ABERDEEN HARBOUR
EXPANSION PROJECT
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HABITATS REGULATIONS APPRAISAL

Aberdeen Harbour

FUGRO

Waterman

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1. INTRODUCTION

1.1 Requirement to Undertake a Habitats Regulation Appraisal (HRA)

The Habitats Directive (European Council Directive 92/43/EEC) and the Birds Directive (European Council Directive 2009/147/EC) form the cornerstone of Europe's nature conservation policy. Under the Directives, European member states have the power and responsibility to classify Special Areas of Conservation (SACs) for the conservation of natural habitats, fauna and flora and Special Protection Areas (SPAs) for the protection of all wild birds, their nests, eggs and habitats within the European Community. SACs and SPAs together form a network commonly referred to as the Natura 2000 network. The Natura 2000 network is an EU-wide network of protected areas established under the Habitats Directive, the aim of which is to ensure the long term survival of Europe's most valuable and threatened species and habitats.

In Scotland, the Habitats Directive is implemented within inshore and offshore waters through the following legislation (collectively termed the Habitats Regulations for inshore waters and Offshore Marine Regulations for offshore waters):

- The Conservation (Natural Habitats, &c.) Regulations 1994;
- The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2004;
- The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2007;
- The Conservation (Natural Habitats, &c.) Amendment (No. 2) (Scotland) Regulations 2007;
- The Conservation of Habitats and Species Regulations 2010 which replace the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) in England and Wales (and to a limited degree in Scotland - as regards reserved matters); and
- The Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 and associated amendments.

In addition to the requirement to undertake an Environmental Impact Assessment (EIA), the European Council Directive 92/43/EEC (the Habitats Directive) and the transposing Habitats Regulations require projects to consider the effects of potential developments on sites and species of international nature conservation importance within the Natura 2000 network. Where any plan or project is likely to significantly affect features of a nature conservation site which has been designated under the Habitats Regulations, a Habitats Regulation Appraisal (HRA) is required and the competent authorities (in this case Transport Scotland (TS), Marine Scotland (MS) and Aberdeen City Council (ACC)) must undertake an Appropriate Assessment (AA) of the potential effects of the project against the site's conservation objectives.

A number of regulatory consents and permissions are required in respect of the Aberdeen Harbour Expansion Project (ES Chapter 5: EIA Process). AHB have applied for the following consents:

- Planning permission under the Town and Country Planning (Scotland) Act 1997 (as amended by the Planning (Scotland) Act 2006) – from Aberdeen City Council;
- A marine licence under the Marine (Scotland) Act 2010 – from Marine Scotland; and

- A Harbour Revision Order (HRO) under the Harbours Act 1964 – from Transport Scotland.

This HRA has been produced to support the above consenting regimes for a number of Natura 2000 sites and information to inform the AA is presented to the competent authorities within this document.

1.2 Approach to the HRA

The process of HRA involves:

Stage One - Screening: test of likely significance: this stage determines whether the proposal is likely to have a significant effect, alone or in combination with other plans or projects, on a Natura 2000 site. This stage, based on objective information, acts to remove elements that do not need further consideration under Stage Two (Appropriate Assessment). For example, if there are no effects on the qualifying features of a European site despite a connection between the proposal and the European site, then the conclusion is one of no Likely Significant Effect (LSE) and no further assessment is required. However, if there is a LSE on a European site, then an AA must be followed.

Stage Two - Appropriate Assessment: the Competent Authorities (in this case Transport Scotland, Marine Scotland (MS) and Aberdeen City Council (ACC)) must undertake an AA of the potential effects of the project against the site's conservation objectives. Where LSE are identified during screening, the AA determines whether, in view of the European site's conservation objectives, the plan or project would have an adverse effect (or risk of adverse effect) on the integrity of the European site.

To inform the AA, the following information will be provided:

- Identification of the development area and possible receptors/interest features for the area (connectivity);
- Identification of the possible effects the development could have on the receptors;
- Identification of key species that could be impacted by the development in a regional setting;
- Identification of key onsite activities associated with the project development;
- Identification of seasonal variations in designated features at the site;
- Assessment of whether the impact from development would have an effect on the interest features of a European site in the region.

Alternatives and Compensation: where the plan or project cannot be shown to avoid an adverse effect on the integrity of a European site, there should be an examination of alternative solutions and compensation measures.

Assessment of Imperative Reasons of Overriding Public Interest (IROPI): if it is not possible to identify mitigation and alternatives that would avoid an adverse effect on a European site, it would be necessary to establish imperative reasons of overriding public interest (IROPI). This is not considered a standard part of the HRA process and would only be carried out in exceptional circumstances.

In summary, after consideration of the initial stages in the HRA (screening and AA), if it cannot be ascertained beyond reasonable scientific doubt that the proposal will not adversely affect the integrity of a Natura 2000 site, the proposal can only proceed if:

- There are no alternative solutions;
- There are imperative reasons of overriding public interest for doing so (including those of social or economic nature); and
- Any necessary compensation measures are taken to secure the overall coherence of the Natura 2000 site network (The Scottish Government, 2014).

SNH provide detailed guidance on the HRA process (David Tyldesley and Associates, 2010) and identify 13 stages to be followed during a HRA (Figure 1.1).

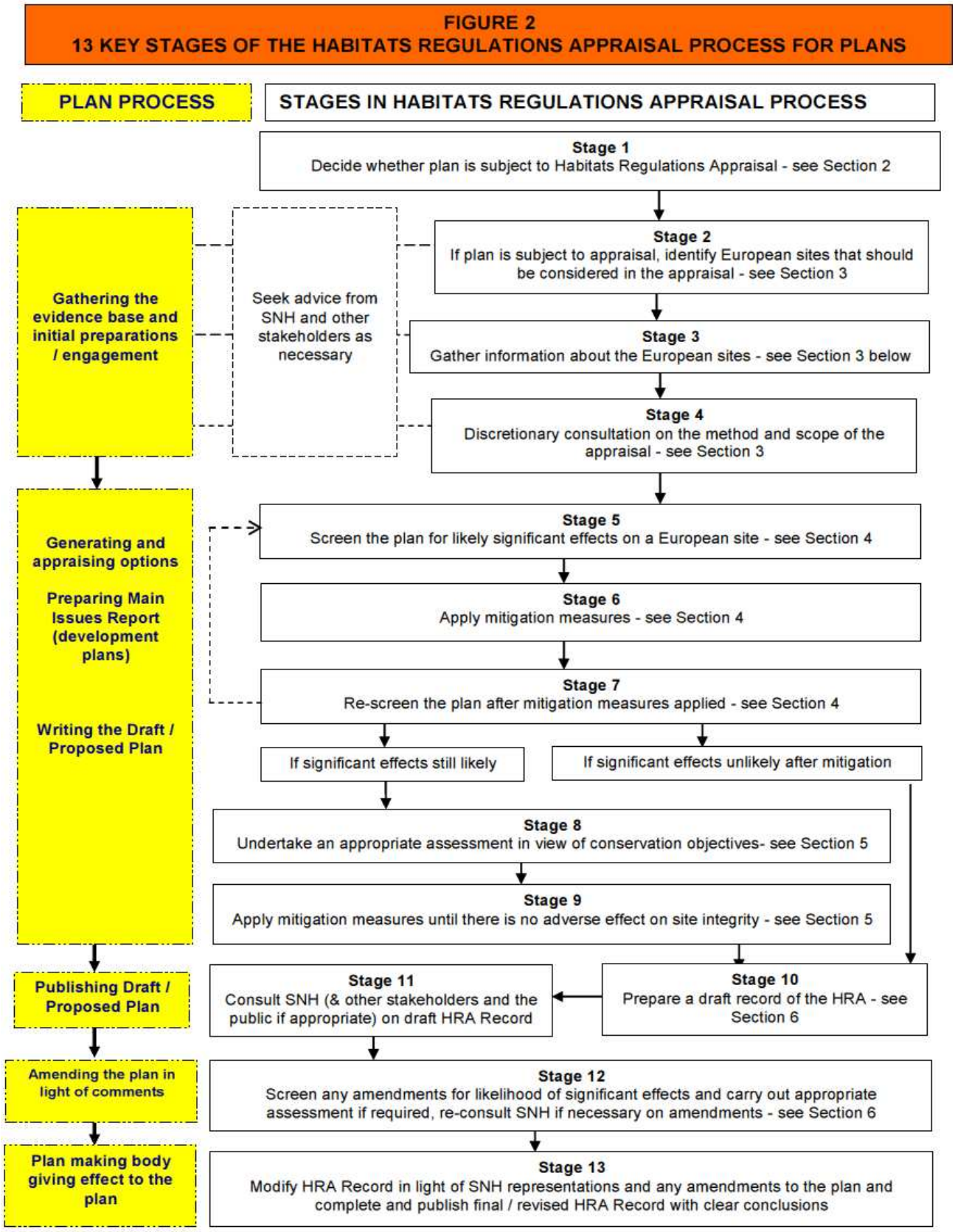

Figure 1.1: Thirteen key stages of HRA

(Figure reproduced from David Tyldesley and Associates, 2010)

1.3 Scope of this HRA

This document forms the initial screening stage of the HRA and presents information on the potential effects of the proposed Aberdeen Harbour Expansion Project (the project) on sites of nature conservation importance, their qualifying features and conservation objectives.

The information presented determines whether the project, either alone or in combination with other plans and projects, is likely to have a LSE on a European site based on the results of the screening assessment. The information provided will inform an AA by the competent authorities of whether, in view of the relevant European site's conservation objectives, the project will have an adverse effect on the integrity of a European site.

The following guidance has been utilised during the production of this document:

- The Habitats Regulations Appraisal handbook (Tyldesley and Chapman, 2013);
- Assessment of plans and projects significantly affecting Natura 2000 sites (European Commission, 2000); and
- Habitats Regulations Appraisal of Plans: Guidance for Plan-making Bodies in Scotland (David Tyldesley and Associates, 2010).

Although the HRA is a standalone document, reference to further data and supporting appendices will be signposted throughout. The HRA document should also be read in conjunction with Section 3 (Biological Environment) of the ES:

- ES Chapter 10: Nature Conservation;
- ES Chapter 11: Terrestrial Ecology;
- ES Chapter 12: Benthic Ecology;
- ES Chapter 13: Fish and Shellfish Ecology;
- ES Chapter 14: Marine Ornithology;
- ES Chapter 15: Marine Mammals.

2. PROJECT DESCRIPTION

The proposed harbour expansion site is located at Nigg Bay, approximately 0.8 km from the current harbour which is located within Aberdeen city centre. The proposed harbour lies within a natural bay which looks out into the North Sea and covers an area of approximately 0.87 km^2. The site is surrounded by rocky cliffs and headlands to the north (Girdle Ness) and south (Greg Ness) which slope down to a cobble beach to the west, and the North Sea to the east.

Included within the initial works will be the construction of the breakwaters, the quaysides (south-east, east, north and western), along with the access road to the southern breakwater and the diversion of Greyhope Road. Approximately 1500 m of new quayside (south-east, east, north and west) is to be constructed. After the construction of the north and west quay the suspended deck structure will be installed. Where rock is above the required dredge level, dredging must be completed before quay construction (Arch Henderson, 2015). Other harbour infrastructure works include car parking facilities to be built in the north-west corner of the site boundary, as well as composite bulk, water and fuel tanks for example, and gatehouse and welfare facilities. Any land restoration (for example, of temporary working areas) will take place once harbour construction works are complete.

The operation life span of the project is anticipated to be 60 years for the quaysides and 100 years for the breakwaters, and therefore decommissioning is not considered within this HRA.

See ES Chapter 3: Description of the Development for a full description of the project, including an indicative construction programme.

3. LIKELY SIGNIFICANT EFFECT

A Likely Significant Effect (LSE) is any effect that may be reasonably predicted as a consequence of a plan or project, which may undermine the conservation objectives for which a European site is designated. During the Waddenzee case (European Court of Justice C-127/02), the European Court ruled that a project should be subject to AA "if it cannot be excluded, on the basis of objective information, that it will have a significant effect on the site, either individually or in combination with other plans or projects" (David Tyldesley and Associates, 2010). A likely effect is one that cannot be ruled out on the basis of objective information (David Tyldesley and Associates, 2010). Likely should therefore not be interpreted as 'probable', but rather whether a significant effect can objectively be ruled out or not. The test of significance is based on whether a plan or project could undermine the site's conservation objectives and must be made in light of the characteristics and specific environmental conditions of the site concerned. There must be a causal connection between the plan or project and the qualifying features of the site, which could result in significant direct or indirect effects within the site. The Habitats Regulations seek only to control effects which are adverse in relation to a sites conservation objectives (Section 4.1).

A LSE does not imply a significant adverse impact on the integrity of a European site, but identifies potential significant effects on qualifying species for which further work is required in the form of an Appropriate Assessment (AA).

The initial screening stage (Section 5) is used to identify the possibility of adverse significant effects which could undermine a European site's conservation objectives. The purpose of screening is, based on objective information, to:

i. Identify aspects of the project which will have no adverse effect on a European site and its conservation objectives, so they can be eliminated from further consideration;

ii. Identify aspects of the project which are not likely to have a significant effect on a European site and its conservation objectives (i.e. aspects which could have some effect but which are minor residual), either alone or in combination with other aspects of the same project or other plans or projects. These aspects therefore do not require an appropriate assessment;

iii. Identify those aspects of the project where it is not possible to rule out the risk of significant effects on a European site and its conservation objectives, either alone or in combination with other plans or projects. This provides a clear scope of the parts of the project that therefore require AA.

If significant effects cannot be excluded on the basis of objective information without extensive investigation at the screening stage, a plan or project should be considered to have a LSE and taken through to an AA (Section 5.1.3).

3.1 Pathways for LSE: Summary of Effects from the Proposed Development

The potential effects from the Aberdeen Harbour Expansion Project on Natura 2000 sites and species can be both temporal and spatial. For example, short-term disturbance during construction activities, long-term disturbance from operation, or effects due to differences in migratory and breeding seasons are all temporal. Spatial effects may occur as a result of species movements occurring nationally between SACs and SPAs and internationally between countries. Effects can also be reversible or irreversible; for example, construction disturbance is part-reversible as disturbance will cease when the

development is complete, whereas habitat loss due to the placement of infrastructure is permanent for the duration of the development.

Potential impacts that could cause a LSE have been identified and effects are summarised in Table 3.1.

Table 3.1: Potential effects of the proposed development on designated features

Identification	Phase(s)	Impact	Effect
1	Construction Operation	Introduction of infrastructure on the seabed (breakwaters and quays)	Permanent loss of original habitat and feeding grounds
2	Construction	Capital dredging of inner basin and approach channel: Seabed disturbance Increased SSC	Loss of original habitat and feeding grounds
3	Operation	Maintenance dredging of inner basin and approach channel: Seabed disturbance Increased SSC	Permanent loss of original habitat and feeding grounds
4	Construction Operation	Reduction in water quality: Accidental spills from vessels during construction and operation Accidental spills from on-site storage of fuels and chemicals Use of anti-fouling chemicals Sediment disturbance (from dredging and propeller wash) and release of sediment contaminants Increased contaminants from discharges into harbour Reduced dissolved oxygen	Avoidance, temporary loss of habitat/feeding grounds, physical injury/loss of condition, mortality (in severe cases)
5	Construction Operation	Seabed disturbance: Capital dredging Maintenance dredging Seabed scour and changes to coastal processes Increased turbidity, SSCs and siltation	Avoidance, temporary loss of habitat/feeding grounds, mortality (in severe cases)
6	Construction	Increased noise and vibration: Drilling, piling, dredging, blasting and dredged material disposal activities Increased vessel movements	Temporary avoidance, physical injury (temporary and permanent), mortality (in severe cases)
7	Operation	Increased noise and vibration: Increased vessel movements Maintenance dredging	Permanent avoidance, physical injury (temporary and permanent), mortality (in severe cases)
8	Construction Operation	Visual disturbance: Presence of vessels and onshore plant Presence of artificial lighting	Temporary/permanent avoidance
9	Construction Operation	Introduction of non-native species (stepping stone effect).	Competition with native species
10	Construction Operation	Introduction of seabed infrastructure – provision of a stratum for colonisation and reef effect.	Behavioural modification: Attraction
11	Construction Operation	Increased collision mortality: Increased vessel movements	Mortality

Table 3.1: Potential effects of the proposed development on designated features continued

Identification	Phase(s)	Impact	Effect
12	Construction Operation	Presence of seabed infrastructure, noise sources and visual disturbances – creation of a barrier	Behaviour modification: Avoidance Changes to regular migratory movements
13	Construction Operation	Exclusion from traditional fishing grounds.	Indirect effect: Increased fishing pressure elsewhere Reduced prey availability
14	Construction Operation	Changes to availability of prey species, e.g. changes to fish and shellfish communities	Indirect effect: Permanent loss of original habitat and feeding grounds Reduced prey availability Loss of condition Mortality (in severe cases).

3.1.1 Direct Habitat Loss

3.1.1.1 Infrastructure on Seabed

There will be a permanent net loss of seabed habitat covering a total area of 212,118 m^2 from the placement of the new quays and associated lay down areas in addition to the installation of the breakwaters. This includes a loss of 140,985 m^2 of subtidal habitat and equates to 57 % of the total seabed habitat within the marine development boundary. Two substantial breakwaters, each over 600 m long, will be constructed to the north and south. The breakwaters will have a maximum crest level of over 12 m above Chart Datum. Approximately 1500 m of new quayside (south-east, east, north and west) is to be constructed. After the construction of the north and west quay the suspended deck structure will be installed. The south-west and southern side of the bay will remain largely undeveloped. The presence of the physical structures will occupy the entire water column, therefore also reducing the pelagic habitat.

Whilst the loss of seabed habitat and pelagic habitat in the water column will be highly localised to within the EIA boundaries, the construction of quays and breakwaters will result in a reduction to the amount of area available for spawning, nurseries and over-wintering. However, the most likely mechanism for effects on SAC and SPA species is indirect, through changes in the distribution of prey and foraging habitat as a result of habitat loss.

3.1.1.2 Dredging

The main dredging activities which generate physical effects on the environment are: screening, overspill, use of a drag head, anchoring and vessel presence. Figure 3.1 demonstrates sources (activities), receptor groups and the physical effects most likely to affect these receptors. The figure also illustrates whether these are direct (physical) and/or indirect (physical and ecological) effects.

There will be a permanent net loss of seabed habitat as a result of dredging activities associated with the installation of the quays, breakwaters and the formation of the navigational channels (see also Section 3.1.2.2). The inner basin will be dredged to 9.0 m below Chart Datum, and the eastern berth and approach channel to 10.5 m below Chart Datum. Dredging is expected to take 19 months and it is assumed that dredging could take place 24/7 throughout the year. The total volume of material to be dredged is 2,300,000 m^3. Of the dredged material, 109,000 m^3 is anticipated to be rock. All rock will be used within the harbour works and will not be disposed offshore.

Dredging activity is anticipated to be undertaken using a trailer suction hopper dredger (TSHD) for approximately 45% of the material (1,035,000 m^3) and a backhoe dredger for approximately 55% of the material (1,265,000 m^3). The dredged material will be transported into barges for disposal offshore at the licensed disposal site that is used for AHB maintenance dredging activities in the existing harbour, with up to three barges operating at any one time. The disposal site is located at 57°07´N 02°00´W (0.25 nm in radius) and further information is provided in ES Chapter 3: Project Description.

Dredging activities will have a direct effect on the benthic communities, including removal of epifauna and infauna (Cook and Burton, 2010) and indirect effects on fish feeding through loss of sediment invertebrate prey. Dredging will also result in a reduction in the amount of area available for spawning, nurseries and over-wintering and increased turbidity in the water column; however, the most likely mechanism for effects on SAC and SPA species is indirect, through changes in prey distribution and foraging habitat as a result of habitat loss.

3.1.2 Physical Disturbance and Displacement

3.1.2.1 Reduced Water Quality

There is potential for a reduction in water quality as a result of construction and operation, via accidental spills, release of sediment contaminants and reduced dissolved oxygen levels. A reduction in water quality may cause species to avoid the area altogether therefore causing a temporary loss of habitat and in severe cases may lead to mortality.

Accidental spillage or release of chemicals into the environment such as fuel, oil and lubricants from vessels during construction and operation could potentially contaminate the marine environment, leading to a reduction in water quality. Similarly, accidental spills from on-site storage of fuels and chemicals and use of anti-fouling chemicals on ship hulls may lead to a reduction in water quality. However, in the event of an accident where toxic chemicals are released into the marine environment, emergency procedures will be in place to minimise the environmental effects as much as possible. For example, vessels and quaysides will be equipped with oil spill kits to enable containment and treatment of oil spills. It is also likely that any accidental spillage or release would be dispersed and diluted quickly by tidal currents and wave action. It should also be noted that strict regulations apply to the ports and shipping industries to reduce the risk of accidental spillages.

Sediment plumes will be generated during dredging, which are likely to cause resuspension of sediment bound contaminants and reduced water quality (Figure 3.1). Resuspension of sediment will take place on a short-term intermittent basis with the majority of material settling out quickly after initial disturbance. With resuspension of sediment, there is potential for contaminants to become available for uptake by species, which in turn can cause harmful bio-accumulation in individuals and may ultimately be passed up the food chain. However, the level of contaminants in the material to be dredged is low. Site specific sediment analyses found all contaminants tested to be below Marine Scotland's Action Level One (ES Appendix 12-B: Subtidal Benthic Ecological Characterisation Survey). Therefore the levels of surface sediment contaminants within the marine development boundary are not considered a danger to the environment if disposed of at sea.

3.1.2.2 Seabed Disturbance

Seabed disturbance will occur during construction and operation of the Aberdeen Harbour Expansion Project. Seabed disturbance may cause species to avoid the area altogether therefore causing a temporary loss of habitat and feeding grounds, and in severe cases may lead to mortality.

Short-term localised seabed habitat disturbance will occur as a result of dredging activities within the project area in relation to the installation of the quays, breakwaters and the formation of the navigational channels (Section 3.1.1). Dredging leads to the production of a suspended sediment plume therefore increased turbidity and siltation (caused by increased suspended sediment concentrations (SSCs)) are likely to occur as a result of dredging during construction (Figure 3.1). Maintenance dredging will also be required during operation, which will cause a short-term localised increase in SSCs during each dredging event. In addition, increased SSCs may occur as a result of propeller wash from vessels during construction and operation. The effects of increased turbidity and SSCs include changes in primary production, filter feeding, migrations and/or movements of fish, survival of pelagic egg and larvae of fish and foraging opportunities of visual predators, e.g. fish, seabirds and mammals (Birklund and Wijsman, 2005; Thaxter et al., 2012). However, SSCs are generally higher within inshore regions due to wave and tidal action which means that species inhabiting these regions will have a higher natural tolerance.

3.1.3 Non-physical Disturbance and Displacement

3.1.3.1 Noise and Vibration

Disturbance and displacement may occur as a result of construction and operation activities which generate increased noise levels and visual disturbance. Disturbance and displacement arising from construction and operation activities can cause both temporary and/or permanent avoidance. In addition, underwater noise may result in physical harm, temporary or permanent hearing loss, masking of important biological sounds and increased vulnerability to predation and other hazards (Bonar et al., 2015). Noise and vibration sources also have the potential to cause species to relocate to sites that may be less optimal and therefore cause increased energetic or behavioural costs, which could increase mortality or reduce breeding success (Bonar et al., 2015; Merchant et al., 2014).

During construction, increased noise and vibration will be generated from drilling, piling, dredging and blasting activities, in addition to an increase in vessel traffic in the area. The noise sources themselves tend not to act in isolation: a spread of platforms or vessels deployed during each task is the most likely scenario.

During operation, increased noise levels will be generated as a result of increased vessel traffic operating in the area. Noise from shipping is a major contributor to the overall noise in a given sea area due principally to the large numbers of ships present, their wide distribution and their mobility. Sound levels and frequency characteristics are related approximately to ship size, vessel speed, engine power and even the age of the engine where through wear and tear, additional noises are generated. However, it is noted that even amongst vessels of similar classes, there is considerable variation.

Further information on noise sources and effects on species can be found in the ES Appendix 13-B: Underwater Noise Impact Study.

3.1.3.2 Visual Disturbance

The installation of infrastructure associated with the proposed development will result in an increase in artificial lighting around berthed vessels, walkways and navigational markers. The implications of unnatural lighting regimes for fauna in coastal ecosystems are relatively unknown; although it is deemed likely to cause temporary or permanent avoidance of SPA and SAC species.

Similarly, some SPA and SAC species may be sensitive to visual disturbances from the presence of vessels. Some bird groups such as gulls have been shown to be attracted to areas with increased shipping activity; however, other groups including sea ducks and divers have been shown to actively avoid areas with increased vessel presence (Cook and Burton, 2010). Responses are therefore highly species specific.

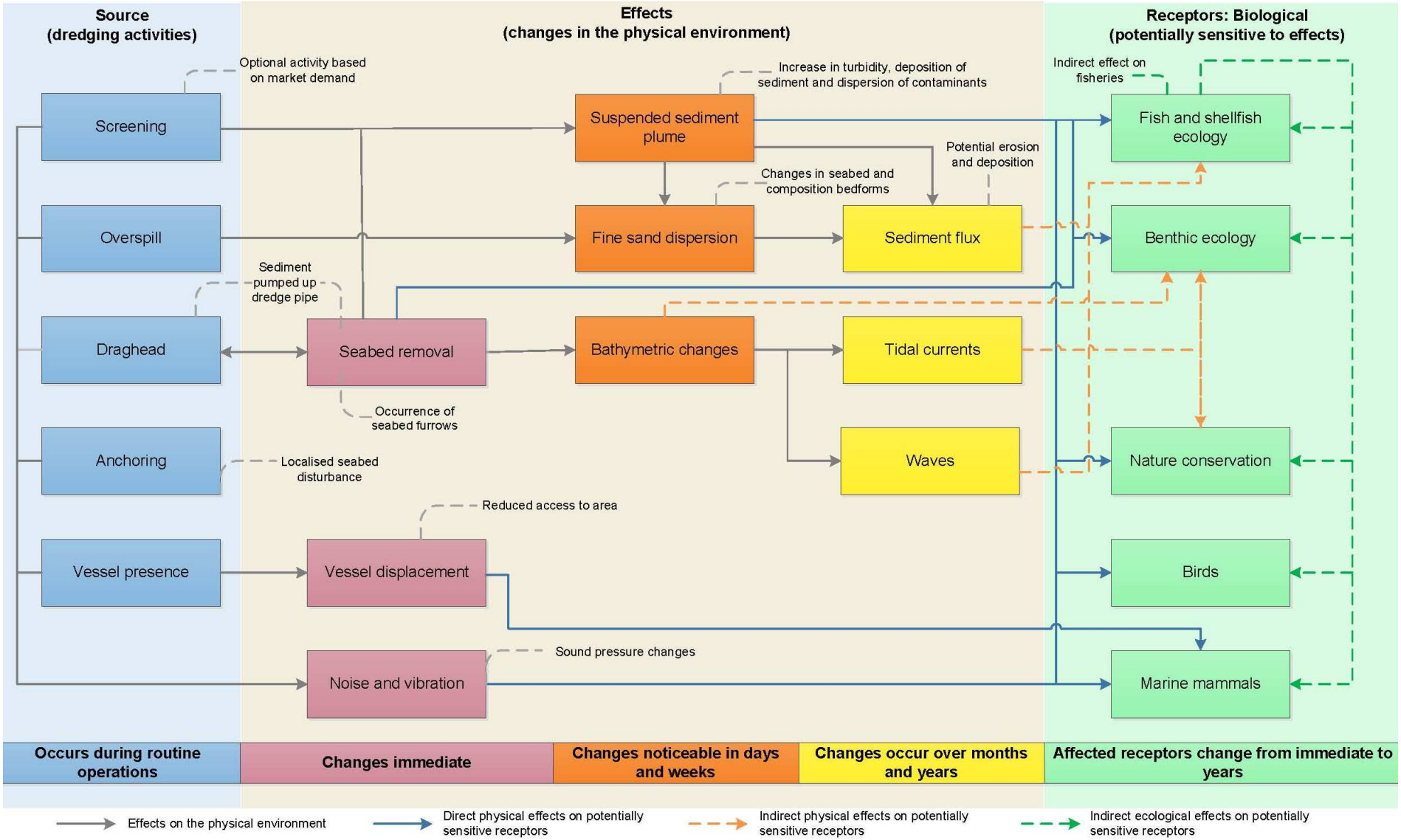

Figure 3.1: Overview of the effects of dredging on biological receptors: source-pathway-receptor model

3.1.4 Biological Disturbance

3.1.4.1 Collision Mortality

An increase in vessel activity has the potential to cause an increase in collision risk, with vessel strikes being a known cause of mortality of marine mammals. A number of responses to vessel traffic have been reported in marine mammals including avoidance, displacement and changes in vocalisation (Bailey et al., 2010). Further information on marine mammals and vessel collisions can be found in ES Chapter 15: Marine Mammals.

Studies investigating interactions between seabirds and vessels have tended to focus on fisheries by-catch and collision risk modelling at wind farms (Cook and Burton, 2010). Although very few studies have directly investigated collisions between seabirds and ships, collision risks are thought to be very low (Cook and Burton, 2010). Further information on seabirds and vessel collisions can be found in ES Chapter 14: Marine Ornithology.

3.1.4.2 Introduction of Non-native Species

Shipping, harbour developments and coastal defence structures are recognised as important vectors for species movement and artificial hard structures may act as stepping stones for non-indigenous biota. The introduction of non-native species via a “stepping stone” effect may lead to reduced biodiversity, particularly where non-native species out-complete native species.

An increase in vessel activity during construction and operation may increase the potential for introduction of non-native species. However, all vessels will follow the relevant procedures including the Non-Native Species Code of Practice (The Scottish Government, 2012). There is already a large volume of vessel activity occurring in the area, with a high intensity of vessel movements to and from Aberdeen Harbour; therefore the additional vessel traffic experienced as a result of the Aberdeen Harbour Expansion Project is likely to be negligible in causing the introduction of non-native species.

3.1.4.3 Barrier and Reef Effects

New hard seabed and mid-water habitats will be created by the placement of the new quays and associated lay down areas as well as from the installation of the breakwaters. Once in place these structures will become a permanent feature of the development area.

The introduction of seabed infrastructure may cause behavioural modification via a barrier effect but may also create a reef effect. For example, species such as salmonids may deviate from their normal migratory routes due to the presence of seabed infrastructure and associated disturbance from construction and operational activities (barrier effect). However, the seabed infrastructure will also act to increase the structural complexity of the existing habitats and will introduce new hard substrate, providing colonisation opportunities for fish, shellfish and invertebrates (reef effect). In time this may support existing populations of fish and shellfish in the surrounding areas by acting as a foraging resource.

3.1.5 Indirect Effects

The development may cause changes to the availability of prey species, e.g. changes to fish and shellfish communities. The species composition of an area is often altered as a result of dredging

operations. This would have an indirect effect on predatory species, causing loss of original habitat and feeding grounds, loss of condition and in severe cases, mortality. For example, impacts to benthic communities as a result of dredging would likely have a negative effect on some seabird populations, although effects will be dependent on species' preferred prey and the depth of water that dredging occurs (Cook and Burton, 2010). In addition, changes to the seabed that occur during dredging operations may also affect fish species and thus indirectly affect birds (Cook and Burton, 2010).

4. QUALIFYING SITES

Special Areas of Conservation (SACs) are sites designated under the Habitats Directive (EU Directive 92/43/EEC on the conservation of habitats and wild flora and fauna). Special Protection Areas (SPAs) are sites classified under the Birds Directive (EU Directive 2009/147/EC on the conservation of wild birds). Ramsar sites are wetlands of international importance designated under The Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) and the Scottish Government has chosen, as a matter of policy, to apply the same considerations to the protection of Ramsar sites as if they were classified as SPAs. Together, SACs and SPAs form part of a European network of protected sites (Natura 2000). The Habitats Regulations require projects to consider the effects of potential developments on sites and species of international nature conservation importance within the Natura 2000 network.

4.1 Conservation Objectives

The conservation objectives for a Natura 2000 site are intended to represent the aims of the Habitats and Birds Directive in relation to that site. Measures taken under the Habitats Directive should be designed to maintain or restore habitats and species of European importance at favourable conservation status (FCS). The conservation objectives of a site set the standards which must be met if the features of the site (habitats and species) are to be at FCS.

The conservation status of natural habitats is defined in Article 1 of the Habitats Directive as follows (European Commission, 2000):

"*The sum of influences acting on a natural habitat and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species.*

The conservation status of natural habitats will be taken as favourable when:

- *Its natural range and areas it covers within that range are stable or increasing;*
- *The species structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future;*
- *The conservation status of its typical species is favourable as defined in Article 1."*

The conservation status of species is defined in Article 1 of the Habitats Directive as follows (European Commission, 2000):

"*The sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its population.*

The conservation status of species will be taken as favourable when:

- *Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;*
- *The natural range of the species is neither being reduced for the foreseeable future;*

- *There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long term basis."*

In order to meet the conservation objectives of a site, the integrity of the site must be maintained. Deterioration or disturbance is assessed against the conservation status of species and habitats concerned. The integrity of a site is the coherence of its ecological structure and the functioning of its ecological systems, the features for which the site is designated (habitats and/or species) and the ability of the site to meet its conservation objectives. An adverse effect is therefore defined as something that impacts the site features, either directly or indirectly, and results in disruption or harm to the ecological structure and functioning of the site and/or affects the ability of the site to meet its conservation objectives across all parts of the site.

At a site level, the maintenance of FCS is evaluated against the conditions provided in the initial Natura 2000 standard data forms completed when the site was proposed for selection or designation, according to the contribution of the site to the ecological coherence of the Natura 2000 network.

The AA will demonstrate whether or not there will be an adverse effect on the integrity of a European site, in light of its conservation objectives. The following sections provide a summary of relevant information that may be used by the competent authority to determine whether an adverse effect will occur on a qualifying site.

4.2 Special Areas of Conservation (SACs)

SACs are protected sites designated under the Habitats Directive (EU Directive 92/43/EEC on the conservation of habitats and wild flora and fauna). Article 3 of the Directive requires the establishment of a European network of important high quality conservation sites that will make a significant contribution to conserving the 189 habitat types and 788 species identified in Annexes I and II of the Directive (as amended). The listed habitat types and species are those considered to be most in need of conservation at a European level (excluding birds). SACs, together with SPAs (Section 4.3), form part of the European network of Natura sites (Natura 2000).

The proposed development site does not overlap directly with any SACs. However, connectivity between the development area and SACs may occur where individuals from populations of qualifying species use both an SAC and the proposed site at some point in during their life cycle. There is no clear guidance on how to define the extent and scope of an SAC population that could potentially be affected by a proposed development. The scope of the HRA therefore focuses on all coastal SACs between Dornoch Firth and Morrich More SAC and Berwickshire and north Northumberland Coast SAC, covering approximately 320 km of coastline. The scope covers the sites advised in the formal Scoping Opinion received from SNH (as presented in ES Appendix 1-D, 11 April 2014). Furthermore, a screening matrix was sent to SNH on 3 July 2015 and it was agreed during this consultation that the selection of Natura 2000 sites for consideration in the HRA was suitable, and possibly overcautious by including dSACs located some distance from the development area. The SACs with potential connectivity to the project and therefore considered as part of the HRA are included in Table 4.1 and Figure 4.1.

Table 4.1: SACs with potential connectivity to the project

Site Name	Distance* [km]	Area [ha]
River Dee SAC	2	2446.82
Moray Firth SAC	160	151347.17
Isle of May SAC	110	356.75
Berwickshire and North Northumberland Coast	132	65045.5
Firth of Tay and Eden Estuary	86	15412.53
Dornoch Firth and Morrich More	195	8700.53

Note:
* Approximate distance by sea from the project

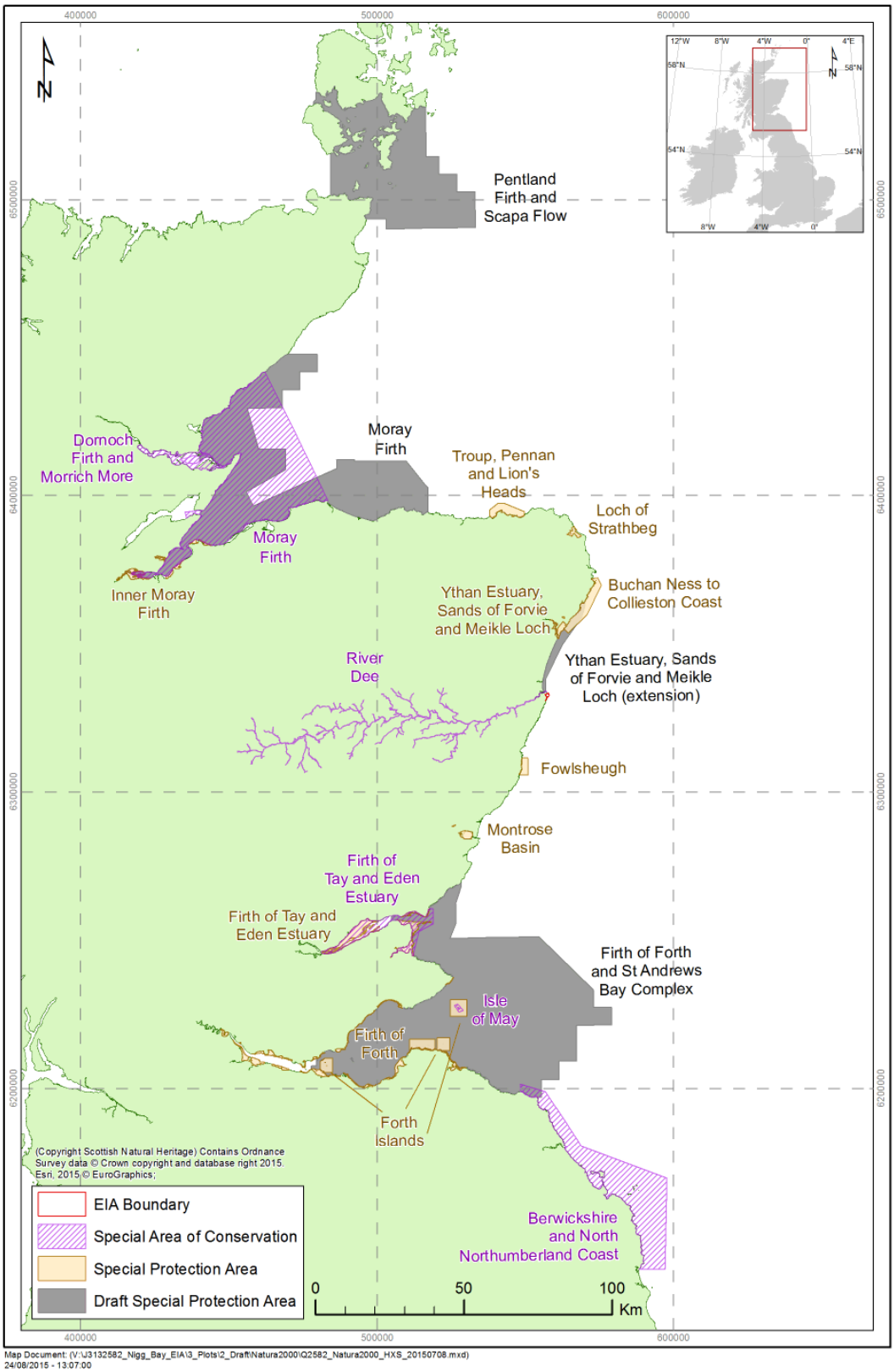

Figure 4.1: Natura 2000 sites with potential connectivity to the project

Full site details are provided in Section 4.2.1 to Section 4.2.7 below; however, it is recognised that connectivity will not occur between the development area and all of the listed qualifying species. The potential for connectivity between the development area and SAC qualifying species is therefore assessed further in Section 5.1.1, where species are either scoped in or out of the HRA.

