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A985 Kincardine Bridge Refurbishment: Piled Viaduct Replacement

Habitats Regulations Appraisal

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1 Introduction

1.1 Background

1.1.1 Jacobs UK Limited (hereafter referred to as 'Jacobs') has been appointed by Transport Scotland to undertake an environmental assessment, including a Habitats Regulations Appraisal (HRA), for the A985 Kincardine Bridge Refurbishment: Piled Viaduct Replacement scheme (hereafter referred to as the 'proposed scheme').

1.1.2 The proposed scheme is located at the southern end of the Kincardine Bridge within Falkirk Council area. The Kincardine Bridge crosses the Firth of Forth between Higgins Neuk in Falkirk Council area and the town of Kincardine in Fife Council area (Figure 1). As part of the proposed scheme the existing piled viaduct (Photograph 1) will be demolished and replaced with a five-span structure of similar appearance to the adjacent spans of the existing Kincardine Bridge. A temporary bridge will be erected during construction to maintain traffic flow in both directions, except when work requires single lane or full closure of the bridge during limited periods.

1.1.3 The proposed scheme is not directly connected with, or essential for, the management of any European or Ramsar site.

Photograph 1: Kincardine Bridge (Showing Existing Piled Viaduct)

1.2 The Habitats Directive and European/Ramsar Sites

1.2.1 The EU Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (hereafter referred to as the Habitats Directive) was adopted in 1992, and the latest amendments to the directive were published on 13 May 2013. The primary aim of the Habitats Directive is to promote the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species listed in the Annexes to the Directive at a favourable conservation status. It also introduces robust protection for those habitats and species of European importance.

1.2.2 The Habitats Directive includes, under Article 3, provision for the designation of Special Areas of Conservation (SACs) for habitats listed on Annex I and for species listed on Annex II. Special Protection

Areas (SPAs) are classified under Article 4 of the Birds Directive (Directive 2009/147/EC on the conservation of wild birds (codified version of Directive 79/409/EEC)). Together SACs and SPAs make up the Natura 2000 network of nature protection areas within the EU. The Habitats Directive provides protection for SPAs classified under the Birds Directive, as well as SACs (Section 2: Requirement for HRA).

1.2.3 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 Natura 2000 network. Most Ramsar sites in Scotland are either designated SPAs or SACs (Scottish Natural Heritage (SNH) 2018a) although not always sharing the same qualifying interests.

1.3 Structure of this Report

1.3.1 This HRA fulfils the requirements of Article 6(3) of the Habitats Directive and covers the first two stages of the HRA process:

- Stage One (Screening): The outcome of the assessment and identification of Likely Significant Effects (LSEs) from the proposed scheme (Section 4: Stage One (Screening)); and
- Stage Two (Appropriate Assessment): The assessment of the project's implications for European/Ramsar sites in view of the sites' conservation objectives to ascertain that the integrity of the sites would not be adversely affected (Section 5: Stage Two (Appropriate Assessment)).

1.3.2 The other stages of the HRA process (Alternative Solutions or Imperative Reasons of Overriding Public Interest (IROPI)) are briefly described in Section 2.2 (The HRA Process). These stages are required under article 6(4) of the Habitats Directive where preliminary investigations reach negative conclusions and consent from the competent authority is still sought.

1.3.3 An assessment of the proposed scheme in combination with other plans and projects is provided in Section 6 (In-Combination Assessment).

1.3.4 Details of designated sites discussed within this report are presented in Appendix A (European and Ramsar Site Details) and detailed survey data which has been used to inform the assessment is presented in Appendix B (Bird Surveys). Screening matrices for these designated sites are presented in Appendix C (Screening Matrices) to be read in conjunction with Section 4 (Stage One (Screening)).

1.3.5 The following figures have been prepared to support this HRA, as follows:

- Figure 1 (Site Location and Proposed Scheme);
- Figure 2 (Existing Piled Viaduct);
- Figure 3 (Proposed Piled Viaduct - General Arrangement);
- Figure 4 (Temporary Diversion Structure - Indicative General Arrangement);
- Figure 5 (Ecological Designations);
- Figure B1 (Bird Survey Area) – to accompany Appendix B (Bird Surveys);
- Figure B2 (Through The Tide Count Survey Results) – to accompany Appendix B (Bird Surveys); and
- Figure B3 (Goose Roost Survey Results) – to accompany Appendix B (Bird Surveys).

1.4 Summary of the Proposed Scheme

1.4.1 The proposed scheme would incorporate:

- the demolition of the existing piled viaduct at the southern end of the Kincardine Bridge;

- replacement of the existing piled viaduct with a new five span structure of similar appearance to the adjacent spans of the Kincardine Bridge; and
- temporary construction works.

1.4.2 The existing piled viaduct at the southern approach of the Kincardine Bridge is approximately 80m in length (Figure 2). As part of the works it is proposed to demolish the existing piled viaduct at the southern approach and replace this with a five-span structure of similar appearance to the adjacent spans of the existing Kincardine Bridge (Figure 3). In order to maintain traffic flow, a temporary bridge would be constructed adjacent to the north-west side of the existing piled viaduct (Figure 4). The temporary bridge would connect to the approach road at the southern end of the Kincardine Bridge. The connection of the temporary bridge to the Kincardine Bridge would be made to the north-east of the piled viaduct. Works will be undertaken on the saltmarsh, below Mean High Water Springs (MHWS).

1.4.3 It is proposed that two-way traffic be maintained during construction, with the exception of limited periods of single lane working or full closure of the bridge for specific short-term duration activities. On completion of the proposed new piled viaduct structure, traffic will be diverted onto the new structure and the temporary bridge will be removed.

1.4.4 The construction phase for the proposed scheme is expected to be between 18 and 24 months in total (including site set-up, mobilisation and de-mobilisation/reinstatement).

1.4.5 Further information pertaining to the proposed scheme is presented in Section 3 (The Proposed Scheme).

1.5 Ecological Surveys, Consultation and Desk Study

1.5.1 To inform the environmental assessment of the proposed scheme, bird surveys were undertaken by suitably experienced Jacobs ecologists between April 2017 and April 2018. The survey methods and results are detailed in Appendix B (Bird Surveys), and the results pertaining to qualifying interests of the Firth of Forth SPA and Ramsar site have been used to inform this HRA.

1.5.2 Consultation was undertaken with SNH in July 2017 regarding bird survey methodology to inform the proposed works. It should be noted that Scottish Natural Heritage (SNH) changed name to NatureScot as of 24 August 2020. However, in this HRA the organisation is referred to as SNH. SNH confirmed that an HRA is required for the proposed works and that normally two years of survey data would be required to inform the appraisal, unless suitable contextual data corroborates a single year of data. A technical memorandum providing justification for a single year of survey was presented to SNH on 27 November 2018 and a response was received on 17 December 2018. SNH supported the conclusion that data recorded by Jacobs was appropriate and representative of the area and advised that further bird surveys are not required. Further consultation with SNH was undertaken in November 2019 to confirm whether any additional survey data would be required following programme changes. SNH confirmed that additional survey data would not be required as the survey data collected to inform the assessment is considered to have a five-year lifespan.

1.5.3 SNH were consulted in July 2020 on the draft HRA and accompanying appendices and figures. SNH provided feedback by email on 31 July 2020. In summary, comments included that the scope of the HRA is well defined and the Appropriate Assessment appears to be reasonable. SNH noted that this would be reviewed in detail when formally consulted on the proposal.

1.5.1 In addition, existing relevant literature and data was reviewed to inform this assessment, including:

- the Environmental Statement (ES) for the Upper Forth Crossing project (hereafter referred to as 2003 ES) (Scottish Executive 2003); and
- the Kincardine Bridge Refurbishment Environmental Review Report (2009) (hereafter referred to as 2009 ERR) (Jacobs 2009).

2 Requirement for HRA

2.1 Introduction

2.1.1 The Habitats Directive was transposed into British legislation via the Conservation (Natural Habitats &c.) Regulations 1994. For Scotland, the most recent such amendment was in 2012. Implementation of the species protection requirements of the Habitats Directive in Scotland is now through a combination of the Conservation (Natural Habitats &c.) Regulations 1994 (as amended for Scotland) (hereafter referred to as the Habitats Regulations), and the Conservation of Habitats and Species Regulations 2017 (in relation to reserved matters such as defence).

2.1.2 In the context of this appraisal, transport projects, such as the proposed scheme, are a matter devolved to the Scottish Government. 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.

2.1.3 The Habitats Regulations 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 candidate or potential SAC/SPA, or a Ramsar site), is likely to have a significant effect either individually or in combination with other plans or projects. HRA is the process, which includes an AA, whereby a Competent Authority comes to a conclusion as to whether there is no adverse effect on site integrity from a plan or project. HRA refers to the process that includes the Competent Authority's conclusions with respect to the AA test concerning site integrity, and the AA must be undertaken 'in view of the site's conservation objectives'. With respect to this HRA, the Competent Authority will be Transport Scotland.

2.2 The HRA Process

2.2.1 The HRA process comprises four main stages and 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.

2.2.2 If the assessment cannot ascertain that the proposal would not adversely affect site integrity and yet still 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 6(4) of the Habitats Directive. Compensatory measures *'should be considered only when the application of other safeguards, such as mitigation measures, is not sufficient'* (European Commission 2007).

2.2.3 The four stages of the HRA process (Diagram 1, (European Commission 2001)) 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 Interest (IROPI) and including, in certain circumstances, compensatory measures.

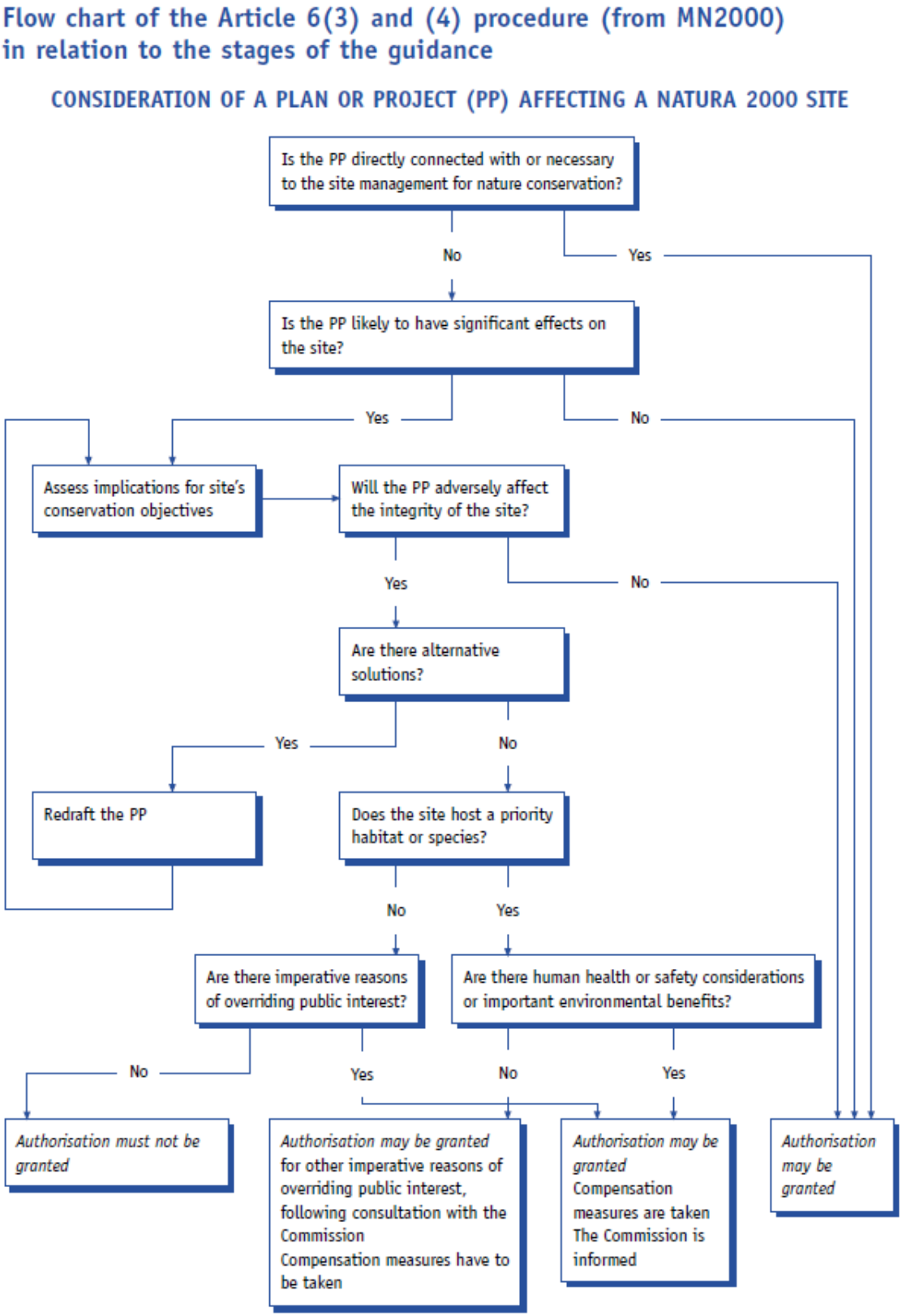


Diagram 1: The HRA process (European Commission 2001)

2.2.4 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

2.2.5 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.

2.2.6 The screening is a test of the 'likelihood' of effects occurring rather than a 'certainty' of effects occurring. In accordance with the Waddenzee Judgement [ECJ 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*.'

2.2.7 The People Over Wind Judgement (European Court of Justice C-323/17) 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*.' However, any measure that forms part of an application which can reasonably be regarded as 'standard practice' or 'best practice' or is provided as a legislative requirement to protect the wider environment and not specifically for European sites and have a high degree of certainty that the measure will be effective in avoiding an impact including on a European site, can be considered at the screening stage (SNH 2019).

Stage Two: Appropriate Assessment (AA)

2.2.8 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.

2.2.9 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 6(3) of the Habitats Directive the objective is to ascertain that the integrity of the site will not be adversely affected.

2.2.10 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).

2.2.11 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 Three: Alternative Solutions

2.2.12 Stage Three is when no adverse effect on site integrity (AESI) cannot be ascertained. It examines alternative ways of achieving the objectives of the project or plan, that may avoid an AESI on the European/Ramsar site. Guidance (European Commission 2007) indicates that all alternatives have to be analysed. This could involve alternative locations or routes, different scales or designs of development, or alternative processes (Highways England, Transport Scotland, Welsh Government and The Department for Infrastructure Northern Ireland 2020).

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

2.2.13 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".

2.3 Guidance

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

- Assessing Connectivity with Special Protection Areas (SPAs) (SNH 2016a);
- 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);
- Design Manual for Roads and Bridges: LA 115 Habitats Regulations assessment (Highways England, Transport Scotland, Welsh Government and The Department for Infrastructure Northern Ireland 2020);
- Communication from the Commission on the Precautionary Principle (European Commission 2000b);
- Guidelines on the Implementation of the Birds and Habitats Directives in Estuaries and Coastal Zones (European Commission 2011);
- Habitats Regulations Appraisal (HRA) on the Firth of Forth: A Guide for developers and regulators (SNH 2016b);
- Habitats Regulations Appraisal of Plans: Guidance for Plan-making Bodies in Scotland, Version 3.0 January 2015 (David Tyldesley and Associates 2015);
- SNH Website: Habitats Regulations Appraisal (HRA) (SNH 2019);
- Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (European Commission 2000a); and
- Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (European Commission 2018).

3 The Proposed Scheme

3.1 Existing Conditions

Site Location and Context

3.1.1 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.

3.1.2 The A985 connects to the A876 South Approach Road at the Higgins Neuk Roundabout which lies immediately to the south-west of the Kincardine Bridge. The A876 extends north from the Higgins Neuk Roundabout and crosses the Firth of Forth on the Clackmannanshire Bridge.

3.1.3 The piled viaduct is located at the southernmost extent of the Kincardine Bridge. The location of the proposed scheme and the extent of the land made available for construction of the proposed scheme is shown on Figure 1.

3.1.4 The Firth of Forth SPA, Ramsar site and Site of Special Scientific Interest (SSSI) cover the intertidal area and saltmarsh habitats within and adjacent to the proposed scheme (Figure 5).

3.2 Procurement

3.2.1 It is anticipated that the proposed scheme would be procured by means of a Transport Scotland model document contract. Under the terms of this contract type, the design of the replacement piled viaduct structure is undertaken by Transport Scotland and the Contractor would undertake both the design of the temporary works and construction of the proposed scheme.

3.2.2 The Contractor's design of the temporary works and construction of the proposed scheme must be within the constraints imposed by the Environmental Impact Assessment (EIA) Report (Jacobs 2020) and within this HRA. Design changes will be subject to environmental review to ensure compliance with environmental commitments and mitigation to safeguard the Firth of Forth SPA/Ramsar site and other ecological features.

3.3 Description of the Proposed Scheme

3.3.1 The location of works, including and the extent of the land made available for construction, is shown on Figure 1 and the section of the piled viaduct to be replaced is shown on Figure 2. The existing piled viaduct is a reinforced concrete structure which forms the southernmost approach to the existing Kincardine Bridge and extends approximately 80m from the south bank across the intertidal area of the Firth of Forth. It consists of five sections, each spanning approximately 15m, separated by expansion joints. These sections are supported by a substructure consisting of transverse beams supported by reinforced concrete piles. The piles extend approximately 15m through alluvial material to gain support from a layer of gravel and also extend upwards to support the transverse beams at approximately 4.5m above ground level. The piled viaduct is currently supported on secondary propping supports. The structure and props exhibit signs of ongoing deterioration which is detrimental to the residual life of the structure.

3.3.2 The parapets on the existing piled viaduct comprise a series of panels spanning between vertical metal support posts. Reinforced concrete posts are situated at the pier positions. Temporary 'Varioguard' safety barriers are located between the carriageway and the footway.

3.3.3 The proposed scheme includes the construction of a new structure to completely replace the existing piled viaduct. The proposed general arrangement and phasing of construction works is shown on Figures 3 and 4). The piled viaduct replacement structure would comprise the following elements:

- A deck formed using in situ (cast on site) reinforced concrete beams with curved soffits. The deck would be supported at the north end by a new reinforced concrete pier on piled supports, independent from and adjacent to the existing pier at the adjacent 15m span of the Kincardine Bridge, and elsewhere by piled reinforced concrete piers of similar appearance to the existing piers of the adjacent 15m spans of the Kincardine Bridge.
- Large diameter bored cast in situ concrete piles bearing onto bedrock to support the structure.
- A new permanent barrier to replace the temporary 'Varioguard' safety barriers over the length of the piled viaduct replacement.
- The existing parapet panels would be re-erected on the new structure where possible. Where existing parapets panels are not suitable for re-erection, new replacement parapets which resemble the design and materials of the existing parapets would be provided. The refurbished/recreated panels would be installed as a pedestrian parapet on the piled viaduct replacement structure. The replacement reinforced concrete posts (pilasters) which are situated at the pier positions would match the design and materials of the originals.
- The existing lamp posts would be retained, refurbished and installed on the piled viaduct replacement structure.
- Pedestrian footways adjacent to the northbound and southbound carriageway.

3.3.4 A new drainage system would be installed in the proposed piled viaduct replacement. The drainage would be carried to the south end of the piled viaduct replacement structure using combined kerb drainage units. It is proposed that the drainage would then tie into the existing drainage network which outfalls into the existing Sustainable Drainage System (SUDS) pond located at Higgins Neuk Roundabout.

