Forth Road Bridge Ten-Year Marine Licence
Habitats Regulations Appraisal
Appendix D - Tern Species Management Plan

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BEAR Scotland

Forth Road Bridge Ten-Year Marine Licence
December 2025

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Acronyms and abbreviations

Acronym	Definition
AA	Appropriate Assessment
BTO	British Trust for Ornithology
CIEEM	Chartered Institute of Ecology and Environmental Management
CNMP	Construction Noise Management Plan
ECoW	Ecological Clerk of Works
FRB	Forth Road Bridge
HPAI	Highly Pathogenic Avian Influenza
HRA	Habitats Regulation Appraisal
LCI	Long Craig Island
QC	Queensferry Crossing
SAC	Special Areas of Conservation
SEMP	Site Environmental Management Plan
SEPA	Scottish Environment Protection Agency
SMP	Species Management Plan
SPA	Special Protection Area
SSSI	Site of Specific Scientific Interest
WeBS	Wetland Bird Survey
ZoI	Zone of Influence

1. Introduction

1.1 Background

Jacobs UK Limited (hereafter 'Jacobs') have been commissioned by BEAR Scotland to undertake a Habitats Regulations Appraisal (HRA), in support of a ten-year Marine Licence application for the planned ongoing maintenance works ('the Proposed Works') on the Forth Road Bridge (FRB). The current licence expires 30 September 2026; however, it is proposed that the new Licence will commence from 1 May 2026. BEAR Scotland is the Operating Company for the FRB on behalf of Transport Scotland until at least 2028. Should the Operating Company change during the ten-year period of the licence, responsibility for implementing this SMP would transfer to the new Operating Company.

The HRA, including an Appropriate Assessment (AA) produced by Jacobs in relation to the Proposed Works identified the requirement for mitigation to be implemented to safeguard three European/Ramsar sites and ensure that no adverse effect on site integrity arises as a result of the works, specifically in respect of disturbance to tern species. The sites are the Firth of Forth Special Protection Area (SPA) and the Firth of Forth Ramsar site, which cover the same area and have the same qualifying interests, and the Forth Islands SPA.

Of relevance to this Species Management Plan (SMP), the Forth Islands SPA is designated for four breeding terns: common tern (*Sterna hirundo*), Arctic tern (*Sterna paradisaea*), Sandwich tern (*Thalasseus sandvicensis*) and roseate tern (*Sterna dougallii*). The Firth of Forth SPA and Ramsar sites are designated for passage Sandwich tern (among other waterbirds).

This SMP collates the mitigation identified as required by the HRA process and provides additional information on its implementation and monitoring. It forms Appendix D of the main HRA text.

1.2 Purpose of the Document

This is a live document that consolidates the avoidance and mitigation measures identified as required in the HRA for the Proposed Works in order to avoid adverse effects on site integrity of the Forth Islands SPA and the Firth of Forth SPA/Ramsar. This is an essential requirement of the HRA process. As such, the implementation of this SMP will be a specification in the contract for the Proposed Works.

The SMP provides a framework to prevent or minimise any potential impacts of the Proposed Works on terns and their supporting habitat. The measures identified are required specifically in relation to terns on Long Craig Island (LCI), both breeding and during the passage period, which is one of the constituent islands of the Forth Islands SPA and located directly beneath the FRB. The measures will also help to remove or reduce effects on other bird species, including other qualifying interests of European and Ramsar sites and notably of the Firth of Forth SPA/Ramsar.

The document details the mechanisms of the environmental commitments required in relation to terns throughout the ten-year duration of the Marine Licence. Information contained in this report is drawn from relevant sections of the HRA for the Proposed Works. This document provides the mitigation required to be implemented, alongside the Construction Noise Management Plan (CNMP), which is Appendix E of the main HRA text.

1.3 Structure of the document

The following sections provide a brief overview of the ecology of the tern species relevant to this SMP and their use of the Firth of Forth estuary, and in particular LCI. Thereafter follows details of the roles and responsibilities for implementing the SMP. In addition, there is a summary of the effects that may result from

the works activities and the associated mitigation and monitoring required to ensure no adverse effects arise on the integrity of the European/Ramsar sites.

2. European/Ramsar sites

2.1 Legislation

The Habitats Regulations (Conservation (Natural Habitats, &c.) Regulations 1994) translated the European Union Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) into UK legislation to protect sites that are internationally important for threatened habitats and species (European sites) and to create a legal framework for species requiring strict protection. The Habitats Directive was adopted in 1992 by the European Community (as was) as the Community's response to the Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention).

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

European sites comprise SPAs (classified under the Birds Directive) and Special Areas of Conservation (SACs) (classified under the Habitats Directive) and form part of an international network of protected sites. Prior to leaving the EU, Scotland's sites contributed to the Natura network and now form part of the Emerald Network, spanning Europe and into Africa. The Emerald Network was launched by the Council of Europe as part of its work under the Bern Convention.

Whilst not a European site designation, wetland sites designated under the Convention on Wetlands of International Importance, known as Ramsar sites after the 1971 Ramsar Convention, are also relevant since they are afforded the same level of protection as European sites under domestic policy and treated in the same way as the UK site network. Most Ramsar sites in Scotland are either designated SPAs or SACs, although not always necessarily sharing the same qualifying interests (NatureScot, 2025a).

The Habitats Regulations continue to require that an 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 is likely to have a significant effect either individually or in combination with other plans or projects.

2.2 Forth Islands SPA

Forth Islands SPA (NatureScot Site Code 8500, EU Site Code UK9004171) (NatureScot, 2025b) covers a series of islands in the Forth Estuary, one of which is LCI (Figures 1-3) which supports a breeding tern colony. The FRB passes directly over LCI at a height of approximately 50m to road level and approximately 44m to the underside of the walkway. Amongst the qualifying interests of the site, and relevant to this document, are:

- Arctic tern (breeding);
- common tern (breeding);
- roseate tern (breeding); and
- Sandwich tern (breeding).

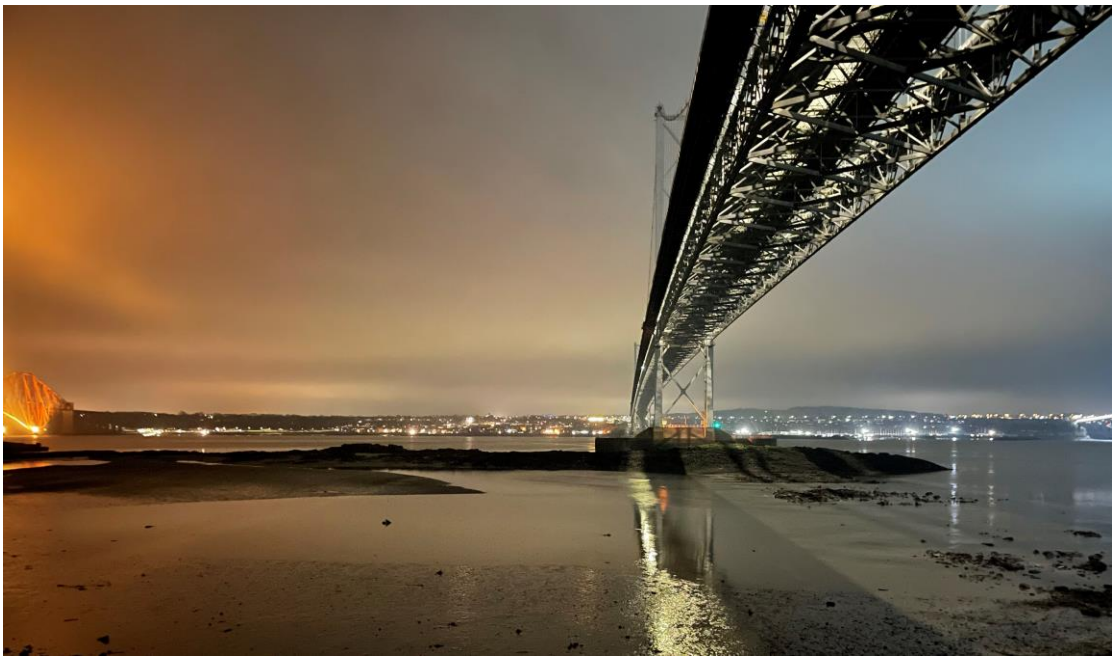


Figure 1: Long Craig Island at low tide

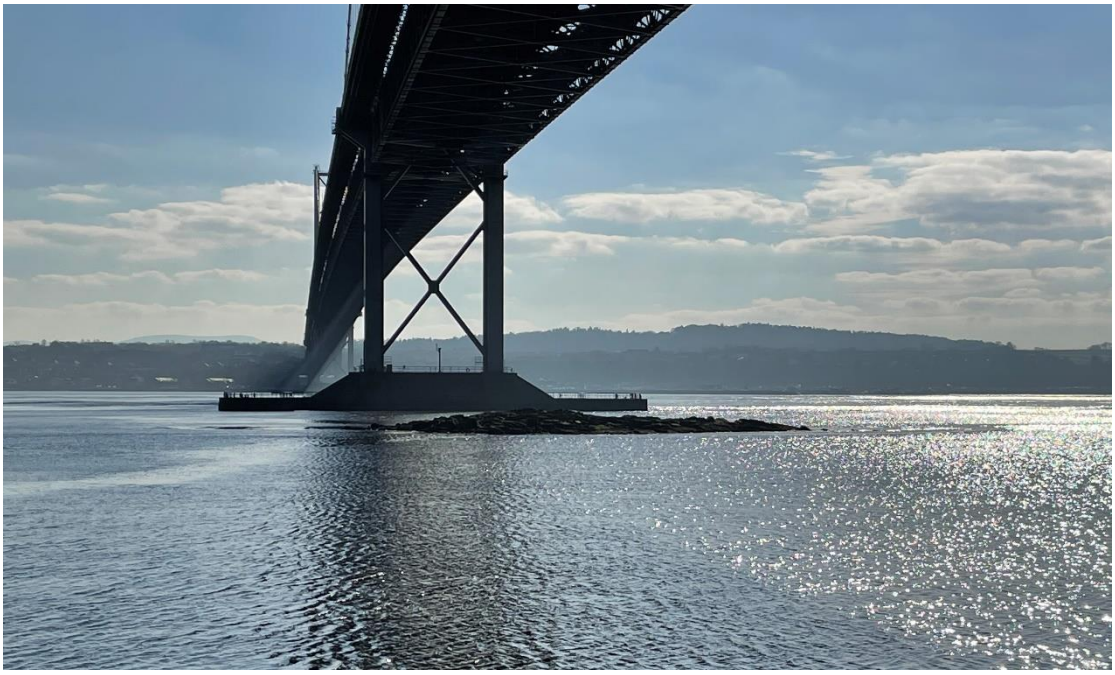


Figure 2: Long Craig Island at high tide. A small part of the island is located out of sight to the left (east)