4.2.1 River Dee SAC

Table 4.2: River Dee SAC

Site Information	Details
Site Overview	The Dee is a major east coast Scottish river, which supports a functional population of freshwater pearl mussel *Margaritifera margaritifera*. *M. margaritifera* is common in the Dee, recorded from a location approximately 30 km from the river source to approximately 6 km – 7 km upstream from its mouth. Juveniles make up approximately 30% of the recorded population, among the highest proportions recorded in Scotland. This indicates that the population is recruiting strongly and is one of the most important in the UK. The River Dee supports a high-quality Atlantic salmon *Salmo salar* population. Although there is a weak nutrient gradient along its length, it is essentially a nutrient-poor river. A high proportion of the river is accessible to salmon, which has resulted in it supporting the full range of life-history types found in Scotland, with sub-populations of spring, summer salmon and grilse all being present. The River Dee supports a significant proportion of the Scottish salmon resource. In recent years it has contributed about 4 or 5% of all salmon caught in Scotland. Surveys have indicated that otter *Lutra lutra* is found throughout Dee catchment, from its mouth at Aberdeen to many of the high-altitude lochs. The river system contains extensive areas of suitable habitat for otter feeding, resting and breeding, including watercourses with a high fish biomass and islands and marshy areas for resting. This is a strong, high quality population, representative of north-east Scotland.
Date of Designation	17/03/2005
Site Designation – Qualifying Species and Features	**Annex II species (primary reason for site selection):** • Atlantic salmon (*Salmo salar*) • Freshwater pearl mussel (*Margaritifera margaritifera*) • Otter (*Lutra lutra*)
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying species that the following are maintained in the long term: • 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 • Distribution and viability of freshwater pearl mussel host species • Structure, function and supporting processes of habitats supporting freshwater pearl mussel host species
Site Condition and Date of Assessment	Atlantic salmon – favourable maintained (21/07/11) Otter – favourable maintained (06/10/12) Freshwater pearl mussel – unfavourable no change (07/08/03)

4.2.2 Moray Firth SAC

Table 4.3: Moray Firth SAC

Site Information	Details
Site Overview	The Moray Firth in north-east Scotland supports the only known resident population of bottlenose dolphin *Tursiops truncatus* in the North Sea. The population is estimated to be around 130 individuals, with dolphins are present all year round.
Date of Designation	17/03/2005
Site Designation – Qualifying Species and Features	**Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:** • 1110 Sandbanks which are slightly covered by sea water all the time
	Annex II species (primary reason for site selection): • Bottlenose dolphin (*Tursiops truncatus*)
Site Conservation Objectives	To avoid deterioration of the qualifying habitat thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying habitat that the following are maintained in the long term: • Extent of the habitat on site • Distribution of the habitat within site • Structure and function of the habitat • Processes supporting the habitat • Distribution of typical species of the habitat • Viability of typical species as components of the habitat • No significant disturbance of typical species of the habitat To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying species that the following are established then 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
Site Condition and Date of Assessment	Bottlenose dolphin – favourable recovered (21/09/10) Subtidal sandbanks – favourable maintained (12/08/04)

4.2.3 Isle of May SAC

Table 4.4: Isle of May SAC

Site Information	Details
Site Overview	The Isle of May, lying at the entrance to the Firth of Forth on the east coast of Scotland, supports a breeding colony of grey seals *Halichoerus grypus*. The site is the largest east coast breeding colony of grey seals in Scotland and the fourth-largest breeding colony in the UK, contributing approximately 4.5% of annual UK pup production. The site overlaps with Forth Islands SPA.
Date of Designation	17/03/2005
Site Designation – Qualifying Species and Features	**Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:** • 1170 Reefs
	Annex II species (primary reason for site selection): • Grey seal (*Halichoerus grypus*)
Site Conservation Objectives	To avoid deterioration of the qualifying habitat thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying habitat that the following are maintained in the long term: • Extent of the habitat on site • Distribution of the habitat within site • Structure and function of the habitat • Processes supporting the habitat • Distribution of typical species of the habitat • Viability of typical species as components of the habitat • No significant disturbance of typical species of the habitat To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying species that the following are established then 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
Site Condition and Date of Assessment	Grey seal – favourable maintained (14/11/09) Reefs – favourable maintained (05/09/07)

4.2.4 Berwickshire and North Northumberland Coast SAC

Table 4.5: Berwickshire and North Northumberland Coast SAC

Site Information	Details
Site Overview	This is an extensive and diverse stretch of coastline in north-east England and south-east Scotland. There is variation in the distribution of features of interest along the coast. Stretches of the coast in England support a very extensive range of intertidal mudflats and sandflats with rich infaunal communities. Whilst predominantly rocky, this stretch of coastline has several characteristic, sediment-dominated embayments in north-east England, including Budle Bay, Beadnell Bay and Embleton Bay. Each of these areas is relatively exposed and uniform in nature and is characterised by crustacean/polychaete- and bivalve/polychaete-biotopes. Budle Bay forms one of the most extensive areas of sandflats between the Firth of Forth and the Wash, and the richest examples of these biotopes in north-east England. Moderately wave-exposed reef habitats occur throughout the site. The subtidal rocky reefs and their rich marine communities, together with the wide variety of associated littoral reefs, are the most diverse known on the North Sea coast. There is also a diverse range of rock types, including soft limestone and hard volcanic rock. The Farne Islands are of special importance as they are among the very few rocky islands with extensive reefs in the enclosed North Sea. Caves occur throughout the site in both the intertidal and the subtidal zones in a range of different hard rock exposures. Caves occur in association with 1170 Reefs, in both the intertidal and the subtidal zones. Depending on the depth of the cave and its morphology, the site supports a range of distinct biological communities. The north-east England coastal section is representative of grey seal *Halichoerus grypus* breeding colonies in the south-east of its breeding range in the UK. It is the most south-easterly site selected for this species, and supports around 2.5% of annual UK pup production.
Date of Designation	17/03/2005
Site Designation – Qualifying Species and Features	**Annex I habitats that are a primary reason for selection of this site** • 1140 Mudflats and sandflats not covered by seawater at low tide • 1160 Large shallow inlets and bays • 1170 Reefs • 8330 Submerged or partially submerged sea caves
	Annex II species (primary reason for site selection): • Grey seal (*Halichoerus grypus*)
Site Conservation Objectives	To avoid deterioration of the qualifying habitat thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying habitat that the following are maintained in the long term: • Extent of the habitat on site • Distribution of the habitat within site • Structure and function of the habitat • Processes supporting the habitat • Distribution of typical species of the habitat • Viability of typical species as components of the habitat • No significant disturbance of typical species of the habitat To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying species that the following are established then 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
Site Condition and Date of Assessment	Grey seal – favourable maintained (10/11/09) Sea caves – favourable maintained (17/06/03)

4.2.5 Firth of Tay and Eden Estuary SAC

Table 4.6: Firth of Tay and Eden Estuary SAC

Site Information	Details
Site Overview	The Firth of Tay and the Eden estuaries are two high-quality estuarine areas. The two estuaries comprise a single site because they are integral components of a large, geomorphologically complex area that incorporates a mosaic of estuarine and coastal habitats. The Tay is the least-modified of the large east coast estuaries in Scotland, while the Eden estuary represents a smaller 'pocket' estuary. The inner parts of the estuaries are largely sheltered from wave action, while outer areas, particularly of the Tay, are exposed to strong tidal streams, giving rise to a complex pattern of erosion and deposition of the sandbank feature at the firths' mouth. The sediments within the site support biotopes that reflect the gradients of exposure and salinity, and are typical of estuaries on the east coast of the UK. The abundance, distribution and composition of the associated plant and animal communities are ecologically representative of northern North Sea estuaries. The Firth of Tay and Eden Estuary supports a nationally important breeding colony of harbour seal *Phoca vitulina*, part of the east coast population of common seals that typically utilise sandbanks. Around 600 adults haul-out at the site to rest, pup and moult, representing around 2% of the UK population of this species. The site overlaps with Firth of Tay and Eden Estuary SPA.
Date of Designation	17/03/2005
Site Designation – Qualifying Species and Features	**Annex I habitats that are a primary reason for selection of this site:** • 1130 Estuaries
	Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: • 1110 Sandbanks which are slightly covered by seawater all the time • 1140 Mudflats and sandflats not covered by seawater at low tide
	Annex II species (primary reason for site selection): • Harbour seal (Phoca vitulina)
Site Conservation Objectives	To avoid deterioration of the qualifying habitat thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying habitat that the following are maintained in the long term: • Extent of the habitat on site • Distribution of the habitat within site • Structure and function of the habitat • Processes supporting the habitat • Distribution of typical species of the habitat • Viability of typical species as components of the habitat • No significant disturbance of typical species of the habitat To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying species that the following are established then 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.
Site Condition and Date of Assessment	Harbour seal – unfavourable declining (17/08/09) Subtidal sandbanks – favourable maintained (04/07/02) Intertidal mudflats and sandflats – favourable maintained (31/12/02)

4.2.6 Dornoch Firth and Morrich More SAC

Table 4.7: Dornoch Firth and Morrich More SAC

Site Information	Details
Site Overview	Dornoch Firth is the most northerly large, complex estuary in the UK and is virtually unaffected by industrial development. Several associated coastal habitats have qualified as Annex I interests. The estuary contains extensive areas of mudflats and sandflats, characteristic of a range of environmental conditions and a high diversity of animal and plant communities supporting polychaetes, oligochaetes, amphipods, gastropods and bivalves. Dornoch Firth and Morrich More has the most extensive area of pioneer glasswort *Salicornia* spp. saltmarsh in Scotland and is one of three sites representing Embryonic shifting dunes on the east coast of Scotland. There is a large area of Decalcified fixed dunes with *Empetrum nigrum* vegetation on this site, occurring in a complicated mosaic of acidic fixed dune vegetation types, principally 2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*). This is the most important acidic dune site in Scotland because of its size and the exceptional diversity of habitats within it. Morrich More is also the most important site in the UK for juniper *Juniperus* spp. stands on dune. Stands of juniper cover approximately 10 ha, with scattered individuals over a larger area. Dornoch Firth and Morrich More consists of an estuarine system with extensive areas of bordering natural habitat including sand dune, woodland and small lochans. The River Evelix and the River Oykel, which both feed into the site, provide otter *Lutra lutra* habitat. The area supports a good population of otters in what is the only east coast estuarine site selected for the species in Scotland. The Dornoch Firth is the most northerly large estuary in Britain and supports a significant proportion of the inner Moray Firth population of the harbour seal *Phoca vitulina*. The seals, which utilise sand-bars and shores at the mouth of the estuary as haul-out and breeding sites, are the most northerly population to utilise sandbanks. Their numbers represent almost 2% of the UK population. The site overlaps with Dornoch Firth and Loch Fleet SPA.
Date of Designation	17/03/2005
Site Designation – Qualifying Species and Features	**Annex I habitats that are a primary reason for selection of this site:** • 1130 Estuaries • 1140 Mudflats and sandflats not covered by seawater at low tide • 1310 Salicornia and other annuals colonizing mud and sand • 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) • 2110 Embryonic shifting dunes • 2120 Shifting dunes along the shoreline with Ammophila arenaria (“white dunes”) • 2130 Fixed coastal dunes with herbaceous vegetation (“grey dunes”) • 2140 Decalcified fixed dunes with Empetrum nigrum • 2150 Atlantic decalcified fixed dunes (Calluno-Ulicetea) *Priority feature • 2140 Decalcified fixed dunes with *Empetrum nigrum* • 2190 Humid dune slacks • 2250 Coastal dunes with Juniperus spp.
	Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: • 1110 Sandbanks which are slightly covered by sea water all the time • 1170 Reefs
	Annex II species (primary reason for site selection): • Harbour seal (*Phoca vitulina*) • Otter (*Lutra lutra*)

Table 4.7: Dornoch Firth and Morrich More SAC Continued

Site Information	Details
Site Conservation Objectives	To avoid deterioration of the qualifying habitat thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying habitat that the following are maintained in the long term: • Extent of the habitat on site • Distribution of the habitat within site • Structure and function of the habitat • Processes supporting the habitat • Distribution of typical species of the habitat • Viability of typical species as components of the habitat • No significant disturbance of typical species of the habitat To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying species that the following are established then 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
Site Condition and Date of Assessment	Dunes with juniper thickets – unfavourable recovering (23/05/14) Atlantic salt meadows – favourable maintained (23/07/14) Shifting dunes – favourable maintained (08/08/10) Glasswort and other annuals colonising mud and sand – favourable maintained (08/08/10) Shifting dunes with marram – favourable maintained (08/08/10) Harbour seal – unfavourable recovering (06/08/09) Otter – favourable maintained (06/08/04) Lime-deficient dune heathland with crowberry – unfavourable no change (10/08/01) Humid dune slacks – favourable maintained (10/08/01) Dune grassland – unfavourable no change (10/08/01) Coastal dune heathland – unfavourable no change (10/08/01) Reefs – favourable maintained (09/09/96) Intertidal mudflats and sandflats – favourable maintained (09/09/96) Subtidal sandbanks – favourable maintained (09/09/96)

4.2.7 Draft Special Areas of Conservation (dSACs)

It is understood that a suite of draft Special Areas of Conservation (dSACs) are in development for the UK. Those in Scottish waters include one which is of relevance to the project, namely, the Outer Moray Firth dSAC. The Outer Moray Firth has been identified as a persistent high density area for harbour porpoise (Heinänen and Skov, 2015).

The Scottish Government advises that HRA and EIA arrangements should be undertaken for sites in the suite from the point at which Ministerial approval is granted for the sites to go to consultation; however, the suite of dSAC is not under public consultation at present. Until specific Ministerial approval has been granted, there is no certainty that dSACs will go forward to become fully designated SACs.

The dSAC is therefore mentioned for information only and these sites do not currently form part of the formal assessment.

Table 4.8: Outer Moray Firth dSAC

Site Information	Details
Site Overview	N/A – draft status
Date of Designation	N/A – draft status
Site Designation – Qualifying Species and Features	Harbour porpoise
Site Conservation Objectives	N/A – draft status
Site Condition	N/A – draft status

4.3 Special Protection Areas (SPAs)

SPAs are protected sites classified under Article 4 of the Birds Directive (EU Directive 2009/147/EC on the conservation of wild birds). SPAs are classified for rare and vulnerable birds (as listed in Annex I of the Directive) and for regularly occurring migratory bird species.

The proposed development site does not overlap with any SPAs. However, connectivity between the development area and SPAs may occur where individuals from populations of qualifying species use both an SPA and the proposed site at some point in during their life cycle. Consideration is given to use of the site:

- During the breeding season by birds which are qualifying species of SPAs, e.g. use of the site for foraging/commuting to foraging areas by breeding seabirds;
- Out with the breeding season by wintering birds which are qualifying species of SPAs, e.g. seabirds and migratory birds (in particular waders and waterfowl).

There is no clear guidance on how to define the extent and scope of an SPA population that could potentially be affected by a proposed development. The scope of the HRA therefore focuses on all coastal SPAs between Inner Moray Firth SPA and Firth of Forth SPA, covering approximately 330 km of coastline. The scope covers the sites advised in the formal Scoping Opinion received from SNH (as presented in ES Appendix 1-D, 11 April 2014). Furthermore, a screening matrix was sent to SNH on 3 July 2015 and it was agreed during this consultation that the selection of Natura 2000 sites for consideration in the HRA was suitable, and possibly overcautious by including dSPAs located a large distance from the development area. The SPAs with potential connectivity to the project and therefore considered as part of the HRA are included in Table 4.9 and Figure 4.1.

Table 4.9: SPAs with potential connectivity to the project

Site Name	Distance* [km]	Area [ha]
Loch of Skene	18	120.89
Fowlsheugh	23	10.15
Montrose Basin	58	984.61
Ythan Estuary, Sands of Forvie and Meikle Loch	20	1016.24
Buchan Ness to Collieston Coast	23	208.62
Loch of Strathbeg	60	615.94
Troup, Pennan and Lion's Heads	85	174.22
Firth of Tay and Eden Estuary	86	6923.29
Forth Islands	107	105.06
Firth of Forth	101	6131.72
Inner Moray Firth	210	2339.23
Note: * Approximate distance by sea from the project		

Full site details are provided in Section 4.3.1 to Section 4.3.12 below; however, it is recognised that connectivity will not occur between the development area and all of the listed qualifying species. The potential for connectivity between the development area and SPA qualifying species is therefore assessed further in Section 5.1.2, where species are either scoped in or out of the HRA.

4.3.1 Loch of Skene SPA

Table 4.10: Loch of Skene SPA

Site Information	Details
Site Overview	Loch of Skene is located about 15 km west of Aberdeen in Scotland. It is a shallow (<2 m deep) eutrophic lowland loch surrounded by fringing reedbeds and birch-willow carr. The loch supports an internationally important roost of Icelandic greylag goose *Anser anser*, as well as Icelandic whooper swan *Cygnus cygnus*. Both swans and geese feed away from the SPA on surrounding agricultural land during the day.
Date of Designation	01/10/1986
Site Classification – Qualifying Species	**Article 4.1 of the Directive (Annex I Species):** • Whooper Swan (*Cygnus cygnus*) 203 individuals representing up to 3.7% of the wintering population in Great Britain
	Article 4.2 of the Directive (Migratory Species): • Greylag Goose (*Anser anser*) 10,840 individuals representing up to 10.8% of the wintering Iceland/UK/Ireland population
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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
Site Condition and Date of Assessment	Greylag goose – unfavourable declining (01/11/08)

4.3.2 Fowlsheugh SPA

Table 4.11: Fowlsheugh SPA

Site Information	Details
Site Overview	Fowlsheugh is located on the east coast of Aberdeenshire in north-east Scotland, overlooking the North Sea. The sheer cliffs, between 30 m - 60 m high, form a rock face with diverse structure providing ideal nesting sites for seabirds. The cliffs support major numbers of breeding seabirds, especially gulls and auks. The seabirds feed outside the SPA in nearby waters, as well as more distantly in the North Sea.
Date of Designation	31/08/1992
Site Classification – Qualifying Species	**Article 4.2 of the Directive (Migratory Species):** • Guillemot (*Uria aalge*) 40,140 breeding pairs, representing at least 1.8% of the East Atlantic breeding population • Kittiwake (*Rissa tridactyla*) 34,870 breeding pairs, representing at least 1.1% of the East Atlantic breeding population
	Article 4.2 of the Directive (Assemblage Qualification): During the breeding season, the area regularly supports 170,000 individual seabirds. The breeding seabird assemblage includes: • Razorbill (*Alca torda*) • Herring gull (*Larus argentatus*) • Fulmar (*Fulmarus glacialis*) • Guillemot (*Uria aalge*) • Kittiwake (*Rissa tridactyla*)
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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
Site Condition and Date of Assessment	Razorbill – favourable maintained (11/06/99) Kittiwake – favourable maintained (11/06/99) Guillemot – favourable maintained (11/06/99) Herring gull – unfavourable declining (18/06/99) Fulmar – favourable maintained (18/06/99) Seabird assemblage – favourable maintained (18/06/99)

4.3.3 Montrose Basin SPA

Table 4.12: Montrose Basin SPA

Site Information	Details
Site Overview	The Montrose Basin is located on the east coast of Scotland in Angus. It is an enclosed tidal basin fed by the River South Esk and contains areas of mud-flat, marsh, agricultural land and a small eutrophic loch. It is a good natural example of an estuary, relatively unaffected by development, with high species diversity in the intertidal zone and supporting a large population of wintering waterbirds. The site is important for wintering populations of pink-footed goose *Anser brachyrhynchus* and greylag goose *Anser anser*, along with ducks and waders. The geese feed away from the SPA on surrounding agricultural land during the day.
Date of Designation	03/02/1995
Site Classification – Qualifying Species	**Article 4.2 of the Directive (Migratory Species):** • Greylag goose (*Anser anser*) 1,080 non-breeding individuals representing at least 1.1% of the wintering Iceland/UK/Ireland population • Knot (*Calidris canutus*) 4,500 non-breeding individuals representing at least 1.3% of the wintering North Eastern Canada/Greenland/Iceland/North Western Europe population • Pink-footed goose (*Anser brachyrhynchus*) 31,622 non-breeding individuals representing at least 14.1% of the wintering Eastern Greenland/Iceland/UK population. • Redshank (*Tringa totanus*) 2,259 non-breeding individuals representing at least 1.5% of the wintering Eastern Atlantic population
	Article 4.2 of the Directive (Assemblage Qualification): Over winter, the area regularly supports 54,917 individual waterfowl. The (non-breeding) waterfowl assemblage includes: • Dunlin (*Calidris alpina alpina*) • Oystercatcher (*Haematopus ostralegus*) • Eider (*Somateria mollissima*) • Wigeon (*Anas penelope*) • Shelduck (*Tadorna tadorna*) • Redshank (*Tringa totanus*) • Knot (*Calidris canutus*) • Greylag goose (*Anser anser*) • Pink-footed goose (*Anser brachyrhynchus*)
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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
Site Condition and Date of Assessment	Eider – favourable maintained (31/03/08) Pink-footed goose – favourable maintained (31/03/08) Wigeon – favourable maintained (31/03/08) Oystercatcher – favourable maintained (31/03/08) Greylag goose – unfavourable no change (31/03/08) Knot – favourable maintained (31/03/08) Redshank – favourable maintained (31/03/08) Waterfowl assemblage – favourable maintained (31/03/08)

4.3.4 Ythan Estuary, Sands of Forvie and Meikle Loch SPA

Table 4.13: Ythan Estuary, Sands of Forvie and Meikle Loch SPA

Site Information	Details
Site Overview	Ythan Estuary, Sands of Forvie and Meikle Loch are located north of Aberdeen on the east coast of Scotland. The site comprises the long, narrow estuary of the River Ythan and Meikle Loch. At its mouth, the river splits an extensive area of sand dunes with the Forveran Links on the west bank and the Sands of Forvie dune system on the east bank. Extensive mud-flats in the upper reaches of the estuary are replaced by coarser gravels with mussel *Mytilus edulis* beds closer to the sea. The margins of the estuary are varied, with areas of saltmarsh, reedbed and poor fen. Meikle Loch is an important roost site for geese, which feed away from the SPA on surrounding farmland in winter. It is a eutrophic loch supporting limited aquatic vegetation. In summer the coastal habitats of the dunes and estuary provide an important breeding site for three species of tern, whilst in winter the estuary holds large numbers of waders, ducks and geese.
Date of Designation	30/03/1998
Site Classification – Qualifying Species	**Article 4.1 of the Directive (Annex I Species):** • Little tern (*Sternula albifrons*) 41 breeding pairs representing up to 1.7% of the breeding population in Great Britain • Common tern (*Sterna hirundo*) 265 breeding pairs representing up to 2.2% of the breeding population in Great Britain • Sandwich tern (*Sterna sandvicensis*) 600 breeding pairs representing up to 4.3% of the breeding population in Great Britain
	Article 4.2 of the Directive (Migratory Species): • Pink-footed goose (*Anser brachyrhynchus*) 17,213 non-breeding individuals representing up to 7.7% of the wintering Eastern Greenland/Iceland/UK population.
	Article 4.2 of the Directive (Assemblage Qualification): Over winter, the area regularly supports 51,265 individual waterfowl. The (non-breeding) waterfowl assemblage includes: • Lapwing (*Vanellus vanellus*) • Eider (*Somateria mollissima*) • Redshank (*Tringa totanus*) • Pink-footed goose (*Anser brachyrhynchus*)
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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
Site Condition and Date of Assessment	Little tern – favourable maintained (01/08/12) Common tern – unfavourable no change (01/08/12) Sandwich tern – favourable maintained (01/08/12) Lapwing – favourable maintained (18/08/12) Eider – favourable declining (21/08/12) Redshank – favourable maintained (19/10/12) Pink-footed goose – favourable maintained (06/11/12) Waterfowl assemblage – favourable maintained (19/10/12)

4.3.5 Buchan Ness to Collieston Coast SPA

Table 4.14: Buchan Ness to Collieston Coast SPA

Site Information	Details
Site Overview	Buchan Ness to Collieston Coast SPA is located on the coast of Aberdeenshire in north-east Scotland. It is a 15km stretch of south-east facing cliff formed of granite, quartzite and other rocks running to the south of Peterhead, interrupted only by the sandy beach of Cruden Bay. The low, broken cliffs (generally less than 50 m high) show many erosion features such as stacks, arches, caves and blowholes. The varied coastal vegetation on the ledges and cliff tops includes maritime heath, grassland and brackish flushes. The site is of importance as a nesting area for a number of seabird species (gulls and auks). These birds feed outside the SPA in the nearby waters, as well as more distantly. The site overlaps with Buchan Ness to Collieston SAC.
Date of Designation	30/03/1998
Site Classification – Qualifying Species	**Article 4.2 of the Directive (Assemblage Qualification):** During the breeding season, the area regularly supports 95,000 individual seabirds. The breeding seabird assemblage includes: • Guillemot (*Uria aalge*) • Kittiwake (*Rissa tridactyla*) • Fulmar (*Fulmarus glacialis*) • Shag (*Phalacrocorax aristotelis*) • Herring gull (*Larus argentatus*)
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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
Site Condition and Date of Assessment	Guillemot – favourable declining (04/07/07) Kittiwake – unfavourable no change (04/07/07) Fulmar – unfavourable declining (04/07/07) Shag – unfavourable no change (04/07/07) Herring gull – unfavourable no change (04/07/07) Seabird assemblage – unfavourable no change (04/07/07)

4.3.6 Loch of Strathbeg SPA

Table 4.15: Loch of Strathbeg SPA

Site Information	Details
Site Overview	The Loch of Strathbeg is located in north-eastern Scotland, in Aberdeenshire, inland from Rattray Head. It is a shallow, naturally eutrophic loch with adjoining reedbeds, freshwater marshes, and alder *Alnus glutinosa* and willow *Salix* spp. The calcareous dunes and dune slacks within the site are relatively undisturbed and contain a rich flora. The loch constitutes the largest dune slack pool in the UK (200 ha) and the largest waterbody in the north-east Scottish lowlands. It is separated from the sea by a 0.5 km -1 km wide dune system. The SPA provides wintering habitat for a number of important wetland bird species, particularly wildfowl (swans, geese and ducks), and is also an important staging area for migratory wildfowl from Scandinavia and Iceland/Greenland. In summer, coastal parts of the site are an important breeding area for Sandwich tern *Sterna sandvicensis*, which feed outside the SPA in adjacent marine areas.
Date of Designation	27/11/1995
Site Classification – Qualifying Species	**Article 4.1 of the Directive (Annex I Species):** • Sandwich tern (*Thalasseus sandvicensis*) 530 breeding pairs representing up to 3.8% of the breeding population in Great Britain. • Svalbard barnacle goose (*Branta leucopsis*) 226 non-breeding individuals representing up to 1.9% of the wintering population in Great Britain. • Whooper swan (*Cygnus cygnus*) 183 non-breeding individuals representing up to 3.3% of the wintering population in Great Britain.
	Article 4.2 of the Directive (Migratory Species): • Greylag goose (*Anser anser*) 3,325 non-breeding individuals representing up to 3.3% of the wintering Iceland/UK/Ireland population • Pink-footed goose (*Anser brachyrhynchus*) 39,924 non-breeding individuals representing up to 17.7% of the wintering Eastern Greenland/Iceland/UK population
	Article 4.2 of the Directive (Assemblage Qualification): Over winter, the area regularly supports 49,452 individual waterfowl. The (non-breeding) waterfowl assemblage includes: • Teal (*Anas crecca*) • Greylag goose (*Anser anser*) • Pink-footed goose (*Anser brachyrhynchus*) • Svalbard barnacle goose (*Branta leucopsis*) • Whooper swan (*Cygnus cygnus*)
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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
Site Condition and Date of Assessment	Sandwich tern – unfavourable no change (31/07/13) Teal – favourable maintained (01/04/09) Svalbard barnacle goose – favourable maintained (01/04/09) Whooper swan – favourable maintained (01/04/09) Greylag goose – unfavourable no change (01/04/09) Pink-footed goose – favourable maintained (01/04/09) Waterfowl assemblage – favourable maintained (01/04/08)

4.3.7 Inner Moray Firth SPA

Table 4.16: Inner Moray Firth SPA

Site Information	Details
Site Overview	The Inner Moray Firth is located to the north of Inverness and is one of the major arms of the Moray Firth. It comprises the Beauly Firth and Inverness Firth which together form the easternmost estuarine component of the Moray Basin ecosystem The site contains extensive intertidal flats and smaller areas of saltmarsh. The rich invertebrate fauna of the intertidal flats, with beds of eelgrass Zostera spp., Glasswort Salicornia spp., and Enteromorpha algae, all provide important food sources for large numbers of wintering and migrating waterbirds (geese, ducks and waders). With adjacent estuarine areas elsewhere in the Moray Firth, this site is the most northerly major wintering area for wildfowl and waders in Europe. The Firth is also of importance as a feeding area for locally breeding Osprey *Pandion haliaetus* as well as for breeding terns. The Inner Moray Firth SPA forms an integral ecological component of Moray Basin Firths and Bays.
Date of Designation	22/03/1999
Site Classification – Qualifying Species	**Article 4.1 of the Directive (Annex I Species):** • Common tern (*Sterna hirundo*) 310 pairs representing at least 2.5% of the breeding population in Great Britain • Osprey (*Pandion haliaetus*) 4 pairs representing at least 4.0% of the breeding population in Great Britain • Bar-tailed godwit (*Limosa lapponica*) 1,155 individuals representing at least 2.2% of the wintering population in Great Britain
	Article 4.2 of the Directive (Migratory Species): • Greylag goose (*Anser anser*) 1,731 individuals representing at least 1.7% of the wintering Iceland/UK/Ireland population • Red-breasted merganser (*Mergus serrator*) 1,731 individuals representing at least 1.4% of the wintering North western/Central Europe population • Redshank (*Tringa totanus*) 1,811 individuals representing at least 1.2% of the wintering Eastern Atlantic wintering population • Scaup (*Aythya marila*) 97 individuals representing <0.1% of the wintering Northern/Western Europe population
	Article 4.2 of the Directive (Assemblage Qualification): Over winter, the area regularly supports at least 20,000 individual waterfowl. The (non-breeding) waterfowl assemblage includes: • Scaup (*Aythya marila*) • Curlew (*Numenius arquata*) • Oystercatcher (*Haematopus ostralegus*) • Goosander (*Mergus merganser*) • Goldeneye (*Bucephala clangula*) • Teal (*Anas crecca*) • Wigeon (*Anas penelope*) • Cormorant (*Phalacrocorax carbo*) • Redshank (*Tringa totanus*) • Red-breasted merganser (*Mergus serrator*) • Greylag goose (*Anser anser*) • Bar-tailed godwit (*Limosa lapponica*)
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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

Table 4.16: Inner Moray Firth SPA continued

Site Information	Details
Site Condition and Date of Assessment	Osprey – favourable maintained (30/06/03) Curlew – favourable maintained (04/02/01) Cormorant – unfavourable no change(04/02/01) Bar-tailed godwit – favourable maintained (04/02/01) Wigeon – favourable maintained (04/02/01) Oystercatcher – favourable maintained (04/02/01) Red-breasted merganser – unfavourable no change (04/02/01) Scaup – favourable maintained (04/02/01) Teal – favourable maintained (04/02/01) Goosander – unfavourable no change (04/02/01) Goldeneye – favourable maintained (04/02/01) Redshank – favourable maintained (04/02/01) Greylag goose – favourable maintained (31/12/01) Common tern – unfavourable no change (30/06/00) Waterfowl assemblage – favourable maintained (31/12/01)

4.3.8 Troup, Pennan and Lion's Heads SPA

Table 4.17: Troup, Pennan and Lion's Heads SPA

Site Information	Details
Site Overview	Troup, Pennan and Lion's Heads SPA is a 9 km stretch of sea-cliffs along the Banff and Buchan coast of Aberdeenshire in north-east Scotland. As well as cliffs, the site also includes adjacent areas of grassland and heath, and several small sand or shingle beaches punctuate the otherwise rocky shore. The cliffs rise to 150 m and provide ideal nesting sites for seabirds, which feed in the rich waters offshore and outside the SPA. Different parts of the cliffs are used by different species of seabirds according to varying ecological requirements. The site is particularly important for its numbers of gulls and auks.
Date of Designation	14/03/1997
Site Classification – Qualifying Species	**Article 4.2 of the Directive (Migratory Species):** • Guillemot (*Uria aalge*) 29,902 breeding pairs representing at least 1.3% of the East Atlantic breeding population
	Article 4.2 of the Directive (Assemblage Qualification): During the breeding season, the area regularly supports 150,000 individual seabirds. The breeding seabird assemblage includes: • Razorbill (*Alca torda*) • Kittiwake (*Rissa tridactyla*) • Herring gull (*Larus argentatus*) • Fulmar (*Fulmarus glacialis*) • Guillemot (*Uria aalge*)
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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
Site Condition and Date of Assessment	Razorbill – unfavourable declining (03/07/07) Guillemot – unfavourable declining (03/07/07) Herring gull – unfavourable no change (03/07/07) Fulmar – unfavourable no change (03/07/07) Kittiwake – unfavourable no change (03/07/07) Seabird assemblage – unfavourable declining (03/07/07)

4.3.9 Firth of Tay and Eden Estuary SPA

Table 4.18: Firth of Tay and Eden Estuary SPA

Site Information	Details
Site Overview	The Firth of Tay and Eden Estuary is located on the east coast of central Scotland. The Firth stretches for some 35 km along the estuary from near Newburgh to the estuary mouth. For much of its length the main channel of the estuary lies close to the southern shore and the most extensive intertidal flats are on the north side, west of Dundee. In Monifieth Bay, to the east of Dundee, the substrate becomes sandier and there are also mussel *Mytilus edulis* beds. The south shore consists of fairly steeply shelving mud and shingle. The Inner Tay Estuary is particularly noted for the continuous dense stands of common reed *Phragmites australis* along its northern shore. These reedbeds, inundated during high tides, are amongst the largest in Britain. Eastwards, as conditions become more saline, there are areas of saltmarsh, a relatively scarce habitat in eastern Scotland. The site is of importance in summer for breeding terns and marsh harrier *Circus aeruginosus*, whilst in the migration periods and in winter the estuary holds major concentrations of waterbirds, especially waders, sea-ducks and geese. Sea-ducks also feed, loaf and roost outside the SPA in the open waters of the Firth. The site overlaps with Firth of Tay and Eden Estuary SAC.
Date of Designation	02/02/2000
Site Classification – Qualifying Species	**Article 4.1 of the Directive (Annex I Species):** • Little tern (*Sternula albifrons*) 44 breeding pairs representing at least 1.8% of the breeding population in Great Britain • Bar-tailed godwit (*Limosa lapponica*) 2,400 non-breeding individuals representing at least 4.5% of the wintering population in Great Britain. • Marsh harrier (*Circus aeruginosus*) 4 breeding pairs representing at least 2.5% of the breeding population in Great Britain.
	Article 4.2 of the Directive (Migratory Species): • Greylag goose (*Anser anser*) 1,355 non-breeding individuals representing at least 1.4% of the wintering Iceland/UK/Ireland population • Pink-footed goose (*Anser brachyrhynchus*) 3,769 non-breeding individuals representing at least 1.7% of the wintering Eastern Greenland/Iceland/UK population • Redshank (*Tringa totanus*) 1,800 non-breeding individuals representing at least 1.2% of the wintering Eastern Atlantic wintering population
	Article 4.2 of the Directive (Assemblage qualification): Over winter, the area regularly supports 34,074 individual waterfowl. The (non-breeding) waterfowl assemblage includes: • Velvet scoter (*Melanitta fusca*) • Pink-footed goose (*Anser brachyrhynchus*) • Greylag goose (*Anser anser)* • Redshank (*Tringa totanus*) • Cormorant (*Phalacrocorax carbo*) • Shelduck (*Tadorna tadorna*) • Eider (*Somateria mollissima*) • Bar-tailed godwit (*Limosa lapponica*) • Common scoter (*Melanitta nigra*) • Black-tailed godwit (*Limosa limosa islandica*) • Goldeneye (*Bucephala clangula*) • Red-breasted merganser (*Mergus serrator*) • Goosander (*Mergus merganser*) • Oystercatcher (*Haematopus ostralegus*) • Grey plover (*Pluvialis squatarola*) • Sanderling (*Calidris alba*) • Dunlin (*Calidris alpina alpine*) • Long-tailed duck (*Clangula hyemalis*)

Table 4.18: Firth of Tay and Eden Estuary SPA continued

Site Information	Details
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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
Site Condition and Date of Assessment	Marsh harrier – favourable maintained (01/09/09) Goldeneye – favourable maintained (31/03/08) Long-tailed duck – unfavourable declining (31/03/08) Black-tailed godwit – favourable maintained (31/03/08) Greylag goose – favourable declining (31/03/08) Common scoter – unfavourable no change (31/03/08) Sanderling – favourable recovered (31/03/08) Shelduck – favourable maintained (31/03/08) Grey plover – favourable maintained (31/03/08) Oystercatcher – favourable recovered (31/03/08) Pink-footed goose – unfavourable no change (28/02/01) Bar-tailed godwit – favourable maintained (28/02/01) Little tern – unfavourable no change (28/02/01) Cormorant – favourable maintained (28/02/01) Dunlin – unfavourable no change (28/02/01) Redshank – favourable maintained (28/02/01) Eider – unfavourable no change (28/02/01) Velvet scoter – favourable maintained (28/02/01) Goosander – favourable maintained (28/02/01) Red-breasted merganser – unfavourable no change (28/02/01) Waterfowl assemblage – favourable maintained (01/06/11)

4.3.10 Forth Islands SPA

Table 4.19: Forth Islands SPA

Site Information	Details
Site Overview	The Firth of Forth Islands are located in or near to the Firth of Forth on the east coast of central Scotland. The SPA comprises a number of separate islands or island groups, principally Inchmickery (together with the nearby Cow and Calves) off Edinburgh, Fidra, Lamb and Craigleith together with the Bass Rock off North Berwick, and the much larger Isle of May in the outer part of the Firth. The site also includes additional other small islands. The inner islands are very low lying whilst those in the outer Firth are higher, steeper and rockier. This applies especially to the Bass Rock which is a volcanic plug rising to over 100 m, and to the Isle of May, which is surrounded by cliffs up to 50 m. The islands support important numbers of a range of breeding seabirds, in particular terns, auks and gulls. The colony of gannets *Morus bassanus* is the largest on the east coast of the UK. The seabirds feed outside the SPA in nearby waters, as well as more distantly in the North Sea.
Date of Designation	25/04/1990
Site Classification – Qualifying Species	**Article 4.1 of the Directive (Annex I Species):** • Arctic tern (*Sterna paradisaea*) 540 breeding pairs representing at least 1.2% of the breeding population in Great Britain • Common tern (*Sterna hirundo*) 800 breeding pairs representing at least 6.5% of the breeding population in Great Britain • Roseate tern (*Sterna dougallii*) 9 breeding pairs representing at least 15.0% of the breeding population in Great Britain • Sandwich tern (*Thalasseus sandvicensis*) 22 breeding pairs representing at least 0.2% of the breeding population in Great Britain
	Article 4.2 of the Directive (Migratory Species): • Gannet (*Morus bassabus*) 34,400 breeding pairs representing at least 13.1% of the breeding North Atlantic population • Lesser black-backed gull (*Larus fuscus*) 2,920 breeding pairs representing at least 2.4% of the breeding Western Europe/Mediterranean/Western Africa population • Puffin (*Fratercula arctica*) 21,000 breeding pairs representing at least 2.3% of the breeding population • Shag (*Phalacrocorax aristotelis*) 2,887 breeding pairs representing at least 2.3% of the breeding Northern Europe population
	Article 4.2 of the Directive (Assemblage qualification): During the breeding season, the area regularly supports 90,000 individual seabirds. The breeding seabird assemblage includes: • Razorbill (*Alca torda*) • Guillemot (*Uria aalge*) • Kittiwake (*Rissa tridactyla*) • Herring gull (*Larus argentatus*) • Cormorant (*Phalacrocorax carbo*) • Fulmar (*Fulmarus glacialis*) • Puffin (*Fratercula arctica*) • Lesser black-backed gull (*Larus fuscus*) • Shag (*Phalacrocorax aristotelis*) • Gannet (*Morus bassanus*) • Arctic tern (*Sterna paradisaea*) • Common tern (*Sterna hirundo*) • Roseate tern (*Sterna dougallii*) • Sandwich tern (*Thalasseus sandvicensis*)

Table 4.19: Forth Islands SPA continued

Site Information	Details
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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
Site Condition and Date of Assessment	Cormorant – favourable declining (16/03/10) Arctic tern – favourable declining (15/06/09) Roseate tern – unfavourable declining (01/07/09) Lesser black-backed gull – favourable maintained (15/06/08) Razorbill – favourable maintained (30/06/07) Guillemot – favourable maintained (30/06/07) Kittiwake – unfavourable declining (30/06/07) Fulmar – favourable maintained (26/06/04) Gannet – favourable maintained (17/07/04) Puffin – favourable maintained (27/04/03) Common tern – favourable maintained (30/06/03) Sandwich tern – unfavourable declining (30/06/03) Herring gull – favourable maintained (30/06/01) Shag – unfavourable recovering (30/06/01) Seabird assemblage – unfavourable declining (17/07/04)

4.3.11 Firth of Forth SPA

Table 4.20: Firth of Forth SPA

Site Information	Details
Site Overview	The Firth of Forth is located on the east coast of central Scotland. It is a complex estuarine site, stretching for over 100 km from the River Forth at Stirling eastwards past Edinburgh and along the coasts of Fife and East Lothian to a wide estuary mouth. A wide range of coastal and intertidal habitats is found within the site, including saltmarshes, dune systems, maritime grasslands, heath and fen, cliff slopes, shingle and brackish lagoons. Extensive mud-flats occur particularly in the Inner Firth, notably at Kinneil Kerse and Skinflats on the south shore and Torry Bay on the north shore. Typically, the flats support a rich invertebrate fauna, with Eelgrass *Zostera* spp. growing on the main mud-flats, both features providing important food sources for the large numbers of migrating and wintering waterbirds that depend on the estuary. In the Outer Firth, the shoreline diversifies, with sandy shores, some rocky outcrops, mussel beds and some artificial sea walls. The North Berwick coast includes cliffs and dune grassland, with extensive dune systems at Aberlady. The Firth is of major importance for a rich assemblage of waterbirds in the migration periods and through the winter, including divers, sea-ducks, geese, other ducks, waders and terns. Some of these species, notably the sea-ducks and divers, also feed, loaf and roost outside the SPA in the open waters of the estuary.
Date of Designation	30/10/2001
Site Classification – Qualifying Species	**Article 4.1 of the Directive (Annex I Species):** • Sandwich tern (*Thalasseus sandvicensis*) 1,611 post-breeding individuals (on passage) representing at least 3.8% of the population in Great Britain • Bar-tailed godwit (*Limosa lapponica*) 2,600 non-breeding individuals representing at least 4.9% of the wintering population in Great Britain • Golden plover (*Pluvialis apricaria*) 2,970 non-breeding individuals representing at least 1.2% of the wintering population in Great Britain • Red-throated diver (*Gavia stellata*) 88 non-breeding individuals representing at least 1.8% of the wintering population in Great Britain • Slavonian grebe (*Podiceps auritus*) 71 non-breeding individuals representing at least 17.8% of the wintering population in Great Britain
	Article 4.2 of the Directive (Migratory Species): • Knot (*Calidris canutus*) 8,013 non-breeding individuals representing at least 2.3% of the wintering North-eastern Canada/Greenland/Iceland/North-western Europe population • Pink-footed goose (*Anser brachyrhynchus*) 12,400 non-breeding individuals representing at least 5.5% of the wintering Eastern Greenland/Iceland/UK population • Redshank (*Tringa tetanus*) 3,700 non-breeding individuals representing at least 2.5% of the wintering Eastern Atlantic population • Shelduck (*Tadorna tadorna*) 3,586 non-breeding individuals representing at least 1.2% of the wintering North-western Europe population • Turnstone (*Arenaria interpres*) 1,286 non-breeding individuals representing at least 1.8% of the wintering Western Palearctic population
	Article 4.2 of the Directive (Assemblage qualification): Over winter, the area regularly supports 86,067 individual waterfowl. The (non-breeding) waterfowl assemblage includes: • Scaup (*Aythya marila*) • Slavonian grebe (*Podiceps auritus*) • Golden plover (*Pluvialis apricaria*) • Bar-tailed godwit (*Limosa lapponica*) • Pink-footed goose (*Anser brachyrhynchus*) • Shelduck (*Tadorna tadorna*) • Knot (*Calidris canutus*) • Redshank (*Tringa tetanus*)

Table 4.20: Firth of Forth SPA Continued

Site Information	Details
Site Classification – Qualifying Species Continued	• Turnstone (*Arenaria interpres*) • Great crested grebe (*Podiceps cristatus*) • Cormorant (*Phalacrocorax carbo*) • Red-throated diver (*Gavia stellata*) • Mallard (*Anas platyrhynchos*) • Curlew (*Numenius arquata*) • Eider (*Somateria mollissima*) • Long-tailed duck (*Clangula hyemalis*) • Common scoter (*Melanitta nigra*) • Velvet scoter (*Melanitta fusca*) • Goldeneye (*Bucephala clangula*) • Red-breasted merganser (*Mergus serrator*) • Oystercatcher (*Haematopus ostralegus*) • Ringed plover (*Charadrius hiaticula*) • Grey plover (*Pluvialis squatarola*) • Lapwing (*Vanellus vanellus*) • Dunlin (*Calidris alpina alpina*) • Wigeon (*Anas penelope*)
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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
Site Condition and Date of Assessment	Cormorant – favourable maintained (19/10/10) Bar-tailed godwit – favourable declining (19/10/10) Common scoter – unfavourable declining (19/10/10) Curlew – favourable maintained (20/10/10) Grey plover – favourable declining (26/10/10) Great crested grebe – unfavourable declining (26/10/10) Mallard – unfavourable declining (26/10/10) Goldeneye – unfavourable declining (26/10/10) Dunlin – favourable declining (26/10/10) Golden plover – favourable maintained (26/10/10) Eider – favourable declining (26/10/10) Redshank – favourable maintained (27/10/10) Pink-footed goose – favourable maintained (27/10/10) Red-breasted merganser – favourable declining (27/10/10) Red-throated diver – favourable maintained (27/10/10) Long-tailed duck – unfavourable declining (27/10/10) Knot – unfavourable declining (27/10/10) Ringed plover – favourable maintained (27/10/10) Oystercatcher – favourable maintained (27/10/10) Lapwing – favourable maintained (27/10/10) Wigeon – favourable recovered (01/11/10) Turnstone – favourable maintained (01/11/10) Sandwich tern – favourable declining (01/11/10) Velvet scoter – favourable maintained (01/11/10) Scaup – unfavourable declining (01/11/10) Slavonian grebe – favourable declining (01/11/10) Shelduck – favourable declining (01/11/10) Waterfowl assemblage – favourable declining (01/11/10)

4.3.12 Draft Special Protection Areas (dSPAs)

A suite of marine draft Special Protection Areas (dSPAs) in Scottish waters is currently being considered by the Scottish Government. It was recognised that the suite of SPAs on land in Scotland is well established, but that further work was needed to complete a network at sea. The UK Government has committed to identifying a network of SPAs in the marine environment and having them substantially classified by the end of 2015. Those dSPAs in Scottish waters which are of relevance to the project include the Outer Firth of Forth and Tay Bay Complex dSPA, the Ythan Estuary dSPA, the Moray Firth dSPA and the Pentland Firth and Scapa Flow dSPA.

Information was made public in 2014; however, its release did not constitute the initiation of a consultation stage. The Scottish Government advises that HRA and EIA arrangements should be undertaken for sites in the suite from the point at which Ministerial approval is granted for the sites to go to consultation. However, the existing suite is only an indicative list, and until specific Ministerial approval has been granted there is no certainty that they will all go forward to become pSPAs.

The following is therefore provided for information only and these sites do not currently form part of the formal assessment.

Table 4.21: Outer Firth of Forth and Tay Bay Complex dSPA

Site Information	Details
Site Overview	N/A – draft status
Date of Designation	N/A – draft status
Site Classification – Qualifying Species	**Annex 1 Species:** Red-throated diver (*Gavia stellata*) Slavonian grebe (*Podiceps auritus*) Little gull (*Hydrocoloeus minutus*) Common tern (*Sterna hirundo*) Arctic tern (*Sterna paradisaea*)
	Migratory Species: Eider (*Somateria mollissima*) Long-tailed duck (*Clangula hyemalis*) Common scoter (*Melanitta nigra*) Velvet scoter (*Melanitta fusca*) Goldeneye (*Bucephala clangula*) Red-breasted merganser (*Mergus serrator*) Gannet (*Morus bassanus*) Manx shearwater (*Puffinus puffinus*) Shag (*Phalacrocorax aristotelis*) Kittiwake (*Rissa tridactyla*) Guillemot (*Uria aalge*) Razorbill (*Alca torda*) Puffin (*Fratercula arctica*) Black-headed gull (*Chroicocephalus ridibundus*) Common gull (*Larus canus*) Herring gull (*Larus argentatus*)
Site Conservation Objectives	N/A – draft status
Site Condition	N/A – draft status

Table 4.22: Ythan Estuary dSPA

Site Information	Details
Site Overview	N/A – draft status
Date of Designation	N/A – draft status
Site Classification – Qualifying Species	**Annex 1 Species:** Sandwich tern (*Thalasseus sandvicensis*) Little tern (*Sternula albifrons*)
Site Conservation Objectives	N/A – draft status
Site Condition	N/A – draft status

Table 4.23: Moray Firth dSPA

Site Information	Details
Site Overview	N/A – draft status
Date of Designation	N/A – draft status
Site Classification – Qualifying Species	**Annex 1 Species:**
	Great Northern diver (*Gavia immer*)
	Red-throated diver (*Gavia stellata*)
	Slavonian grebe (*Podiceps auritus*)
	Migratory Species:
	Scaup (*Aythya marila*)
	Eider (*Somateria mollissima*)
	Long-tailed duck (*Clangula hyemalis*)
	Common scoter (*Melanitta nigra*)
	Velvet scoter (*Melanitta fusca*)
	Goldeneye (*Bucephala clangula*)
	Red-breasted merganser (*Mergus serrator*)
	Shag (*Phalacrocorax aristotelis*)
Site Conservation Objectives	N/A – draft status
Site Condition	N/A – draft status

Table 4.24: Pentland Firth and Scapa Flow dSPA

Site Information	Details
Site Overview	N/A – draft status
Date of Designation	N/A – draft status
Site Classification – Qualifying Species	**Annex 1 Species:**
	Great Northern diver (*Gavia immer*)
	Red-throated diver (*Gavia stellata*)
	Black-throated diver (*Gavia arctica*)
	Slavonian grebe (*Podiceps auritus*)
	Arctic tern (*Sterna paradisaea*)
	Migratory Species:
	Shag (*Phalacrocorax aristotelis*)
	Guillemot (*Uria aalge*)
	Eider (*Somateria mollissima*)
	Long-tailed duck (*Clangula hyemalis*)
	Goldeneye (*Bucephala clangula*)
	Red-breasted merganser (*Mergus serrator*)
Site Conservation Objectives	N/A – draft status
Site Condition	N/A – draft status

4.4 Ramsar Sites

Ramsar sites are wetlands of international importance designated under The Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention). The Convention was adopted in Ramsar, Iran in February 1971 and ratified by the UK in 1976. It covers all aspects of wetland conservation and wise use.

In Scotland, all Ramsar sites are either SPAs or SACs, although the designation boundaries may not always exactly match. The Scottish Planning Policy (SPP) document (The Scottish Government, 2014) states that Ramsar sites designated under the Ramsar Convention are also Natura 2000 sites and protected under the same statutory regimes as SACs and SPAs.

The proposed development site does not overlap with any Ramsar sites. However, connectivity between the development area and Ramsar sites may occur where individuals from populations of qualifying species use both a Ramsar site and the proposed site at some point in during their life cycle.

Ramsar sites with potential connectivity to the development are presented in Table 4.25.

Table 4.25: Ramsar sites with potential connectivity to the proposed development

Site Name	Distance* [km]	Area [ha]
Loch of Skene	18	120.90
Ythan Estuary and Meikle Loch	20	314.16
Montrose Basin	58	984.62
Loch of Strathbeg	60	615.94
Firth of Tay and Eden Estuary	86	6918.42
Note: * Approximate distance by sea from the proposed development		

Where the interests of Ramsar sites correspond with overlapping SACs and SPAs, it is deemed unnecessary to consider them separately within the HRA (David Tyldesley and Associates, 2010). The Loch of Skene, Loch of Strathbeg and the Firth of Tay and Eden Estuary Ramsar sites are therefore not considered further in this assessment because they are already considered under the equivalent SPA designations (the areas match and the identified features are also designated for the SPA). As part of a precautionary approach Montrose Basin Ramsar is included because of the presence of eider. However, it should be noted that although eider are listed on the information sheet on Ramsar Wetlands for the site it is only under the heading ‘noteworthy fauna’ and as such does not itself fulfil any of the designation criteria.