3.3.5 Pollution prevention measures following current best practice, legislation and guidance will be adhered to during construction of the proposed scheme. These will include following best practice construction methods (CIRIA 2015) including the use of appropriate pollution controls (i.e. Guidance for Pollution Prevention (GPPs)), such as construction drainage, a strict re-fuelling protocol and removal of all loose materials from the intertidal area. Further details of pollution prevention measures can be found in Chapter 7: Road Drainage and the Water Environment of the EIA Report. These will be committed to through contract requirements identified in the procurement process.

3.4 Programme of Works

3.4.1 This section contains an indicative programme of works and construction methodology for the proposed scheme. As stated in Section 3.2, the Contractor would undertake the design of the temporary works and construction of the proposed scheme within the constraints imposed by the EIA Report (Jacobs 2020) and within this HRA.

3.4.2 The Contractor will prepare a programme for the construction of works, which will be approved by Transport Scotland's representative on site. Although the exact programme for the construction works will be determined by the Contractor, a programme of between 18 and 24 months is estimated. Habitat re-instatement and management commitments may continue after this timeframe.

3.4.3 The Contractor will be required to adhere to standard construction hours within the Falkirk Council boundary as follows:

- Monday to Friday: 08:00 to 19:00
- Saturday: 08:00 to 13:00

- Sunday: no works to be audible at the site boundary.

3.4.4 It is anticipated that some work would be required outwith these hours for exceptional activities (including changes to traffic management layouts and short-term overnight closures of Kincardine Bridge) subject to agreement with Transport Scotland, Falkirk Council and Fife Council.

3.4.5 It is anticipated that construction would not commence before summer 2021 (subject to completion of statutory procedures) and the overall construction period is expected to be between 18 to 24 months.

3.4.6 Following the advanced works, the indicative construction phasing of construction activities is as follows:

- mobilisation/site establishment;
- construction of temporary bridge structure;
- demolition of existing piled viaduct;
- construction of piled viaduct replacement;
- removal of temporary bridge structure; and
- reinstatement.

Mobilisation and Site Establishment

3.4.7 As noted in paragraph 3.4.1 this section contains an indicative construction methodology. The site compound would be located to the east of the existing SUDS pond and accessed from the existing bellmouth off the Higgins Neuk Roundabout. The bellmouth would have to be suitably widened to accommodate large plant and delivery vehicles entering and exiting the site compound simultaneously.

3.4.8 A temporary access to the site from the north (Clackmannanshire Bridge) would be located directly off the A876, prior to the roundabout. Access to the site from the south would be from the site compound at the SUDS pond via a track constructed parallel to the south of the approach embankment. These tracks on both the north and south sides would be formed of geotextile matting and predominately crushed rock. The existing drainage channel that runs along the south side of the approach embankment would be temporarily realigned to accommodate the temporary access track and a temporary raised working platform.

3.4.9 A detailed construction drainage design shall be developed by the Contractor. This should comprise a closed-loop system, to ensure run-off or spillages do not enter the intertidal habitat surrounding the site and should pump any collected water within excavations or isolated works to appropriate treatment facilities (likely comprising a proprietary treatment system and dosing system and supporting header tanks to store excess capacity).

Construction of the Temporary Bridge Structure

3.4.10 The replacement of the existing piled viaduct is proposed to be undertaken with traffic diverted over a temporary bridge structure adjacent to the north-west side of the existing piled viaduct. The temporary structure shall meet a minimum carriageway width of 7.3m between kerbs to maintain two-way traffic during construction, with the exception of limited periods of single lane working or full closure of the bridge for specific short-term duration activities. Figure 4 shows the indicative temporary bridge structure.

3.4.11 The temporary alignment is proposed to provide a minimum 5m clearance to the existing piled viaduct to permit demolition of the existing piled viaduct and construction of the replacement structure. Sheet piling or a similar protective measure would be provided between the temporary alignment and the existing piled viaduct during the construction of the piled viaduct replacement structure.

3.4.12 Following the installation of the sheet piling, the temporary raised working platform to the north of the existing piled viaduct would be constructed to facilitate the construction of the temporary bridge. A geotextile separator would be placed directly on the saltmarsh before construction of the temporary working platform. The geotextile separator would be required to prevent the loss of the temporary working platform material into the saltmarsh.

3.4.13 The foundations for the temporary bridge is proposed to comprise a number of reinforced concrete pile caps at working platform level supported on concrete piles. The piles would be constructed by boring through the temporary working platform and approximately 30m to the bedrock. The construction of the temporary bridge structure would involve boring and casting approximately 90 reinforced concrete piles with rock sockets. Reinforced concrete pile caps would then be constructed on top of the piles.

3.4.14 The connection of the temporary bridge to the existing Kincardine Bridge is proposed to be made onto the existing 15m spans to the north-east of the piled viaduct (Figure 4). This would necessitate the removal of the reinforced concrete posts (pilasters), parapet panels, and the lamp posts between the 2nd and 5th 15m spans from the south-west to allow traffic to cross between the temporary and permanent structures.

3.4.15 The temporary bridge would need to be supported by a temporary support structure which would bear onto pile caps. The temporary support structure could be in the form of proprietary steel tower systems or the deck could be landed directly on bearers on the pile caps. The temporary deck could comprise a proprietary modular system.

3.4.16 Bridging plates and temporary surfacing would be installed at the tie-in between the temporary bridge structure and the existing Kincardine Bridge (Figure 4).

Demolition of Existing Piled Viaduct

3.4.17 Whilst the remainder of the existing bridge would remain open to traffic during construction operations, traffic would be diverted over the temporary bridge to the north of the existing piled viaduct to allow for the demolition of the piled viaduct and construction of the replacement structure. It is anticipated that full closure would only be required for isolated short periods to alter the carriageway alignment at the tie-in locations and could occur during a night-time closure to minimise disruption to traffic.

3.4.18 A temporary working platform would be constructed to the south of the existing piled viaduct. As for the temporary raised working platform to the north of the piled viaduct, a geotextile separator would be placed directly on the saltmarsh before construction of the temporary works platform.

3.4.19 The parapet panels on the existing piled viaduct are proposed to be removed and fully inspected to determine which would be refurbished. The lamp posts would be removed and stored for use on the replacement piled viaduct.

3.4.20 The demolition of the existing piled viaduct is proposed to involve the use of mechanical heavy cutting equipment such as a wire saw. Netting or some form of collection would be installed for the demolition debris. It is proposed that the existing substructure would be removed to a minimum of 1m below existing ground level and disposed of at an appropriate facility off-site.

3.4.21 The existing temporary propping structure would be removed during demolition of the existing piled viaduct. The Contractor will be required to develop a safe demolition sequence for the existing piled viaduct and the temporary propping structure.

Construction of Piled Viaduct Replacement Structure

3.4.22 The piles to support the new structure are proposed to be constructed by boring into the working platform plus approximately 30m into the ground and the bedrock. A rock socketed bored pile with

temporary casing within the superficial deposits could be used. The construction would involve boring and casting 34 reinforced concrete piles with rock sockets.

3.4.23 The existing piles could initially be cut down to a level where they could support the deck formwork. Sheet piling could be installed to form caissons around each individual pile cap and abutment base whilst the pile caps are being constructed. Formwork would then be erected within the caissons to cast the pile caps and abutment base and propping of the sheet piling may be required. The piers would then be constructed from the footings. Bespoke formwork is required due to the unique geometrical shape of the in-situ reinforced concrete leaf piers.

3.4.24 As the new superstructure is of cast reinforced concrete cast on-site (in situ), bespoke temporary falsework would be provided to support the wet concrete. This could be supported off the existing piled viaduct piles and proposed pile caps. Upon the concrete reaching the desired strength, backfilling activities would commence to the level of the parapet support slabs. These could then be constructed using conventional concreting techniques.

Demolition of Temporary Bridge and Completion of Replacement Structure

3.4.25 On completion of the new piled viaduct, traffic will be diverted onto it and the temporary bridge will be removed. Full bridge closure would be required. All temporary access measures provided to facilitate construction of the new piled viaduct and temporary bridge structure will be removed on completion of construction with any piles cut down to at least 1m below ground level.

3.4.26 The area surrounding the pile will be locally excavated, with that excavated material then reinstated as backfill.

Reinstatement

3.4.27 On completion of the works all access tracks and working platforms will be removed in their entirety.

Decommissioning

3.4.28 The Design Working Life (DWL) for the replacement structure is ≥120 years for all work except replaceable structural parts (expansion joints, safety barriers and waterproofing systems) which have a DWL of 50 years.

3.4.29 As there are no plans for it to be decommissioned, decommissioning will not be assessed. Should decommissioning be required however, a detailed assessment would be undertaken to identify any potential environmental impacts and mitigation prior to decommissioning.

4 Stage One (Screening)

4.1 Introduction

4.1.1 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.

4.1.2 Details of the project design are discussed in Section 3 (The Proposed Scheme) and other plans/projects that in combination have the potential for LSE on European/Ramsar sites are discussed in Section 6 (In-Combination Assessment).

4.1.3 As stated in Section 1.1 (Background), the proposed scheme is not directly connected with or essential for the management of any European or Ramsar site.

4.2 European Sites with Potential Effects from the Proposed Scheme

4.2.1 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.

4.2.2 SNH provided guidance in response to the Scoping Report (Jacobs 2018) for the proposed scheme, particularly in regard to designated sites to be included within this HRA.

4.2.3 For the assessment of the proposed scheme, relevant European and Ramsar sites were identified by looking for potential effect pathways, particularly with regards to disturbance and pollution. Following consultation with SNH (SNH 2018b), and further assessment of potential source-receptor pathways from the proposed scheme, three sites were identified to be considered within the screening (Figure 5), namely:

- Firth of Forth SPA;
- Firth of Forth Ramsar; and
- River Teith SAC.

4.2.4 The proposed scheme falls within the Firth of Forth SPA and Ramsar site and is 20km downstream of the River Teith SAC. No source-receptor pathways to other European/Ramsar sites could be identified and therefore there is no potential for LSEs on any other European/Ramsar site. Of note, the Firth of Forth SPA and Ramsar sites cover almost entirely the same area, with the site boundaries in the context of the proposed scheme being identical (Figure 5).

4.2.5 Qualifying interests, conservation objectives and site vulnerabilities are presented in Table 1 below, and in Appendix A (European and Ramsar Site Details).

Table 1: European and Ramsar Sites with Potential for LSEs from the Proposed Scheme

Area (ha)	Qualifying Interest	Conservation Objectives	Identified Feature Pressures (Scotland's Environment 2018)
UK9004411 / 8499 Firth of Forth SPA (SNH 2018c)			
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*) • 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*)	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 • 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 2018)
	• Scaup (*Aythya marila*) • Velvet scoter (*Melanitta fusca*) • Wigeon (*Mareca penelope*) (formerly *Anas penelope*)		
UK13017 / 8424 Firth of Forth Ramsar (SNH 2018d; JNCC 2008)			
6313.68	The site qualifies under Ramsar criterion 5: Assemblages of international importance: Species with peak counts in winter: • 72281 waterfowl (5-year peak mean 1998/1999-2002/2003) The site qualifies under Ramsar criterion 6: • Species/populations occurring at levels of international importance. Qualifying interests/populations with peak counts in spring/autumn: • Pink-footed goose • Shelduck • Redshank • Turnstone Qualifying interests/populations with peak counts in winter: • Slavonian grebe • Goldeneye • Knot • Bar-tailed godwit	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
UK0030263 / 8367 River Teith SAC (SNH 2018e)			
1289.33	The site is designated for the following qualifying interests: • Sea lamprey (*Petromyzon marinus*) • Brook lamprey (*Lampetra planeri*) • River lamprey (*Lampetra fluviatilis*) • Atlantic salmon (*Salmo salar*)	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	• forestry operation • invasive species • water quality • water management

Area (ha)	Qualifying Interest	Conservation Objectives	Identified Feature Pressures (Scotland's Environment 2018)
		• structure, function and supporting processes of habitats supporting the species • no significant disturbance of the species	

*species also an assemblage qualifier.

4.3 Screening

4.3.1 The construction and operational phases of the proposed scheme could result in a variety of potential impacts which could directly or indirectly affect European/Ramsar sites such as:

- habitat loss and/or fragmentation;
- disturbance (e.g. noise, vibration, movement and lighting);
- changes in water quality (e.g. pollution); and
- changes in coastal processes (e.g. hydrology and sedimentation) leading to indirect habitat loss.

4.3.2 The potential impacts were used to identify LSEs on the European/Ramsar sites in terms of the sites' conservation objectives from the construction and operation activities of the proposed scheme, presented in Section 3 (The Proposed Scheme). The screening process considered:

- potential for effects pathways between the site and the proposed scheme during the construction and operating processes;
- 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 6: In-combination Assessment).

4.3.3 Table 2 provides the screening of European/Ramsar sites with potential for LSE from the construction and/or operation of the proposed scheme.

4.3.4 To inform the screening, survey data and the ecological characteristics of qualifying interests has been taken into account. Species that have not been recorded within the survey area and that are considered to be associated with habitats outwith the inner Forth have been considered separately in the screening (Table 2).

Table 2: Screening

Conservation Objectives	Distance/Connectivity to Proposed Scheme	Qualifying Interests (SNH SiteLink) (SNH 2018c, 2018d, 2018e)	Potential Effects and Commentary	Screening Conclusion
UK9004411 / 8499 **Firth of Forth SPA**				
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 • No significant disturbance of the species	The proposed scheme is within the Firth of Forth SPA at Kincardine.	• Bar-tailed godwit*, non-breeding • Golden plover*, non-breeding • Sandwich tern, passage • Knot*, non-breeding • Pink-footed goose*, non-breeding • Redshank*, non-breeding • Shelduck*, non-breeding Waterfowl assemblage (non-breeding)	<u>Disturbance (Noise, Vibration and Visual)</u> There is potential for disturbance to qualifying interests of the SPA which are found within the inner Forth, during the construction of the proposed scheme from temporary lighting, piling works, construction traffic, demolition of the existing piers and decommissioning of the temporary bridge. 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 Surveys). These species, in addition assemblage qualifying interests found within the inner Forth, and Sandwich tern on passage through the area, have the potential to be disturbed during the construction of the proposed scheme. The operational disturbance of the proposed scheme is unlikely to differ from current disturbance experienced at the existing Kincardine Bridge.	LSEs identified during construction only. Requirement to progress to AA (HRA Stage 2)
			<u>Habitat Loss</u> Temporary loss of 3.24ha of habitat within the SPA, of which up to 2.99ha comprises saltmarsh habitat, during construction. Due to the compression of sediments under the working platform the ground level will be lowered and could lead to natural geomorphic processes being compromised. This could affect the natural recovery of the saltmarsh in this location. Construction 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. Bar-tailed godwit, golden plover, knot, pink-footed goose, redshank and shelduck have been recorded within the Kincardine Bridge area and utilise saltmarsh habitat over winter. These species, along with assemblage qualifying interests which rely on saltmarsh have the potential to be impacted by the temporary habitat loss as a result of the construction of the proposed scheme. The footprint of the proposed scheme, once operational, will require slightly less land take from the SPA (0.012ha) than the existing structures as fewer piers will be required for the support of the viaduct. There would be a minor increase in the potential for pioneer intertidal habitats (saltmarsh) to establish as a result of the proposed scheme in the long-term, although the effect of this change is unlikely to be discernible given the very localised nature of the change. In addition, surveys indicate that these species do not utilise the habitat directly beneath the footprint of the operational scheme (Appendix B: Bird Surveys).	LSEs identified during construction only. Requirement to progress to AA (HRA Stage 2)

Conservation Objectives	Distance/Connectivity to Proposed Scheme	Qualifying Interests (SNH SiteLink) (SNH 2018c, 2018d, 2018e)	Potential Effects and Commentary	Screening Conclusion
		• Turnstone, non-breeding • Slavonian grebe*, non-breeding • Red-throated diver*, non-breeding	<u>Disturbance (Noise, Vibration and Visual)</u> Surveys undertaken by Jacobs (Appendix B: Bird Surveys) did not record Slavonian grebe, red-throated diver or turnstone within the area around the Kincardine Bridge, which suggests that this species favours other areas within the SPA over winter. Furthermore, the presence of Slavonian grebe within the inner Forth is considered to be rare (SNH 2016b), and similarly both red-throated diver and turnstone favour habitats in the outer Forth. Disturbance to these species during construction is unlikely. The operational disturbance is unlikely to differ from current disturbance at the Kincardine Bridge.	No potential for LSE during construction or operation. AA (HRA Stage 2) is not required.
			<u>Habitat Loss</u> Turnstone, Slavonian grebe and red-throated diver do not rely on saltmarsh and mudflat habitats which represent the dominant habitats around the proposed scheme; red-throated diver and Slavonian grebe rely on open water habitats predominantly and turnstone rely on rocky/stony shores (SNH 2016b). The temporary bridge will extend into the saltmarsh habitats of the SPA, however open water habitats will not be disturbed or lost during construction. No loss of habitat used by these qualifying interests will result from the construction of the proposed scheme. There is considered to be no potential for LSE on Slavonian grebe, red-throated diver or turnstone from loss of SPA habitat during operation.	No potential for LSE during construction or operation. AA (HRA Stage 2) is not required.
		All species, including assemblage	<u>Changes in Coastal Processes</u> Localised and temporary changes in estuary bed and shoreline morphology are associated with the temporary works of the proposed scheme; the temporary bridge structure and construction working areas are located within the saltmarsh and below MHWS. The presence of the temporary raised working platform will 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). Furthermore, as the saltmarsh has a naturally dynamic system of creeks the temporary changes are not likely to be significant for the site's conservation objectives. During operation there are likely to be very minor localised changes to hydrology and geomorphic processes, however any change is likely to be negligible as the piers have been positioned to replicate the existing structure. Scour and the effect on the rate of accretion/erosion of sediment would not be increased from the baseline conditions. Changes in coastal processes as a result of the construction and operation of the proposed scheme are considered to be negligible and having a *de minimis* effect and therefore there is no potential for a LSE.	No potential for LSE during construction or operation. AA (HRA Stage 2) is not required.

