing in summer 2022. • Temporary access arrangements will be required.

Photograph 1: SPV and Propping System

Photograph 2: Concrete spans looking north along the Kincardine Bridge

2.2.2 In addition to the maintenance schemes to be taken forward on the Kincardine Bridge, there are a number of smaller routine maintenance activities which are carried out on a regular basis. These are presented in Appendix A in more detail and summarised below in Table 2.

Table 2: Routine Maintenance Activities

Location	Activity
Piers, abutments, wing walls	Remove graffiti.
	Clear vegetation.
	Clean debris from bearing shelves.
	Clean drainage channels.
	Rod outlet pipes to ensure effective operation.
	Rod weep pipes and remove silt and debris.
	Check gap sealant on movement joints.
	Check paving slabs on south abutment.
	Reset slabs and reinstate joints material where necessary.
Steel columns	Remove graffiti.
	Remove debris and bird droppings.
Approach embankments (north and south)	General requirements, inspection and maintenance requirements are in accordance with the operating company's term maintenance contract with any special requirements for highway structures on the network.
Landscape maintenance (grassed areas and scrub)	Grassed areas include the embankment slopes at the north and south approach and the grassed area below the approach spans within the highway boundaries. General requirements, inspection and maintenance requirements are in accordance with the operating company's term maintenance contract with any special requirements for highway structures on the network.
Landscape maintenance (hedges, trees and planted areas, wetlands and special ecological measures)	General requirements, inspection and maintenance requirements are in accordance with the operating company's term maintenance contract with any special requirements for highway structures on the network.
Safety fences and barriers	Existing fencing at north and south approaches. General requirements, inspection and maintenance requirements shall be in accordance with the operating company's term maintenance contract and with any special requirements for highway structures on the network.
Fences, walls screens and environmental barriers	General requirements, inspection and maintenance requirements are in accordance with the operating company's term maintenance contract with any special requirements for highway structures on the network.
Steel beams, girders, truss and concrete beams	Remove graffiti.
	Remove debris and bird droppings from all surfaces. No specialist access required.
	Clear drainage holes.
	Check and tighten fixing arrangements of electrical cables and equipment, drainage and service tied to the beams, girders, copings and pillars (to be undertaken by BEAR Scotland's electrical team).
Deck carriageway, footways	Remove grass and weeds from gaps in surfacing and from

Location	Activity
and parapet cantilever	channels.
	Repair joint and gap sealant to joints in foot ways surfacing (transverse and longitudinal).
Steel spans	Until major refurbishment of bridge, brush down areas of corrosion in beams at outlet of deck drainage and apply minor repairs to coating system.
Concrete spans and concrete deck/copings	Brush down any flaking in protective coating and apply repair painting.
	Remove any loose spalling concrete, apply rust-inhibitor to exposed reinforcement and apply minor repair concrete.
Expansion joints	Clean out debris and vegetation.
	Check and reinstate joint sealant where necessary.
	Clear and check drainage system.
	Check and tighten where necessary any loose nuts and bolts. Replace where appropriate.
Deck drainage	Unless already available, develop and maintain a record of all gullies, catchpits and other drainage elements.
	Inspect and empty gullies and catchpits once a year. The need for a greater frequency will depend on the proposed footway protection scheme currently under consideration.
Bridge parapet	Check and tighten where necessary any loose nuts and bolts. Replace where appropriate.
	Brush down any flaking in protective coating and apply where possible touch up painting.
	Remove graffiti on concrete pillars and reset copings.
	Clean the surface of the concrete pillar by low pressure water jetting.
	Clean and reinstate the historical bridge plates fixed to the concrete pillars at the north end of the bridge.
Covers, gratings, frames and boxes	There are a number of manholes and services chambers in both footways including manholes in the carriageway and in the footways at the ends of the swing span for access to the voids within the piers and walkways to the bearing shelves. The general, inspection and maintenance requirements shall be in accordance with the operating company's term maintenance contract.
Carriageway surfacing, road markings, road studs, kerbs and road lighting	The requirements shall be as per the requirements in the relevant sections of the operating company's term maintenance contract with any special requirements for highway structures on the network.
Cabin and engine room	General cleaning: Dusting of surfaces and equipment, mopping floor and cleaning windows at intervals of one month.
	Fire extinguishers: The maintenance requirements and intervals shall be in accordance with BS5306 pt.3: 2017

Location	Activity
	Heating system: Routine maintenance requirements and frequency in accordance with the manufacturer's instructions.
	Window and door frames: Check, clean, repair the paint work and reinstate sealant when necessary.
	Building fire alarm and security alarms systems: Maintenance as per manufacturer's instructions.
	Engine room floor, access to centre pier core/bearing area - check and clean the manhole cover and frame and undertake any necessary repair works. Check access ladder and tighten bolts. Check area and ensure that it is dry and clean.
Swing span end portal frames	Clean all external concrete surfaces by low pressure water jetting.
	Remove any loose spalling concrete and undertake the necessary concrete repairs.
	Clear all drains channels.
	Clear and test all drainage pipes.
	Check the frame, the fixings and the rails of the disused mounted traffic barriers, including tighten fixing bolts, clear channels, brush down any rust in metal surfaces and apply touch up repair protective coating where necessary.
	Check the fixings of the weather monitor equipment mounted on the north portal.
	Check and clean the historical bridge plates fixed to the elevations of the portals. Tighten or reinstate fixings if necessary.
Metal walkways, guard rails, stairs and ladders	Fixing bolts shall be checked and tightened.
	Damaged sections shall be repaired or replaced unless damage is clearly superficial with no loss of integrity of the element.
	Clean all surfaces of dirt and bird droppings.
Swing span end supports - voids in piers/access to bearing shelf	Check access ladders and their fixings and undertake any necessary repairs.
	Clean areas of any pigeon droppings and close any openings.
	Check and maintain doors and frames. Undertake any necessary repairs.
	At bearing shelf clean walkways and all areas of pigeon droppings.
Swing span mechanical/rocker bearings	Clean surrounding area.
	Clean all surfaces and remove any debris around the bearing and ensure that there is adequate drainage around the bearing.
	Check general alignment of the top plate to the base part of the bearing.
	Check and tighten all bolts and fixings.
	Grease all accessible sliding surfaces.
	Remove any loose grout.
	Reinstate any missing or removed bedding mortar using non-shrink high strength cementous grout.

Location	Activity
	Check, clean and tighten connections to the hydraulic equipment.
	Check that the corrosion protection system applied has not been compromised (where applicable).
Timber jetties	Clear the decking of vegetation, debris and loose material.
	Check and tighten bolts in all connections.
	Secure any loose decking boards.
	Remove and replace broken decking boards.
	Check and maintain metal guard rails.
Varioguard	Any special requirement by the designer or manufacturer.
	Check and clean and test the drainage openings and deck gullies.
	Any requirements for safety fencing in accordance with the operating company's term maintenance contract.
North-west embankment- Enclosure below concrete staircase	Maintenance subject to the condition and usage of this area.
	Maintain in a clean, dry and secure condition.

3 Stage One (Screening)

3.1 Introduction

3.1.1 This section details the Stage One Screening of the HRA process, which comprises the following:

- determining whether the project or plan is directly connected with or necessary to the management of a European/Ramsar site;
- identifying the potential for effects on European/Ramsar sites; and
- assessing the significance of any potential effects on European/Ramsar sites.

3.1.2 Details of the Proposed Works are discussed in Section 2 (The Proposed Works) and other plans/projects that in combination have the potential for LSE on European/Ramsar sites are discussed in Section 5 (In-Combination Assessment).

3.1.3 As stated in Section 1.1 (Background), the Proposed Works are not directly connected with or essential for the management of any European or Ramsar site.

3.2 European Sites with Potential Effects from the Proposed Works

3.2.1 Guidance dictates that all European/Ramsar sites which have the potential to be affected by a plan or project should be considered as part of the HRA process. For the assessment of the Proposed Works, relevant European and Ramsar sites were identified by looking for ecological connectivity and potential source-receptor pathways, and reference was made to the recent HRA undertaken for the Kincardine Bridge Piled Viaduct scheme (Transport Scotland, 2020a). Three sites were identified to be considered within the HRA screening assessment, namely:

- Firth of Forth SPA (NatureScot Site Code 8499, EU Site Code UK9004411);
- Firth of Forth Ramsar (NatureScot Site Code 8424, EU Site Code UK13017); and
- River Teith SAC (NatureScot Site Code 8367, EU Site Code UK0030263).

3.2.2 The location of these sites relative to the Kincardine Bridge is shown in Figure 1. Other designated sites not relevant to this assessment are shown greyed out on Figure 1, for completeness. Site qualifying interests, conservation objectives and identified feature pressures, as identified by NatureScot's Sitelink tool are presented in Appendix C, along with the species' scientific names. Common names are used within this HRA main text.

3.2.3 Qualifying interests, conservation objectives and site vulnerabilities are presented in Table 3 below, and in Appendix C (European and Ramsar Site Details).

Table 3: European and Ramsar Sites with Potential for LSEs from the Proposed Works

Area (ha)	Qualifying Interest	Conservation Objectives	Identified Feature Pressures (Scotland's Environment 2021)
UK9004411 / 8499 Firth of Forth SPA (NatureScot, 2021d)			
6317.93	The site qualifies under Article 4.1 of the Directive (79/409/EEC) by regularly supporting wintering populations of European importance of the following Annex 1 species: • Bar-tailed godwit (*Limosa lapponica*)*, non-breeding • Golden plover (*Pluvialis apricaria*)*, non-breeding • Slavonian grebe (*Podiceps auritus*)*, non-breeding • Red-throated diver (*Gavia stellata*)*, non-breeding • Sandwich tern (*Sterna sandvicensis*), passage • The site qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting wintering populations of European importance of the following migratory species: • Knot (*Calidris canutus*)*, non-breeding • Pink-footed goose (*Anser brachyrhynchus*)*, non-breeding • Redshank (*Tringa totanus*)*, non-breeding • Shelduck (*Tadorna tadorna*)*, non-breeding • Turnstone (*Arenaria interpres*)*, non-breeding The site qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting a wintering waterfowl assemblage of national importance. Assemblage qualifying interests (all non-breeding): • Common scoter (*Melanitta nigra*) • Cormorant (*Phalacrocorax carbo*) • Curlew (*Numenius arquata*) • Dunlin (*Calidris alpina alpina*)	To avoid deterioration of the habitats of the qualifying interests or significant disturbance to the qualifying interests, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying interests that the following are maintained in the long term: • population of the species as a viable component of the site; • distribution of the species within site; • distribution and extent of habitats supporting the species; • structure, function and supporting processes of habitats supporting the species; and • no significant disturbance of the species.	• game/fisheries management • recreation/disturbance • water quality • climate change • natural event

Area (ha)	Qualifying Interest	Conservation Objectives	Identified Feature Pressures (Scotland's Environment 2021)
	• Eider (*Somateria mollissima*) • Goldeneye (*Bucephala clangula*) • Great crested grebe (*Podiceps cristatus*) • Grey plover (*Pluvialis squatarola*) • Lapwing (*Vanellus vanellus*) • Long-tailed duck (*Clangula hyemalis*) • Mallard (*Anas platyrhynchos*) • Oystercatcher (*Haematopus ostralegus*) • Red-breasted merganser (*Mergus serrator*) • Ringed plover (*Charadrius hiaticula*) • Scaup (*Aythya marila*) • Velvet scoter (*Melanitta fusca*) • Wigeon (*Mareca penelope*) (formerly *Anas penelope*)		
UK13017 / 8424 Firth of Forth Ramsar (NatureScot, 2021e; JNCC 2008)			
6317.93	The site qualifies under Ramsar criterion 2 for the following species: • Red-throated diver* • Golden plover* The site qualifies under Ramsar criterion 5 by regularly supporting waterbirds in numbers of 20000 or more. The site also qualifies under Ramsar Criterion 4 by supporting the following waterbird species at a critical stage in their life cycles: • Scaup • Great crested grebe • Cormorant • Curlew	The Ramsar Convention's mission is '*the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world*'.	• game/fisheries management • recreation/disturbance • climate change • water quality

Area (ha)	Qualifying Interest	Conservation Objectives	Identified Feature Pressures (Scotland's Environment 2021)
	• Eider • Long-tailed duck • Common scoter • Velvet scoter • Red-breaster merganser • Oystercatcher • Ringed plover • Grey plover • Dunlin And nationally important populations of the following species: • Mallard • Lapwing • Wigeon The site qualifies under Ramsar criterion 6 by regularly supporting 1% or more of the individuals in a population of waterbirds: • Pink-footed goose* • Shelduck* • Redshank* • Turnstone* • Slavonian grebe* • Goldeneye* • Knot* • Bar-tailed godwit* • Sandwich tern		

Area (ha)	Qualifying Interest	Conservation Objectives	Identified Feature Pressures (Scotland's Environment 2021)
UK0030263 / 8367 River Teith SAC (NatureScot, 2021f)			
1289.33	The site is designated for the following qualifying interests: • Atlantic salmon (*Salmo salar*) • Brook lamprey (*Lampetra planeri*) • River lamprey (*Lampetra fluviatilis*) • Sea lamprey (*Petromyzon marinus*)	To avoid deterioration of the habitats of the qualifying interests or significant disturbance to the qualifying interests, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying interests that the following are maintained in the long term: • population of the species, including range of genetic types for salmon, as a viable component of the site; • distribution of the species within site; • distribution and extent of habitats supporting the species; • structure, function and supporting processes of habitats supporting the species; and • no significant disturbance of the species.	• forestry operation • invasive species • water quality • water management

*species also an assemblage qualifier.