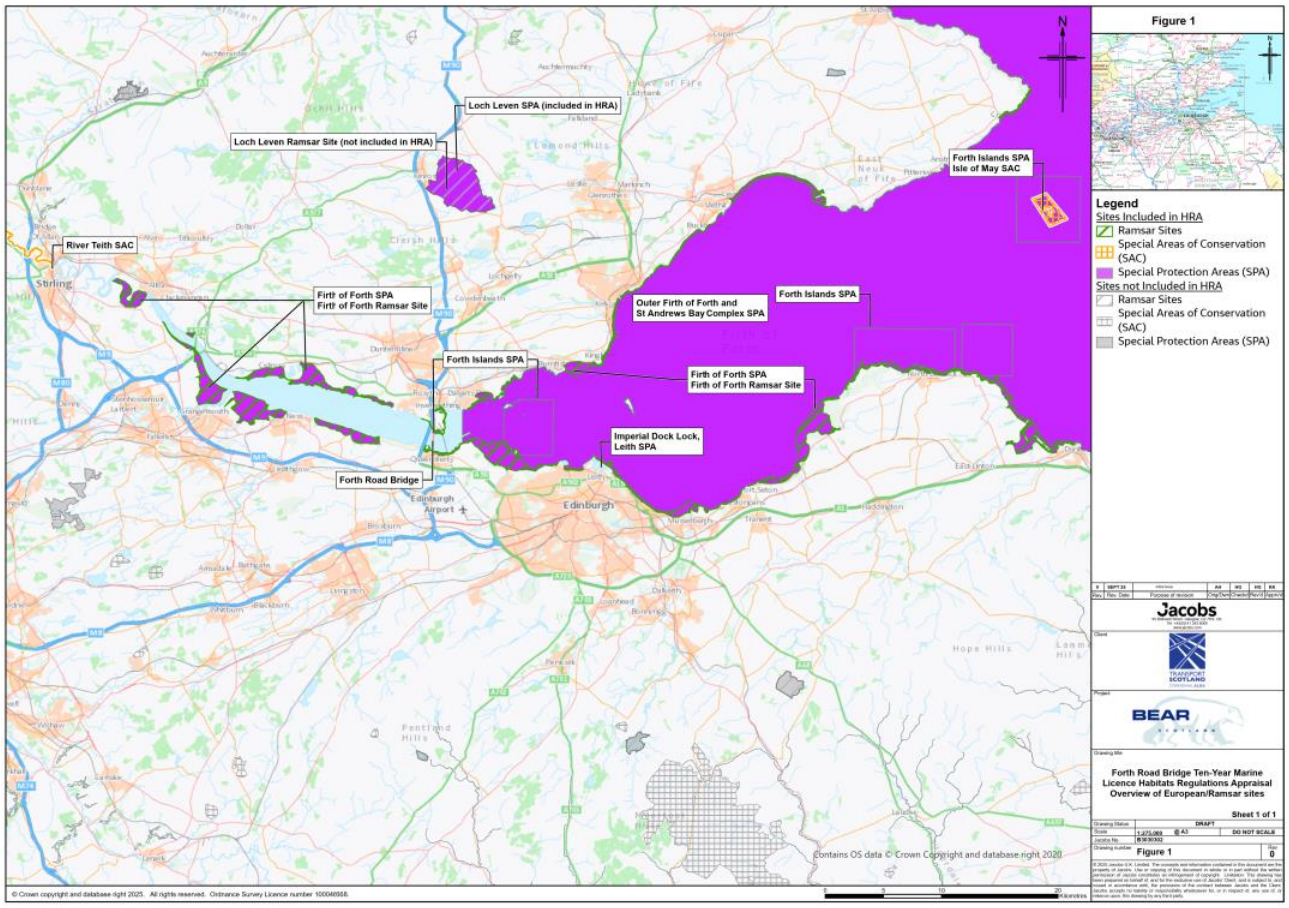


Figure 3: Location of Proposed Works and adjacent European/Ramsar sites

2.3 Firth of Forth SPA/Firth of Forth Ramsar

Firth of Forth SPA (NatureScot Site Code 8499, EU Site Code UK9004411) (NatureScot, 2025c) and Ramsar site (NatureScot Site Code 8424, EU Site Code UK13017) (NatureScot, 2025d) cover approximately 6,300ha of the estuary. The area comprises a mosaic of estuarine and coastal habitats spanning the length of the Forth Estuary. The intertidal mudflats, saltmarsh, rocky shores and bays that provide important food sources and shelter for the qualifying wintering birds and passage migrants are included within the extensive designated site boundary. The qualifying interest of both sites relevant to this document is Sandwich tern which use LCI and Port Edgar during the passage period. The FRB passes over the Firth of Forth SPA/Ramsar, as shown in Figure 3.

3. Tern Species

The following section provides an introduction to tern ecology as relevant to this SMP and the distribution of tern species within the Firth of Forth.

3.1 Common tern

Common tern is a summer visitor to the UK and is primarily a marine species in Scotland, although colonies are often found inland across its global range. After breeding, some birds can remain in the Firth of Forth until as late as October, before moving south to winter off the coast of West Africa.

Common terns forage over inshore and offshore waters, diving into water to catch small fish, principally sand eels (*Ammodytidae sp.*), small herrings (*Clupea harengus*) and sprats (*Sprattus sprattus).*

Data relating to the common tern colony on LCI has been collated through the Scottish Wildlife Trust (SWT) from the roseate tern LIFE project and Royal Society for the Protection of Birds (RSPB) for the period 1981-2020, together with data from Jacobs Ecological Clerk of Works (ECoW) monitoring for the period 2021-2025.

Common tern is the primary tern species currently breeding at LCI, with peaks in 2025 of 195 adults, 34 nests and an estimated 17-24 successfully fledged young (Appendix B Bird Data). Note that of the 195 adults, only 56 were on LCI itself, with others loafing, roosting or preening on exposed sand nearby and it is likely that some of these 195 birds were not breeding on the island. The peak count of adults on the island in 2025 was 85. Nevertheless, this site has long been considered one of the most important for common tern within the Forth Islands SPA (Knowles, 2019).

Census data for the colony held between 1981 and 2020 (Appendix B Bird Data) indicates a broad trend of stable or increasing but highly fluctuating numbers of breeding pairs/adults on nests (Figure 4), and unchanged or decreasing productivity, measured as chicks fledged per breeding pair/nest (Figure 5). Productivity peaked in 2003 at 1.33 chicks per nest or pair.

Figure 4: Census data over time at LCI

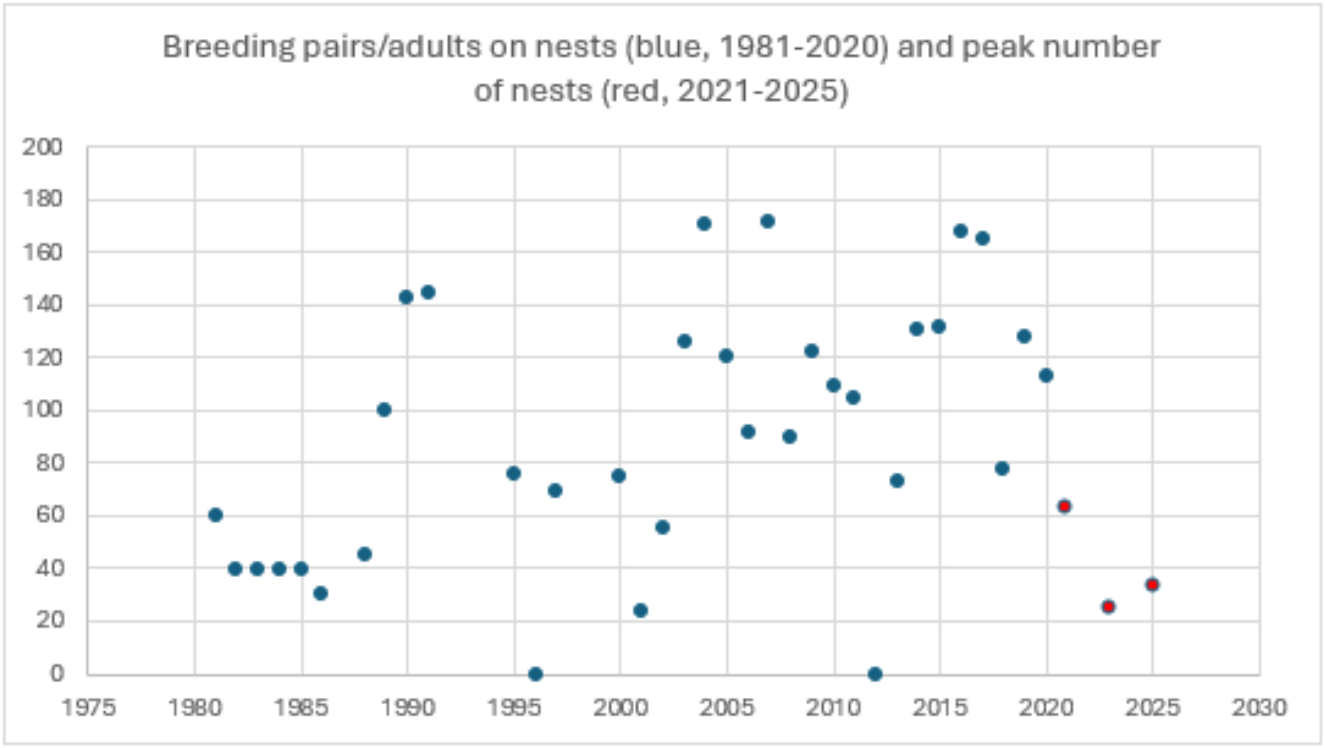
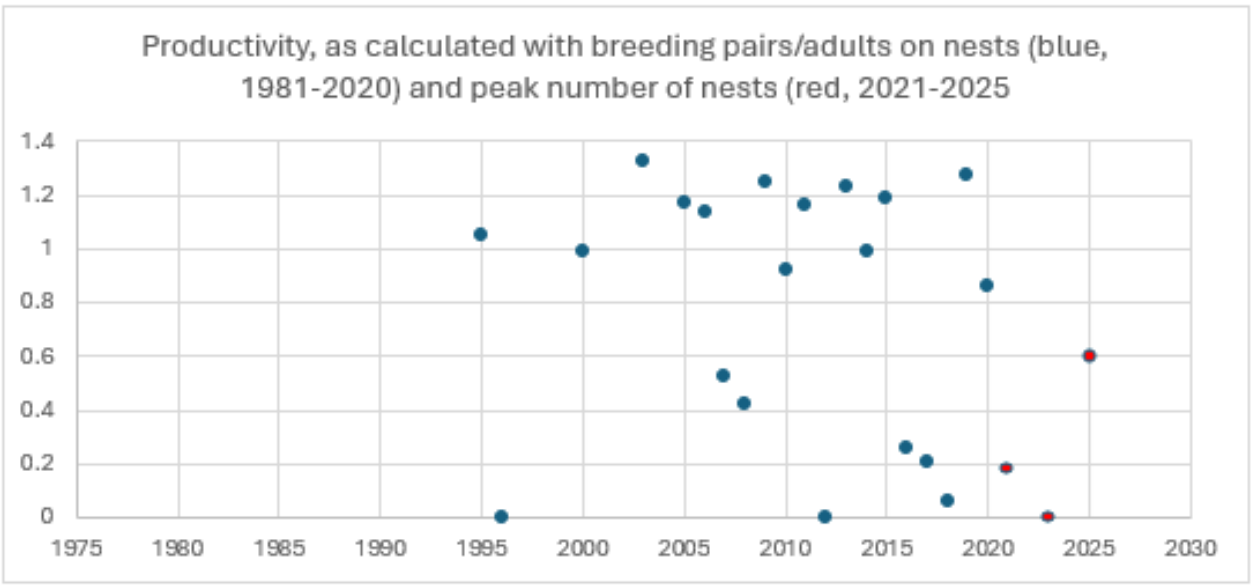