Conservation Objectives	Distance/Connectivity to Proposed Scheme	Qualifying Interests (SNH SiteLink) (SNH 2018c, 2018d, 2018e)	Potential Effects and Commentary	Screening Conclusion
			Changes in Water Quality Potential changes in water quality from pollution events (e.g. accidental spillage and construction runoff) during construction has the potential to have an indirect effect on qualifying interests of the SPA site through causing deterioration of saltmarsh and mudflat habitats, and thus the feeding resource for waders and waterfowl. However, best practice construction methods (CIRIA 2015) will be used including the use of appropriate pollution controls (i.e. Guidance for Pollution Prevention (GPPs)), such as construction drainage, a strict re-fuelling protocol and removal of all loose materials from the intertidal area. These measures are embedded within the proposed scheme design and are a legal obligation to be employed irrespective of the European designation of the site and are not specifically required to avoid LSE. Operational changes in water quality will not differ significantly from the existing conditions at the Kincardine Bridge; however, a slight beneficial impact is anticipated as a result of the additional runoff treatment embedded in the proposed design.	No potential for LSE during construction or operation. AA (HRA Stage 2) is not required.
UK13017 / 8424 Firth of Forth Ramsar				
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 proposed scheme is within the Firth of Forth Ramsar at Kincardine.	• Pink-footed goose • Shelduck • Redshank • Goldeneye • Knot • Bar-tailed godwit Waterfowl assemblage	Disturbance (Noise, Vibration and Visual) There is potential for disturbance to qualifying interests of the Ramsar which are found within the inner Forth, during the construction of the proposed scheme from temporary lighting, piling works, construction traffic, demolition of the existing piers and decommissioning of the temporary bridge. Pink-footed geese, shelduck, redshank, goldeneye, knot and bar-tailed godwit are all species associated with habitats within the inner Forth and have been recorded within the Kincardine Bridge area (Appendix B: Bird Surveys). These species, in addition assemblage qualifying interests found within the inner Forth, have the potential to be disturbed during the construction of the proposed scheme. The operational disturbance of the proposed scheme is unlikely to differ from current disturbance experienced at the existing Kincardine Bridge.	LSEs identified during construction only. Requirement to progress to AA (HRA Stage 2)

Conservation Objectives	Distance/Connectivity to Proposed Scheme	Qualifying Interests (SNH SiteLink) (SNH 2018c, 2018d, 2018e)	Potential Effects and Commentary	Screening Conclusion
			Habitat Loss Temporary loss 3.24ha of habitat within the Ramsar, of which up to 2.99ha comprises saltmarsh habitat, during construction. Due to the compression of sediments under the working platform the ground level will be lowered and could lead to natural geomorphic processes being compromised. This could affect the natural recovery of the saltmarsh in this location. Construction within the intertidal habitats (saltmarsh) may result in localised fragmentation/temporary loss of habitat for qualifying interests of the Ramsar, especially those which rely on saltmarsh as their primary habitat type over winter. Pink-footed geese, shelduck, redshank, goldeneye, knot and bar-tailed godwit have been recorded within the Kincardine Bridge area and utilise saltmarsh habitat over winter. These species, along with assemblage qualifying interests which rely on saltmarsh have the potential to be impacted by the temporary habitat loss as a result of the construction of the proposed scheme. The footprint of the proposed scheme, once operational, will require slightly less land take from the Ramsar (0.012ha) than the existing structures as fewer piers will be required for the support of the viaduct. There would be a minor increase in the potential for pioneer intertidal habitat (saltmarsh) to establish as a result of the proposed scheme in the long-term, although the effect of this change is unlikely to be discernible given the very localised nature of the change. In addition, surveys indicate that these species do not utilise the habitat directly beneath the footprint of the operational scheme (Appendix B: Bird Surveys).	LSEs identified during construction only. Requirement to progress to AA (HRA Stage 2)
		• Turnstone • Slavonian grebe	Disturbance (Noise, Vibration and Visual) Surveys undertaken by Jacobs (Appendix B: Bird Surveys) did not record Slavonian grebe or turnstone within the area around the Kincardine Bridge, which suggests that this species favours other areas within the Ramsar site over winter. Furthermore, the presence of Slavonian grebe within the inner Forth is considered to be rare (SNH 2016b), and similarly turnstone favour habitats in the outer Forth. Disturbance to these species during construction is unlikely. The operational disturbance is unlikely to differ from current disturbance at the Kincardine Bridge.	No potential for LSE during construction or operation. AA (HRA Stage 2) is not required.
			Habitat Loss Turnstone and Slavonian grebe do not rely on saltmarsh and mudflat habitats, which represent the dominant habitat types adjacent to the proposed scheme; Slavonian grebe rely on open water habitats predominantly and turnstone rely on rocky/stony shores (SNH 2016b). The temporary bridge will extend into the saltmarsh habitats of the Ramsar, however open water habitats will not be disturbed or lost during	No potential for LSE during construction or operation. AA (HRA Stage 2) is not required.

Conservation Objectives	Distance/Connectivity to Proposed Scheme	Qualifying Interests (SNH SiteLink) (SNH 2018c, 2018d, 2018e)	Potential Effects and Commentary	Screening Conclusion
			construction. No loss of habitat used by these qualifying interests will result from the construction of the proposed scheme.	
		All species, including assemblage	<u>Changes in Coastal Processes</u> Localised and temporary changes in estuary bed and shoreline morphology are associated with the temporary works of the proposed scheme; the temporary bridge structure and construction working areas are located within the saltmarsh and below MHWS. The presence of the temporary raised working platform will 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). Furthermore, as the saltmarsh has a naturally dynamic system of creeks the temporary changes are not likely to be significant for the site's conservation objectives. During operation there are likely to be very minor localised changes to hydrology and geomorphic processes, however any change is likely to be negligible as the piers have been positioned to replicate the existing structure. Scour and the effect on the rate of accretion/erosion of sediment would not be increased from the baseline conditions. Changes in coastal processes as a result of the construction and operation of the proposed scheme are considered to be negligible and having a *de minimis* effect and therefore there is no potential for a LSE.	No potential for LSE during construction or operation. AA (HRA Stage 2) is not required.
			<u>Changes in Water Quality</u> Potential changes in water quality from pollution events (e.g. accidental spillage and construction runoff) during construction has the potential to have an indirect effect on qualifying interests of the Ramsar site through causing deterioration of saltmarsh and mudflat habitats, and thus the feeding resource for waders and waterfowl. Best practice construction methods (CIRIA 2015) will be used including the use of appropriate pollution controls (i.e. Guidance for Pollution Prevention (GPPs)), such as construction drainage, a strict re-fuelling protocol and removal of all loose materials from the intertidal area. These measures are embedded within the proposed scheme design, and are a legal obligation to be employed irrespective of the designation and are not specifically required to avoid LSE. Operational changes in water quality will not differ significantly from the existing conditions at the Kincardine Bridge; however, a slight beneficial impact is anticipated as a result of the additional runoff treatment embedded in the proposed design.	No potential for LSE during construction or operation. AA (HRA Stage 2) is not required.

Conservation Objectives	Distance/Connectivity to Proposed Scheme	Qualifying Interests (SNH SiteLink) (SNH 2018c, 2018d, 2018e)	Potential Effects and Commentary	Screening Conclusion
UK0030263 / 8367 **River Teith SAC**				
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 • no significant disturbance of the species	Hydrologically connected to the proposed scheme. The SAC is located approximately 20km upstream of the proposed scheme.	• Sea lamprey • Brook lamprey • River lamprey • Atlantic salmon	<u>Disturbance (Noise and Vibration)</u> The proposed scheme is 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 EIA Report (Jacobs 2020). The Firth of Forth is a wide estuary (between 0.5-1km wide in the study area) and the proposed scheme is localised to the southern extent of the bridge, within the saltmarsh habitat which is only available to fish at high tide. The proposed works have the potential to cause disturbance during construction. Anthropogenic noise is known to cause behavioural (avoidance) and physiological (barotrauma - tissue injury due to rapid changes in pressure) effects on fish. A study in the Humber Estuary predicted, for the 'loudest' impact piling (2.1m diameter steel tubular pile and 400kJ hammer), distances of 20m for physical injury and 490m for avoidance behaviour in Atlantic salmon (Mason and Collett 2011). However, the effects vary among different species, with species without swim bladders (such as lamprey) likely to be least sensitive (Popper, Hawkins, Fay, Mann, Bartol, Carlson, Coombs, Ellison, Gentry, Halvorsen, Lokkeborg, Rogers, Southall, Zeddies and Tavolga 2014). Published guidelines on noise exposure (Popper et al. 2014) indicate that, for the most sensitive fish species exposed to a continuous noise, the risk of behavioural changes is high in the near field (10s metres), moderate in the intermediate field (100s metres) and low in the far field (1000s metres). It is also suggested that exposure to sound levels of 158 dB rms for 12 hours could result in a temporary threshold shift and continuous exposure to levels of 170 dB rms for 48 hours could cause recoverable injury. The potential for mortality is low for all fish species when exposed to a continuous noise. The construction of bored concrete piles, as proposed, will generate less noise and vibration than the alternative, driven piles (Daniels and Loven 2014). Typical source levels of over 240 dB re 1 µPa are reported from underwater impact piling operations (Bailey, Senior, Simmons, Rusin, Picken and Thompson 2010, Mason and Collett 2011) whereas source sound pressure levels of between 121.0 and 184.5 dB re 1 µPa have been reported during underwater pile drilling (boring) operations (Dazey, McIntosh, Brown and Dudzinski 2012). Additionally, standard working hours will be adhered to and night-time working will only be permitted for exceptional activities, therefore the period during which migratory fish are thought to be most active will be safeguarded. Furthermore, as 24-hour working is not anticipated as part of the works programme, there will be a period of time each 24-hour period, where there are no construction	No potential for LSE during construction or operation. AA (HRA Stage 2) is not required.

Conservation Objectives	Distance/Connectivity to Proposed Scheme	Qualifying Interests (SNH SiteLink) (SNH 2018c, 2018d, 2018e)	Potential Effects and Commentary	Screening Conclusion
			activities when qualifying interests can migrate through the area without any level of disturbance above that which is experienced already at the site. Given the lower noise levels produced by bored piling and the works programme, and that the duration of sheet piling operations is anticipated to be short, significant disturbance to migratory fish species is not anticipated. No potential for LSE from construction or operational disturbance is identified.	
			<u>Habitat Loss</u> No land-take from the SAC is required for the proposed scheme. 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 saltmarsh at the southern extent of Kincardine Bridge. 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). 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. No potential for LSE during construction or operation with regards to habitat loss is identified.	No potential for LSE during construction or operation. AA (HRA Stage 2) is not required.
			<u>Changes in Water Quality</u> The proposed scheme is located 20km downstream of the SAC. Potential changes in water quality from pollution events (e.g. accidental spillage and construction runoff) during construction is unlikely to have any effect on the SAC or its qualifying interests. Furthermore, best practice construction methods (CIRIA 2015) will be used including the use of appropriate pollution controls (i.e. Guidance for Pollution Prevention (GPPs)), such as construction drainage, a strict re-fuelling protocol and removal of all loose materials from the intertidal area to mitigate for any potential water quality impacts. These measures are embedded within the proposed scheme design and are a legal obligation to be employed irrespective of the European designation of the site and are not specifically required to avoid LSE. Operational changes in water quality will not differ significantly from the existing conditions at the Kincardine Bridge; however, a slight beneficial impact is anticipated as a result of the additional runoff treatment embedded in the proposed design.	No potential for LSE during construction or operation. AA (HRA Stage 2) is not required.
			<u>Changes in Coastal Processes</u> Localised and temporary changes in estuary bed and shoreline morphology are associated with the temporary works of the proposed scheme; the temporary bridge	No potential for LSE during construction

Conservation Objectives	Distance/Connectivity to Proposed Scheme	Qualifying Interests (SNH SiteLink) (SNH 2018c, 2018d, 2018e)	Potential Effects and Commentary	Screening Conclusion
			structure and construction working areas are located within the saltmarsh and below MHWS. The presence of the temporary raised working platform will 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). Furthermore, as the saltmarsh has a naturally dynamic system of creeks the temporary changes are not likely to be significant for the site's conservation objectives. During operation there are likely to be very minor localised changes to hydrology and estuarine geomorphic processes, however any change is likely to be negligible as the piers have been positioned to replicate the existing structure. Scour and the effect on the rate of accretion/erosion of sediment would not be increased from the baseline conditions (see Chapter 7: Road Drainage and the Water Environment of the EIA Report (Jacobs 2020)). Changes in coastal processes as a result of the construction and operation of the proposed scheme are considered to be negligible and having a *de minimis* effect and therefore there is no potential for a LSE.	or operation. AA (HRA Stage 2) is not required.

*species also an assemblage qualifier.

4.4 Screening Conclusion

4.4.1 The proposed scheme has the potential for LSEs on Firth of Forth SPA and Ramsar site, as identified from the screening in Table 2, and therefore an Appropriate Assessment (HRA Stage 2) is required.

4.4.2 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.

4.4.3 A screening matrix has been provided in Appendix C (Screening Matrices) for each site which summarises the Screening detailed above.

5 Stage Two (Appropriate Assessment)

5.1 Introduction

5.1.1 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 site, with respect to the site's structure and function, and its conservation objectives.

5.1.2 The approach adopted for this AA assesses the implications from the identified LSE for the conservation objectives of the site and then identifies measures to protect the site's integrity.

5.1.3 As stated in Section 1.5, bird surveys were undertaken by Jacobs between April 2017 and April 2018 to inform the environmental assessment of the proposed scheme. The survey results pertaining to qualifying interests of the Firth of Forth SPA and Ramsar are detailed in Appendix B (Bird Surveys). Overall, 19 qualifying interests of the Firth of Forth SPA and Ramsar sites were recorded within the survey area. The data have been used within the assessment, along with ecological requirements and habitat preferences of the qualifying interests, to provide commentary on the LSEs identified at Stage One (Screening) and enable specific appraisal of the proposed scheme with regard to the implications for the site's conservation objectives and the site integrity of the Firth of Forth SPA and Ramsar site.

5.2 Effects Pathways: Firth of Forth SPA and Ramsar Site

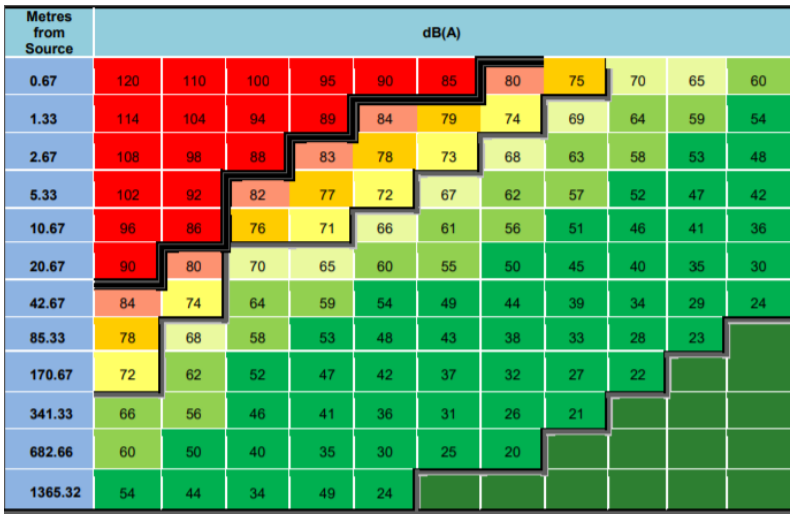
5.2.1 This section discusses effects pathways on the conservation objectives of the Firth of Forth SPA and Ramsar site. LSEs were identified on qualifying interests of the SPA and Ramsar site through disturbance and habitat loss during the construction phase (Stage One (Screening), Table 2).

Disturbance

5.2.2 Noise (including vibration) and visual (including lighting) disturbance from construction activities, especially during passage and over winter (September to March), has the potential to disturb qualifying bird species of the SPA and Ramsar site. This could lead to displacement of birds from areas used for foraging, loafing and overnight roosting, and subsequently additional energy expenditure and loss of condition.

5.2.3 For wetland birds, generally auditory disturbance of more than 70dB (as experienced at the bird) has the potential to elicit a high level disturbance effect (Cutts, Hemmingway and Spencer 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 construction activities will be greater than 70dB at source, however, attenuation can be achieved over a relatively short distance (Diagram 2). Therefore, it is likely that any potential for significant disturbance from noise will be limited to birds within close proximity of the works area.

5.2.4 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, Hemmingway and Spencer 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 construction 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, Hemingway and Spencer 2013)

Habitat Loss

5.2.5 The working area for construction will cover a footprint up to 3.87ha, of which 3.24ha falls within the SPA/Ramsar boundary. The works will result in temporary loss of 2.99ha of saltmarsh. This habitat will not be available to the qualifying bird species of the Firth of Forth SPA and Ramsar site during construction of the proposed scheme. The saltmarsh lost from the working area in total represents up to 2.5% of the saltmarsh recorded in the Firth of Forth (Haynes 2016). This may lead to localised habitat fragmentation and displacement of individuals. This habitat would be lost for the duration of construction, which is estimated to be between 18 and 24 months. Due to compression of the sediments under the working platform, 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.

5.3 Assessment Against the Conservation Objectives for Firth of Forth SPA and Ramsar Site

5.3.1 This section provides the assessment of the effects of the proposed scheme against the conservation objectives for the Firth of Forth SPA and Ramsar site (Tables 3 to 8). Screening demonstrates that both the Firth of Forth SPA and Ramsar site occupy the same area and exhibit considerable overlap in the species listed as qualifying interests. Ramsar sites do not have specific conservation objectives and thus the conservation objectives for the SPA are considered to be an appropriate proxy to facilitate the assessment. As all qualifying interests of the Ramsar site that have been screened in are also qualifying interests of the SPA, the assessment of the likely significant effects for AESI will be against the Firth of Forth SPA's conservation objectives.

5.3.2 Each qualifying interests of the SPA and Ramsar site that has been screened in has been assessed against their conservation objectives separately (Tables 3 to 7), whereas those that are only assemblage qualifiers are assessed as a group (Table 8). The following species are listed on the SPA and Ramsar site designation (those with an asterisk are also assemblage qualifiers of the SPA or Ramsar site):

- Bar-tailed godwit* (SPA and Ramsar site)
- Knot* (SPA and Ramsar site)
- Golden plover* (SPA)
- Sandwich tern (SPA)
- Pink-footed goose* (SPA and Ramsar site)

- Redshank* (SPA and Ramsar site)
- Shelduck* (SPA and Ramsar site)
- Goldeneye* (SPA and Ramsar site)

5.4 Mitigation

5.4.1 Mitigation measures aimed at avoiding or reducing the effects of the proposed scheme in order to avoid adverse effects on site integrity are detailed below and summarised in Tables 3 to 8.

5.4.2 Prior to construction the Contractor will develop a Construction Environmental Management Plan (CEMP), including an Ecological Management Plan, which will detail the mitigation to be implemented and how this will be monitored. The Ecological Management Plan will be developed in consultation with relevant stakeholders including SNH. The CEMP will be prepared and developed from the environmental commitments identified in the EIA Report (Jacobs 2020) and will include for example:

- Species Management Plans, to include a wetland bird management plan;
- details of proposed protection measures, including any required exclusion zones, to avoid any unnecessary encroachment into adjoining areas;
- monitoring to be undertaken;
- restrictions on the timing of construction works, for example during site clearance and main construction works; and
- appropriate watching briefs during construction.

5.4.3 Prior to construction a suitably qualified Ecological Clerk of Work(s) (ECoW) will be appointed by the Contractor and will be responsible for implementation of the Ecological Management Plan, including any advance mitigation works. An ecologist, acting on behalf of Transport Scotland, will check that the Contractor's ECoW is suitably qualified to undertake their role. The ECoW will:

- provide ecological advice over the entire construction programme;
- ensure mitigation measures as committed within the proposed scheme's EIA Report are implemented;
- and monitor the implementation of the mitigation measures during the construction phase to ensure compliance. Mitigation measures to protect qualifying interests will include noise and light control and visual screening as discussed below.

5.4.4 An ecologist, acting on behalf of Transport Scotland, will audit compliance with regards to the implementation of the CEMP and Ecological Management Plan, and will record the outcome of the mitigation commitments.

5.4.5 Monitoring of bird responses to construction activities will be undertaken. Surveys will follow an adapted methodology based on the wetland bird Through The Tide Count (TTTC) surveys and will be undertaken by an ecologist acting on behalf of Transport Scotland throughout the construction period. Should monitoring data identify significant changes in the distribution and number of birds, based on the professional experience of the ecologist, further mitigation will be proposed and discussed with SNH. Further mitigation could include: extending the "soft-start" process; amendments to lighting plans (see 5.4.6 below) and screening placements (see 5.4.9 below); and extending restrictions on works during severe winter weather to qualifying interests other than pink-footed geese (see 5.4.7 below).