4.4.1 Montrose Basin Ramsar

Table 4.26: Montrose Basin Ramsar

Site Name	Distance [km]*	Description/Interest Feature(s)
Montrose Basin	58	**Ramsar Criterion 1 (Wetland of International Importance)**
		A particularly good example of an estuary, being relatively unaffected by land-claim, industrial development or pollution. Montrose Basin has a remarkably high species diversity in the intertidal zone when compared other sites. The site hydrology is unusual, although the main mudflat is exposed for a long during each tidal cycle, it remains wet, and therefore supports this high diversity. The complete exchange of water in the Basin with each tide gives the site a high overall water quality.
		Ramsar Criterion 5 (Assemblages of International Importance)
		Waterfowl assemblage (non-breeding): 29116 waterfowl
		Ramsar Criterion 6 (Species/Populations at Levels of International Importance)
		Pink-footed goose (*Anser brachyrhynchus*), non-breeding: 7198 individuals, representing an average of 2.9% of the population
		Greylag goose (*Anser anser*), non-breeding: 1080 individuals, representing an average of 1.2% of the population

4.4.2 Ythan Estuary and Meikle Loch Ramsar

Table 4.27: Ythan Estuary and Meikle Loch Ramsar

Site Name	Distance [km]*	Description/Interest Feature(s)
Ythan Estuary and Meikle Loch	20	**Ramsar Criterion 5 (Assemblages of International Importance)**
		Waterfowl assemblage, non-breeding: 9271 waterfowl
		Ramsar Criterion 6 (Species/Populations at Levels of International Importance)
		Sandwich tern (*Thalasseus sandvicensis*), breeding: 524 apparently occupied nests, representing an average of 4.9% of the GB population
		Pink-footed goose (*Anser brachyrhynchus*), non-breeding: 1145 individuals, representing an average of 0.4% of the GB population

4.5 Summary of Natura 2000 Sites and Qualifying Species

Table 4.28: Qualifying species for each Natura 2000 site

Qualifying Species	Site																							
	SAC						SPA										Ramsar		dSAC	dSPA				
	River Dee	Moray Firth	Isle of May	Firth of Tay and Eden Estuary	Berwickshire and North Northumberland Coast	Dornoch Firth and Morrich More	Ythan Estuary, Sands of Forvie and Meikle Loch	Fowlsheugh	Loch of Skene	Buchan Ness to Collieston Coast	Montrose Basin	Loch of Strathbeg	Inner Moray Firth	Troup, Pennan and Lions Heads	Firth of Tay and Eden Estuary	Forth Islands	Firth of Forth	Montrose Basin	Ythan Estuary and Meikle Loch	Outer Moray Firth	Outer Firth of Forth and Tay Bay Complex	Ythan Estuary and Sands of Forvie	Moray Firth	Pentland Firth and Scapa Flow
Atlantic salmon	X																							
Freshwater pearl mussel	X																							
Otter	X					X																		
Grey seal			X		X																			
Harbour seal				X		X																		
Bottlenose dolphin		X																						
Harbour porpoise																			X					
Whooper swan									X			X												
Pink-footed goose							X				X	X			X		X	X	X					
Greylag goose									X		X	X	X		X			X						

Table 4.28: Qualifying species for each Natura 2000 site continued

Qualifying Species	Site																							
	SAC						SPA										Ramsar		dSAC	dSPA				
	River Dee	Moray Firth	Isle of May	Firth of Tay and Eden Estuary	Berwickshire and North Northumberland Coast	Dornoch Firth and Morrich More	Ythan Estuary, Sands of Forvie and Meikle Loch	Fowlsheugh	Loch of Skene	Buchan Ness to Collieston Coast	Montrose Basin	Loch of Strathbeg	Inner Moray Firth	Troup, Pennan and Lions Heads	Firth of Tay and Eden Estuary	Forth Islands	Firth of Forth	Montrose Basin	Ythan Estuary and Meikle Loch	Outer Moray Firth	Outer Firth of Forth and Tay Bay Complex	Ythan Estuary and Sands of Forvie	Moray Firth	Pentland Firth and Scapa Flow
Svalbard barnacle goose												X												
Shelduck											X				X		X							
Wigeon											X		X				X							
Teal												X	X											
Mallard																	X							
Scaup													X				X						X	
Eider							X				X				X		X				X		X	X
Long-tailed duck															X		X				X		X	X
Common scoter															X		X				X		X	
Velvet scoter															X		X				X		X	
Goldeneye													X		X		X				X		X	X
Red-breasted merganser													X		X		X				X		X	X

Table 4.28: Qualifying species for each Natura 2000 site continued

Qualifying Species	Site																							
	SAC						SPA										Ramsar		dSAC	dSPA				
	River Dee	Moray Firth	Isle of May	Firth of Tay and Eden Estuary	Berwickshire and North Northumberland Coast	Dornoch Firth and Morrich More	Ythan Estuary, Sands of Forvie and Meikle Loch	Fowlsheugh	Loch of Skene	Buchan Ness to Collieston Coast	Montrose Basin	Loch of Strathbeg	Inner Moray Firth	Troup, Pennan and Lions Heads	Firth of Tay and Eden Estuary	Forth Islands	Firth of Forth	Montrose Basin	Ythan Estuary and Meikle Loch	Outer Moray Firth	Outer Firth of Forth and Tay Bay Complex	Ythan Estuary and Sands of Forvie	Moray Firth	Pentland Firth and Scapa Flow
Goosander													X		X									
Red-throated diver																	X				X		X	X
Black-throated diver																								X
Great Northern diver																							X	X
Fulmar								X		X				X		X								
Manx shearwater																					X			
Gannet																X					X			
Cormorant													X		X	X	X							
Shag										X						X					X		X	X
Great crested grebe																	X							
Slavonian grebe																	X				X		X	X
Marsh harrier															X									

Table 4.28: Qualifying species for each Natura 2000 site continued

Qualifying Species	Site																							
	SAC						SPA										Ramsar		dSAC	dSPA				
	River Dee	Moray Firth	Isle of May	Firth of Tay and Eden Estuary	Berwickshire and North Northumberland Coast	Dornoch Firth and Morrich More	Ythan Estuary, Sands of Forvie and Meikle Loch	Fowlsheugh	Loch of Skene	Buchan Ness to Collieston Coast	Montrose Basin	Loch of Strathbeg	Inner Moray Firth	Troup, Pennan and Lions Heads	Firth of Tay and Eden Estuary	Forth Islands	Firth of Forth	Montrose Basin	Ythan Estuary and Meikle Loch	Outer Moray Firth	Outer Firth of Forth and Tay Bay Complex	Ythan Estuary and Sands of Forvie	Moray Firth	Pentland Firth and Scapa Flow
Osprey													X											
Oystercatcher											X		X		X		X							
Golden plover																	X							
Grey plover															X		X							
Lapwing							X										X							
Ringed plover																	X							
Curlew													X				X							
Black-tailed godwit															X									
Bar-tailed godwit													X		X		X							
Turnstone																	X							
Knot											X						X							
Sanderling															X									

Table 4.28: Qualifying species for each Natura 2000 site continued

Qualifying Species	Site																							
	SAC						SPA										Ramsar		dSAC	dSPA				
	River Dee	Moray Firth	Isle of May	Firth of Tay and Eden Estuary	Berwickshire and North Northumberland Coast	Dornoch Firth and Morrich More	Ythan Estuary, Sands of Forvie and Meikle Loch	Fowlsheugh	Loch of Skene	Buchan Ness to Collieston Coast	Montrose Basin	Loch of Strathbeg	Inner Moray Firth	Troup, Pennan and Lions Heads	Firth of Tay and Eden Estuary	Forth Islands	Firth of Forth	Montrose Basin	Ythan Estuary and Meikle Loch	Outer Moray Firth	Outer Firth of Forth and Tay Bay Complex	Ythan Estuary and Sands of Forvie	Moray Firth	Pentland Firth and Scapa Flow
Dunlin											X				X		X							
Redshank							X				X		X		X		X							
Puffin																X					X			
Razorbill								X						X		X					X			
Guillemot								X		X				X		X					X			X
Little tern							X								X							X		
Sandwich tern							X					X				X	X		X			X		
Common tern							X						X			X					X			
Roseate tern																X								
Arctic tern																X					X			X
Kittiwake								X		X				X		X					X			
Black-headed gull																					X			

Table 4.28: Qualifying species for each Natura 2000 site continued

Qualifying Species	Site																							
	SAC						SPA										Ramsar		dSAC	dSPA				
	River Dee	Moray Firth	Isle of May	Firth of Tay and Eden Estuary	Berwickshire and North Northumberland Coast	Dornoch Firth and Morrich More	Ythan Estuary, Sands of Forvie and Meikle Loch	Fowlsheugh	Loch of Skene	Buchan Ness to Collieston Coast	Montrose Basin	Loch of Strathbeg	Inner Moray Firth	Troup, Pennan and Lions Heads	Firth of Tay and Eden Estuary	Forth Islands	Firth of Forth	Montrose Basin	Ythan Estuary and Meikle Loch	Outer Moray Firth	Outer Firth of Forth and Tay Bay Complex	Ythan Estuary and Sands of Forvie	Moray Firth	Pentland Firth and Scapa Flow
Little gull																					X			
Common gull																					X			
Lesser black-backed gull																X								
Herring gull								X		X				X		X					X			

5. SCREENING FOR LIKELY SIGNIFICANT EFFECT

For there to be a potential LSE on an SAC or SPA qualifying species, three conditions must be satisfied using an objective approach (European Commission, 2000):

i. The species under consideration is sensitive to the potential effects of the development (Section 3.1);

ii. There is evidence that the qualifying species under consideration (i.e. the population of a species from a particular SAC or SPA) is likely to use the development area (connectivity);

iii. The number of individuals of the species population under consideration that are likely to use the development area is sufficiently large (in the context of the SAC or SPA population) for it to be possible that a significant effect on the population could arise.

5.1.1 Assessment of SAC Connectivity

The proposed development area does not overlap with any SACs. However, connectivity between the project and SACs may arise where individuals from populations of qualifying species use both an SAC and the proposed development area at some point during their life cycle. Connectivity between the project and SACs has been assessed by identifying:

- The species known or likely to use or pass through the proposed development area;
- The peak numbers of each species (where applicable) and their seasonal occurrence;
- Whether individuals of these species form part of the qualifying feature of a SAC;
- The SACs which individuals of each species may use during their life cycle;
- Receptor sensitivity (Table 5.1).

Table 5.1: Categories of SAC receptor sensitivity and associated criteria

Receptor Sensitivity	Definition
Very High	The receptor is protected by international law and is a qualifying feature of a Natura 2000 site. N.B. In UK waters, all marine mammals receive protection at international level (for example under Annex IV and II of the EC Habitats Directive) as implemented though the Habitats Regulations 1994 (as amended in Scotland). All cetaceans are considered European Protected Species (EPS). Consequently, this assessment considers the value of **all** marine mammals to be Very High.
High	The receptor is protected by national law, is important for national biodiversity, restricted in its regional distribution and is subject to a species plan.
Medium	The receptor is locally or nationally important for nature conservation, widely distributed across the region, contributes to the selection of Scottish MPAs and/or has a key ecosystem role.
Low	The receptor does not hold any nature conservation designation but represents a healthy and productive example nonetheless or has a key ecosystem role.
Negligible	The feature is commonly occurring and widespread throughout the UK.

5.1.1.1 Marine Mammal Surveys

Site specific information on the marine mammal species which use or pass through the proposed development area has been collected during vantage point (VP) surveys, undertaken between June

2014 and May 2015. Four VPs were selected to allow full coverage of the bay and offshore areas to the north and south. Each month, surveys were conducted over one 3 hour period at VP1, two 3 hour periods at VP2 and 1 hour periods at VP3 and VP4. VP1 and VP2 were the main vantage points, affording the best views into the bay.

A single observer made observations by scanning the viewshed with 10 × 42 binoculars and a 30-70 magnification telescope. Recordings at VP1 and VP2 were broken down into 20 minute periods, with periods focusing on marine mammals using the bay and then marine mammals passing further offshore, in turn. Recording for the 1 hour sessions at VP3 and VP4 was focussed on recording marine mammals, with VP4 also focusing on vessel traffic and any interactions between boats and marine mammals.

For each observation, details on the species, number and behaviour were noted. Where marine mammals were observed passing offshore, the direction of travel was noted. For all observations, the location was marked on a map and the angle of inclination was recorded, which was then used to calculate a distance from the observer. A bearing was also taken, which when coupled with the calculated distances, would be used to accurately record locations of observations.

In addition, acoustic data were collected using two passive acoustic monitoring devices (C-PODs). C-PODs were deployed at two offshore locations adjacent to Nigg Bay to provide a more detailed assessment of cetacean presence/absence in the area and to distinguish between dolphin and harbour porpoise.

Further details of the survey methodology can be found in ES Chapter 15: Marine Mammals and ES Appendix 14-A: Marine Ornithology Technical Report.

5.1.1.2 Test for LSE: SAC Species

Full details of SACs, including their qualifying species and conservation objectives are presented in Section 4.2. Table 5.2 provides information on those qualifying species recorded during surveys (Section 5.1.1.1) or identified from the literature review, and supports the rationale for screening the species for LSE.

A number of qualifying species were not recorded during the site specific surveys and may therefore have comparatively lower connectivity or be at relatively lower risk to potential effects than those observed to be frequently occurring or present in high abundance. Table 5.3 provides information on those species not recorded during the site specific surveys, but that are qualifying SAC species and which therefore LSE may occur, in line with a precautionary approach.

Species recorded during the surveys or literature review that are not SAC qualifying species do not require consideration within the HRA, therefore have not been included in the assessment. In addition, the initial screening assessment did not identify that the proposed development will cause an effect on qualifying habitats, therefore no further assessment was undertaken on qualifying habitats in SACs that are otherwise considered in the assessment for their qualifying species.

Table 5.2: SAC species recorded during VP surveys or literature review

Species	SAC(s)	Approximate Distance From Site [km]	SAC Resident Population	Peak Count [month]	Foraging Range [km]	SAC Within Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Atlantic salmon	River Dee	2	N/A	N/A	N/A	Yes	Very high	Yes	Atlantic salmon was identified during the literature and data review and thus is confirmed as present. They are a qualifying SAC feature and are known to utilise the area on passage.
Otter	River Dee	2	Common	N/A	5	Yes	Very high	Yes	Although no resting places or potential holts were recorded during the otter survey, old spraints and otter feeding signs were identified.
	Dornoch Firth and Morrich More	195	Present					No	The Dornoch Firth and Morrich More SAC can be eliminated from further assessment as it is 195 km from the proposed development area and otters from this SAC will not be present in Nigg Bay
Grey seal	Isle of May	110	5900	Feb	145	Yes	Very high	Yes	With reported foraging ranges of up to 145 km (Thompson et al., 1996), the species is recognised as being highly adaptable with the ability to forage over long distances for durations between 1 and 30 days (SCOS, 2013). The species will typically forage within 100 km from a haul-out site, although they can feed up to several hundred km offshore (SCOS, 2013).
	Berwickshire and North Northumberland Coast	132	501-1000						
Bottlenose dolphin	Moray Firth	160	101-250	Jun	N/A	N/A	Very high	Yes	Bottlenose dolphin were recorded during VP and C-POD surveys and utilise the site year round. Bottlenose dolphin are a qualifying species of the Moray Firth SAC and there is clear connectivity with the SAC. Research has shown that there is significant movement of highly mobile individuals along the east coast of Scotland with the same identified individuals seen in the Moray Firth as well as off the Grampian/Fife coast (Cheney et al., 2013).
Harbour porpoise	Outer Moray Firth (dSAC)	125	-	Jun	N/A	N/A	Very high	Yes	Harbour porpoise were recorded during VP and C-POD surveys and utilise the site year round. Although there are no SACs for harbour porpoise within the UK, JNCC are evaluating a potential suitable sites for designation, e.g. Outer Moray Firth dSAC. As a wide-ranging and dispersed species in the north west North Sea, individuals from the concentrations of the species in the Outer Moray Firth may also use the waters of Aberdeenshire and the development.

Table 5.3: Likely SAC species which were not recorded during surveys or literature review but may potentially use or migrate through the development area

Species	SAC(s)	Approximate distance from site [km]	SPA population	Foraging range [km]	SAC within foraging range	Development area within migratory pathway	Receptor sensitivity	Potential for LSE	Rationale
Freshwater pearl mussel	River Dee	2	N/A	N/A	N/A	N/A	Very high	Yes	While freshwater pearl mussels will not occur in the development site; impacts to Atlantic salmon could have indirect effects on freshwater pearl mussel populations.
Harbour seal	Firth of Tay and Eden Estuary	86	Common	50	No	N/A	Very high	No	SNH were consulted and asked to provide advice regarding connectivity between the seal colonies at SACs and the proposed development. SNH advised that the distance at which there is considered to be connectivity is 50km for harbour seals during the breeding season. There are no SACs within the harbour seal foraging range. The two nearest harbour seal SACs are more than 50km away from Nigg Bay and no harbour seals were recorded within the vicinity of Nigg Bay during VP surveys. Telemetry analysis undertaken by SMRU Consulting demonstrated that only one single harbour seal of those tagged at SACs used the study area around the development during the duration of the tagging. The SAC associated with the individual was the closest SAC to the development, the Firth of Tay and Eden Estuary SAC. This suggests that the degree of connectivity between harbour seal SACs and Nigg Bay is very limited (Plunkett and Sparling, 2015). As harbour seals were absent during the surveys and clearly do not rely on the waters within the marine development boundary or indeed frequent them in any regularity, any effect pathway would be tenuous and effect is therefore considered to be negligible and not significant.
	Dornoch Firth and Morrich More	195	251-500						

5.1.2 Assessment of SPA Connectivity

The proposed development does not overlap with any SPAs. However, connectivity between the proposed development and SPAs may arise where individual birds from populations of qualifying species use both an SPA and the proposed development site at some point during their life cycle.

HRA screening is achieved by considering the strength of connectivity between the project's anticipated footprint and each SPA (i.e. how likely is it that the birds using the area originate from a particular SPA), the abundance and behaviour of each species using the anticipated footprint and the sensitivity of each species to the potential effects.

Connectivity between the proposed development site and SPAs has been assessed by identifying:

- The bird species known or likely to use or pass through the proposed development area, based on data collected as part of the EIA and existing data sources;
- The peak numbers of each species and their seasonal occurrence;
- Whether individuals of these species may potentially form part of the qualifying feature of a SPA;
- The SPAs which individuals of each species may use during the breeding and non-breeding seasons;
- Receptor sensitivity (Table 5.4).

Table 5.4: Categories of SPA receptor sensitivity and associated criteria

Receptor sensitivity	Definition
Very High	A feature species of SPA(s) and Ramsar sites.
High	Bird species that contribute towards the integrity of an SPA or Ramsar site. Includes species that are of international or national importance, for example those whose population estimates exceed 1% of national or international populations. Further encompasses ecologically sensitive species, for example, nationally rare species or large birds of prey (particularly those with less than 300 breeding pairs within Great Britain).
Medium	Species of regional importance as a result of population size or in the context in which they are distributed. Also includes EU Birds Directive Annex 1 species, EU Habitats Directive priority habitat and priority species and any Wildlife and Countryside Act Schedule 1 species not covered above. UK Biodiversity Action Plan (BAP) species are also considered of medium value.
Low	Includes any other species of conservation interest, for example, species listed on the Birds of Conservation Concern lists, unless detailed and included in one of the higher receptor criteria.
Negligible	Includes species which are not a feature of any SPA or designated site and are common or widespread throughout Great Britain.

5.1.2.1 Marine Ornithology Surveys

Site specific information on the bird species which use or pass through the proposed development area has been collected during vantage point (VP) surveys, undertaken between June 2014 and May 2015. Two VPs were selected as the main vantage points for birds, to allow full coverage of the bay and offshore areas to the north and south. Each month, surveys were conducted over one 3 hour period at VP1 and two 3 hour periods at VP2.

A single observer made observations by scanning the viewshed with 10 × 42 binoculars and a 30-70 magnification telescope. Recordings at VP1 and VP2 were broken down into 20 minute periods, with periods focusing on birds using the bay and then birds passing further offshore, in turn. Recording for the 1 hour sessions at VP3 and VP4 was focussed on recording marine mammals only, with VP4 focusing on vessel traffic and any interactions between boats and marine mammals (Section 5.1.1.1).

For each observation, details on the species, number and behaviour were noted. Where birds were observed passing offshore, the direction of travel was noted. For all observations, the location was marked on a map and the angle of inclination was recorded, which was then used to calculate a distance from the observer. A bearing (or range of bearings for larger flocks of birds) was also taken, which when coupled with the calculated distances, was used to accurately record locations of observations.

Ad hoc counts were also undertaken over a 9 month period, which recorded VP target species, in addition to any waders and waterfowl using the bay.

Further details of the ornithology survey methodology can be found in ES Chapter 14: Marine Ornithology and ES Appendix 14-A: Marine Ornithology Vantage Point Survey Report (June 2014 to May 2015).

5.1.2.2 Test for LSE: SPA Species

Full details of SPAs, including their qualifying species and conservation objectives are presented in Section 4.3. Table 5.5 provides information on those qualifying species recorded during surveys (Section 5.1.2.1) or identified from the literature review, and supports the rationale for screening the species for LSE.

A number of qualifying species were not recorded during the site specific surveys and may therefore have comparatively lower connectivity or be at relatively lower risk to potential effects than those observed to be frequently occurring or present in high abundance. Table 5.6 provides information on those species not recorded during the site specific surveys, but that are qualifying SPA species and which therefore LSE may occur, in line with a precautionary approach.

For breeding bird species, the screening assessment is based on the maximum reported foraging ranges for each species; for example, if the development area is out with the species foraging range, there is no LSE. Non-breeding bird species that are listed as a qualifying feature for an SPA are all considered to be at potential risk; however, the level of significance is based on the number of birds in the SPA population, the number of birds recorded within the proposed development area and their behaviour within the area. Species recorded during the surveys or literature review that are not SPA qualifying species do not require consideration within the HRA, therefore have not been included in the HRA assessment.

Table 5.5: SPA species recorded during VP and ad hoc surveys

Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	SPA Status: B/W/P[2]	Peak Count Post Breeding [Month]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Whooper swan	Loch of Skene	18	203	1.3	3.6	W	4 (Mar) *	N/A	N/A	Medium	No	Recorded most autumn and winter months, winter visitor. Recorded passing headland.
	Loch of Strathbeg	60	183	1.1	3.3	W						
Pink-footed goose	Ythan Estuary, Sands of Forvie and Meikle Loch	20	17,213	7.7	9.0	W	438 (Sep)*	N/A	N/A	High	No	This species is recorded during the autumn and winter months; however, use of the development area is restricted to shelter during harsh weather; therefore connectivity with the SPAs is unlikely.
	Montrose Basin	58	31,622	14.1	16.5	W						
	Loch of Strathbeg	60	39,924	17.7	20.8	W						
	Firth of Tay and Eden Estuary	86	3,769	1.7	2.0	W						
	Firth of Forth	101	12,400	5.5	6.5	W						
Wigeon	Montrose Basin	58	4,340	0.4	1.6	W	40 (Sep) *	N/A	N/A	High	No	This species is recorded during the autumn and winter months. However, the species was only recorded flying passed the development area and not utilising the site; therefore connectivity with the SPAs is unlikely.
	Firth of Forth	101	2,139	0.2	0.78	W						
	Inner Moray Firth	210	6,800	0.5	2.5	W						

Note:
1. Mean maximum foraging range (if known) taken from Thaxter et al., 2012
2. B = breeding, W = wintering, P = passage
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Table 5.5: SPA species recorded during VP and ad hoc surveys continued

Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	SPA Status: B/W/P[2]	Peak Count Post Breeding [Month]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Teal	Loch of Strathbeg	60	1,898	0.5	1.4	W	24 (Sep) *	N/A	N/A	High	No	This species is recorded during the autumn and winter months. However, the species was only recorded flying passed the development area and not utilising the site; therefore connectivity with the SPAs is unlikely.
	Inner Moray Firth	210	1,849	0.5	1.4	W						
Eider	Ythan Estuary, Sands of Forvie and Meikle Loch	20	1,778	0.1	2.3	W	903 (Jul)	N/A	N/A	High	Yes	The species is present in the development area all year and shows clear connectivity with UK SPAs.
	Montrose Basin	58	1,794	0.1	2.3	W						
	Firth of Tay and Eden Estuary	86	2,061	0.1	2.7	W						
	Firth of Forth	101	7,887	0.5	10.2	W						
	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-						
	Moray Firth (dSPA)	118	-	-	-	-						
	Pentland Firth and Scapa Flow (dSPA)	180	-	-	-	-						

Note:
1. Mean maximum foraging range (if known) taken from Thaxter et al., 2012
2. B = breeding, W = wintering, P = passage
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Table 5.5: SPA species recorded during VP and ad hoc surveys continued

Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	SPA Status: B/W/P[2]	Peak Count Post Breeding [Month]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Long-tailed duck	Firth of Tay and Eden Estuary	86	560	0.4	2.4	W	27 (Apr)	N/A	N/A	High	Yes	This species is a wintering species with peak counts in spring. The species uses the development area for feeding on benthic prey items. Although the majority of records are birds passing the headland, small groups have been recorded in amongst larger flocks of eider. Wintering birds of UK SPAs may pass through the development area, therefore there is a potential connectivity with SPAs.
	Firth of Forth	101	716	0.5	3.1	W						
	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-						
	Moray Firth (dSPA)	118	-	-	-	-						
	Pentland Firth and Scapa Flow (dSPA)	180	-	-	-	-						

Note:
1. Mean maximum foraging range (if known) taken from Thaxter et al., 2012
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Table 5.5: SPA species recorded during VP and ad hoc surveys continued

Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	SPA Status: B/W/P[2]	Peak Count Post Breeding [Month]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Common scoter	Firth of Tay and Eden Estuary	86	1,444	0.1	5.3	W	800 (Jun)	N/A	N/A	High	Yes	This species is present seasonally in the development area in high numbers. It is possible that wintering birds of UK SPAs may pass through the development area, therefore there is a potential connectivity with SPAs.
	Firth of Forth	101	2,653	0.2	9.6	W						
	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-						
	Moray Firth (dSPA)	118	-	-	-	-						
Velvet scoter	Firth of Tay and Eden Estuary	86	256	<0.1	8.5	W	5 (May & Jun)	N/A	N/A	High	Yes	This species is occasionally present in the development area in early summer. Individuals will associate with the more numerous common scoter, which is present seasonally in the development area in high numbers. Wintering birds of UK SPAs may pass through the development area, therefore there is a potential connectivity with SPAs.
	Firth of Forth	101	356	<0.1	11.9	W						
	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-						
	Moray Firth (dSPA)	118	-	-	-	-						

Note:
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Table 5.5: SPA species recorded during VP and ad hoc surveys continued

Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	SPA Status: B/W/P[2]	Peak Count Post Breeding [Month]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Goldeneye	Firth of Tay and Eden Estuary	86	255	<0.1	1.5	W	11 (Oct)	N/A	N/A	High	Yes	This species shows limited use of bay. Its occurrence is very seasonal; however, wintering birds of UK SPAs may pass through the development area, therefore there is a potential connectivity with SPAs.
	Firth of Forth	101	2,267	0.8	13.3	W						
	Inner Moray Firth	210	199	<0.1	1.2	W						
	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-						
	Moray Firth (dSPA)	118	-	-	-	-						
	Pentland Firth and Scapa Flow (dSPA)	180	-	-	-	-						
Red-breasted merganser	Firth of Tay and Eden Estuary	86	470	0.4	4.7	W	1 (Jun & Sep)	N/A	N/A	High	No	This species shows limited use of the development area, and was recorded during surveys in very low numbers. VP records are limited to birds passing through; therefore connectivity with the SPAs is unlikely.
	Firth of Forth	101	650	0.5	6.5	W						
	Inner Moray Firth	210	1,731	1.4	17.3	W						
	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-						
	Moray Firth (dSPA)	118	-	-	-	-						
	Pentland Firth and Scapa Flow (dSPA)	180	-	-	-	-						

Note:
1. Mean maximum foraging range (if known) taken from Thaxter et al., 2012
2. B = breeding, W = wintering, P = passage
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Table 5.5: SPA species recorded during VP and ad hoc surveys continued

Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	SPA Status: B/W/P[2]	Peak Count Post Breeding [Month]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Goosander	Firth of Tay and Eden Estuary	86	195	0.1	2.1	W	3 (Aug)	N/A	N/A	High	No	This species was recorded during surveys in very low numbers. There is limited use of the development area and VP records are of birds passing through; therefore connectivity with the SPA is unlikely.
	Inner Moray Firth	210	397	0.2	4.4	W						
Red-throated diver	Firth of Forth	101	88	0.1	1.8	W	34 (May)	N/A	N/A	High	Yes	This species is common within the area and present all year round in low numbers. In spring, small groups use the bay for resting and feeding. Most sightings are of birds passing the headland, however small groups associate with eiders. Wintering birds of UK SPAs may pass through the development area, therefore there is a potential connectivity with SPAs.
	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-						
	Moray Firth (dSPA)	118	-	-	-	-						
	Pentland Firth and Scapa Flow (dSPA)	180	-	-	-	-						

Note:
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Table 5.5: SPA species recorded during VP and ad hoc surveys continued

Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	SPA Status: B/W/P[2]	Peak Count Post Breeding [Month]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Fulmar	Fowlsheugh	23	1,170	<0.1	0.2	B	Present - Peak numbers not assessed	400	Yes	High	Yes	Small numbers of fulmar breed on the cliffs to the south of the site and regularly feed in the outer areas of Nigg Bay. SPA(s) are present within the species foraging range; therefore there is potential for connectivity with SPAs.
	Buchan Ness to Collieston Coast	23	1,765	<0.1	0.3	B						
	Troup, Pennan and Lion's Heads	85	4,400	<0.1	0.8	B						
	Forth Islands	107	1,600	<0.1	0.3	B						
Manx shearwater	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-	538 (Aug)*	>330	No	Medium	No	This species occasionally feeds in the outer area of Nigg Bay. Although the foraging range for this species is large, the development area is likely to be beyond the foraging range of nesting birds at UK SPAs, situated on the west coast of Scotland and Wales, therefore connectivity to SPAs is unlikely. However, it should be noted that there is a dSPA within the foraging range.

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Table 5.5: SPA species recorded during VP and ad hoc surveys continued

Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	SPA Status: B/W/P[2]	Peak Count Post Breeding [Month]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Gannet	Forth Islands	107	34,400	13.1	17.1	B	Present - Peak numbers not assessed	230	Yes	High	Yes	This species regularly feeds in the outer areas of Nigg Bay and is common offshore. There are SPA(s) within the species foraging range thus potential connectivity with the SPA(s).
	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-						
Cormorant	Firth of Tay and Eden Estuary	86	230	0.2	1.7	W	Present - Peak numbers not assessed	25	No	Medium	No	This species is common all year round and passes through Nigg Bay between day and night time roosts. However, there are no SPA(s) within the species foraging range therefore connectivity with the SPAs is unlikely.
	Firth of Forth	101	697	0.6	5.3	W						
	Forth Islands	107	240	0.6	3.4	B						
	Inner Moray Firth	210	418	0.4	3.2	W						
Shag	Buchan Ness to Collieston Coast	23	1,045	0.8	2.8	B	Present - Peak numbers not assessed	15	No	Medium	No	This species is common all year round and regularly feeds in the outer areas of Nigg Bay. There are no SPAs present within the species foraging range.
	Forth Islands	107	2,887	2.3	7.7	B						
	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-						
	Moray Firth (dSPA)	118	-	-	-	-						
	Pentland Firth and Scapa Flow (dSPA)	180	-	-	-	-						

Note:
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Table 5.5: SPA species recorded during VP and ad hoc surveys continued

Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	SPA Status: B/W/P[2]	Peak Count Post Breeding [Month]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Oystercatcher	Montrose Basin	58	2,368	0.3	0.7	W	68 (Oct)	N/A	N/A	Medium	Yes	This species is present all year round and uses the rocky foreshore and beach area, therefore indicating potential connectivity with nearby SPAs via birds on migratory passage.
	Firth of Tay and Eden Estuary	86	4,215	0.5	1.2	W						
	Firth of Forth	101	8,931	1.0	2.5	W						
	Inner Moray Firth	210	3,063	0.4	0.9	W						
Golden plover	Firth of Forth	101	2,970	0.2	1.2	W	2 (Jun)	N/A	N/A	Medium	No	This species is a passage migrant which uses the rocky foreshore and beach area. Recorded during ad hoc survey in very low numbers therefore connectivity to SPA(s) is unlikely.
Lapwing	Ythan Estuary, Sands of Forvie and Meikle Loch	20	2,542	<0.1	0.2	W	1 (Jul)	N/A	N/A	Medium	No	This species is a passage migrant which uses the beach area and grassy areas inland. Recorded during ad hoc survey in very low numbers (one record); therefore connectivity to SPA(s) is unlikely.
	Firth of Forth	101	4,148	<0.1	0.3	W						

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Table 5.5: SPA species recorded during VP and ad hoc surveys continued

Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	SPA Status: B/W/P[2]	Peak Count Post Breeding [Month]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Ringed plover	Firth of Forth	101	413	0.9	1.4	W	6 (Mar, Jun, Jul)	N/A	N/A	Medium	Yes	This species is present in low numbers for months of the year and one pair has been recorded to nest on the Nigg Bay foreshore; therefore there is potential for SPA connectivity via birds on migratory passage.
Curlew	Firth of Forth	101	2,188	0.6	1.9	W	19 (Feb)	N/A	N/A	Medium	Yes	This species is predominantly present in late winter and early spring but is present in low numbers all year round, and uses the rocky foreshore and beach area; therefore there is potential for SPA connectivity via birds on migratory passage.
	Inner Moray Firth	210	1,337	0.4	1.2	W						

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Table 5.5: SPA species recorded during VP and ad hoc surveys continued

Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	SPA Status: B/W/P[2]	Peak Count Post Breeding [Month]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Turnstone	Firth of Forth	101	1,286	1.9	2.0	W	26 (Apr)	N/A	N/A	Medium	Yes	This species is predominantly present in late winter and early spring but is present in low numbers all year round, and uses the rocky foreshore and beach area; therefore there is potential for SPA connectivity via birds on migratory passage.
Sanderling	Firth of Tay and Eden Estuary	86	223	0.2	1.0	W	1 (Aug)	N/A	N/A	Medium	No	This species is present as a passage migrant in very low numbers and uses the beach area. The species is more numerous in the coastline sector between the Dee and Don estuaries; therefore connectivity with the SPA is unlikely.

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Table 5.5: SPA species recorded during VP and ad hoc surveys continued

Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	SPA Status: B/W/P[2]	Peak Count Post Breeding [Month]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Dunlin	Montrose Basin	58	2,244	0.2	0.4	W	2 (May, Aug)	N/A	N/A	Medium	No	This species is a winter passage migrant which uses the beach area. Recorded during ad hoc survey in very low numbers; therefore connectivity to SPA(s) is unlikely.
	Firth of Tay and Eden Estuary	86	5,479	0.4	1.0	W						
	Firth of Forth	101	10,033	0.7	1.9	W						
Redshank	Ythan Estuary, Sands of Forvie and Meikle Loch	20	3,088	1.7	2.7	W	15 (Apr)	N/A	N/A	Medium	Yes	This species is present as a passage migrant in the summer months and uses the rocky foreshore and beach area; therefore there is potential for SPA connectivity via birds on migratory passage.
	Montrose Basin	58	2,259	1.3	2.0	W						
	Firth of Tay and Eden Estuary	86	1,800	1.0	1.6	W						
	Firth of Forth	101	3,700	2.1	3.3	W						
	Inner Moray Firth	210	1,811	1.0	1.6	W						
Puffin	Forth Islands	107	21,000	2.3	4.7	B	9	105	Yes	High	Yes	This species is a regular visitor to the area during spring and summer. There are SPA(s) present within the species foraging range thus potential connectivity with the SPA(s).
	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-						

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Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	SPA Status: B/W/P[2]	Peak Count Post Breeding [Month]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Razorbill	Fowlsheugh	23	4,576	0.8	4.6	B	Present - Peak numbers not assessed	49	Yes	High	Yes	This species forages in the outer area of Nigg Bay and is common in the development area all year. There are SPAs present within the species foraging range thus potential connectivity with the SPAs.
	Troup, Pennan and Lion's Heads	85	3,216	0.6	3.2	B						
	Forth Islands	107	2,693	0.5	2.7	B						
	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-						
Guillemot	Fowlsheugh	23	40,140	1.8	5.7	B	Present - Peak numbers not assessed	84	Yes	High	Yes	This species forages in the outer area of Nigg Bay and is common in the development area all year. There are SPAs present within the species foraging range thus potential connectivity with the SPAs.
	Buchan Ness to Collieston Coast	23	8,640	0.4	1.2	B						
	Troup, Pennan and Lion's Heads	85	29,902	1.3	4.3	B						
	Forth Islands	107	22,452	1.0	3.2	B						
	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-						
	Pentland Firth and Scapa Flow (dSPA)	180	-	-	-	-						

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Table 5.5: SPA species recorded during VP and ad hoc surveys continued

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Sandwich tern	Ythan Estuary, Sands of Forvie and Meikle Loch	20	600	0.5	4.3	B	Present - Peak numbers not assessed	49	Yes	High	Yes	This species is common in the area, with roosts and creches on the rocky shore in Greyhope Bay. There are SPAs present within the species foraging range thus potential connectivity with the SPAs.
	Loch of Strathbeg	60	530	0.4	3.8	B						
	Firth of Forth	101	1,611	0.4	3.8	P						
	Forth Islands	107	22	<0.1	0.2	B						
	Ythan Estuary and Sands of Forvie (dSPA)	2.5	-	-	-	-						
Common tern	Ythan Estuary, Sands of Forvie and Meikle Loch	20	265	0.1	2.2	B	Present - Peak numbers not assessed	15	No	High	Yes	This species is common in the area, with roosts and creches on the rocky shore in Greyhope Bay. There are no SPAs present within the species foraging range; however, on a precautionary basis, the Ythan Estuary, Sands of Forvie and Meikle Loch SPA is on the limits of the foraging range thus there may be potential connectivity with the SPA.
	Forth Islands	107	800	0.4	6.5	B						
	Inner Moray Firth	210	310	0.2	2.5	B						
	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-						

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Arctic tern	Forth Islands	107	540	<0.1	1.2	B	Present - Peak numbers not assessed	24	No	High	No	This species is common in the area, with roosts and creches on the rocky shore in Greyhope Bay. There are no SPAs present within the species foraging range therefore connectivity with SPAs is unlikely.
	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-						
	Pentland Firth and Scapa Flow (dSPA)	180	-	-	-	-						
Kittiwake	Fowlsheugh	23	34,870	1.1	7.1	B	Present - Peak numbers not assessed	60	Yes	High	Yes	This species is common in the development area and there are large roosts of several thousand individuals along the breakwaters in Aberdeen Harbour. There are SPAs present within the species foraging range thus potential connectivity with the SPAs.
	Buchan Ness to Collieston Coast	23	30,452	0.96	6.2	B						
	Troup, Pennan and Lion's Heads	85	31,66	1.0	6.5	B						
	Forth Islands	107	9,380	0.3	1.9	B						
	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-						

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Black-headed gull	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-	Present - Peak numbers not assessed	26	No	Medium	No	This species is common within the development area in autumn, winter and spring. However there are no SPAs within the species foraging range therefore connectivity with SPAs is unlikely.
Common gull	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-	2350 (Nov)	50	No	Medium	Yes	This species is very common within the area, with a winter peak of 2,400. There are significant roosts in the bay thus potential connectivity with SPAs.
Lesser black-backed gull	Forth Islands	107	2,920	2.4	3.5	B	Present - Peak numbers not assessed	141	Yes	High	Yes	This species is common during the spring and summer months. Although lesser black-backed gull do not use the development area for any particular activity, there is an SPA within the species foraging range thus potential connectivity with the SPA.

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Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	SPA Status: B/W/P[2]	Peak Count Post Breeding [Month]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Herring gull	Fowlsheugh	23	3,190	0.3	2.0	B	Present - Peak numbers not assessed	61	Yes	High	Yes	This species is common all year round and breeds on the roof of the sewage treatment works. There are SPAs within the species foraging range thus potential connectivity with the SPAs.
	Buchan Ness to Collieston Coast	23	4,292	0.5	2.7	B						
	Troup, Pennan and Lion's Heads	85	4,200	0.5	2.6	B						
	Forth Islands	107	6,600	0.7	4.1	B						
	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-						

Note:
1. Mean maximum foraging range (if known) taken from Thaxter et al., 2012
2. B = breeding, W = wintering, P = passage
* Data collected by surveyor covering the Girdleness area. Not part of the VP survey which just recorded presence

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Table 5.6: Likely SPA species which were not recorded during surveys but may potentially use or migrate through the development area

Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	Status: B/W/P[2]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Greylag goose	Loch of Skene	18	10,840	10.8	10.8	W	N/A	N/A	High	No	Greylag goose favours freshwater and saltmarsh, therefore the development area is not a primary habitat for this species.
	Montrose Basin	58	1,080	1.1	1.1	W					
	Loch of Strathbeg	60	3,325	3.3	3.3	W					
	Firth of Tay and Eden Estuary	86	1,355	1.4	1.4	W					
	Inner Moray Firth	210	1,731	1.7	1.7	W					
Svalbard barnacle goose	Loch of Strathbeg	60	226	1.9	1.3	W	N/A	N/A	High	No	Svalbard barnacle goose favours tidal mudflats and saltmarshes, therefore the development area is not a primary habitat for this species.
Shelduck	Montrose Basin	58	753	0.3	1.0	W	N/A	N/A	High	No	Shelduck favours tidal mudflats and saltmarshes, therefore the development area is not a primary habitat for this species.
	Firth of Tay and Eden Estuary	86	1,144	0.4	1.6	W					
	Firth of Forth	101	3,586	1.2	4.9	W					
Mallard	Firth of Forth	101	2,564	<0.1	0.5	W	N/A	N/A	Medium	No	The development area is not a primary habitat for mallard. In addition, the nearest SPA is 101km from the proposed development. This distance, for this common and widespread bird, is unlikely to impact on this SPA.

Note:
1. Mean max foraging range taken from Thaxter et al., 2012
2. B = breeding, W = wintering, P = passage

Table 5.6: Likely SPA species which were not recorded during surveys but may potentially use or migrate through the development area continued

Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	Status: B/W/P[2]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Scaup	Firth of Forth	101	220	<0.1	2.0	W	N/A	N/A	High	No	Scaup prefers coastal lagoons and estuaries, therefore the development area is not a primary habitat for this species and is significant distance from these SPAs.
	Inner Moray Firth	210	97	<0.1	0.9	W					
	Moray Firth (dSPA)	118	-	-	-	-					
Black-throated diver	Pentland Firth and Scapa Flow (dSPA)	180	-	-	-	-	N/A	N/A	High	Yes	Black-throated diver were not recorded during the VP survey; however, they can be confused with red throated diver and should be included as a precaution (reference to diver species in the aerial survey data).
Great Northern diver	Moray Firth (dSPA)	118	-	-	-	-	N/A	N/A	High	Yes	Not recorded during the site specific VP survey, but are known to use the area in low numbers.
	Pentland Firth and Scapa Flow (dSPA)	180	-	-	-	-					

Note:
1. Mean max foraging range taken from Thaxter et al., 2012
2. B = breeding, W = wintering, P = passage

Table 5.6: Likely SPA species which were not recorded during surveys but may potentially use or migrate through the development area continued

Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	Status: B/W/P[2]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Great crested grebe	Firth of Forth	101	632	0.4	6.5	W	N/A	N/A	High	No	The development area is not the primary winter habitat for great crested grebe. This species prefers estuaries, sheltered sea lochs and freshwater lakes.
Slavonian grebe	Firth of Forth	101	71	1.4	17.8	W	N/A	N/A	High	No	The development area is not the primary winter habitat for Slavonian grebe. This species prefers estuaries, sheltered sea lochs and freshwater lakes.
	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-					
	Moray Firth (dSPA)	118	-	-	-	-					
	Pentland Firth and Scapa Flow (dSPA)	180	-	-	-	-					
Marsh harrier	Firth of Tay and Eden Estuary	86	4	<0.1	2.6	B	N/A	N/A	High	No	The development area is not a primary habitat for marsh harrier.
Osprey	Inner Moray Firth	210	4	<0.1	4	B	N/A	N/A	High	No	The development area is not a primary habitat for osprey.
Grey plover	Firth of Tay and Eden Estuary	86	933	0.6	2.2	W	N/A	N/A	Medium	No	Grey plover favours large, soft sediment estuaries, therefore the development area is not a primary habitat for this species
	Firth of Forth	101	704	0.4	1.6	W					

Note:
1. Mean max foraging range taken from Thaxter et al., 2012
2. B = breeding, W = wintering, P = passage

Table 5.6: Likely SPA species which were not recorded during surveys but may potentially use or migrate through the development area continued

Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	Status: B/W/P[2]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Black-tailed godwit	Firth of Tay and Eden Estuary	86	150	0.2	2.0	W	N/A	N/A	High	No	Black-tailed godwit favours estuaries and coastal lagoons, therefore the development area is not a primary habitat for this species.
Bar-tailed godwit	Firth of Tay and Eden Estuary	86	2,400	2.1	4.6	W	N/A	N/A	Medium	No	Bar-tailed godwit favours estuaries and coastal lagoons, therefore the development area is not a primary habitat for this species.
	Firth of Forth	101	2,600	2.3	5.0	W					
	Inner Moray Firth	210	1,155	1.0	2.2	W					
Knot	Montrose Basin	58	4,500	1.3	1.6	W	N/A	N/A	Medium	No	Knot favours large muddy estuaries, therefore the development area is not a primary habitat for this species.
	Firth of Forth	101	8,013	2.3	2.8	W					

Note:
1. Mean max foraging range taken from Thaxter et al., 2012
2. B = breeding, W = wintering, P = passage

Table 5.6: Likely SPA species which were not recorded during surveys but may potentially use or migrate through the development area continued

Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	Status: B/W/P[2]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Little tern	Ythan Estuary, Sands of Forvie and Meikle Loch	20	41	0.2	1.7	B	6	Yes (dSPA)	High	No	This species was not recorded within the development area during the surveys.
	Firth of Tay and Eden Estuary	86	44	0.2	1.8	B				No	
	Ythan Estuary dSPA	2.5	-	-	-	-				Yes	Although this species was not recorded within the development area during the surveys, the Ythan Estuary dSPA is present within the species foraging range thus there is potential for connectivity with the dSPA.
Roseate tern	Forth Islands	107	9	0.5	14.1	B	17	No	High	No	This species was not recorded within the development area during the surveys, and there are no SPAs within the species foraging range therefore SPA connectivity is unlikely.