3.3 Screening

3.3.1 The Proposed Works could result in LSEs which could directly or indirectly affect European/Ramsar sites.

3.3.2 The identification of LSEs on the European/Ramsar sites in terms of their conservation objectives from the Proposed Works considered:

- the potential for effects pathways to exist between the site and the Proposed Works;
- the ecological characteristics of the qualifying interests, taking into consideration the sites' conservation objectives; and
- potential for in-combination effects with other plans and projects (Section 5: In-combination Assessment).

3.3.3 Potential changes in water quality from pollution events (e.g. accidental spillage) during works have the potential to have an indirect effect on the Firth of Forth. Deterioration of intertidal habitat could degrade the feeding resource for bird species. For migratory fish species, increased siltation or a higher incidence of suspended solids could disrupt feeding behaviour, and increase of suspended solids or introduction of harmful chemicals could impact gill physiology and reduce oxygen uptake. However, best practice construction methods (CIRIA, 2015) will be implemented to protect the wider environment, including the use of appropriate pollution controls (i.e. Guidance for Pollution Prevention (GPPs)), such as a strict re-fuelling protocol and removal of all loose materials from the intertidal area. These measures are embedded in the construction methodology via the Site Environmental Management Plan (SEMP) and are a legal obligation to be employed irrespective of the European designation of the site. These embedded measures would avoid any water quality effects at source and are established and uncontroversial industry practice not specifically required to avoid LSE. Water quality effects are therefore not considered further in this HRA.

3.3.4 Table 4 provides the screening of European/Ramsar sites, recognising LSE from the Proposed Works where they have been identified.

3.3.5 To inform the screening, survey and desk-study data (Appendix B: Bird Data) and the ecological characteristics of qualifying interests has been taken into account.

Table 4: Screening Assessment

Conservation Objectives	Connectivity to the Proposed Works	Qualifying Interests	Likely Significant Effects	Screening Conclusion
Firth of Forth SPA (NatureScot, 2021b)				
To avoid deterioration of the habitats of the qualifying interests or significant disturbance to the qualifying interests, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying interests that the following are maintained in the long term: • population of the species as a viable component of the site; • distribution of the species within site; • distribution and extent of habitats supporting the species;	The Kincardine Bridge is located directly above the Firth of Forth SPA. As such, the maintenance works described in Section 2.2 and Appendix A being undertaken from the bridge structure over the one-year period have potential implications for the surrounding environment, including qualifying	• bar-tailed godwit*, non-breeding • golden plover*, non-breeding • knot*, non-breeding • pink-footed goose*, non-breeding • red-throated diver*, non-breeding • redshank*, non-breeding • Sandwich tern, passage • shelduck*, non-breeding • Slavonian grebe*, non-breeding • turnstone, non-breeding Waterfowl assemblage (non-breeding): • common scoter • cormorant • curlew • dunlin • eider	<u>Disturbance (Noise, Vibration and Visual)</u> The Proposed Works are scheduled to commence in 2022. Works on the bridge in winter (September-March) have the potential to disturb qualifying interests of the SPA. Bar-tailed godwit, golden plover, knot, pink-footed goose, redshank and shelduck are all species associated with habitats within the inner Forth and have been recorded within the Kincardine Bridge area (Appendix B: Bird Data). These species in addition to assemblage qualifying interests found within the inner Forth, and Sandwich tern on passage, have the potential to be disturbed during the Proposed Works. Due to the nature of the works, the impacts are likely to be minor, very localised to the bridge and immediate adjacent area, and would only be experienced by a small number of individuals in close proximity to the bridge. Significant disturbances to qualifying interests as a result of the Proposed Works are considered to be unlikely; however, short-term disturbance of some qualifying interests could cause local displacement, which	LSEs identified. Requirement to progress to AA (HRA Stage 2).

Conservation Objectives	Connectivity to the Proposed Works	Qualifying Interests	Likely Significant Effects	Screening Conclusion
• structure, function and supporting processes of habitats supporting the species; and • no significant disturbance of the species.	interests of the SPA.	• goldeneye • great crested grebe • grey plover • lapwing • long-tailed duck • mallard • oystercatcher • red-breasted merganser • ringed plover • scaup • velvet scoter • wigeon	could result in additional energy expenditure and loss of condition. Night-time works, in particular have the potential to cause significant disturbances to roosting qualifying interests near the bridge. Specifically, pink-footed geese have been recorded roosting in large numbers southeast of the bridge (Appendix B: Bird Data). It is considered that LSE from the Proposed Works cannot be ruled out, in the absence of mitigation, for works during winter months.	
			<u>Habitat Loss/Damage</u> Some of the Proposed Works on the SPV require access/working from the saltmarsh under and adjacent to the bridge. Working on the saltmarsh, particularly use of vehicles and machinery could lead to compression of sediments which in turn could lead to natural geomorphic processes being compromised. This could affect the natural recovery of the saltmarsh in this location. Furthermore, works within the intertidal habitats (saltmarsh) may result in localised fragmentation/temporary loss of habitat for qualifying interests of the SPA, especially those which rely on saltmarsh as their primary habitat type over winter.	LSEs identified. Requirement to progress to AA (HRA Stage 2).

Conservation Objectives	Connectivity to the Proposed Works	Qualifying Interests	Likely Significant Effects	Screening Conclusion
			Given the nature and scale of the Proposed Works it is unlikely for there to be any significant damage to the saltmarsh, and the area of habitat temporarily unavailable to qualifying interests of the SPA over winter is likely to be negligible. However, adopting a precautionary approach it is considered that LSE from the Proposed Works cannot be ruled out in the absence of mitigation.	
			<u>Changes in Coastal Processes</u> Localised and temporary changes in estuary bed and shoreline morphology are associated with the Proposed Works, specifically the SPV propping system repairs which require temporary removal of existing ground around the columns. The presence of the temporary working areas could result in localised changes in hydrology on the saltmarsh which could alter erosion and deposition in the immediate area. These changes in terms of their spatial and temporal extent during the tidal cycle, are not considered to be large enough to significantly increase the potential for scour, erosion, transport or deposition (i.e. morphological change). Changes in coastal processes as a result	No potential for LSE. AA (HRA Stage 2) is not required.

Conservation Objectives	Connectivity to the Proposed Works	Qualifying Interests	Likely Significant Effects	Screening Conclusion
			of the Proposed Works are considered to be negligible.	
Firth of Forth Ramsar (NatureScot, 2021c)				
The Ramsar Convention's mission is 'the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world'. The site qualifies under Ramsar criterion 2 - A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.	The Kincardine Bridge is located directly above the Firth of Forth Ramsar. As such, the maintenance works described in Section 2.2 and Appendix A being undertaken from the bridge structure over the one-year period have potential implications on the surrounding environment,	• bar-tailed godwit, nonbreeding • goldeneye, non-breeding- • knot, non-breeding • pink-footed goose, non-breeding • redshank, non-breeding • Sandwich tern, passage • shelduck, non-breeding • Slavonian grebe, non-breeding • turnstone, non-breeding • waterfowl assemblage, non-breeding	<u>Disturbance (Noise, Vibration and Visual)</u> The Proposed Works are scheduled to commence in 2022. Works on the bridge in winter (September-March) have the potential to disturb qualifying interests of the SPA. Bar-tailed godwit, golden plover, knot, pink-footed goose, redshank and shelduck are all species associated with habitats within the inner Forth and have been recorded within the Kincardine Bridge area (Appendix B: Bird Data). These species in addition to assemblage qualifying interests found within the inner Forth, and Sandwich tern on passage, have the potential to be disturbed during the Proposed Works. Due to the nature of the works, the impacts are likely to be minor, very localised to the bridge and immediate adjacent area, and would only be experienced by a small number of individuals in close proximity to the bridge. Significant disturbances to qualifying interests as a result of the Proposed Works are considered to be unlikely; however, short-term disturbance of some qualifying	LSEs identified. Requirement to progress to AA (HRA Stage 2).

Conservation Objectives	Connectivity to the Proposed Works	Qualifying Interests	Likely Significant Effects	Screening Conclusion
The site qualifies under Ramsar criterion 5 - A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds The site qualifies under Ramsar criterion 6 - A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.	including on qualifying interests of the Ramsar.		interests could cause local displacement, which could result in additional energy expenditure and loss of condition. Night-time works, in particular have the potential to cause significant disturbances to roosting qualifying interests near the bridge. Specifically, pink-footed geese have been recorded roosting in large numbers southeast of the bridge (Appendix B: Bird Data). It is considered that LSE from the Proposed Works cannot be ruled out, in the absence of mitigation, for works during winter months.	
			<u>Habitat Loss</u> Some of the Proposed Works on the SPV require access/working from the saltmarsh under and adjacent to the bridge. Working on the saltmarsh, particularly use of vehicles and machinery could lead to compression of sediments which in turn could lead to natural geomorphic processes being compromised. This could affect the natural recovery of the saltmarsh in this location. Furthermore, works within the intertidal habitats (saltmarsh) may result in localised fragmentation/temporary loss of habitat for qualifying interests of the SPA, especially those which rely on saltmarsh as their primary habitat	LSEs identified. Requirement to progress to AA (HRA Stage 2).

Conservation Objectives	Connectivity to the Proposed Works	Qualifying Interests	Likely Significant Effects	Screening Conclusion
			type over winter. Given the nature and scale of the Proposed Works it is unlikely for there to be any significant damage to the saltmarsh, and the area of habitat temporarily unavailable to qualifying interests of the Ramsar over winter is likely to be negligible. However, adopting a precautionary approach it is considered that LSE from the Proposed Works cannot be ruled out in the absence of mitigation.	
			<u>Changes in Coastal Processes</u> Localised and temporary changes in estuary bed and shoreline morphology are associated with the Proposed Works, specifically the SPV propping system repairs which require temporary removal of existing ground around the columns. The presence of the temporary working areas could result in localised changes in hydrology on the saltmarsh which could alter erosion and deposition in the immediate area. These changes in terms of their spatial and temporal extent during the tidal cycle, are not considered to be large enough to significantly increase the potential for scour, erosion, transport or deposition (i.e. morphological change). Changes in coastal processes as a result	No potential for LSE. AA (HRA Stage 2) is not required.

Conservation Objectives	Connectivity to the Proposed Works	Qualifying Interests	Likely Significant Effects	Screening Conclusion
			of the Proposed Works are considered to be negligible.	
River Teith SAC (NatureScot, 2021d)				
To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying species that the following are maintained in the long term:	Hydrologically connected to the Kincardine Bridge. The SAC is located approximately 20km upstream of the Proposed Works.	• Atlantic salmon • brook lamprey • river lamprey • sea lamprey	<u>Disturbance (Noise and Vibration)</u> The Proposed Works are located 20km downstream of the SAC, however lamprey species and Atlantic salmon will migrate through the Firth of Forth. Further information on the baseline conditions of the Forth and the migratory species present can be found in Chapter 8: Marine Ecology of the Kincardine Piled Viaduct EIA Report (Transport Scotland 2020a). The Proposed Works have the potential to cause disturbance. Anthropogenic noise is known to cause behavioural (avoidance) and physiological (barotrauma - tissue injury due to rapid changes in pressure) effects on fish. However, as the Proposed Works are small-scale, localised to the bridge and do not involve any piling or any other particularly disturbing activities close to/in the watercourse, significant disturbance to fish species within the Forth is unlikely. No potential for LSE from the Proposed Works with regard to disturbance is identified.	No potential for LSE. AA (HRA Stage 2) is not required

Conservation Objectives	Connectivity to the Proposed Works	Qualifying Interests	Likely Significant Effects	Screening Conclusion
• population of the species, including range of genetic types for salmon, as a viable component of the site • distribution of the species within site • distribution and extent of habitats supporting the species • structure, function and supporting processes of habitats supporting the species • no significant disturbance of the species			<u>Habitat Loss</u> No land-take from the SAC is required for the Proposed Works. Furthermore, there will be no loss or severance of supporting habitat for lamprey species or Atlantic salmon as all the works are localised to the Kincardine Bridge. The mudflats under and immediately adjacent to the bridge are narrow when compared to the extensive flats at Pow Burn, Kennet Pans and Skinflats and also the wider mudflats on the opposite northern bank. Although intertidal studies have shown that a number of fish species may use saltmarsh areas during particularly high spring tides (5.6m above chart datum or more), it is considered that the unfavourable conditions in the channel running under the Kincardine Bridge lead to the reduction in use of the saltmarsh by fish when compared to other saltmarsh habitat further up or downstream (Lyndon, Kingston and Moore 2000; Northern Ecological Services 2003). No potential for LSE from the Proposed Works with regards to habitat loss is identified.	

3.4 Screening Conclusion

3.4.1 The Proposed Works have the potential for LSEs on Firth of Forth SPA and Ramsar sites as identified from the screening in Table 3 and therefore an Appropriate Assessment (HRA Stage Two) is required for these sites.

3.4.2 No LSEs were identified on the River Teith SAC and therefore there is no requirement for further assessment for this designated site, including any assessment of in-combination effects with other plans and projects.