Figure 5: **Productivity of common terns over time at LCI**



Due to uncertainty over the method of data collection prior to 2021 the data has been distinguished separately for 2021, 2023 and 2025. No data is held for 2022 or 2024 since no works requiring a tern ECoW were undertaken and these years are therefore excluded.

Productivity has been consistently low in recent years; in seven out of the eight most recent years in which productivity was recorded, the figure was less than one chick per nest, albeit in 2019 saw the highest since 2003.

Wetland Bird Survey (WeBS) data provided by the British Trust for Ornithology (BTO) show that common terns were present throughout the breeding season during each survey period (starting in July and continuing

through to the following June) between 2019/2020 and 2023/2024, with a peak count of 161 individuals in August 2019 in the Hound Point to South Queensferry sector, on the south side of the estuary.

NatureScot consultation advice in 2021 (NatureScot, 2021) identified 1 May to 15 August inclusive to be the sensitive period for breeding common terns. Jacobs' data broadly corroborates this arrival date (Annex A, Table A1), with arrival in the first week of May in 2021, 2023 and 2025. The only year for which fledging data is available is 2025, and in this year all tern chicks had fledged or nests failed by 22 August. In 2021, between 5 and 18 chicks had fledged by the time of the abandonment on 22 July, and no chicks had fledged by the time of the abandonment in 2023, on 17 July. In both years eggs and unfledged chicks remained at the time of abandonment. As such, it is considered that the end of the sensitive period should be considered whenever all chicks have fledged, which may extend beyond 15 August. In order to allow for the Operating Company and Contractor to effectively plan works, it is therefore recommended that a date of 1 September is used as the assumed end of fledging unless identified earlier through ECoW. Should chicks remain unfledged after this date, it is considered likely that they will be very close to fledging, and that works packages planned for outwith the breeding period can therefore proceed. Depending on the nature of works it may be appropriate to include additional mitigation to limit any disturbance, however it is acknowledged that this may not be possible due to requirement for the Contractor to plan.

It should be noted that some birds will remain in the Firth of Forth beyond the date when all chicks fledge as fledged birds may continue to be dependent on their parents for some time and are likely to remain near the nesting location (Jennings, 2012) for two to three months.

Clutch size is typically 2-3 eggs, with incubation lasting 21-22 days. Young leave the nest 3-4 days after hatching and hide nearby while waiting to be fed. They begin to fly at 22-28 days and are not fully independent until 2-3 months (Ferguson-Lees et al., 2011).

3.2 Roseate tern

Roseate tern is the rarest breeding seabird in the UK and the species is 'red-listed' in the Birds of Conservation Concern (Stanbury et al., 2021). In addition to its European designation, LCI is designated as a Site of Special Scientific Interest (SSSI) for roseate tern. The birds first bred there in 1981, and numbers peaked in 1991 with 21 pairs (NatureScot, 2011). However, this species has not been recorded breeding on the island since 2009 (Knowles, 2019).

Roseate terns visiting the Firth of Forth area since 2009 are considered likely to be from colonies in Northumberland (Scottish Natural Heritage (SNH, now NatureScot), 2016). This species winters off West Africa and arrives in Scottish waters between late April and early June. As with common tern, roseate terns feed on small fish caught by plunge diving. Some adult roseate terns exhibit kleptoparasitic behaviour whereby they steal fish from other terns (Shealer and Spendelow, 2002).

It is reported that a common x roseate hybrid pair successfully fledged a chick in 2019. What is likely the same pair were present but did not breed successfully in 2020 (Knowles 2020). One suspected hybrid common x roseate individual was recorded sitting on a nest on LCI in 2023 but the colony failed that year. A suspected hybrid common x roseate tern was also observed on LCI on two days in July 2025. There are no roseate tern records contained in WeBS data from 2014/2015 to 2023/2024; however, such surveys typically represent a limited snapshot in time.

Roseate terns rely on the protection of the more aggressive and numerous common (and where present Arctic) tern at nesting sites. Sandwich terns are reported to outcompete roseate terns when breeding in proximity. Therefore, common tern colonies are considered ideal for roseate terns to occupy. As a result, the welfare of the other terns (particularly common tern) in the Firth of Forth is vital if roseate terns are to return as a breeding species: NatureScot have identified LCI as being essential to the recolonisation of the Firth of Forth by roseate tern.

3.3 Arctic tern

Arctic terns typically arrive in the UK from mid-April onwards. Historically, this species nested on several of the Forth Islands, including LCI and nearby Inchmickery (NatureScot, 2024), but since 1998 Arctic tern has only been recorded nesting on the Isle of May (SNH, 2016) and Great Carr (Knowles, 2018). The Forth Islands SPA Conservation and Management Advice (NatureScot, 2024) reports that Arctic tern populations have decreased by 35% in the UK since the Seabird 2000 census (1998-2002) and by 54% in Scotland (Burnell et al., 2023). Monitoring in 2023 indicated a decline of 5% in Scotland due to highly pathogenic avian influenza (HPAI) (Tremlett et al., 2024).

Arctic tern was not reported in the vicinity of FRB in the WeBS datasets for the ten-year period 2014 to 2024 and it was not recorded during ECoW monitoring during 2021–2025 or surveys of Port Edgar undertaken during July to September 2025. The Forth Islands Tern Warden Season Reports (Knowles, 2017, 2018 & 2019) noted its only breeding site in the Forth in those years was the Isle of May. Data obtained as part of environmental studies ahead of the construction of the Queensferry Crossing (QC) data did record small numbers of Arctic tern in the autumn/winter of 2007 and 2008, with a peak of 10 in October 2007 (Jacobs Arup, 2009). In 2008, most records were from Port Edgar. They were described as rarely observed in the wider survey area for estuarine birds and as making very little use of the inner Forth estuary in the vicinity of the QC. Furthermore, Arctic terns are known to forage more frequently in the outer Forth (SNH, 2016). The FRB area is not considered to be important for this species.

3.4 Sandwich tern

Sandwich terns build in large numbers in the Forth in July and August, after breeding. Most birds leave by the end of September before spending the winter off West Africa. For the purposes of this SMP, the Sandwich tern passage period is taken to be 1 July to 30 September, or whenever the last Sandwich terns leave the area if earlier.

In 2025, Sandwich tern surveys were conducted weekly at Port Edgar between 1 July and 30 September. These surveys generally comprised a daytime watch of 1-2 hours focussing on key locations within Port Edgar, namely the east and west breakwaters, the purpose-built tern raft and the floating tyre raft. Sandwich terns were not recorded until 21 August and were last observed on 18 September.

Sandwich terns will roost across a range of habitats, including offshore islands, rocks, estuaries and coastal lagoons, and can be displaced from roost sites due to disturbance, predation and gull (Laridae) colony presence (SNH, 2016). Like the other tern species, Sandwich terns feed on small fish by aerial diving. They often nest in mixed colonies with other terns and gulls. Historically the species bred in the Forth, with 1100 pairs noted in 1962 (Bruce, 2010) but has not bred on LCI in recent years. Their breeding sites within the SPA are now restricted to a small population on the Isle of May (Knowles, 2017; Knowles, 2018; Knowles, 2019). Other birds in the Forth have been identified as originating from breeding sites elsewhere in Scotland, England, Belgium and The Netherlands (SNH, 2016).

Sandwich tern was recorded in the Hound Point to South Queensferry WeBS sector with a peak count of 50 in August 2020 and in the Forth Cult Ness sector with a peak count of 16 birds in August 2019. The peak number recorded during Jacobs 2025 surveys of Port Edgar was 52 juveniles (0 adults) on 29 August, and on 1 September 18 adults (0 juveniles) were recorded.

The peaks across all locations correspond with the height of the main passage season (July to September). These numbers are a notable decrease from QC data which recorded peak numbers of 596 in 2007 and 429 in 2008 between Port Edgar and LCI, which is over a quarter of the cited Firth of Forth SPA population. The cited Firth of Forth SPA population is a winter peak mean during the five-year period 1993/94 to 1997/98 of 1,617 individuals (6% of the GB population). This species is also considered to have undergone population-level impacts resulting from HPAI in at least some parts of its European range (Knief et al., 2024).