Note:
1. Mean max foraging range taken from Thaxter et al., 2012
2. B = breeding, W = wintering, P = passage

Table 5.6: Likely SPA species which were not recorded during surveys but may potentially use or migrate through the development area continued

Species	SPA(s)	Approximate Distance From Site [km]	SPA Population	% of Bio-geographical Population	% of National Population	Status: B/W/P[2]	Foraging Range in Breeding Season [km][1]	SPA in Foraging Range	Receptor Sensitivity	Potential for LSE	Rationale
Little gull	Outer Firth of Forth and Tay Bay Complex (dSPA)	70	-	-	-	-	N/A	N/A	High	No	Little gull favours coastal areas particularly between Tayside and Yorkshire, so the development area is considered to be outside its normal range.

Note:
1. Mean max foraging range taken from Thaxter et al., 2012
2. B = breeding, W = wintering, P = passage

5.1.3 Summary of Screening

From the initial screening assessment of the proposed Aberdeen Harbour Expansion Project, it is concluded that the proposed project:

- Is not directly connected with or necessary to European site management for nature conservation;
- Has the potential to have a significant effect on the internationally important features of a European site, either alone or in combination with other plans or projects.

Therefore, in line with current guidance (Tyldesley and Chapman, 2013), an AA of the proposed project is required to be undertaken by the competent authorities, based on the information presented in this HRA (Section 6).

6. INFORMATION TO INFORM AN APPROPRIATE ASSESSMENT

6.1 Approach to AA

The initial screening assessment of the proposed Aberdeen Harbour Expansion Project, in addition to feedback received from SNH, identified a list of designated sites and qualifying features with potential connectivity to the development and for which there is potential for LSE (Section 4, Section 5.1.1.2 and Section 5.1.2.2).

The qualifying species (as identified in Table 5.2, Table 5.3, Table 5.5 and Table 5.6) and LSEs are evaluated further in Section 5.1.1.2 and 5.1.2.2 and have been either recommended for inclusion in the AA (screened in) or dismissed (screened out) as having no LSE.

Where LSE are identified during screening (Section 5.1.1.2 and 5.1.2.2), the AA determines whether, in view of the European site's conservation objectives, the plan or project would have an adverse effect (or risk of adverse effect) on the integrity of the European site, either alone or in-combination with other plans or projects. An assessment is made for each qualifying species, taking into account the potential pathways for LSE (Section 3.1) and available evidence:

i. The potential impacts and likely consequences for the qualifying features, in light of the site conservation objectives, are identified;

ii. For each impact the probability of it affecting the conservation objectives is assessed;

iii. For each impact the magnitude, duration and reversibility of the effects is assessed;

iv. Mitigation is proposed and its likely effectiveness in removing or reducing impacts is considered;

v. Any assumptions made and evidence or advice used is recorded;

vi. It is concluded whether it can be ascertained that site integrity will not be adversely affected.

This methodology and approach is based upon feedback with regulators as advised in the formal Scoping Opinion from SNH (as presented in ES Appendix 1-D, 11 April 2014).

6.2 In-combination Effects

Under the Habitats Regulations, it is necessary to consider the in-combination effects of development proposals on Natura 2000 sites. These refer to effects, which may or may not interact with each other, but which could affect the same receptor or interest feature (i.e. a habitat or species for which a European site is designated).

The consideration of potential in-combination effects is of key importance when undertaking a HRA. Guidance from David Tyldesley and Associates (2010) suggests that any plans or projects at the following stages may be relevant to an in-combination assessment:

- Applications lodged but not yet determined;
- Projects subject to periodic review, e.g. annual licences, during the time that their renewal is under consideration;

- Refusals subject to appeal procedures not yet determined;
- Projects authorised but not yet started;
- Projects started but not yet completed;
- Known projects that do not require external authorisation;
- Proposals in adopted plans;
- Proposals in finalised draft plans formally published or submitted for final consultation, examination or adoption.

There are a number of projects, programmes, plans or activities that, in combination with effects arising from the Aberdeen Harbour Expansion Project, could have an effect on European sites qualifying features (Table 6.1 and Figure 6.1). Coastal developments at Dundee and Edinburgh waterfronts are not considered likely to displace species from key foraging areas, nor pose a barrier to movements. Given that all coastal developments are 80 km or further from the development area, any disturbance during construction and operation is unlikely to cause in-combination effects with disturbance from the Aberdeen Harbour Expansion Project. These coastal developments are therefore scoped out of the in-combination assessment.

Table 6.1: Developments considered as part of the in-combination assessment

Project/Proposed Development	Description	Approximate Distance to Project [km]	Status	Effects
Aberdeen maintenance dredging	Harbour maintenance dredging	2	Consented, Ongoing	An existing part of the baseline; effects relating to construction plumes.
European Offshore Wind Deployment Centre (EOWDC)	Offshore wind demonstrator	10	Consented (under legal challenge)	Loss of habitat within the wind farm array (or associated infrastructure), displacement and barrier effect. Potential collision risk. Underwater noise and vibration during construction and operation. Increased Suspended Sediment Concentration (SSC), deposition of sediment plumes.
Kincardine Offshore Wind Farm	Floating offshore wind farm	12	Application	Loss of habitat within the wind farm array (or associated infrastructure), displacement and barrier effect. Potential collision risk. Underwater noise and vibration during construction and operation. Increased Suspended Sediment Concentration (SSC), deposition of sediment plumes.
Hywind Scotland Pilot Park Offshore Wind Farm	Floating offshore wind demonstrator	51	Application	Loss of habitat within the wind farm array (or associated infrastructure), displacement and barrier effect. Potential collision risk. Underwater noise and vibration during construction and operation. Increased Suspended Sediment Concentration (SSC), deposition of sediment plumes.

Table 6.1: Developments considered as part of the in-combination assessment continued

Project/Proposed Development	Description	Approximate Distance to Project [km]	Status	Effects
Seagreen Alpha Round 3 Offshore Wind Farm	Round 3 offshore wind farm	64	Consented (subject to judicial review)	Loss of habitat within the wind farm array (or associated infrastructure), displacement and barrier effect. Potential collision risk. Underwater noise and vibration during construction and operation. Increased Suspended Sediment Concentration (SSC), deposition of sediment plumes.
Seagreen Bravo Round 3 Offshore Wind Farm	Round 3 offshore wind farm	64	Consented (subject to judicial review)	Loss of habitat within the wind farm array (or associated infrastructure), displacement and barrier effect. Potential collision risk. Underwater noise and vibration during construction and operation. Increased Suspended Sediment Concentration (SSC), deposition of sediment plumes.
Inch Cape STW Offshore Wind Farm	Scottish territorial waters offshore wind farm	65	Consented (subject to judicial review)	Loss of habitat within the wind farm array (or associated infrastructure), displacement and barrier effect. Potential collision risk. Underwater noise and vibration during construction and operation. Increased Suspended Sediment Concentration (SSC), deposition of sediment plumes.
Neart na Gaoithe STW Offshore Wind Farm	Scottish territorial waters offshore wind farm	95	Consented (subject to judicial review)	Loss of habitat within the wind farm array (or associated infrastructure), displacement and barrier effect. Potential collision risk. Underwater noise and vibration during construction and operation. Increased Suspended Sediment Concentration (SSC), deposition of sediment plumes.
Forthwind (Methil) Offshore Wind Demonstrator	Offshore wind demonstrator	131	Application	Loss of habitat within the wind farm array (or associated infrastructure), displacement and barrier effect. Potential collision risk. Underwater noise and vibration during construction and operation. Increased Suspended Sediment Concentration (SSC), deposition of sediment plumes.
Moray Firth Eastern Development Area	Round 3 offshore wind farm	130	Consented	Loss of habitat within the wind farm array (or associated infrastructure), displacement and barrier effect. Potential collision risk. Underwater noise and vibration during construction and operation. Increased Suspended Sediment Concentration (SSC), deposition of sediment plumes.

Table 6.1: Developments considered as part of the in-combination assessment continued

Project/Proposed Development	Description	Approximate Distance to Project [km]	Status	Effects
Moray Firth Western Development Area	Round 3 offshore wind farm	130	Concept	Loss of habitat within the wind farm array (or associated infrastructure), displacement and barrier effect. Potential collision risk. Underwater noise and vibration during construction and operation. Increased Suspended Sediment Concentration (SSC), deposition of sediment plumes.
Beatrice STW Offshore Wind Farm	Scottish territorial waters offshore wind farm	135	Consented	Loss of habitat within the wind farm array (or associated infrastructure), displacement and barrier effect. Potential collision risk. Underwater noise and vibration during construction and operation. Increased Suspended Sediment Concentration (SSC), deposition of sediment plumes.
Peterhead Carbon Capture and Storage	Subsea pipeline	30	Application	Underwater noise and vibration during construction and operation. Increased Suspended Sediment Concentration (SSC), deposition of sediment plumes.
Peterhead Harbour Masterplan	Port development	44	Application	Loss of habitat within the harbour (or associated infrastructure), displacement and barrier effect. Potential collision risk. Underwater noise and vibration during construction and operation. Increased Suspended Sediment Concentration (SSC), deposition of sediment plumes.
Port of Ardersier	Port development	197	Consented	Loss of habitat within the harbour (or associated infrastructure), displacement and barrier effect. Potential collision risk. Underwater noise and vibration during construction and operation. Increased Suspended Sediment Concentration (SSC), deposition of sediment plumes.

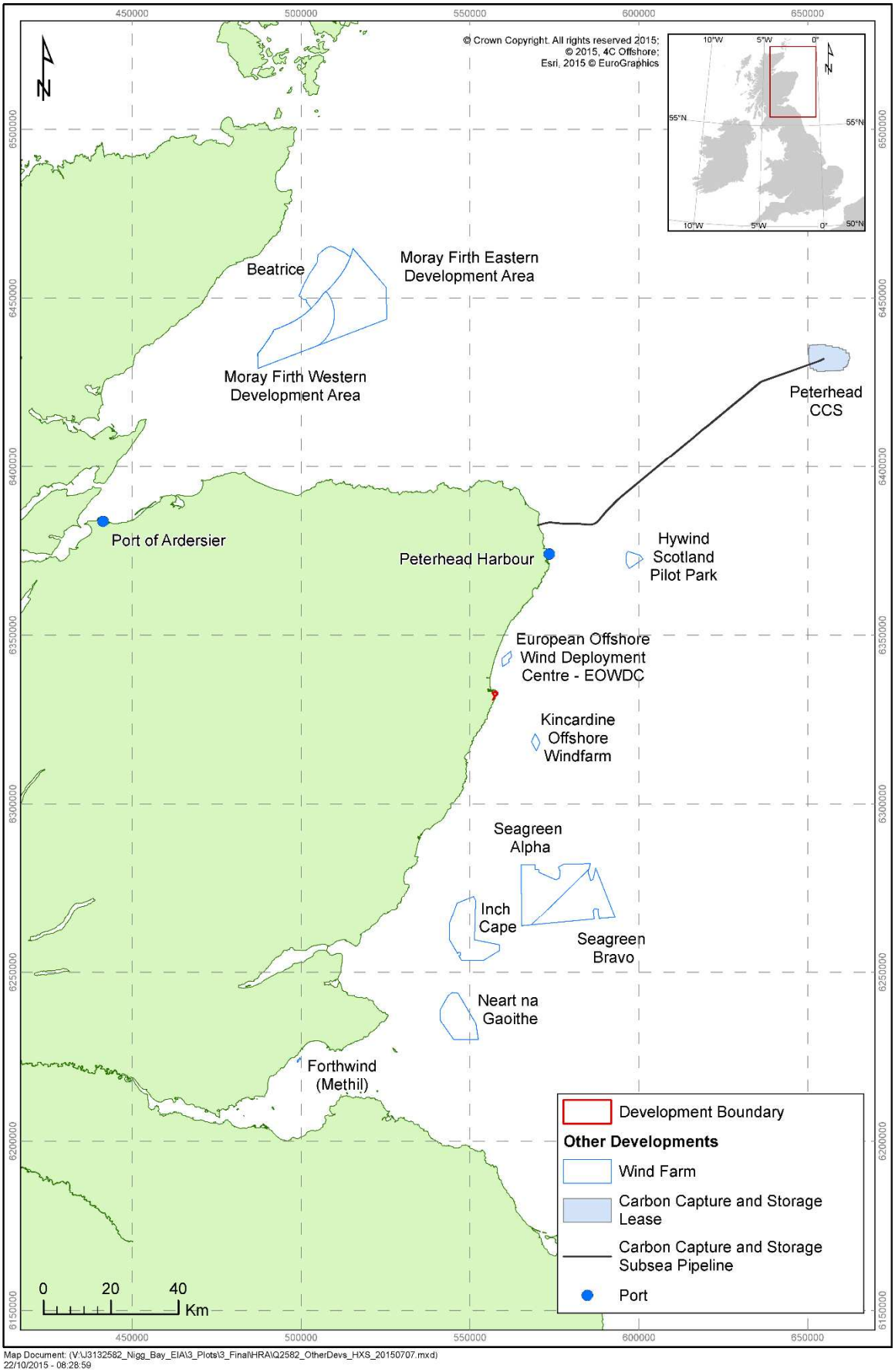

Figure 6.1: Other developments in relation to the proposed development

6.3 Special Areas of Conservation

6.3.1 River Dee SAC

Atlantic salmon, freshwater pearl mussel and otter are all designated features of the River Dee SAC, which is located 2 km from the proposed development. Atlantic salmon and freshwater pearl mussel have been identified as having a LSE (Section 5.1.1.2) therefore require further consideration within an Appropriate Assessment. Otter (*Lutra lutra*) is included in the AA due to the proximity of the River Dee SAC to the project area, and the known presence of otter in the area.

The conservation objectives for the SAC can be viewed in Table 6.2. The following draws upon the impact assessments presented within the ES to appraise the likely significant effect of the project on the River Dee SAC in view of these conservation objectives. Further information on the ecology of Atlantic salmon and freshwater pearl mussel qualifying features is presented within ES Chapter 13: Fish and Shellfish Ecology and ES Appendix: 13-A: Fish and Shellfish Ecology Technical Report. Further information on otter can be viewed in ES Chapter 11: Terrestrial Ecology.

Table 6.2: River Dee SAC conservation objectives

Site Information	Details
Site Designation – Qualifying Species and Features	**Annex II species (primary reason for site selection):** • Atlantic salmon (*Salmo salar*) • Freshwater pearl mussel (*Margaritifera margaritifera*) • Otter (*Lutra lutra*)
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying species that the following are maintained in the long term: • 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 • Distribution and viability of freshwater pearl mussel host species • Structure, function and supporting processes of habitats supporting freshwater pearl mussel host species
Site Condition and Date of Assessment	Atlantic salmon – favourable maintained (21/07/11) Otter – favourable maintained (06/10/12) Freshwater pearl mussel – unfavourable no change (07/08/03)

6.3.1.1 Atlantic Salmon (*Salmo salar*) and Freshwater Pearl Mussel (*Margaritifera margaritifera*)

Within their scoping opinion, SNH provided guidance and indicated possible causes of LSE on Atlantic salmon and freshwater pearl mussel including:

- Noise and vibration impacts – construction and operation
- Reduced water quality – construction and operation

- Timing and duration of work – construction
- Lighting – construction and operation

The EIA findings are discussed below and a summary of the findings, including an assessment of the effect of the project on the integrity of the SAC and its conservation objectives, can be viewed in Table 6.4.

Atlantic salmon (*Salmo salar*) migrate to and from the River Dee and surrounding east coast catchments as part of their migratory life cycle. Tagging studies summarised in Malcolm et al. (2010) record an offshore movement of returning salmon which initially approach the south Scottish and north east English coasts before turning north to natal Scottish rivers. As such, individuals of Atlantic salmon returning to the River Dee will be likely to traverse the development area or close environs prior to river entry. Upstream movement is greatest during night time hours.

Catch data from rod and line fisheries within the River Dee catchment and from historic netting stations along the local Aberdeenshire coast, together with data from literature review, have been used to characterise seasonal patterns of Atlantic salmon and sea trout migration, highlighting the period between April and July inclusive as the peak period of salmonid movement within the vicinity of the project (ES Technical Appendix 13-A Fish and Shellfish Ecology Technical Report).

The potential effects of the project on sea trout (*Salmo trutta*) have also been considered. Although sea trout is not cited as an interest feature of the River Dee SAC, it is nonetheless a host for freshwater pearl mussel (a SAC qualifying feature) which relies on the presence of healthy populations of both Atlantic salmon and sea trout for the maintenance of its own population. The conservation objectives for this site provide for the maintenance of the distribution and viability of freshwater pearl mussel host species. As such, sea trout warrants the same attention in terms of LSE as Atlantic salmon, and both are assessed.

Atlantic salmon and sea trout are assessed together because they share broadly similar behaviours and habitats and are likely to respond to project impacts in the same way. However, peak migration patterns of sea trout differ slightly to those of Atlantic salmon and sea trout may use coastal areas to a greater degree.

The project will not occur within the boundaries of the River Dee SAC. As such, no direct deterioration or effects on extent or function of habitats within the site will occur. The relevant conservation objectives to be considered here therefore relate to the maintenance of the distribution and viability of Atlantic salmon and freshwater pearl mussel (FWPM) host populations.

Noise and Vibration

The EIA process (ES Chapter 13: Fish and Shellfish Ecology) identified that underwater noise is the most significant potential impact arising from the construction on salmon and FWPM hosts. Specifically, unmitigated percussive piling is forecast to create levels of underwater noise that could modify salmon behaviour at the mouth of the River Dee. This may result in delays to the migration of adults and smolts with possible consequences for the viability of and disturbance of individuals of these species.

Mathematical modelling (ES Chapter 13: Fish and Shellfish Ecology), predicted that the range over which temporary hearing damage or injury could occur, as indicated by the TTS and 'no-injury' criteria from piling in Nigg Bay could be up to 3110 m. This is an extremely conservative estimate applying generally to all fish above 2 grams in size. Salmonids in the marine environment are considerably larger than this and may therefore be more resilient to potential physiological effects of underwater noise than indicated by the modelling, although this is uncertain. Also, salmonids will be responding to other factors in the marine environment and may be comparatively tolerant to higher noise inputs when occupying valued habitats or when undergoing foraging and migration behaviours. A further confounding issue is the presence of the rocky headland at Girdle Ness which may provide some attenuating property and which has not been accounted for in the modelling, and which may reduce the overall underwater noise impact at the mouth of the River Dee to levels which do not pose a barrier to migration of salmonid adults or smolts. Furthermore, the construction (partial or otherwise) of the breakwaters prior to the onset of piling might provide significant mitigation in this regard. The predicted range of effect therefore should not be taken as an absolute value but indicative only and considered within the context of likely salmonid tolerance based on their size, behaviours and over-riding biological imperatives.

In the absence of the final construction design and any detailed modelling to account for potential noise shadowing within the lee of the headland at Girdle Ness, a precautionary stance needs to be adopted. This should include consideration that the range of underwater noise impacts from piling in Nigg Bay overlap the mouth of the River Dee and thus may represent a barrier to individuals of salmon and FWPM hosts entering and/or leaving the River Dee resulting in a potential adverse effect on site integrity. Avoiding an adverse effect on site integrity would involve the application of mitigation measures presented in Section 13.8 of the Environmental Statement (ES Chapter 13: Fish and Shellfish Ecology) and will include the following:

- Soft start to piling to assist individuals of salmon and FWPM hosts to move away and out of the area prior to the onset of full piling;
- Scheduling of percussive piling activities on a diurnal and seasonal basis to avoid peak migration periods;
- Contribution to national monitoring efforts to enhance the evidence base on the ecology and migration patterns and inform the mitigation.

The final design and implementation of the mitigation measures will be developed in consultation with the regulators and stakeholders for subsequent incorporation within the environmental management and monitoring plan (EMMP). With the mitigation in place, there will be no interaction between hammer piling and key periods of salmon movements and therefore no adverse effect on site integrity. Indirect effects on FWPM will also be addressed within the mitigation for Atlantic salmon.

In-combination Underwater Noise Effects

The EIA process identified that underwater noise effects propagating from the piling of foundations at the European Offshore Wind Deployment Centre (EOWDC) in Aberdeen Bay may result in an in-combination effect if undertaken consecutively with the current proposed piling at Nigg Bay. Mathematical modelling predictions of noise propagation from worse case piling (8.5 m diameter piles) at the EOWDC (Aberdeen Offshore Wind Farm Limited, 2011) showed that levels of noise within the vicinity of the River Dee may affect 85 % of individuals of salmon although effects will probably be limited

due to habituation (Aberdeen Offshore Wind Farm Limited, 2011). However, it should be noted that any piling activity at EOWDC will be very short lived due to the low number of piles proposed (up to eleven) so that any potential cumulative effect will be of very short duration.

In conclusion, in the place of agreed mitigation outlined above, there will be no significant adverse effects either singly or in-combination with other plans or projects on the population of Atlantic salmon and FWPM host species and no adverse effect on site integrity.

Effects of Reduced Water and Habitat Quality

Whilst water and habitat quality are forecast to be reduced as a result of the construction and operation of the project, these effects are not forecast to significantly affect the distribution and viability of Atlantic salmon and FWPM host species populations either singly or in-combination with other plans or projects in the area.

The ES (ES Chapter 13: Fish and Shellfish Ecology) acknowledges that dredging of the seabed and placement of harbour infrastructure will lead to a localised loss of, and change to, the benthic and pelagic habitat and hydrodynamic processes in Nigg Bay. The diversity and abundance of sediment dwelling invertebrates will be reduced within the footprint of the capital and operational dredging as a result of uptake and entrainment. Deterioration in water quality, including a decrease in dissolved oxygen content and increases in SSCs and contaminants in the water are also forecast within Nigg Bay due to seabed disturbances, raised sediment plumes and increased retention of the constituents of existing wastewater discharges within the embayment compared to the current situation. Testing of contaminants within surficial seabed sediments collected during the benthic ecological site specific survey found levels that were within Marine Scotland Action Level I guidelines indicating no threat to marine life on disturbance and disposal.

The historic salmon netting catch data provided by the River Dee Trust (ES Chapter 13: Fish and Shellfish Ecology) showed that individual adult salmon and sea trout use Nigg Bay. However, it is acknowledged that these data do not make it clear how salmonids are using the bay or what proportion of the River Dee population may utilise this area.

Salmonid populations range widely (between Scotland and sub-arctic areas for Atlantic salmon) and so cover a very wide range of marine coastal and open water habitats and are out of the current development area for a significant proportion of their life-cycle. Against the highly mobile and wide ranging nature of salmonid, the habitats within Nigg Bay are unlikely to be critical to the maintenance of the distribution and viability of these populations and any effects of localised changes to the benthic and pelagic habitats and water quality will be negligible at the population level and at the geographic scale of the salmonid range footprint.

Migratory species such as Atlantic salmon and sea trout are naturally tolerant to a degree of elevated SSCs as they are typically exposed to turbid conditions during their migration through estuary environments. Raised SSCs will be generated as a result of the action of the dredging tool on the seabed during the construction phase and operational (maintenance dredging) phases. Mathematical modelling shows elevated levels will be highly localised to the point of disturbance within the Nigg Bay embayment and at the offshore disposal site but that these will be very short lived as the coarser fractions of the

disturbed seabed sediments quickly settle back to the seafloor. The capital dredging operation will last for a maximum of 19 months and salmon and other FWPM host species are expected to avoid areas where very high SSCs will occur at the point of disturbance for the duration of the construction although intermediate SSCs away from the immediate dredging may actually benefit these species through reduced predation risk and increased foraging opportunities from released benthic resources. At the mouth of the River Dee, SSCs will be lower than those in the development site due to the distance separation and the dispersion and dilution that will be achieved and are not expected to be any greater than those that occur naturally within the Dee estuary. Consequently, no significant barrier to the movements of Atlantic salmon and FWPM host species due to adverse SSCs will occur.

The consequences of reduced prey items in Nigg Bay on salmon and other freshwater pearl mussel host species will be negligible as it is considered that individuals returning to the River Dee for spawning do not tend to feed and would preferentially take pelagic food items in any case. Therefore a localised reduction or change in the benthic resource, and avoidance of adverse water quality, may be of little consequence to returning adults. Sandeel populations outside the proposed harbour are predicted to remain unaffected during construction and operational phases and so sandeel prey availability within the wider region is not expected to be significantly reduced. Classification and mapping of sand eel habitat (Greenstreet et al., 2010) using particle size data collected from the benthic ecology site specific survey showed that the best quality sand eel habitat occurred outside of the development area with substrates within the development classified as unsuitable. Significant adverse direct effects on sand eel prey for salmonids are therefore not expected (ES Chapter 13: Fish and Shellfish Ecology).

Water quality modelling predicts a decrease in DO concentrations as a result of continued wastewater inputs within the operational harbour (ES Chapter 7: Marine Water and Sediment Quality and ES Appendix 7-B: Water Quality Modelling Assessment Assessment). Low DO conditions are not expected to be suitable for salmonids and they may avoid the operational harbour during periods of significant adverse DO conditions. Given their mobility and wide range movement, the potential exclusion of salmonids from the operational harbour is not considered to be significant as they will be able to exploit other areas within the wider region for feeding. Also, salmon and sea trout will not be exposed to depressed levels of DO for long periods of time as they will pass through the area very quickly during their migration movements to and from the River Dee so that longer term, sub-lethal effects on salmon are not expected.

The risk of accidental spillage or release of chemicals into the environment such as fuel, oil and lubricants from vessels during construction and operation will be reduced through the development of, and adherence to, an Environmental Management and Monitoring Plan (EMMP). Chapter 26 of the ES (Mitigation and Monitoring) identifies the EMMP that will be developed following consent of the project.

In-combination Reduced Water and Habitat Quality Effects

Potential in-combination effects of raised SSCs have been considered with regard to the offshore wind farm proposals at the EOWDC at Aberdeen, Kincardine floating offshore wind farm and the on-going dredging at Aberdeen Harbour.

Aberdeen Offshore Wind Limited (2011) reports that maximum SSCs will reach 35 mg/l within a plume that extends from Aberdeen Harbour to a point approximately 3 km south of the River Ythan. Following

installation of the maximum of eleven foundations, higher concentrations will remain within this plume footprint. These levels are well within the natural variation to which salmonids will be tolerant. Currently, there are no data on predicted plume excursions and SSCs arising from the Kincardine development. However, this development is for a floating array so that only minimal seabed disturbances and associated raised SSCs will occur compared to the installation of turbine foundations. As such, it is expected that maximum SSCs will be less than those predicted at the EOWDC project. The installation of the Kincardine export cable will also raise SSCs within the close environs but this activity is expected to be completed rapidly. Any seabed disturbance will occur at the seabed only so that any associated effects of raised SSCs will be very short lived and highly localised.

The on-going dredging at Aberdeen Harbour occurs closer to the current project, compared to the wind farm projects discussed above. The movement of sediment plumes and SSCs arising from this project are not known at present but these are expected to remain largely within the harbour due to the presence of the harbour walls restricting plume dispersion seaward. Mathematical modelling of the plumes and SSCs from the current project show that only very low SSCs will occur outside of Nigg Bay. For example, at St Fittick's combined sewer overflow (CSO) on the end of Girdle Ness, SSCs from the Nigg Bay project are forecast to be only 0.45 mg/l and well within the natural variation and tolerance of salmonid populations. They will not therefore contribute to levels of SSCs that will deter salmonid during their migration. SSCs in-combination with other local projects will therefore not be at levels that exceed those of the estuary at present so that adverse effects on migration movements will not occur.

Reductions in water and habitat quality as a result of the offshore wind farm projects are considered to be negligible within the context of the mobility and wide range movement of Atlantic salmon and FWPM host species and will not contribute to a significant adverse in-combination effect of these species.

In conclusion, reductions in water and habitat quality will be highly localised and will not significantly adversely affect Atlantic salmon and FWPM host species populations either singly or in combination with other local plans and projects. Raised SSCs at the mouth of the River Dee will be no greater than those occurring naturally in the estuary and thus will not represent a significant barrier to salmonid migration. Development of, and adherence to, an EMMP will reduce the risk of accidental spillages of potentially harmful substances into the marine environment. No adverse effect on site integrity as a result of localised reductions in water and habitat quality will thus occur.

Visual Disturbance

Returning adult salmonids will pass through, or close to, the operational harbour during their inshore northwards migration back to the River Dee and may experience strong contrasts in underwater illumination subject to the position and brightness of the sun, dimensions of the harbour buildings and structures casting any shadow(s) and the use and position of artificial lighting at night.

The ES (ES Chapter 13: Fish and Shellfish Ecology) recognises that individuals of adult salmon and FWPM host species experiencing sharp contrasting illumination may make minor deviations or delay migration patterns. At present it is not clear how possible minor alterations in the behaviour of individuals might translate to population level effects.

Atlantic salmon and sea trout already migrate up and down the River Dee, exiting from and emerging to the marine environment at Aberdeen Harbour, where existing harbour infrastructure and lighting already exists. Within the context of the harbour structures and buildings already present at Aberdeen Harbour and the historic return salmon migration to the River Dee, the effect is judged to be not significant. Lighting at the new harbour will be directional and dimmable to minimise the spillage of light into non-operational areas.

In conclusion, no adverse effects on Atlantic salmon and FWPM host populations will occur as a result of visual disturbances. Lighting at the new harbour will be dimmable to mitigate light spillage at night and during peak upstream movements of these species. No adverse effect on site integrity will therefore occur.

In-combination Visual Disturbance Effects

No in-combination effects with other projects at the European Offshore Wind Deployment Centre, Kincardine offshore wind farm and the Aberdeen Harbour dredging have been identified.

6.3.1.2 Otter (*Lutra lutra*)

To assess use of the site by otters from the River Dee SAC, an otter survey was undertaken in November 2014 (ES Appendix 11-D Otter Survey November 2014). From the evidence gathered during the survey, it was established that otters use both Girdle Ness and Greg Ness headlands, with spraints and feeding signs identified within these two areas suggesting that otter use the site for feeding and commuting. The spraints recorded were old, suggesting that otter do not frequently use the area; however, neither actual frequency nor pattern of otter activity was established during the survey.

A summary of the potential impacts of the project and effects on otter can be viewed in Table 6.3. The EIA findings are discussed below and a summary of the findings, including an assessment of the effect of the project on the integrity of the SAC and its conservation objectives, can be viewed in Table 6.5.

Table 6.3: Potential impacts and effects on otter of the River Dee SAC

Impact and Source	Nature of Impact on Receptor (Effect)
Introduction of harbour infrastructure and quays (operation)	Permanent net loss of habitat
Capital and maintenance dredging of inner basin, eastern berth and approach channel (construction and operation): • Seabed disturbance • Increased SSC	Permanent net loss of habitat Reduced prey availability
Reduced water chemical quality (construction and operation): • Accidental spills from vessels during construction and operation • Accidental spills from on-site storage of fuels and chemicals	Avoidance Temporary loss of habitat Reduced prey availability Mortality (in severe cases)
Seabed disturbances (construction and operation): • Capital dredging • Maintenance dredging • Seabed scour and changes to coastal processes • Increased turbidity and siltation	
Increased noise and vibration (construction and operation): • Drilling, piling, dredging, blasting activities • Increased vessel movements	Temporary/permanent disturbance
Visual (construction and operation): • Presence of vessels and onshore plant • Artificial lighting	Permanent disturbance

Net Loss of Habitat

Although the proposed development will reduce the availability of foraging habitat for otter, the number of otter using the site is low. It is considered possible that otter using the site will likely be commuting across Nigg Bay from the River Dee SAC. Given the low level of activity recorded, loss of habitat is not considered to be significant as there are large areas of alternative foraging habitat in the wider area. It is considered that, over time, otter would become habituated to the activity associated with the new harbour.

No specific resting places or holts were identified during the survey and although long grass could provide temporary couches and shelter, the site is frequented by dog walkers and recreational walkers, and therefore this is considered unlikely.

From the low level of activity recorded from the targeted otter survey, it is considered likely that the site forms part of a single territory. The proposed development will reduce the availability of foraging habitat which may lead to the loss of the territory. However, with alternative foraging habitat abundant in the wider area, it is likely that any territory would alter naturally according to food sources, depending on alternative foraging availability in the River Dee.

The following mitigation measures are also to be implemented during the construction phase (ES Chapter 11: Terrestrial Ecology):

- Lights at the compound should be hooded and face onto the site, away from the shoreline;

- Soil materials stockpiled in the site for an extended period of time should be inspected weekly to ensure no mammal burrows are present;
- Any trenches/excavations should be fenced off to prevent otter from entering them;
- Proposed planting schemes as discussed in the EMMP, where appropriate would provide more cover for otter moving through the site.

Following mitigation, there is therefore anticipated to be no adverse effect on site integrity due to habitat loss.

Reduced Prey Availability

Given the availability of suitable foraging habitat in the wider area, the effect of reduced prey availability is not significant and will cause no adverse effect on site integrity.

Accidental Spills

Accidental spillage or release of chemicals into the environment such as fuel, oil and lubricants from vessels during construction and operation could potentially contaminate the marine environment, leading to a reduction in water quality. Similarly, accidental spills from on-site storage of fuels and chemicals and use of anti-fouling chemicals on ship hulls may lead to a reduction in water quality.

During construction and operation, vessel traffic will be slow moving and predictable for safety and operational reasons, therefore it is unlikely that the vessels will pose risk of collision and therefore oil/chemical release. Furthermore, on-site storage of fuels and chemicals will follow relevant guidance and bunds will be in place around storage areas at all times.

However, in the event of an accident where toxic chemicals are released into the marine environment, emergency procedures will be in place to minimise the environmental effects as much as possible. For example, vessels and quaysides will be equipped with oil spill kits to enable containment and treatment of oil spills. It is also likely that any accidental spillage or release would be dispersed and diluted quickly by tidal currents and wave action.

Given the field signs found during the targeted surveys (presence of spraints and feeding signs), it is considered that any reduction in water quality as a result of accidental spills from vessels would result in a temporary, minor adverse effect. However, with alternative foraging habitat abundant in the wider area, it is likely that otter feeding behaviour/activity would alter naturally according to food sources, and therefore there will be no adverse effect on site integrity as a result of reduced water quality.

Increased Noise and Vibration

Disturbance in the form of increased noise, vibration, lighting and visual disturbance is likely to affect foraging and commuting behaviour. Given the field signs found during the targeted surveys, (evidence of feeding and commuting), it is considered that construction of the proposed development would result in a temporary, minor adverse effect. However, with alternative foraging habitat abundant in the wider area, it is likely that otter would alter naturally according to food sources, and effects of increased noise and vibration on otter will have no adverse effect on site integrity.

Visual Disturbance

It is considered that otter using the site would become habituated to the new activities associated with the harbour development. The following mitigation measures are to be implemented during the construction phase (ES Chapter 11: Terrestrial Ecology):

- Lights at the compound should be hooded and face onto the site, away from the shoreline;
- Proposed planting schemes as discussed in the EMMP, where appropriate would provide more cover for otter moving through the site.

Following mitigation, any effects on otter will have no adverse effect on-site integrity.

In-combination Effects

The maximum otter foraging range is 5 km; therefore no in-combination effects are anticipated for otter. It can be concluded that, in place of agreed mitigation outlined above, there will be no significant adverse effects either singly or in-combination with other plans or projects on otter and any effects identified will have no adverse effect on site integrity.

6.3.1.3 Summary of Effects on the River Dee SAC

Table 6.4: Summary of effects on the River Dee SAC (Salmon and Freshwater pearl mussel)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	Underwater noise and vibration	Mortality, startle reaction and avoidance	Underwater noise may modify salmon behaviour at the mouth of the River Dee and thus may represent a barrier to individuals of salmon and FWPM hosts entering and/or leaving the River Dee This may result in delays to the migration of adults and smolts with possible consequences for the viability of and disturbance of individuals of these species	Construction design. Hammer piling during the day and vibration piling by night during sensitive periods	No
Drilling				None	No
Blasting				None	No
Dredging and disposal of dredged material	Underwater noise and vibration	Mortality, startle reaction and avoidance		None	No
	Increased physical seabed disturbance	Seabed habitat disturbances	Disturbance to the seabed may result in reduced prey availability. However effects on migrating salmonids are thus anticipated to be negligible and any significant indirect effects on freshwater pearl mussel populations are therefore not forecast		
		Increased SSC	Raised SSCs will be generated as a result of the action of the dredging tool on the seabed. Salmon and other FWPM host species are expected to avoid areas where very high SSCs will occur at the point of disturbance for the duration of the construction		
Dredging and disposal of dredged material	Underwater noise and vibration	Deposition of sediment plumes	A temporary increase in sediment deposition on the seafloor will occur as a result of the settlement of sediment plumes that have been raised by capital dredging operations		
		Temporary release of sediment contaminants	Surface sediment contaminants within the EIA marine boundary are not considered a danger to the environment if disposed of at sea		
Note: * As discussed within ES Chapter 26 EMMP					

Table 6.4: Summary of effects on the River Dee SAC (Salmon and Freshwater pearl mussel) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Releases of chemicals such as fuel, oil and lubricants into the marine environment during construction have the potential to be harmful to marine life. Mobile fish and shellfish species would avoid significantly affected areas and would return once conditions improve. Less mobile species such as the permanent residents and juvenile components of the seasonal residents receptor groups, may experience high mortalities	Development of, and adherence to, an EMMP*.	No
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	There will be a permanent net loss of seabed habitat in Nigg Bay as a result of the installation of the new quays, lay down areas and breakwaters	None	No
		Changes to the hydrodynamic regime	Changes in water levels could change the availability of the intertidal habitats and associated shallow pools that remain within Nigg Bay following construction which in turn may temporarily affect foraging and refuge behaviours during particular states of the tide for the permanent fish and shellfish residents		
		Introduction of new seabed habitats	New hard seabed and mid-water habitats will be created by the placement of the new quays, associated lay down areas, and installation of breakwaters and associated scour protection material. These structures will become a permanent feature. The addition of seabed infrastructure will act to increase the structural complexity of the existing habitats and will introduce new hard substrate		

Note:
* As discussed within ES Chapter 26 EMMP

Table 6.4: Summary of effects on the River Dee SAC (Salmon and Freshwater pearl mussel) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Retention of pollutants entering Nigg Bay	Water quality changes	Reduction in water quality within the harbour during the operational phase of the scheme. This will occur gradually due to the continued wastewater discharges from diffuse and point sources into the bay and the reduced flushing capacity of the operational harbour compared to the baseline conditions in Nigg Bay, causing an overall build-up of contaminant levels within the harbour	None	No
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC	Seabed disturbances relating to propeller wash have the potential to occur every time a vessel enters or leaves the harbour	None	No
	Vessel noise	Avoidance due to increased vessel noise and presence	There is a forecast increase in vessel traffic and associated noise due to the new harbour once operational, however it is unlikely to significantly affect fish and shellfish ecology given the current levels of current shipping activity within the locale	None	No
	Transport of species	Introduction of harmful species	Vessels using the operational harbour, as well as those involved in its initial construction, can for example, act as vectors for the introduction of various marine species via attachment to hulls or in ballast waters	Development of, and adherence to, an EMMP*.	No

Note:
* As discussed within ES Chapter 26 EMMP

Table 6.4: Summary of effects on the River Dee SAC (Salmon and Freshwater pearl mussel) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Maintenance dredging and disposal of dredged material	Underwater noise and vibration	Mortality, startle reaction and avoidance	Underwater noise may modify salmon behaviour at the mouth of the River Dee and thus may represent a barrier to individuals of salmon and FWPM hosts entering and/or leaving the River Dee This may result in delays to the migration of adults and smolts with possible consequences for the viability of and disturbance of individuals of these species	None	No
	Increased physical seabed disturbance	Seabed habitat disturbances Increased SSC Deposition of sediment plumes Temporary release of sediment contaminants	Ongoing maintenance dredging within the harbour and entrance channel will increase SSCs, increase local sediment deposition and lower the seabed to 9.0 m and 10.5 m below CD	None	No
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	Changes to ambient light conditions may occur as a result of: (i) The installation of artificial lighting around the new harbour, including navigational lights; (ii) Shading from new buildings and structures.	None	No
Note: * As discussed within ES Chapter 26 EMMP					

Table 6.5: Summary of effects on the River Dee SAC (Otter)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling, drilling and blasting	Noise, vibration, lighting and visual	Disturbance to feeding/commuting behaviour	Disturbance in the form of increased noise, vibration, lighting and visual is likely to affect feeding and commuting otter within the Site	Otter Protection Plan included in the EMMP*. It is recommended that any further surveys are undertaken pre-construction. Appropriate best practice measures including: • Lights at the compound should be hooded and face onto the site and away from the shoreline; • Soil materials stockpiled in the site for an extended period of time would be inspected weekly to ensure no mammal burrows are present; • Construction compounds and Site works (including trenches/excavations) would be fenced off to prevent otter for entering them, any trenches/excavations would have escape ramps provided in case otter fall in; • Proposed planting schemes as discussed in the HCMP, where appropriate would provide more cover for otter moving through the site.	No
Operation					
Operational activities such as: Vessel and plant movements, maintenance dredging and disposal of dredged material, safety or navigational lighting or shading from buildings or over-water structures.	Permanently increased levels of human activity, traffic, Increased levels of night time lighting that may impact patterns of animal use within adjacent habitats.	Disturbance.	Otters in the short time are likely to avoid the area, but may become habituated over time to the port operation.	None.	No
Note: * As discussed within Chapter 26 EMMP					

6.3.2 Moray Firth SAC

Bottlenose dolphin is an Annex II species and a primary reason for the designation of the Moray Firth SAC, which is located 160 km from the proposed development. The proposed development has been identified as having a LSE (Section 5.1.1.2) on the species and therefore requires that an Appropriate Assessment is undertaken by the competent authority.

SNH, in its scoping opinion responses, identified the following potential causes of LSE on bottlenose dolphin:

- Noise and vibration impacts – from dredging, piling, drilling and blasting, and from construction and traffic movements – primarily construction
- Reduced water quality – including increased suspended solids and reduced dissolved oxygen from piling and dredging, and possible release of contaminants – construction and operation
- Timing and duration of work – construction
- Lighting – construction and operation
- Physical disturbance – for example injury from collision with vessels – construction and operation
- Indirect effects of prey availability – construction and operation.

This is in line with the SNH Regulation 33 advice published for the Moray Firth SAC (SNH, 2006).

Further information on bottlenose dolphins is presented within ES Chapter 15: Marine Mammals. The conservation objectives for the SAC can be viewed in Table 6.6. Those objectives concerned with on-site Annex I habitat Sandbanks which are slightly covered by sea water all the time are not considered further in this appraisal as no LSE on this feature has been identified.

Table 6.6: Moray Firth SAC conservation objectives

Site Information	Details
Site Designation – Qualifying Species and Features	**Annex II species (primary reason for site selection):** • Bottlenose dolphin (*Tursiops truncatus*)
Site Conservation Objectives	To avoid deterioration of the qualifying habitat thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying habitat that the following are maintained in the long term: • Extent of the habitat on site • Distribution of the habitat within site • Structure and function of the habitat • Processes supporting the habitat • Distribution of typical species of the habitat • Viability of typical species as components of the habitat • No significant disturbance of typical species of the habitat To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying species that the following are established then 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
Site Condition and Date of Assessment	Bottlenose dolphin – favourable recovered (21/09/10)

6.3.2.1 Bottlenose Dolphin (*Tursiops truncatus*)

The Moray Firth population is considered to be one of two semi-resident UK populations of the species, the other being located in Cardigan Bay, Wales (JNCC, 2013; JNCC, 2015; Culloch and Robinson, 2008). Bottlenose dolphins are encountered along the east coast of Scotland in waters less than 20 m depth and within 2 km of the coast line, but are also frequently observed in offshore waters (Clarkin and McMullan, 2015). It is thought that nearly 200 dolphins make up the east coast population between the Moray Firth and Fife, with known differences in site fidelity and ranging behaviour within this population (Thompson et al., 2011; Cheney et al., 2013; Quick et al., 2014). This is clearly indicated by the latest Article 17 report published by the JNCC (2013) which states that, '*the population of bottlenose dolphins off the east coast of Scotland is highly mobile*'. However, it is worth noting that Quick et al. (2014) found that females show a significantly higher '*probability of presence within the Moray Firth SAC than males, and males appear to move between areas more frequently than females*'. SNH (2006) state that while, '*the dolphins range widely in the Moray Firth, they appear to favour particular areas and the marine SAC is a core part of the animals' range*'. This is in agreement with the JNCC (2013) which states that '*although the bottlenose dolphins have expanded their range beyond the Moray Firth SAC during the 1990s, the area of the SAC continues to be important for them*'. In addition, the report goes on to say

that recent, '*monitoring suggests that despite interannual variability, the number of dolphins using the SAC between 1990 and 2010 has remained stable*' and that the '*site continues to be used year round*' (JNCC, 2013; Cheney et al, 2012; Thompson et al., 2011).

The bottlenose dolphins in the Aberdeen area form part of the east coast of Scotland population. In 2012 to 2013 60% of the total Scottish east coast bottlenose dolphin population was using the area between Aberdeen and the Firth of Forth (Quick et al., 2014). The JNCC (2013) state that 64% of the Scottish east coast bottlenose dolphin population are known to utilise the Moray Firth site (Cheney et al, 2012).

Detailed site specific vantage point (VP) survey data drawn from observations from four coastal sites over 1 year (June 2014 to May 2015) (ES Chapter 15: Marine Mammals) identified bottlenose dolphin as present within Nigg Bay at distances between 100 km and 1,000 km in all months with the exception of July, August and November. Figure 6.2 presents the numbers of bottlenose dolphin observations per month.