4 Stage Two (Appropriate Assessment)

4.1 Introduction

4.1.1 This section forms the Stage Two (Appropriate Assessment (AA)) of the HRA process which was identified as required in Stage One (Screening). The AA considers the effect of the project or plan, either alone or in combination with other projects or plans, on the integrity of the European/Ramsar sites, with respect to the sites' structure and function, and their conservation objectives.

4.1.2 This HRA examines the implications from the Proposed Works for the conservation objectives of two sites based on the LSE identified in Stage One (Screening) and where applicable details the measures required to protect the conservation objectives and integrity of these sites.

4.1.3 Information on the distribution and abundance of bird species within the Firth of Forth was compiled through the sources identified in Section 1.6 above. Note that data collected by Jacobs as part of the Kincardine Bridge Southern Piled Viaduct scheme between 2017-2018 (Transport Scotland, 2020a, 2020b) have been used to supplement the available BTO Wetland Bird Survey (WeBS) data where appropriate. The dataset is considered to remain relevant due to the fact that the habitats in the vicinity of the bridges are largely unchanged and the survey data date range overlaps with the WeBS five year count period which is 2015/2016 to 2019/2020.

4.1.4 It should be noted that within the WeBS methodology, counting of gulls and terns is optional. As such it is noted that the WeBS data may not be a true reflection of the abundance of these species. With the use of supplementary data from Kincardine Southern Piled Viaduct scheme however, it is considered that a robust assessment can be made.

4.2 Firth of Forth SPA and Ramsar Site

4.2.1 Conservation objectives of the Firth of Forth SPA are detailed in Table 3 above. Ramsar sites do not have specific conservation objectives however the aim of the Ramsar designation is to facilitate conservation of wetland habitat and populations of wildlife supported. Further, it is Scottish Government policy to apply the same level of protection for Ramsar sites as is applied for Special Protection Areas classified under the EU Birds Directive and therefore the same objectives for SACs and SPAs are applicable (Scottish Government, 2019b). The Firth of Forth SPA and Ramsar site occupy the same area and share considerable overlap in the species listed as qualifying species, with all specified qualifying interests of the Ramsar also being qualifying interests of the SPA. The conservation objectives for the SPA include avoiding significant disturbance to the qualifying interests and are considered to be an appropriate proxy for the Ramsar. As such, the assessment of the effects will be against the Firth of Forth SPA's conservation objectives. It is considered, based on the above similarities between the two sites, that the assessment can be undertaken parallel and captured within the same commentary text in Tables 5 to 7.

4.2.2 Two LSEs were identified at Stage One (Screening) that might compromise the conservation objectives of the Firth of Forth SPA and Ramsar site and cause an adverse effect on site integrity (AESI), namely disturbance (noise, vibration, and visual) and habitat loss/damage (temporary).

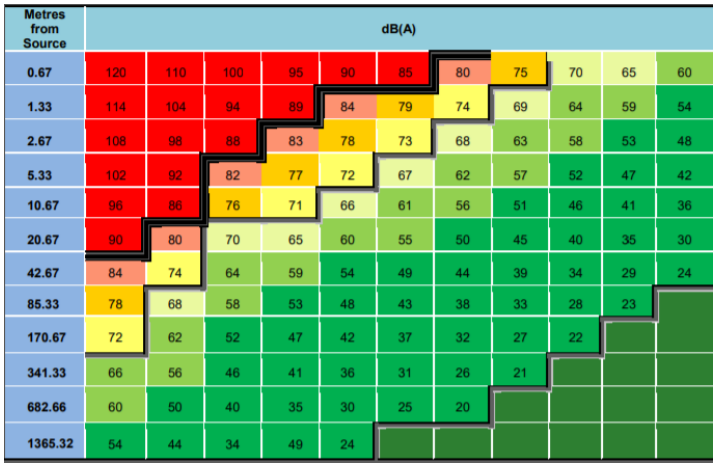
4.3 Likely Significant Effect: Disturbance

4.3.1 Noise and visual disturbance (short-term) associated with the Proposed Works has the potential to disturb qualifying bird species of the SPA and Ramsar site that utilise habitats within and adjacent to the works area. This could lead to displacement of birds from areas used for foraging, loafing and roosting, and subsequently additional energy expenditure and loss of condition. Based on baseline data and ecological characteristics of the qualifying interests it is considered that the following species have the potential to experience disturbance from the Proposed Works: bar-tailed godwit, golden plover, sandwich tern, knot, pink-footed goose, redshank, shelduck, as well assemblage qualifying species that rely on habitats adjacent to the bridge.

4.3.2 Noisy activities associated with the Proposed Works are expected to include concrete breaking, welding, hammers and site generators. Noisy activities are typically defined as any construction activity that would result in an increase of ≥3dB(A) in the ambient noise level (dBLAeq).

4.3.3 For wetland birds, generally auditory disturbance of more than 70dB (as experienced by the bird) has the potential to elicit a high level disturbance effect (Cutts et al., 2013). However, variation in species' tolerance, the nature of the disturbance (for example sudden/gradual, intermittent/continuous) and the level of background noise can determine the behavioural response of birds to noise disturbance. Noise from some activities that are required as part of the Proposed Works are expected to be greater than 70dB at source, for example the power generator noise level is approximately 85-90dB at source, and percussive noise from hand-tools may generate similar or lesser sound levels. However, attenuation can be achieved over a relatively short distance (Diagram 2). It is therefore likely that any potential for significant disturbance from noise will be limited to birds within close proximity of the works area, with the distance at which this occurs varying by species (Cutts et al., 2013).

4.3.4 Visual stimuli can elicit a high-level disturbance response from wetland birds before noise starts, however as with noise disturbances, there is interspecies variation. Roost sites can be particularly susceptible to visual disturbance as a flight response from one individual can cause all birds to be flushed from the area despite some species having a higher tolerance threshold (Cutts et. al., 2013). Visual disturbance caused by the Proposed Works is more likely to cause significant disturbance to the qualifying interests of the SPA and Ramsar than noise disturbance, however noise and visual stimuli are likely to be concurrent during the Proposed Works.



Metres from Source	dB(A)										
0.67	120	110	100	95	90	85	80	75	70	65	60
1.33	114	104	94	89	84	79	74	69	64	59	54
2.67	108	98	88	83	78	73	68	63	58	53	48
5.33	102	92	82	77	72	67	62	57	52	47	42
10.67	96	86	76	71	66	61	56	51	46	41	36
20.67	90	80	70	65	60	55	50	45	40	35	30
42.67	84	74	64	59	54	49	44	39	34	29	24
85.33	78	68	58	53	48	43	38	33	28	23	
170.67	72	62	52	47	42	37	32	27	22		
341.33	66	56	46	41	36	31	26	21			
682.66	60	50	40	35	30	25	20				
1365.32	54	44	34	49	24						

Diagram 2: Standard Distance Decay Rates for Noise from Source (Cutts et al., 2013)

4.4 Likely Significant Effect: Habitat Loss/Damage

4.4.1 The Proposed Works will require working from and access to the saltmarsh under and adjacent to the bridge, specifically to facilitate the SPV Propping System Repairs and SPV Concrete Repairs. These works have the potential to result in temporary loss of saltmarsh habitat. This habitat will not be available to the qualifying bird species of the Firth of Forth SPA and Ramsar site during the works. This may lead to localised habitat fragmentation and displacement of individuals. Due to compression of the sediments under the working areas, the ground level will be lowered, leading to the natural geomorphic processes being compromised. This may affect the long-term natural recovery of the saltmarsh in this location.

4.4.2 The area of saltmarsh that will be used to facilitate the works (approximately 0.43ha) represents up to 0.4% of the saltmarsh recorded in the Firth of Forth (Haynes, 2016), and most of this is unvegetated intertidal habitat under the SPV deck. Therefore, the temporary loss of this habitat during the works is likely to be negligible in relation to the available intertidal habitat within the Firth of Forth.

4.5 Mitigation

4.5.1 Mitigation measures aimed at avoiding or reducing the effects of the Proposed Works in order to avoid adverse effects on site integrity are detailed below and summarised in Table 5 to Table 7. Mitigation detailed below is based on mitigation proposed for the following schemes:

- A985 Kincardine Bridge Refurbishment: Piled Viaduct Replacement Scheme (Transport Scotland 2020b);
- A985 Kincardine Bridge 20/NSE/1203/020 Concrete & 20/NSE/1203/010 Steel Investigations (Transport Scotland, 2021a); and
- A985 Kincardine Bridge Southern Piled Viaduct (SPV) Propping System Repairs (Re-packing) (Transport Scotland 2021b).

4.5.2 As part of the Contractor's legal obligations to be employed irrespective any European site designations, they will adhere to a SEMP, which will detail the mitigation to be

implemented and how this will be monitored. The SEMP will include best practice construction methods (CIRIA, 2015) will be used including the use of appropriate pollution controls (i.e. GPPs) and removal of all loose materials from the intertidal area.

4.5.3 A suitably qualified Ecological Clerk of Works (ECoW) will be appointed by the Contractor. The ECoW will:

- provide ecological support to the Contractor during the Proposed Works and ensure the ecological mitigation within the SEMP is adhered to;
- supervise and advise on the placement of noise and visual screens around the compound; and
- be present on site during daytime maintenance works on the SPV, to observe birds' reactions to the Proposed Works to identify if there is significant disturbance. If significant disturbance is identified, works will cease and appropriate mitigation will be proposed and discussed with NatureScot. Further mitigation could include: extending the "soft-start" process (see 4.5.10 below); amendments to lighting plans (see 4.5.6 below); and use of additional screening (see 4.5.9 below).

4.5.4 The footprint of the working area will be minimised as far as possible and vehicles, plant and personnel will be constrained to this area through the use of temporary barriers to minimise the damage to habitats located within and adjacent to this footprint. The working area for the Proposed Works will comprise the bridge structure itself and an area under the bridge required to facilitate repairs to the SPV.

4.5.5 The Proposed Works, specifically on the SPV and southern span, will be timed, as far as practicable, to avoid peak times when qualifying interests are present, specifically undertaking as much of the work as practicable outwith the winter period (September to March).

4.5.6 The Contractor will provide a construction lighting plan and method statement detailing the specific mitigation requirements with regards to lighting during the Proposed Works. Mitigation will include, but will not be limited to measures to avoid light spill/reflections and avoidance of white-blue spectrum and high UV emitting lighting, to protect qualifying interests roosting adjacent to the bridge. Published guidance on lighting (e.g. Institution of Lighting Professionals (2011), The Royal Commission on Environmental Pollution (2009) and Bat Conservation Trust and Institution of Lighting Professionals (2018)) will be adhered to. The lighting design will be developed specifically to prevent illuminating sensitive bird habitats adjacent to the bridge, particularly to the southeast of the piers where large numbers of pink-footed geese were recorded roosting during surveys (see Appendix B: Bird Data). Where this is not possible the Contractor will agree any exceptions with the ECoW.

4.5.7 To reduce disturbance to roosting pink-footed geese, working during the hours of darkness during September to March will be avoided as far as practicable. Standard construction hours will be 08:00-17:00 (Monday to Friday), with exceptions for certain activities. Some working during the hours of darkness will likely be unavoidable during winter. Lighting management will be detailed within a construction lighting plan, as discussed above.

4.5.8 If night time work coincides with severe winter weather (i.e. Alert Level 3 as defined by the Met Office as mean daily temperature of less 2°C and/or widespread ice and heavy snow (Met Office, 2021)), working methods should be agreed with the ECoW before they proceed to protect roosting birds from additional physiological stress during harsh winter conditions.

4.5.9 Screening of at least 2m in height (such as Heras Readyhoard or Steelhoard Screening fences (Heras, 2021)) will be provided between the works and the coastal area throughout winter. Where possible, and as agreed by the ECoW, screens will be positioned around working areas, including ancillary works/plant, to reduce the visual disturbance caused by operatives, plant and vehicles. Screens will be in place to mitigate against visual disturbance from the works primarily, but also provide some sound attenuation to limit noise disturbance. The screening should be checked by the ECoW prior to, and during, the works to ensure that the screening is appropriately placed.

4.5.10 “Soft-start” techniques to all noisy activities will be employed to avoid sudden and unexpected disturbances during construction. Each time the activity is started up after a period of inactivity, the noise levels will be gradually increased over a period of 30 minutes to allow birds (and other animals) to move away from the disturbance.

4.5.11 The access track and working areas on the saltmarsh will be created through use of geotextile mats. This will prevent construction materials sinking into, and machinery/vehicles compacting the saltmarsh.

4.5.12 On completion of the works all access tracks and working platforms will be removed in their entirety from the saltmarsh. There will be no materials stored on the saltmarsh or below Mean High Water Springs (MHWS) during the works.

4.5.13 In addition to visual screens during winter (as discussed in 4.5.9 above), wherever feasible and relevant to do so (due to potential pollution, dropping of tools, or other disturbance), appropriate mitigation measures will be employed during the Proposed Works to: provide a degree of visual screening; to contain the works and prevent any materials or tools dropped from falling onto areas below the bridge; and to contain waste arisings such as dust and paint flakes. Appropriate mitigation will be developed on a scheme-by-scheme basis following environmental screening, and consultation from specialist contractors (for example in relation to ACM removal), and may include but not be limited to measures such as: full encapsulation of the works area, use of tool tethers, installation of boarding, netting, and sheeting, etc.