As detailed in the HRA, the scientific literature increasingly supports the idea that Sandwich tern have low sensitivity to human disturbance away from breeding colonies and that Sandwich terns foraging or commuting over the sea do not appear to be disturbed by the presence of people. A Zone of Influence (ZoI) of 50m is used for the species based on Goodship and Furness (2019). The key habitat of Port Edgar lies outwith the ZoI from the Proposed Works for this species. Whilst LCI is also used by Sandwich tern, the HRA assesses that there is a wide availability of alternative suitable habitat and no specific mitigation is required for this species.

4. Potential Impacts

Noise and visual disturbance related to the Proposed Works could potentially deter tern species from foraging in the open water adjacent to the FRB and successfully breeding on LCI. The potential for items being dropped from the bridge and resulting in direct mortality of adults or nests was also considered. The HRA identified that mitigation, in the form of protection measures, was required to address these potential impacts.

LCI is the only area of the Forth Islands SPA that falls within the 300m ZoI defined in the HRA, and is the only suitable habitat for breeding terns within the ZoI. LCI is currently considered key supporting habitat for common tern. Arctic tern, Sandwich tern and roseate tern do not currently breed on LCI. However, the measures proposed would help to maintain or restore conditions that would be potentially suitable for breeding of these species, of which roseate tern is a conservation priority. In addition, the measures proposed would help to minimise disturbance to those qualifying interests of the Firth of Forth SPA/Ramsar which may use habitats adjacent to the bridge.

Data collected during 2021-2025 inclusive indicate that 58% of potential disturbance events from any source experienced by the colony do not result in a response from the birds. Furthermore, 97% of activities that do result in a response from the birds are not linked to works on the FRB. Of the 97% of non-works related disturbances to the birds, the cause could not be identified in 62% of cases.

The common tern colony on LCI has experienced a decline in breeding success. This has coincided with an observed increase in the frequency of extreme weather events such as storms, with waves and winds that can lead to nest and chick destruction, which it is considered may in part be a result of global climate change trends. This is thought to have been a factor in the colony failure in 2023. Another likely contributor is HPAI which has significantly impacted UK wild bird populations since 2021, coinciding with when ECoW monitoring of the colony began.

Whilst the colony is less productive than in previous years, it remains an important site within the Forth, as demonstrated by the regular return of birds, despite repeated colony failures. As such, ongoing monitoring of the colony over the coming ten-year period is important to further understand tern species' requirements and minimise any potential impacts from Proposed Works associated with the FRB.

4.1 Common tern

Common terns are considered to be relatively resilient to human disturbance. Generally, however, the presence of gulls and other predatory bird species was shown to exert considerably more disturbance compared to anthropogenic noise. The degree of sensitivity to human disturbance varies with the level of previous exposure to human activity, with approach distances typically being smaller at sites where birds are habituated to human activity (Burger and Gochfeld, 1983; Erwin, 1989). Research undertaken on the nearby common tern population at the Imperial Dock Lock, Leith SPA reported habituation to '*regular human activity*' (Jennings, 2012), with only unusual or high-level disturbance events having a significant effect. For example, Jennings (2012) describes industrial activities such as pipe-laying having adverse effects on when the birds arrive at breeding sites. Additionally, industrial activities such as arrival of a ship nearby could exacerbate the opportunistic actions of predators as they are more able to predate eggs and chicks if the adults have left the area due to anthropogenic disturbances.

Given that the colony has been long-established under a busy bridge and near a marina and shipping channel it is expected that the birds will be largely habituated to general port activity. In their review of bird disturbance distances, Goodship and Furness (2022) recommended a breeding season buffer zone of 200–400m for common tern colonies; they also note sensitivity is likely to be low away from breeding grounds. The HRA concluded that a 300m ZoI was appropriate in the context of the Proposed Works due to the high level of background disturbance in the area, and the fact the birds are approximately 44m beneath the

bridge deck and screened from some works by the deck, barriers and parapet, rather than being on the same level in direct line of sight.

In addition to high tides and poor weather, a number of unknown disturbance events not attributed to works on the bridge have been linked to the abandonment of the LCI colony in 2018, 2020, 2021 and 2023. Whilst there is no proven causation in these years, there is potential for the Proposed Works to result in significant disturbance, and it is considered that works on the bridge are likely to have contributed to the abandonment of the colony in 2020, just prior to BEAR taking over the maintenance contract for the structure. During the nesting period such disturbance events could have a significant impact on productivity due to increased chick/egg predation and associated energetic costs. This could constitute an impact on the population of the species as a viable component of the SPA site. It should be noted that, since terns do not breed until three or four years old (BTO, 2025), the limited breeding success of the LCI tern colony in at least two of the last five years can reasonably be expected to be reflected in a reduction in colony size emerging over the next few years, irrespective of future disturbance, tides or weather.

Within the last ten years, eight of which data is held for, estimated productivity has been less than one for all but one year (2019, productivity 1.27). As such, whilst the colony has managed to persist despite repeated poor breeding success, assurances around the population of the species being maintained as a viable component of the site and no significant disturbance of the species are particularly critical over the coming ten years during which the Marine Licence will be in place.

Section 5 contains detailed mitigation measures which allow the HRA process to conclude no adverse effect on SPA/Ramsar site integrity resulting from the Proposed Works.

4.2 Roseate tern

As noted above, roseate tern has not been recorded breeding at LCI since 2009 (Knowles, 2019). However, due to the tendency of roseate terns to nest in multi-species colonies with the more aggressive and numerous common tern (and where present Arctic tern), the welfare of the other terns in the Forth is key if roseate terns are to return to the area as a breeding species. Therefore, disturbance during the Proposed Works has the potential to negatively impact the conservation objectives for roseate tern within the Forth Islands SPA.

5. Mitigation Measures

The mitigation measures set out in this section are primarily designed to minimise disturbance of breeding common tern but will also act to have the same effect on Sandwich tern using LCI during the passage period. They will also help to remove or reduce effects on other bird species, including other qualifying interests of European and Ramsar sites and notably of the Firth of Forth SPA/Ramsar.

5.1 Embedded mitigation measures

This section sets out mitigation measures and expected parameters that apply to the entire programme of works throughout the ten-year period of the Marine Licence. These are part of the design of the Proposed Works and would apply regardless of the findings of the HRA.

1. A Site Environmental Management Plan (SEMP) will be developed by the Environmental Team at BEAR (or subsequent Operating Company) for each scheme which will detail mitigation relevant to that activity or package of works. It will set out the responsibilities of site staff and provide a complete list of mitigation and working methods required to safeguard the local environment and meet compliance with environmental legislation and relevant consents. It should act as a benchmark for best practice and covers all phases of scheme construction, including mobilisation and demobilisation. It will include topics such as pollution control, incident reporting, site inductions, waste management and drainage.

2. Plant and personnel will be constrained to the minimum required working area. This will comprise only the bridge structure itself, with only two exceptions, for which barges/boats are required, namely the Runway Beam Bracket Replacement and New Suspended Span Underdeck Access Gantry activity and the Repair of Cathodic Protection Systems activity. In addition, a safety boat is required to be available whenever activities requiring work outside of the carriageway and walkways are programmed. The boat is moored at Port Edgar Marina when not in use and on station throughout day shifts. It mobilises whenever required or if there is a welfare concern.

3. Typical working hours for site construction personnel are Monday to Friday 07:30-18:00 although works on a Saturday are contractually permitted. However, the first 30 minutes and final 30 minutes are typically given over to site setup and clearing. Due to limited daylight length, some working during the hours of darkness will likely be unavoidable during winter, and there is a requirement for night working associated with some overnight closures of the carriageway. This will be limited as far as practicable.

4. Wherever feasible and relevant to do so (due to potential pollution, dropping of tools, or other disturbance), appropriate mitigation measures will be employed to: provide a degree of visual screening; to contain the works and prevent any materials or tools dropped from falling onto areas below the bridge; and to contain waste arisings such as dust and paint flakes. Appropriate mitigation will be developed on a task-by-task basis following environmental screening, and may include (but not be limited to) measures such as: full encapsulation of the works area, use of tool tethers, installation of boarding, netting, and sheeting, etc.

5. Standard mitigation measures set out in Appendix A of the HRA: Programme of Works are presented here for ease of reference:

    - Encapsulation of working activities where there is a risk of loss of material i.e. during painting, grit blasting, hydro-demolition, intrusive investigation, etc. This may be full or local encapsulation as appropriate.

- Temporary works including boarding and debris netting will be in place over the extent of the working area and site access when required to ensure no loss of material from the site during planing works.
- Use of tool tethers when working from suspended areas.
- Fuel and other substances potentially hazardous to health will be stored securely and safely on site to prevent spillage or loss from the work site.
- Plant nappies and spill kits will be utilised on site to prevent potential fuel leaks from entering the watercourse.
- Access platforms will be boarded and debris netting installed to prevent loss of materials during the removal and installation of platforms.
- Adherence to the Scottish Environment Protection Agency's (SEPA) Guidelines for Pollution Prevention, in particular GPP 5: Works and Maintenance Near Water.
- The contractor will be required to produce a contingency plan for dealing with spills or environmental incidents on site. Spill kits will be present on site, quickly accessible, and all staff trained in their use.
- All spills will be logged and reported. In the event of any spills into the water environment, all works will stop and the incident be reported to the project manager and the BEAR Scotland Environmental Team. Marine Directorate and SEPA will be informed of any such incident as soon as possible, and within 24 hours at the latest. The local District Salmon Fisheries Board will also be informed of any incidents as soon as possible.
- Any waste generated will be removed from site and either recycled or disposed of in compliance with Waste Management Regulations.
- Plant, machinery and equipment fitted with effective silencers where available will be utilised for the works. Where fitted, and where permitted under Health and Safety requirements, white noise reversing alarms should be utilised during construction.
- Where possible, inherently quiet plant should be selected for construction works. Where appropriate, pumps and generators will be sound-reduced models with fitted, lined, and sealed acoustic covers.
- All plant will be operated in such a way that minimises noise emissions and be switched off when not in use.
- All ancillary plant such as generators will be positioned so as to cause minimum noise disturbance. Where deemed necessary, acoustic screens will be utilised.
- Where possible, works will be programmed for daylight hours. If artificial lighting is required, it should be used for as short a duration as possible and directed on the immediate area of works. Artificial lighting (including lights from the site compound and other infrastructure) should avoid being directed onto the aquatic environment or habitats nearby as far as is safe and reasonably practicable.