5.4.6 A construction lighting plan and method statement will be developed by the Contractor. The plan will detail specific mitigation requirements, including but not 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. The lighting plan will take into account 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)). The construction lighting design will be developed specifically to prevent illuminating sensitive bird habitats adjacent to the bridge, particularly to the southeast of the piers. Where this is not possible the Contractor will agree any exceptions with the ECoW.

5.4.7 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 throughout the construction phase will be 08:00-19:00 (Monday to Friday) and 08:00-13:00 (Saturday), with exceptions for certain activities such as demolition of the existing piled viaduct and removal of the temporary bridge. Some working during the hours of darkness will likely be unavoidable during winter, therefore lighting will need to avoid illuminating sensitive bird habitats adjacent to the bridge. Lighting management will be detailed within a construction lighting plan, as discussed above. 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 2020)), working methods should be agreed with the ECoW before they proceed to protect roosting birds from additional physiological stress during harsh winter conditions.

5.4.8 Plant and personnel will be constrained to the working area, the footprint of which will be minimised as far as possible within the land made available to the Contractor. Temporary barriers will be in place to prevent access to areas outwith the works area which will minimise potential direct mortality and disturbance to qualifying interests located adjacent to this footprint.

5.4.9 Screening of at least 2m in height (such as Heras Readyhoard or Steelhoard Screening fences (Heras 2020)) 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 such as water treatment tanks, 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.

5.4.10 Noise and vibration limits for ecological noise sensitive receptors (NSRs) will be agreed with SNH and these limits will be incorporated into the Contract Documents. The Contractor will be required to develop and implement a Noise and Vibration Management Plan (NVMP) to reduce construction noise and adhere to appropriate noise thresholds where possible.

5.4.11 Use of "soft-start" techniques to all noisy activity to avoid sudden and unexpected disturbance 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. This will apply year-round.

5.4.12 Prior to construction a Saltmarsh Management Plan will be developed in consultation with SNH. This will include measures to reduce damage and encourage recovery of the saltmarsh. Post-construction monitoring will be undertaken in accordance with the Saltmarsh Management Plan. This monitoring will determine the progress of saltmarsh restoration and inform whether further mitigation, maintenance or changes in mitigation approach are required to maintain the conservation status of qualifying interests.

5.4.13 The access track and working platforms on the saltmarsh will be created through use of geotextile matting under aggregate material. This will prevent construction materials sinking into the saltmarsh. With the exception of temporarily realigning the existing SUDS outfall, no works will be undertaken on the saltmarsh outside the footprint of these areas. This includes provision of drainage or water treatment facilities for construction run-off. This will minimise the damage to the saltmarsh habitat.

5.4.14 On completion of the works all access tracks and working platforms will be removed in their entirety from the saltmarsh to minimise the long-term damage to saltmarsh habitat and encourage regeneration.

Table 3: HRA Stage Two (AA) Assessment Table for Bar-tailed Godwit, Golden Plover, Knot, Redshank

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 species	Screening identified the potential for disturbance to bar-tailed godwit, golden plover, knot and redshank following high level review of the survey data and ecological requirements of these species. It is considered that noise, vibration and visual disturbance related to the construction activities of the proposed scheme could deter bar-tailed godwit, golden plover, knot and redshank from feeding, loafing and roosting within the intertidal mudflats and saltmarsh adjacent to the bridge. <u>Bar-tailed Godwit</u> Bar-tailed godwit are relatively sensitive to disturbance compared to other waders (SNH 2016b), however as there is suitable habitat within the estuary for bar-tailed godwit to feed and roost, the disturbance is unlikely to have a significant effect on the species or on its distribution within the SPA/Ramsar. This is supported by the results of the surveys by Jacobs (see Appendix B: Bird Surveys). The surveys indicate that bar-tailed godwits utilise the mudflats adjacent to the proposed scheme, 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 0.7% of the total SPA population (estimated at 2600 individuals JNCC 2005) of bar-tailed godwit indicating that bar-tailed godwit utilise other areas within the SPA to a larger degree and that the SPA at the proposed scheme is not a key area for this species over-winter. Therefore, LSE on bar-tailed godwit resulting from disturbance will not compromise the conservation objectives for the species and therefore there are no AESI predicted. <u>Golden Plover</u> Surveys undertaken by Jacobs (Appendix B: Bird Surveys) indicated that golden plover utilise the saltmarsh adjacent to the proposed scheme, on the southern side of the estuary, however this species was only recorded on two occasions during the survey period. A peak count of 65 roosting golden plover was made in October 2017 which represents 2% of the total SPA population of golden plover (approximately 2970 individuals (JNCC 2005)). This suggests that there are other areas within the	Although there is a LSE identified for bar-tailed godwit and golden plover it is precautionary and it is concluded that no specific mitigation is required for these species with regard to disturbance impacts; however, mitigation is required for disturbance impacts on knot and redshank. The following avoidance/mitigation measures will be undertaken to ensure the conservation objectives are not compromised for knot and redshank, and to further reduce any effects on other waders: • The Contractor will develop a CEMP, including an Ecological Management Plan, which will detail the mitigation to be implemented and how this will be monitored. • An ECoW will be appointed who will ensure mitigation measures are implemented to avoid and reduce impacts on qualifying species. • An ecologist, acting on behalf of Transport Scotland, will audit compliance with regards to the implementation of the CEMP and Ecological Management Plan. • Monitoring surveys following adapted TTTC methods will be undertaken by an ecologist, acting on behalf Transport Scotland, throughout the construction period. • A construction lighting plan and method statement will be developed by the Contractor. • Plant and personnel will be constrained to the working area. • Provision of visual screening between the works and the coastal area throughout winter. • Noise and vibration limits for ecological noise sensitive receptors (NSRs) will be agreed with SNH	No adverse effect on site integrity

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
		SPA/Ramsar site favoured by golden plover during the winter and that the area around Kincardine Bridge is not important supporting habitat for this species. Furthermore, 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. Therefore, LSE on golden plover resulting from disturbance will not compromise the conservation objectives for the species and therefore there are no AESI predicted. <u>Knot</u> Surveys by Jacobs (Appendix B: Bird Surveys) indicated that knot utilise the mudflats adjacent to the proposed scheme, 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. Of note, knot favour extensive intertidal mudflats, of which the mudflats around Grangemouth (Skinflats) provide better habitat for this species than the area around the Kincardine Bridge. Knot are sensitive to disturbance (SNH 2016b) which could mean that during construction this species could be deterred from the Kincardine Bridge area. <u>Redshank</u> Surveys by Jacobs (Appendix B: Bird Surveys) indicated that redshank utilise the mudflats adjacent to the proposed scheme, on the on both side of the estuary. More redshank were recorded in the winter months with a peak count of 120 made in October 2017. This represents 3% of the SPA population (estimated to be 3700 individuals (JNCC 2005)). 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).	and these limits will be incorporated into the Contract Documents. • Use “soft-start” techniques to avoid sudden and unexpected disturbance.	

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
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 and extent of habitats supporting the species • structure, function and supporting processes of habitats supporting the species	Screening identified that bar-tailed godwit, golden plover, knot and redshank could be impacted by the loss of intertidal habitat as a results of the construction of the proposed scheme based on the high level review of the survey data and ecological requirements for the species. The working area for construction will cover a footprint of up to 3.87ha (of which 3.24ha is within the SPA/Ramsar boundary) and will result in temporary loss of 2.99ha saltmarsh habitat available for bar-tailed godwit, golden plover and knot. This area of saltmarsh comprises a total of 0.05% of the area of the SPA/Ramsar site as a whole. <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 Surveys) indicated that bar-tailed godwits, although shown to utilise the mudflats adjacent to the proposed scheme, 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 (SNH 2018c). The habitats within the study area are not considered to be functionally important for bar-tailed godwit. However, there is the potential for localised changes in use of habitat at Kincardine by bar-tailed godwit as the saltmarsh regenerates following removal of the temporary working area. <u>Golden Plover</u> Surveys undertaken by Jacobs (Appendix B: Bird Surveys) indicated that golden plover utilise the saltmarsh adjacent to the proposed scheme, 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. Golden plover was only recorded in October and November 2017. 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	To ensure the conservation objectives of bar-tailed godwit, golden plover, knot and redshank are not compromised as a result of saltmarsh loss during the construction of the proposed scheme, 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 develop a CEMP, including an Ecological Management Plan, which will detail the mitigation to be implemented and how this will be monitored. • An ECoW will be appointed who will ensure mitigation measures are implemented to avoid and reduce impacts on qualifying species. • An ecologist, acting on behalf of Transport Scotland, will audit compliance with regards to the implementation of the CEMP and Ecological Management Plan. • Prior to construction a Saltmarsh Management Plan will be developed in consultation with SNH. • Plant and personnel will be constrained to the working area. • The access track and working platforms on the saltmarsh will be created through use of geotextile matting under aggregate material. • On completion of the works all access tracks and working platforms will be removed in their entirety from the saltmarsh.	No adverse effect on site integrity

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
		the conservation objectives for the species and therefore there are no AESI predicted. However, there is the potential for localised changes in use of habitat at Kincardine by golden plover as the saltmarsh regenerates following removal of the temporary working area. <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 Surveys). However, there is the potential for localised changes in use of habitat at Kincardine by knot as the saltmarsh regenerates following removal of the temporary working area. <u>Redshank</u> Surveys by Jacobs (Appendix B: Bird Surveys) indicated that redshank utilise the mudflats adjacent to the proposed scheme, on the on both side of the estuary. Loss of 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. The saltmarsh habitat at Kincardine Bridge is not considered to be important supporting habitat for redshank within the SPA/Ramsar. However, there is the potential for localised changes in use of habitat at Kincardine by redshank as the saltmarsh regenerates following removal of the temporary working area.		

Table 4: HRA Stage Two (AA) Assessment Table for Sandwich Tern

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 species	Screening identified the potential for disturbance to Sandwich tern from the construction of the proposed scheme based on the high-level review of the survey data and ecological requirements for Sandwich tern. Noise and visual disturbance related to the construction phase of the proposed scheme could deter Sandwich tern from the area for feeding in the open water adjacent to the site. Surveys by Jacobs (Appendix B: Bird Surveys) 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). Most records of Sandwich tern pertained to small groups of tern flying over the site and correspond with early passage activity. All records of tern were within the southern survey sectors (S1 and S2). 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. 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.	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 develop a CEMP, including an Ecological Management Plan, which will detail the mitigation to be implemented and how this will be monitored. • An ECoW will be appointed who will ensure mitigation measures are implemented to avoid and reduce impacts on qualifying species. • An ecologist, acting on behalf of Transport Scotland, will audit compliance with regards to the implementation of the CEMP and Ecological Management Plan. • Monitoring surveys following an adapted TTTC method will be undertaken by an ecologist, acting on behalf Transport Scotland, throughout the construction period.	No adverse effect on site integrity
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). The temporary bridge will extend into the saltmarsh of the SPA, however open water habitats will not be disturbed or lost during construction 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	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	conservation objectives for the species and therefore there are no AESI predicted.		

Table 5: HRA Stage Two (AA) Assessment Table for Pink-footed Goose

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	Screening identified the potential for disturbance to pink-footed goose following review of the survey data and ecological requirements for the species. Noise, vibration and visual disturbance related to the construction phase of the proposed scheme could deter pink-footed geese from feeding, loafing and particularly roosting within the intertidal mudflats and saltmarsh adjacent to the bridge. Surveys by Jacobs (see Appendix B: Bird Surveys) recorded pink-footed geese in large numbers over winter with peak counts during March and October which corresponds with the seasonality trend for this species in	To ensure that the conservation objectives for pink-footed goose are not compromised, the following avoidance/mitigation measures will be undertaken. The measures will prevent significant disturbance to, and a change in the distribution of, pink-footed goose: • The Contractor will develop a CEMP, including an Ecological Management Plan, which will detail the mitigation to be implemented and how this will be monitored.	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 • no significant disturbance of the species	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 whilst other left the roost site. This area is considered to represent an important roost site for pink-footed geese over winter with the peak number roosting (1755 roosting geese) representing 14% of the SPA population of pink-footed geese (estimated to be 12,400 individuals (JNCC 2005)). The saltmarsh to the upstream side of the bridge, where the temporary bridge is proposed was not considered to be an important area for pink-footed geese with only small numbers recorded using this area during the surveys. Disturbance during construction has the potential to alter the species distribution within the SPA/Ramsar site as well as causing significant disturbance during the construction period.	• An ECoW will be appointed who will ensure mitigation measures are implemented to avoid and reduce impacts on qualifying species. • An ecologist, acting on behalf of Transport Scotland, will audit compliance with regards to the implementation of the CEMP and Ecological Management Plan. • Monitoring surveys following an adapted TTTC method will be undertaken by an ecologist, acting on behalf Transport Scotland, throughout the construction period. • Avoid working during hours of darkness during September to March to prevent disturbance to roosting geese as far as practicable, and where not possible employ lighting management to prevent light spill. • A construction lighting plan and method statement will be developed by the Contractor. • Plant and personnel will be constrained to the working area. • Provision of visual screening between the works and the coastal area throughout winter. • Noise and vibration limits for ecological noise sensitive receptors (NSRs) will be agreed with SNH and these limits will be incorporated into the Contract Documents. • Use “soft-start” techniques to avoid sudden and unexpected disturbance.	

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
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 and extent of habitats supporting the species • structure, function and supporting processes of habitats supporting the species	Screening identified that pink-footed goose could be impacted by the loss of intertidal habitat as a result of the construction of the proposed scheme based on the highlevel review of the survey data and ecological requirements for the species. The working area for construction will cover a footprint of up to 3.87ha (of which 3.24ha is within the SPA/Ramsar boundary) and will result in temporary loss of 2.99ha of saltmarsh habitat available for pink-footed geese. This area of saltmarsh comprises a total of 0.05% of the area of the SPA/Ramsar site as a whole. Loss of saltmarsh habitat during the construction phase 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 Surveys) for pink-footed geese were from the area downstream side of the bridge which will not suffer considerable land-take during construction. Pink-footed geese were observed roosting on the mudflats and saltmarsh to the south east of the bridge during the goose roost surveys, with many remaining to feed whilst others left the roost site. The saltmarsh to the upstream side of the bridge, where the temporary bridge is proposed, was not considered to be an important area for pink-footed geese with only small numbers recorded using this area during the surveys. There is the potential for localised changes in use of habitat at Kincardine by pink-footed geese as the saltmarsh regenerates following removal of the temporary working area.	To ensure that the conservation objectives for pink-footed goose are not compromised, the following avoidance/mitigation measures will be undertaken: structure and function of the habitats that support them: • The Contractor will develop a CEMP, including an Ecological Management Plan, which will detail the mitigation to be implemented and how this will be monitored. • An ECoW will be appointed who will ensure mitigation measures are implemented to avoid and reduce impacts on qualifying species. • An ecologist, acting on behalf of Transport Scotland, will audit compliance with regards to the implementation of the CEMP and Ecological Management Plan. • Prior to construction a Saltmarsh Management Plan will be developed in consultation with SNH. • Plant and personnel will be constrained to the working area. • The access track and working platforms on the saltmarsh will be created through use of geotextile matting under aggregate material. • On completion of the works all access tracks and working platforms will be removed in their entirety from the saltmarsh.	No adverse effect on site integrity

Table 6: HRA Stage Two (AA) Assessment Table for Shelduck

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 species	Screening identified the potential of disturbance to shelduck following high level review of the survey data and ecological requirements for the species. Noise, vibration and visual disturbance related to the construction phase of the proposed scheme could deter shelduck from feeding, loafing and roosting within the intertidal mudflats and saltmarsh adjacent to the bridge. Surveys by Jacobs (Appendix B: Bird Surveys) indicated that shelduck utilise the mudflats and saltmarsh adjacent to the proposed scheme 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 proposed scheme. Notably, the late summer moulting flock around Grangemouth (approximately 3km downstream of the proposed scheme) is one of the three largest in Britain (SNH 2016b). 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 (SNH 2018c)	To ensure that the conservation objectives for shelduck are not compromised, the following avoidance/mitigation measures will be undertaken. The measures will be undertaken to prevent significant disturbance to, and a change in the distribution of, shelduck: • The Contractor will develop a CEMP, including an Ecological Management Plan, which will detail the mitigation to be implemented and how this will be monitored. • An ECoW will be appointed who will ensure mitigation measures are implemented to avoid and reduce impacts on qualifying species. • An ecologist, acting on behalf of Transport Scotland, will audit compliance with regards to the implementation of the CEMP and Ecological Management Plan. • Monitoring surveys following adapted TTTC methods will be undertaken by an ecologist, acting on behalf Transport Scotland, throughout the construction period. • A construction lighting plan and method statement will be developed by the Contractor. • Plant and personnel will be constrained to the working area. • Provision of visual screening between the works and the coastal area throughout winter. • Noise and vibration limits for ecological noise sensitive receptors (NSRs) will be agreed with SNH and these limits will be incorporated into the Contract Documents.	No adverse effect on site integrity

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
			• 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 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	Screening identified that shelduck could be impacted by the loss of intertidal habitat as a result of the construction of the proposed scheme based on the high level review of the survey data and ecological requirements for the species The working area for construction will cover a footprint of up to 3.87ha (of which 3.24ha is within the SPA/Ramsar boundary) and will result in temporary loss of 2.99ha of saltmarsh habitat available for shelduck. This area of saltmarsh comprises a total of 0.05% of the area of the SPA/Ramsar site as a whole. 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.	Although there is a LSE identified for shelduck with regard to temporary loss of saltmarsh habitat, it is precautionary. To ensure that the conservation objectives for shelduck are not compromised, the following avoidance/mitigation measures will be undertaken. The measures will be undertaken to prevent a change in the distribution of, and protect the structure and function of habitats that support, shelduck: • The Contractor will develop a CEMP, including an Ecological Management Plan, which will detail the mitigation to be implemented and how this will be monitored. • An ECoW will be appointed who will ensure mitigation measures are implemented to avoid and reduce impacts on qualifying species. • An ecologist, acting on behalf of Transport Scotland, will monitor ecological features, and the implementation of the CEMP and Ecological Management Plan. • Prior to construction a Saltmarsh Management Plan will be developed in consultation with SNH. • Plant and personnel will be constrained to the working area. • The access track and working platforms on the saltmarsh will be created through use of geotextile matting under aggregate material. • On completion of the works all access tracks and working platforms will be removed in their entirety from the saltmarsh.	No adverse effect on site integrity

Table 7: HRA Stage Two (AA) Assessment Table for Goldeneye

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 species	Screening identified a potential for disturbance to goldeneye following review of the survey data and ecological requirements for this species. Noise, vibration and visual disturbance related to the construction phase of the proposed scheme could deter goldeneye from foraging in the estuary in the vicinity of the Kincardine Bridge. However, goldeneye rely predominately on open water habitats and are found most often in the outer Forth (SNH 2016b). Furthermore, the surveys undertaken by Jacobs (Appendix B: Bird Surveys) recorded very few goldeneyes in the vicinity of the proposed scheme. Therefore, LSE on goldeneye resulting from the disturbance will not compromise the conservation objectives for the species and therefore there are no AESI predicted, however there is the potential for small numbers to be affected.	Although there is a LSE identified for goldeneye with regard to disturbance, it is precautionary and it is concluded that no specific mitigation is required. It is considered that the mitigation measures in place to protect other qualifying interests will further reduce any effects on these species and ensure the conservation objectives are not compromised. The following avoidance/mitigation measures will be undertaken: • The Contractor will develop a CEMP, including an Ecological Management Plan, which will detail the mitigation to be implemented and how this will be monitored. • An ECoW will be appointed who will ensure mitigation measures are implemented to avoid and reduce impacts on qualifying species. • An ecologist, acting on behalf of Transport Scotland will audit compliance with regards to the implementation of the CEMP and Ecological Management Plan. • Monitoring surveys following adapted TTTC methods will be undertaken by an ecologist, acting on behalf Transport Scotland, throughout the construction period. • Plant and personnel will be constrained to the working area. • Noise and vibration limits for ecological noise sensitive receptors (NSRs) will be agreed with SNH and these limits will be incorporated into the Contract Documents. • Provision of visual screening between the works and the coastal area throughout winter.	No adverse effect on site integrity