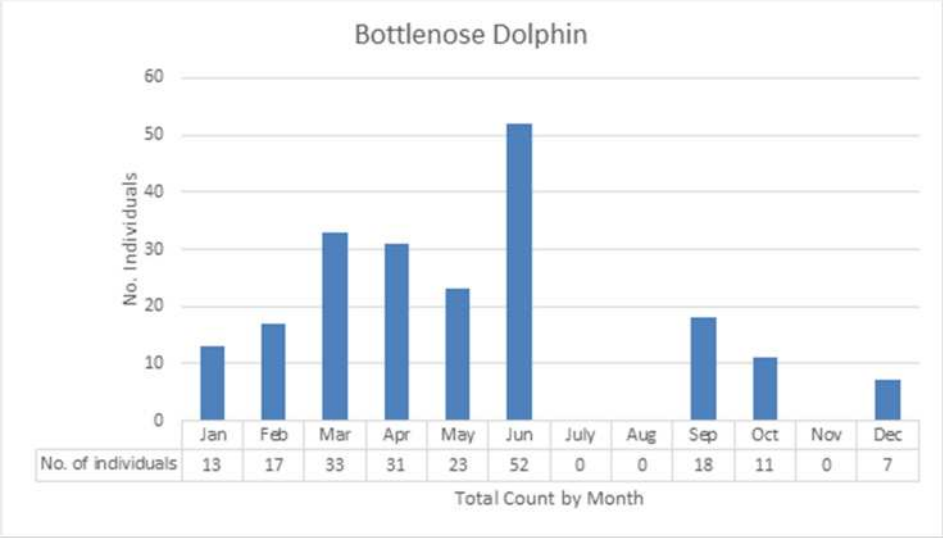

Figure 6.2: Numbers of individuals recorded by season for bottlenose dolphin in Nigg Bay

To supplement the coastal observational data, two C-PODS were repeatedly deployed to detect marine mammal presence within and around Nigg Bay. A total of five deployments were made through 2014 and 2015 as summarised below:

- Deployment 1: August to October 2014;
- Deployment 2: November 2014 to February 2015;
- Deployment 3: February to April 2015;
- Deployment 4: April to June 2015;
- Deployment 5: June to August 2015.

Data from these deployments showed that dolphins (the majority of which were assumed to be bottlenose dolphin from the VP data) were present 56.5% of all days, 5.15% of all hours and 0.4% of all minutes.

The EIA findings are discussed below and a summary of the findings, including an assessment of the effect of the project on the integrity of the SAC and its conservation objectives, can be viewed in Table 6.7.

Increased Underwater Noise

Underwater noise from percussive piling has been predicted to have potential significant adverse effects on bottlenose dolphin (ES Chapter 15: Marine Mammals). Mathematical modelling (ES Technical Appendix 13-B: Underwater Noise Impact Study) predicts that underwater noise will cause injury to bottlenose dolphin out to a range of 651 m. Cumulative noise metrics have shown that this activity has the potential to cause auditory injury at distances up to 210 m, whilst temporary hearing damage, or temporary threshold shift (TTS) may occur at distances up to 3150 m. The ES also predicts low level disturbance resulting in potential behavioural modification to a range of 49.2 km although the disturbance levels of most concern (associated with the Level B-Harassment) are predicted to occur up to 10.5 km.

Mitigation to avoid injury and mortality to marine mammals during percussive piling events is presented in the ES (ES Chapter 15: Marine Mammals). This includes the use of Marine Mammal Observers (MMOs) prior to and during percussive piling to detect bottlenose dolphin presence and to delay the activity until the marine mammal is out of the immediate area of potential injury. In addition to the use of MMOs, a slow start over 40 minutes, where practical, will ensure that bottlenose dolphin will have sufficient time to move out of the wider area of predicted injury before the onset of full piling with maximum energy. The 40 minute time period is double the minimum guideline provided by the JNCC and is highly precautionary.

ES Chapter 15: Marine Mammals presents both the use of MMOs and a soft start procedure over 40 minutes as adequate mitigation for potential injury and mortality effects of percussion piling on bottlenose dolphin. With these measures in place, marine mammals will be beyond these impact ranges before full piling commences whilst a stop procedure will be in place in the event that bottlenose dolphins return to the area of operation before full piling starts. The ES proposes that MMO observations should be undertaken over a range of 1 km to cover the predicted range for auditory injury for bottlenose dolphin and for other marine mammals including seals. Commitment by the project to these measures can be secured through appropriate conditioning with the consent licence and further secured through EPS licencing. Securing and agreeing mitigation measures will be discussed in collaboration with the statutory authorities and with reference to the appropriate JNCC guidance.

Whilst mitigation can be applied to remove injury and mortality to bottlenose dolphin, it is acknowledged that mitigation for potential adverse displacement and/or low level disturbance effects is not possible. As well as the percussive piling activity discussed above, dredging, drilling and blasting is also forecast to result in underwater noise at levels indicative of disturbance and which could cause displacement of bottlenose dolphin out of Nigg Bay for the duration of the respective activity.

Whilst each individual ‘noisy’ activity is expected to be intermittent and short lived, it is assumed that activities will be broadly undertaken simultaneously or consecutively so that there will be little, if any, quiescent periods during the 3 year construction period during which bottlenose dolphin may return to

Nigg Bay to resume feeding and foraging. As a precaution therefore, bottlenose dolphin is assumed to be displaced from the immediate Nigg Bay area during the construction phase.

The modelling used in the assessment (ES Chapter 15: Marine Mammals) does not account for background noise, habituation or local geography. This means that behavioural modification up to 49.2 km, as predicted by the modelling, is not considered likely to occur. This is because the low-level disturbance criterion used in the assessment is set at 140 dB re 1 µPa, and the Level B-Harassment criterion is set at 160 dB re 1 µPa. Background noise levels in Aberdeen (and within the river Dee itself) have been reported to be high, mainly from shipping, in the region of 118-149 dB re 1µPa mms over a frequency bandwidth of 10 Hz to 10 kHz (Evans, Anderwald and Hepworth, 2008). Therefore, baseline conditions exceed the threshold level for the Low-level Disturbance criterion and are within 11 dB re 1 µPa of the Level B-Harassment criterion. It is therefore likely that individuals of bottlenose dolphin using Aberdeen Harbour are habituated to the prevailing noise conditions indicative of low level disturbance such that displacement over the entire 49.2 km range will not occur. Note also that the Level B-Harassment criterion relates to sound pressure levels which are not considered injurious to the animal. The use of such a criterion in an impact assessment can therefore be deemed precautionary given the high background noise from nearby vessel activity in Aberdeen harbour (ES Appendix 13-B: Underwater Noise Impact Study (Kongsberg, 2015)).

Beyond Nigg Bay, the most significant potential disturbance to bottlenose dolphin will arise from the percussive piling. The TTS impact range from piling is predicted to overlap the entrance to Aberdeen Harbour where bottlenose dolphin feeding is focused. Therefore in addition to an almost permanent exclusion form Nigg Bay itself, bottlenose dolphin are expected to be disturbed and displaced from this local important feeding location. Note that the piling will only be undertaken over a 23 month period and will be intermittent during this time. Furthermore, there is mitigation already proposed for Atlantic salmon and human receptors in the ES (ES Chapter 13: Fish and Shellfish Ecology) which would further restrict percussive piling during night time hours and on Sundays, further protecting bottlenose dolphin using this location for feeding. The local geography may also moderate predicted impacts of percussive piling over those presented in the ES. For instance, the model does not take account of the rocky promontory at Girdle Ness which may attenuate underwater noise at the entrance to Aberdeen Harbour so that the actual noise levels here would be less than those modelled. The degree to which underwater noise from piling at the entrance to Aberdeen Harbour would be reduced compared to modelled results is not known and so as a precaution, displacement of individuals is assumed. As a worse case therefore, adverse underwater noise effects on bottlenose dolphin at the entrance to Aberdeen Harbour will be occasional and short lived and will result in interrupted feeding of individuals. Individuals may have intermittent access to the entrance of Aberdeen Harbour during periods when no percussive piling occurs.

Displaced bottlenose dolphins are known to be able to use other compensation areas for foraging to minimise exposure to construction Lusseau (2013). This however, may be at some energetic cost to the individuals involved and any success of relocation may depend on the quality of the food resources available and the environmental conditions present during their transit to, and arrival at, the compensation site. Although the movement range of bottlenose dolphin is very large (between the Moray Firth and Firth of Forth) the distribution of individuals within that range is uneven with individuals concentrating around local ‘hotspots’ of preferred feeding locations. It is expected that individuals will have greater reliance on adjacent hotspots, such as Stonehaven and Montrose, to compensate for the

loss of Nigg Bay and intermittent access to the entrance to Aberdeen Harbour. The population of bottlenose dolphin is known to be expanding along the east coast of Scotland and appears to be able to exploit new areas over recent years.

Overall, the consequences of the permanent loss of Nigg Bay and only intermittent access to the entrance of Aberdeen Harbour over 23 month on the population are not known. Predictions may be further confounded through the interaction of the sub-components of the population and their respective contributions to population status. For instance, Lusseau (2013) predicted a slight population decline (3 % to 5 %) in the Moray Firth population over the 5 year to 6 year construction period of the Beatrice and Moray Firth offshore wind farms together with the ports at Nigg (Cromarty Firth) and Invergordon. However, when the interactions with components of the wider population that exist outside of the Moray Firth are taken into account then recovery of the population was forecast by the end of this period.

In light of the current uncertainties, additional mitigation over and above that already discussed has been proposed in the ES (ES Chapter 15: Marine Mammals). This includes the use of bubble curtains, or other techniques, within practical means, to reduce the predicted underwater noise levels from piling at Nigg Bay entering the marine environment. Sufficient noise attenuation will ensure that the local hotspot of feeding at the entrance to Aberdeen Harbour will remain available throughout the construction period for use as compensation for any displacement from Nigg Bay. Other local feeding hotspots along the east coast of Scotland and within the range movement of bottlenose dolphin will remain unaffected although there may be greater reliance on these areas. Therefore in the place of mitigation, there will be no significant adverse displacement effects on the distribution or viability of the bottlenose dolphin population and no adverse effect on site integrity.

Note also that the entrance to Aberdeen Harbour may be within the Girdle Ness noise shadow of piling at Nigg Bay, such that predicted noise impacts may not occur. Furthermore, the final construction design has not yet been determined. Construction (partial or otherwise) of the breakwaters may also further attenuate underwater sound further protecting bottlenose dolphin at the entrance to Aberdeen Harbour and local environs. Final mitigation will be designed and agreed in collaboration with the statutory agencies.

<u>In-combination Effects (Increased Underwater Noise)</u>

In-combination effects of underwater noise and displacement have been considered with regard the EOWDC and Kincardine offshore floating wind farm. The offshore wind farm and port construction projects in the Moray Firth and Forth and Tay are over 100 km away (ES Chapter 5: Environmental Impact Assessment Process; Table 6.1) and so noise impacts will not spatially overlap. They are nonetheless within the footprint of range movement of bottlenose dolphin.

Aberdeen Offshore Wind Limited (2011) predicts behavioural avoidance of bottlenose dolphin to piling at the EOWDC within a range of 8.5 km. Some possible overlap of noise impact ranges with those arising from the current project could therefore occur in the event that these projects are undertaken simultaneously. However, avoidance of the EOWDC will only occur during the piling activities and as such will be limited to a maximum of 24 hours per pile (Aberdeen Offshore Wind Limited, 2011). As only eleven foundations are planned at the EOWDC, total avoidance over the entire construction period will only occur.

Conclusion (Increased Underwater Noise)

Bottlenose dolphin will be displaced from Nigg Bay during the construction as a result of adverse noise from 'noisy' activities. The value of the bay as a feeding resource during the operational phase will be reduced due to the forecast reduction in the numbers of seasonal and permanent fish and shellfish residents. Nigg Bay is very small in the context of the wide range movement of the SAC bottlenose dolphin population and other preferred feeding locations including Stonehaven and Montrose will remain unaffected. With mitigation, or through final construction design, the preferred feeding location at the entrance to Aberdeen Harbour will also remain unaffected as compensatory feeding habitat. In conclusion, displacement from Nigg Bay will have no adverse effect on site integrity either alone or in-combination with other local plans and projects with regard to bottlenose dolphin.

Increased Vessel Traffic and Collision Risk

Bottlenose dolphins are present year round in the Aberdeen Harbour area and coexist with high vessel traffic; therefore they will have developed a level of existing habituation. These dolphins have been observed to continue partaking in playful activity, do nothing, or to move out of the area temporarily during large vessel transits. Therefore, these dolphins do appear to have developed a level of existing habituation. There will be an increase in vessel presence and movements during construction and operation. Based on observations of bottlenose dolphins at Aberdeen Harbour and the available literature (ES Chapter 15: Marine Mammals), the bottlenose dolphins are known to co-exist with high vessel traffic in an extremely busy harbour environment.

If foraging within the Nigg Bay area, the reduction in foraging time caused by repeated vessel transits is not considered to be sufficient to cause a significant reduction in an individual's energy intake, due to the short-term nature of each vessel transit. Individuals have been shown to recommence foraging as the boat moves away following the disturbance event (Pirotta et al., 2015). It is also important to consider that vessels will be moving along a predicable route, mostly at slow speeds, which will likely be perceived as less of a threat. Whilst subtle changes in the activity budget have the potential to translate into reduced energy intake (Pirotta et al., 2015), there is extensive foraging habitat available in adjacent waters away from the routes used by vessels, and if an individual was to suffer from a reduction in energy intake due to a reduction in foraging time, although unlikely, they could make the trade-off decision to move into an area of adjacent foraging habitat.

Vessel traffic will be slow moving and predictable for safety and operational reasons on approach to and leaving the harbour and therefore it is likely that the vessels will pose little risk of collision to marine mammals. Given the lack of significant effects at site level, any significant in-combination effects with other local plans and projects are not forecast.

Conclusion (Increased Vessel Traffic and Collision Risk)

In summary, no adverse effect on site integrity is predicted due to increased vessel traffic either alone or in-combination with regard to bottlenose dolphin.

6.3.2.2 Summary of Effects on the Moray Firth SAC

Table 6.7: Summary of effects on the Moray Firth SAC (Bottlenose dolphin)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	Increased levels of underwater noise	Underwater noise leading to mortality, permanent or temporary injury or avoidance	The potential effects relating to lethality, injury and behavioural changes are a result of piling impacts that will be intermittent and temporary on bottlenose dolphin individuals	Where practical, vibropiling to be used instead of percussive piling; Percussive piling during day-time only. Percussive piling restricted to the hours of 7 am to 7 pm Monday and Friday, 9 am and 4 pm on Saturdays, no percussive piling on Sundays. If vibropiling is conducted at night, PAM is to be used for mitigation zone monitoring; Use of MMOs and 1 km buffer, which will form part of a Marine Mammal Mitigation Protocol (MMMP* developed in consultation with the relevant statutory authorities); Soft-start procedures over a duration of 40 minutes to displace individuals from areas where injury may occur; and Bubble curtains / resonance cages, foam sheeting or mattresses to be investigated to establish their suitability and effectiveness in reducing propagation of underwater noise	No
Drilling	Increased levels of underwater noise	Underwater noise leading to mortality, permanent or temporary injury or avoidance	The potential effects relating to lethality, injury and behavioural changes are a result of drilling impacts that will be intermittent and temporary on bottlenose dolphin individuals	MMO is deployed for all drilling activities, with a minimum of a 500 m mitigation zone.	No
Note: * As discussed within Chapter 26 EMMP					

Table 6.7: Summary of effects on the Moray Firth SAC (Bottlenose dolphin) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Blasting	Increased levels of underwater noise	Underwater noise leading to mortality, permanent or temporary injury or avoidance	Contained blasting is to be undertaken on occasions during the construction phase of the Development, thus having the potential to create underwater noise. Body weight of an individual also affects the range at which certain effects will be received by a receptor	MMOs, PAM and a mitigation zone. The size of the mitigation zone should be a minimum of 1 km. The mitigation zone will be agreed with the statutory nature conservation bodies in the development of the MMMP*. Adherence to JNCC blasting guidance (JNCC, 2010c)	No
Dredging and disposal of dredged material	Increased levels of underwater noise	Underwater noise leading to mortality, permanent or temporary injury or avoidance	The noise created during dredging activities such as a draghead being moved across the seabed and material placed onto the seabed can elicit physiological and behavioural effects on marine mammals	MMOs, PAM monitoring and a 500 m mitigation zone (for capital dredging)	No
	Increased physical seabed disturbance	Increased SSC leading to impairment of ability to forage and temporary displacement from habitat	Increases in suspended sediment concentrations (SSCs) will occur as a result of the action of the dredger draghead or the backhoe dredging tool on the seabed, and also from any overspill from the dredger hopper, and dredge disposal	None	
		Increase in bioavailability of sediment contaminants	When sediment is disturbed there is potential for any contaminants contained within it to be released. Significant increases in the bio-availability of sediment contaminants are not anticipated to occur		

Note:
* As discussed within Chapter 26 EMMP

Table 6.7: Summary of effects on the Moray Firth SAC (Bottlenose dolphin) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Construction vessel and plant activities	Increased vessel movements	Disturbance due to visual impacts/movements	During construction activities there will be an increase in vessel numbers at the Site and this may cause disturbance to bottlenose dolphin activity in the area such as foraging	Vessel routing plan. Vessel management plan. Aberdeen Harbour Dolphin Code	No
	Collision between dolphin and vessels (hull impacts)	Mortality or physical injury due to collisions with vessel hulls or propellers	There will be an intermittent increase in the number of vessels in the area, due to the presence of construction vessels. There is therefore the potential for an intermittent increased risk of collisions between marine mammals in the area and vessels	Vessel routing plan. Vessel management plan. Aberdeen Harbour Dolphin Code	No
	Accidental spills	Water quality changes Interaction of pollutants with marine mammals following accidental spills	Potentially toxic and harmful substances to marine mammals may be released into the surrounding environments of the proposed development if an accidental spill or release of a toxic substance, such as diesel, oil, cement or sewage was to occur from construction vessels	EMMP* (this can also be undertaken for operational activities)	No
All construction activities	Changes in prey resource	Reduction in prey species for marine mammals and lessening of foraging ability	Construction impacts have the potential to cause localised reductions in the abundance of fish prey items	None	No
Note: * As discussed within Chapter 26 EMMP					

Table 6.7: Summary of effects on the Moray Firth SAC (Bottlenose dolphin) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Reduction in extent of foraging habitat	There will be a permanent net loss of 140,985 m^2 of subtidal habitat from the existing 563,869.34 m^2 of subtidal habitat within the development boundary. The presence of the physical structures will occupy the entire water column, therefore also reducing the pelagic habitat	Post-construction monitoring	No
	Retention of pollutants entering Nigg Bay	Water quality changes- reduction of flushing of pollutants and increased residence times	Mathematical modelling forecasts a reduction in water quality within the harbour during the operational phase of the scheme. Water quality will reduce gradually due to the retentive properties and reduced flushing capacity of the harbour compared to baseline conditions in Nigg Bay and to the continued presence of wastewater discharges into the bay	None	No
Vessel movements	Collision between dolphins and vessels	Mortality of physical injury	There will be an increase in vessel movements due to new vessel traffic. The impact will be permanent and intermittent, and will occur throughout the operation of the Development	Vessel routing plan. Vessel management plan. Aberdeen Harbour Dolphin Code.	No
	Vessel noise	Avoidance due to increased vessel noise and presence	Potential impact will occur over a long time-frame for the duration of the operation and maintenance of the development. There will be an increase from the baseline	Vessel routing plan. Vessel management plan. Aberdeen Harbour Dolphin Code.	No
Note: * As discussed within Chapter 26 EMMP					

Table 6.7: Summary of effects on the Moray Firth SAC (Bottlenose dolphin) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Vessel movements	Increased vessel traffic	Disturbance due to visual impacts/movements	Potential impact will occur over a long time-frame for the duration of the operation and maintenance of the development. There will be an increase from the baseline	Vessel routing plan. Vessel management plan. Aberdeen Harbour Dolphin Code.	No
Maintenance dredging and disposal of dredged material	Increased physical seabed disturbance	Increased SSC leading to impairment of ability to forage and temporary displacement from habitat	Increases in suspended sediment concentrations (SSCs) will occur as a result of the action of the dredger draghead or the backhoe dredging tool on the seabed, and also from any overspill from the dredger hopper, and dredge disposal	None	No
All operational activities	Changes in prey resource	Reduction in prey species for marine mammals and lessening of foraging ability	Construction impacts have the potential to cause localised reductions in the abundance of prey items	None	No
Note: * As discussed within Chapter 26 EMMP					

6.3.3 Isle of May SAC

Grey seal is a designated feature of the Isle of May SAC, which is located 110 km from the proposed development and so likely significant effects on SAC site integrity will refer to the interaction between designated grey seal and the impacts arising from the scheme which will occur outside of the SAC boundaries. No direct effects on habitat and species interests within the SAC boundary will occur.

The conservation objectives for the SAC can be viewed in Table 6.8. Detailed information on grey seal together with evidence as to their spatial and temporal distribution within and around the proposed development area is presented in the Environmental Statement (ES) Chapter 15: Marine Mammals. The following describes the likely interactions arising from the Nigg Bay proposals on grey seals and appraises any likely significant effects on SAC site integrity with regard to grey seal.

Table 6.8: Isle of May SAC conservation objectives

Site Information	Details
Site Designation – Qualifying Species and Features	**Annex II species (primary reason for site selection):** • Grey seal (*Halichoerus grypus*)
Site Conservation Objectives	To avoid deterioration of the qualifying habitat thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying habitat that the following are maintained in the long term: • Extent of the habitat on site • Distribution of the habitat within site • Structure and function of the habitat • Processes supporting the habitat • Distribution of typical species of the habitat • Viability of typical species as components of the habitat • No significant disturbance of typical species of the habitat To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying species that the following are established then 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
Site Condition and Date of Assessment	Grey seal – favourable maintained (14/11/09)

SNH, in its scoping opinion responses, identified the following potential causes of LSE on grey seal:

- Noise and vibration impacts – from dredging, piling, drilling and blasting, and from construction and traffic movements – primarily construction;

- Reduced water quality – including increased suspended solids and reduced dissolved oxygen from piling and dredging, and possible release of contaminants – construction and operation
- Timing and duration of work – construction;
- Physical disturbance – for example injury from collision with vessels – construction and operation.

6.3.3.1 Grey Seal (*Halichoerus grypus*)

Grey seals are present at a moderate density along the east coast of Scotland, and are present in particularly high densities in and around the Firth of Forth and north-east England (Jones et al., 2013) where the Isle of May SAC is located, with large breeding colonies present. Several grey seal haul out sites are also located along the east coast of Aberdeenshire at the mouths of the river Don and Ythan, Peterhead Harbour, Catterline, Boddam and Cruden Bay.

Site specific vantage point surveys (ES Technical Appendix 15-A: Baseline Distribution of Marine Mammals Using Integrated Passive Acoustic and Visual Data for Nigg Bay) were conducted each month over 1 year. Grey seal individuals were observed each month through the annual observation period at distances between 100 m and 1 km from the shore, although what proportion of these are associated with the Isle of May SAC population are not known.

SNH were consulted and asked to provide advice regarding connectivity between the seal colonies in the SAC and the proposed development. SNH advised that the distance at which there is considered to be connectivity is 20 km for grey seals during the breeding season. The two nearest grey seal SACs are more than 100 km from Nigg Bay. Outwith the breeding season, a precautionary foraging range of 145 km has been considered based on Thompson et al. (1996); however, SCOS (2013) notes that the species will typically forage within 100 km from a haul-out site, but can feed up to several hundred kilometres offshore. Therefore, only two designations for grey seal within the reported foraging range of 145 km have been considered within screening (Isle of May SAC and Berwickshire and North Northumberland Coast SAC), as seals from more distant SACs would only be expected to be present within the area on very rare occasions and would likely be limited to single individuals.

To better understand connectivity with the Isle of May SAC (and other SACs within the region) site specific analysis of historic seal telemetry was undertaken (see Technical Appendix 15-B: Seal telemetry analysis). This included the tracking of adult grey seals and pups that had been tagged within SAC boundaries and at other locations outside of SACs. Results showed that only eight seals tagged within the boundaries of the Isle of May SAC had entered the wider Nigg Bay study area sometime between 1997 and 2010. Three of the eight individuals recorded 17.2 %, 10.2 % and 7.2 % of their telemetry-derived locations within the study area respectively, whilst the remaining five individuals recorded values between 0.5 % and 4.8 %. Current evidence therefore points to a connectivity between the Nigg Bay study area and the Isle of May SAC but that attendance is rare (less than one seal per year) and of short duration.

Analysis of the tracks of all tagged seals (Technical Appendix 15-B: Seal Telemetry Analysis) showed that adult grey seals transit along the coast, passing just offshore of the Nigg Bay development, while grey seal pups tend to spend most of their time at Newburgh or Stonehaven with no apparent focus of activity or use at Nigg Bay (Figure 4.1).

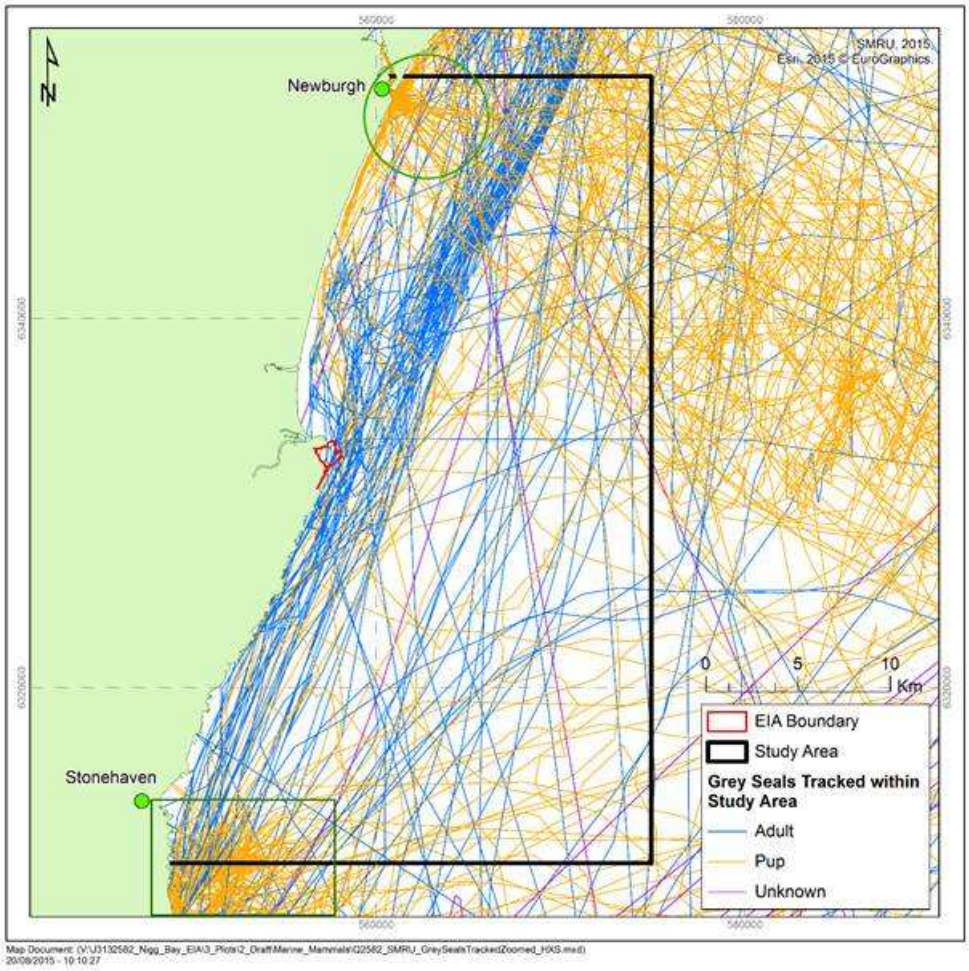

Figure 6.3: All grey seal tracks within the study area

(Figure reproduced from ES Technical Appendix 15-B)

The construction and operation of the port at Nigg Bay is forecast to result in a localised reduction in seasonal and permanent fish and shellfish species within the Nigg embayment. However, given the apparent low attendance of individuals of the Isle of May SAC grey seal population, no significant loss of feeding resource is forecast. Also, the area lost is negligible in comparison to the coastal and offshore foraging habitat available along the Scottish east coast within their natural range movement. Sandeel and Atlantic salmon populations over the wider area are not predicted to be significantly affected in the place of mitigation. Significant adverse effects on seal population distribution and viability are not therefore forecast.

A deterioration in water quality is predicted to occur (ES Technical Appendix 7-B: Water Quality Modelling Assessment) but will be highly localised to the operational harbour and is similarly not forecast to significantly affect the distribution and viability of the Isle of May grey seal population. Development of and adherence to an Environmental Management and Monitoring Plan (EMMP), including pollution prevention and contingency plans, would significantly reduce the likelihood of accidental spills of harmful substances in to the marine environment by controlling the storage and handling of potential pollutants.

Underwater Noise

The construction of the harbour includes a range of 'noisy' activities including piling, drilling, blasting of rock seabed and dredging. All of these activities will be intermittent but are assumed to run either simultaneously or concurrently through the 3 year construction period with little, if any, quiescent periods. Each activity will generate levels of adverse underwater noise over different spatial scales. The most significant noise producing activity will be the percussive piling.

Mathematical modelling of the impacts of underwater noise (ES Technical Appendix 13-B: Underwater Noise Impacts Study) predicted a range of 246 m within which permanent damage to grey seal will occur due to percussive piling. Accounting for cumulative noise and assuming a 186 dB re 1 μPa^2s criterion then permanent damage (expressed as the cumulative permanent threshold shift (PTS)) increases to 2,490 m around each piling event. The effects of all other noise producing activities will be within this range.

Mitigation to avoid injury and mortality to bottlenose dolphin is already described (see above) and includes the use of a soft start procedure to piling to ensure sensitive species are out of the area prior to full piling. Marine mammal observers (MMOs) together with the deployment of passive acoustic monitoring (PAM) devices will also be used and will ensure that no marine mammals are within the immediate area prior to the onset of each piling, blasting, drilling and dredging event. It is acknowledged that PAM will not detect seals at night. However, in place of further mitigation measure proposed for Atlantic salmon and human receptors, there will be no percussive piling at night. Thus percussive piling will only be undertaken during daylight hours during which MMOs will be able to observe seals.

The low attendance of Isle of May SAC grey seals within the wider study area suggests a low risk of significant interaction with any adverse impacts arising from the project and the application of the suggested mitigation provides further protection. On consent of the project, an application for a European Protected Species (EPS) licence will need to be made.

The final construction design has not yet been determined. The presence of the breakwaters (partial or otherwise) will cause some attenuation of the underwater noise. As such, the predicted impact ranges of adverse noise may be considerable less than those assessed here.

In-combination Effects Underwater Noise

In-combination effects of underwater noise and displacement have been considered with regard the EOWDC and Kincardine offshore floating wind farm. The offshore wind farm and port construction projects in the Moray Firth and Forth and Tay are over 100 km away (ES Chapter 5: Environmental Impact Assessment Process) and so noise impacts will not spatially overlap. They are nonetheless within the footprint of range movement of grey seal.

Grey seals passing though the Nigg Bay area to or from the Isle of May SAC are likely to also pass through areas close to other wind farm sites. In-combination displacement effects may therefore occur in the event of simultaneous construction. Grey seal pass through the Nigg Bay area with little or no apparent reliance on local resources or habitats although they would be expected to undertake feeding and foraging activity. Any displacement from the Nigg Bay area during construction will therefore have little or negligible adverse consequences for the Isle of May SAC population and is unlikely to contribute

to significant in-combination displacement effects. Soft start procedures and the application of MMOs at respective construction projects will ensure that no injury or mortality to individuals of grey seal will occur.

Aberdeen Offshore Wind Limited (2011) predicts behavioural avoidance of bottlenose dolphin to piling at the EOWDC within a range of 9.6 km. Temporary auditory damage (TTS) from percussive piling at Nigg Bay, and resulting in avoidance, or interruption of foraging, feeding and migration in grey seals, is predicted to occur within distances of > 10 km.

Some possible overlap of noise impact ranges from EOWDC with those arising from the current project could therefore occur in the event that these projects are undertaken simultaneously. However, avoidance of the EOWDC construction site will only occur during the piling activities and as such will be limited to a maximum of 24 hours per pile (Aberdeen Offshore Wind Limited, 2011). As only eleven foundations are planned at the EOWDC, total avoidance over the entire construction period will only occur over a very short period (maximum 11 days). Avoidance behaviour is also expected to be reversible in that grey seal behaviour will revert to the baseline situation on completion of the installation. Grey seals will also be likely to be in transit and so displacement would have negligible consequences other than interruption to feeding and foraging. Because of the very short duration and reversibility of the predicted avoidance behaviour, their transitory nature and the mitigation proposed, no significant in-combination effects with the current project at Nigg Bay will occur.

The introduction of underwater noise from the construction of any of the other projects located within the footprint of range movement could result in the displacement of individuals of grey seal from preferred habitat in-combination with their displacement from Nigg Bay. However, with mitigation in place, or with further protection afforded by the final construction design at Nigg Bay, grey seal will not be significantly affected by adverse noise arising from the current construction. Consequently, no in-combination effects are considered likely and no adverse effect on SAC site integrity will occur with regard to grey seal.

Conclusion Underwater Noise

The limited use of Nigg Bay and surrounding areas and their transitory nature through the wider region means that any effects of displacement on grey seals during construction will be negligible. Nigg Bay is very small in the context of the wide range movement of the SAC grey seal population. With mitigation, or through final construction design, ‘noisy’ activities will not result in any injury or mortality. Any displacement from Nigg Bay is not forecast to have any significant adverse effect on site integrity either alone or in-combination with other local plans and projects with regard to grey seal. No adverse effect on site integrity will therefore occur with regards to grey seal.

Increased Vessel Traffic and Collision Risk

Grey seal are present year-round in the Aberdeen Harbour area and co-exist with the high vessel traffic, therefore these individuals are unlikely to avoid the development area due to an existing level of habituation. SAC individuals are unlikely to be present within the area of highest vessel concentration, and will be subjected to less disturbance than those individuals which are regularly present in the area.

Vessel traffic will be slow moving and predictable for safety and operational reasons on approach to and leaving the harbour and therefore it is likely that the vessels will pose little risk of collision to marine mammals. Given the lack of significant effects at site level, any significant in-combination effects with other local plans and projects are not forecast.

In respect of corkscrew injuries, SMRU (Thompson et al., 2015) have recently observed, reported and documented detailed visual observations of adult grey seal predation upon weaned grey seal pups on the Isle of May. Thompson et al. (2015) have concluded that it is likely that all of the reported corkscrew cases at the Isle of May since 2010 were caused by grey seal predation. Although it would be premature to disregard propeller interactions as a cause of some corkscrew injuries, grey seal predation could be the cause of the majority of corkscrew mortalities seen in UK waters. Thompson et al. (2015) concluded that the characteristics of the corkscrew wounds seen around the UK in other locations are of such similarity, that a proportion of these can be concluded to have been a result of grey seal predation events. In light of these observations, and in conjunction with slow vessel speeds and the short-term avoidance responses, the effect is considered to be negligible and not significant.

Conclusion (Increased Vessel Traffic and Collision Risk)

No adverse effect on the integrity of the SAC is predicted due to increased vessel traffic either alone or in-combination with regard to grey seal.

6.3.3.2 Summary of Effects on the Isle of May SAC

Table 6.9: Summary of effects on the Isle of May SAC (Grey seal)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	Increased levels of underwater noise	Underwater noise leading to mortality, permanent or temporary injury or avoidance.	The potential effects relating to lethality, injury and behavioural changes are a result of piling impacts that will be intermittent and temporary on grey seal individuals	Where practical, vibropiling to be used instead of percussive piling; Percussive piling during day-time only. Percussive piling restricted to the hours of 7 am to 7 pm Monday and Friday, 9 am and 4 pm on Saturdays, no percussive piling on Sundays. If vibropiling is conducted at night, PAM is to be used for mitigation zone monitoring; Use of MMOs and 1 km buffer, which will form part of a Marine Mammal Mitigation Protocol (MMMP* developed in consultation with the relevant statutory authorities); Soft-start procedures over a duration of 40 minutes to displace individuals from areas where injury may occur; and Bubble curtains / resonance cages, foam sheeting or mattresses to be investigated to establish their suitability and effectiveness in reducing propagation of underwater noise	No
Drilling	Increased levels of underwater noise	Underwater noise leading to mortality, permanent or temporary injury or avoidance.	The potential effects relating to lethality, injury and behavioural changes are a result of drilling impacts that will be intermittent and temporary on grey seal individuals	MMO is deployed for all drilling activities, with a minimum of a 500 m mitigation zone	No
Note * As discussed within Chapter 26 EMMP					

Table 6.9: Summary of effects on the Isle of May SAC (Grey seal) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Blasting	Increased levels of underwater noise	Underwater noise leading to mortality, permanent or temporary injury or avoidance.	Contained blasting is to be undertaken on occasions during the construction phase of the Development, thus having the potential to create underwater noise. Body weight of an individual also affects the range at which certain effects will be received by a receptor	MMOs, PAM and a mitigation zone. The size of the mitigation zone should be a minimum of 1 km. The mitigation zone will be agreed with the statutory nature conservation bodies in the development of the MMMP	No
Dredging and disposal of dredged material	Increased levels of underwater noise	Underwater noise leading to mortality, permanent or temporary injury or avoidance.	The noise created during dredging activities such as a draghead being moved across the seabed and material placed onto the seabed can elicit physiological and behavioural effects on marine mammals	None	No
	Increased physical seabed disturbance	Increased SSC leading to impairment of ability to forage and temporary displacement from habitat	Increases in suspended sediment concentrations (SSCs) will occur as a result of the action of the dredger draghead or the backhoe dredging tool on the seabed, and also from any overspill from the dredger hopper, and dredge disposal		
		Increase in bioavailability of sediment contaminants	When sediment is disturbed there is potential for any contaminants contained within it to be released. Significant increases in the bio-availability of sediment contaminants are not anticipated to occur		

Note
* As discussed within Chapter 26 EMMP

Table 6.9: Summary of effects on the Isle of May SAC (Grey seal) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Construction vessel and plant activities	Increased vessel movements	Disturbance due to visual impacts/movements	During construction activities there will be an increase in vessel numbers at the Site and this may cause disturbance to grey seal activity in the area such as foraging	Vessel routing plan. Vessel management plan	No
	Collision between grey seals and vessels (hull impacts)	Mortality or physical injury due to collisions with vessel hulls or propellers	There will be an intermittent increase in the number of vessels in the area, due to the presence of construction vessels. There is therefore the potential for an intermittent increased risk of collisions between marine mammals in the area and vessels	Vessel routing plan. Vessel management plan	No
	Propeller (corkscrew) impacts	Mortality or physical injury due to collisions with vessel propellers	Potential propeller impacts include lacerations, resulting in either mortality or injury	Vessel routing plan. Vessel management plan	No
	Accidental spills	Water quality changes Interaction of pollutants with marine mammals following accidental spills	Potentially toxic and harmful substances to marine mammals may be released into the surrounding environments of the proposed development if an accidental spill or release of a toxic substance, such as diesel, oil, cement or sewage was to occur from construction vessels	EMMP* (this can also be undertaken for operational activities)	No
All construction activities	Changes in prey resource	Reduction in prey species for marine mammals and lessening of foraging ability	Construction impacts have the potential to cause localised reductions in the abundance of prey items	None	No
Note * As discussed within Chapter 26 EMMP					

Table 6.9: Summary of effects on the Isle of May SAC (Grey seal) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Reduction in extent of foraging habitat	Removal of the seabed will reduce the size of available foraging area however telemetry data suggests that Nigg Bay is not likely to be a preferred area of foraging habitat for these individuals	Post-construction monitoring	No
	Retention of pollutants entering Nigg Bay	Water quality changes- reduction of flushing of pollutants and increased residence times	Mathematical modelling forecasts a reduction in water quality within the harbour during the operational phase of the scheme. Water quality will reduce gradually due to the retentive properties and reduced flushing capacity of the harbour compared to baseline conditions in Nigg Bay and to the continued presence of wastewater discharges into the bay	None	No
Vessel movements	Collision between grey seal and vessels	Mortality of physical injury	There will be an increase in vessel movements due to new vessel traffic. The impact will be permanent and intermittent, and will occur throughout the operation of the Development	Vessel routing plan. Vessel management plan.	No
	Vessel noise	Avoidance due to increased vessel noise and presence	Potential impact will occur over a long time-frame for the duration of the operation and maintenance of the development. There will be an increase from the baseline	Vessel routing plan. Vessel management plan.	No
Note * As discussed within Chapter 26 EMMP					

Table 6.9: Summary of effects on the Isle of May SAC (Grey seal) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Vessel movements	Increased vessel traffic	Disturbance due to visual impacts/movements	Potential impact will occur over a long time-frame for the duration of the operation and maintenance of the development. There will be an increase from the baseline	Vessel routing plan. Vessel management plan.	No
Maintenance dredging and disposal of dredged material	Increased physical seabed disturbance	Increased SSC leading to impairment of ability to forage and temporary displacement from habitat	Increases in suspended sediment concentrations (SSCs) will occur as a result of the action of the dredger draghead or the backhoe dredging tool on the seabed, and also from any overspill from the dredger hopper, and dredge disposal	None	No
All operational activities	Changes in prey resource	Reduction in prey species for marine mammals and lessening of foraging ability	Construction impacts have the potential to cause localised reductions in the abundance of prey items	None	No
Note * As discussed within Chapter 26 EMMP					

6.3.4 Berwickshire and North Northumberland Coast SAC

Grey seal is a designated feature of the Berwickshire and North Northumberland Coast SAC. The SAC is located 132 km from the proposed development and so likely significant effects on SAC site integrity will refer to the interaction between designated grey seal and the impacts arising firm the scheme which will occur outside of the SAC boundaries. No direct effects on habitat and species interests within the SAC boundary will occur.

SNH, in its scoping opinion responses, identified the following potential effects of the proposed development as reasons for identifying grey seal as subject to LSE:

- Noise and vibration impacts - from dredging, piling, drilling and blasting, and from construction and traffic movements - primarily construction;
- Reduced water quality – including increased suspended solids and reduced dissolved oxygen from piling and dredging, and possible release of contaminants – construction and operation;
- Timing and duration of work – construction;
- Physical disturbance – for example injury from collision with vessels – construction and operation.

The conservation objectives for the SAC can be viewed in Table 6.10. Detailed information on grey seal together with evidence as to their spatial and temporal distribution within and around the proposed development area is presented in ES Chapter 15: Marine Mammals. The following describes the likely interactions arising from the Nigg Bay proposals on grey seals and appraises any likely significant effects on SAC site integrity with regard to grey seal.

Table 6.10: Berwickshire and North Northumberland Coast SAC conservation objectives

Site Information	Details
Site Designation – Qualifying Species and Features	**Annex II species (primary reason for site selection):** • Grey seal (*Halichoerus grypus*)
Site Conservation Objectives	To avoid deterioration of the qualifying habitat thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying habitat that the following are maintained in the long term: • Extent of the habitat on site • Distribution of the habitat within site • Structure and function of the habitat • Processes supporting the habitat • Distribution of typical species of the habitat • Viability of typical species as components of the habitat • No significant disturbance of typical species of the habitat To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying species that the following are established then 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
Site Condition and Date of Assessment	Grey seal – favourable maintained (10/11/09)

6.3.4.1 Grey Seal (*Halichoerus grypus*)

Grey seals are present at a moderate density along the east coast of Scotland, and are present in particularly high densities in and around the Firth of Forth and north-east England (Jones et al., 2013) where the Berwickshire and North Northumberland Coast SACs is located, with large breeding colonies present. Several grey seal haul out sites are also located along the east coast of Aberdeenshire at the mouths of the river Don and Ythan, Peterhead Harbour, Catterline, Boddam and Cruden Bay.

Site specific vantage point surveys (ES Technical Appendix 15-A: Baseline Distribution of Marine Mammals Using Integrated Passive Acoustic and Visual Data for Nigg Bay) were conducted each month over one year. Grey seal individuals were observed each month through the annual observation period at distances between 100 m and 1 km from the shore although what proportion of these are associated with the SAC population are not known.

SNH were consulted and asked to provide advice regarding connectivity between the seal colonies in the SAC and the proposed development. SNH advised that the distance at which there is considered to be connectivity is 20 km for grey seals during the breeding season. The two nearest grey seal SACs are more than 100 km from Nigg Bay. Outwith the breeding season, a precautionary foraging range of 145 km has been considered based on Thompson et al. (1996); however, SCOS (2013) notes that the species will typically forage within 100 km from a haul-out site, but can feed up to several hundred kilometres offshore. Therefore, only two designations for grey seal within the reported foraging range of 145 km have been considered within screening (Isle of May SAC and Berwickshire and North

Northumberland Coast SAC), as seals from more distant SACs would only be expected to be present within the area on very rare occasions and would likely be limited to single individuals.

To better understand connectivity with the Berwickshire and North Northumberland Coast SAC site specific analysis of historic seal telemetry was undertaken (ES Technical Appendix 15-B: Seal Telemetry Analysis). This included the tracking of adult grey seals and pups that had been tagged within SAC boundaries and at other locations outside of SACs. Results showed that a total of four seals tagged within the Berwickshire and Northumberland Coast SAC used the study are during this period. Maximum percentage of telemetry-derived locations within the study area for any of the four seals associated with the Berwickshire and North Northumberland Coast SAC was 1%. Current evidence therefore points to a connectivity between the Nigg Bay study area and the Isle of May SAC but that attendance is rare (less than one seal per year) and sort duration.

Analysis of the tracks of all tagged seals (ES Technical Appendix 15-B: Seal Telemetry Analysis) showed that adult grey seals transit along the coast, passing just offshore of the Nigg Bay development, while grey seal pups tend to spend most of their time at Newburgh or Stonehaven with no apparent focus of activity or use at Nigg Bay (Figure 6.3).

The construction and operation of the port at Nigg Bay is forecast to result in a localised reduction in seasonal and permanent fish and shellfish species within the Nigg embayment. However, given the apparent low attendance of individuals of SAC grey seal populations, no significant loss of feeding resource is forecast. Also, the area lost is negligible in comparison to the coastal and offshore foraging habitat available along the Scottish east coast within their natural range movement. Sandeel and Atlantic salmon populations over the wider area are not predicted to be significantly affected in the place of mitigation. Significant adverse effects on seal population distribution and viability are not therefore forecast.