6. Additional mitigation for specific works packages as set out in Appendix A of the HRA: Programme of Works is summarised here for ease of reference.

- For the following schemes, A Notice to Mariners will be issued and consultation undertaken with Forth Ports and the Coastguard to prevent private vessels from sailing below the works area: *Footpath Elastomeric Bearing Replacement; Main Tower Lateral Thrust Bearing Replacement; Side Tower Rocker Replacement; Pedestrian Balustrade Strengthening; Runway Beam Bracket Replacement and New Suspended Span Underdeck Access Gantry; Vehicle Restraint Barrier/Grillage Refurbishment; Suspended* Span *Half Joint Replacement; Suspended Span Carriageway Concrete Deck.*

- Additionally for the packages *Side Tower Rocker Replacement* and *Suspended Span Carriageway Concrete Deck*, the following measures will apply:
  - Hydro-demolition works will be fully encapsulated to ensure no concrete wash/waste-water enters the marine environment.
  - Hydro-demolition waste/wash water will either be removed off site or disposed on site as trade effluent under an appropriate authorisation from SEPA. Where disposed on site all conditions of the authorisation will be adhered to.

5.2 Site-specific mitigation

The following mitigation has been developed to address specific predicted effects from Proposed Works during the tern breeding season, 1 May until whenever all chicks are fledged, which is typically mid- to late-August. After the last chicks fledge, young birds are likely to remain near the nesting location (Jennings, 2012) for two to three months albeit they are considered less vulnerable to disturbance during this period.

Jennings (2012) noted at Imperial Dock Leith, Leith SPA that '*newly fledged terns are vulnerable and dependent on their parents as they learn to feed themselves, so care should be taken to avoid disturbance in this area late in the season'*. It states further that *'Once fledged, many juvenile birds left the colony and gathered on the dockside adjacent to the SPA, presumably to minimise conflict with remaining nesting birds. This could make juveniles vulnerable to attack from land-based predators'*.

It is considered that post-fledging, no specific mitigation is required since although young birds are still vulnerable, they will likely experience less disturbance as they move to areas further from LCI and FRB.

The primary means of avoiding adverse effects on the LCI tern colony has been to restrict the timing of the most disturbing Proposed Works (due to potential noise and/or visual stimuli) to avoid the breeding season and/or to take place during the breeding season only at locations beyond an exclusion zone around LCI, such as on the southern section of the bridge only.

During consultation with NatureScot (Jacobs, 2020), they indicated that this exclusion zone should be 400m from LCI during the breeding season. The ZoI for breeding terns is identified in the HRA as 300m. Whilst the 400m ZoI was used in the previous iteration of the Marine Licence on a precautionary basis, an evidence-based approach has been used to refine this to 300m in the current application. This is based on substantial site-based evidence of the limited response of the colony from works-related potential disturbances, and the scientific literature also supporting the 300m ZoI as detailed in Section 4. BEAR Scotland have reflected the 300m buffer in the Proposed Works programme where possible. Based on the works programme provided by BEAR Scotland (Appendix A of the main HRA) this has been implemented for two schemes as shown in Table 1. These two schemes are either located outwith 300m of Long Craig Island (for example at the south end of the bridge) or, where works are required within 300m of the island, these elements can be undertaken outwith the tern breeding season.

Table 1: Locations and Timings of Individual Schemes

Schemes	No works required within 300m of LCI OR works within 300m of LCI can be completed outwith breeding season	Some or all scheme activities required within 300m of LCI during breeding season
Footpath Elastomeric Bearing Replacements	X	
Footpath Resurfacing		X
Main Cable Intrusive Investigation		X

Main Tower Lateral Thrust Bearing Replacement		X
Pedestrian Balustrade Strengthening		X
Runway Beam Bracket Replacement and New Suspended Span Underdeck Access Gantry		X
Side Tower Rocker Replacement		X
Suspended Span Carriageway Concrete Deck		X
Suspended Span Half Joint Replacement		X
Suspended Span Painting Works		X
Suspended Span Resurfacing		X
Suspended Span Truss Strengthening Works		X
Suspended Span Under Deck Access (SSUDA)	X	
Vehicle Restraint Barrier/Grillage Refurbishment		X

FRB is designated as a key resilience route to provide an alternative crossing point to the Queensferry Crossing should this be required to close for planned works or during bad weather. To facilitate this, an embargo on traffic management is implemented on FRB between 01 November to 31 March. This means that works involving traffic management can only be undertaken 01 April to 31 October. Some of the works packages above require a sustained period of carriageway closure, including overnight works, in order to complete the works efficiently. For other works packages they are not possible to undertake during colder winter months from an engineering perspective, for example due to the requirement for waterproofing or exposure of cables to the elements.

In addition to the above schemes, some routine maintenance works, including emergency works, may be required to be undertaken during the tern breeding season within 300m of LCI. The ECoW or BEAR Environmental Manager will be consulted in the first instance where this is the case.

As part of the *Runway Beam Bracket Replacement and New Suspended Span Underdeck Access Gantry* activity, at least one maintenance gantry requires installation on one of the three suspended spans, and the remaining two suspended spans may have gantries installed subsequently. This activity requires use of a barge to raise the gantry to the underside of the bridge using two cranes at road level. Works need to be undertaken outwith the November to March traffic management embargo. Due to the size of the barge required and the likelihood of its sustained presence, rather than simply passing by, it is considered that this activity has potential to be significantly disturbing to breeding terns if undertaken close to LCI within the breeding season. BEAR have advised that should a gantry be installed on the main span, that this can be lifted adjacent to the south main tower which is over 1000m away from LCI. An ECoW should be present for this operation. If a gantry were needed to be lifted onto the north side span, this activity should be undertaken outwith the tern breeding season and post-fledging period, that is, during April or October.

Boat movements may also be required as part of the *Repair of Cathodic Protection Systems* activity and boat access to the pierhead may be required at any time if a failure were to occur. The pier defences are on the main span side (south) of the North Main Tower, and therefore there is visual screening provided by the pier itself and North Main Tower.

Where not emergency works, boat access within 300m of LCI should be undertaken outwith the tern breeding season.

When a safety boat is required, it is anchored in a suitable location as to be able to provide a safe and effective rescue service. During the tern breeding and passage period, the safety boat will not anchor within 300m of LCI unless for essential time-critical repairs or for welfare reasons, and will take relevant and appropriate measures to minimise any potential disturbance to LCI, for example it will not leave the engine idling and an ECoW will be present where there is a risk that it could need to approach within 300m of LCI.

Diving may be required for the activities listed below, and is restricted to the North Main Tower and South Main Tower.

- *Pier Defences Repairs.* This is a routine works activity which can be planned outwith the tern breeding season for the North Main Tower.
- *Repair of Cathodic Protection Systems.* This is a routine works activity on the ship impact sheet piles but is undertaken reactively when issues arise with the cathodic protection systems that require underwater investigation or repairs occur. As such this may require diving at any time.
- *Inspection regime.* As part of the bridge inspection regime, a dive survey is required to be undertaken every six years (next due 2028). This would typically be done in summer months due to calmer weather. It is recommended this is scheduled for April or October.

For any works taking place during the tern breeding season and within 300m of LCI, the following additional mitigation measures are required to be implemented.

- Due to the complexity of the works programme and potential requirement for emergency works, the requirement for multiple maintenance packages to be undertaken concurrently cannot be precluded. Where multiple works packages are occurring simultaneously, noisy or otherwise disturbing works will, as much as is practicable, be timed so as not to coincide.
- No access beyond mean low water springs (MLWS) of LCI will be permitted under any circumstance during the tern breeding season without written agreement of the ECoW and NatureScot. The sole exception to this would be access by the safety boat or rescue operatives if required during an emergency rescue.
- 'Soft-start' techniques will be used for all noisy activities to avoid sudden and unexpected disturbance during construction. Noisy activities are typically defined as any construction activity that would result in an increase of ≥3dB(A) in the ambient noise level (dBLAeq) at sensitive receptors (i.e. LCI). For any such activity, 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 to habituate to the disturbance.
- A CNMP is provided in Appendix E and sets out measures which will reduce construction noise.
- In the rare instances where emergency repairs are required at short notice within 300m of LCI during the tern breeding season, the implementation of certain additional mitigation measures as identified above may not be possible due to length of time required to put these measures in place. Emergency repairs would be defined as works identified at short notice that are required to prevent failure of the structure or to prevent a substantial risk to public health and safety. In such cases, NatureScot, Marine Directorate and Transport Scotland will generally be notified prior to the commencement of works. In addition, works will be discussed with and monitored by the ECoW. A written record will be kept of the justification for emergency repairs, what alternatives and mitigation was discussed and where proposed mitigation was agreed as being feasible, and what that mitigation was.

- Monitoring of bird responses to works activities will be undertaken throughout the breeding period as detailed in Section 5.3. Should monitoring identify significant changes in the distribution or number of birds as a result of works (as detailed in Section 7.1), then works will be stopped immediately until further mitigation is identified and implemented. NatureScot would be notified of any such significant changes or extended stop works instructions having been issued. Such mitigation could include extension or expansion of the measures noted in this section, including: restrictions to the types or timing of noisy works; extending the 'soft-start' process; amendments to lighting plans; and changes to visual and noise screening. It may also be appropriate to review noise monitoring data as works restart. Additional noise mitigation could include the use of noise barriers or noise damping materials being installed within the encapsulation. The locations of screening or barriers should be agreed with an acoustics specialist prior to works, and checked periodically throughout the programme of works.
- A toolbox talk should be delivered to all site personnel as part of their induction. This should summarise the legal requirement to safeguard breeding terns and the reporting process in the event of disturbance caused by the works.

Lighting is not expected to cause disturbance or avoidance by terns during breeding season due to long daylight hours during the breeding season. Control of lighting will however benefit both breeding and wintering qualifying interests and should be implemented whenever lighting is required. Therefore whilst primarily relevant to qualifying interest of the Firth of Forth SPA, this is included within this tern SMP for completeness. The following measures should therefore be implemented year-round in respect of lighting to protect qualifying interests of the SPA, based on information from the Institution of Lighting Professionals (2011), The Royal Commission on Environmental Pollution (2009) and Bat Conservation Trust and Institution of Lighting Professionals (2018).