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
			• A construction lighting plan and method statement will be developed by the Contractor. • 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 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.	The working area for construction will cover a footprint of up to 3.87ha (of which 3.24ha is within the SPA/Ramsar boundary) and will result in temporary loss of 2.99ha of saltmarsh habitat available to goldeneye. This area of saltmarsh comprises a total of 0.05% of the area of the SPA as a whole. 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 proposed scheme (see Appendix B: Bird Surveys). Therefore, LSE on goldeneye resulting from habitat loss will not compromise the conservation objectives for the species and therefore there are no AESI predicted.	No specific mitigation is required goldeneye. It is considered that the mitigation measures in place to protect other qualifying interests (as detailed below) will further reduce any effects on these species and ensure the conservation objectives are not compromised. The following avoidance/mitigation measures will be undertaken: • The Contractor will develop a CEMP, including an Ecological Management Plan, which will detail the mitigation to be implemented and how this will be monitored. • An ECoW will be appointed who will ensure mitigation measures are implemented to avoid and reduce impacts on qualifying species. • An ecologist, acting on behalf of Transport Scotland will audit compliance with regards to the implementation of the CEMP and Ecological Management Plan. • Prior to construction a Saltmarsh Management Plan will be developed in consultation with SNH. • Plant and personnel will be constrained to the working area. • The access track and working platforms on the saltmarsh will be created through use of geotextile matting under aggregate material. • On completion of the works all access tracks and working platforms will be removed in their entirety from the saltmarsh.	No adverse effect on site integrity

Table 8: 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 significant disturbance of the species	As the proposed scheme is located within 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 during the construction, operation and de-commissioning of the temporary bridge. There is also potential for disturbance during the removal of the existing structure and construction of the new piers and bridge span, as well as general construction site disturbance due to moving plant and personnel. Noise, vibration and visual disturbance related to the construction phase of the proposed scheme could deter qualifying interests from feeding, loafing and roosting within the intertidal mudflats and saltmarsh adjacent to the bridge. The survey results 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 (Appendix B: Bird Surveys): • Common scoter • Cormorant • Curlew • Dunlin • Eider • Lapwing • Mallard • Oystercatcher • Red-breasted merganser • Ringed plover • Wigeon Qualifying interests that have the potential to be disturbed are cormorant, curlew, mallard, oystercatcher and wigeon as these species were all recorded over winter at the Kincardine Bridge (Appendix B: Bird Surveys) and utilise habitats within and adjacent to the works area.	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, several 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 develop a CEMP, including an Ecological Management Plan, which will detail the mitigation to be implemented and how this will be monitored. • An ECoW will be appointed who will ensure mitigation measures are implemented to avoid and reduce impacts on qualifying species. • An ecologist, acting on behalf of Transport Scotland, will audit compliance with regards to the implementation of the CEMP and Ecological Management Plan. • Monitoring surveys following adapted TTTC methods will be undertaken by an ecologist, acting on behalf Transport Scotland, throughout the construction period. • A construction lighting plan and method statement will be developed by the Contractor. • Plant and personnel will be constrained to the working area. • Provision of visual screening between the works and the coastal area throughout winter.	No adverse effect on site integrity

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
		<u>Cormorant</u> 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 (SNH 2018c). <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 (SNH 2018c). <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 (SNH 2018c). <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 (SNH 2018c). <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 (SNH 2018c). 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	• Noise and vibration limits for ecological noise sensitive receptors (NSRs) will be agreed with SNH and these limits will be incorporated into the Contract Documents. • Use “soft-start” techniques to avoid sudden and unexpected disturbance.	

LSE	Conservation Objectives Potentially Affected	Commentary	Avoidance and Mitigation	AA Determination after Mitigation
		Forth (SNH 2016b). This assessment is corroborated by the survey data; common scoter, eider and red-breasted merganser were recorded in low numbers during the surveys and the other open water species were not recorded (Appendix B: Bird Surveys).		
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 and extent of habitats supporting the species • structure, function and supporting processes of habitats supporting the species	The working area for construction will cover a footprint of up to 3.87ha (of which 3.24ha is within the SPA/Ramsar boundary) and will result in temporary loss of 2.99ha of saltmarsh habitat available to qualifying interests of the SPA/Ramsar site. This area of saltmarsh comprises a total of 0.05% of the area of the SPA/Ramsar site as a whole. The survey results 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 Surveys): • 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 develop a CEMP, including an Ecological Management Plan, which will detail the mitigation to be implemented and how this will be monitored. • An ECoW will be appointed who will ensure mitigation measures are implemented to avoid and reduce impacts on qualifying species. • An ecologist, acting on behalf of Transport Scotland, will audit compliance with regards to the implementation of the CEMP and Ecological Management Plan. • Prior to construction a Saltmarsh Management Plan will be developed in consultation with SNH. • Plant and personnel will be constrained to the working area. • The access track and working platforms on the saltmarsh will be created through use of geotextile matting under aggregate material. • On completion of the works all access tracks and working platforms will be removed in their entirety from the saltmarsh.	No adverse effect on site integrity

6 In-Combination Assessment

6.1 Introduction

6.1.1 This section comprises an assessment of the proposed scheme in combination with other plans and projects. Following screening (Section 4: Stage One (Screening)), LSEs from the proposed scheme were identified for the Firth of Forth SPA and Ramsar site.

6.2 Other Projects and Plans Considered in the Assessment

6.2.1 A search on Falkirk Council, Fife Council and Clackmannanshire Council's planning portals was undertaken on 30 September 2020 to identify any projects or plans that may act in-combination with the proposed scheme to result in a LSE on the Firth of Forth SPA and Ramsar site. Table 9 provides the results of this search.

6.2.2 In addition, a desk-based search for other relevant proposals within the area was made using simple internet-based searches, as well as a search for Marine Licence Applications within the Forth Estuary. Grangemouth Flood Protection Scheme (Falkirk Council 2019) and dredging at Grangemouth (Marine Licence Application references 00008842 and 07120/20/0) and railway upgrades (Network Rail 2020) were identified to be included within this in-combination assessment due to their proximity to the Firth of Forth SPA and Ramsar. These have also been included in Table 9 with additional commentary for the potential for in-combination effects.

6.2.3 A number of planning applications exist for minor alterations, extensions to buildings and change in property use, within the town of Kincardine. Due to the small-scale nature of these proposals they have been omitted as there is no potential for in-combination, effects either solely or cumulatively, with the proposed scheme.

Table 9: Other Plans and Projects and Potential for In-Combination Effects

Proposal Name	Distance from Proposed Scheme	Application Reference Number	Status/ Decision	Potential for In-combination Effects
Erection of Industrial Unit at Carron Dry Dock, North Shore Road, Grangemouth, FK3 8UH.	4.4km	Falkirk Council (P/17/0534/FUL)	Planning Permission Granted October 2017	Proposal for an industrial unit within an already heavily industrialised site located over 4km from the Kincardine Bridge. The proposal was granted permission in 2017, however review of recent aerial imagery indicates that this has yet to be constructed and there is no indication of construction timing available; therefore, the proposal could be constructed concurrently with the proposed scheme. However, the works to erect an industrial unit are small scale and localised, and the works and the resultant unit are shielded from the Firth of Forth by surrounding infrastructure. The proposal is unlikely to result in significant disturbance above that which is already experienced in the locality. Therefore, there are no effects from this proposed development that could act in combination with the proposed scheme to have a likely significant effect on the Firth of Forth SPA or Ramsar site. **No potential for in-combination effects.**
Application for a Certificate of Proposed Lawful	4.5km	Falkirk Council (P/18/0608/CPL)	Certificate of Lawful Use or	Proposal to install storage tanks and associated infrastructure within an already heavily industrialised site. The Environmental

Proposal Name	Distance from Proposed Scheme	Application Reference Number	Status/ Decision	Potential for In-combination Effects
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.			Development Granted March 2019	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 scheme. **No potential for in-combination effects.**
Application for Planning Permission in Principle for residential development with associated roads, open space, community facilities, formation of new access, SUDS infrastructure and development of a new business park with associated infrastructure at Land To South Of Riverside Terrace Kincardine Fife	1km	Fife Council (17/02330/PPP)	Conditional Approval/Legal Agreement November 2017	Planning Permission in Principle for residential development with associated roads, open space, community facilities, formation of new access, SUDS infrastructure and development of a business park with associated infrastructure. This proposal has been approved in principle, but subject to a number of particulars being complied with to include further applications and detailed plans submitted to the council. The decision is valid for a three-year period and therefore there is a potential for the development to be concurrent with the proposed scheme, provided that development commences before expiration of the Planning Permission in Principle in November 2020. However, the development is located over 300m from the Firth of Forth, set back within an agricultural landscape south of Kincardine; disturbance to qualifying interests within the estuary is thus considered very unlikely. Therefore, there is no potential for in-combination effects with the proposed scheme. **No potential for in-combination effects.**
Request for Screening Opinion for demolition of Longannet Power Station, associated buildings and chimney stack	2km	Fife Council (17/02217/SCR)	Environmental Impact Assessment (EIA) Not Required September 2017	Demolition of the Longannet Power station is proposed, and a screening opinion was sought. The screening for the proposed demolition concluded that the environmental impacts of demolition would not significantly impact on the SPA. This proposal is ongoing, and according to the programme is due to finish at the end of 2020. Therefore, this proposal will likely be completed prior to the early construction/mobilisation phase of the proposed scheme. There is considered to be no potential for in-combination effects as the proposed scheme and the demolition proposal will not be concurrent. Furthermore, once the demolition is completed there will be no residual

Proposal Name	Distance from Proposed Scheme	Application Reference Number	Status/ Decision	Potential for In-combination Effects
				disturbance effects which could act in-combination with the proposed scheme. **No potential for in-combination effects.**
Replacement of existing 275kV electrical switchyard with 275kV gas insulated switchgear substation. Application includes installation of proposed switchgear, new GIS building, installation of new steel palisade security fencing and a new access track within the former Kincardine Power Station site, Fife.	0.7km	Fife Council (18/00296/FULL)	Planning Permission Granted June 2018	Planning permission granted for erection of a 275kV gas insulated substation including ancillary electrical infrastructure and permanent access. The existing infrastructure will be replaced to maintain continuity of supply and to reduce flood risk to key assets as part of the energy network. Conditions imposed on the proposal includes submission and adherence to a CEMP approved by SEPA and compliance with noise regulations. Furthermore, the Kincardine Power Station is set back from the shore of the estuary and therefore disturbance impacts on qualifying interests within the Firth of Forth are unlikely. In addition, works are proposed for completion in February 2021, therefore the current programme indicates that there will be no overlap in programmes. Furthermore, once the works are completed there will be no residual disturbance effects which could act in-combination with the proposed scheme. **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 works and associated development at Longannet Power Station, Fife.	0.7km	Fife Council (19/02331/EIA) *Associated proposal and reference: (19/00627/PAN)*	Planning Permission Granted January 2020	Planning Permission granted for the redevelopment of the former power station. The total development area is 122.8ha. Supporting documentation for the proposal included an EIA report and an HRA, the latter of which concluded no adverse effect on site integrity for the Firth of Forth SPA. The site is located on the Longannet Power Station site, and is adjacent to the Firth of Forth, albeit set back from the shore front. There is the potential for the redevelopment of the site to be undertaken concurrently with the proposed scheme. However, 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 scheme. **No potential for in-combination effects.**
Final capping of remaining ash lagoons and associated engineering works at Valleyfield Ash Lagoons, Main Street, Low Valleyfield,	7.8km	Fife Council (18/01662/FULL) Associated proposal and reference (18/00339/SCR)	Application for Planning Permission (Registered)	Proposals to cap the final three ash lagoons located at Low Valleyfield, east of Culross, to preserve their integrity and promote biodiversity. Previously a screening opinion was sought, and it was concluded that the development would unlikely cause significant environmental harm, therefore an EIA was not required.

Proposal Name	Distance from Proposed Scheme	Application Reference Number	Status/ Decision	Potential for In-combination Effects
Dunfermline, KY12 8TY.				The proposal is considered to be sufficiently distant for there to be no likely in-combination effects with the proposed scheme with regard to disturbance of qualifying interests. Furthermore, no land-take from the SPA/Ramsar is proposed, therefore there will be no change in availability of intertidal habitat for waders and waterfowl within the Firth of Forth. **No potential for in-combination effects.**
Demolition of existing kiosk building, erection of a petrol filling station and associated retail kiosk (Class 1) and jet washes, freestanding restaurant (Class 3) including drive-thru lane (Sui Generis), site access, parking provision, landscaping and ancillary works at Viewforth Filling Station Airth Falkirk FK2 8PW	0.08km	Falkirk Council (P/20/0398/FUL)	Awaiting Decision	The proposal submitted in September 2020 is for the demolition of an existing building and erection of a petrol filling station and associated infrastructure, including a 'drive-thru' McDonalds restaurant. There is the potential for the works to be concurrent with construction phase of the proposed scheme. 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 scheme. Furthermore, once the works are completed there will be no residual disturbance effects which could act in-combination with the proposed scheme. **No potential for in-combination effects.**
Grangemouth Flood Protection Scheme	4km	n/a (Pre-marine licence application)	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, therefore the flood protection scheme and the proposed works at Kincardine Bridge will not be concurrent. There is no potential for the flood scheme to act in-combination with the proposed scheme at Kincardine based on the available information. **No potential for in-combination effects.**
Water Injection Maintenance Dredging - Grangemouth and Leith Locks	4km	Marine Licence Application - 00008842	Application September 2020	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 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

Proposal Name	Distance from Proposed Scheme	Application Reference Number	Status/ Decision	Potential for In-combination Effects
				of analysis of sediment samples from recent licence applications. Dredging would be expected to be carried out over approximately 3 to 4 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 features of the SPA/Ramsar 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 scheme. **No potential for in-combination effects.**
Maintenance Dredging - Port of Grangemouth	4km	Marine Licence Application - 07120	Licence Granted January 2020	The licence application covers the maintenance dredging at the Port of Grangemouth in the training channel, bellmouth 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 scheme. Dredging in the bellmouth is carried out over approximately 4 to 5 days each month and dredging within the docks is carried out in conjunction usually taking place over a 4 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 features of the SPA/Ramsar 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 scheme. **No potential for in-combination effects.**
Network Rail West of Fife Enhancement Project.	0.5km	n/a	Unknown	Improvements (electrification) to the railway line between Alloa and Longannet. This project is in the early stages of development and there is no publicly available information indicating a time frame for delivery of the project. The electrification falls under the wider Scottish Government's rail decarbonisation agenda which looks forward

Proposal Name	Distance from Proposed Scheme	Application Reference Number	Status/ Decision	Potential for In-combination Effects
				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. It is assumed, based on the available information, that the ongoing site investigations will conclude this year and therefore prior to the proposed scheme commencing construction. Therefore, there is no potential for in-combination effects. The project is very early in the development stage, and there is no indication as to when the main enhancement could be delivered. Therefore, it is considered unlikely that the project would be undertaken concurrently with the construction phase of the proposed scheme at Kincardine. **No potential for in-combination effects.**

6.3 Assessment of the Firth of Forth SPA and Ramsar Site

6.3.1 No projects or plans were identified that have the potential to act in-combination with the proposed scheme to result in a cumulative effect on the Firth of Forth SPA and Ramsar site.

6.3.2 As a result, it is concluded that there are no in-combination effects on the Firth of Forth SPA and Ramsar site. It is acknowledged, however, that potential future proposals adjacent to the estuary may act in-combination with the proposed scheme, but it would therefore be for these future developments to take into account the results of this assessment, especially if construction phases are concurrent.

7 Summary and Conclusions

Screening

7.1.1 Relevant European and Ramsar sites were selected by identifying ecological connectivity and the potential effects pathways from the project, particularly with regards to disturbance and pollution. Following consultation with SNH (SNH 2018b), and further assessment of potential effects pathways from the proposed scheme, three sites were identified to be considered within the screening: Firth of Forth SPA; Firth of Forth Ramsar; and River Teith SAC.

7.1.2 Following the screening, it was concluded that the proposed scheme has the potential for LSEs on some of the qualifying features of the Firth of Forth SPA and Ramsar site, therefore a requirement to progress to Stage 2 (AA). No LSEs were identified on the River Teith SAC and therefore no requirement for further assessment for this designated site.

Appropriate Assessment

7.1.3 Implications to the Firth of Forth SPA and Firth of Forth Ramsar site's conservation objectives were avoided through design or through application of mitigation measures. It is identified that mitigation to safeguard the conservation objectives of one qualifying interest, through prevention of significant disturbance and habitat loss, will have also be applicable to safeguarding the conversation of other species of the SPA and Ramsar site.

7.1.4 Although a precautionary approach has been used in relation to the anticipated programme and construction processes in this HRA, the Contractor may identify improvements or changes to these. If these do change then a no worse environmental test will be undertaken by the Contractor and SNH consulted to confirm the protection of European and Ramsar sites is assured and the conclusions of the HRA remain valid.

7.1.5 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 through either the construction or operational phases of the project. Therefore, there will be no adverse effect on site integrity (AESI) for the Firth of Forth SPA or Ramsar site either alone or in combination with other plans and projects.

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Appendix A: European and Ramsar Site Details

1 Purpose of Appendix

1.1 This appendix details the qualifying interests, condition assessments and conservation objectives for each of the European/Ramsar sites assessed within the Habitats Regulations Appraisal (HRA), namely:

- Firth of Forth Special Protection Area (SPA);
- Firth of Forth Ramsar; and
- River Teith Special Area of Conservation (SAC).