Table 5: HRA Stage Two (AA) Assessment Table for Firth of Forth SPA/Ramsar Non-breeding Species

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
Disturbance (noise, vibration and visual)	To avoid deterioration of the habitats of the qualifying interests or significant disturbance to the qualifying interests, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying interests that the following are maintained in the long term: • distribution of the species within site • no	Works during winter (September-March) have the potential to cause disturbance to all qualifying interests within the SPA/Ramsar which utilise habitats adjacent to the Kincardine Bridge. It is considered that noise, vibration and visual disturbance related to the Proposed Works could deter qualifying interests from feeding, loafing and roosting within the intertidal mudflats and saltmarsh adjacent to the bridge. <u>Bar-tailed godwit</u> Surveys undertaken by Jacobs (Appendix B: Bird Data) indicate that bar-tailed godwits utilise the mudflats adjacent to the Kincardine Bridge, on the southern side of the estuary with a peak of 17 recorded in November 2017. This coincides with the peak in seasonality trends for bar-tailed godwit in the Firth of Forth (SNH 2016b), however, this peak count represents only 0.9% of the total SPA population. The peak count of bar-tailed godwit from five years of WeBS counts was 26 in October 2016 (Appendix B: Bird Data). These data indicate that bar-tailed godwit utilise other areas within the SPA to a larger degree and that habitats in proximity of the Kincardine Bridge are not key for this species over winter. Bar-tailed godwit are relatively sensitive to disturbance compared to other waders (SNH 2016b), although they	The following avoidance/mitigation measures will be undertaken to ensure the conservation objectives of qualifying interests are not compromised: • The Contractor will adhere to a SEMP which will detail the mitigation to be implemented and how this will be monitored. • A suitably qualified ECoW will be appointed by the Contractor and will be on site, undertake surveys and provide advice during the Proposed Works. • The footprint of the working area will be minimised as far as possible and vehicles, equipment/machinery and personnel will be constrained to this area through the use of temporary barriers. • Timing works on the SPV, as far as practicable, to avoid peak times when qualifying interests are present (September to March).	No adverse effect on site integrity

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
	significant disturbance of the species	habituate to works rapidly (Cutts et al., 2013). Disturbance leading to displacement due to noise and visual stimuli during the Proposed Works could occur, however based on the small numbers of bar-tailed godwit observations within proximity of the Kincardine Bridge and the wider WeBS sector, the number of individuals likely to be impacted is likely to be very low. If individual bar-tailed godwits are disturbed, this would be a short-term localised displacement, with birds redistributing to other areas within the Firth of Forth SPA; there is alternative suitable habitat within the estuary for bar-tailed godwit to feed and roost. Displacement out of the SPA is not predicted given the availability of alternative habitat. Therefore, any disturbance caused by the works is unlikely to result in significant disturbance to bar-tailed godwit or change their distribution within the SPA. Therefore, LSE on bar-tailed godwit resulting from disturbance will not compromise the conservation objectives for the species and there are no AESI predicted. <u>Golden Plover</u> Surveys undertaken by Jacobs (Appendix B: Bird Data) recorded golden plover on the saltmarsh adjacent to the Kincardine Bridge, on the southern side of the estuary. However this species was only recorded on two occasions during the survey period, indicating infrequent	• A construction lighting plan and method statement will be provided by the Contractor. • Working during hours of darkness during September to March will be avoided to prevent disturbance to roosting geese as far as practicable. • Provision of visual screening between the works and the coastal area throughout winter. • Use “soft-start” techniques to avoid sudden and unexpected disturbance.	

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
		use of the habitats within the area adjacent to the bridge. A peak count of 65 roosting golden plover was made in October 2017 which represents 2% of the total SPA population of golden plover. Furthermore, the peak count of golden plover from five years of WeBS counts was 61 in October 2016, however the mean peak is only 12 individuals which results from very low or nil counts over the other winters within the five year period (Appendix B: Bird Data). These data indicate that golden plover generally utilise other areas within the SPA to a larger degree and that the habitats in proximity of the Kincardine Bridge are not key for this species over winter. Golden plover tends to exhibit more tolerance to disturbance than other waders (SNH, 2016b) and as there is already disturbance at the site there may be a level of habituation exhibited by individuals of the species. If golden plover are disturbed, this would be a short-term localised displacement, with birds redistributing to other areas within the Firth of Forth SPA; displacement out of the SPA is not predicted given the availability of alternative habitat, and evident preference for alternative sites based on low counts within the area. Therefore, LSE on golden plover resulting from disturbance will not compromise the conservation objectives for the species and there are no AESI predicted.		

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
		Knot Surveys by Jacobs (Appendix B: Bird Data) indicated that knot utilise the mudflats adjacent to the Kincardine Bridge, on the southern side of the estuary, however this species was only recorded infrequently with a peak count of seven birds in March 2018. This suggests that there are other areas within the SPA favoured by knot during the winter. The peak count of knot from five years of WeBS counts was 455 in October 2016, however the mean peak is only 92 individuals which results from very low or nil counts over the other winters within the five year period (Appendix B: Bird Data). These data indicate that knot generally utilise other areas within the SPA to a larger degree and that the habitats in proximity of the Kincardine Bridge and the wider WeBS sector are not key for this species over winter. Knot is sensitive to disturbance (SNH 2016b) which could mean that disturbance caused by the Proposed Works could deter knot from the Kincardine Bridge area. However, notably knot is primarily sensitive to disturbance at roost sites, and considered to be relatively tolerant to visual disturbance, including people, and habituates to works rapidly (Cutts et al., 2013). Furthermore, knot carry out widespread movements within the Forth Estuary and exhibit little site fidelity during the winter months (Pienkowski and Clark, 1979).		

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
		Therefore, whilst knot may occasionally utilise areas adjacent to the bridge, the transient nature of this species and fact that disturbed birds are likely to be able re-distribute to other areas within the Firth of Forth means adverse effects on the conservation objectives of the SPA are not predicted. Therefore, LSE on knot resulting from disturbance will not compromise the conservation objectives for the species and there are no AESI predicted. <u>Redshank</u> Surveys by Jacobs (Appendix B: Bird Data) indicated that redshank utilise the mudflats adjacent to the Kincardine Bridge, on the on both sides of the estuary. More redshank were recorded in the winter months with a peak count from surveys of 120 made in October 2017. This represents 3% of the SPA population (estimated to be 3,700 individuals). The peak count of redshank from five years of WeBS counts was 1,522 in December 2019, and the mean peak over the five years is 1,273 (Appendix B: Bird Data). These counts are notably greater than those recorded during the surveys by Jacobs, however this is attributable to the difference in sizes of the study areas (the WeBS sector is approximately seven times the size of the Jacobs study area). The WeBS sector also encompasses the large mudflat expanse at Skinflats which offers key feeding habitat for redshank.		

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
		Redshank rely on small prey and require a longer feeding time than other waders. This makes them susceptible to disturbance in harsh winters as this can affect the amount of time they have to build up resources (SNH 2016b). If redshank are disturbed, it is likely that this would be a short-term localised displacement, with birds redistributing to other areas within the Firth of Forth SPA; displacement out of the SPA is not predicted given the availability of alternative habitat. However, as data shows redshank do use areas around the bridge, and in the absence of mitigation, disturbance to redshank could compromise the conservation objectives. <u>Pink-footed goose</u> Surveys by Jacobs (see Appendix B: Bird Data) recorded pink-footed geese in large numbers over winter with peak counts during March and October, which corresponds with the seasonal trend for this species in the Firth of Forth (SNH 2016b). Pink-footed geese were observed roosting on the mudflats and saltmarsh on the downstream side of the bridge during the goose roost surveys, with many remaining to feed during the day whilst others left the roost site. This area is considered to represent an important roost site for pink-footed geese over winter, with the peak number identified through surveys as roosting (1,755 roosting geese in March 2018)		

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
		representing 14% of the SPA population of pink-footed geese (estimated to be 12,400 individuals). The five year annual peak count for pink footed goose within the WeBS sector was 5,750 in November 2015, with the mean peak recorded as 3,440 individuals. These counts indicate that habitats within the Kincardine area are important for this species over winter. Noise and site presence, including lighting, during the Proposed Works has the potential to alter the species distribution within the SPA/Ramsar site as well as causing significant disturbance. <u>Shelduck</u> Surveys by Jacobs (Appendix B: Bird Data) indicated that shelduck utilise the mudflats and saltmarsh adjacent to the Kincardine Bridge more frequently in the spring and summer months, with the peak count of 680 individuals recorded in July 2017 in the mudflats to the east of the Kincardine Bridge. A winter peak count of 31 shelduck was recorded during the surveys, which indicates that this species may use other areas within the Firth of Forth during winter to a greater degree. The winter peak count only represents 0.7% of the SPA population. Notably, the late summer moulting flock around Grangemouth (approximately 3km downstream of the Kincardine Bridge) is one of the three largest in Britain (SNH 2016b).		

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
		The WeBS data corroborates this with annual peak counts in September each year with a mean peak of 905 individuals. It is considered that any noise, vibration and visual stimuli arising from the works is unlikely to result in significant disturbance to shelduck or change their distribution within the SPA based on the data for the area near Kincardine Bridge and the wider WeBS sector. Therefore, LSE on shelduck resulting from disturbance will not compromise the conservation objectives for the species and there are no AESI predicted. <u>Goldeneye</u> Goldeneye rely predominantly on open water habitats and are found most often in the outer Forth (SNH 2016b). Surveys undertaken by Jacobs (Appendix B: Bird Data) recorded very few goldeneye in the vicinity of the Kincardine Bridge, and WeBS data recorded a five-year mean peak of only 7 in the survey sector. Any disturbance caused by the works is unlikely to result in significant disturbance to goldeneye or change their distribution within the SPA, therefore no AESI is predicted. <u>Red-throated diver</u> Red-throated diver are predominantly a marine species, occurring on sheltered inshore waters, and in the largest		

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
		numbers are in the outer Firth of Forth (SNH, 2016b). It is scarce within the inner Forth. No observations of red-throated diver were made during Jacobs surveys (Appendix B: Bird Data) and, and only a small number of records were identified in the WeBS data where a five year peak count of 3 was recorded in October 2017, and only single counts recorded in other years. Based on survey data from the Kincardine Bridge area and in the wider WeBS sector, disturbance caused by the works is unlikely to result in significant disturbance to red-throated diver or change their distribution within the SPA, therefore no AESI is predicted. <u>Slavonian grebe</u> The presence of Slavonian grebe within the inner Forth is considered rare, and even within outer areas of the Forth is considered uncommon and found only locally (SNH, 2016b). Only one Slavonian grebe was recorded in the WeBS sector over the five year period in September 2019, and Jacobs survey data recorded no observations of this species. In winter they are predominantly a marine species, preferring sheltered open water sites. They are most regular between Musselburgh and Gullane on the south side of the Forth, and in Largo Bay in Fife. As such, disturbance to this species is unlikely and no impacts on Slavonian grebe in terms of distribution and extent of supporting habitat is expected.		

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
		Any disturbance caused by the Proposed Works is unlikely to result in significant disturbance to Slavonian grebe or change their distribution within the SPA, therefore no AESI is predicted. <u>Turnstone</u> Turnstone are considered scarce within the inner Forth (SNH, 2016b). The species was recorded in low numbers in the WeBS sector, with a peak count of 4 in December 2016, and was not recorded during the Jacobs surveys adjacent to the Kincardine Bridge. Turnstone are not particularly sensitive to disturbance compared to other wader species (SNH, 2016b), however they exhibit a high degree of fidelity to wintering and migration sites between and within estuaries during the winter (Cramp and Simmons, 1983). If feeding turnstone were displaced, it would likely be limited to a small number of birds within very close proximity of the works area only, and indeed turnstone have been found to forage within 10m of plant (Cutts et al., 2013). Furthermore, this species also has a very wide diet, including invertebrates and carrion, found in habitat types present throughout the SPA such as rocky shores, mudflats, sandy shores and on tide wrack. As such, disturbance to this species is unlikely and no impacts on turnstone in terms of distribution and extent of supporting habitat is expected.		