- Avoid illuminating sensitive bird habitats below and adjacent to the works areas.
- Avoid white-blue spectrum and high UV emitting lighting during the hours of darkness, warm white should be adopted instead where necessary.
- Dark buffers should be used to separate habitats.
- Luminaires should lack UV elements.
- Metal halide and fluorescent sources should not be used.
- LED lights should be used where possible.
- Luminaires should feature peak wavelength to avoid the component of light most disturbing to wildlife.
- Directional luminaries should be used to retain darkness above/below.
- Column heights should be carefully considered to minimise light spill.
- As a last resort, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed.
- A competent light designer to provide recommendations.
- Where any of the above may not be possible/practical, the Contractor will seek permission for any exceptions with the ECoW or an environmental representative of BEAR Scotland.

Around the pier ship impact defences at the North Main Tower, at the time of writing there is lighting which includes a light directed towards Long Craig Island. As part of proposed works on the pier defences It is proposed to reduce the number of lights and direct them away from Long Craig Island, removing the light from the north side of the North Main Tower pierhead, since large vessels do not pass through this span.

5.3 ECoW monitoring and Camera Trial

Measures to minimise disturbance impacts on breeding terns and monitor the tern colony will be in place from at least 1 May until all chicks have fledged, typically mid- to late-August. This period may differ if no

terns are present during the breeding season either due to non-arrival of terns or abandonment of the LCI colony. Should this be the case, the ECoW would be consulted, and NatureScot would be notified prior to these measures being curtailed. The nature of these measures will vary depending on the time of year and activities on site as described below.

Data from 2021-2025 show that during the first week of May the terns typically arrive in the Forth but are rarely seen landing on LCI at this time. Courtship behaviour typically commences from the second week of May. The period from mid-May to mid-August is considered to be the most sensitive period for the colony. By 22 August all chicks had fledged in 2025 although young birds typically remain dependent on their parents for some time, and in 2025 were seen using LCI until the final survey on 1 September.

As noted above, data collected between 2021-2025 indicate that the large majority of works activities on the bridge do not result in observable disturbance to the tern colony and that a substantial majority of disturbance episodes occur due to predators, large vessels, kayakers, or activities on the shoreline such as grass cutting. It should be noted that although planned, no noisy works took place on the bridge during the 2025 tern breeding season, however an ECoW was present. The limited number of disturbance events attributed to works were typically from activities such as metallic banging, grinding, banging of scaffolding from the compound, grit blasting and impact wrenches. Accordingly, for this iteration of the licence, site presence of the ECoW has been refined from that recommended in the 2021-2026 licence; broadly from five full days per week to three mornings per week but subject to conditions as set out below. To supplement the ECoW presence, the use of cameras is proposed to be trialled, as detailed below.

The recommended minimum monitoring activities are set out in Table 2. These parameters should be considered a starting place for the trial period and may be subject to review, in agreement with the ECoW and NatureScot, as detailed below. Note that Table 2 assumes no weekend working; where weekend working is required, a comparable level of ECoW and camera monitoring effort should be assumed.

It is recognised that climate change is causing changes in breeding seasons for various bird species (Romano et al., 2022) with breeding seasons starting earlier in many cases. In the event that monitoring captures such trends for terns using LCI, the dates set out for monitoring and implementing mitigation measures will be reviewed and agreed with NatureScot.

Table 2: Recommended Minimum Monitoring Activities at Long Craig Island

Date	Disturbing works within 300m of LCI		No disturbing works within 300m of LCI	
	ECoW	Camera	ECoW	Camera
1 - 6 May	One visit to assess tern presence/ activity. Additional visits may be undertaken if camera monitoring indicates early presence of terns on/around LCI.	Weekday checks 3x daily when no ECoW site presence	One visit to assess tern presence/ activity.	Weekday checks 3x daily when no ECoW site presence
7 May – 1 September (or sooner if all chicks have fledged)	Site presence suggested three mornings per week 8am-12 noon, provided significant disturbances are not noted. If disturbances are noted, the ECoW should remain for the full day.	Weekday checks 8x daily on days when no ECoW site presence for a minimum duration of 5 minutes, or 4x daily on days with half-day ECoW presence	One weekly visit, full day	Weekday checks 3x daily when no ECoW site presence

5.3.1 ECoW monitoring arrangements

A summary of the proposed arrangements in a variety of scenarios is set out below.

Note that typical working hours for site construction personnel are 07:30-18:00. However, the first 30 minutes and final 30 minutes are typically given over to site setup and clearing. These activities have generally (though not entirely) been associated with limited levels of disturbance. Accordingly, where the ECoW is present on site for a full day, this should generally be taken to be 08:00-17:30 unless otherwise agreed with BEAR / the Contractor.

Years in which there are some periods of disturbing works within 300m of LCI during the period 1 May to 1 September

Whenever noisy or visually disturbing works are scheduled within 300m of LCI during the core breeding period, the ECoW is required to be present on site for at least three half days per week. This should be supplemented by regular checks of the cameras each day when not on site. It is expected that the cameras will enable tern fly-ups to be viewed and recorded. If disturbances are noted on the cameras, the procedure set out in Section 6.2.2 will apply. Activities such as compound setup, scaffolding installation and netting installation should be considered as potentially disturbing in addition to those such as grit-blasting, impact wrenches, concrete breaking. Any activities requiring diving operations or a boat should also be considered potentially disturbing.

During the periods when no noisy or visually disturbing works are being undertaken within 300m of LCI during the period 7 May to 1 September, ECoW presence can be limited to one weekly full day visit,

supplemented by daily checks (x3) of the cameras when not on site, typically at the beginning of the morning, around lunchtime and at the end of the afternoon.

For ease of planning, it is recommended that activities are considered on a weekly basis, such that if there are no disturbing activities planned for a full calendar week, ECoW presence can be reduced. If no disturbing works are planned on a single day during a week in which disturbing activities are otherwise taking place, ECoW presence will remain as would be required for a full week of disturbing works. If BEAR or the Contractor have not provided information to indicate that no disturbing works are planned within 300m of LCI, it should be assumed that they are. The effectiveness of the mitigation relies on accurate and timely information about planned and emergency works being provided to the ECoW.

Years in which there are no planned periods of disturbing works within 300m of LCI during the period 1 May to 1 September

In years in which there are no planned works within 300m of LCI in the period 1 May to 1 September at all, it is not considered a requirement to have an ECoW appointed. Nevertheless it is recommended that an ECoW is appointed and that the same monitoring takes place as set out in the column "No disturbing works within 300m of LCI" in Table 2, in order to provide monitoring of the colony that will inform future Marine Licences.

The monitoring protocol set out above is intended to ensure mitigation measures are in place from the start to the end of the sensitive breeding activity period as well as facilitating an accurate assessment of colony breeding success.

Note that for all scenarios above, where the ECoW undertakes a once weekly visit it is recommended that this should include a full colony count. If this cannot be achieved from the cameras then this should be done from the underdeck walkway as only a partial view of the colony is possible from the vantage point at the compound on the northern shore of the Firth of Forth.

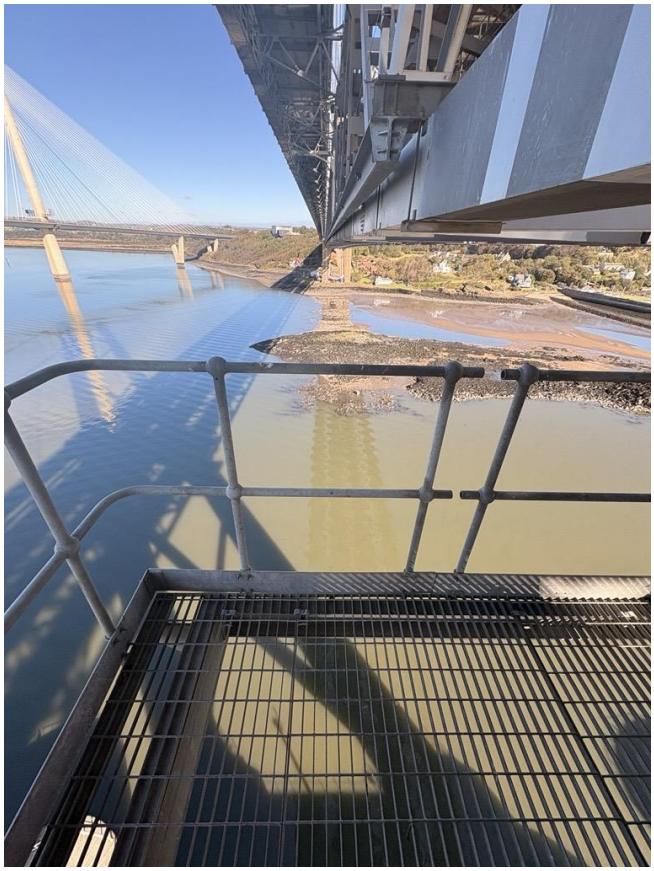
5.3.2 Camera arrangements

Two cameras are proposed to be installed on the north side span deck truss adjacent to the north main tower, one on the west side and one on the east side. These locations have been identified as a suitable compromise between the best view of the island in order to see the colony but also to capture when birds have flown up; installation and access for maintenance has also been considered. It is currently anticipated that both cameras will have the pan function disabled to avoid any privacy/security issues with properties in North Queensferry, but it will be possible to zoom in on the island and surrounding water. Discussions regarding camera setup are ongoing at the time of writing but it is anticipated it will be possible to access the footage via a web-based portal to allow remote viewing by the ECoW. An indicative view of one of the cameras is shown in Figure 6. Annex A presents a general arrangement drawing of the camera locations.

It is anticipated data will be recorded continuously. It is anticipated that the ECoW will be able to review recently recorded footage from the portal. Data will be retained for 28 days and then deleted.

Camera checks would typically be expected to have a minimum duration of five minutes, which is considered appropriate if the birds appear settled on nests or roosting. If the birds are unsettled, or professional judgement otherwise indicates that a longer watch is necessary, this should be done until the ECoW is satisfied that the birds are not experiencing disturbance. If the birds are not visible or appear to be disturbed, the procedure set out in Section 6.2.2 will apply.

Figure 6: Indicative location of camera on the west side of the bridge, and view from the vantage point of LCI



5.3.3 Limitations of the camera

As noted above, the camera arrangement is proposed to be undertaken on a trial basis, to be used alongside, and therefore supplement ECoW presence on site. The ongoing requirement for the ECoW and camera will be reviewed and agreed with NatureScot after the first year of the licence, or earlier if relevant data become available. Changes agreed with NatureScot will be reflected in updates to this SMP.