1.2 Details of each site can be found in Table 1 below.

Table 1: Site Details for European and Ramsar Sites

Site Name and Code (EU code/SNH code)	Area (ha)	Qualifying Interest (SNH 2018a, 2018b, 2018c, JNCC 2008)	Condition Assessment (Scotland's Environment 2018)		Conservation Objectives
			Condition	Date	
Firth of Forth Special Protection Area (UK9004411 / 8499)	6317.93	Bar-tailed godwit (*Limosa lapponica*), non-breeding	Favourable (maintained)	01/03/2015	• To avoid deterioration of the habitats of the qualifying interests (listed) 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.
		Golden plover (*Pluvialis apricaria*), non-breeding	Unfavourable (declining)	01/03/2015	
		Slavonian grebe (*Podiceps auritus*), non-breeding	Unfavourable (declining)	01/03/2015	
		Red-throated diver (*Gavia stellata)*, non-breeding	Favourable (maintained)	01/03/2015	
		Sandwich tern (*Sterna sandvicensis*), passage	Favourable (maintained)	01/03/2015	
		Knot (*Calidris canutus*), non-breeding	Unfavourable (declining)	01/03/2015	
		Pink-footed goose (*Anser brachyrhynchus*), non-breeding	Favourable (maintained)	01/03/2015	
		Redshank (*Tringa totanus*), non-breeding	Favourable (maintained)	01/03/2015	
		Shelduck (*Tadorna tadorna)*, non-breeding	Favourable (maintained)	01/03/2015	
		Turnstone (*Arenaria interpres*), non-breeding	Favourable (maintained)	01/03/2015	
		Common scoter *(Melanitta nigra*), non-breeding*	Unfavourable (declining)	01/03/2015	
		Cormorant (*Phalacrocorax carbo*), non-breeding*	Favourable (maintained)	01/03/2015	
		Curlew (*Numenius arquata*), non-breeding*	Favourable (maintained)	01/03/2015	
		Dunlin (*Calidris alpina alpina*), non-breeding*	Favourable (declining)	01/03/2015	
		Eider (*Somateria mollissima*), non-breeding*	Favourable (declining)	01/03/2015	
		Goldeneye (*Bucephala clangula*), non-breeding*	Unfavourable (declining)	01/03/2015	
		Great crested grebe (*Podiceps cristatus*), non-breeding*	Unfavourable (declining)	01/03/2015	
		Grey plover (*Pluvialis squatarola*), non-breeding*	Favourable (declining)	01/03/2015	
		Lapwing (*Vanellus vanellus*), non-breeding*	Favourable (declining)	01/03/2015	
		Long-tailed duck (*Clangula hyemalis*), non-breeding*	Unfavourable (declining)	01/03/2015	
		Mallard (*Anas platyrhynchos*), non-breeding*	Favourable (declining)	01/03/2015	
		Oystercatcher (*Haematopus ostralegus*), non-breeding*	Favourable (maintained)	01/03/2015	
		Red-breasted merganser (*Mergus serrator*), non-breeding *	Unfavourable (declining)	01/03/2015	
		Ringed plover (*Charadrius hiaticula*), non-breeding*	Favourable (maintained)	01/03/2015	
		Scaup (*Aythya marila*), non-breeding*	Unfavourable (declining)	01/03/2015	
		Velvet scoter (*Melanitta fusca*), non-breeding*	Favourable (maintained)	01/03/2015	
			Favourable (maintained)	01/03/2015	

Site Name and Code (EU code/SNH code)	Area (ha)	Qualifying Interest (SNH 2018a, 2018b, 2018c, JNCC 2008)	Condition Assessment (Scotland's Environment 2018)		Conservation Objectives
			Condition	Date	
		Wigeon (*Mareca penelope*), non-breeding* (formerly *Anas penelope*) Waterfowl assemblage, non-breeding	Favourable (maintained)	01/03/2015	
Firth of Forth Ramsar (UK13017 / 8424)	6313.68	Waterfowl assemblage, non-breeding Qualifying interests/populations with peak counts in spring/autumn: • Pink-footed goose • Shelduck • Redshank • Turnstone Qualifying species/populations with peak counts in winter: • Slavonian grebe • Goldeneye • Knot • Bar-tailed godwit	Favourable (declining) Favourable (maintained) Favourable (declining) Favourable (maintained) Favourable (maintained) Favourable (declining) Unfavourable (declining) Unfavourable (declining) Favourable (declining)	01/11/2010 27/10/2010 01/11/2010 27/10/2010 01/11/2010 01/11/2010 26/10/2010 27/10/2010 19/10/2010	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*'.
River Teith SAC (UK0030263 / 8367)	1289.33	Sea lamprey (*Petromyzon marinus*) Brook lamprey (*Lampetra planeri*) River lamprey (*Lampetra fluviatilis*) Atlantic salmon (*Salmo salar*)	Unfavourable (declining) Favourable (maintained) Favourable (maintained) Unfavourable (recovering)	09/11/2011 09/11/2011 09/11/2011 09/11/2011	• 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;

Site Name and Code (EU code/SNH code)	Area (ha)	Qualifying Interest (SNH 2018a, 2018b, 2018c, JNCC 2008)	Condition Assessment (Scotland's Environment 2018)		Conservation Objectives
			Condition	Date	
					➢ 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.
*assemblage qualifier only					

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Appendix B: Bird Surveys

1 Purpose of Appendix

1.1 This appendix provides detailed information on the survey baseline for the Firth of Forth Special Protection Area (SPA) and Ramsar sites qualifying interests for the local area around Kincardine Bridge between April 2017 and April 2018. Information presented in this appendix has been used to inform Stage One (Screening) and Stage Two (Appropriate Assessment) of the Habitats Regulations Appraisal (HRA) for the proposed scheme.

1.2 Data within this appendix only pertains to qualifying interests of the SPA and Ramsar sites, rather than all bird species recorded during the surveys, as these are of specific relevance to the HRA.

2 Previous Studies

2.1 The 2003 Environmental Statement (Environmental Statement) (Scottish Executive 2003) utilised data from Through The Tide Count (TTTC) surveys undertaken between December 1999 and September 2000 and concluded that the estuarine habitat potentially impacted by the works is of lesser importance than areas immediately adjacent to the bridge, for example Skinflats.

2.2 The 2009 Environmental Review Report (ERR) (Jacobs 2009a) details that as part of the commitments made in the 2003 ES, the University of Exeter was commissioned to undertake a programme of monitoring. The results of the monitoring concluded that there was no strong evidence that bridge construction would have a negative impact on overall populations of wildfowl or shorebird species.

3 Wetland Bird Surveys

Through the Tide Count Surveys

Survey Methods

3.1 Through The Tide Count (TTTC) surveys were undertaken by Jacobs between April 2017 and April 2018 inclusive to record the numbers, distribution and behaviour of all estuarine water birds (including all qualifying interests of the Firth of Forth SPA and Ramsar sites) present in the Forth Estuary (the shoreline, intertidal and open water areas) in the vicinity of the proposed scheme. The information gathered during these surveys enabled identification of areas which are particularly important for overwintering and migratory bird assemblages.

3.2 The survey methods used by Jacobs were based on the Wetland Bird Surveys (WeBS) core counts (in which high tide only is surveyed, as described in Bibby, C.J., Burgess, N.D., Hill, D.A. and Mustoe, S. (2000)). Jacobs survey methods also encapsulated low and mid tide as well as high tide within the survey area. Wetland birds that were surveyed for included gulls, terns, divers, grebes, cormorants, herons, swans, geese, ducks, rails, waders and kingfisher, as defined by Wetlands International (Rose, P.M and Scott, D.A 1997).

3.3 During each count, birds were viewed with the assistance of binoculars and telescopes, from specific vantage points (VP) along the shoreline. VPs were chosen during an initial site visit so as not to influence the survey results and enabling the entire shoreline within the survey area to be observed. Each VP was surveyed in sequence, following the same order over each count period. Figure B1 shows the location of the VPs and the survey sectors that were used for the surveys. Surveyors took 'snapshot' scans and recorded the number, location and behaviour of birds on maps of each of the count sectors. Care was taken to prevent double counting of birds during the counts. Data were recorded on maps using standard British Trust for Ornithology (BTO) bird species codes (BTO 2008), with the number of each species

recorded in superscript and the related behaviour (flying, loafing, roosting or feeding) indicated in subscript text. In addition to bird data, weather (wind speed and direction, rainfall, cloud cover and visibility) and sources of potential or actual disturbance to birds were recorded during the counts.

3.4 Table 1 provides the survey dates for the TTTC surveys. Surveys were scheduled each month to capture a spring and a neap tide.

Table 1: Survey Dates for TTTC Surveys at Kincardine

Year	Day and Month
2017	27 April
	4 May, 19 May and 25 May
	9 June and 16 June
	24 July and 31 July
	21 August and 28 August
	14 September and 22 September
	6 October and 12 October
	7 November and 13 November
	4 December and 11 December
2018	9 January
	1 February, 22 February and 27 February
	9 March and 20 March
	10 April and 18 April

Data Analysis

3.5 Analysis of the TTTC data was undertaken to estimate the peak counts and distribution of waterbirds within the survey area over the year. The analysis was conducted to account for the VPs being undertaken in sequence rather than simultaneously. Specifically, peak counts were derived from the highest counts of a species from a single sector (N1, N2, S1, S2) over a tidal state (High, Mid, Low), rather than an addition of the counts from each sector over the tidal state. The analysis was conducted in this way to take consideration of birds being mobile and the potential for the same birds to be recorded in multiple sectors over a tidal state, thus avoiding double counting of birds.

3.6 Data was derived for each species in the following ways:

- peak count – the highest individual count of birds recorded in the survey area;
- monthly peak count – the highest peak count within a calendar month;
- winter peak count – the highest peak count between September and March (inclusive); and
- winter mean peak count – the mean (average) of all the monthly peak counts between September and March (inclusive).

3.7 In addition to peak counts, the number of times a species was recorded has been used to provide an indication of the prevalence of the species within the survey area. A record is defined within this assessment as an individual/group exhibiting a single behaviour during the surveys. For example observation of one mallard loafing would be one record, as would observation of 20 oystercatchers roosting in a group.

TTTC Survey Results

3.8 A total of 39 species of waterbirds birds (including gulls, terns, cormorants and kingfisher) were recorded during the TTTC surveys between April 2017 and April 2018, of which 19 species were qualifying interests of the Firth of Forth SPA and Ramsar sites. Table 2 presents the monthly peak counts of qualifying interests recorded during the TTTC surveys, and Figure B2 shows the distribution and activity of species within the survey sectors.

Table 2: Monthly Peak Counts of Qualifying Interests Recorded during TTTC Surveys for the Full Survey Period April 2017 to April 2018

Species	Apr 2017 (1)	May 2017 (3)	Jun 2017 (2)	Jul 2017 (2)	Aug 2017 (2)	Sept 2017 (2)	Oct 2017 (2)	Nov 2017 (2)	Dec 2017 (2)	Jan 2018 (1)	Feb 2018 (3)	Mar 2018 (2)	Apr 2018 (2)	Monthly Peak	Monthly Mean Peak	Winter Peak	Winter Mean Peak
Bar-tailed godwit * ^	0	0	0	0	0	4	0	17	2	0	4	0	0	17	2.08	17	3.86
Common scoter *	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.08	1	0.14
Cormorant *	2	3	1	8	23	9	31	26	19	16	29	10	5	31	14.00	31	20
Curlew *	3	4	3	83	56	84	117	26	40	74	290	98	64	290	72.46	290	104.14
Dunlin *	0	1	0	0	0	10	5	25	0	0	0	0	0	25	3.15	27	5.71
Eider *	4	3	2	1	0	0	0	0	0	0	0	0	0	4	0.77	0	0
Golden plover *	0	0	0	0	0	0	65	25	0	0	0	0	0	65	6.92	65	12.86
Goldeneye * ^	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0.15	1	0.29
Knot * ^	0	0	0	0	0	0	0	0	0	0	1	7	0	7	0.62	7	1.14
Lapwing *	1	0	0	0	0	0	29	0	0	0	0	3	0	29	2.54	29	4.57
Mallard *	6	26	18	32	22	90	66	37	62	32	50	10	16	90	35.92	90	49.57
Oystercatcher *	61	20	9	20	16	46	43	61	72	27	113	42	35	113	43.46	113	57.71
Pink-footed goose * ^	9	0	1	6	4	20	997	583	204	500	702	1,021	256	1,021	331.00	1,021	575.29
Red-breasted merganser *	2	1	2	6	1	0	0	4	3	1	6	1	6	6	2.54	6	2.14
Redshank * ^	0	2	0	0	2	26	120	114	16	2	39	9	2	120	25.54	120	46.57
Ringed plover *	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.08	0	0
Sandwich tern * ^	0	0	0	1	45	1	0	0	0	0	0	0	0	45	3.62	1	0.14
Shelduck * ^	3	8	25	680	46	31	18	2	9	3	5	6	16	680	65.54	31	10.57
Wigeon *	0	0	1	0	0	1	20	77	103	42	136	58	0	136	33.69	136	62.43

(n) is the number of individual surveys in the month

* = SPA Qualifying Interest ^ = Ramsar Qualifying Interest

Goose Roost Surveys

Survey Methods

3.9 The habitat surrounding Kincardine Bridge is known to provide suitable habitat for roosting geese and in order to identify potential impacts on geese, goose roost surveys were undertaken. Starting in September 2017, goose roost surveys, focussing specifically on the pink-footed goose (a qualifying interest of the Firth of Forth SPA and Ramsar sites), were undertaken once every two weeks until the end of March 2018 (Table 3). Survey methodology followed Gilbert, G., Gibbons, D.W. and Evans, J (1998). Surveys were undertaken from the viewpoints VP1 to VP6 in the S1 and S2 survey sectors out to 500m from the Kincardine Bridge and commenced one hour before civil dawn (i.e. when centre of the sun is 6° below the horizon) and lasted two hours in total. Geese were counted with the aid of binoculars and telescopes from the VPs.

Table 3: Survey Dates for Goose Surveys at Kincardine

Survey Number	Survey Date
1	22 September 2017
2	6 October 2017
3	20 October 2017
4	3 November 2017
5	20 November 2017
6	5 December 2017
7	21 December 2017
8	5 January 2018
9	17 January 2018
10	1 February 2018
11	16 February 2018
12	8 March 2018
13	20 March 2018
14	29 March 2018

3.10 The number (and species) of geese roosting in S1 and S2 survey sectors was recorded and their spatial locations marked on a paper map. Additionally, the number of geese flying over, landing in the S1 and S2 survey sectors from another site or taking off from the S1 and S2 survey sectors to another site was noted.

Data Analysis

3.11 Analysis of the goose survey data was undertaken to estimate the population size and distribution of geese within the survey area over winter. Data was derived for pink-footed geese in the following ways:

- monthly peak count – the highest count of geese in a month;
- monthly peak roost count – the highest count of roosting geese in a month;
- winter peak count – the highest peak count between September and March (inclusive);
- winter mean peak count – the mean (average) of all the monthly peak counts between September and March (inclusive); and
- winter mean peak roost count – the mean (average) of all the monthly peak roost counts between September and March (inclusive).

Goose Roost Survey Results

3.12 Pink-footed geese roosted overnight within the survey area, with a peak of 1,285 roosting birds recorded on 20 October 2017. All observations, with the exception of four observations (a total of 16 birds), were recorded roosting in Sector S2, to the east of the Kincardine Bridge. No geese were observed on the north side of the estuary in the survey area (Figure B3).

3.13 A total of 46 flyovers (totalling 4,055 individual geese) were recorded during the survey period, with flocks ranging from single birds to a peak of 1,200 (recorded in October 2017).

3.14 Table 4 presents the monthly peak counts of pink-footed geese recorded. The counts include all individuals recorded, including birds recorded as flying or loafing, with specific peak roost counts presented separately.

Table 4: Monthly Peak Counts of Pink-footed Geese

Data Method	Sept 2017	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Winter Peak Count	Winter Mean Peak Count
Monthly Peak Counts	7	3,249	824	225	2,739	1,594	2,206	3,249	1,549
Peak Number Roosting	0	1,285 (*20-Oct*)	758 (*07-Nov*)	18 (*21-Dec*)	1,498 (*17-Jan*)	502 (*16-Feb*)	1,755 (*08-Mar*)	1,755 (*08-Mar*)	829.6

(*dd-month*) = date of record, if applicable.

Species Accounts from TTTC surveys and Goose Roost Surveys

3.15 Overall, 19 qualifying interests of the Firth of Forth SPA and Ramsar sites were recorded within the survey area. Full species accounts are provided in Table 5.

Table 5: Wader and Wildfowl Species Accounts

Species	Species Accounts	Species Habitat Use with Relevance to Study Area (SNH 2016)
Bar-tailed godwit * ^	Bar-tailed godwit was recorded on sixteen occasions during the TTTC all on the mudflats on the southern side of the bridge. A peak of 17 bar-tailed godwit was recorded in November 2017. This represents the winter peak and monthly peak count for bar-tailed godwit. Bar-tailed godwit were recorded feeding, roosting and loafing throughout all tidal states during the survey period.	Intertidal mud Saltmarsh
Common scoter *	Common scoter was recorded once during the surveys, loafing in the estuary on the southern side of the bridge. This single record indicates that common scoter rarely utilise the estuary near Kincardine.	Open water Intertidal mud
Cormorant *	Cormorant was recorded regularly over the survey period with a total of 243 records pertaining to 584 individual birds. Of these records only 32 were made in the northern sectors; a distinct preference for the southern side of the bridge was noted in the survey	Open water Intertidal mud

Species	Species Accounts	Species Habitat Use with Relevance to Study Area (SNH 2016)
	area. A monthly peak count of 31 cormorants was recorded in October 2017. This peak count also represents the winter peak count for this species. Cormorants fish within the estuary and were frequently recorded in groups loafing on the saltmarsh and mudflats drying their wings.	
Curlew *	A total of 535 records of curlew were made during the TTTC surveys with a monthly peak count of 290 on 1 February 2018. This count also represents the winter peak count for this species. Curlew was recorded in larger numbers over the winter, as with other species showing preference for the mudflats and estuarine habitats within the southern survey sectors.	Intertidal mud Saltmarsh
Dunlin *	A small number or records of dunlin were made during the TTTC surveys, all within 2017. A monthly peak count of 25 dunlin was recorded on 7 November 2017, loafing on mudflats south of the bridge. This peak count also represents the winter peak count for this species.	Intertidal mud Saltmarsh
Eider *	Records of eider were made in summer 2017 on both sides of the bridge. A monthly peak count of four eider was made in April 2017. All individuals were recorded during high tide. No winter observations of eider were made during the surveys.	Open water Intertidal mud
Golden plover * ^	Only recorded in the southern sectors, golden plovers were recorded on two occasions during the TTTC surveys. 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. Golden plover was only recorded in October and November 2017.	Intertidal mud Saltmarsh
Goldeneye *	Goldeneye was only recorded during the winter surveys in December 2017 and January 2018. A peak count of one over the winter indicates that the area around the Kincardine Bridge is not important in supporting this species over winter.	Open water Intertidal mud
Knot * ^	A peak count of seven knot were recorded on 20 March 2018. This count also represents the winter peak count for this species. Knot were only recorded in February and March 2018 within the survey area and likely use the mudflats within the survey area sporadically for foraging over-winter, likely favouring more coastal areas.	Intertidal mud Saltmarsh
Lapwing *	Lapwing was recorded only to the south of the bridge. A peak count of 27 flying lapwing was recorded on 12 October 2017 however this flock was not observed on land within the survey area. Lapwing on the ground were observed as individuals or in groups of two only. It is likely that lapwing use the fields within the wider area.	Intertidal mud Saltmarsh

Species	Species Accounts	Species Habitat Use with Relevance to Study Area (SNH 2016)
Mallard *	The most frequently recorded waterfowl species within the survey area, mallard was recorded a total of 371 times over the TTTC surveys. Mallard were often observed roosting on the pipelines in the northern sector of the survey area at low tide. Mallard were 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 and this represents the winter peak count for this species.	Open water Intertidal mud Saltmarsh
Oystercatcher *	Oystercatcher was recorded regularly over the survey period and a total of 261 records were made. A peak count of 113 oystercatcher was recorded on 1 February 2018. This count represents the winter peak count for this species. Oystercatcher was recorded in similar numbers in the winter and during the spring/summer months, however the monthly peak counts are higher over winter. Both sides of the estuary are used by oystercatcher and they appear to show less preference for the mudflats to the south than other waders recorded during the TTTCs.	Intertidal mud Saltmarsh
Pink-footed goose * ^	Pink-footed goose was the most recorded goose species within the survey area, recorded in large numbers particularly over winter. A total of 190 records of pink-footed geese were made during the TTTC of which 180 records were made on the southern side of the bridge. A monthly and winter peak count during the TTTC surveys of 1,021 geese was made on 9 March 2018, however the targeted goose roost surveys returned a monthly peak count of 3,249 geese in October 2017 which represents the overall winter peak for this species. Pink-footed geese were observed roosting on the mudflats and saltmarsh to the south east of the bridge during the goose roost surveys, with many remaining to feed whilst others left the roost site.	Open water Intertidal mud Saltmarsh
Red-breasted merganser *	A total of 27 records of red-breasted merganser were made during the TTTC surveys, with most records pertaining to loafing birds. A peak count of six birds was recorded in July 2017, February 2018 and April 2018. This species was more frequently recorded during the spring/summer months and more than half of the records were made in the southern sectors of the survey area. A peak winter count for red-breasted merganser of 6 birds was recorded.	Open water Intertidal mud
Redshank * ^	Redshank was recorded on most of the surveys during the TTTC survey period and were recorded throughout the tidal states. Records of redshank were made on both sides of the estuary and a monthly peak count of 120 was made on 6 October 2017. This count represents the winter peak count for this species. Notably more redshank were recorded over winter than in the spring/summer months during the TTTC surveys.	Intertidal mud Saltmarsh

Species	Species Accounts	Species Habitat Use with Relevance to Study Area (SNH 2016)
Ringed plover *	One loafing ringed plover was recorded in May in survey sector S2. This record was the only observation of ringed plover over the survey period. Habitats within the survey are suitable for this species for foraging, however ringed plover generally breed in coastal habitats.	Intertidal mud Saltmarsh
Sandwich tern * ^	Sandwich terns were mostly recorded in the summer, with a monthly peak count of 45 in August 2017. The majority of records pertain to small numbers of terns flying over the survey area. All records of tern were made in S1 and S2. A winter peak count of one was recorded during the surveys. No records of Sandwich tern were made between September 2017 to March 2018.	Open water Intertidal mud
Shelduck * ^	Shelduck was recorded frequently in the spring/summer and a monthly peak count of 680 shelduck was recorded on 31 July 2017 (590 roosting, and 90 feeding, on the mudflats to the south east of the bridge (survey sector S2)). A winter peak count of 31 shelduck was recorded during the surveys.	Open water Intertidal mud Saltmarsh
Wigeon *	A total of 89 records of wigeon were made during the TTTC with all but two records from the winter months. A monthly peak count of 136 wigeon was recorded in February 2018. This count also represents the winter peak count for this species. Wigeon was frequently recorded in the southern sectors of the survey area, with only one record of a pair of loafing wigeon on the north side of the estuary within the survey area.	Open water Intertidal mud Saltmarsh

* SPA Qualifying Interest

^ Ramsar Qualifying Interest

4 References

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Appendix C: Screening Matrices

1 Purpose of Appendix

1.1 This Appendix provides the Habitats Regulations Appraisal (HRA) Screening Matrices for the following European Sites:

- Firth of Forth Special Protection Area (SPA);
- Firth of Forth Ramsar site; and
- River Teith Special Area of Conservation (SAC).