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
		Any disturbance caused by the works is unlikely to result in significant disturbance to turnstone or change their distribution within the SPA, therefore no AESI is predicted.		
Habitat loss	To avoid deterioration of the habitats of the qualifying interests or significant disturbance to the qualifying interests, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying interests that the following are maintained in the long term: • distribution of the	Screening identified that qualifying interests that rely of intertidal habitats could be impacted by the temporary loss of intertidal habitat as a result of the Proposed Works. <u>Bar-tailed godwit</u> It is considered that the area of habitat temporarily lost would be negligible given the amount of remaining habitat available for bar-tailed godwit. Furthermore, surveys by Jacobs (Appendix B: Bird Data) indicated that bar-tailed godwits, although shown to utilise the mudflats adjacent to the Kincardine Bridge, do not appear to favour the area for foraging during the winter with a peak of 17 recorded in November 2017 representing only 0.7% of the SPA population. The habitats within the study area are not considered to be functionally important for bar-tailed godwit therefore there are no likely long term changes to the extent of habitats within the SPA that support this species. Furthermore, the temporary loss of habitat is unlikely to result in changes to the distribution of bar-tailed godwit within the SPA. Therefore, LSE on bar-tailed godwit resulting from the temporary loss of habitat will not compromise the conservation objectives for the species	To ensure the conservation objectives of qualifying interests are not compromised as a result of saltmarsh loss during the Proposed Works, the following avoidance/mitigation measures will be undertaken to prevent a change in the distribution of qualifying interests and to protect the structure and function of the habitats that support them: • The Contractor will adhere to a SEMP which will detail the mitigation to be implemented and how this will be monitored. • A suitably qualified ECoW will be appointed by the Contractor and will be on site, undertake surveys and provide advice during the Proposed Works. • The footprint of the working area will be minimised as far as possible and vehicles,	No adverse effect on site integrity

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
	species within site • distribution and extent of habitats supporting the species • structure, function and supporting processes of habitats supporting the species	and there are no AESI predicted. <u>Golden plover</u> Surveys undertaken by Jacobs (Appendix B: Bird Data) indicated that golden plover utilise the saltmarsh adjacent to the Kincardine Bridge, on the southern side of the estuary, however this species was only recorded on two occasions during the survey period and only on the saltmarsh downstream of the Kincardine Bridge. A monthly peak count of 65 golden plover was made in October 2017, all of which were roosting on the saltmarsh. This represents the winter peak count for this species. Furthermore, the peak count of golden plover from five years of WeBS counts was 61 in October 2016, however the mean peak is only 12 individuals which results from very low or nil counts over the other winters within the five year period (Appendix B: Bird Data). These data indicate that golden plover generally utilise other areas within the SPA to a larger degree and that the habitats in proximity of the Kincardine Bridge are not key for this species over winter. This suggests that there are other areas within the SPA/Ramsar site favoured by golden plover during the winter and that the area around Kincardine Bridge is not an integral supporting habitat for this species. Therefore, LSE on golden plover resulting from the temporary loss of habitat will not compromise the conservation objectives for the species and there are no	equipment/machinery and personnel will be constrained to this area through the use of temporary barriers. • The access tracks and working platforms on the saltmarsh will be created through use of geotextile matting. • On completion of the works all access tracks and materials will be removed in their entirety from the saltmarsh.	

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
		AESI predicted. <u>Knot</u> Loss of saltmarsh habitat during the construction phase could deter knot from the area, however this is unlikely to have a significant effect on the distribution of knot within the SPA/Ramsar site given that other habitat within the sites are more favoured by knot, evidenced by low numbers of knot recorded during surveys with a peak count of 7 birds recorded in March 2017 (Appendix B: Bird Data). The peak count of knot from five years of WeBS counts was 455 in October 2016, however the mean peak is only 92 individuals which results from very low or nil counts over the other winters within the five year period (Appendix B: Bird Data). These data further indicate that knot generally utilise other areas within the SPA to a larger degree and that the habitats in proximity of the Kincardine Bridge and the wider WeBS sector are not key for this species over winter. Therefore, LSE on knot resulting from the temporary loss of habitat will not compromise the conservation objectives for the species and there are no AESI predicted. <u>Redshank</u> Surveys by Jacobs (Appendix B: Bird Data) indicated that redshank utilise the mudflats adjacent to the Kincardine Bridge, on the on both side of the estuary. Loss of		

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
		saltmarsh habitat during the construction phase could deter redshank from feeding, loafing and roosting within the area. However, redshank is considered to be widespread and numerous within the inner and outer Forth (SNH, 2016b) which suggests there is available habitat for redshank outwith the works area, and the large mudflat expanse at Skinflats is considered to offer key feeding habitat for redshank. Therefore, there are no likely long term changes to the extent of habitats within the SPA that support this species. Furthermore, the temporary loss of habitat is unlikely to result in changes to the distribution of redshank within the SPA. Therefore, LSE on redshank resulting from the temporary loss of habitat will not compromise the conservation objectives for the species and there are no AESI predicted. <u>Pink-footed goose</u> The temporary loss of saltmarsh could deter pink-footed geese from feeding, loafing and roosting within the area, however, the majority of roosting records from the Jacobs surveys (Appendix B: Bird Data) for pink-footed geese were from the area downstream side of the bridge which will not be impacted by the Proposed Works. Therefore, there are no likely long term changes to the extent of habitats within the SPA that support this species. Furthermore, the temporary loss of habitat is unlikely to result in changes to the distribution of pink-footed goose		

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
		within the SPA. Therefore, LSE on pink-footed goose resulting from the temporary loss of habitat will not compromise the conservation objectives for the species and there are no AESI predicted. <u>Shelduck</u> Loss of saltmarsh habitat during the construction phase could deter shelduck from feeding, loafing and roosting within the area. However, shelduck are considered to be widespread and numerous within the inner Forth (SNH 2016b) which suggests there is available habitat for shelduck outwith the works area. The saltmarsh habitat at Kincardine Bridge is not considered to be important supporting habitat for shelduck within the SPA/Ramsar. Furthermore, survey data (Appendix B:Bird Surveys) indicates a winter peak count of 31 shelduck at Kincardine which represents 0.7% of the SPA population. Therefore, there are no likely long term changes to the extent of habitats within the SPA that support this species. Furthermore, the temporary loss of habitat is unlikely to result in changes to the distribution of shelduck within the SPA. Therefore, LSE on shelduck resulting from the temporary loss of habitat will not compromise the conservation objectives for the species and there are no AESI predicted. <u>Goldeneye</u>		

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
		Goldeneye do not rely on saltmarsh as a key habitat (SNH 2016b), and appear to use other mudflats within the SPA, evidenced by limited records of this species within the area of the Kincardine Bridge (see Appendix B: Bird Data). Therefore, there are no likely long term changes to the extent of habitats within the SPA that support this species. Furthermore, the temporary loss of habitat is unlikely to result in changes to the distribution of goldeneye within the SPA. Therefore, LSE on goldeneye resulting from the temporary loss of habitat will not compromise the conservation objectives for the species and there are no AESI predicted. <u>Red-throated diver</u> Red-throated diver is a predominately marine species and does not rely on saltmarsh and mudflat habitats which represent the dominant habitats around the Proposed Works. No loss of habitat used by these qualifying interests will result from the Proposed Works. Therefore, LSE on red-throated diver resulting from the temporary loss of habitat will not compromise the conservation objectives for the species and there are no AESI predicted. <u>Slavonian grebe</u> Slavonian grebe is predominately marine species and does not rely on saltmarsh and mudflat habitats which		

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
		represent the dominant habitats around the Proposed Works. No loss of habitat used by these qualifying interests will result from the Proposed Works. Therefore, LSE on Slavonian grebe resulting from the temporary loss of habitat will not compromise the conservation objectives for the species and there are no AESI predicted. <u>Turnstone</u> Turnstone are considered scarce within the inner Forth (SNH, 2016b) and was recorded in low numbers in the WeBS sector, with a peak count of 4 in December 2016, and was not recorded during the Jacobs surveys adjacent to the Kincardine Bridge. Loss of saltmarsh habitat during the construction phase could deter turnstone from the area, however this is unlikely to have a significant effect on the distribution of this species within the SPA/Ramsar site given that other habitat within the sites are more favoured by turnstone. Therefore, LSE on turnstone resulting from the temporary loss of habitat will not compromise the conservation objectives for the species and there are no AESI predicted.		

Table 6: HRA Stage Two (AA) Assessment Table for Passage Species

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
Disturbance (Noise, Vibration and Visual)	To avoid deterioration of the habitats of the qualifying interests or significant disturbance to the qualifying interests, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying interests that the following are maintained in the long term: • distribution of the species within site • no significant disturbance of the	Screening identified the potential for disturbance to Sandwich tern from the Proposed Works based on the high-level review of the survey data and ecological requirements for Sandwich tern. Noise and visual disturbance related to Proposed Works could deter Sandwich tern from the area for feeding in the open water adjacent to the site. Surveys by Jacobs (Appendix B: Bird Data) recorded Sandwich tern in the summer months with a total of 15 records over the surveys period. A peak count of 45 terns was recorded in August 2017 which corresponds with the seasonality trend for the Firth of Forth (SNH 2016b). The five year annual peak for Sandwich tern from the WeBS sector is 15 in September 2017 and other peak counts over the five year period were all from September which similarly corresponds with this trend. Most records of Sandwich tern from Jacobs surveys pertained to small groups of tern flying over the site and correspond with early passage activity and records were concentrated on the south side of the estuary. No records of Sandwich tern feeding within the area around Kincardine Bridge were made; however, it is considered likely that the area could be used for feeding as other diving birds including cormorants were observed feeding within the estuary.	Although there is a LSE identified for Sandwich tern it is precautionary and it is concluded that no specific mitigation is required for Sandwich tern with regard to disturbance impacts. It is considered that the mitigation measures in place to protect other qualifying interests will further reduce any effects on Sandwich tern. The following avoidance/mitigation measures will be implemented: • The Contractor will adhere to a SEMP which will detail the mitigation to be implemented and how this will be monitored. • A suitably qualified ECoW will be appointed by the Contractor and will be on site, undertake surveys and provide advice during the Proposed Works. • Timing works on the SPV, as	No adverse effect on site integrity

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
	species	However, Sandwich tern are uncommon in the inner Forth (SNH 2016b) and as such are unlikely to rely on the estuary at Kincardine, favouring other areas within the Firth of Forth for feeding. Therefore, LSE on Sandwich tern resulting from disturbance will not compromise the conservation objectives for the species and therefore there are no AESI predicted.	far as practicable, to avoid peak times when qualifying interests are present (September to March). • A construction lighting plan and method statement will be provided by the Contractor. • Provision of visual screening between the works and the coastal area throughout winter. • Use “soft-start” techniques to avoid sudden and unexpected disturbance.	
Habitat loss	To avoid deterioration of the habitats of the qualifying interests or significant disturbance to the qualifying interests, thus ensuring that the integrity of the site is maintained; and	Sandwich tern rely on open water habitat predominately, are most regularly found within the marine environment and are uncommon in the inner Forth (SNH 2016b). Use of boat/vessels to facilitate the Proposed Works (specifically installation of gauge boards) will require work in open water habitats, however no open water habitat will be lost during the Proposed Works and no impacts to Sandwich tern in terms of distribution and extent of supporting habitat is expected. Therefore, LSE on Sandwich tern resulting from habitat loss will not compromise the conservation objectives for the species and therefore there are no AESI predicted.	No mitigation is required.	No adverse effect on site integrity

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
	To ensure for the qualifying interests that the following are maintained in the long term: • distribution of the species within site • distribution and extent of habitats supporting the species • structure, function and supporting processes of habitats supporting the species			

Table 7: HRA Stage Two (AA) Assessment Table for Waterfowl and Wader Assemblages

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
Disturbance (Noise, Vibration and Visual)	To avoid deterioration of the habitats of the qualifying interests or significant disturbance to the qualifying interests, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying interests that the following are maintained in the long term: • distribution of the species within site • no	As the Proposed Works are located within, and adjacent to, the Firth of Forth SPA and Ramsar, it is considered that there is potential for disturbance to all waders and waterfowl which rely on habitats within the Kincardine area. Noise, vibration and visual disturbance related to the Proposed Works could deter qualifying interests from feeding, loafing and roosting within the intertidal mudflats and saltmarsh adjacent to the bridge. Note that all species named are part of the waterfowl assemblage for the Firth of Forth SPA only, with the exception of goldeneye, which is an assemblage qualifier for both the SPA and Ramsar. The following assemblage qualifying interests were recorded during Jacobs surveys (Appendix B: Bird Data): • Common scoter • Cormorant • Curlew • Dunlin • Eider • Lapwing • Mallard • Oystercatcher • Red-breasted merganser • Ringed plover • Wigeon	It is considered that due to the ecological requirements and distribution of species within the Firth of Forth SPA that many of the assemblage qualifying interests are unlikely to be disturbed by the works; however, a small number of qualifying interests that comprise the assemblages may be disturbed. To ensure that the conservation objectives for the waterbird assemblages are not compromised, the following avoidance/mitigation measures will be undertaken. The measures will be undertaken to prevent significant disturbance to, or a change in the distribution of, waterbirds within the sites: • The Contractor will adhere to a SEMP which will detail the mitigation to be implemented and how this will be monitored. • A suitably qualified ECoW will	No adverse effect on site integrity

	significant disturbance of the species	The following species were also recorded in small numbers within the WeBS sector (Appendix B: Bird Data): • Cormorant • Curlew • Dunlin • Eider • Goldeneye • Great crested grebe • Grey plover • Lapwing • Long-tailed duck • Mallard • Oystercatcher • Red-breasted merganser • Ringed plover • Scaup • Wigeon The following commentary relates to qualifying interests not already discussed as individually cited species in Tables 4 and 6 above. All survey data referred to is presented in Appendix B: Bird Data. <u>Cormorant</u> During Jacobs surveys cormorant was recorded fishing within the estuary and were frequently recorded in groups loafing on the saltmarsh and mudflats drying their wings over winter a peak of 31 birds in winter represents 4% of the SPA population. The five year peak count for cormorant in the WeBS sector is 80 in September 2019, with the mean peak over the five years being 46. The Firth	be appointed by the Contractor and will be on site, undertake surveys and provide advice during the Proposed Works. • The footprint of the working area will be minimised as far as possible and vehicles, equipment/machinery and personnel will be constrained to this area through the use of temporary barriers. • Timing works on the SPV, as far as practicable, to avoid peak times when qualifying interests are present (September to March). • A construction lighting plan and method statement will be provided by the Contractor. • Working during hours of darkness during September to March will be avoided to prevent disturbance to roosting geese as far as practicable. • Provision of visual screening between the works and the coastal area throughout winter. • Use “soft-start” techniques to	

		of Forth offers good foraging for this species, and there is suitable available habitat within the SPA for cormorant. It is considered that any disturbance caused by the works is unlikely to result in significant disturbance to cormorant or change their distribution within the SPA based on the data for the area near Kincardine Bridge and the wider WeBS sector. Therefore, LSE on cormorant resulting from disturbance will not compromise the conservation objectives for the species and therefore there are no AESI predicted. <u>Curlew</u> Curlew was recorded in larger numbers over the winter at Kincardine with a peak of 290 in February 2018, showing preference for the mudflats and estuarine habitats within the southern survey sectors. This peak represent 15% of the SPA population. The five year peak count for curlew in the WeBS sector is 586 in February 2016, with the mean peak over the five years being 481. If curlew are disturbed, it is likely that this would be a short-term localised displacement, with birds redistributing to other areas within the Firth of Forth SPA; displacement out of the SPA is not predicted given the availability of alternative habitat. However, as data shows curlew do use areas around the bridge, and in the absence of mitigation, disturbance to curlew could compromise the conservation objectives. <u>Dunlin</u> A small number or records of dunlin were made during the Jacobs surveys, all within 2017. A monthly peak count of 25 dunlin was recorded on 7 November 2017, loafing on	avoid sudden and unexpected disturbance.	