There are a number of potential limitations of the camera relative to an ECoW.

- The camera will not include an audio feed.
- The camera will not have a pan function.
- The camera is expected to provide a good view of the island although its exact view and capacity, for example, the extent of the zoom function, are not yet known.
- There is potential for the camera to malfunction. Regular maintenance will be scheduled outwith working hours or over the winter period where possible.

Despite these limitations, given the evidence collated over the duration of the current Marine Licence, it is considered that the cameras have potential to be an effective tool, alongside the ECoW, to monitoring any disturbance responses exhibited by breeding terns birds on LCI.

6. Roles and Responsibilities for Implementing the SMP

This SMP is a live document which may be updated should further relevant information become available. It will be a contractual responsibility of the appointed Contractor to ensure all mitigation is implemented for the duration of the ten-year licence as required (noting, for example, some measures apply at certain times of the year only). Whilst the mitigation proposed is expected to safeguard the conservation objectives of the Forth Islands SPA, if during the course of operations should it become apparent that additional mitigation is required, this document will be updated to include those measures.

A programme of works was provided by BEAR Scotland to inform the HRA (Appendix A of the HRA), setting out the routine and non-routine works expected to be undertaken during the ten-year period. It details the expected activities, timing, duration/frequency, and equipment required. If the programme of works is changed by the Contractor or BEAR Scotland, the changes will have to be assessed to demonstrate there are no additional implications for the European/Ramsar sites and their conservation objectives. They would need to undergo an additional HRA process to demonstrate there are no additional likely significant effects which could lead to adverse effects on site integrity to ensure that the conclusion of the HRA produced for the ten-year works programme remains valid. This assessment may consequently identify changes to the avoidance and mitigation measures required. As a result, the SMP would need to be updated to include these additional protective measures and agreed with NatureScot and Marine Directorate.

6.1 Ecological Clerk of Works

The presence of an ECoW to monitor Proposed Works, tern activity, and advise on the implementation of mitigation is a key part of the suite of protection measures set out in this SMP. The ECoW will be appointed by BEAR Scotland prior to works commencing in certain areas and certain times of the year. The requirements for this role have been refined following three seasons' of full time ECoW monitoring at LCI and are detailed in this section.

When present on site, or when required to advise while offsite, the ECoW will be responsible for advising on the effective implementation of this SMP. However, at all times it remains the responsibility of BEAR Scotland and their appointed Contractor(s) to ensure protection measures are successfully implemented and adhered to.

Arrangements relating to the ECoW appointment are as follows:

- the ECoW will be an ecologist with a demonstrable past of undertaking ornithological input in line with accepted professional standards and will have previous experience in similar ECoW roles.
- the ECoW will be a suitably experienced ornithologist and be equipped with suitable optical equipment (i.e. binoculars and a tripod-mounted spotting scope).
- the ECoW will be a partially site-based role and partially office-based, and the ECoW will be consulted by BEAR and the Contractor when necessary if not required on site.
- in years in which any works are planned within 300m of LCI, an ECoW will be appointed in advance of the commencement of the tern breeding season to ensure any advance mitigation measures required are implemented. In years in which no works are planned within 300m of LCI, an ECoW is still recommended to be appointed as detailed in Section 5.3 but is not proposed as a requirement of the Marine Licence.
-

When on site during the tern breeding period, the ECoW will be responsible for the following key activities:

- monitoring of the works in the context of the ecological mitigation and protective measures agreed through the consenting process;
- providing an in-person and paper-copy toolbox talk summarising the legal requirement to safeguard breeding terns and the reporting process in the event of disturbance caused by the works;

- providing ecological advice to BEAR Scotland and the Contractor as required;
- providing supplementary monitoring of compliance with the mitigation measures as committed within the HRA, including this SMP, and advising on the implementation of mitigation if required, with a view to preventing significant adverse effects on qualifying tern species;
- issuing a request for a stop works instruction via the BEAR FRB manager / BEAR Engineer or their delegated appointee if the works are identified as having potential adverse effects for terns, or if mitigation is failing to deliver protection, until such time as a solution can be found and/or NatureScot agrees to the works continuing. Further details are provided in Section 7;
- monitoring and assessing the delivery of the contractual obligations with regard to ecological safeguarding and ecological mitigation requirements by the Contractor; and
- discussing and agreeing with BEAR Scotland and the Contractor appropriate approaches to implementing additional ecological mitigation where more than one option is available.

When the ECoW is present on site, during potentially noisy or visually disturbing works, monitoring will be undertaken continuously, with the exception of short welfare breaks which are timed to coincide with breaks in noisy works where possible. During non-noisy or non-visually disturbing works, monitoring watches will be conducted over as much of the day or half day (as appropriate, see Table 2) as possible.

During periods where the terns are absent from LCI for a sustained period (for example at the start of the breeding season when birds can be absent for several days at a time) the island will be checked approximately every 20 minutes during potentially noisy or visually disturbing works, and approximately hourly at other times.

Should monitoring identify any change in the behaviour, number and distribution of terns that, in the opinion of the ECoW, could potentially negatively impact their breeding success, the BEAR FRB Manager / BEAR engineer or their delegated appointee will be informed immediately and a stops works issued by BEAR. Where appropriate, advice on additional mitigation will be provided by the ECoW and acoustician. Further mitigation could include extension or expansion of the measures noted in this section. These may include: restrictions to the types or timing of noisy works; extending the 'soft-start' process; amendments to lighting plans; and changes to visual and noise screening. It may also be appropriate to commence noise monitoring when works restart. Additional noise mitigation could include the use of noise barriers or noise damping materials being installed within the encapsulation. The locations of screening or barriers should be agreed with an acoustics specialist and checked periodically. In such circumstances, works will only commence once suitable mitigation is in place.

Marine Directorate and NatureScot will be notified of any disturbance incidents that warrant works to be stopped for a prolonged period and will be provided with details of actions taken. In the case of any emergency repairs, the implementation of certain additional mitigation measures as identified above may not be possible due to the time sensitive nature of emergency works. In such cases, NatureScot and Marine Directorate will be notified prior to the commencement of works and an ECoW will attend site full time. A written record will be kept detailing the need for emergency repairs, what alternatives were considered, what mitigation was discussed and, where proposed mitigation was agreed as being feasible, what that mitigation was.

Through the monitoring process, the ECoW will continue to record accurate data and build on the existing understanding of tern species behaviour and interaction with works or non-works related disturbance events. It is recommended that this is undertaken in all years of the Marine Licence but is only a requirement during years in which at least some disturbing works are planned within 300m of LCI.

6.2 Communications strategy

The following communications strategies will be implemented to ensure the timely resolution of any incidents and that relevant parties are informed as required.

In reference to these procedures, refer to Section 7.1 for examples of tern behaviour that may be considered relevant.

6.2.1 Incident reporting – in person ECoW

1. A disturbance incident or potential disturbance incident occurs. **A threshold of approximately 5 minutes' absence from the island is considered an appropriate threshold for this incident reporting procedure.**
2. The incident is observed by ECoW or other site personnel. Observer (if not ECoW) reports incident to ECoW immediately, if present. If no ECoW is present, it is reported to the BEAR Environmental Manager in the first instance.
3. If, based on professional judgement, ECoW considers it appropriate, request to stop work as soon as it is safe to do so is issued. Instruction to Contractor to stop work will be issued by the BEAR FRB Manager/BEAR Engineer, not the ECoW.
4. Noise monitoring data may be reviewed by the ECoW, with input from an acoustician, if appropriate.
5. Marine Directorate and NatureScot will be notified as soon as possible (within the day) if a prolonged stop works event occurs. Within Transport Scotland, both the Project Manager and the Environmental Advisor, will be notified by the BEAR Environmental Manager/BEAR FRB Manager of any significant incidents that require notification to statutory bodies.
6. When ECoW, BEAR FRB Manager and BEAR Engineer are in agreement that it is appropriate, instruction that works may recommence is issued via the BEAR FRB Manager/BEAR Engineer. The time for which works cease may vary from a short period required for the birds to re-settle, to a longer period should it be identified that additional mitigation and/or discussion with NatureScot is required. Within Transport Scotland, both the Project Manager and the Environmental Advisor, will be notified by the BEAR Environmental Manager/BEAR FRB Manager of any significant incidents that require notification to statutory bodies.
7. Lessons learned will be collated by ECoW/BEAR Environmental Manager with input from site personnel and site supervisors/managers as appropriate, and reviewed by all parties as required, with resulting recommendations implemented as appropriate.

6.2.2 Incident reporting – camera

1. A disturbance incident or possible disturbance incident is observed, or is found to have occurred when the camera feed is checked. If all or a substantial number (>50%) of the birds previously noted are absent from LCI, recent camera footage is reviewed to determine when they left. If the birds do not return to normal activity within 5 minutes, contact should be made with BEAR Environmental Manager (Table 3).
2. BEAR will make contact with on-site staff and alert the Contractor. ECoW will continue to monitor the live feed and advise if the birds return to the island and resume normal activity.
3. Where possible, someone on site such as a BEAR Engineer will verify whether there is any obvious cause of disturbance that is not related to the works and that cannot be seen on camera (noting that it does not include an audio feed), for example a ship passing out of view of the camera, or a fog horn blasting. As noted in Section 7.1, the works can be stopped even if there is no clear link to works since it is possible the works are contributing additional stress which cumulatively could result in failed nests or abandonment of the colony, or that there is a works-related disturbance that is not perceived as such by the ECoW. This step however allows for professional judgement to be applied.

4. As soon as possible after notification and based on the professional judgement of the ECoW, the instruction to stop work as soon as it is safe to do so is requested. Instruction to Contractor to stop work will be issued by BEAR FRB Manager/BEAR Engineer, not the ECoW.

5. Noise monitoring data may be reviewed by the ECoW, with input from an acoustician, if appropriate.

6. Marine Directorate and NatureScot will be notified as soon as possible (within the day) if a stop works event occurs. The Transport Scotland Environment Adviser and Project Manager will also be notified by BEAR Environmental Manager (via BEAR Engineer) of any significant incidents that require notification to statutory bodies.