A deterioration in water quality is predicted to occur (ES Technical Appendix 7-B: Water Quality Modelling Assessment) but will be highly localised to the operational harbour and is similarly not forecast to significantly affect the distribution and viability of the Isle of May grey seal population. Development of, and adherence to, an Environmental Management and Monitoring Plan (EMMP), including pollution prevention and contingency plans, would significantly reduce the likelihood of accidental spills of harmful substances in to the marine environment by controlling the storage and handling of potential pollutants.

Underwater Noise

The construction of the harbour includes a range of 'noisy' activities including piling, drilling, blasting of rock seabed and dredging. All of these activities will be intermittent but are assumed to run either simultaneously or concurrently through the 3 year construction period with little, if any, quiescent periods. Each activity will generate levels of adverse underwater noise over different spatial scales. The most significant noise producing activity will be the percussive piling.

Mathematical modelling of the impacts of underwater noise (ES Technical Appendix 13-B: Underwater Noise Impacts Study) predicted a range of 246 m within which permanent damage to grey seal will occur due to percussive piling. Accounting for cumulative noise and assuming a 186 dB re 1 μPa^2s criterion then permanent damage (expressed as the cumulative permanent threshold shift (PTS)) increases to

2,490 m around each piling event. The effects of all other noise producing activities will be within this range.

Mitigation to avoid injury and mortality to bottlenose dolphin is already described (see above) and includes the use of a soft start procedure to piling to ensure sensitive species are out of the area prior to full piling. Marine mammal observers (MMOs) together with the deployment of passive acoustic monitoring (PAM) devices will also be used and will ensure that no marine mammals are within the immediate area prior to the onset of each piling, blasting, drilling and dredging event. It is acknowledged that PAM will not detect seals at night. However, in place of further mitigation measure proposed for Atlantic salmon and human receptors, there will be no percussive piling at night. Thus percussive piling will only be undertaken during daylight hours during which MMOs will be able to observe seals.

The low attendance of Isle of May SAC grey seals within the wider study area suggests a low risk of significant interaction with any adverse impacts arising from the project and the application of the suggested mitigation provides further protection. On consent of the project, an application for a European Protected Species (EPS) licence will need to be made.

The final construction design has not yet been determined. The presence of the breakwaters (partial or otherwise) will cause some attenuation of the underwater noise. As such, the predicted impact ranges of adverse noise may be considerable less than those assessed here.

In-combination Effects Underwater Noise

In-combination effects of underwater noise and displacement have been considered with regard the EOWDC and Kincardine offshore floating wind farm. The offshore wind farm and port construction projects in the Moray Firth and Forth and Tay are over 100 km away (ES Chapter 5: Environmental Impact Assessment Process) and so noise impacts will not spatially overlap. They are nonetheless within the footprint of range movement of grey seal.

Grey seals passing though the Nigg Bay area to or from the Berwickshire and Northumberland Coast SAC are likely to also pass through areas close to other wind farm sites. In-combination displacement effects may therefore occur in the event of simultaneous construction. Grey seal pass through the Nigg Bay area with little or no apparent reliance on local resources or habitats although they would be expected to undertake feeding and foraging activity. Any displacement from the Nigg Bay area during construction will therefore have little or negligible adverse consequences for the Isle of May SAC population and is unlikely to contribute to significant in-combination displacement effects. Soft start procedures and the application of MMOs at respective construction projects will ensure that no injury or mortality to individuals of grey seal will occur.

Aberdeen Offshore Wind Limited (2011) predicts behavioural avoidance of bottlenose dolphin to piling at the EOWDC within a range of 9.6 km. Temporary auditory damage (TTS) from percussive piling at Nigg Bay, and resulting in avoidance, or interruption of foraging, feeding and migration in grey seals, is predicted to occur within distances of > 10 km.

Some possible overlap of noise impact ranges from EOWDC with those arising from the current project could therefore occur in the event that these projects are undertaken simultaneously. However,

avoidance of the EOWDC construction site will only occur during the piling activities and as such will be limited to a maximum of 24 hours per pile (Aberdeen Offshore Wind Limited, 2011). As only eleven foundations are planned at the EOWDC, total avoidance over the entire construction period will only occur over a very short period (maximum 11 days). Avoidance behaviour is also expected to be reversible in that grey seal behaviour will revert to the baseline situation on completion of the installation. Grey seals will also be likely to be in transit and so displacement would have negligible consequences other than interruption to feeding and foraging. Because of the very short duration and reversibility of the predicted avoidance behaviour, their transitory nature and the mitigation proposed, no significant in-combination effects with the current project at Nigg Bay will occur.

The introduction of underwater noise from the construction of any of the other projects located within the footprint of range movement could result in the displacement of individuals of grey seal from preferred habitat in-combination with their displacement from Nigg Bay. However, with mitigation in place, or with further protection afforded by the final construction design at Nigg Bay, grey seal will not be significantly affected by adverse noise arising from the current construction. Consequently, no in-combination effects are considered likely and no adverse effect on SAC site integrity will occur with regard to grey seal.

Conclusion Underwater Noise

The limited use of Nigg Bay and surrounding areas and their transitory nature through the wider region means that any effects of displacement on grey seals during construction will be negligible. Nigg Bay is very small in the context of the wide range movement of the SAC grey seal population. With mitigation, or through final construction design, noisy activities will not result in any injury or mortality. Any displacement from Nigg Bay is not forecast to have any significant adverse effect on site integrity either alone or in-combination with other local plans and projects with regard to grey seal. No likely significant effects on site integrity will therefore occur with regards to grey seal.

Increased Vessel Traffic and Collision Risk

Grey seal are present year-round in the Aberdeen Harbour area and co-exist with the high vessel traffic, therefore these individuals are unlikely to avoid the development area due to an existing level of habituation. SAC individuals are unlikely to be present within the area of highest vessel concentration, and will be subjected to less disturbance than those individuals which are regularly present in the area.

Vessel traffic will be slow moving and predictable for safety and operational reasons on approach to and leaving the harbour and therefore it is likely that the vessels will pose little risk of collision to marine mammals. Given the lack of significant effects at site level, any significant in-combination effects with other local plans and projects are not forecast.

In respect of corkscrew injuries, SMRU (Thompson et al., 2015) have recently observed, reported and documented detailed visual observations of adult grey seal predation upon weaned grey seal pups on the Isle of May. Thompson et al. (2015) have concluded that it is likely that all of the reported corkscrew cases at the Isle of May since 2010 were caused by grey seal predation. Although it would be premature to disregard propeller interactions as a cause of some corkscrew injuries, grey seal predation could be the cause of the majority of corkscrew mortalities seen in UK waters. Thompson et al. (2015) concluded that the characteristics of the corkscrew wounds seen around the UK in other locations are of such

similarity, that a proportion of these can be concluded to have been a result of grey seal predation events. In light of these observations, and in conjunction with slow vessel speeds and the short-term avoidance responses, the effect is considered to be negligible and not significant.

Conclusion (Increased Vessel Traffic and Collision Risk)

No significant effect on the integrity of the SAC are predicted due to increased vessel traffic either alone or in-combination with regard to grey seal.

6.3.4.2 Summary of Effects on the Berwickshire and North Northumberland Coast SAC

Table 6.11: Summary of effects on the Berwickshire and North Northumberland Coast SAC (Grey seal)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	Increased levels of underwater noise	Underwater noise leading to mortality, permanent or temporary injury or avoidance.	The potential effects relating to lethality, injury and behavioural changes are a result of piling impacts that will be intermittent and temporary on grey seal individuals	Where practical, vibropiling to be used instead of percussive piling; Percussive piling during day-time only. Percussive piling restricted to the hours of 7 am to 7 pm Monday and Friday, 9 am and 4 pm on Saturdays, no percussive piling on Sundays. If vibropiling is conducted at night, PAM is to be used for mitigation zone monitoring; Use of MMOs and 1 km buffer, which will form part of a Marine Mammal Mitigation Protocol (MMMP* developed in consultation with the relevant statutory authorities); Soft-start procedures over a duration of 40 minutes to displace individuals from areas where injury may occur; and Bubble curtains / resonance cages, foam sheeting or mattresses to be investigated to establish their suitability and effectiveness in reducing propagation of underwater noise	No
Drilling	Increased levels of underwater noise	Underwater noise leading to mortality, permanent or temporary injury or avoidance.	The potential effects relating to lethality, injury and behavioural changes are a result of drilling impacts that will be intermittent and temporary on grey seal individuals	MMO is deployed for all drilling activities, with a minimum of a 500 m mitigation zone	No
Note: *As discussed within Chapter 26 EMMP					

Table 6.11: Summary of effects on the Berwickshire and North Northumberland Coast SAC (Grey seal) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Blasting	Increased levels of underwater noise	Underwater noise leading to mortality, permanent or temporary injury or avoidance.	Contained blasting is to be undertaken on occasions during the construction phase of the Development, thus having the potential to create underwater noise. Body weight of an individual also affects the range at which certain effects will be received by a receptor	MMOs, PAM and a mitigation zone. The size of the mitigation zone should be a minimum of 1 km. The mitigation zone will be agreed with the statutory nature conservation bodies in the development of the MMMP	No
Dredging and disposal of dredged material	Increased levels of underwater noise	Underwater noise leading to mortality, permanent or temporary injury or avoidance.	The noise created during dredging activities such as a draghead being moved across the seabed and material placed onto the seabed can elicit physiological and behavioural effects on marine mammals	None	No
	Increased physical seabed disturbance	Increased SSC leading to impairment of ability to forage and temporary displacement from habitat	Increases in suspended sediment concentrations (SSCs) will occur as a result of the action of the dredger draghead or the backhoe dredging tool on the seabed, and also from any overspill from the dredger hopper, and dredge disposal		
		Increase in bioavailability of sediment contaminants	When sediment is disturbed there is potential for any contaminants contained within it to be released. Significant increases in the bio-availability of sediment contaminants are not anticipated to occur		
Note: *As discussed within Chapter 26 EMMP					

Table 6.11: Summary of effects on the Berwickshire and North Northumberland Coast SAC (Grey seal) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Construction vessel and plant activities	Increased vessel movements	Disturbance due to visual impacts/movements	During construction activities there will be an increase in vessel numbers at the Site and this may cause disturbance to grey seal activity in the area such as foraging	Vessel routing plan. Vessel management plan	No
	Collision between grey seals and vessels (hull impacts)	Mortality or physical injury due to collisions with vessel hulls or propellers	There will be an intermittent increase in the number of vessels in the area, due to the presence of construction vessels. There is therefore the potential for an intermittent increased risk of collisions between marine mammals in the area and vessels	Vessel routing plan. Vessel management plan	No
	Propeller (corkscrew) impacts	Mortality or physical injury due to collisions with vessel propellers	Potential propeller impacts include lacerations, resulting in either mortality or injury	Vessel routing plan. Vessel management plan	No
	Accidental spills	Water quality changes Interaction of pollutants with marine mammals following accidental spills	Potentially toxic and harmful substances to marine mammals may be released into the surrounding environments of the proposed development if an accidental spill or release of a toxic substance, such as diesel, oil, cement or sewage was to occur from construction vessels	EMMP* (this can also be undertaken for operational activities)	No
All construction activities	Changes in prey resource	Reduction in prey species for marine mammals and lessening of foraging ability	Construction impacts have the potential to cause localised reductions in the abundance of prey items	None	No
Note: *As discussed within Chapter 26 EMMP					

Table 6.11: Summary of effects on the Berwickshire and North Northumberland Coast SAC (Grey seal) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Reduction in extent of foraging habitat	Removal of the seabed will reduce the size of available foraging area however telemetry data suggests that Nigg Bay is not likely to be a preferred area of foraging habitat for these individuals	Post-construction monitoring	No
	Retention of pollutants entering Nigg Bay	Water quality changes- reduction of flushing of pollutants and increased residence times	Mathematical modelling forecasts a reduction in water quality within the harbour during the operational phase of the scheme. Water quality will reduce gradually due to the retentive properties and reduced flushing capacity of the harbour compared to baseline conditions in Nigg Bay and to the continued presence of wastewater discharges into the bay	None	No
Vessel movements	Collision between grey seal and vessels	Mortality of physical injury	There will be an increase in vessel movements due to new vessel traffic. The impact will be permanent and intermittent, and will occur throughout the operation of the Development	Vessel routing plan. Vessel management plan.	No
	Vessel noise	Avoidance due to increased vessel noise and presence	Potential impact will occur over a long time-frame for the duration of the operation and maintenance of the development. There will be an increase from the baseline	Vessel routing plan. Vessel management plan.	No
Note: *As discussed within Chapter 26 EMMP					

Table 6.11: Summary of effects on the Berwickshire and North Northumberland Coast SAC (Grey seal) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
	Increased vessel traffic	Disturbance due to visual impacts/movements	Potential impact will occur over a long time-frame for the duration of the operation and maintenance of the development. There will be an increase from the baseline	Vessel routing plan. Vessel management plan.	No
Maintenance dredging and disposal of dredged material	Increased physical seabed disturbance	Increased SSC leading to impairment of ability to forage and temporary displacement from habitat	Increases in suspended sediment concentrations (SSCs) will occur as a result of the action of the dredger draghead or the backhoe dredging tool on the seabed, and also from any overspill from the dredger hopper, and dredge disposal	None	No
All operational activities	Changes in prey resource	Reduction in prey species for marine mammals and lessening of foraging ability	Construction impacts have the potential to cause localised reductions in the abundance of prey items	None	No.
Note: *As discussed within Chapter 26 EMMP					

6.3.5 Outer Moray Firth dSAC

Harbour porpoise is a proposed qualifying feature of the Outer Moray Firth dSAC, which is located 32 km from the proposed development. As a draft site, no conservation objectives are currently set. Further information on harbour porpoise is presented within ES Chapter 15: Marine Mammals. No conservation objectives currently exist for the potential draft SAC (dSAC) designation that has been discussed in respect of harbour porpoise. Until the Scottish Ministers issue a decision on the progression of the designation, and until formal conservation objectives are issued, the effect of the project on the integrity of the Outer Moray Firth dSAC cannot be fully assessed. However, a summary of the potential impacts of the project and effects on harbour porpoise can be viewed in Table 6.12 and a summary of the EIA findings can be viewed in Table 6.13.

Table 6.12: Potential impacts and effects on Harbour porpoise of the Outer Moray Firth dSAC

Impact and Source	Nature of Impact on Receptor (Effect)
Introduction of infrastructure on the seabed (breakwaters and quays)	Permanent loss of original habitat and feeding grounds
Reduced water quality: • Accidental spills from vessels/on-site storage of fuels during construction and operation • Sediment disturbance (from dredging and propeller wash) – release of sediment contaminants • Increased contaminants from discharges into harbour	Avoidance Temporary loss of habitat and feeding grounds Mortality (in severe cases)
Seabed disturbance: • Capital dredging • Maintenance dredging • Seabed scour and changes to coastal processes • Increased turbidity, SSCs and siltation	
Increased noise and vibration: • Piling, drilling, dredging, blasting and dredged material disposal activities • Increased vessel noise	Temporary avoidance, physical injury (temporary and permanent), mortality (in severe cases)
Visual disturbance: • Presence and movements of vessels	Temporary/permanent avoidance
Increased collision mortality: • Increased vessel movements	Mortality
The potential impacts associated with construction and operation of the harbour have the potential to result in changes to fish and shellfish communities (i.e. loss of habitat, noise, dredging, changes in water quality and lighting).	Indirect effect: Reduced prey availability

6.3.5.1 Summary of Effects on the Outer Moray Firth dSAC

Table 6.13: Summary of effects on the Outer Moray Firth dSAC (Harbour porpoise)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	Increased levels of underwater noise	Underwater noise leading to mortality, permanent or temporary injury or avoidance	The potential effects relating to lethality, injury and behavioural changes are a result of piling impacts that will be intermittent and temporary on harbour porpoise individuals	Where practical, vibropiling to be used instead of percussive piling; Percussive piling during day-time only. Percussive piling restricted to the hours of 7 am to 7 pm Monday and Friday, 9 am and 4 pm on Saturdays, no percussive piling on Sundays. If vibropiling is conducted at night, PAM is to be used for mitigation zone monitoring; Use of MMOs and 1 km buffer, which will form part of a Marine Mammal Mitigation Protocol (MMMP* developed in consultation with the relevant statutory authorities); Soft-start procedures over a duration of 40 minutes to displace individuals from areas where injury may occur; and Bubble curtains / resonance cages, foam sheeting or mattresses to be investigated to establish their suitability and effectiveness in reducing propagation of underwater noise	N/A
Drilling	Increased levels of underwater noise	Underwater noise leading to mortality, permanent or temporary injury or avoidance	The potential effects relating to lethality, injury and behavioural changes are a result of drilling impacts that will be intermittent and temporary on harbour porpoise individuals	MMO is deployed for all drilling activities, with a minimum of a 500 m mitigation zone.	N/A
Note: *As discussed within Chapter 26 EMMP					

Table 6.13: Summary of effects on the Outer Moray Firth dSAC (Harbour porpoise) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Blasting	Increased levels of underwater noise	Underwater noise leading to mortality, permanent or temporary injury or avoidance	Contained blasting is to be undertaken on occasions during the construction phase of the Development, thus having the potential to create underwater noise. Body weight of an individual also affects the range at which certain effects will be received by a receptor	MMOs, PAM and a mitigation zone. The size of the mitigation zone should be a minimum of 1 km. The mitigation zone will be agreed with the statutory nature conservation bodies in the development of the MMMP*. Adherence to JNCC blasting guidance (JNCC, 2010c)	N/A
Dredging and disposal of dredged material	Underwater noise and vibration	Mortality, permanent/temporary injury or avoidance	The noise created during dredging activities such as a draghead being moved across the seabed and material placed onto the seabed can elicit physiological and behavioural effects on marine mammals	MMOs, PAM monitoring and a 500 m mitigation zone (for capital dredging)	N/A
	Increased physical seabed disturbance	Increased SSC leading to impairment of ability to forage and temporary displacement from habitat	Increases in suspended sediment concentrations (SSCs) will occur as a result of the action of the dredger draghead or the backhoe dredging tool on the seabed, and also from any overspill from the dredger hopper, and dredge disposal		
		Increase in bioavailability of sediment contaminants	When sediment is disturbed there is potential for any contaminants contained within it to be released. Significant increases in the bio-availability of sediment contaminants are not anticipated to occur		
Note: *As discussed within Chapter 26 EMMP					

Table 6.13: Summary of effects on the Outer Moray Firth dSAC (Harbour porpoise) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Construction vessel and plant activities	Increased vessel movements	Disturbance due to visual impacts/movements	During construction activities there will be an increase in vessel numbers at the Site and this may cause disturbance to bottlenose dolphin activity in the area such as foraging	Vessel routing plan. Vessel management plan. Aberdeen Harbour Dolphin Code	N/A
	Collision between harbour seals and vessels (hull impacts)	Mortality or physical injury due to collisions with vessel hulls or propellers	There will be an intermittent increase in the number of vessels in the area, due to the presence of construction vessels. There is therefore the potential for an intermittent increased risk of collisions between marine mammals in the area and vessels	Vessel routing plan. Vessel management plan. Aberdeen Harbour Dolphin Code	N/A
	Accidental spills	Water quality changes Interaction of pollutants with marine mammals following accidental spills	Potentially toxic and harmful substances to marine mammals may be released into the surrounding environments of the proposed development if an accidental spill or release of a toxic substance, such as diesel, oil, cement or sewage was to occur from construction vessels	EMMP* (this can also be undertaken for operational activities)	N/A
All construction activities	Changes in prey resource	Reduction in prey species for marine mammals and lessening of foraging ability	Construction impacts have the potential to cause localised reductions in the abundance of prey items	None	N/A

Note:
*As discussed within Chapter 26 EMMP

Table 6.13: Summary of effects on the Outer Moray Firth dSAC (Harbour porpoise) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Reduction in extent of foraging habitat	Harbour porpoise will likely forage in the area, however Nigg Bay is not recognised as critical foraging habitat for harbour porpoise	Post-construction monitoring	N/A
	Retention of pollutants entering Nigg Bay	Water quality changes- reduction of flushing of pollutants and increased residence times	Mathematical modelling forecasts a reduction in water quality within the harbour during the operational phase of the scheme. Water quality will reduce gradually due to the retentive properties and reduced flushing capacity of the harbour compared to baseline conditions in Nigg Bay and to the continued presence of wastewater discharges into the bay	None	N/A
Vessel movements	Collision between harbour porpoise and vessels	Mortality of physical injury	There will be an increase in vessel movements due to new vessel traffic. The impact will be permanent and intermittent, and will occur throughout the operation of the Development	Vessel routing plan. Vessel management plan. Aberdeen Harbour Dolphin Code.	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Potential impact will occur over a long time-frame for the duration of the operation and maintenance of the development. There will be an increase from the baseline	Vessel routing plan. Vessel management plan. Aberdeen Harbour Dolphin Code.	N/A
Note: *As discussed within Chapter 26 EMMP					

Table 6.13: Summary of effects on the Outer Moray Firth dSAC (Harbour porpoise) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Vessel movements	Increased vessel traffic	Disturbance due to visual impacts/movements	Potential impact will occur over a long time-frame for the duration of the operation and maintenance of the development. There will be an increase from the baseline	Vessel routing plan. Vessel management plan. Aberdeen Harbour Dolphin Code.	N/A
Maintenance dredging and disposal of dredged material	Increased physical seabed disturbance	Increased SSC leading to impairment of ability to forage and temporary displacement from habitat	Increases in suspended sediment concentrations (SSCs) will occur as a result of the action of the dredger draghead or the backhoe dredging tool on the seabed, and also from any overspill from the dredger hopper, and dredge disposal	None	N/A
All operational activities	Changes in prey resource	Reduction in prey species for marine mammals and lessening of foraging ability	Construction impacts have the potential to cause localised reductions in the abundance of prey items	None	N/A
Note: *As discussed within Chapter 26 EMMP					

6.4 Special Protection Areas

6.4.1 Common Ornithological Aspects Relevant to LSE

6.4.1.1 Loss of Habitat

Any loss of habitat poses a potential effect on bird species utilising the area for breeding, roosting and feeding, with many species being site faithful and returning to the same sites year after year. The development will result in a complete and irreversible loss to existing habitat. The loss of habitat will effect birds during all different seasonal uses of the site, from breeding, foraging and to a lesser extent roosting.

Marine birds are among the top predators of the benthos, fish and shellfish populations found within Nigg Bay. During construction, the seabed within the harbour will be dredged to 9 m below CD in the basin and to 10.5 m below CD in the approach channel and eastern quayside. There will be a loss of 212,118 m^2 of seabed habitat within Nigg Bay as a result of the placement of the proposed harbour infrastructure on the seabed.

Birds which are more concentrated in their feeding within the bay are likely to be affected more than birds which range over wider distances. If foraging habitat is lost and there is no ability for prey species to recolonise any new habitat, the area is effectively devoid of any potential food sources for marine birds and the area is unlikely to be able to support the previous foraging population. Regular dredging of the seabed is likely to prevent any recolonisation of this site for seabirds in the future and therefore the effect is assessed as a permanent and irreversible loss in foraging terms.

In-combination Habitat Loss

The EIA identified that habitat loss at the European Offshore Wind Deployment Centre (EOWDC) in Aberdeen Bay may result in an in-combination effect. However, the total footprint of the EOWDC is likely to be minuscule, especially as the foundations of the turbines themselves create a reef effect over time. All other offshore projects are considered to be too far away to have an in-combination effect with the harbour extension project.

6.4.1.2 Reduced Prey Availability

Disturbance to the seabed caused by dredging will result in abrasion and compaction effects on benthic habitats, increased sediment instability and uptake (entrainment) of sessile and sedentary benthic invertebrates via the action of a draghead or backhoe tool on the seabed.

This will result in the displacement, mortality and loss of seabed invertebrate and fish and shellfish which form the primary prey species within the dredging footprint. Birds will be affected by the development to varying degrees according to their use of the bay, as reflected in their seasonality, numbers, feeding and foraging regimes. Whilst some benthic fish and scavenging shellfish, such as crabs, may initially derive some benefit, due to the release of benthic resources within sediment plumes arising from seabed disturbances, this is likely to be very short-lived (hours or days) following each dredging event in any one area. As dredging progresses across the bay over time, an overall incremental reduction in local benthic invertebrate prey availability is expected.

In-combination Reduced Prey Availability

The impacts of reduced prey availability around Nigg Bay will have no in-combination effects with other developments, as the footprint of the development and that of EOWDC are miniscule in comparison to the habitat available in the wider area.

6.4.1.3 Reduced Water Quality

Release of chemicals such as fuel, oil and lubricants into the marine environment during operation of the harbour has the potential to be harmful to marine life. Marine birds have varying degrees of sensitivity to pollutants depending on the proportion of time they spend swimming, the type and quantity of substance entering the marine environment and the dilution and dispersion properties of the receiving waters.

Most oil pollution in the sea is not derived from oil tankers (Hampton et al., 2003) but from general leakage from ships. Even a small spill can have a serious effect upon seabird populations, especially survival during winter (Votier et al., 2005). Oiling rates are highest in species which spend most of the time swimming especially in areas of frequent oil spills such as around shipping lanes (or ports).

The magnitude of this effect on marine bird receptors depends upon the quantities and nature of the spillage/release, the dilution and dispersal properties of the receiving waters and the bio-availability of the spilt contaminant. There will be an increased risk of oil spillage from both the dredging activities during construction and operation and general increased vessels.

Furthermore, in the event of an accidental spill, the nature of the impact would depend on the quantities and nature of the spillage/release, the dilution and dispersal properties of the receiving waters and the bioavailability of the contaminant. The nature and severity of any spill is unquantifiable at this stage. However, development of and adherence to an EMMP, including pollution prevention and contingency plans, would significantly reduce the likelihood of this impact occurring by controlling the storage and handling of potential pollutants and imposing contingency plans thereby reducing or eliminating the risk of such an event occurring.

In-combination Reduced Water Quality

There will be no in-combination effect for reduced water quality with the other offshore developments proposed.

6.4.1.4 Disturbance Due to Construction and Operational Activities

Disturbance and subsequent displacement is relevant to any species present within the footprint of the development and actively using the area for a key phase of their life cycle. Adverse effects of displacement may occur when birds are excluded from breeding, roosting and feeding habitats for significant periods of time. Within the construction phase disturbance may occur due to the following activities:

- Vessel presence (dredgers and construction/support vessels);
- Construction activities (i.e., drilling, pilling, rock placement and general construction of breakwaters and harbour infrastructure);

- Terrestrial activities occurring along the harbour edge.

Cook and Burton (2010) undertook a systematic review of the effects of marine aggregate extraction (and associated shipping) on seabirds and coastal waterbirds (including waders) birds and their supporting habitat and prey. This review has been used to support this HRA with further detail on sensitivities found within ES Chapter 14: Marine Ornithology.

Construction vessels may lead to increased flushing which can result in disturbance and ultimately displacement of bird species which may then result in a temporary loss of habitat, energetic costs associated with unnecessary flight and lowered reproductive output. Some species are typically more sensitive to vessel disturbance and include sea duck, divers, shearwaters, grebes and terns, which have been shown to actively avoid shipping lanes (Kube 1996; Kaiser 2004; Borberg et al., 2005). Overwintering and passage migrant marine bird species may be particularly sensitive to disturbance whilst feeding to maintain energy reserves for transit to breeding and wintering grounds. Any disturbance that requires birds to take flight reduces feeding time and increases energy expenditure.

It is feasible that some species of bird will be positively attracted to the development area, as a result of increased food availability as bottom sediments are stirred up, leading to algal blooms which in turn attract potential prey items of marine bird species (particularly gulls). Increased shipping in itself can attract birds especially if the vessels are slow moving, which is again most typically associated with gull species (Garthe and Hüppop 1999). Indeed, gulls have been shown to be attracted to areas with increased shipping activity (Garthe and Hüppop 1999; Skov and Durinck 2001; Christensen et al., 2003).

In-combination Disturbance due to Construction and Operational Activities

There will be no in-combination effect for disturbance due to construction and operational activities with the other offshore developments proposed.

6.4.1.5 Risk of Collision Mortality

Most bird species will be displaced from the development site once it becomes operational due to loss of habitat and disturbance, so the likelihood that any species will be at risk of a collision with a vessel is extremely unlikely.

Although there will be an increase in the overall number of vessels using the site from the construction phase, a speed limit is likely to be imposed by the AHB within the harbour site, together with the deployment of pilots and tugs, will make it even more unlikely that there will be any collisions with any species of marine bird.

In-combination Collision Mortality

There will be no in-combination effect for collision mortality with the other offshore developments proposed.

6.4.2 Species Specific Aspects Relevant to LSE

6.4.2.1 Eider

Habitat Loss

Eider feed on sedentary prey such as mussels, which are likely to be attached to subsea structures or the seabed, and will concentrate their foraging activity in a narrow area. Therefore the effect of habitat loss is considered to be significant in the immediate vicinity. However, there are alternative habitats suitable for eider in the Aberdeen Bay area and further afield.

With the proposed mitigation of the EMMP and through the use of a vessel routing plan, an area free of disturbance will be created immediately outside of the harbour area. In addition, creation of the southern breakwater will create a shelter belt for eiders to exploit.

Reduced Prey Availability

Eider are likely to be more sensitive than other species to reduced prey availability due to their relative sedentary use of the wider area, spending most of their time swimming (loafing and foraging). However, these effects are localised as Nigg Bay is a very small part of a larger similar habitat along the Aberdeenshire coastline. The effects of reduced prey availability will be localised as there are suitable foraging areas for eider in the Aberdeen Bay area and further afield.

Reduced Water Quality

The impacts of reduced water quality will have no effect on the distribution of eider, as the levels of pollution are unchanged over the wider area. In addition, the disturbance factors from shipping and the loss of seabed habitat are likely to displace most eider from using the harbour during the operational phase and therefore any potential effects from reduced water quality will be reduced or removed altogether.

Disturbance Due to Construction and Operational Activities

Eider are considered highly sensitive to disturbance effects and given their usage of roosting and feeding within Nigg Bay. There is potential for permanent displacement, especially as eider foraging areas are likely to be impaired. However, there is alternative habitat available in the open waters of Aberdeen Bay, the existing harbour and Greyhope Bay, which they currently utilise for feeding and loafing (Genesis, 2012).

Roosting areas for this species overlap with the proposed development footprint and it is expected that effects will arise. However, the creation of the southern breakwater and the adoption of a vessel routing plan as part of an EMMP will create a sheltered area (exclusion zone) outside of the proposed harbour area where commercial vessel movements will be prohibited, thereby creating a suitable roosting habitat for eider.

The impacts of disturbance due to construction and operational activities within the harbour extension will have little effect on eider, as the footprint of the area effected is miniscule in comparison the wider area, and the deployment of mitigation measures referred to above should allow for close co-existence of eider.

Risk of Collision Mortality

Eider could be at risk of collision with vessels either during the construction or operation phase of the harbour extension. During late summer, eider aggregate along the eastern coast of Scotland and undergo a moult which temporarily renders them flightless and therefore potentially vulnerable to collision.

The impacts of collision mortality on the distribution of eider are easily mitigated. During construction, an EMMP will be developed. As part of this there will be co-ordination between MMO/ECoW, Marine Coordinator and guard vessel. Any vessel entering or leaving the development area will be instructed to steer clear of any flocks of sea duck detected. In addition, a vessel routing plan will be developed so that vessels will not be able to enter certain areas of the outer Bay.

During construction and operation there will be a strict speed limit within the confines of the harbour area and the vessel routing plan will be enforced.

6.4.2.2 Redshank

Habitat Loss

Redshanks were observed from the site specific surveys to make use of rocky foreshore and beach area. The inter-tidal zone within the operational new harbour will be lost; however, as a group of birds their dependence on this site is likely to be low, with other suitable habitats available elsewhere along the Aberdeenshire coastline. In addition, creation of breakwaters will provide a suitable high tide roost site.

Reduced Prey Availability

Redshank will be affected by any activity which impacts on the sub-littoral zone for feeding. However, the effect of prey reduction will be localised. The extent of reduced prey availability, as a proportion of this total habitat available, is miniscule and therefore the effect is considered to be not significant.

Reduced Water Quality

The impacts of reduced water quality will have no effect on the distribution of redshank, as the levels of pollution are unchanged over the wider area. In addition, the disturbance factors from shipping and the loss of intertidal habitat are likely to displace most redshank from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether.

Disturbance Due to Construction and Operational Activities

Redshank are known to utilise the existing harbour and thus are tolerant to general shipping activity. As the intertidal area along the northern and western shoreline of the bay with be lost under the quayside when the harbour is operational, these birds will be permanently displaced from this area and may be disturbed from the southern less-developed shoreline as ships come and go from the harbour. However, this area is a small part of a wider area that redshank are able to utilise therefore the effect is considered to be not significant.

In addition, breakwaters will be created which will not be accessible to the general public, and will support the displacement from the rocky foreshore to the breakwaters.

The impacts of disturbance due to construction and operational activities within the harbour extension will have little effect on redshank, as the footprint of the area effected is miniscule in comparison the wider area, and the deployment of mitigation measures referred to above should allow for close co-existence of redshank.

Risk of Collision Mortality

Redshanks like other wading birds are at potential risk of collision with the built environment around the harbour. The direction and brightness of security lighting, as well as lighting from buildings can result in collision with buildings, particularly on moonless nights whilst birds are undergoing migration.

However, the impacts of collision mortality on the distribution of redshank are easily mitigated, with the careful positioning of security lighting and dimmable lights directed landwards.

6.4.2.3 Sandwich Tern

Habitat Loss

Sandwich terns pursue their prey and so forage over a wider area than species which feed on sedentary prey such as molluscs and bivalves. Their dependence on a relatively confined area will be reduced and thus any potential effect of habitat loss in Nigg Bay will be reduced. Sandwich terns are generally present in low numbers and do display some degree of tolerance of human activities as has been witnessed from the data gathered adjacent to the existing harbour operation. In addition, creation of breakwaters will provide a suitable high tide roost site and crèche area for juveniles.

Reduced Prey Availability

During the construction phase there will be a reduction in prey availability which will displace sandwich tern to other areas along the coast; however, the effects of reduced prey availability will be highly localised as Nigg Bay is a very small part of a larger similar habitat along the Aberdeenshire coastline and the extent of reduced prey availability, as a proportion of this total habitat available, is miniscule.

Reduced Water Quality

The impacts of reduced water quality will have no effect on the distribution of sandwich tern, as the levels of pollution are unchanged over the wider area. In addition, the disturbance factors from shipping and the loss of intertidal habitat are likely to displace most sandwich tern from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether. During the operational phase of the new harbour, sandwich tern will be able to utilise the area surrounding the bay as well as along the immediate coastline.

Disturbance Due to Construction and Operational Activities

Sandwich tern are known to avoid shipping lanes but are generally tolerant of shipping activity therefore will be able to still feed in the vicinity of Nigg Bay. However, sandwich tern are an infrequent visitor and this area is a small part of a wider area utilised by sandwich tern, therefore the effect is considered to be not significant.

In addition, breakwaters will be created which will not be accessible to the general public, and will support the displacement from the rocky foreshore to the breakwaters.

Risk of Collision Mortality

Sandwich tern are frequently observed foraging in Nigg Bay, and they are unlikely to either collide with shipping or any built infrastructure including lighting.

6.4.2.4 Common Tern

Habitat Loss

Common terns pursue their prey and so forage over a wider area than species which feed on sedentary prey such as molluscs and bivalves. Their dependence on a relatively confined area will be reduced and thus any potential effect of habitat loss in Nigg Bay will be reduced. Common terns are generally present in low numbers and do display some degree of tolerance of human activities as has been witnessed from the data gathered adjacent to the existing harbour operation. In addition, creation of breakwaters will provide a suitable high tide roost site and crèche area for juveniles.

Reduced Prey Availability

During the construction phase there will be a reduction in prey availability which will displace common tern to other areas along the coast; however the effects of reduced prey availability will be highly localised as Nigg Bay is a very small part of a larger similar habitat along the Aberdeenshire coastline and the extent of reduced prey availability, as a proportion of this total habitat available, is miniscule.

Reduced Water Quality

The disturbance factors from shipping and the loss of seabed habitat are likely to displace common tern from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether. During the operational phase of the new harbour, common tern will be able to utilise the area surrounding the bay as well as along the immediate coastline.

Disturbance Due to Construction and Operational Activities

Common terns are known to avoid shipping lanes but are generally tolerant of shipping activity therefore will be able to still feed in the vicinity of Nigg Bay. However, common tern are an infrequent visitor and this area is a small part of a wider area utilised by common tern, therefore the effect is considered to be not significant.

In addition, breakwaters will be created which will not be accessible to the general public, and will support the displacement from the rocky foreshore to the breakwaters.

The impacts of disturbance due to construction and operational activities within the harbour extension will have little effect on common tern, as the footprint of the area effected is miniscule in comparison the wider area, and the deployment of mitigation measures referred to above should allow for close co-existence of common tern.

Risk of Collision Mortality

Common tern are frequently observed foraging in Nigg Bay, and they are unlikely to either collide with shipping or any built infrastructure including lighting.

6.4.2.5 Fulmar

Habitat Loss

Fulmar breed locally in low numbers on the cliffs to the south of Nigg Bay. Fulmar feed on a varied diet taken from a wide variety of habitats and have the longest measured foraging range of all British seabirds at 400 km (Thaxter et al., 2012). Fulmar have been observed foraging in the outer bay; however, most of their foraging is undertaken further offshore. This would indicate that their dependency on Nigg Bay is limited.

Although fulmar will be displaced from Nigg Bay, the effect is localised as there is suitable alternative habitat for fulmar outside of Nigg Bay. Nigg Bay, as proportion of this total habitat, is small thus the effect is considered to be not significant.

Reduced Prey Availability

Fulmar forage on a wide variety of habitat and have a varied diet. They are mainly surface feeders, although they will dive up to one metre to retrieve fish. The effects of a temporary increase in sediment plumes is considered to be highly localised and therefore the effect is judged to be not significant.

Reduced Water Quality

The disturbance factors from shipping and the loss of seabed habitat are likely to displace fulmar from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether. During the operational phase of the new harbour, fulmar will be able to utilise the area surrounding the bay as well as along the immediate coastline.

Disturbance Due to Construction and Operational Activities

Fulmar are known to be attracted to areas with increased shipping activity and have a low sensitivity, often observed feeding on fish discards from trawling vessels. The effects on fulmar are therefore considered to be not significant.

In addition, breakwaters will be created which will not be accessible to the general public, and will support the displacement from the rocky foreshore to the breakwaters.

The impacts of disturbance due to construction and operational activities within the harbour extension will have little effect on fulmar, as the footprint of the area effected is miniscule in comparison the wider area, and the deployment of mitigation measures referred to above should allow for close co-existence of fulmar.

Risk of Collision Mortality

Fulmar are frequently observed foraging in the outer Nigg Bay area, they are unlikely to either collide with shipping or any built infrastructure including lighting.

6.4.2.6 Razorbill

Habitat Loss

Razorbill forage in the outer areas of Nigg Bay, but are not restricted to feeding in the area, as there are alternative habitats suitable for eider in the Aberdeen Bay area and further afield. Outside of the breeding season they disperse out to sea; therefore the effect is judged to be not significant during this time.

With the proposed mitigation of the EMMP and through the use of a vessel routing plan, an area free of disturbance will be created immediately outside of the harbour area. In addition, creation of the southern breakwater will create a shelter belt for razorbill to exploit.

Reduced Prey Availability

Razorbill are likely to be sensitive to the increases in turbidity and the indirect effects of the deposition of re-suspended sediments which could potentially negatively impact on their food supply (Cook and Burton, 2010) as they require clear water in which to pursue prey. However, the use of Nigg Bay by razorbill as recorded in the VP survey shows that these species tend to forage in the outer areas of the bay thus the effect is therefore judged to be not significant.

Reduced Water Quality

The disturbance factors from shipping and the loss of seabed habitat are likely to displace razorbill from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether. During the operational phase of the new harbour, razorbill will be able to utilise the area surrounding the bay as well as along the immediate coastline.

Disturbance Due to Construction and Operational Activities

Razorbill are regularly recorded in low numbers, diving for small fish. These species are likely to be displaced due the habitat loss referred to above, therefore the likelihood of these species being disturbed by port activities will be reduced and effect is judged to be not significant.

Risk of Collision Mortality

Razorbills undergo their annual moult post breeding, at which stage they are flightless. Most birds will disperse to the open sea, but some birds are observed foraging in the outer bay area. Whilst birds are flightless they are potentially at greater risk of colliding with vessels. Construction vessels pose a potential greater threat than operational vessels, however numbers of birds observed are low and will likely dive to avoid ships. The effect is therefore judged to be negligible and not significant.

6.4.2.7 Guillemot

Habitat Loss

Guillemot forage in the outer areas of Nigg Bay, but are not restricted to feeding in the area. They breed in small numbers on cliffs to the south of the development site. Outside of the breeding season they disperse out to sea. This would indicate that their dependency on Nigg Bay is limited, and therefore the development is not likely to cause significant disturbance

With the proposed mitigation of the EMMP and through the use of a vessel routing plan, an area free of disturbance will be created immediately outside of the harbour area. In addition, creation of the southern breakwater will create a shelter belt for guillemot to exploit.

Reduced Prey Availability

Guillemot are likely to be sensitive to the increases in turbidity and the indirect effects of the deposition of re-suspended sediments which could potentially negatively impact on their food supply (Cook and Burton, 2010), as they require clear water in which to pursue prey. However as a pelagic species able to exploit habitats further offshore, they will generally be less sensitive to localised increases in turbidity as they will be able to forage elsewhere. The use of Nigg Bay by guillemot as recorded in the VP survey shows that these species tend to forage in the outer areas of the bay thus the effect is therefore judged to be not significant.

Reduced Water Quality

The disturbance factors from shipping and the loss of seabed habitat are likely to displace guillemot from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether.

Disturbance Due to Construction and Operational Activities

Guillemot have been seen to feed in the outer areas of the bay, although most will forage further afield therefore effect is judged to be not significant.

With the proposed mitigation of the EMMP and through the use of a vessel routing plan, an area free of disturbance will be created immediately outside of the harbour area. In addition, creation of the southern breakwater will create a shelter belt for guillemot to exploit.

The impacts of disturbance due to construction and operational activities within the harbour extension will have little effect on guillemot, as the footprint of the area effected is miniscule in comparison the wider area, and the deployment of mitigation measures referred to above should allow for close co-existence of the guillemot.

Risk of Collision Mortality

Juvenile guillemots fledge their breeding colonies flightless and are accompanied by the adult male which at the same time undertake their annual moult so they also momentarily lose the ability to fly. Most birds will disperse to the open sea, but some birds are observed foraging in the outer bay area. Whilst birds are flightless they are potentially at greater risk of colliding with vessels. Construction vessels pose a potential greater threat than operational vessels, however numbers of birds observed are low and will be likely to dive to avoid ships. The effect is therefore judged to be negligible and not significant.

6.4.2.8 Kittiwake

Habitat Loss

Gulls tend to have a varied diet taken from a wide variety of habitats therefore are less susceptible to loss of any feeding habitat at Nigg Bay. Kittiwake do roost on the breakwaters of the existing harbour

and it is highly likely that they would exploit a similar habitat created in the new harbour creation of breakwaters will provide a suitable high tide roost site.

Reduced Prey Availability

Kittiwake are more likely to be sensitive to the effects of dredging operations than other gull species as they are more constrained in their choice of prey species (Furness and Tasker., 2000); however, this effect will be highly localised therefore effect is considered to be not significant.

Reduced Water Quality

The disturbance factors from shipping and the loss of seabed habitat are likely to displace kittiwake from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether.

Disturbance Due to Construction and Operational Activities

Kittiwakes are generalist feeders and are able to exploit foraging opportunities from human activities in the locality (for example feeding on fishing industry discards, tip waste, and urban waste). Therefore effect for kittiwake is considered to be not significant.

In addition, breakwaters will be created which will not be accessible to the general public, and will support any displacement from the rocky foreshore.

The impacts of disturbance due to construction and operational activities within the harbour extension will have little effect on kittiwake, as the footprint of the area effected is miniscule in comparison the wider area, and the deployment of mitigation measures referred to above should allow for close co-existence of kittiwake.

Risk of Collision Mortality

Fulmar are frequently observed foraging in the outer Nigg Bay area, they are unlikely to either collide with shipping or any built infrastructure including lighting.

6.4.2.9 Herring Gull

Habitat Loss

Gulls tend to have a varied diet taken from a wide variety of habitats therefore are less susceptible to loss of any feeding habitat at Nigg Bay. A large proportion of their diet is derived from terrestrial sources, and in foraging terms they are not dependent on Nigg Bay; therefore the effect is judged to be not significant. In addition, creation of breakwaters will provide a suitable high tide roost site.

Reduced Prey Availability

As above, gulls tend to have a varied diet taken from a wide variety of habitats therefore are less susceptible to loss of any feeding habitat at Nigg Bay. Birds will be affected by the development to varying degrees according to their use of the bay, as reflected in their seasonality, numbers, feeding and foraging regimes. Herring gulls are typically flexible in their habitat use (Garthe and Hüppop 2004; King et al., 2009), therefore as this effect is localised and considered to be not significant.

Reduced Water Quality

The disturbance factors from shipping and the loss of seabed habitat are likely to displace herring gull from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether.

Disturbance Due to Construction and Operational Activities

Herring gulls are generalist feeders and are able to exploit foraging opportunities from human activities in the locality (for example feeding on fishing industry discards, tip waste, and urban waste), therefore effect for herring gull is considered to be not significant. The impacts of disturbance due to construction and operational activities may displace herring gull locally from Nigg Bay, although there is evidence to the contrary that they may also be attracted to the development.

Risk of Collision Mortality

Herring gull are frequently observed foraging in Nigg Bay, they are unlikely to either collide with shipping or any built infrastructure including lighting.

6.4.2.10 Oystercatcher

Habitat Loss

The inter-tidal zone within the operational new harbour will be lost; however as a group of birds the dependence of oystercatcher on this site is likely to be low, with other suitable habitats available elsewhere along the Aberdeenshire coastline. In addition, creation of breakwaters will provide a suitable high tide roost site.