		mudflats south of the bridge. This peak count also represents the winter peak count for this species from these surveys. The five year peak count for dunlin in the WeBS sector is 1025 in October 2017, with the mean peak over the five years being 722. The data indicates that dunlin show preferences for areas within the SPA outwith the Kincardine Bridge area. However, as this species has been recorded in the area, and uses habitats adjacent to the works, there is the potential for disturbance to dunlin as a result of the Proposed Works. Therefore, as data shows dunlin do use areas around the bridge and the wider area, and in the absence of mitigation, disturbance to dunlin could compromise the conservation objectives. <u>Oystercatcher</u> Oystercatcher was recorded regularly over winter and summer, and peak count of 113 oystercatcher was recorded on 1 February 2018. This peak represents 1% of the SPA population. The five year peak count for oystercatcher in the WeBS sector is 195 in February 2020, with the mean peak over the five years being 144. If oystercatcher are disturbed, it is likely that this would be a short-term localised displacement, with birds redistributing to other areas within the Firth of Forth SPA; displacement out of the SPA is not predicted given the availability of alternative habitat. However, as data shows oystercatcher do use areas around the bridge, and in the absence of mitigation, disturbance to oystercatcher could compromise the conservation objectives. <u>Eider</u>		

		Records of eider were made in summer 2017 during Jacobs surveys on both sides of the bridge. A monthly peak count of four eider was made in April 2017 and no winter observations of eider were made during the surveys. The five year peak count for eider in the WeBS sector is 6 in November 2019, with the mean peak over the five years being 4. Based on survey data from the Kincardine Bridge area and in the wider WeBS sector, disturbance caused by the works is unlikely to result in significant disturbance to eider or change their distribution within the SPA, therefore no AESI is predicted. <u>Great crested grebe</u> The five year peak count for great crested grebe in the WeBS sector is 8 in December 2018, with the mean peak over the five years being 3. Great crested grebe were not recorded during Jacobs surveys. Based on survey data from the Kincardine Bridge area and in the wider WeBS sector, disturbance caused by the works is unlikely to result in significant disturbance to great crested grebe or change their distribution within the SPA, therefore no AESI is predicted. <u>Grey plover</u> The five year peak count for grey plover in the WeBS sector is 16 in October 2016, with the mean peak over the five years being 5. Grey plover were not recorded during Jacobs surveys. Based on survey data from the Kincardine Bridge area and in the wider WeBS sector, disturbance caused by the works is unlikely to result in significant disturbance to grey plover or change their distribution		

		within the SPA, therefore no AESI is predicted. <u>Lapwing</u> The five year peak count for lapwing in the WeBS sector is 523 in November 2018, with the mean peak over the five years being 468. A peak count of 27 flying lapwing was recorded on 12 October 2017 during Jacobs surveys, however this flock was not observed on land within the survey area. Based on survey data from the Kincardine Bridge area and in the wider WeBS sector, disturbance caused by the works is unlikely to result in significant disturbance to lapwing or change their distribution within the SPA, therefore no AESI is predicted. <u>Mallard</u> Mallard was recorded across the survey area and showed no obvious preference to the northern or southern survey sectors. A monthly peak count of 90 was recorded in September 2017 which represents 4% of the SPA population. The five year peak count for mallard in the WeBS sector is 148 in January 2017, with the mean peak over the five years being 102. <u>Long-tailed duck</u> The five year peak count for long-tailed duck in the WeBS sector is 1 in October 2016 and November 2018. Very low counts of this species result in a mean peak count of <1 over the five years. This species was not recorded during Jacobs surveys. Based on survey data from the Kincardine Bridge area and in the wider WeBS sector, disturbance caused by the works is unlikely to result in significant		

		disturbance to long-tailed duck or change their distribution within the SPA, therefore no AESI is predicted. <u>Red-breasted merganser</u> A peak count of red-breasted merganser was recorded in July 2017, February 2018 and April 2018 during Jacobs surveys. This species was more frequently recorded during the spring/summer months. The five year peak count for red-breasted merganser in the WeBS sector is 35 in December 2018, with the mean peak over the five years being 23. Based on survey data from the Kincardine Bridge area and in the wider WeBS sector, disturbance caused by the works is unlikely to result in significant disturbance to red-breasted merganser or change their distribution within the SPA, therefore no AESI is predicted. <u>Ringed plover</u> The five year peak count for ringed plover in the WeBS sector is 2 in October 2015 and September 2017, with the mean peak over the five years being 1. Only one record of this species was made during the Jacobs surveys in May 2017. Based on survey data from the Kincardine Bridge area and in the wider WeBS sector, disturbance caused by the works is unlikely to result in significant disturbance to ringed plover or change their distribution within the SPA, therefore no AESI is predicted. <u>Scaup</u> The five year peak count for scaup in the WeBS sector is 2 in October 2017 and September 2017, with the mean peak over the five years being 1. This species was not recorded		

		during Jacobs surveys. Based on survey data from the Kincardine Bridge area and in the wider WeBS sector, disturbance caused by the works is unlikely to result in significant disturbance to scaup or change their distribution within the SPA, therefore no AESI is predicted. <u>Wigeon</u> Wigeon was frequently recorded in the southern sectors of the survey area with a monthly peak count of 136 wigeon recorded in February 2018 which represents 6% of the SPA population. The five year peak count for wigeon in the WeBS sector is 241 in December 2017, with the mean peak over the five years being 221. Wigeon flocks, if disturbed, may not return immediately which can affect their ability to forage if ongoing disturbance occurs (SNH 2016). It is considered that there is suitable available habitat within the Firth of Forth to forage away from disturbance, therefore if wigeon are disturbed it would be a short-term localised displacement, with birds redistributing to other areas within the Firth of Forth SPA. Therefore, LSE on wigeon resulting from disturbance will not compromise the conservation objectives for the species and therefore there are no AESI predicted. Qualifying interests, for which the LSE resulting from disturbance will not compromise the conservation objectives for the species and therefore there are no AESI predicted, are common scoter, eider, great crested grebe, grey plover, long-tailed duck, red-breasted merganser, red-throated diver, Slavonian grebe, turnstone and scaup as these species either rely predominately on open water		

		habitats or are found in the outer Forth (SNH 2016b). This assessment is corroborated by the Jacobs survey data and WeBS data; common scoter, eider and red-breasted merganser were recorded in low numbers (or nil counts) during the surveys (Appendix B: Bird Data).		
Habitat loss	To avoid deterioration of the habitats of the qualifying interests or significant disturbance to the qualifying interests, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying interests that the following are maintained in the long term: • distribution of the species within site • distribution	The Proposed Works will require temporary access/working within the saltmarsh which will result in temporary loss of this habitat available to qualifying interests of the SPA/Ramsar site. Results from Jacobs surveys and WeBS surveys indicate that several assemblage qualifying interests use the habitats around Kincardine Bridge over the winter, including features already discussed above. The following assemblage qualifying interests were recorded during the surveys using the saltmarsh at Kincardine (Appendix B: Bird Data): • Cormorant • Curlew • Dunlin • Lapwing • Mallard • Oystercatcher • Ringed plover • Wigeon Loss of habitat could have an impact on all species with the exception of those that rely predominately on open water habitats and those that are found in the outer Forth (noted previously), although there is available habitat for all species throughout the Firth of Forth.	To ensure that the conservation objectives for the waterbird assemblages are not compromised, the following avoidance/mitigation measures will be undertaken. The measures will prevent a change in the distribution of waterbirds and protect habitats which support the waterbird assemblages: • The Contractor will adhere to a SEMP which will detail the mitigation to be implemented and how this will be monitored. • A suitably qualified ECoW will be appointed by the Contractor and will be on site, undertake surveys and provide advice during the Proposed Works. • The footprint of the working area will be minimised as far as possible and vehicles, equipment/machinery and personnel will be constrained	No adverse effect on site integrity

	and extent of habitats supporting the species • structure, function and supporting processes of habitats supporting the species		to this area through the use of temporary barriers. • The access tracks and working platforms on the saltmarsh will be created through use of geotextile matting. • On completion of the works all access tracks and materials will be removed in their entirety from the saltmarsh.	

4.6 Appropriate Assessment Conclusion

4.6.1 Detailed assessment (Table 5 to Table 7) of the implications from the Proposed Works on the Firth of Forth SPA and Ramsar site concluded the conservation objectives of the sites would not be compromised and there would be no AESI if the required mitigation is implemented.

5 In-Combination Assessment

5.1 Introduction

5.1.1 Following screening (Section 3: Stage One (Screening)), LSEs from the Proposed Works were identified for the Firth of Forth SPA and Firth of Forth Ramsar. This section of the report describes the in-combination assessment that has been undertaken to identify whether there are any other plans and projects which could affect the integrity of these European sites in combination with the Scheme.

5.1.2 Article 48 of the Habitats Regulations requires that Appropriate Assessments of projects should include a consideration of other plans or projects which could affect site integrity in combination with the proposal under assessment.

5.1.3 There is potential for adverse effects on the integrity of the Firth of Forth SPA and Firth of Forth Ramsar to accrue as a result of the Proposed Works in combination with other proposed developments or works on, adjacent to, or within the area. Relevant developments might impact on the estuarine system and the qualifying species by causing disturbance and/or loss of habitat and/or introducing barriers to migration or normal ranging behaviour of the qualifying species within the estuarine catchment.

5.1.4 In terms of the potential for in-combination effects with the maintenance works, the key issue, based on the assessment above, is considered to be the potential for other developments to result in an increase in disturbance (and therefore also displacement) within the Firth of Forth estuary, which may impact on the qualifying species of the two sites.

5.1.5 The in-combination assessment may identify developments which are themselves considered likely to have a significant effect on the Firth of Forth SPA and Firth of Forth Ramsar and which will also be required to undergo an Appropriate Assessment under Regulation 48 of the Conservation (Natural Habitats &c.) Regulations 1994 (as amended). There may also be plans or projects which, when considered individually, may not adversely affect a European site, but which may have an adverse effect when combined with the Proposed Works.

5.2 Approach to Assessment

5.2.1 The approach adopted for the in-combination assessment of the Proposed Works in relation to the two sites was firstly to identify a search area for plans or projects with the potential to cause in-combination adverse effects on the integrity of the Firth of Forth SPA and Firth of Forth Ramsar with the Proposed Works. As the Firth of Forth SPA/Ramsar cover such large areas, it was considered appropriate that the search area captured all projects and plans within the Firth of Forth Catchment.

5.2.2 A search was undertaken on 24 November 2021 for any Marine Licence Applications within the Forth Estuary on the Scottish Government's website. Marine Licence applications within five years of the search date were identified.

5.2.3 A search was undertaken on 24 November 2021 for projects and plans with the potential to have an in-combination adverse effect within East Lothian Council, City of Edinburgh Council, Clackmannanshire Council, Falkirk Council, West Lothian and Fife Council. Each local authority's planning portal was searched for consented or pending applications within a three-year period of the search date. The following exclusions applied to the search to identify relevant proposals for inclusion within the assessment:

- householder applications for improvements/extensions;
- local commercial and business applications for minor improvement works and alterations;
- change of use (where external building work is not required);
- applications for advertisement consent;
- enforcement actions; and
- applications that have been withdrawn.

5.2.4 In addition, separate planned maintenance works on the Kincardine Bridge (to be covered in a separate Marine Licence), as advised by BEAR Scotland, have been included within the in-combination assessment.

5.2.5 A review of documentation and information available for each proposal, including published HRAs, environmental impact assessments, consultation responses, decision notices or other relevant documentation were consulted to identify projects with potential for in-combination effects.

5.2.6 The findings of the search are presented in Table 8 below, along with a summary of the identified potential for in-combination effects.