7. When ECoW/BEAR Environmental Manager, BEAR Engineer, and where appropriate NatureScot, are in agreement that it is appropriate, instruction that works may recommence is issued via the BEAR Engineer. The time for which works cease may vary from a short period required for the birds to re-settle, to a much longer period should it be identified that additional mitigation and/or discussion with NatureScot is required. The Transport Scotland Environment Adviser and Project Manager will also be notified by BEAR Environmental Manager (via BEAR Engineer) once works have re-commenced.

8. Lessons learned will be collated by ECoW/Environmental Manager with input from site personnel and site supervisors/managers as appropriate, and reviewed by all parties on a monthly basis, with resulting recommendations implemented as appropriate.

6.2.3 Monitoring data

As detailed in Section 7, regular monitoring data will be issued to BEAR during the tern breeding period. Monitoring data will be sent to NatureScot on request.

6.3 Useful contacts

Contact information for those parties identified in the communications strategy are provisionally provided as follows. This section will be updated as required.

Table 3: Useful Contacts

Organisation	Name/Team	Role	Email address
NatureScot	Sorcha Gibson	Forth Regional team contact	sorcha.gibson@nature.scot
Marine Directorate	TBC	Marine Licensing Case Manager	TBC
BEAR Scotland	Peter Wrigley	BEAR Environmental Manager	PWrigley@BEARScotland.co.uk
BEAR Scotland	Generic Team Email Address	South East Environmental Team	SEEnvironment@BEARScotland.co.uk
BEAR Scotland	Barry Stewart	BEAR FRB Manager	BStewart@BEARScotland.co.uk
BEAR Scotland	Robert McCulloch	Principal Engineer	RMcCulloch@BEARScotland.co.uk
BEAR Scotland	Each project will have an identified BEAR Engineer responsible for the delivery and oversight of the works. Contact details of this engineer will be appropriately communicated with relevant parties, such as the ECoW prior to the start of works.		
TBC	TBC	Ecological Clerk of Works	TBC
Scottish Wildlife Trust (SWT)*	Clare Toner	Reserves Manager - East Central Scotland	ctoner@scottishwildlifetrust.org.uk
Transport Scotland	Myra Conn	Transport Scotland Environmental Advisor	myra.conn@transport.gov.scot
Transport Scotland	Jason Cheetham	Transport Scotland Project Manager	Jason.Cheetham@transport.gov.scot

* SWT manages Long Craig Island

7. Monitoring

7.1 Disturbance incidents

As an agile and largely airborne species, terns generally take flight quite readily and exhibit little by way of pre-flight activity or restlessness. Monitoring of the common tern colony on LCI has found that they exhibit various behaviours that appear to be reactions to disturbance. Sometimes the source of the disturbance is obvious. However, more commonly there is no apparent trigger. The term 'fly-up' is used to describe a situation in which adult terns lift off the nest and hover above it or otherwise remain in the immediate vicinity. In such circumstances the birds would usually settle relatively quickly (i.e. within approximately one minute). In addition, the term 'dread' is used to describe those instances in which either part of, or the whole, colony fly silently away from the nest area. In 2025 in particular, some lengthy dreads were observed of up to 20 minutes in duration and sometimes very regularly (up to 10 times per hour). In addition, other behaviours (e.g. mobbing predators) are associated with disturbance from predators such as gulls (Laridae), corvids (Corvidae), and grey heron *Ardea cinerea*.

The judgement as to whether an incident requires a stop work instruction to be requested will be made by the ECoW based on experience and professional judgement. Examples of when a stop works instruction should be issued include the following:

- a 'fly up' or 'dread' of a significant proportion of the tern colony (50% or more) without resettling within a short period and where there is a clear link to bridge works or there is no other clear external influence to cause that behaviour;
- 'fly ups' or 'dreads' occurring with a frequency that is higher than recently observed behaviour, when no evident disturbance is occurring;
- any other disturbance of concern or disturbance response potentially related to the works occurs, e.g. a works item is observed falling onto the island, or personnel or a boat is observed within MLWS of LCI.

Examples of when a stop works instruction would not usually be required are when dreading occurs but is clearly in response to a stimuli not associated with the works e.g. predators, weather/sea state, boating activity (members of the public or commercial) unless it is considered that the works may be exacerbating the disturbance experienced by the birds, in which case a temporary stoppage may be recommended.

Note that the stop works instruction can be given for a short period to allow the birds to resettle. In such instances 20 minutes to an hour may be sufficient. Where the disturbance is more significant and linked to works, such that additional mitigation may need to be considered, the works stop is likely to be longer. It is noted that there is a significant financial implication for works being stopped due to enforced downtime for the Contractor and the ECoW will use their best professional judgement to advise the BEAR FRB Manager/BEAR Engineer accordingly.

7.2 Noise monitoring

Noise monitoring equipment is installed in two locations on the bridge – on the North Main Tower at pierhead level, and on the North Side Tower at ground level. The monitoring equipment was used alongside ECoW presence during the 2021 breeding season, however it was found that the location of the bridge results in a large amount of data being affected by atmospheric conditions which are not suitable for accurate noise measurement. This is particularly the case for high windspeed events. Accurate noise measurement is not practicable above 5m/s, or when it is raining, and there are significant periods of time where windspeeds are above this level, or where it is raining. Additionally, high measured levels at the equipment did not necessarily tally with reactions by the terns in the colony. The monitoring equipment has therefore not been used since 2021, although it remains in place. Accordingly, it is not proposed to use continuous noise monitoring as part of the monitoring programme. It is however proposed that it will be kept calibrated and operational for the duration of the Marine Licence unless agreed otherwise such that it can be turned on should the need arise,

for example if regular or significant disturbance to the birds is reported, as noted in the incident reporting procedures in Section 6.2. Should the equipment malfunction or otherwise not be operational however, this should not preclude works going ahead.

Any relevant noise monitoring data may be issued to NatureScot alongside the details of any stop works instructions given.

7.3 Tern colony monitoring

When on site for full days, the ECoW will undertake three counts of the number of adult terns on LCI, at equal intervals throughout the day. When on site for half days, one or two checks will be made and the remaining check(s) undertaken via the remote camera. Undertaking regular counts throughout the day will enable a daytime peak number of birds to be obtained. The highest count of the day will be recorded as the daily peak count.

Counts will be undertaken from the vantage point at the compound on the northern shore of the Firth of Forth using a spotting scope and binoculars.

Where the ECoW undertakes a once-weekly visit, it is recommended that this should include a full colony count. If this cannot be achieved from the cameras, this should be undertaken from the underdeck walkway, since only a partial view of the colony is possible from the vantage point at the compound on the northern shore of the Firth of Forth.

Additional information relevant to tern behaviour will also be recorded, such as the arrival and departure dates of terns at the start and end of season respectively, the presence of other bird species on the island, the presence of actual or perceived predators (i.e. birds, wild mammals, humans) in the vicinity, and anything further that the ECoW deems noteworthy that may provide further insight into tern behaviour.

As detailed in Section 6.2, regular monitoring data will be issued to BEAR during the tern breeding period. Monitoring data will be sent to NatureScot on request.

In addition, if a stop works instruction is issued for a prolonged period, or if the ECoW identifies any other novel issues of concern, NatureScot will additionally be notified at the earliest opportunity. In the event of any stop works instruction, however brief, Transport Scotland will be notified at the earliest opportunity.

7.4 Data sharing

Given the importance of LCI in terms of the long-term prospects for roseate tern as a Scottish breeding species, it is considered that FRB tern monitoring data will be of conservation and ecological value. As such, over the ten-year period of the Marine Licence, the daily counts will be shared with the BTO and SWT by 31 December of each monitoring year.

8. Summary

This SMP sets out the mitigation and monitoring that will be implemented during the Proposed Works to safeguard the conservation objectives of the Forth Islands SPA and ensure no adverse effects on site integrity, as required by the HRA process. This is required specifically in relation to breeding terns of the Forth Islands SPA.

The conservation objectives for the sites centre around avoiding deterioration of the habitats of the qualifying interests, including their distribution, structure, function and supporting processes; avoiding significant disturbance to the qualifying interests; maintaining in the long term the distribution of the species and thus the population of the species as a viable component of the site, all of which in turn contribute towards the maintenance of site integrity.

The primary means of avoiding significant effects during the breeding season is the implementation of an exclusion zone around LCI. In addition, a suite of measures to reduce the likelihood and severity of impacts is proposed, including supervision, a soft-start process, encapsulation of works, and prohibiting access to the island.

The data gathered in terms of tern behaviour and phenology over the course of the previous licence is substantial and underpins the mitigation methodology outlined in this document. This will continue to be an iterative process over the coming ten-year licence period, during which regular liaison with NatureScot will take place. The addition of cameras is anticipated to further enhance monitoring efforts. It is important to note that FRB works on the bridge appear to have exerted relatively minor disturbance impacts on the LCI tern colony.

Data sharing is recognised as an important contribution to ongoing conservation efforts in relation to roseate tern and in terms of advancing scientific understanding of disturbance responses of terns to construction activities on the Firth of Forth and potentially beyond this area.

This SMP will form part of the contract documents for the Proposed Works in order to ensure the environmental commitments relating to protection of European and Ramsar sites are delivered effectively.

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Annex A. Additional information

Table A1: Key Observations of Terns in the Firth of Forth at LCI Based on 20210-2025 Monitoring

Activity	2021 date	2023 date	2025 date
Arrival of common terns at LCI / Firth of Forth	03/05	02/05	01/05
Courtship behaviours first observed	07/05	10/5	09/05
Terns observed loafing, courtship displays and courtship feeding on LCI	10/05	22/5	13/05
Mating observed on LCI	12/05	22/5	03/06
Nest scraping observed on LCI	13/05	18/05	05/06
Roseate x common tern hybrids first recorded	18/05	26/6	10/07
Territorial behaviour towards other terns on LCI first observed (calling, chasing, etc.)	25/05	22/05	05/06
First nest occupation recorded (laying/incubating)	01/06	30/5	10/06
First Sandwich tern observed in Firth of Forth	02/06	28/6	10/07
First chick recorded on LCI	21/06	19/06	03/07
First fledged chick recorded on LCI	15/07	N/A	23/07
Colony abandoned	22/07	17/07	N/A
All chicks fledged. Parental dependence ongoing.	N/A	N/A	22/08

Annex B. Locations of Long Craig Island monitoring cameras