Reduced Prey Availability

Oystercatcher will be affected by any activity which impacts on the sub-littoral zone for feeding. However, the effect of prey reduction will be localised and therefore the effect is considered to be not significant.

Reduced Water Quality

The disturbance factors from shipping and the loss of seabed habitat are likely to displace oystercatcher from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether.

Disturbance Due to Construction and Operational Activities

Oystercatcher are known to utilise the existing harbour and thus are tolerant to general shipping activity. As the intertidal area along the northern and western shoreline of the bay with be lost under the quayside when the harbour is operational, these birds will be permanently displaced from this area and may be disturbed from the southern less developed shoreline as ships come and go from the harbour. However, this area is a small part of a wider area that these birds are able to utilise therefore the effect is considered to be not significant.

In addition, breakwaters will be created which will not be accessible to the general public, and will support any displacement from the rocky foreshore.

The impacts of disturbance due to construction and operational activities within the harbour extension will have little effect on oystercatcher, as the footprint of the area effected is miniscule in comparison the wider area, and the deployment of mitigation measures referred to above should allow for close co-existence of oystercatcher.

Risk of Collision Mortality

Oystercatcher like other wading birds are at potential risk of collision with the built environment around the harbour. The direction and brightness of security lighting, as well as lighting from buildings can result in collision with buildings, particularly on moonless nights whilst birds are undergoing migration.

However, the impacts of collision mortality on the distribution of oystercatcher are easily mitigated, with the careful positioning of security lighting and dimmable lights directed landwards.

6.4.2.11 Goldeneye

Habitat Loss

Low numbers of goldeneye were recorded in Nigg Bay during late autumn (October/November) with a small flock also recorded in June. Their use of the bay appears to be transitionary, and Nigg Bay does not appear to an important area for them. Effects on goldeneye are considered to be not significant, as this species does not demonstrate the same degree of displacement as other sea ducks.

With the proposed mitigation of the EMMP and through the use of a vessel routing plan, an area free of disturbance will be created immediately outside of the harbour area. In addition, creation of the southern breakwater will create a shelter belt for goldeneye to exploit.

Reduced Prey Availability

Goldeneye are likely to be more sensitive than other species to reduced prey availability due to their relative limited use of the area. Their prey items (mussels and small fish) are similar to that of other species of sea duck; however, their comparative uncommon status in Nigg Bay reduces the significance of any effect at population level. Effect is therefore considered not significant.

Reduced Water Quality

The disturbance factors from shipping and the loss of seabed habitat are likely to displace goldeneye from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether.

Disturbance Due to Construction and Operational Activities

Goldeneye are considered sensitive to disturbance effects and given their usage of Nigg Bay this species has potential for permanent displacement; however, alternative habitat is available in the open waters of Aberdeen Bay. The creation of the southern breakwater and the adoption of a vessel routing plan as part of an EMMP is likely to a create a sheltered area outside of the proposed harbour area where commercial vessel movements would be prohibited, thereby creating a suitable roosting habitat for goldeneye.

The impacts of disturbance due to construction and operational activities within the harbour extension will have little effect on goldeneye, as the footprint of the area effected is miniscule in comparison the wider area, and the deployment of mitigation measures referred to above should allow for close co-existence of the goldeneye.

Risk of Collision Mortality

There is a risk that goldeneye could be at risk of collision with vessels either during the construction or operation phase of the harbour extension. The impacts of collision mortality on the distribution of goldeneye are easily mitigated. During construction an EMMP will be developed. As part of this there will be co-ordination between MMO/ECoW, the Marine Coordinator and the Guard Vessel. Any vessel entering or leaving the development area will be instructed to steer clear of any flocks of sea duck detected. In addition, a vessel routing plan will be developed so that vessels will not be able to enter certain areas of the outer Bay. During construction and operation there will be a strict speed limit within the confines of the harbour area and the vessel routing plan will be enforced.

6.4.2.12 Curlew

Habitat Loss

The inter-tidal zone within the operational new harbour will be lost; however, as a group of birds the dependence of curlew on this site is likely to be low, with other suitable habitats available elsewhere along the Aberdeenshire coastline. In addition, creation of breakwaters will provide a suitable high tide roost site.

Reduced Prey Availability

Curlew will be affected by any activity which impacts on the sub-littoral zone for feeding. However, the effect of prey reduction will be localised and therefore the effect is considered to be not significant. The impacts of reduced prey availability around Nigg Bay will have little effect on curlew, as the footprint of the development is miniscule in comparison to the habitat available in the wider area.

Reduced Water Quality

The disturbance factors from shipping and the loss of seabed habitat are likely to displace curlew from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether.

Disturbance Due to Construction and Operational Activities

Curlew are known to utilise the existing harbour and thus are tolerant to general shipping activity. As the intertidal area along the northern and western shoreline of the bay with be lost under the quayside when the harbour is operational, these birds will be permanently displaced from this area and may be disturbed from the southern less developed shoreline as ships come and go from the harbour. However, this area is a small part of a wider area that these birds are able to utilise therefore the effect is considered to be not significant.

In addition, breakwaters will be created which will not be accessible to the general public, and will support any displacement from the rocky foreshore.

The impacts of disturbance due to construction and operational activities within the harbour extension will have little effect on curlew, as the footprint of the area effected is miniscule in comparison the wider area, and the deployment of mitigation measures referred to above should allow for close co-existence of curlew.

Risk of Collision Mortality

Curlew like other wading birds are at potential risk of collision with the built environment around the harbour. The direction and brightness of security lighting, as well as lighting from buildings can result in collision with buildings, particularly on moonless nights whilst birds are undergoing migration.

However, the impacts of collision mortality on the distribution of redshank are easily mitigated, with the careful positioning of security lighting and dimmable lights directed landwards.

6.4.2.13 Long-tailed Duck

Habitat Loss

Effects on long-tailed duck are considered to be not significant, as this species does not demonstrate the same degree of displacement as other sea ducks.

With the proposed mitigation of the EMMP and through the use of a vessel routing plan, an area free of disturbance will be created immediately outside of the harbour area. In addition, creation of the southern breakwater will create a shelter belt for long-tailed duck to exploit.

Reduced Prey Availability

Long-tailed duck are likely to be more sensitive than other species to reduced prey availability due to their relative sedentary use of the area, spending most of their time swimming (loafing and foraging). However, these effects are localised as Nigg Bay is a very small part of a larger similar habitat along the Aberdeenshire coastline, therefore the effect is considered not significant.

Reduced Water Quality

The disturbance factors from shipping and the loss of seabed habitat are likely to displace long-tailed duck from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether.

Disturbance Due to Construction and Operational Activities

Effects on long-tailed duck are considered to be not significant, as this species does not demonstrate the same degree of displacement as other sea ducks. Alternative habitat is available in the open waters of Aberdeen Bay.

With the proposed mitigation of the EMMP and through the use of a vessel routing plan, an area free of disturbance will be created immediately outside of the harbour area. In addition, creation of the southern breakwater will create a shelter belt for long-tailed duck to exploit.

The impacts of disturbance due to construction and operational activities within the harbour extension will have little effect on long-tailed duck, as the footprint of the area effected is miniscule in comparison

the wider area, and the deployment of mitigation measures referred to above should allow for close co-existence of the long-tailed duck.

Risk of Collision Mortality

There is a risk that long-tailed duck could be at risk of collision with vessels either during the construction or operation phase of the harbour extension. The impacts of collision mortality on the distribution of goldeneye are easily mitigated. During construction an EMMP will be developed. As part of this there will be co-ordination between MMO/ECoW, the Marine Coordinator and the Guard Vessel. Any vessel entering or leaving the development area will be instructed to steer clear of any flocks of sea duck detected. In addition, a vessel routing plan will be developed so that vessels will not be able to enter certain areas of the outer Bay. During construction and operation there will be a strict speed limit within the confines of the harbour area and the vessel routing plan will be enforced.

6.4.2.14 Common Scoter

Habitat Loss

Common scoter feed on sedentary prey such as mussels, which are likely to be attached to subsea structures or the seabed, and will concentrate their foraging activity in a narrow area. Therefore for the more sedentary feeders like common scoter, the effect of habitat loss is considered to be significant.

With the proposed mitigation of the EMMP, an area free of disturbance will be created immediately outside of the harbour area through the use of a vessel routing plan. In addition, creation of the southern breakwater will create a shelter belt for common scoter to exploit.

Reduced Prey Availability

Common scoter are likely to be more sensitive than other species to reduced prey availability due to their relative sedentary use of the area, spending most of their time swimming (loafing and foraging). However, these effects are localised as Nigg Bay is a very small part of a larger similar habitat along the Aberdeenshire coastline, therefore the effect is considered not significant.

Reduced Water Quality

The disturbance factors from shipping and the loss of seabed habitat are likely to displace common scoter from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether.

Disturbance Due to Construction and Operational Activities

Common scoter are considered highly sensitive to disturbance effects and given their usage of Nigg Bay this species has potential for permanent displacement, especially as their foraging areas are likely to be impaired. The effect is therefore judged to be significant. In addition, roosting areas for this species overlap with the proposed development footprint and it is expected that effects will arise.

The creation of the southern breakwater and the adoption of a vessel routing plan as part of an EMMP is likely to a create a sheltered area outside of the proposed harbour area where commercial vessel movements would be prohibited, thereby creating a suitable roosting habitat for common scoter.

The impacts of disturbance due to construction and operational activities within the harbour extension will have little effect on common scoter, as the footprint of the area effected is miniscule in comparison the wider area, and the deployment of mitigation measures referred to above should allow for close co-existence of the common scoter.

Risk of Collision Mortality

There is a risk that common scoter could be at risk of collision with vessels either during the construction or operation phase of the harbour extension. During late summer common scoter aggregate along the eastern coast of Scotland and undergo a moult which temporarily renders then flightless and therefore potentially vulnerable to collision.

The impacts of collision mortality on the distribution of common scoter are easily mitigated. During construction an EMP will be developed. As part of this there will be co-ordination between MMO/ECoW, the Marine Coordinator and the Guard Vessel. Any vessel entering or leaving the development area will be instructed to steer clear of any flocks of sea duck detected. In addition, a vessel routing plan will be developed so that vessels will not be able to enter certain areas of the outer Bay. During construction and operation there will be a strict speed limit within the confines of the harbour area and the vessel routing plan will be enforced.

6.4.2.15 Velvet Scoter

Habitat Loss

Velvet scoter feed on sedentary prey such as mussels, which are likely to be attached to subsea structures or the seabed, and will concentrate their foraging activity in a narrow area. Therefore for the more sedentary feeders like velvet scoter, the effect of habitat loss is considered to be significant.

With the proposed mitigation of the EMMP, an area free of disturbance will be created immediately outside of the harbour area through the use of a vessel routing plan. In addition, creation of the southern breakwater will create a shelter belt for velvet scoter to exploit.

Reduced Prey Availability

Velvet scoter are likely to be more sensitive than other species to reduced prey availability due to their relative sedentary use of the area, spending most of their time swimming (loafing and foraging). However, these effects are localised as Nigg Bay is a very small part of a larger similar habitat along the Aberdeenshire coastline, therefore the effect is considered not significant.

Reduced Water Quality

The disturbance factors from shipping and the loss of seabed habitat are likely to displace velvet scoter from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether.

Disturbance Due to Construction and Operational Activities

Velvet scoter are considered highly sensitive to disturbance effects and given their usage of Nigg Bay this species has potential for permanent displacement, especially as their foraging areas are likely to be

impaired. The effect is therefore judged to be significant. In addition, roosting areas for this species overlap with the proposed development footprint and it is expected that effects will arise.

The creation of the southern breakwater and the adoption of a vessel routing plan as part of an EMMP is likely to a create a sheltered area outside of the proposed harbour area where commercial vessel movements would be prohibited, thereby creating a suitable roosting habitat for velvet scoter.

The impacts of disturbance due to construction and operational activities within the harbour extension will have little effect on velvet scoter, as the footprint of the area effected is miniscule in comparison the wider area, and the deployment of mitigation measures referred to above should allow for close co-existence of the velvet scoter.

Risk of Collision Mortality

There is a risk that velvet scoter could be at risk of collision with vessels either during the construction or operation phase of the harbour extension. During late summer velvet scoter aggregate along the eastern coast of Scotland and undergo a moult which temporarily renders then flightless and therefore potentially vulnerable to collision.

The impacts of collision mortality on the distribution of velvet scoter are easily mitigated. During construction an EMMP will be developed. As part of this there will be co-ordination between MMO/ECoW, the Marine Coordinator and the Guard Vessel. Any vessel entering or leaving the development area will be instructed to steer clear of any flocks of sea duck detected. In addition, a vessel routing plan will be developed so that vessels will not be able to enter certain areas of the outer Bay. During construction and operation there will be a strict speed limit within the confines of the harbour area and the vessel routing plan will be enforced.

6.4.2.16 Gannet

Habitat Loss

Gannet are highly pelagic having a foraging range of 230 km (Thaxter et al 2012). As a species which pursue their prey they will forage over a much wider area, and although they have been observed feeding in the outer Nigg Bay area, their dependence on a relatively confined area will be reduced.

Gannet will be locally disturbed within the vicinity of the development due to loss of habitat loss; however the breeding sites to the south of the development should not be effected. Gannet have one of the largest foraging ranges (Thaxter et al., 2012) so there will be the availability of other habitats. Any effects from habitat loss will be limited, therefore the effect is considered to be not significant.

Reduced Prey Availability

Any increase in turbidity will reduce the visual ability of a number of species who actively pursue their prey in the water by vision, including gannet. As a result water clarity may play an important role in the foraging success of these and other species.

Pelagic species will generally be less sensitive to increases in turbidity as they tend to forage further offshore and over a wider variety of habitat and prey. Gannet for example is a visual foraging diving species but is able to exploit a number of different prey species over a wide foraging range and therefore

the potential loss of foraging opportunities in Nigg Bay will have limited effects on breeding success (Martin 1989; Furness and Tasker 2000; Hamer et al., 2000). This ability to forage widely results in lower sensitivity to prey changes.

Gannet forage on a wide variety of habitat and have a varied diet. They are pursuit feeders, so they will be sensitive to any increased levels in sediment plumes, however these effects are likely to be temporary and localised, and therefore the effect is considered to be not significant.

Reduced Water Quality

The disturbance factors from shipping and the loss of seabed habitat are likely to displace gannet from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether.

Disturbance Due to Construction and Operational Activities

Gannet are known to be attracted to areas with increased shipping activity and have a low sensitivity, often observed feeding on fish discards from trawling vessels. However, the impacts of disturbance due to construction and operational activities may displace gannet locally from Nigg Bay. With the proposed mitigation of the creation of exclusion zones on the outside edge of the breakwaters, these effects are considered to be not significant.

The impacts of disturbance due to construction and operational activities within the harbour extension will have little effect on gannet, as the footprint of the area effected is miniscule in comparison the wider area, and the deployment of mitigation measures referred to above should allow for close co-existence of gannet.

Risk of Collision Mortality

Gannet are frequently observed foraging in the outer Nigg Bay area, they are unlikely to either collide with shipping or any built infrastructure including lighting.

6.4.2.17 Puffin

Habitat Loss

Puffin do not forage in Nigg Bay to the same extent as other auk species, as they tend to feed further offshore. Outside the breeding season they tend to disperse much further afield. Many puffin that breed along the east coast disperse into the Mid-Atlantic Ocean. Therefore the effect is judged to be not significant.

With the proposed mitigation of the EMMP, an area free of disturbance will be created immediately outside of the harbour area through the use of a vessel routing plan. In addition, creation of the southern breakwater will create a shelter belt for puffin to exploit.

Reduced Prey Availability

Puffin are likely to be sensitive to the increases in turbidity and the indirect effects of the deposition of re-suspended sediments which could potentially negatively impact on their food supply (Cook and Burton, 2010), as puffin require clear water in which to pursue prey. However, as identified by the VP survey puffin rarely venture this close to the bay tending to forage further offshore. The potential loss of

foraging opportunities in Nigg Bay have limited effects on breeding success (Martin 1989; Furness and Tasker 2000; Hamer et al., 2000) and the effect is therefore judged to be not significant.

Reduced Water Quality

The disturbance factors from shipping and the loss of seabed habitat are likely to displace puffin from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether.

Disturbance Due to Construction and Operational Activities

Puffins tend to feed further offshore of Nigg Bay and thus likely to be outside of any potential impact. Puffin have been recorded in the VP surveys as primarily using areas beyond the outer areas of the Bay for foraging. However, the impacts of disturbance due to construction and operational activities will displace puffin locally from Nigg Bay.

With proposed mitigation including the EMMP, vessel routing plan, and exclusion zone on the outside of the northern breakwater, this displacement will be to the outer edges of the Bay and the effects are considered to be not significant.

The impacts of disturbance due to construction and operational activities within the harbour extension will have little effect on puffin, as the footprint of the area effected is miniscule in comparison the wider area, and the deployment of mitigation measures referred to above should allow for close co-existence of the puffin.

Risk of Collision Mortality

Construction vessels pose a potential greater threat than operational vessels, however numbers of birds observed are low and will likely dive to avoid ships. The effect is therefore judged to be negligible and not significant.

The impacts of collision mortality on the distribution of puffin are easily mitigated. During construction an EMMP will be developed. As part of this there will be co-ordination between MMO/ECoW, the Marine Coordinator and the Guard Vessel. Any vessel entering or leaving the development area will be instructed to steer clear of any flocks of auk detected. In addition a vessel routing plan will be developed so that vessels will not be able to enter certain areas of the outer Bay area.

6.4.2.18 Lesser-black Backed Gull

Habitat Loss

Lesser black-backed gulls tend to have a varied diet taken from a wide variety of habitats therefore are less susceptible to loss of any feeding habitat at Nigg Bay; therefore the effect is judged to be not significant. In addition, creation of breakwaters will provide a suitable high tide roost site.

Reduced Prey Availability

Lesser black-backed gulls tend to have a varied diet taken from a wide variety of habitats therefore are less susceptible to loss of any feeding habitat at Nigg Bay. A large proportion of their diet is derived from terrestrial sources, and therefore in foraging terms they are not dependent on Nigg Bay, Lesser

black-backed gulls are typically flexible in their habitat use (Garthe and Hüppop 2004; King et al., 2009), therefore as this effect is localised and considered to be not significant.

Reduced Water Quality

Lesser black-backed gulls do not generally utilise the bay for feeding. The disturbance factors from shipping and the loss of seabed habitat are likely to displace those few lesser black-backed gulls from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether. The effect is therefore considered to be not significant.

Disturbance Due to Construction and Operational Activities

Lesser black-backed gulls are generalist feeders and are able to exploit foraging opportunities from human activities in the locality (for example feeding on fishing industry discards, tip waste, and urban waste). Therefore effect for lesser black-backed gull is considered to be not significant.

The impacts of disturbance due to construction and operational activities within the harbour extension will have little effect on lesser black-backed gull, as the footprint of the area effected is miniscule in comparison the wider area, and the deployment of mitigation measures referred to above should allow for close co-existence of lesser black-backed gull.

Risk of Collision Mortality

Lesser black-backed gull are frequently observed foraging in Nigg Bay, and they are unlikely to either collide with shipping or any built infrastructure including lighting.

6.4.2.19 Red-throated Diver

Habitat Loss

Red-throated divers have been recorded both in the VP surveys and the JNCC aerial surveys. In the later, they are present all along Aberdeen Bay, and are more common during spring and autumn migration. They are pursuit feeders similar to terns; however, unlike terns they are likely be excluded from the bay when the harbour is operational due to disturbance.

With the proposed mitigation of the EMMP, an area free of disturbance will be created immediately outside of the harbour area through the use of a vessel routing plan. In addition, creation of the southern breakwater will create a shelter belt for red-throated diver to exploit.

Although this is a permanent displacement, the effect is localised as there is suitable alternative habitat for red-throated diver down the east coast of Scotland. Nigg Bay, as proportion of this total habitat, is small thus the effect is considered to be not significant.

Reduced Prey Availability

Red-throated diver are likely to be more sensitive than other species to reduced prey availability as they tend to be more confined to coastal inshore areas, in addition to their relative sedentary use of a foraging area. However, the effects are localised, as Nigg Bay is a very small part of a larger suitable habitat available to red-throated diver along the Aberdeenshire coastline. The effect is therefore considered to be not significant.

Reduced Water Quality

The disturbance factors from shipping and the loss of seabed habitat are likely to displace red-throated diver from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether.

Disturbance Due to Construction and Operational Activities

Red-throated diver are known to be highly sensitive to disturbance effects. Due to their low tolerance for disturbance, effects on red-throated diver are considered to be significant.

The impacts of disturbance due to construction and operational activities will displace red-throated diver locally from Nigg Bay. With proposed mitigation including the creation of the southern breakwater and the adoption of a vessel routing plan as part of an EMMP is likely to a create a sheltered area outside of the proposed harbour area where commercial vessel movements would be prohibited, thereby creating a suitable habitat for red-throated diver.

The impacts of disturbance due to construction and operational activities within the harbour extension will have little effect on red-throated diver, as the footprint of the area effected is miniscule in comparison the wider area, and the deployment of mitigation measures referred to above should allow for close co-existence of the red-throated diver.

Risk of Collision Mortality

There is a risk that red-throated diver could be at risk of collision with vessels either during the construction or operation phase of the harbour extension. During late summer red-throated diver aggregate along the eastern coast of Scotland.

The impacts of collision mortality on the distribution of red-throated diver are easily mitigated. During construction an EMMP will be developed. As part of this there will be co-ordination between MMO/ECoW, the Marine Coordinator and the Guard Vessel. Any vessel entering or leaving the development area will be instructed to steer clear of any flocks of diver detected. In addition a vessel routing plan will be developed so that vessels will not be able to enter certain areas of the outer Bay area.

6.4.2.20 Ringed Plover

Habitat Loss

The inter-tidal zone within the operational new harbour will be lost; however, as a group of birds the dependence of ringed plover on this site is likely to be low, with other suitable habitats available elsewhere along the Aberdeenshire coastline. In addition, creation of breakwaters will provide a suitable high tide roost site.

Reduced Prey Availability

Ringed plover will be affected by any activity which impacts on the sub-littoral zone for feeding. However, the effect of prey reduction will be localised and therefore the effect is considered to be not significant.

Reduced Water Quality

The disturbance factors from shipping and the loss of seabed habitat are likely to displace ringed plover from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether.

Disturbance Due to Construction and Operational Activities

Ringed plover are known to utilise the existing harbour and thus are tolerant to general shipping activity. As the intertidal area along the northern and western shoreline of the bay with be lost under the quayside when the harbour is operational, these birds will be permanently displaced from this area and may be disturbed from the southern less developed shoreline as ships come and go from the harbour. However, this area is a small part of a wider area that these birds are able to utilise therefore the effect is considered to be not significant.

In addition, breakwaters will be created which will not be accessible to the general public, and will support any displacement from the rocky foreshore.

Risk of Collision Mortality

Ringed plover like other wading birds are at potential risk of collision with the built environment around the harbour. The direction and brightness of security lighting, as well as lighting from buildings can result in collision with buildings, particularly on moonless nights whilst birds are undergoing migration.

However, the impacts of collision mortality on the distribution of ringed plover are easily mitigated, with the careful positioning of security lighting and dimmable lights directed landwards.

6.4.2.21 Turnstone

Habitat Loss

The inter-tidal zone within the operational new harbour will be lost; however, as a group of birds the dependence of turnstone on this site is likely to be low, with other suitable habitats available elsewhere along the Aberdeenshire coastline. In addition, creation of breakwaters will provide a suitable high tide roost site.

Reduced Prey Availability

Turnstone will be affected by any activity which impacts on the sub-littoral zone for feeding. However, the effect of prey reduction will be localised and therefore the effect is considered to be not significant.

Reduced Water Quality

The disturbance factors from shipping and the loss of seabed habitat are likely to displace turnstone from using the harbour during the operational phase and therefore any potential effects from the water quality will be reduced or removed altogether.

Disturbance Due to Construction and Operational Activities

Turnstone are known to utilise the existing harbour and thus are tolerant to general shipping activity. As the intertidal area along the northern and western shoreline of the bay with be lost under the quayside when the harbour is operational, these birds will be permanently displaced from this area and may be

disturbed from the southern less developed shoreline as ships come and go from the harbour. However, this area is a small part of a wider area that these birds are able to utilise therefore the effect is considered to be not significant.

In addition, breakwaters will be created which will not be accessible to the general public, and will support any displacement from the rocky foreshore.

The impacts of disturbance due to construction and operational activities within the harbour extension will have little effect turnstone, as the footprint of the area effected is miniscule in comparison the wider area, and the deployment of mitigation measures referred to above should allow for close co-existence of turnstone.

Risk of Collision Mortality

Turnstone like other wading birds are at potential risk of collision with the built environment around the harbour. The direction and brightness of security lighting, as well as lighting from buildings can result in collision with buildings, particularly on moonless nights whilst birds are undergoing migration.

However, the impacts of collision mortality on the distribution of turnstone are easily mitigated, with the careful positioning of security lighting and dimmable lights directed landwards.

6.4.3 Ythan Estuary, Sands of Forvie and Meikle Loch SPA

Eider, redshank, sandwich tern and common tern are all designated features of the Ythan Estuary, Sands of Forvie and Meikle Loch SPA, which is located 20 km from the proposed development. These species have been identified as having a LSE (Section 5.1.2.2) therefore require further consideration within an Appropriate Assessment.

The conservation objectives for the SPA can be viewed in Table 6.14. Further information on each of these species is presented within ES Chapter 14: Marine Ornithology and a summary of the potential impacts of the project and effects on these bird species can be viewed in Table 6.15. A summary of the EIA findings, including an assessment of the effect of the project on the integrity of the SPA and its conservation objectives, can be viewed in Table 6.16 to Table 6.19.

Table 6.14: Ythan Estuary, Sands of Forvie and Meikle Loch SPA conservation objectives

Site Information	Details
Site Classification – Qualifying Species	**Article 4.1 of the Directive (Annex I Species):**
	• Common tern (*Sterna hirundo*) 265 breeding pairs representing up to 2.2% of the breeding population in Great Britain
	• Sandwich tern (*Sterna sandvicensis*) 600 breeding pairs representing up to 4.3% of the breeding population in Great Britain
	Article 4.2 of the Directive (Assemblage Qualification):
	Over winter, the area regularly supports 51,265 individual waterfowl. The (non-breeding) waterfowl assemblage includes:
	• Eider (*Somateria mollissima*)
	• Redshank (*Tringa totanus*)
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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
Site Condition and Date of Assessment	Common tern – unfavourable no change (01/08/12)
	Sandwich tern – favourable maintained (01/08/12)
	Eider – favourable declining (21/08/12)
	Redshank – favourable maintained (19/10/12)
	Waterfowl assemblage – favourable maintained (19/10/12)

Table 6.15: Potential impacts to Eider, Redshank, Sandwich tern and Common tern of Ythan Estuary, Sands of Forvie and Meikle Loch SPA

Impact and Source	Nature of Impact on Receptor (Effect)
Introduction of infrastructure on the seabed (breakwaters and quays) - operation	Permanent loss of habitat and feeding grounds
Capital and maintenance dredging of inner basin and approach channel (construction and operation) • Seabed disturbance • Increased SSC	Permanent loss of habitat and feeding grounds Reduced prey availability
Reduced water chemical quality (construction and operation): • Accidental spills from vessels during construction and operation • Accidental spills from on-site storage of fuels and chemicals • Use of anti-fouling chemicals • Sediment disturbance (from dredging and propeller wash) – release of sediment contaminants and reduced DO	Avoidance Temporary loss of habitat and feeding grounds Reduced prey availability Mortality (in severe cases)
Seabed disturbances (construction and operation): • Capital dredging • Maintenance dredging • Seabed scour and changes to coastal processes • Increased turbidity and siltation	
Increased noise and vibration (construction and operation): • Drilling, piling, dredging, blasting activities • Increased vessel movements	Temporary avoidance
Visual (construction and operation): • Presence of vessels and onshore plant	Permanent avoidance

6.4.3.1 Eider (*Somateria mollissima*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Eider will be locally disturbed within the vicinity of the development due to loss of habitat; however, with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although eider will be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats there will be no adverse effect on site integrity.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Eider will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific increased collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

After mitigation, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.3.2 Redshank (*Tringa totanus)*

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Redshank will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and provision of breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although redshank may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Redshank will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

Following the proposed mitigation measures, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.3.3 Sandwich Tern (*Thalasseus sandvicensis*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Sandwich tern will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and the provision of the breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although sandwich tern may be locally displaced within the vicinity of the development due to reduced prey availability, as an infrequent visitor, and through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Sandwich tern will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.3.4 Common Tern (*Sterna hirundo*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Common tern will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and the provision of the breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although common tern may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Common tern will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.3.5 Summary of Effects on the Ythan Estuary, Sands of Forvie and Meikle Loch SPA

Table 6.16: Summary of effects on the Ythan Estuary, Sands of Forvie and Meikle Loch SPA (Eider)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 20 km away, and disturbance effects are highly localised, eider will be displaced to other suitable habitats along coast.
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 6.16: Summary of effects on the Ythan Estuary, Sands of Forvie and Meikle Loch SPA (Eider) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature eiders is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	yes	EMMP, Vessel routing plan,	Yes, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely although adults are flightless during post breeding moult	EMMP, Vessel routing plan	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised, temporary and of short duration
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised temporary and of short duration
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.17: Summary of effects on the Ythan Estuary, Sands of Forvie and Meikle Loch SPA (Redshank)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None,
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, redshank are sensitive to sudden loud noise	None	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	None		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	None	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.17: Summary of effects on the Ythan Estuary, Sands of Forvie and Meikle Loch SPA (Redshank) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Creation of breakwaters should provide roosting sites	None
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	Yes	Dimmed lighting, and directional lighting	None, based on low/negligible numbers of birds using the site

Table 6.18: Summary of effects on the Ythan Estuary, Sands of Forvie and Meikle Loch SPA (Sandwich tern)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	None, effects highly localised and of short duration.
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	Yes, reduction in visibility in foraging for prey		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Yes	None	None, Effects highly localised
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.18: Summary of effects on the Ythan Estuary, Sands of Forvie and Meikle Loch SPA (Sandwich tern) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes loss of rocky foreshore	Creation of breakwaters should provide roost and crèche sites	None
		Introduction of new seabed habitats	None		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.19: Summary of effects on the Ythan Estuary, Sands of Forvie and Meikle Loch SPA (Common tern)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	None, effects highly localised, temporary and of short duration
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	Yes, reduction in visibility in foraging for prey		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.19: Summary of effects on the Ythan Estuary, Sands of Forvie and Meikle Loch SPA (Sandwich tern) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes loss of rocky foreshore	Creation of breakwaters should provide roost and crèche sites	None
		Introduction of new seabed habitats	None		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

6.4.4 Fowlsheugh SPA

Fulmar, razorbill, guillemot, kittiwake and herring gull are all designated features of the Fowlsheugh SPA, which is located 23 km from the proposed development. The conservation objectives for the SPA can be viewed in Table 6.20. These species have been identified as having a LSE (Section 5.1.2.2) therefore require further consideration within an Appropriate Assessment.

Further information on each of these species is presented within ES Chapter 14: Marine Ornithology and a summary of the potential impacts of the project and effects on these bird species can be viewed in Table 6.21. A summary of the EIA findings, including an assessment of the effect of the project on the integrity of the SPA and its conservation objectives, can be viewed in Table 6.22 to Table 6.26.

Table 6.20: Fowlsheugh SPA conservation objectives

Site Information	Details
Site Classification – Qualifying Species	**Article 4.2 of the Directive (Migratory Species):** • Guillemot (*Uria aalge*) 40,140 breeding pairs, representing at least 1.8% of the East Atlantic breeding population • Kittiwake (*Rissa tridactyla*) 34,870 breeding pairs, representing at least 1.1% of the East Atlantic breeding population
	Article 4.2 of the Directive (Assemblage Qualification): During the breeding season, the area regularly supports 170,000 individual seabirds. The breeding seabird assemblage includes: • Razorbill (*Alca torda*) • Herring gull (*Larus argentatus*) • Fulmar (*Fulmarus glacialis*) • Guillemot (*Uria aalge*) • Kittiwake (*Rissa tridactyla*)
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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
Site Condition and Date of Assessment	Razorbill – favourable maintained (11/06/99) Kittiwake – favourable maintained (11/06/99) Guillemot – favourable maintained (11/06/99) Herring gull – unfavourable declining (18/06/99) Fulmar – favourable maintained (18/06/99) Seabird assemblage – favourable maintained (18/06/99)

Table 6.21: Potential impacts to Fulmar, Razorbill, Guillemot, Kittiwake and Herring gull of Fowlsheugh SPA

Impact and Source	Nature of Impact on Receptor (Effect)
Introduction of infrastructure on the seabed (breakwaters and quays) - operation	Permanent loss of habitat and feeding grounds
Capital and maintenance dredging of inner basin and approach channel (construction and operation) • Seabed disturbance • Increased SSC	Permanent loss of habitat and feeding grounds Reduced prey availability
Reduced water chemical quality (construction and operation): • Accidental spills from vessels during construction and operation • Accidental spills from on-site storage of fuels and chemicals • Use of anti-fouling chemicals • Sediment disturbance (from dredging and propeller wash) – release of sediment contaminants and reduced DO	Avoidance Temporary loss of habitat and feeding grounds Reduced prey availability Mortality (in severe cases)
Seabed disturbances (construction and operation): • Capital dredging • Maintenance dredging • Seabed scour and changes to coastal processes • Increased turbidity and siltation	
Increased noise and vibration (construction and operation): • Drilling, piling, dredging, blasting activities • Increased vessel movements	Temporary avoidance
Visual (construction and operation): • Presence of vessels and onshore plant	Permanent avoidance

6.4.4.1 Fulmar (*Fulmarus glacialis*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Fulmar will be locally displaced from the development due to loss of habitat; however, with the availability of other habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although fulmar may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Fulmar will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.4.2 Razorbill (*Alca torda*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Razorbill will be locally disturbed within the vicinity of the development due to loss of habitat; however, with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although razorbill may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Razorbill will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Increased Collision Mortality

Generic and species specific risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.4.3 Guillemot (*Uria aalge*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Guillemot will be locally disturbed within the vicinity of the development due to loss of habitat; however, with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although guillemot may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4.

Guillemot will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Increased Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.4.4 Kittiwake (*Rissa tridactyla*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Kittiwake will be locally displaced from the development due to loss of habitat; however, with the availability of other habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although kittiwake may be locally displaced within the vicinity of the development due to reduced prey availability, this will be highly localised and through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Kittiwake will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Increased Collision Mortality

Generic and species specific risk of collision mortality issues discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.4.5 Herring Gull (*Larus argentatus*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Herring gull will be locally displaced from the development due to loss of habitat; however, with the availability of other habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although herring gull may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Herring gull may will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Increased Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.4.6 Summary of Effects on Fowlsheugh SPA

Table 6.22: Summary of effects on the Fowlsheugh SPA (Fulmar)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Small population breeds locally to south of the development site	None	Breeding sites are outside of the development and do not form part of site integrity of this SPA.
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	yes	None	None, birds forage in the outer bay area, and have very wide foraging ranges
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.22: Summary of effects on the Fowlsheugh SPA (Fulmar) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	None – Breeding and foraging sites are outside development site	None	None
		Introduction of new seabed habitats	None		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.23: Summary of effects on the Fowlsheugh SPA (Razorbill)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 23 km away, and disturbance effects are highly localised, Razorbill will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Auks are prone to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 6.23: Summary of effects on the Fowlsheugh SPA (Razorbill) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature razorbill is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely although adults and juveniles are flightless during post breeding moult	EMMP, Vessel routing plan	None, effects highly localised
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.24: Summary of effects on the Fowlsheugh SPA (Guillemot)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 23 km away, and disturbance effects are highly localised, guillemot will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Auks are prone to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 6.24: Summary of effects on the Fowlsheugh SPA (Guillemot) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature guillemot is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely although adults and juveniles are flightless during post breeding moult	EMMP, Vessel routing plan	None, effects highly localised
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.25: Summary of effects on the Fowlsheugh SPA (Kittiwake)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Birds might be displaced, conversely some might be attracted.	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 23 km away, and disturbance effects are highly localised, kittiwake will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.25: Summary of effects on the Fowlsheugh SPA (Kittiwake) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Breakwaters are likely to provide a roost site	None, amount of seabed lost in comparison with total habitat available to SPA feature kittiwake is negligible
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.26: Summary of effects on the Fowlsheugh SPA (Herring gull)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Birds might be displaced, conversely some might be attracted.	None	None
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.26: Summary of effects on the Fowlsheugh SPA (Herring gull) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes, herring gull are a local breeder	Breakwaters are likely to provide a roost site	None, amount of seabed lost in comparison with total habitat available to SPA feature herring gull is negligible. Breeding areas will not be effected
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

6.4.5 Buchan Ness to Collieston Coast SPA

Fulmar, guillemot. Kittiwake and herring gull are all designated features of the Buchan Ness to Collieston Coast SPA, which is located 23 km from the proposed development. The conservation objectives for the SPA can be viewed in Table 6.27. These species have been identified as having a LSE (Section 5.1.2.2) therefore require further consideration within an Appropriate Assessment.

Further information on each of these species is presented within ES Chapter 14: Marine Ornithology and a summary of the potential impacts of the project and effects on these bird species can be viewed in Table 6.28. A summary of the EIA findings, including an assessment of the effect of the project on the integrity of the SPA and its conservation objectives, can be viewed in Table 6.29 to Table 6.32.

Table 6.27: Buchan Ness to Collieston Coast SPA conservation objectives

Site Information	Details
Site Classification – Qualifying Species	**Article 4.2 of the Directive (Assemblage Qualification):** During the breeding season, the area regularly supports 95,000 individual seabirds. The breeding seabird assemblage includes: • Guillemot (*Uria aalge*) • Kittiwake (*Rissa tridactyla*) • Fulmar (*Fulmarus glacialis*) • Herring gull (*Larus argentatus*)
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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
Site Condition and Date of Assessment	Guillemot – favourable declining (04/07/07) Kittiwake – unfavourable no change (04/07/07) Fulmar – unfavourable declining (04/07/07) Herring gull – unfavourable no change (04/07/07) Seabird assemblage – unfavourable no change (04/07/07)

Table 6.28: Potential impacts to Fulmar, Guillemot, Kittiwake and Herring gull of Buchan Ness to Collieston Coast SPA

Impact and Source	Nature of Impact on Receptor (Effect)
Introduction of infrastructure on the seabed (breakwaters and quays) - operation	Permanent loss of habitat and feeding grounds
Capital and maintenance dredging of inner basin and approach channel (construction and operation) • Seabed disturbance • Increased SSC	Permanent loss of habitat and feeding grounds Reduced prey availability
Reduced water chemical quality (construction and operation): • Accidental spills from vessels during construction and operation • Accidental spills from on-site storage of fuels and chemicals • Use of anti-fouling chemicals • Sediment disturbance (from dredging and propeller wash) – release of sediment contaminants and reduced DO	Avoidance Temporary loss of habitat and feeding grounds Reduced prey availability Mortality (in severe cases)
Seabed disturbances (construction and operation): • Capital dredging • Maintenance dredging • Seabed scour and changes to coastal processes • Increased turbidity and siltation	
Increased noise and vibration (construction and operation): • Drilling, piling, dredging, blasting activities • Increased vessel movements	Temporary avoidance
Visual (construction and operation): • Presence of vessels and onshore plant	Permanent avoidance

6.4.5.1 Fulmar (*Fulmarus glacialis*)

Loss of Habitat

Generic and species specific habitat loss issues are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Fulmar will be locally displaced from the development due to loss of habitat; however, with the availability of other habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although fulmar may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Fulmar will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.5.2 Guillemot (*Uria aalge*)

Loss of Habitat

Generic and species specific habitat loss issues are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Guillemot will be locally disturbed within the vicinity of the development due to loss of habitat; however, with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although guillemot may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Guillemot will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Increased Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.5.3 Kittiwake (*Rissa tridactyla*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Kittiwake will be locally displaced from the development due to loss of habitat; however, with the availability of other habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although kittiwake may be locally displaced within the vicinity of the development due to reduced prey availability, this will be highly localised and through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Kittiwake will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Increased Collision Mortality

Generic and species specific risk of collision mortality issues discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.5.4 Herring Gull (*Larus argentatus*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Herring gull will be locally displaced from the development due to loss of habitat; however, with the availability of other habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although herring gull may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Herring gull may will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Increased Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.5.5 Summary of Effects on Buchan Ness to Collieston Coast SPA

Table 6.29: Summary of effects on the Buchan Ness to Collieston Coast SPA (Fulmar)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Small population breeds locally to south of the development site	None	Breeding sites are outside of the development and do not form part of site integrity of this SPA.
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Yes	None	None, birds forage in the outer bay area, and have very wide foraging ranges
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.29: Summary of effects on the Buchan Ness to Collieston Coast SPA (Fulmar) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	None – Breeding and foraging sites are outside development site	None	None
		Introduction of new seabed habitats	None		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.30: Summary of effects on the Buchan Ness to Collieston Coast SPA (Guillemot)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 23 km away, and disturbance effects are highly localised, guillemot will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Auks are prone to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 6.30: Summary of effects on the Buchan Ness to Collieston Coast SPA (Guillemot) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature guillemot is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely although adults and juveniles are flightless during post breeding moult	EMMP, Vessel routing plan	None, effects highly localised
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.31: Summary of effects on the Buchan Ness to Collieston Coast SPA (Kittiwake)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Birds might be displaced, conversely some might be attracted.	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 23 km away, and disturbance effects are highly localised, kittiwake will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.31: Summary of effects on the Buchan Ness to Collieston Coast SPA (Kittiwake) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Breakwaters are likely to provide a roost site	None, amount of seabed lost in comparison with total habitat available to SPA feature kittiwake is negligible
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.32: Summary of effects on the Buchan Ness to Collieston Coast SPA (Herring gull)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Birds might be displaced, conversely some might be attracted.	None	None
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.32: Summary of effects on the Buchan Ness to Collieston Coast SPA (Herring gull) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes, herring gull are a local breeder	Breakwaters are likely to provide a roost site	None, amount of seabed lost in comparison with total habitat available to SPA feature herring gull is negligible. Breeding areas will not be effected
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

6.4.6 Montrose Basin SPA

Eider, oystercatcher and redshank are all designated features of the Montrose Basin SPA, which is located 58 km from the proposed development. The conservation objectives for the SPA can be viewed in Table 6.33. These species have been identified as having a LSE (Section 5.1.2.2) therefore require further consideration within an Appropriate Assessment.

Further information on each of these species is presented within ES Chapter 14: Marine Ornithology and a summary of the potential impacts of the project and effects on these bird species can be viewed in Table 6.34. A summary of the EIA findings, including an assessment of the effect of the project on the integrity of the SPA and its conservation objectives, can be viewed in Table 6.35 to Table 6.37.

Table 6.33: Montrose Basin SPA conservation objectives

Site Information	Details
Site Overview	The Montrose Basin is located on the east coast of Scotland in Angus. It is an enclosed tidal basin fed by the River South Esk and contains areas of mud-flat, marsh, agricultural land and a small eutrophic loch. It is a good natural example of an estuary, relatively unaffected by development, with high species diversity in the intertidal zone and supporting a large population of wintering waterbirds. The site is important for wintering populations of pink-footed goose *Anser brachyrhynchus* and greylag goose *Anser anser*, along with ducks and waders. The geese feed away from the SPA on surrounding agricultural land during the day.
Date of Designation	03/02/1995
Site Classification – Qualifying Species	**Article 4.2 of the Directive (Migratory Species):** • Greylag goose (*Anser anser*) 1,080 non-breeding individuals representing at least 1.1% of the wintering Iceland/UK/Ireland population • Knot (*Calidris canutus*) 4,500 non-breeding individuals representing at least 1.3% of the wintering North Eastern Canada/Greenland/Iceland/North Western Europe population • Pink-footed goose (*Anser brachyrhynchus*) 31,622 non-breeding individuals representing at least 14.1% of the wintering Eastern Greenland/Iceland/UK population. • Redshank (*Tringa totanus*) 2,259 non-breeding individuals representing at least 1.5% of the wintering Eastern Atlantic population
	Article 4.2 of the Directive (Assemblage Qualification): Over winter, the area regularly supports 54,917 individual waterfowl. The (non-breeding) waterfowl assemblage includes: • Dunlin (*Calidris alpina alpina*) • Oystercatcher (*Haematopus ostralegus*) • Eider (*Somateria mollissima*) • Wigeon (*Anas penelope*) • Shelduck (*Tadorna tadorna*) • Redshank (*Tringa totanus*) • Knot (*Calidris canutus*) • Greylag goose (*Anser anser*) • Pink-footed goose (*Anser brachyrhynchus*)
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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

Table 6.33: Montrose Basin SPA conservation objectives continued

Site Information	Details
Site Condition and Date of Assessment	Eider – favourable maintained (31/03/08) Pink-footed goose – favourable maintained (31/03/08) Wigeon – favourable maintained (31/03/08) Oystercatcher – favourable maintained (31/03/08) Greylag goose – unfavourable no change (31/03/08) Knot – favourable maintained (31/03/08) Redshank – favourable maintained (31/03/08) Waterfowl assemblage – favourable maintained (31/03/08)

Table 6.34: Potential impacts to Eider, Oystercatcher and Redshank of Montrose Basin SPA

Impact and Source	Nature of Impact on Receptor (Effect)
Introduction of infrastructure on the seabed (breakwaters and quays) - operation	Permanent loss of habitat and feeding grounds
Capital and maintenance dredging of inner basin and approach channel (construction and operation) • Seabed disturbance • Increased SSC	Permanent loss of habitat and feeding grounds Reduced prey availability
Reduced water chemical quality (construction and operation): • Accidental spills from vessels during construction and operation • Accidental spills from on-site storage of fuels and chemicals • Use of anti-fouling chemicals • Sediment disturbance (from dredging and propeller wash) – release of sediment contaminants and reduced DO	Avoidance Temporary loss of habitat and feeding grounds Reduced prey availability Mortality (in severe cases)
Seabed disturbances (construction and operation): • Capital dredging • Maintenance dredging • Seabed scour and changes to coastal processes • Increased turbidity and siltation	
Increased noise and vibration (construction and operation): • Drilling, piling, dredging, blasting activities • Increased vessel movements	Temporary avoidance
Visual (construction and operation): • Presence of vessels and onshore plant	Permanent avoidance

6.4.6.1 Eider (*Somateria mollissima*)

Loss of Habitat

Generic and species specific habitat loss issues are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Eider will be locally disturbed within the vicinity of the development due to loss of habitat; however, with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although eider will be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in-Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Eider will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific increased collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

With mitigation, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.6.2 Oystercatcher (*Haematopus ostralegus*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Oystercatcher will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and provision of breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although oystercatcher will be locally displaced within the vicinity of the development due to reduced prey availability, this will be highly localised and through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Oystercatcher will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

Following the proposed mitigation measures, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.6.3 Redshank (*Tringa totanus)*

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Redshank will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and provision of breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although redshank may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Redshank will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

Following the proposed mitigation measures, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.6.4 Summary of Effects on Montrose Basin SPA

Table 6.35: Summary of effects on the Montrose Basin SPA (Eider)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 58 km away, and disturbance effects are highly localised, eider will be displaced to other suitable habitats along coast.
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 6.35: Summary of effects on the Montrose Basin SPA (Eider) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature eiders is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	yes	EMMP, Vessel routing plan,	Yes, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely although adults are flightless during post breeding moult	EMMP, Vessel routing plan	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised, temporary and of short duration
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised temporary and of short duration
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.36: Summary of effects on the Montrose Basin SPA (Oystercatcher)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None,
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, oystercatcher are sensitive to sudden loud noise	None	None, effects highly localised , temporary and of short duration
	Increased physical seabed disturbance	Seabed habitat disturbances	None		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	None	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.36: Summary of effects on the Montrose Basin SPA (Oystercatcher) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Creation of breakwaters should provide roosting sites	None
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour,	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour,	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	Yes	Dimmed lighting, and directional lighting	None

Table 6.37: Summary of effects on the Montrose Basin SPA (Redshank)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None,
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, redshank are sensitive to sudden loud noise	None	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	None		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	None	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.37: Summary of effects on the Montrose Basin SPA (Redshank) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Creation of breakwaters should provide roosting sites	None
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	Yes	Dimmed lighting, and directional lighting	None, based on low/negligible numbers of birds using the site

6.4.7 Loch of Strathbeg SPA

Sandwich tern is a designated feature of the Loch of Strathbeg SPA, which is located 60 km from the proposed development. The conservation objectives for the SPA can be viewed in Table 6.38. These species have been identified as having a LSE (Section 5.1.2.2) therefore require further consideration within an Appropriate Assessment.