Table 8: Other Plans and Projects and Potential for In-Combination Effects

Project/Plan Application Name	Approximate Distance from Kincardine Bridge	Council	Planning Application and/or Marine Licence Reference Number	Status or Decision	Description of the Project/Plan and Potential for In-Combination Effects
A985 Kincardine Bridge Refurbishment: Piled Viaduct Replacement Scheme *Kincardine Bridge, Airth.*	0km	Falkirk Council	P/20/0595/LBC	Granted	The proposal relates to listed building consent for the A985 Kincardine Bridge Refurbishment: Piled Viaduct Replacement Scheme (hereafter the 'Refurbishment Scheme'). An EIA Report and an HRA have been prepared for the Refurbishment Scheme (Transport Scotland, 2020a, 2020b) and the HRA concludes no AESI on the Firth of Forth SPA/Ramsar, alone or in combination with other projects and plans. The assessments identified the potential for disturbance of qualifying interests of the Firth of Forth SPA/Ramsar/SSSI, and temporary loss of habitat within these designated sites. However, with the application of mitigation, the EIA Report concluded no significant residual effects with regard to ecology, and the HRA concluded no AESI. The Scottish Ministers' notice of decision to proceed with the Scheme under the Roads (Scotland) Act 1984 was published in July 2021. Construction of the Refurbishment Scheme is programmed to commence in 2022. The Refurbishment Scheme was assessed to result in long-term impacts to the saltmarsh due to the requirement for a large raised working platform. As a result, a comprehensive set of mitigation measures together with a management

Project/Plan Application Name	Approximate Distance from Kincardine Bridge	Council	Planning Application and/or Marine Licence Reference Number	Status or Decision	Description of the Project/Plan and Potential for In-Combination Effects
					plan was developed (Transport Scotland, 2020a, 2020b). Taken together, these would fully mitigate the effects of the Refurbishment Scheme on the saltmarsh habitat. The Proposed Works will be completed prior to the commencement of the Refurbishment Scheme. The required working area for the Proposed Works (specifically related to the SPV works) utilises a small area of saltmarsh under and adjacent to the SPV which will be covered by a working platform comprising geotextile mats; it is therefore acknowledged that there is likely to be some minor localised deterioration to the saltmarsh as a result. However, due to the small area of the works and the use of the geotextile matting any impacts on the habitat would be minor and short-term compared with those of the Refurbishment Scheme. The low impact and small-scale nature of the Proposed Works will therefore be fully mitigated by the mitigation proposals of the Refurbishment Scheme and there will be no in-combination effect of habitat deterioration/loss. There could also be an in-combination effect of the Proposed Works and the Refurbishment Scheme as a result of disturbance. However, as noted above the HRA

Project/Plan Application Name	Approximate Distance from Kincardine Bridge	Council	Planning Application and/or Marine Licence Reference Number	Status or Decision	Description of the Project/Plan and Potential for In-Combination Effects
					recorded no AESI with mitigation measures in place. The mitigation measures for the Proposed Works follow the same principles as those for the Refurbishment Scheme. Furthermore, the two sets of works will not be concurrent, the Proposed Works are short-term, and there will likely be a period of delay between the completion of the Proposed Works and the commencement of the Refurbishment Scheme. Therefore, there will be no in-combination effect as a result of disturbance. **No potential for in-combination effects.**
A985 Kincardine Bridge Maintenance Works *Kincardine Bridge, Airth.*	0km	Falkirk Council	n/a	n/a	A separate scheme of Maintenance Works are proposed for the Kincardine Bridge and a Marine Licence application (covering a 7-year period) is in preparation. The Proposed Works will be completed prior to the consent and commencement of the Maintenance Works under the 7-year licence. In addition to routine maintenance activities over the 7-year period, specific activities such as repairs to the 50ft concrete spans, bridge drainage replacement, steelwork repairs and refurbishment of timber jetties are proposed, with indicative timescales covering 2023-2026. An HRA to support a Marine Licence is currently in development for these works and will be required to take into account the Proposed Works in the assessment of potential in-combination effects.

Project/Plan Application Name	Approximate Distance from Kincardine Bridge	Council	Planning Application and/or Marine Licence Reference Number	Status or Decision	Description of the Project/Plan and Potential for In-Combination Effects
					An in-combination assessment is not possible at this time.
Demolition of Existing Kiosk Building, Erection of Petrol Filling Station with Associated Kiosk (Class 1), Jet Washes, Restaurant (Including Drive-Thru) (Class 3), Formation of Site Access, Parking Provision, Landscaping and Ancillary Works	0.13km	Falkirk Council	P/20/0398/FUL	Grant Planning Permission	The proposal submitted in September 2020, and approved in October 2021, is for the demolition of an existing building and erection of a petrol filling station and associated infrastructure, including a 'drivethru' McDonalds restaurant. There is the potential for the proposal to be concurrent with the Proposed Works. The works are over 140m from the Firth of Forth SPA/Ramsar boundary and are not visible from the estuary. Therefore, it is considered that noise and visual disturbance to qualifying features within the SPA/Ramsar from the demolition and construction works at the filling station will not act in combination with the Proposed Works. Furthermore, once the works are completed there will be no residual disturbance effects which could act in-combination with the Proposed Works. **No potential for in-combination effects.**
Network Rail West of Fife Enhancement Project.	0.5km	Fife Council	20/02427/SCR	EIA Not Required	Improvements (electrification) to the railway line between Alloa and Longannet. This project is in the early stages of development. An EIA screening request was submitted to Fife Council in October 2020 and it was confirmed on 7 December 2020 that an EIA was not required for the proposal. The electrification falls under the wider Scottish

Project/Plan Application Name	Approximate Distance from Kincardine Bridge	Council	Planning Application and/or Marine Licence Reference Number	Status or Decision	Description of the Project/Plan and Potential for In-Combination Effects
					Government's rail decarbonisation agenda which looks forward to 2035. Site investigations are ongoing until the end of the year along the 11.5km track to assess the ground conditions to inform the potential upgrade. These works will be localised to land within the railway boundary. Therefore, there is no potential for in-combination effects. The project is very early in the development stage, and there is no confirmation of when the enhancement could be delivered, although it may be just before, or in parallel, with works at Longannet Power Station. It is considered unlikely that the project would be undertaken concurrently with the Proposed Works given the stage of the proposals. **No potential for in-combination effects.**
Redevelopment of former Power Station site with a mix of Class 4 (Business), 5 (General Industrial) and 6 (Storage and distribution) Uses, service facilities, SUDS, landscape	2.7km	Fife Council	19/02331/EIA 19/00627/PAN	Application Permitted with Conditions	Planning permission has been granted for the redevelopment of the former power station. The total development area is 122.8ha on the site of Longannet Power Station, and is adjacent to the Firth of Forth, albeit set back from the shore front. The boiler house at the power station was demolished by controlled explosion on 4 February 2021 (BBC, 2021). The remaining redevelopment works at Longannet Power Station may be concurrent with the Proposed Works. Supporting documentation for the proposal included an EIA

Project/Plan Application Name	Approximate Distance from Kincardine Bridge	Council	Planning Application and/or Marine Licence Reference Number	Status or Decision	Description of the Project/Plan and Potential for In-Combination Effects
works and associated development at Longannet Power Station, Fife. *Longannet Power Station, Fife.*					report and an HRA, the latter of which concluded no adverse effect on site integrity for the Firth of Forth SPA. The HRA concluded that due to the nature of the development and the responses of birds to disturbances, there would be no adverse effect on site integrity of the Firth of Forth SPA. Furthermore, there is no land-take from the Firth of Forth SPA/Ramsar proposed as part of the redevelopment, therefore the availability of habitat for waders and waterfowl will not change. It is therefore considered that there is no potential for in-combination effects with the Proposed Works. **No potential for in-combination effects.**
Temporary testing of a reactive engine on moveable test bed; storage of ancillary equipment within isocontainers; short-term (up to five days) storage within pre-fabricated bunds of 400kg of kerosene and	4km	Fife Council	19/02632/CLP	Application Permitted - no conditions	A certificate of lawfulness was approved for the temporary testing of a reactive engine and storage of kerosene, hydrogen peroxide and ancillary equipment. A noise and environmental assessment were undertaken to accompany the application which identified that the level of noise at 150m would be 72dB. Given the location of the engine site to the Firth of Forth (i.e. set back from the estuary), it is unlikely that the noise generated would have a significant disturbing effect on qualifying interests. In relation to the potential for accidental spillage of harmful materials, it was concluded that dilution with water would minimise the

Project/Plan Application Name	Approximate Distance from Kincardine Bridge	Council	Planning Application and/or Marine Licence Reference Number	Status or Decision	Description of the Project/Plan and Potential for In-Combination Effects
2000kg of hydrogen peroxide. (Maximum of three tests per month/duration of tests 1-3 minutes). *Land to west of Caledonia Road, Rosyth Business Park, Rosyth, Fife.*					impact on the environment. The proposed testing regime states a maximum of three tests a month of 1-3 minutes' duration. It is not clear if this testing regime has been completed; however, in absence of further information, it is considered that this may be ongoing. However, given the nature of the works, in-combination disturbance effects with the Proposed Works are unlikely. **No potential for in-combination effects.**
Grangemouth Flood Protection Scheme *Grangemouth, Falkirk.*	4.2km	Falkirk Council	n/a	Options Appraisal	The flood protection scheme is being advanced as a formal flood protection scheme under the Flood Risk Management (Scotland) Act 2009. The environmental impact assessment is ongoing. The programme currently assumes construction will start in 2024. The scheme is in development, with the EIA Report and HRA currently in progress. Given the stage at which the scheme is at, and the assumption that construction will commence in 2024, there is no overlap in the construction periods for the scheme and the Proposed Works. **No potential for in-combination effects.**
Maintenance dredging - Port of	4.2km	Falkirk Council	Marine Licence Application –	Granted consent	The licence application covers the maintenance dredging at the Port of Grangemouth in the training channel, bellmouth

Project/Plan Application Name	Approximate Distance from Kincardine Bridge	Council	Planning Application and/or Marine Licence Reference Number	Status or Decision	Description of the Project/Plan and Potential for In-Combination Effects
Grangemouth *Port of Grangemouth, Grangemouth.*			(07120)		and docks. This site has been previously dredged (periodic maintenance), under licence, to maintain safety of navigation. The proposed start date stated in the application was 01/02/2020 with a proposed completion date of 31/01/2023. These works are ongoing and will be concurrent with the Proposed Works. Dredging in the bellmouth is carried out over approximately four to five days each month and dredging within the docks is carried out in conjunction usually taking place over a four month period towards the latter half of the year. The Best Practice Environmental Option Report which accompanies the application states that "*[g]iven that disposal was an existing activity and ongoing disposal is at a similar scale to previous disposal activities it is considered that the proposals will not have significant effects on the qualifying interest of the SPA*." As the dredging is an ongoing activity that has been undertaken previously it is considered that qualifying interests of the European sites will be habituated to these activities and the works will be no more disturbing than background levels. It is therefore considered that there is no potential for in-combination effects with the Proposed Works. **No potential for in-combination effects.**

Project/Plan Application Name	Approximate Distance from Kincardine Bridge	Council	Planning Application and/or Marine Licence Reference Number	Status or Decision	Description of the Project/Plan and Potential for In-Combination Effects
Application for a Certificate of Proposed Lawful Use or Development relating to the installation of 3 No. above ground liquid storage tanks, bunds and associated infrastructure at Land North of McIntyres, North Shore Road, Grangemouth.	4.5km	Falkirk Council	P/18/0608/CPL	Certificate of Lawful Use or Development Granted	Proposal to install storage tanks and associated infrastructure within an already heavily industrialised site. The Environmental Screening Report submitted as supporting documentation states that although the development has the potential to cause noise and vibration, the construction methods should not have any greater impact than current activities, and the operation of the site following completion of the works will not change. Therefore, as the works are small scale and localised within an already industrialised area and are unlikely to result in significant disturbance above that which is already experienced in the locality, there is no potential for in-combination effects. Furthermore, once the storage tanks and associated infrastructure are erected there will be no residual disturbance effects which could act in-combination with the Proposed Works. **No potential for in-combination effects.**
Final capping of remaining ash lagoons and associated engineering works, including the	7.6km	Fife Council	18/01662/FULL 18/00339/SCR	Application permitted with conditions October 2020	Proposals to cap the final three ash lagoons located at Low Valleyfield, east of Culross, to preserve their integrity and promote biodiversity. This will also include re-grading and the removal of physical infrastructure. The area is immediately adjacent to the Firth of Forth SPA and Ramsar site.