1.2 Table 1 below presents the summary of potential effects on the designated sites considered in the screening assessment for the proposed scheme. Full screening matrices to be read in conjunction with the main report (Section 4: Stage One (Screening)) are presented in the subsequent sections within this appendix.

Table 1 Screening - Potential Effects Summary

European Site name and designation	Effects described in screening submission	Presented/considered in screening submission under:
Firth of Forth SPA	• Habitat loss leading to localised fragmentation/displacement of species • Disturbance (noise, vibration and visual) to species • Water quality changes leading to deterioration of feeding resources for species • Change in coastal processes leading to habitat deterioration/change	• Habitat Loss • Disturbance • Water Quality Changes • Change in Coastal Processes
Firth of Forth Ramsar	• Habitat loss leading to localised fragmentation/displacement of species • Disturbance (noise, vibration and visual) to species • Water quality changes leading to deterioration of feeding resources for species • Change in coastal processes leading to habitat deterioration/change	• Habitat Loss • Disturbance • Water Quality Changes • Change in Coastal Processes
River Teith SAC	• Habitat loss or severance of supporting habitat • Disturbance (noise, vibration and visual) to species • Water quality changes leading to deterioration of habitat for qualifying features • Change in coastal processes leading to habitat deterioration/change	• Habitat Loss • Disturbance • Water Quality Changes • Change in Coastal Processes

2 Firth of Forth SPA

Table 2: Screening Matrix for Firth of Forth SPA

Project	A985 Kincardine Bridge Piled Viaduct Replacement	
European Site under consideration	Firth of Forth SPA	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
2020	Jacobs	Transport Scotland
Description of Project		
Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European Site by virtue of:		
Size and scale (road type and probable traffic volume)	Replacement of existing piled viaduct; traffic volumes not anticipated to change on completion.	
Land-take	3.24ha (temporary)	
Distance from the European Site or key features of the site (from edge of project assessment corridor)	0km. The works are within the SPA.	
Resource requirements (from the European Site or from areas in proximity to the site, where of relevance to consideration of impacts.)	Temporary land-take from the SPA required for the construction of the temporary bridge and access. 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.	
Emissions (e.g. polluted surface water runoff – both soluble and insoluble pollutants, atmospheric pollution)	Accidental spillage and construction runoff during the construction phase of the proposed scheme. Potential changes in water quality from such pollution events during construction has the potential to have an indirect effect on qualifying species of the SPA through causing deterioration of saltmarsh and mudflat habitats, and thus the feeding resource for waders and waterfowl. However, best practice construction methods (CIRIA 2015) will be used including the use of appropriate pollution controls (i.e. Guidance for Pollution Prevention (GPPs)), such as construction drainage, a strict re-fuelling protocol and removal of all loose materials from the intertidal area. These measures are embedded within the proposed scheme design and are a legal obligation to be employed irrespective of the European designation of the site and are not specifically required to avoid LSE. Operational changes in water quality are not considered to differ significantly from the existing conditions at the Kincardine Bridge; however, a slight beneficial impact is anticipated as a result of the additional runoff treatment embedded in the proposed design.	
Excavation requirements (e.g. impacts of local hydrogeology)	Some excavation from the SPA is required for the construction of the proposed scheme. Localised and temporary changes in estuary bed and shoreline morphology are associated with the temporary works of the proposed scheme; the temporary bridge structure and construction working areas are located within the saltmarsh and below MHWS.	
Transportation requirements	Transportation of material to the works site will be undertaken using existing road infrastructure and is anticipated to involve concrete wagons and other heavy goods vehicles. The operational phase of the proposed scheme is unlikely to differ from the current situation with regards to traffic volumes.	
Duration of construction, operation, etc.	The Contractor will prepare a programme for the construction of works, which will be approved by Transport Scotland's representative on site. Although the exact programme for the construction works will be determined by the Contractor, a programme of between 18 and 24 months is estimated at this stage. The Design Working Life (DWL) for the replacement structure (with exception on replaceable structural parts such as safety barriers) is ≥120 years. Replaceable structural parts have a DWL of 50 years.	

Project	A985 Kincardine Bridge Piled Viaduct Replacement	
European Site under consideration	Firth of Forth SPA	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
2020	Jacobs	Transport Scotland
Description of Project		
Other	There is potential for disturbance to qualifying species of the SPA which are found within the inner Forth, during the construction of the proposed scheme from temporary lighting, piling works, construction traffic, demolition of the existing piers and decommissioning of the temporary bridge. Conventional construction techniques will be employed during the construction of the temporary structure and the replacement viaduct, to include piling (sheet and bored) from working areas on the saltmarsh.	
Description of avoidance and/or mitigation measures		
Describe any assumed (plainly established and uncontroversial) mitigation measures, including information on:		
Nature of proposals	Best practice construction methods (CIRIA 2015) will be used including the use of appropriate pollution controls (i.e. Guidance for Pollution Prevention (GPPs)), such as construction drainage, a strict re-fuelling protocol and removal of all loose materials from the intertidal area. These measures are embedded within the proposed scheme design and are a legal obligation to be employed irrespective of the European designation of the site and are not specifically required to avoid LSE.	
Location	Throughout the works site.	
Evidence for effectiveness	Best practice industry standard guidance.	
Mechanism for delivery (legal conditions, restriction or other legally enforceable obligations)	These measures are a legal obligation to be employed irrespective of the SPA designation.	
Characteristics of European Site(s)		
A brief description of the European site to be produced, including information on:		
Name of European Site and its EU code	Firth of Forth Special Protection Area (UK9004411)	
Location and distance of the European Site from the proposed works	0km. The works are within the SPA.	
European Site size	6317.93ha	
Key features of the European Site including the primary reasons for selection and any other qualifying interests	• 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 • 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 • Common scoter (*Melanitta nigra*), non-breeding* • Cormorant (*Phalacrocorax carbo*), non-breeding* • Curlew (*Numenius arquata*), non-breeding* • Dunlin (*Calidris alpina alpina*), non-breeding* • Eider (*Somateria mollissima*), non-breeding*	

Project	A985 Kincardine Bridge Piled Viaduct Replacement	
European Site under consideration	Firth of Forth SPA	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
2020	Jacobs	Transport Scotland
Description of Project		
	• Goldeneye (*Bucephala clangula*), non-breeding* • Great crested grebe (*Podiceps cristatus*), non-breeding* • Grey plover (*Pluvialis squatarola*), non-breeding* • Lapwing (*Vanellus vanellus*), non-breeding* • Long-tailed duck (*Clangula hyemalis*), non-breeding* • Mallard (*Anas platyrhynchos*), non-breeding* • Oystercatcher (*Haematopus ostralegus*), non-breeding* • Red-breasted merganser (*Mergus serrator*), non-breeding * • Ringed plover (*Charadrius hiaticula*), non-breeding* • Scaup (*Aythya marila*), non-breeding* • Velvet scoter (*Melanitta fusca*), non-breeding* • Wigeon (*Mareca penelope*), non-breeding* • Waterfowl assemblage, non-breeding *species also an assemblage qualifier.	
Vulnerability of the European Site – any information available from the standard data forms on potential effects pathways	• game/fisheries management • recreation/disturbance • water quality • climate change • natural event	
European Site conservation objectives – where these are readily available	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 • no significant disturbance of the species	
Assessment Criteria		
Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European Site.		
• Habitat loss and/or fragmentation resulting from the temporary working area; • Disturbance (e.g. noise, vibration, movement and lighting) resulting from construction phase of the proposed scheme (including construction of the working area, construction of the temporary bridge, demolition of the existing piled viaduct, construction of the replacement piled viaduct, and decommissioning of the temporary bridge and working area); • Changes in water quality (e.g. pollution) resulting from spillages/run-off from construction plant and working areas; • Changes in coastal processes (e.g. hydrology and sedimentation) resulting from the temporary works area and footprint of replacement viaduct.		
Initial Assessment		
The key characteristics of the site and the details of the European Site to be considered in identifying potential impacts. Describe any likely changes to the site arising as a result of:		
Reduction of habitat area	Temporary reduction of 2.99ha of saltmarsh habitat within the SPA.	

Project	A985 Kincardine Bridge Piled Viaduct Replacement	
European Site under consideration	Firth of Forth SPA	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
2020	Jacobs	Transport Scotland
Description of Project		
Disturbance to key species	There is potential for disturbance to qualifying species of the SPA which are found within the inner Forth, during the construction of the proposed scheme from temporary lighting, piling works, construction traffic, demolition of the existing piers and decommissioning of the temporary bridge. The following species are considered likely to be impacted by disturbance. • Bar-tailed godwit (non-breeding) • Golden plover (non-breeding) • Sandwich tern (passage) • Knot (non-breeding) • Pink-footed goose (non-breeding) • Redshank (non-breeding) • Shelduck (non-breeding) • Waterfowl assemblage (non-breeding) Turnstone (non-breeding), Slavonian grebe (non-breeding) and red-throated diver (non-breeding) are unlikely to be disturbed during construction as these species favours habitats within the outer Forth and were not recorded during survey to inform the impact assessment.	
Habitat or species fragmentation	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. The following species are considered likely to be impacted by habitat loss and localised fragmentation. • Bar-tailed godwit (non-breeding) • Golden plover (non-breeding) • Sandwich tern (passage) • Knot (non-breeding) • Pink-footed goose (non-breeding) • Redshank (non-breeding) • Shelduck (non-breeding) • Waterfowl assemblage (non-breeding) Turnstone (non-breeding), Slavonian grebe (non-breeding) and red-throated diver (non-breeding) are unlikely to be impacted as these species do not rely on saltmarsh and mudflat habitats which represent the dominant habitats around the proposed scheme.	
Reduction in species density	There is the potential for localised changes in species density resulting from species behaviour to disturbance. This impact is considered applicable to the following species due to their habitat preferences: • Bar-tailed godwit (non-breeding) • Golden plover (non-breeding) • Sandwich tern (passage) • Knot (non-breeding) • Pink-footed goose (non-breeding) • Redshank (non-breeding) • Shelduck (non-breeding) • Waterfowl assemblage (non-breeding)	

Project	A985 Kincardine Bridge Piled Viaduct Replacement	
European Site under consideration	Firth of Forth SPA	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
2020	Jacobs	Transport Scotland
Description of Project		
	A change or reduction in density of turnstone (non-breeding), Slavonian grebe (non-breeding) and red-throated diver (non-breeding) is unlikely; these species do not rely on saltmarsh and mudflat habitats which represent the dominant habitats around the proposed scheme.	
Changes in key indicators of conservation value (water quality, etc)	Potential changes in water quality from pollution events (e.g. accidental spillage and construction runoff) during construction has the potential to have an indirect effect on all qualifying species of the SPA site through causing deterioration of saltmarsh and mudflat habitats, and thus the feeding resource for waders and waterfowl. However, best practice construction methods (CIRIA 2015) will be used including the use of appropriate pollution controls (i.e. Guidance for Pollution Prevention (GPPs)), such as construction drainage, a strict re-fuelling protocol and removal of all loose materials from the intertidal area. These measures are embedded within the proposed scheme design and are a legal obligation to be employed irrespective of the designation. Operational changes in water quality are not considered to differ significantly from the existing conditions at the Kincardine Bridge; however, a slight beneficial impact is anticipated as a result of the additional runoff treatment embedded in the proposed design.	
Climate change	There are no implications from the works on climate change which could have an effect on the qualifying interests of the SPA. The works are small-scale and localised and the operational phase of the proposed scheme will not differ significantly from the current situation.	
Describe any likely impacts on the European Site as a whole in terms of:		
Interference with the key relationships that define the structure of the site	There is potential for disturbance to qualifying species of the SPA which are found within the inner Forth (as discussed above), during the construction of the proposed scheme from temporary lighting, piling works, construction traffic, demolition of the existing piled viaduct and decommissioning of the temporary bridge. This has the potential to cause localised changes in distribution of qualifying species during the construction. Temporary loss of saltmarsh habitat 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 (as discussed above). This has the potential to cause localised changes in distribution of qualifying species during the construction.	
Interference with key relationships that define the function of the site	Temporary loss of saltmarsh habitat 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. This has the potential to cause localised changes in distribution of qualifying species during the construction period, and into the operational period as the saltmarsh regenerates.	
Indicate the significance as a result of the identification of impacts set out above in terms of:		
Reduction of habitat area	Likely significant.	
Disturbance to key species	Likely significant.	
Habitat or species fragmentation	Likely significant.	
Loss	Likely significant.	
Fragmentation	Likely significant.	

Project	A985 Kincardine Bridge Piled Viaduct Replacement	
European Site under consideration	Firth of Forth SPA	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
2020	Jacobs	Transport Scotland
Description of Project		
Disruption	Likely significant.	
Disturbance	Likely significant.	
Change to key elements of the site (e.g. water quality, hydrological regime etc.)	Not significant.	
Describe from the above those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.		
• Reduction of habitat (saltmarsh) as a result of the construction phase has the potential to cause fragmentation/temporary loss of habitat for qualifying interests of the SPA, especially those which rely on saltmarsh as their primary habitat type over winter. This could change the distribution of species within the SPA through localised changes in distribution at Kincardine Bridge, as well as altering the extent of saltmarsh within the site during the during construction and operational phase of the scheme. The footprint of the proposed scheme, once operational, will require slightly less land take from the SPA (0.012ha) than the existing structures as fewer piers will be required for the support of the viaduct, however. • Disturbance during the construction phase has the potential to cause significant disturbance to qualifying species of the SPA.		
Outcome of screening stage (delete as appropriate)	Significant effects are likely/ ~~Sufficient uncertainty remains/~~ ~~Not likely to be significant effects~~	
Are the appropriate statutory environmental bodies in agreement with this conclusion (delete as appropriate and attach relevant correspondence).	YES~~/NO~~[1]	

3 Firth of Forth Ramsar

Table 3: Screening Matrix for Firth of Forth Ramsar

Project	A985 Kincardine Bridge Piled Viaduct Replacement	
European Site under consideration	Firth of Forth Ramsar	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
2020	Jacobs	Transport Scotland
Description of Project		
Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European Site by virtue of:		
Size and scale (road type and probable traffic volume)	Replacement of existing piled viaduct; traffic volumes not anticipated to change on completion.	
Land-take	3.24ha (temporary)	

[1] Correspondence from SNH to Jacobs on 31 July 2020 provides SNH's response to an early review of the draft HRA. Comments indicate agreement with the Screening Assessment, specifically "*We support […] the sites taken forward to Appropriate Assessment stage*". SNH will "*…review this in detail when [they] are formally consulted on the proposal*."

Project	A985 Kincardine Bridge Piled Viaduct Replacement	
European Site under consideration	Firth of Forth Ramsar	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
2020	Jacobs	Transport Scotland
Description of Project		
Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European Site by virtue of:		
Size and scale (road type and probable traffic volume)	Replacement of existing piled viaduct; traffic volumes not anticipated to change on completion.	
Distance from the European Site or key features of the site (from edge of project assessment corridor)	0km. The works are within the Ramsar site.	
Resource requirements (from the European Site or from areas in proximity to the site, where of relevance to consideration of impacts.	Temporary land-take from the SPA required for the construction of the temporary bridge and access. Works within the intertidal habitats (saltmarsh) may result in localised fragmentation/temporary loss of habitat for qualifying interests of the Ramsar, especially those which rely on saltmarsh as their primary habitat type over winter.	
Emissions (e.g. polluted surface water runoff – both soluble and insoluble pollutants, atmospheric pollution)	Accidental spillage and construction runoff during the construction phase of the proposed scheme. Potential changes in water quality from such pollution events during construction has the potential to have an indirect effect on qualifying species of the Ramsar through causing deterioration of saltmarsh and mudflat habitats, and thus the feeding resource for waders and waterfowl. Operational changes in water quality are not considered to differ significantly from the existing conditions at the Kincardine Bridge; however, a slight beneficial impact is anticipated as a result of the additional runoff treatment embedded in the proposed design.	
Excavation requirements (e.g. impacts of local hydrogeology)	Some excavation from the SPA is required for the construction of the proposed scheme. Localised and temporary changes in estuary bed and shoreline morphology are associated with the temporary works of the proposed scheme; the temporary bridge structure and construction working areas are located within the saltmarsh and below MHWS.	
Transportation requirements	Transportation of material to the works site will be undertaken using existing road infrastructure and is anticipated to involve concrete wagons and other heavy goods vehicles. The operational phase of the proposed scheme is unlikely to differ from the current situation with regards to traffic volumes.	
Duration of construction, operation, etc.	The Contractor will prepare a programme for the construction of works, which will be approved by Transport Scotland's representative on site. Although the exact programme for the construction works will be determined by the Contractor, a programme of 18 to 24 months is estimated at this stage. The Design Working Life (DWL) for the replacement structure (with exception on replaceable structural parts such as safety barriers) is ≥120 years. Replaceable structural parts have a DWL of 50 years.	
Other	There is potential for disturbance to qualifying species of the Ramsar which are found within the inner Forth, during the construction of the proposed scheme from temporary lighting, piling works, construction traffic, demolition of the existing piers and decommissioning of the temporary bridge. Conventional construction techniques will be employed during the construction of the temporary structure and the replacement viaduct, to include piling (sheet and bored) from working areas on the saltmarsh.	