Project/Plan Application Name	Approximate Distance from Kincardine Bridge	Council	Planning Application and/or Marine Licence Reference Number	Status or Decision	Description of the Project/Plan and Potential for In-Combination Effects
erection of a wind turbine of up to 11.8m blade-tip height *Valleyfield Ash Lagoons, Main Street, Low Valleyfield Dunfermline, Fife KY12 8TY.*					SNH considered that two of the lagoons acted as supporting habitat for qualifying species of the Firth of Forth SPA. Furthermore, they stated that did not agree with the conclusions of the applicant's HRA which concluded that there would be no adverse effect on the integrity of the SPA. It was SNH's view that the proposed mitigation within the HRA was not adequate to avoid an adverse effect on the integrity of the SPA. One of the conditions of the application approval is for a final, detailed restoration scheme for the application site to be submitted to Fife Council as Planning Authority for approval, in consultation with NatureScot (formerly SNH) and RSPB Scotland. Therefore, for the proposal to go ahead either appropriate mitigation or compensation would be required. The project now includes the erection of a wind turbine of a height <11.8m to blade tip. The final details of the proposed wind turbine shall be submitted for the written approval of Fife Council as Planning Authority. The capping of the lagoons may result in a loss of supporting habitat for qualifying species of the Firth of Forth SPA. Whilst the Proposed Works are majorly localised to the Kincardine Bridge, some access may be required through the SPA which could result in temporary habitat

Project/Plan Application Name	Approximate Distance from Kincardine Bridge	Council	Planning Application and/or Marine Licence Reference Number	Status or Decision	Description of the Project/Plan and Potential for In-Combination Effects
					loss however this is unlikely to be significant. There is the potential for the capping of the lagoons (and associated works) to be undertaken concurrently with the Proposed Works. The planning permission is conditional on approval of a detailed restoration scheme, CEMP, specification of the wind turbine, amongst others, to ensure protection of environmental features including the Firth of Forth SPA and Ramsar. Therefore, it is considered there will therefore be no in-combination effect and no adverse effect on site integrity. **No potential for in-combination effects.**
Erection of Engine Workshop. *Bo'ness Station, Union Street, Bo'ness, EH51 9AQ*	9.6km	Falkirk Council	P/19/0337/FUL	Grant Planning Application	Application for the erection of an engine workshop adjacent to other industrial buildings and the Museum of Scottish Railways in Bo'ness. The building will be constructed in an already industrialised setting and is set back from the Firth of Forth. The application was granted in August 2019, however the building has yet to be constructed. No disturbance to qualifying interests of the Firth of Forth SPA/Ramsar are anticipated from this proposal given the nature and location of the works, therefore in-combination effects with the Proposed Works are not predicted. **No potential for in-combination effects.**

Project/Plan Application Name	Approximate Distance from Kincardine Bridge	Council	Planning Application and/or Marine Licence Reference Number	Status or Decision	Description of the Project/Plan and Potential for In-Combination Effects
Erection of Storage Warehouse Buildings (Class 6) with Associated Landscaping, Land to the South. *Midtown Blackgrange Road, Cambus, Clackmannanshire.*	10.15km	Clackmannanshire Council	18/00239/PAN	Response to Notice Issued	The proposal concerns the erection of storage warehouse buildings approximately 600m from the Firth of Forth SPA and Ramsar site, in Cambus. The proposal has been subject to a scoping opinion and NatureScot (formerly SNH) stated that it had concerns about the potential to disturb or displace the qualifying species or to reduce their foraging/roosting habitat. No further information is currently available. The proposal has not developed beyond scoping; no environmental information is available, nor an HRA. A timescale for this information is not available. It is therefore not possible to determine what, if any, LSEs or adverse effects may occur on the Firth of Forth SPA. **An in-combination assessment is not possible at this time.**
Demolition of existing buildings and erection of a 2850m^2 distillery building with access road, service buildings, landscaping and	17km	West Lothian	0543/FUL/20	Grant Planning Permission	The proposed development is for the demolition of existing buildings, the erection of distillery buildings and conversion of Midhope Castle for visitor accommodation. An Extended Phase 1 habitat survey was undertaken in March/April 2020 which noted the Firth of Forth SPA, Ramsar and SSSI being 580m north of the application site. In initial consultation in August 2020 NatureScot stated that LSE on the SPA (disturbance to birds that travel inland, and

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parking and conversion of Midhope Castle to provide visitor accommodation. *Midhope Castle Grounds, Abercorn, Newton, West Lothian, EH30 9SL.*					pollution/hydrological impacts) was likely and an AA will be needed. An HRA was undertaken for the development in September 2020, and updated in February 2021, and concluded no adverse effects on the integrity of the Firth of Forth SPA. NatureScot agreed with the conclusions of the HRA, although identified that the document used incorrect terminology and was inaccurate in places with regard to the HRA process. However, NatureScot considered that for intents and purposes the HRA could be used by the council to undertake AA as the competent authority. Based on the conclusions of the HRA for the proposal and the location of the proposal in relation to the Kincardine Bridge, in-combination effects are considered unlikely. **No potential for in-combination effects.**
Maintenance dredging and sea deposit - Port of Rosyth, Fife *Port of Rosyth, Fife.*	17.2km	Fife Council	Marine Licence Application – (00008987)	Application	The licence application covers the maintenance dredging at the Port of Rosyth and Rosyth Approach Channel to ensure appropriate depths of water to maintain operations. The site has been maintained previously under licence (06448/18/2) which expires on 11/02/2021. The proposed start date stated in the application is 12/02/2021 with a proposed completion date of 11/02/2024. Dredging would be expected to be carried out over approximately four to five

Project/Plan Application Name	Approximate Distance from Kincardine Bridge	Council	Planning Application and/or Marine Licence Reference Number	Status or Decision	Description of the Project/Plan and Potential for In-Combination Effects
					days during each campaign, during the spring and autumn, as part of the routine maintenance at the ports, with disposal of material (up to 520,000 tonnes per year) to east of Inchcolm Island, east of the Forth Road Bridge. The proposal is small scale and dredging activities will be of a short-term nature, undertaken over a three-year period. Furthermore, as dredging has been undertaken previously, and is ongoing as part of maintenance, it is considered that qualifying interests of the European sites will be habituated to these activities and the works will be no more disturbing than background levels. It is therefore considered that there is no potential for in-combination effects with the Proposed Works. **No potential for in-combination effects.**
Creation of an international container terminal capable of simultaneously accommodating two container ships with a capacity in the range of 500 - 2000	18km	Fife Council	Marine Licence Application - (n/a)	Pre-application	The proposal is for the development of a container port at Rosyth. The site is adjacent to the Firth of Forth SPA and dredging within the Firth of Forth itself would be required. The proposal went through public local inquiry in 2012 and revised Harbour Revision Orders were submitted in 2013. In response to this, an application for a Marine Licence for all in-estuary works was initiated by production of a scoping report. However, a Marine Licence was not submitted, although the terminal may still be under consideration for

Project/Plan Application Name	Approximate Distance from Kincardine Bridge	Council	Planning Application and/or Marine Licence Reference Number	Status or Decision	Description of the Project/Plan and Potential for In-Combination Effects
Twenty-foot Equivalent Units (TEU) *Rosyth, Fife.*					development. The revised Harbour Revision Orders requires a successful application for a Marine Licence to allow it to proceed. An HRA is required to accompany that application. No licence has been submitted and it is therefore not possible to determine what, if any, LSEs or adverse effects on European sites may occur. In addition, no timescale is available for further development of this Marine Licence. **An in-combination assessment is not possible at this time.**
Construction and Maintenance Works - Forth Road Bridge, Forth *Forth Road Bridge, Forth.*	21.4km	City of Edinburgh Council	Marine Licence Applications – (05568/ 00008903/ 00009122/ 00009380)	Granted	Marine Licence granted in April 2021 for maintenance works to the Forth Road Bridge (FRB). The FRB crosses over the Firth of Forth SPA/Ramsar and the Forth Islands SPA and an HRA was undertaken. LSE resulting from disturbance to qualifying interests of all designated sites was identified, however with the application of mitigation measures the assessment concluded no AESI on any designated site. The works on the FRB may be concurrent with the Proposed Works. However, the bridges occupy different locations within the Firth of Forth (notably Kincardine is much further inland) and the availability of different supporting habitats within areas adjacent to the bridges are

Project/Plan Application Name	Approximate Distance from Kincardine Bridge	Council	Planning Application and/or Marine Licence Reference Number	Status or Decision	Description of the Project/Plan and Potential for In-Combination Effects
					therefore quite different; for example saltmarsh and mudflats habitats are prominent within proximity of the Kincardine Bridge, with open water and rocky shores being more prevalent within proximity of the FRB. As such, disturbance events to qualifying interests of the SPA/Ramsar are unlikely to affect the same species therefore potential for significant disturbance and or displacement to qualifying interests is unlikely. Furthermore, with the implementation of mitigation identified within the HRA to safeguard the Firth of Forth SPA and Ramsar site (and the Forth Islands SPA), it is considered that there is no potential for in-combination effects with the Proposed Works. **No potential for in-combination effects.**
Water injection maintenance dredging - Grangemouth and Leith Locks *Grangemouth Locks, Grangemouth and Leith Locks, Leith.*	4.2km and 35.4km	Falkirk Council and City of Edinburgh Council	Marine Licence Application – (00008842)	Application	A Marine Licence application has been submitted for Water Injection Dredging (WID) of engineered surfaces within Forth Ports jurisdiction e.g. Grangemouth and Leith locks and dock entrances. The works will include flushing the agitated material back into the estuary, from where it originated. The site at Grangemouth has been previously dredged (periodic maintenance), under licence, to maintain safety of navigation. The proposed start date stated in the application was 10/08/2020 with a proposed completion

Project/Plan Application Name	Approximate Distance from Kincardine Bridge	Council	Planning Application and/or Marine Licence Reference Number	Status or Decision	Description of the Project/Plan and Potential for In-Combination Effects
					date of 09/08/2023. No detrimental impacts to the surrounding environment were identified. Furthermore, Forth Ports do not foresee any negative impacts from this work based on the results of analysis of sediment samples from recent licence applications. Dredging would be expected to be carried out over approximately three to four days during each campaign as part of the routine maintenance at the locks. The proposal is small scale and dredging activities will be short-term nature over the period for which the licence is granted. Furthermore, as dredging has been undertaken previously, and is ongoing as part of maintenance, it is considered that qualifying interests of the European sites will be habituated to these activities and the works will be no more disturbing than background levels. It is therefore considered that there is no potential for in-combination effects with the Proposed Works. **No potential for in-combination effects.**

5.3 Assessment of the Firth of Forth SPA and Firth of Forth Ramsar

5.3.1 A total of seventeen projects were identified for inclusion in the in-combination assessment (Table 8). Of these projects, the A985 Kincardine Bridge Refurbishment: Piled Viaduct Replacement Scheme is particularly noteworthy. The scheme is inherently linked to the Proposed Works, insofar as the SPV that is being repaired as part of the Proposed Works is scheduled for replacement to commence in 2022. The required working area for the Proposed Works utilises a small area of saltmarsh under and adjacent to the SPV which will be covered by a larger raised working platform which will be put in place for the duration of the construction of the A985 Kincardine Bridge Refurbishment: Piled Viaduct Replacement Scheme. This raised working platform will result in long-term impacts for the saltmarsh (Transport Scotland, 2020a, 2020b), although these will be fully mitigated by the measures and management plan proposed for that scheme.

5.3.2 It is acknowledged that there is likely to be some minor localised deterioration to the saltmarsh as a result of the Proposed Works, however the working methods will mitigate for any long-term damage that would otherwise compromise the conservation objectives of the SPA and Ramsar sites. The low impact and small-scale nature of the Proposed Works will therefore also not jeopardise the mitigation proposed for the A985 Kincardine Bridge Refurbishment: Piled Viaduct Replacement Scheme (Transport Scotland, 2020a, 2020b).

5.3.3 An application for a 7-Year Marine Licence for future maintenance works for the Kincardine Bridge is currently in development. An HRA is under development for these works and potential in-combination effects with the SPV Emergency Works will be fully assessed within that document.

5.3.4 In summary, no projects or plans were identified that have the potential to act in-combination with the Proposed Works to result in a cumulative effect on the Firth of Forth SPA and Ramsar site.

5.3.5 As a result, it is concluded that there are no in-combination effects on the Firth of Forth SPA and Ramsar site.

6 Summary and Conclusions

6.1 Screening Assessment

6.1.1 Relevant European and Ramsar sites were selected by identifying ecological connectivity and the potential effects pathways from the project, particularly with regards to disturbance. Following further assessment of potential effects pathways from the Proposed Works, three sites were identified to be considered within the screening: Firth of Forth SPA, Firth of Forth Ramsar and River Teith SAC.

6.1.2 Following the screening, it was concluded that the Proposed Works have the potential to result in LSEs on qualifying interests of the Firth of Forth SPA and Ramsar site, therefore there was a requirement to progress to Stage Two (AA) for these two sites. No LSEs were identified on the River Teith SAC and therefore there was no requirement for further assessment of this site.

6.1.3 An assessment of the Proposed Works in combination with other plans and projects was undertaken following screening. No projects or plans were identified that have the potential to act in-combination with the Proposed Works to result in a cumulative effect on the Firth of Forth SPA and Ramsar site.

6.2 Appropriate Assessment

6.2.1 Implications for the Firth of Forth SPA and Firth of Forth Ramsar's conservation objectives were avoided through application of mitigation measures.

6.2.2 Although a precautionary approach has been taken in relation to the anticipated programme and methods for the Proposed Works included in this HRA, the Contractor or BEAR Scotland may identify requirements to amend these, for example due to bad weather delaying activities, or improved methods. If Proposed Works do change in nature or timing then a no worse environmental test will be undertaken, and NatureScot and/or Marine Scotland (as appropriate) will be consulted to confirm the protection of European and Ramsar sites is assured and the conclusions of the HRA remain valid.

6.2.3 With mitigation in place it is concluded that there will be no implications for the conservation objectives of the Firth of Forth SPA and Ramsar sites from Proposed Works as described within this HRA. There will therefore be no AESI for the sites, either alone or in combination with other plans and projects.

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