Project	A985 Kincardine Bridge Piled Viaduct Replacement	
European Site under consideration	Firth of Forth Ramsar	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
2020	Jacobs	Transport Scotland
Description of Project		
Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European Site by virtue of:		
Size and scale (road type and probable traffic volume)	Replacement of existing piled viaduct; traffic volumes not anticipated to change on completion.	
Description of avoidance and/or mitigation measures		
Describe any assumed (plainly established and uncontroversial) mitigation measures, including information on:		
Nature of proposals	Best practice construction methods (CIRIA 2015) will be used including the use of appropriate pollution controls (i.e. Guidance for Pollution Prevention (GPPs)), such as construction drainage, a strict re-fuelling protocol and removal of all loose materials from the intertidal area.	
Location	Throughout the works site.	
Evidence for effectiveness	Best practice industry standard guidance.	
Mechanism for delivery (legal conditions, restriction or other legally enforceable obligations)	These measures are a legal obligation to be employed irrespective of the Ramsar designation.	
Characteristics of European Site(s)		
A brief description of the European site to be produced, including information on:		
Name of European Site and its EU code	Firth of Forth Ramsar (UK13017)	
Location and distance of the European Site from the proposed works	0km. The works are within the Ramsar site.	
European Site size	6313.68ha	
Key features of the European Site including the primary reasons for selection and any other qualifying interests	Waterfowl assemblage, non-breeding Qualifying interests/populations with peak counts in spring/autumn: • Pink-footed goose • Shelduck • Redshank • Turnstone Qualifying species/populations with peak counts in winter: • Slavonian grebe • Goldeneye • Knot • Bar-tailed godwit	
Vulnerability of the European Site – any information available from the standard data forms on potential effects pathways	• Game/fisheries management • Recreation/disturbance • Climate change • Water quality	
European Site conservation objectives – where these are readily available	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*'.	
Assessment Criteria		
Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European Site.		

Project	A985 Kincardine Bridge Piled Viaduct Replacement	
European Site under consideration	Firth of Forth Ramsar	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
2020	Jacobs	Transport Scotland
Description of Project		
Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European Site by virtue of:		
Size and scale (road type and probable traffic volume)	Replacement of existing piled viaduct; traffic volumes not anticipated to change on completion.	
• Habitat loss and/or fragmentation resulting from the temporary working area; • Disturbance (e.g. noise, vibration, movement and lighting) resulting from construction phase of the proposed scheme (including construction of the working area, construction of the temporary bridge, demolition of the existing piled viaduct, construction of the replacement piled viaduct, and decommissioning of the temporary bridge and working area); • Changes in water quality (e.g. pollution) resulting from spillages/run-off from construction plant and working areas; • Changes in coastal processes (e.g. hydrology and sedimentation) resulting from the temporary works area and footprint of replacement viaduct.		
Initial Assessment		
The key characteristics of the site and the details of the European Site to be considered in identifying potential impacts. Describe any likely changes to the site arising as a result of:		
Reduction of habitat area	Temporary reduction of 2.99ha of saltmarsh habitat within the Ramsar.	
Disturbance to key species	There is potential for disturbance to qualifying species of the Ramsar which are found within the inner Forth, during the construction of the proposed scheme from temporary lighting, piling works, construction traffic, demolition of the existing piers and decommissioning of the temporary bridge. The following species are considered likely to be impacted by disturbance. • Pink-footed goose • Shelduck • Redshank • Goldeneye • Knot • Bar-tailed godwit • Waterfowl assemblage Turnstone and Slavonian grebe are unlikely to be disturbed during construction as these species favours habitats within the outer Forth and were not recorded during survey to inform the impact assessment.	
Habitat or species fragmentation	Works within the intertidal habitats (saltmarsh) may result in localised fragmentation/temporary loss of habitat for qualifying interests of the Ramsar, especially those which rely on saltmarsh as their primary habitat type over winter. The following species are considered likely to be impacted by habitat loss and localised fragmentation. • Pink-footed goose • Shelduck • Redshank • Goldeneye • Knot • Bar-tailed godwit • Waterfowl assemblage	

Project	A985 Kincardine Bridge Piled Viaduct Replacement	
European Site under consideration	Firth of Forth Ramsar	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
2020	Jacobs	Transport Scotland
Description of Project		
Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European Site by virtue of:		
Size and scale (road type and probable traffic volume)	Replacement of existing piled viaduct; traffic volumes not anticipated to change on completion.	
	Turnstone and Slavonian grebe are unlikely to be impacted as these species do not rely on saltmarsh and mudflat habitats which represent the dominant habitats around the proposed scheme.	
Reduction in species density	There is the potential for localised changes in species density resulting from species behaviour to disturbance. This impact is considered applicable to the following species due to their habitat preferences: • Pink-footed goose • Shelduck • Redshank • Goldeneye • Knot • Bar-tailed godwit • Waterfowl assemblage A change or reduction in density of turnstone and Slavonian grebe is unlikely; these species do not rely on saltmarsh and mudflat habitats which represent the dominant habitats around the proposed scheme.	
Changes in key indicators of conservation value (water quality, etc)	Potential changes in water quality from pollution events (e.g. accidental spillage and construction runoff) during construction has the potential to have an indirect effect on all qualifying species of the Ramsar site through causing deterioration of saltmarsh and mudflat habitats, and thus the feeding resource for waders and waterfowl. However, best practice construction methods (CIRIA 2015) will be used including the use of appropriate pollution controls (i.e. Guidance for Pollution Prevention (GPPs)), such as construction drainage, a strict re-fuelling protocol and removal of all loose materials from the intertidal area. These measures are embedded within the proposed scheme design and are a legal obligation to be employed irrespective of the designation. Operational changes in water quality are not considered to differ significantly from the existing conditions at the Kincardine Bridge; however, a slight beneficial impact is anticipated as a result of the additional runoff treatment embedded in the proposed design.	
Climate change	There are no implications from the works on climate change which could have an effect on the qualifying interests of the Ramsar. The works are small-scale and localised and the operational phase of the proposed scheme will not differ significantly from the current situation.	
Describe any likely impacts on the European Site as a whole in terms of:		
Interference with the key relationships that define the structure of the site	There is potential for disturbance to qualifying species of the Ramsar which are found within the inner Forth, during the construction of the proposed scheme from temporary lighting, piling works, construction traffic, demolition of the existing piled viaduct and decommissioning of the temporary bridge. This has the potential to cause localised changes in distribution of qualifying species during the construction.	

Project	A985 Kincardine Bridge Piled Viaduct Replacement	
European Site under consideration	Firth of Forth Ramsar	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
2020	Jacobs	Transport Scotland
Description of Project		
Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European Site by virtue of:		
Size and scale (road type and probable traffic volume)	Replacement of existing piled viaduct; traffic volumes not anticipated to change on completion.	
	Temporary loss of saltmarsh habitat may result in localised fragmentation/temporary loss of habitat for qualifying interests of the Ramsar, especially those which rely on saltmarsh as their primary habitat type over winter. This has the potential to cause localised changes in distribution of qualifying species during the construction.	
Interference with key relationships that define the function of the site	Temporary loss of saltmarsh habitat may result in localised fragmentation/temporary loss of habitat for qualifying interests of the Ramsar, especially those which rely on saltmarsh as their primary habitat type over winter. This has the potential to cause localised changes in distribution of qualifying species during the construction period, and into the operational period as the saltmarsh regenerates.	
Indicate the significance as a result of the identification of impacts set out above in terms of:		
Reduction of habitat area	Likely significant.	
Disturbance to key species	Likely significant.	
Habitat or species fragmentation	Likely significant.	
Loss	Likely significant.	
Fragmentation	Likely significant.	
Disruption	Likely significant.	
Disturbance	Likely significant.	
Change to key elements of the site (e.g. water quality, hydrological regime etc.)	Not significant.	
Describe from the above those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.		
• Reduction of habitat (saltmarsh) as a result of the construction phase has the potential to cause fragmentation/temporary loss of habitat for qualifying interests of the Ramsar, especially those which rely on saltmarsh as their primary habitat type over winter. This could change the distribution of species within the SPA through localised changes in distribution at Kincardine Bridge, as well as altering the extent of saltmarsh within the site during the during construction and operational phases of the proposed scheme. The footprint of the proposed scheme, once operational, will require slightly less land take from the SPA (0.012ha) than the existing structures as fewer piers will be required for the support of the viaduct, however. • Disturbance during the construction phase has the potential to cause significant disturbance to qualifying species of the Ramsar.		
Outcome of screening stage (delete as appropriate)	Significant effects are likely/ ~~Sufficient uncertainty remains/~~ ~~Not likely to be significant effects~~	

Project	A985 Kincardine Bridge Piled Viaduct Replacement	
European Site under consideration	Firth of Forth Ramsar	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
2020	Jacobs	Transport Scotland
Description of Project		
Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European Site by virtue of:		
Size and scale (road type and probable traffic volume)	Replacement of existing piled viaduct; traffic volumes not anticipated to change on completion.	
Are the appropriate statutory environmental bodies in agreement with this conclusion (delete as appropriate and attach relevant correspondence).	YES~~/NO~~[2]	

4 River Teith SAC

Table 4: Screening Matrix for River Teith SAC

Project	A985 Kincardine Bridge Piled Viaduct Replacement	
European Site under consideration	River Teith SAC	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
2020	Jacobs	Transport Scotland
Description of Project		
Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European Site by virtue of:		
Size and scale (road type and probable traffic volume)	Replacement of existing piled viaduct; traffic volumes not anticipated to change on completion.	
Land-take	0ha	
Distance from the European Site or key features of the site (from edge of project assessment corridor)	Hydrologically connected to the proposed scheme. The SAC is located approximately 20km upstream of the proposed scheme.	
Resource requirements (from the European Site or from areas in proximity to the site, where of relevance to consideration of impacts.	No resource requirements for the proposed scheme that are of relevance to the SAC. No land-take from the SAC is required for the proposed scheme.	
Emissions (e.g. polluted surface water runoff – both soluble and insoluble pollutants, atmospheric pollution)	Potential changes in water quality from pollution events (e.g. accidental spillage and construction runoff) during construction is unlikely to have any effect on the SAC or its qualifying features. Operational changes in water quality are not considered to differ significantly from the existing conditions at the Kincardine Bridge; however, a slight beneficial impact is anticipated as a result of the additional runoff treatment embedded in the proposed design.	
Excavation requirements (e.g. impacts of local hydrogeology)	No excavation from the SAC required. Localised and temporary changes in estuary bed and shoreline morphology are associated with the temporary works of the proposed scheme; the temporary bridge structure and	

[2] Correspondence from SNH to Jacobs on 31 July 2020 provides SNH's response to an early review of the draft HRA. Comments indicate agreement with the Screening Assessment, specifically "*We support […] the sites taken forward to Appropriate Assessment stage*". SNH will "*…review this in detail when [they] are formally consulted on the proposal.*"

Project	A985 Kincardine Bridge Piled Viaduct Replacement	
European Site under consideration	River Teith SAC	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
2020	Jacobs	Transport Scotland
Description of Project		
	construction working areas are located within the saltmarsh and below MHWS. However this will have no effect on the SAC.	
Transportation requirements	Transportation of material to the works site will be undertaken using existing road infrastructure and is anticipated to involve concrete wagons and other heavy goods vehicles. The operational phase of the proposed scheme is unlikely to differ from the current situation with regards to traffic volumes.	
Duration of construction, operation, etc.	The Contractor will prepare a programme for the construction of works, which will be approved by Transport Scotland's representative on site. Although the exact programme for the construction works will be determined by the Contractor, a programme of 18 to 24 months is estimated at this stage. The Design Working Life (DWL) for the replacement structure (with exception on replaceable structural parts such as safety barriers) is ≥120 years. Replaceable structural parts have a DWL of 50 years.	
Other	The proposed scheme is located 20km downstream of the SAC, however lamprey species and Atlantic salmon will migrate through the Firth of Forth. The Firth of Forth is a wide estuary and the proposed scheme is localised to the southern extent of the bridge, within the saltmarsh habitat. The proposed works have the potential to cause disturbance during construction. Anthropogenic noise is known to cause behavioural (avoidance) and physiological (barotrauma - tissue injury due to rapid changes in pressure) effects on fish. However, the effects vary among different species, with species without swim bladders (such as lamprey) likely to be least sensitive (Popper, Hawkins, Fay, Mann, Bartol, Carlson, Coombs, Ellison, Gentry, Halvorsen, Lokkeborg, Rogers, Southall, Zeddies and Tavolga 2014). Furthermore, a study in the Humber Estuary predicted, for the 'loudest' impact piling (2.1m diameter steel tubular pile and 400kJ hammer), distances of 20m for physical injury and 490m for avoidance behaviour in Atlantic salmon (Mason and Collett 2011). The estuary at Kincardine is considered wide enough that, during bored piling which produces less noise than impact piling (Dazey, McIntosh, Brown and Dudzinski 2012), there would be a sufficient migratory corridor maintained and any effect on migratory species would be minor. In addition, the duration of sheet piling operations is anticipated to be short and any impact on migratory fish would be minor and not significant. Furthermore, 24-hour working is not proposed as part of the works programme, therefore there will be a time in each 24-hour period where there is no construction disturbance when fish can migrate through the area without experiencing disturbance above that which is already present at Kincardine. No potential for LSE from construction or operational disturbance is identified.	
Description of avoidance and/or mitigation measures		
Describe any assumed (plainly established and uncontroversial) mitigation measures, including information on:		
Nature of proposals	Best practice construction methods (CIRIA 2015) will be used including the use of appropriate pollution controls (i.e. Guidance for Pollution Prevention (GPPs)), such as construction drainage, a strict re-fuelling protocol and removal of all loose materials from the intertidal area.	

Project	A985 Kincardine Bridge Piled Viaduct Replacement	
European Site under consideration	River Teith SAC	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
2020	Jacobs	Transport Scotland
Description of Project		
Location	Throughout the works site.	
Evidence for effectiveness	Best practice industry standard guidance.	
Mechanism for delivery (legal conditions, restriction or other legally enforceable obligations)	These measures are a legal obligation to be employed irrespective of the SAC designation.	
Characteristics of European Site(s)		
A brief description of the European site to be produced, including information on:		
Name of European Site and its EU code	River Teith SAC (UK0030263)	
Location and distance of the European Site from the proposed works	20km upstream of the works.	
European Site size	1289.33ha	
Key features of the European Site including the primary reasons for selection and any other qualifying interests	• Sea lamprey (*Petromyzon marinus*) • Brook lamprey (*Lampetra planeri*) • River lamprey (*Lampetra fluviatilis*) • Atlantic salmon (*Salmo salar*)	
Vulnerability of the European Site – any information available from the standard data forms on potential effects pathways	• forestry operation • invasive species • water quality • water management	
European Site conservation objectives – where these are readily available	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 • no significant disturbance of the species	
Assessment Criteria		
Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European Site.		
• Disturbance (e.g. noise, vibration, movement and lighting) resulting from construction phase of the proposed scheme (including construction of the working area, construction of the temporary bridge, demolition of the existing pier, construction of the replacement pier, and decommissioning of the temporary bridge and working area); • Changes in water quality (e.g. pollution) resulting from spillages/run-off from construction plant and working areas; • Changes in coastal processes (e.g. hydrology and sedimentation) resulting from the temporary works area and footprint of replacement viaduct.		
Initial Assessment		

Project	A985 Kincardine Bridge Piled Viaduct Replacement	
European Site under consideration	River Teith SAC	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
2020	Jacobs	Transport Scotland
Description of Project		
The key characteristics of the site and the details of the European Site to be considered in identifying potential impacts. Describe any likely changes to the site arising as a result of:		
Reduction of habitat area	No land-take from the SAC is required for the proposed scheme.	
Disturbance to key species	The proposed scheme is located 20km downstream of the SAC, however lamprey species and Atlantic salmon will migrate through the Firth of Forth. The Firth of Forth is a wide estuary and the proposed scheme is localised to the southern extent of the bridge, within the saltmarsh habitat. The proposed works have the potential to cause disturbance during construction, however it is not considered that it would have a significant effect on lamprey species or Atlantic salmon migration. Although narrower in the area of Kincardine Bridge, the estuary is considered wide enough that, during use of bored piling which produces less noise than impact piling (Dazey, McIntosh, Brown and Dudzinski 2012), there would be a sufficient migratory corridor maintained and any effect on migratory species would be minor.	
Habitat or species fragmentation	There will be no loss or severance of supporting habitat for lamprey species or Atlantic salmon as all the works are localised to the saltmarsh at the southern extent of Kincardine Bridge.	
Reduction in species density	There will be no reduction in species density of lamprey species or Atlantic salmon; all the works are localised to the saltmarsh at the southern extent of Kincardine Bridge.	
Changes in key indicators of conservation value (water quality, etc)	The proposed scheme is located 20km downstream of the SAC. Potential changes in water quality from pollution events (e.g. accidental spillage and construction runoff) during construction is unlikely to have any effect on the SAC or its qualifying features. Furthermore, best practice construction methods (CIRIA 2015) will be used including the use of appropriate pollution controls (i.e. Guidance for Pollution Prevention (GPPs)), such as construction drainage, a strict re-fuelling protocol and removal of all loose materials from the intertidal area to mitigate for any potential water quality impacts. These measures are embedded within the proposed scheme design and are a legal obligation to be employed irrespective of the designation of the site. Operational changes in water quality are not considered to differ significantly from the existing conditions at the Kincardine Bridge; however, a slight beneficial impact is anticipated as a result of the additional runoff treatment embedded in the proposed design.	
Climate change	There are no implications from the works on climate change which could have an effect on the qualifying interests of the SAC. The works are small-scale and localised and the operational phase of the proposed scheme will not differ significantly from the current situation.	
Describe any likely impacts on the European Site as a whole in terms of:		
Interference with the key relationships that define the structure of the site	None identified.	
Interference with key relationships that define the function of the site	None identified.	
Indicate the significance as a result of the identification of impacts set out above in terms of:		
Reduction of habitat area	Not applicable.	

Project	A985 Kincardine Bridge Piled Viaduct Replacement	
European Site under consideration	River Teith SAC	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
2020	Jacobs	Transport Scotland
Description of Project		
Disturbance to key species	Not applicable.	
Habitat or species fragmentation	Not applicable.	
Loss	Not applicable.	
Fragmentation	Not applicable.	
Disruption	Not applicable.	
Disturbance	Not applicable.	
Change to key elements of the site (e.g. water quality, hydrological regime etc.)	Not applicable.	
Describe from the above those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.		
Not applicable.		
Outcome of screening stage (delete as appropriate)	~~Significant effects are likely/~~ ~~Sufficient uncertainty remains/~~ Not likely to be significant effects	
Are the appropriate statutory environmental bodies in agreement with this conclusion (delete as appropriate and attach relevant correspondence).	YES~~/NO~~[3]	

[3] Correspondence from SNH to Jacobs on 31 July 2020 provides SNH's response to an early review of the draft HRA. Comments indicate agreement with the Screening Assessment, specifically "*We support […] the sites taken forward to Appropriate Assessment stage*". SNH will "*…review this in detail when [they] are formally consulted on the proposal.*"

5 References

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