Further information on sandwich tern is presented within ES Chapter 14: Marine Ornithology and a summary of the potential impacts of the project and effects on the species can be viewed in Table 6.39. A summary of the EIA findings, including an assessment of the effect of the project on the integrity of the SPA and its conservation objectives, can be viewed in Table 6.40.

Table 6.38: Loch of Strathbeg SPA conservation objectives

Site Information	Details
Site Classification – Qualifying Species	**Article 4.1 of the Directive (Annex I Species):** • Sandwich tern (*Thalasseus sandvicensis*) 530 breeding pairs representing up to 3.8% of the breeding population in Great Britain.
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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
Site Condition and Date of Assessment	Sandwich tern – unfavourable no change (31/07/13)

Table 6.39: Potential impacts to Sandwich tern of Loch of Strathbeg SPA

Impact and Source	Nature of Impact on Receptor (Effect)
Introduction of infrastructure on the seabed (breakwaters and quays) - operation	Permanent loss of habitat and feeding grounds
Capital and maintenance dredging of inner basin and approach channel (construction and operation) • Seabed disturbance • Increased SSC	Permanent loss of habitat and feeding grounds Reduced prey availability
Reduced water chemical quality (construction and operation): • Accidental spills from vessels during construction and operation • Accidental spills from on-site storage of fuels and chemicals • Use of anti-fouling chemicals • Sediment disturbance (from dredging and propeller wash) – release of sediment contaminants and reduced DO	Avoidance Temporary loss of habitat and feeding grounds Reduced prey availability Mortality (in severe cases)
Seabed disturbances (construction and operation): • Capital dredging • Maintenance dredging • Seabed scour and changes to coastal processes • Increased turbidity and siltation	
Increased noise and vibration (construction and operation): • Drilling, piling, dredging, blasting activities • Increased vessel movements	Temporary avoidance
Visual (construction and operation): • Presence of vessels and onshore plant	Permanent avoidance

6.4.7.1 Sandwich Tern (*Thalasseus sandvicensis*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Sandwich tern will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and the provision of the breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although sandwich tern may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Sandwich tern will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.7.2 Summary of Effects on Loch of Strathbeg SPA

Table 6.40: Summary of effects on the Loch of Strathbeg SPA (Sandwich tern)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	None, effects highly localised and of short duration.
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	Yes, reduction in visibility in foraging for prey		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Yes	None	None, Effects highly localised
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.40: Summary of effects on the Loch of Strathbeg SPA (Sandwich tern) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes loss of rocky foreshore	Creation of breakwaters should provide roost and crèche sites	None
		Introduction of new seabed habitats	None		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

6.4.8 Inner Moray Firth SPA

Goldeneye, Oystercatcher, curlew, redshank and common tern are all designated features of the Inner Moray Firth SPA, which is located 210 km from the proposed development. The conservation objectives for the SPA can be viewed in Table 6.41. These species have been identified as having a LSE (Section 5.1.2.2) therefore require further consideration within an Appropriate Assessment.

Further information on each of these species is presented within ES Chapter 14: Marine Ornithology and a summary of the potential impacts of the project and effects on these bird species can be viewed in Table 6.42. A summary of the EIA findings, including an assessment of the effect of the project on the integrity of the SPA and its conservation objectives, can be viewed in Table 6.43 to Table 6.47.

Table 6.41: Inner Moray Firth SPA conservation objectives

Site Information	Details
Site Overview	The Inner Moray Firth is located to the north of Inverness and is one of the major arms of the Moray Firth. It comprises the Beauly Firth and Inverness Firth which together form the easternmost estuarine component of the Moray Basin ecosystem The site contains extensive intertidal flats and smaller areas of saltmarsh. The rich invertebrate fauna of the intertidal flats, with beds of eelgrass Zostera spp., Glasswort Salicornia spp., and Enteromorpha algae, all provide important food sources for large numbers of wintering and migrating waterbirds (geese, ducks and waders). With adjacent estuarine areas elsewhere in the Moray Firth, this site is the most northerly major wintering area for wildfowl and waders in Europe. The Firth is also of importance as a feeding area for locally breeding Osprey *Pandion haliaetus* as well as for breeding terns. The Inner Moray Firth SPA forms an integral ecological component of Moray Basin Firths and Bays.
Date of Designation	22/03/1999
Site Classification – Qualifying Species	**Article 4.1 of the Directive (Annex I Species):**
	• Common tern (*Sterna hirundo*) 310 pairs representing at least 2.5% of the breeding population in Great Britain
	Article 4.2 of the Directive (Migratory Species):
	• Redshank (*Tringa totanus*) 1,811 individuals representing at least 1.2% of the wintering Eastern Atlantic wintering population
	Article 4.2 of the Directive (Assemblage Qualification):
	Over winter, the area regularly supports at least 20,000 individual waterfowl. The (non-breeding) waterfowl assemblage includes:
	• Curlew (*Numenius arquata*)
	• Oystercatcher (*Haematopus ostralegus*)
	• Goldeneye (*Bucephala clangula*)
	• Redshank (*Tringa totanus*)
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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
Site Condition and Date of Assessment	Goldeneye – favourable maintained (04/02/01) Redshank – favourable maintained (04/02/01) Greylag goose – favourable maintained (31/12/01) Common tern – unfavourable no change (30/06/00) Waterfowl assemblage – favourable maintained (31/12/01) Curlew – favourable maintained (04/02/01) Oystercatcher – favourable maintained (04/02/01)

Table 6.42: Potential impacts to Goldeneye, Oystercatcher, Curlew, Redshank and Common tern of the Inner Moray Firth SPA

Impact and Source	Nature of Impact on Receptor (Effect)
Introduction of infrastructure on the seabed (breakwaters and quays) - operation	Permanent loss of habitat and feeding grounds
Capital and maintenance dredging of inner basin and approach channel (construction and operation) • Seabed disturbance • Increased SSC	Permanent loss of habitat and feeding grounds Reduced prey availability
Reduced water chemical quality (construction and operation): • Accidental spills from vessels during construction and operation • Accidental spills from on-site storage of fuels and chemicals • Use of anti-fouling chemicals • Sediment disturbance (from dredging and propeller wash) – release of sediment contaminants and reduced DO	Avoidance Temporary loss of habitat and feeding grounds Reduced prey availability Mortality (in severe cases)
Seabed disturbances (construction and operation): • Capital dredging • Maintenance dredging • Seabed scour and changes to coastal processes • Increased turbidity and siltation	
Increased noise and vibration (construction and operation): • Drilling, piling, dredging, blasting activities • Increased vessel movements	Temporary avoidance
Visual (construction and operation): • Presence of vessels and onshore plant	Permanent avoidance

6.4.8.1 Goldeneye (*Bucephala clangula*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Goldeneye will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and the provision of the breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although goldeneye may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Goldeneye will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

Following the proposed mitigation measures, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.8.2 Oystercatcher (*Haematopus ostralegus*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Oystercatcher will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and provision of breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although oystercatcher will be locally displaced within the vicinity of the development due to reduced prey availability, this will be highly localised and through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 0.

Oystercatcher will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

Following the proposed mitigation measures, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.8.3 Curlew (*Numenius arquata*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Curlew will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and provision of breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although curlew may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 0.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Curlew will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

Following the proposed mitigation measures, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.8.4 Redshank (*Tringa totanus)*

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Redshank will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and provision of breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although redshank may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Redshank will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

Following the proposed mitigation measures, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.8.5 Common Tern (*Sterna hirundo*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2

Common tern will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and the provision of the breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although common tern may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Common tern will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.8.6 Summary of Effects on Inner Moray Firth SPA

Table 6.43: Summary of effects on the Inner Moray Firth SPA (Goldeneye)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 210 km away, and disturbance effects are highly localised, goldeneye will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 6.43: Summary of effects on the Inner Moray Firth SPA (Goldeneye) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature goldeneye is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.44: Summary of effects on the Inner Moray Firth SPA (Oystercatcher)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None,
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, oystercatcher are sensitive to sudden loud noise	None	None, effects highly localised , temporary and of short duration
	Increased physical seabed disturbance	Seabed habitat disturbances	None		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	None	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.44: Summary of effects on the Inner Moray Firth SPA (Oystercatcher) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Creation of breakwaters should provide roosting sites	None
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour,	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour,	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	Yes	Dimmed lighting, and directional lighting	None

Table 6.45: Summary of effects on the Inner Moray Firth SPA (Curlew)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None,
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, curlew are sensitive to sudden loud noise	None	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	None		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.45: Summary of effects on the Inner Moray Firth SPA (Curlew) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Creation of breakwaters should provide roosting sites	None
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour,	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour,	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	Yes	Dimmed lighting, and directional lighting	None, based on low/negligible numbers of birds using the site

Table 6.46: Summary of effects on the Inner Moray Firth SPA (Redshank)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None,
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, redshank are sensitive to sudden loud noise	None	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	None		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	None	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.46: Summary of effects on the Inner Moray Firth SPA (Redshank) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Creation of breakwaters should provide roosting sites	None
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	Yes	Dimmed lighting, and directional lighting	None, based on low/negligible numbers of birds using the site

Table 6.47: Summary of effects on the Inner Moray Firth SPA (Common tern)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	None, effects highly localised, temporary and of short duration
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	Yes, reduction in visibility in foraging for prey		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.47: Summary of effects on the Inner Moray Firth SPA (Common tern) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes loss of rocky foreshore	Creation of breakwaters should provide roost and crèche sites	None
		Introduction of new seabed habitats	None		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

6.4.9 Troup, Pennan and Lion's Heads SPA

Fulmar, razorbill, guillemot, kittiwake and herring gull are all designated features of the Troup, Pennan and Lion's Heads SPA, which is located 85 km from the proposed development. The conservation objectives for the SPA can be viewed in Table 6.48. These species have been identified as having a LSE (Section 5.1.2.2) therefore require further consideration within an Appropriate Assessment.

Further information on each of these species is presented within ES Chapter 14: Marine Ornithology and a summary of the potential impacts of the project and effects on these bird species can be viewed in Table 6.49. A summary of the EIA findings, including an assessment of the effect of the project on the integrity of the SPA and its conservation objectives, can be viewed in Table 6.50 to Table 6.54.

Table 6.48: Troup, Pennan and Lion's Heads SPA conservation objectives

Site Information	Details
Site Overview	Troup, Pennan and Lion's Heads SPA is a 9 km stretch of sea-cliffs along the Banff and Buchan coast of Aberdeenshire in north-east Scotland. As well as cliffs, the site also includes adjacent areas of grassland and heath, and several small sand or shingle beaches punctuate the otherwise rocky shore. The cliffs rise to 150 m and provide ideal nesting sites for seabirds, which feed in the rich waters offshore and outside the SPA. Different parts of the cliffs are used by different species of seabirds according to varying ecological requirements. The site is particularly important for its numbers of gulls and auks.
Date of Designation	14/03/1997
Site Classification – Qualifying Species	**Article 4.2 of the Directive (Migratory Species):** • Guillemot (*Uria aalge*) 29,902 breeding pairs representing at least 1.3% of the East Atlantic breeding population
	Article 4.2 of the Directive (Assemblage Qualification): During the breeding season, the area regularly supports 150,000 individual seabirds. The breeding seabird assemblage includes: • Razorbill (*Alca torda*) • Kittiwake (*Rissa tridactyla*) • Herring gull (*Larus argentatus*) • Fulmar (*Fulmarus glacialis*) • Guillemot (*Uria aalge*)
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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
Site Condition and Date of Assessment	Razorbill – unfavourable declining (03/07/07) Guillemot – unfavourable declining (03/07/07) Herring gull – unfavourable no change (03/07/07) Fulmar – unfavourable no change (03/07/07) Kittiwake – unfavourable no change (03/07/07) Seabird assemblage – unfavourable declining (03/07/07)

Table 6.49: Potential impacts to Fulmar, Razorbill, Guillemot, Kittiwake and Herring gull of the Troup, Pennan and Lion's Heads SPA

Impact and Source	Nature of Impact on Receptor (Effect)
Introduction of infrastructure on the seabed (breakwaters and quays) - operation	Permanent loss of habitat and feeding grounds
Capital and maintenance dredging of inner basin and approach channel (construction and operation) • Seabed disturbance • Increased SSC	Permanent loss of habitat and feeding grounds Reduced prey availability
Reduced water chemical quality (construction and operation): • Accidental spills from vessels during construction and operation • Accidental spills from on-site storage of fuels and chemicals • Use of anti-fouling chemicals • Sediment disturbance (from dredging and propeller wash) – release of sediment contaminants and reduced DO	Avoidance Temporary loss of habitat and feeding grounds Reduced prey availability Mortality (in severe cases)
Seabed disturbances (construction and operation): • Capital dredging • Maintenance dredging • Seabed scour and changes to coastal processes • Increased turbidity and siltation	
Increased noise and vibration (construction and operation): • Drilling, piling, dredging, blasting activities • Increased vessel movements	Temporary avoidance
Visual (construction and operation): • Presence of vessels and onshore plant	Permanent avoidance

6.4.9.1 Fulmar (*Fulmarus glacialis*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Fulmar will be locally displaced from the development due to loss of habitat; however, with the availability of other habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although fulmar may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Fulmar will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.9.2 Razorbill (*Alca torda*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Razorbill will be locally disturbed within the vicinity of the development due to loss of habitat; however, with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although razorbill may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Razorbill will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Increased Collision Mortality

Generic and species specific risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.9.3 Guillemot (*Uria aalge*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Guillemot will be locally disturbed within the vicinity of the development due to loss of habitat; however, with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although guillemot may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4.

Guillemot will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Increased Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.9.4 Kittiwake (*Rissa tridactyla*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 0.

Kittiwake will be locally displaced from the development due to loss of habitat; however, with the availability of other habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although kittiwake may be locally displaced within the vicinity of the development due to reduced prey availability, this will be highly localised and through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Kittiwake will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Increased Collision Mortality

Generic and species specific risk of collision mortality issues discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.9.5 Herring Gull (*Larus argentatus*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Herring gull will be locally displaced from the development due to loss of habitat; however, with the availability of other habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although herring gull may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Herring gull may will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Increased Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.9.6 Summary of Effects on Troup, Pennan and Lion's Heads SPA

Table 6.50: Summary of effects on the Troup, Pennan and Lion's Heads SPA (Fulmar)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Small population breeds locally to south of the development site	None	Breeding sites are outside of the development and do not form part of site integrity of this SPA.
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	yes	None	None, birds forage in the outer bay area, and have very wide foraging ranges
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.50: Summary of effects on the Troup, Pennan and Lion's Heads SPA (Fulmar) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	None – Breeding and foraging sites are outside development site	None	None
		Introduction of new seabed habitats	None		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.51: Summary of effects on the Troup, Pennan and Lion's Heads SPA (Razorbill)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 85 km away, and disturbance effects are highly localised, Razorbill will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Auks are prone to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 6.51: Summary of effects on the Troup, Pennan and Lion's Heads SPA (Razorbill) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature razorbill is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely although adults and juveniles are flightless during post breeding moult	EMMP, Vessel routing plan	None, effects highly localised
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.52: Summary of effects on the Troup, Pennan and Lion's Heads SPA (Guillemot)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 85 km away, and disturbance effects are highly localised, guillemot will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Auks are prone to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 6.52: Summary of effects on the Troup, Pennan and Lion's Heads SPA (Guillemot) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature guillemot is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely although adults and juveniles are flightless during post breeding moult	EMMP, Vessel routing plan	None, effects highly localised
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.53: Summary of effects on the Troup, Pennan and Lion's Heads SPA (Kittiwake)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Birds might be displaced, conversely some might be attracted.	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 85 km away, and disturbance effects are highly localised, kittiwake will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.53: Summary of effects on the Troup, Pennan and Lion's Heads SPA (Kittiwake) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Breakwaters are likely to provide a roost site	None, amount of seabed lost in comparison with total habitat available to SPA feature kittiwake is negligible
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.54: Summary of effects on the Troup, Pennan and Lion's Heads SPA (Herring gull)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Birds might be displaced, conversely some might be attracted.	None	None
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.54: Summary of effects on the Troup, Pennan and Lion's Heads SPA (Herring gull) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes, herring gull are a local breeder	Breakwaters are likely to provide a roost site	None, amount of seabed lost in comparison with total habitat available to SPA feature herring gull is negligible. Breeding areas will not be effected
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

6.4.10 Firth of Tay and Eden Estuary SPA

Eider, long-tailed duck, common scoter, velvet scoter, goldeneye, oystercatcher, redshank and little tern are all designated features of the Firth of Tay and Eden Estuary SPA, which is located 86 km from the proposed development. The conservation objectives for the SPA can be viewed in Table 6.55. These species have been identified as having a LSE (Section 5.1.2.2) therefore require further consideration within an Appropriate Assessment.

Further information on each of these species is presented within ES Chapter 14: Marine Ornithology and a summary of the potential impacts of the project and effects on these bird species can be viewed in Table 6.49. A summary of the EIA findings, including an assessment of the effect of the project on the integrity of the SPA and its conservation objectives, can be viewed in Table 6.57 to Table 6.63.

Table 6.55: Firth of Tay and Eden Estuary SPA conservation objectives

Site Information	Details
Site Classification – Qualifying Species	**Article 4.2 of the Directive (Migratory Species):** • Redshank (*Tringa totanus*) 1,800 non-breeding individuals representing at least 1.2% of the wintering Eastern Atlantic wintering population
	Article 4.2 of the Directive (Assemblage qualification): Over winter, the area regularly supports 34,074 individual waterfowl. The (non-breeding) waterfowl assemblage includes: • Velvet scoter (*Melanitta fusca*) • Redshank (*Tringa totanus*) • Eider (*Somateria mollissima*) • Common scoter (*Melanitta nigra*) • Goldeneye (*Bucephala clangula*) • Oystercatcher (*Haematopus ostralegus*) • Long-tailed duck (*Clangula hyemalis*)
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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
Site Condition and Date of Assessment	Goldeneye – favourable maintained (31/03/08) Long-tailed duck – unfavourable declining (31/03/08) Common scoter – unfavourable no change (31/03/08) Oystercatcher – favourable recovered (31/03/08) Redshank – favourable maintained (28/02/01) Eider – unfavourable no change (28/02/01) Velvet scoter – favourable maintained (28/02/01) Waterfowl assemblage – favourable maintained (01/06/11)

Table 6.56: Potential impacts to Eider, Long-tailed duck, Common scoter, Velvet scoter, Goldeneye, Oystercatcher and Redshank of the Firth of Tay and Eden Estuary SPA

Impact and Source	Nature of Impact on Receptor (Effect)
Introduction of infrastructure on the seabed (breakwaters and quays) - operation	Permanent loss of habitat and feeding grounds
Capital and maintenance dredging of inner basin and approach channel (construction and operation) • Seabed disturbance • Increased SSC	Permanent loss of habitat and feeding grounds Reduced prey availability
Reduced water chemical quality (construction and operation): • Accidental spills from vessels during construction and operation • Accidental spills from on-site storage of fuels and chemicals • Use of anti-fouling chemicals • Sediment disturbance (from dredging and propeller wash) – release of sediment contaminants and reduced DO	Avoidance Temporary loss of habitat and feeding grounds Reduced prey availability Mortality (in severe cases)
Seabed disturbances (construction and operation): • Capital dredging • Maintenance dredging • Seabed scour and changes to coastal processes • Increased turbidity and siltation	
Increased noise and vibration (construction and operation): • Drilling, piling, dredging, blasting activities • Increased vessel movements	Temporary avoidance
Visual (construction and operation): • Presence of vessels and onshore plant	Permanent avoidance

6.4.10.1 Eider (*Somateria mollissima*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Eider will be locally disturbed within the vicinity of the development due to loss of habitat; however, with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although eider will be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Eider will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific increased collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

With mitigation, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.10.2 Long-tailed Duck (*Clangula hyemalis*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Long-tailed duck will be locally disturbed within the vicinity of the development due to loss of habitat; however, with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although long-tailed duck will be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2

Long-tailed duck will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

With mitigation, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.10.3 Common Scoter (*Melanitta nigra*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Common scoter will be locally disturbed within the vicinity of the development due to loss of habitat; however, with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although common scoter will be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Common scoter will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

With mitigation, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.10.4 Velvet Scoter (*Melanitta fusca*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Velvet scoter will be locally disturbed within the vicinity of the development due to loss of habitat; however, with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although velvet scoter will be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Velvet scoter will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together

with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

With mitigation, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.10.5 Goldeneye (*Bucephala clangula*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Goldeneye will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and the provision of the breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although goldeneye may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Goldeneye will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

Following the proposed mitigation measures, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.10.6 Oystercatcher (*Haematopus ostralegus*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Oystercatcher will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and provision of breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although oystercatcher will be locally displaced within the vicinity of the development due to reduced prey availability, this will be highly localised and through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Oystercatcher will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

Following the proposed mitigation measures, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.10.7 Redshank (*Tringa totanus)*

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Redshank will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and provision of breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although redshank may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Redshank will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

Following the proposed mitigation measures, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.10.8 Summary of Effects on Firth of Tay and Eden Estuary SPA

Table 6.57: Summary of effects on the Firth of Tay and Eden Estuary SPA (Eider)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 86 km away, and disturbance effects are highly localised, eider will be displaced to other suitable habitats along coast.
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 5.57: Summary of effects on the Firth of Tay and Eden Estuary SPA (Eider) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature eiders is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	yes	EMMP, Vessel routing plan,	Yes, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely although adults are flightless during post breeding moult	EMMP, Vessel routing plan	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised, temporary and of short duration
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised temporary and of short duration
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.58: Summary of effects on the Firth of Tay and Eden Estuary SPA (Long-tailed duck)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 86 km away, and disturbance effects are highly localised, long-tailed duck will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 5.58: Summary of effects on the Firth of Tay and Eden Estuary SPA (Long-tailed duck) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature Long-tailed duck is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.59: Summary of effects on the Firth of Tay and Eden Estuary SPA (Common scoter)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 86 km away, and disturbance effects are highly localised, common scoter will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 5.59: Summary of effects on the Firth of Tay and Eden Estuary SPA (Common scoter) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature common scoter is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	None Unlikely to suffer collision, but general displacement likely to occur, birds also flightless during post breeding moult	EMMP, Vessel routing plan,	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised

Table 5.59: Summary of effects on the Firth of Tay and Eden Estuary SPA (Common scoter) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Maintenance dredging and disposal of dredged material continued	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.60: Summary of effects on the Firth of Tay and Eden Estuary SPA (Velvet scoter)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 86 km away, and disturbance velvet scoters are highly localised, eider will be displaced to other suitable habitats along coast.
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 5.60: Summary of effects on the Firth of Tay and Eden Estuary SPA (Velvet scoter) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature velvet scoter is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.61: Summary of effects on the Firth of Tay and Eden Estuary SPA (Goldeneye)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 86 km away, and disturbance effects are highly localised, goldeneye will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 5.61: Summary of effects on the Firth of Tay and Eden Estuary SPA (Goldeneye) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature goldeneye is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			

Table 5.61: Summary of effects on the Firth of Tay and Eden Estuary SPA (Goldeneye) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Activity
Operation					
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.62: Summary of effects on the Firth of Tay and Eden Estuary SPA (Oystercatcher)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None,
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, oystercatcher are sensitive to sudden loud noise	None	None, effects highly localised , temporary and of short duration
	Increased physical seabed disturbance	Seabed habitat disturbances	None		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	None	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 5.62: Summary of effects on the Firth of Tay and Eden Estuary SPA (Oystercatcher) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Creation of breakwaters should provide roosting sites	None
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour,	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour,	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	Yes	Dimmed lighting, and directional lighting	None

Table 6.63: Summary of effects on the Firth of Tay and Eden Estuary SPA (Redshank)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None,
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, redshank are sensitive to sudden loud noise	None	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	None		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	None	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 5.63: Summary of effects on the Firth of Tay and Eden Estuary SPA (Redshank) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Creation of breakwaters should provide roosting sites	None
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	Yes	Dimmed lighting, and directional lighting	None, based on low/negligible numbers of birds using the site

6.4.11 Forth Islands SPA

Fulmar, gannet, puffin, razorbill, guillemot, sandwich tern, common tern, kittiwake, lesser black-backed gull and herring gull are all designated features of the Forth Islands SPA, which is located 107 km from the proposed development. The conservation objectives for the SPA can be viewed in Table 6.64. These species have been identified as having a LSE (Section 5.1.2.2) therefore require further consideration within an Appropriate Assessment.

Further information on each of these species is presented within ES Chapter 14: Marine Ornithology and a summary of the potential impacts of the project and effects on these bird species can be viewed in Table 6.65. A summary of the EIA findings, including an assessment of the effect of the project on the integrity of the SPA and its conservation objectives, can be viewed in Table 6.66 to Table 6.75.

Table 6.64: Forth Islands SPA conservation objectives

Site Information	Details
Site Classification – Qualifying Species	**Article 4.1 of the Directive (Annex I Species):** • Common tern (*Sterna hirundo*) 800 breeding pairs representing at least 6.5% of the breeding population in Great Britain • Sandwich tern (*Thalasseus sandvicensis*) 22 breeding pairs representing at least 0.2% of the breeding population in Great Britain
	Article 4.2 of the Directive (Migratory Species): • Gannet (*Morus bassabus*) 34,400 breeding pairs representing at least 13.1% of the breeding North Atlantic population • Lesser black-backed gull (*Larus fuscus*) 2,920 breeding pairs representing at least 2.4% of the breeding Western Europe/Mediterranean/Western Africa population • Puffin (*Fratercula arctica*) 21,000 breeding pairs representing at least 2.3% of the breeding population
	Article 4.2 of the Directive (Assemblage qualification): During the breeding season, the area regularly supports 90,000 individual seabirds. The breeding seabird assemblage includes: • Razorbill • Guillemot • Kittiwake • Herring gull • Fulmar • Puffin • Lesser black-backed gull • Gannet • Common tern • Sandwich tern
Site Conservation Objectives Continued	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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

Table 5.64. Forth Islands SPA conservation objectives continued

Site Information	Details
Site Condition and Date of Assessment	Lesser black-backed gull – favourable maintained (15/06/08) Razorbill – favourable maintained (30/06/07) Guillemot – favourable maintained (30/06/07) Kittiwake – unfavourable declining (30/06/07) Fulmar – favourable maintained (26/06/04) Gannet – favourable maintained (17/07/04) Puffin – favourable maintained (27/04/03) Common tern – favourable maintained (30/06/03) Sandwich tern – unfavourable declining (30/06/03) Herring gull – favourable maintained (30/06/01) Seabird assemblage – unfavourable declining (17/07/04)

Table 6.65: Potential impacts to Fulmar, Gannet, Puffin, Razorbill, Guillemot, Sandwich tern, Common tern, Kittiwake, Lesser black-backed gull and Herring gull of the Forth Islands SPA

Impact and Source	Nature of Impact on Receptor (Effect)
Introduction of infrastructure on the seabed (breakwaters and quays) - operation	Permanent loss of habitat and feeding grounds
Capital and maintenance dredging of inner basin and approach channel (construction and operation) • Seabed disturbance • Increased SSC	Permanent loss of habitat and feeding grounds Reduced prey availability
Reduced water chemical quality (construction and operation): • Accidental spills from vessels during construction and operation • Accidental spills from on-site storage of fuels and chemicals • Use of anti-fouling chemicals • Sediment disturbance (from dredging and propeller wash) – release of sediment contaminants and reduced DO	Avoidance Temporary loss of habitat and feeding grounds Reduced prey availability Mortality (in severe cases)
Seabed disturbances (construction and operation): • Capital dredging • Maintenance dredging • Seabed scour and changes to coastal processes • Increased turbidity and siltation	
Increased noise and vibration (construction and operation): • Drilling, piling, dredging, blasting activities • Increased vessel movements	Temporary avoidance
Visual (construction and operation): • Presence of vessels and onshore plant	Permanent avoidance

6.4.11.1 Fulmar (*Fulmarus glacialis*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 0.

Fulmar will be locally displaced from the development due to loss of habitat; however, with the availability of other habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although fulmar may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Fulmar will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.11.2 Gannet (*Morus bassanus*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Gannet will be locally displaced from the development due to loss of habitat; however, displacement will be limited and with the availability of other habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although gannet may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Gannet will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Increased Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.11.3 Puffin (*Fratercula artica*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Puffin will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although puffin will be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Puffin will be locally disturbed and displaced within the vicinity of the development due to construction and operational activities; however, with the mitigation measures proposed, there will be no adverse effect on site integrity.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.11.4 Razorbill (*Alca torda*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Razorbill will be locally disturbed within the vicinity of the development due to loss of habitat; however, with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although razorbill may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Razorbill will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Increased Collision Mortality

Generic and species specific risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.11.5 Guillemot (*Uria aalge*)

Loss of Habitat

Generic and species specific habitat loss issues are discussed in Section 6.4.1.1.

Guillemot will be locally disturbed within the vicinity of the development due to loss of habitat; however, with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2.

Although guillemot may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4.

Guillemot will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Increased Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.11.6 Sandwich Tern (*Thalasseus sandvicensis*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Sandwich tern will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and the provision of the breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although sandwich tern may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Sandwich tern will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.11.7 Common Tern (*Sterna hirundo*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Common tern will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and the provision of the breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although common tern may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Common tern will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.11.8 Kittiwake (*Rissa tridactyla*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Kittiwake will be locally displaced from the development due to loss of habitat; however, with the availability of other habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although kittiwake may be locally displaced within the vicinity of the development due to reduced prey availability, this will be highly localised and through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Kittiwake will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Increased Collision Mortality

Generic and species specific risk of collision mortality issues discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.11.9 Lesser Black-backed Gull (*Larus fuscus*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Lesser black-backed gull will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and the provision of the breakwaters, there will be no adverse effect on site integrity.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although lesser black-backed gull may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Lesser black-backed gull will be locally disturbed and displaced within the vicinity of the development due to construction and operational activities; however as it is an infrequent visitor there will be no adverse effect on site integrity.

Increased Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.11.10 Herring Gull (*Larus argentatus*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Herring gull will be locally displaced from the development due to loss of habitat; however, with the availability of other habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although herring gull may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Herring gull may will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Increased Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.11.11 Summary of Effects on Forth Islands SPA

Table 6.66: Summary of effects on the Forth Islands SPA (Fulmar)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Small population breeds locally to south of the development site	None	Breeding sites are outside of the development and do not form part of site integrity of this SPA.
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	yes	None	None, birds forage in the outer bay area, and have very wide foraging ranges
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 5.66: Summary of effects on the Forth Islands SPA (Fulmar) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	None – Breeding and foraging sites are outside development site	None	None
		Introduction of new seabed habitats	None		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.67: Summary of effects on the Forth Islands SPA (Gannet)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Birds likely to be displaced	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 107 km away, and disturbance effects are highly localised, gannet forage over wide areas so will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 5.67: Summary of effects on the Forth Islands SPA (Gannet) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature gannet is negligible.
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.68: Summary of effects on the Forth Islands SPA (Puffin)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 107 km away, and disturbance effects are highly localised, puffin will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	None	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Auks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 5.68: Summary of effects on the Forth Islands SPA (Puffin) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature puffin is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely	EMMP, Vessel routing plan,	None, effects highly localised
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.69: Summary of effects on the Forth Islands SPA (Razorbill)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 107 km away, and disturbance effects are highly localised, Razorbill will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Auks are prone to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 5.69: Summary of effects on the Forth Islands SPA (Razorbill) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature razorbill is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely although adults and juveniles are flightless during post breeding moult	EMMP, Vessel routing plan	None, effects highly localised
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.70: Summary of effects on the Forth Islands SPA (Guillemot)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 107 km away, and disturbance effects are highly localised, guillemot will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Auks are prone to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 5.70: Summary of effects on the Forth Islands SPA (Guillemot) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature guillemot is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely although adults and juveniles are flightless during post breeding moult	EMMP, Vessel routing plan	None, effects highly localised
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.71: Summary of effects on the Forth Islands SPA (Sandwich tern)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	Plume modelling suggests that 2mm of mud from the licenced disposal site could be deposited at the southern edge of the dSPA. This effect will be within natural variation and will not have aa adverse effect on site integrity. For all other effects there is no effect pathway.
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	Yes,		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Yes	None	None, Effects highly localised
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 5.71: Summary of Effects on the Forth Islands SPA (Sandwich tern) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes loss of rocky foreshore	Creation of breakwaters should provide roost and crèche sites	None
		Introduction of new seabed habitats	None		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.72: Summary of effects on the Forth Islands SPA (Common tern)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	None, effects highly localised, temporary and of short duration
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	Yes, reduction in visibility in foraging for prey		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 5.72: Summary of effects on the Forth Islands SPA (Common tern) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes loss of rocky foreshore	Creation of breakwaters should provide roost and crèche sites	None
		Introduction of new seabed habitats	None		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.73: Summary of effects on the Forth Islands SPA (Kittiwake)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Birds might be displaced, conversely some might be attracted.	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 107 km away, and disturbance effects are highly localised, kittiwake will be displaced to other suitable habitats along coast.
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 5.73: Summary of effects on the Forth Islands SPA (Kittiwake) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Breakwaters are likely to provide a roost site	None, amount of seabed lost in comparison with total habitat available to SPA feature kittiwake is negligible
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.74: Summary of effects on the Forth Islands SPA (Lesser black-backed gull)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Birds might be displaced, conversely some might be attracted.	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 107 km away, and disturbance effects are highly localised, lesser black-backed gull will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 5.74: Summary of effects on the Forth Islands SPA (Lesser black-backed gull) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes, lesser black-backed gull are a local breeder	Breakwaters are likely to provide a roost site	None, amount of seabed lost in comparison with total habitat available to SPA feature lesser black-backed gull is minuscule. Breeding areas will not be effected
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.75: Summary of effects on the Forth Islands SPA (Herring gull)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Birds might be displaced, conversely some might be attracted.	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 107 km away, and disturbance effects are highly localised, lesser black-backed gull will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 5.75: Summary of effects on the Forth Islands SPA (Herring gull) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes, lesser black-backed gull are a local breeder	Breakwaters are likely to provide a roost site	None, amount of seabed lost in comparison with total habitat available to SPA feature lesser black-backed gull is minuscule. Breeding areas will not be effected
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

6.4.12 Firth of Forth SPA

Eider, long-tailed duck, common scoter, velvet scoter, goldeneye, red-throated diver, oystercatcher, ringed plover, curlew, turnstone, redshank and sandwich tern are all designated features of the Firth of Forth SPA, which is located 101 km from the proposed development. The conservation objectives for the SPA can be viewed in Table 6.76. These species have been identified as having a LSE (Section 5.1.2.2) therefore require further consideration within an Appropriate Assessment.

Further information on each of these species is presented within ES Chapter 14: Marine Ornithology and a summary of the potential impacts of the project and effects on these bird species can be viewed in Table 6.77. A summary of the EIA findings, including an assessment of the effect of the project on the integrity of the SPA and its conservation objectives, can be viewed in Table 6.78 to Table 6.89.

Table 6.76: Firth of Forth SPA conservation objectives

Site Information	Details
Site Classification – Qualifying Species	**Article 4.1 of the Directive (Annex I Species):** • Sandwich tern (*Thalasseus sandvicensis*) 1,611 post-breeding individuals (on passage) representing at least 3.8% of the population in Great Britain • Red-throated diver (*Gavia stellata*) 88 non-breeding individuals representing at least 1.8% of the wintering population in Great Britain
	Article 4.2 of the Directive (Migratory Species): • Redshank (*Tringa tetanus*) 3,700 non-breeding individuals representing at least 2.5% of the wintering Eastern Atlantic population • Turnstone (*Arenaria interpres*) 1,286 non-breeding individuals representing at least 1.8% of the wintering Western Palearctic population
	Article 4.2 of the Directive (Assemblage qualification): Over winter, the area regularly supports 86,067 individual waterfowl. The (non-breeding) waterfowl assemblage includes: • Redshank (*Tringa tetanus*)
Site Classification – Qualifying Species Continued	• Turnstone (*Arenaria interpres*) • Red-throated diver (*Gavia stellata*) • Curlew (*Numenius arquata*) • Eider (*Somateria mollissima*) • Long-tailed duck (*Clangula hyemalis*) • Common scoter (*Melanitta nigra*) • Velvet scoter (*Melanitta fusca*) • Goldeneye (*Bucephala clangula*) • Oystercatcher (*Haematopus ostralegus*) • Ringed plover (*Charadrius hiaticula*)
Site Conservation Objectives	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species 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

Table 5.76: Firth of Forth SPA conservation objectives continued

Site Information	Details
Site Condition and Date of Assessment	Common scoter – unfavourable declining (19/10/10) Curlew – favourable maintained (20/10/10) Goldeneye – unfavourable declining (26/10/10) Golden plover – favourable maintained (26/10/10) Eider – favourable declining (26/10/10) Redshank – favourable maintained (27/10/10) Red-throated diver – favourable maintained (27/10/10) Long-tailed duck – unfavourable declining (27/10/10) Ringed plover – favourable maintained (27/10/10) Oystercatcher – favourable maintained (27/10/10) Turnstone – favourable maintained (01/11/10) Sandwich tern – favourable declining (01/11/10) Velvet scoter – favourable maintained (01/11/10) Waterfowl assemblage – favourable declining (01/11/10)

Table 6.77: Potential Impacts to Eider, Long-tailed duck, Common scoter, Velvet scoter, Goldeneye, Red-throated diver, Oystercatcher, Ringed plover, Curlew, Turnstone, Redshank and Sandwich tern of the Forth Islands SPA

Impact and Source	Nature of Impact on Receptor (Effect)
Introduction of infrastructure on the seabed (breakwaters and quays) - operation	Permanent loss of habitat and feeding grounds
Capital and maintenance dredging of inner basin and approach channel (construction and operation) • Seabed disturbance • Increased SSC	Permanent loss of habitat and feeding grounds Reduced prey availability
Reduced water chemical quality (construction and operation): • Accidental spills from vessels during construction and operation • Accidental spills from on-site storage of fuels and chemicals • Use of anti-fouling chemicals • Sediment disturbance (from dredging and propeller wash) – release of sediment contaminants and reduced DO	Avoidance Temporary loss of habitat and feeding grounds Reduced prey availability Mortality (in severe cases)
Seabed disturbances (construction and operation): • Capital dredging • Maintenance dredging • Seabed scour and changes to coastal processes • Increased turbidity and siltation	
Increased noise and vibration (construction and operation): • Drilling, piling, dredging, blasting activities • Increased vessel movements	Temporary avoidance
Visual (construction and operation): • Presence of vessels and onshore plant	Permanent avoidance

6.4.12.1 Eider (*Somateria mollissima*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Eider will be locally disturbed within the vicinity of the development due to loss of habitat; however, with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although eider will be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Eider will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific increased collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

With mitigation, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.12.2 Long-tailed Duck (*Clangula hyemalis*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Long-tailed duck will be locally disturbed within the vicinity of the development due to loss of habitat; however, with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although long-tailed duck will be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Long-tailed duck will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

With mitigation, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.12.3 Common Scoter (*Melanitta nigra*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Common scoter will be locally disturbed within the vicinity of the development due to loss of habitat; however, with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although common scoter will be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Common scoter will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

With mitigation, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.12.4 Velvet Scoter (*Melanitta fusca*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Velvet scoter will be locally disturbed within the vicinity of the development due to loss of habitat; however, with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although velvet scoter will be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Velvet scoter will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

With mitigation, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.12.5 Goldeneye (*Bucephala clangula*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Goldeneye will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and the provision of the breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although goldeneye may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Goldeneye will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

Following the proposed mitigation measures, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.12.6 Red-throated Diver (*Gavia stellata*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Red-throated diver will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and the mitigation measures proposed, there will be no adverse effect on site integrity.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although red-throated diver will be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Red-throated diver will be locally disturbed and displaced within the vicinity of the development due to construction and operational activities; however, with the mitigation measures proposed there will be no adverse effect on site integrity.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

Following the proposed mitigation measures, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.12.7 Oystercatcher (*Haematopus ostralegus*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Oystercatcher will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and provision of breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although oystercatcher will be locally displaced within the vicinity of the development due to reduced prey availability, this will be highly localised and through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Oystercatcher will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

Following the proposed mitigation measures, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.12.8 Ringed Plover (*Charadrius hiaticula*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Ringed plover will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and the provision of the breakwaters, there will be no adverse effect on site integrity.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although ringed plover will be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats there will be no adverse effect on site integrity.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Ringed plover will be locally disturbed and displaced within the vicinity of the development due to construction and operational activities; however, with the mitigation measures proposed there will be no adverse effect on site integrity.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

Following the proposed mitigation measures, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.12.9 Curlew (*Numenius arquata*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Curlew will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and provision of breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although curlew may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Curlew will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

Following the proposed mitigation measures, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.12.10 Turnstone (*Arenaria interpres*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Turnstone will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and the provision of the breakwaters, there will be no adverse effect on site integrity.

Reduced Prey Availability

Generic reduced prey availability issues common to all species are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although turnstone will be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats there will be no adverse effect on site integrity.

Reduced Water Quality

Generic reduced water quality issues common to all species are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic disturbance due to construction and operational activities common to all species is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Turnstone will be locally disturbed and displaced within the vicinity of the development due to construction and operational activities; however, with the mitigation measures proposed there will be no adverse effect on site integrity.

Risk of Collision Mortality

Generic risk of collision mortality issues common to all species are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

With mitigation, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.12.11 Redshank (*Tringa totanus)*

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Redshank will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and provision of breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although redshank may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Redshank will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

Following the proposed mitigation measures, there will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.12.12 Sandwich Tern (*Thalasseus sandvicensis*)

Loss of Habitat

Generic habitat loss issues common to all species are discussed in Section 6.4.1.1. An appraisal of species specific effects are discussed in Section 6.4.2.

Sandwich tern will be locally disturbed within the vicinity of the development due to loss of habitat loss; however with the availability of other habitats and the provision of the breakwaters, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Prey Availability

Generic and species specific reduced prey availability issues are discussed in Section 6.4.1.2. An appraisal of species specific effects are discussed in Section 6.4.2.

Although sandwich tern may be locally displaced within the vicinity of the development due to reduced prey availability, through the availability of alternative foraging habitats, there will be no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Reduced Water Quality

Generic and species specific reduced water quality issues are discussed in Section 6.4.1.3. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to reduced water quality, either singly or in-combination with other plans or projects.

Disturbance Due to Construction and Operational Activities

Generic and species specific disturbance due to construction and operational activities is discussed in Section 6.4.1.4. An appraisal of species specific effects are discussed in Section 6.4.2.

Sandwich tern will be locally displaced within the vicinity of the development; however, the extent of disturbance due to construction and operational activities as a proportion of the total coastline will, together with proposed mitigation, have no adverse effect on site integrity, either singly or in-combination with other plans or projects.

Risk of Collision Mortality

Generic and species specific risk of collision mortality issues are discussed in Section 6.4.1.5. An appraisal of species specific effects are discussed in Section 6.4.2.

There will be no adverse effect on site integrity due to increased collision risk, either singly or in-combination with other plans or projects.

6.4.12.13 Summary of Effects on Firth of Forth SPA

Table 6.78: Summary of effects on the Firth of Forth SPA (Eider)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 101 km away, and disturbance effects are highly localised, eider will be displaced to other suitable habitats along coast.
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 6.78: Summary of effects on the Firth of Forth SPA (Eider) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature eiders is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	yes	EMMP, Vessel routing plan,	Yes, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely although adults are flightless during post breeding moult	EMMP, Vessel routing plan	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised, temporary and of short duration
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised temporary and of short duration
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.79: Summary of effects on the Firth of Forth SPA (Long-tailed duck)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 101 km away, and disturbance effects are highly localised, long-tailed duck will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 6.79: Summary of effects on the Firth of Forth SPA (Long-tailed duck) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature Long-tailed duck is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.80: Summary of effects on the Firth of Forth SPA (Common scoter)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 101 km away, and disturbance effects are highly localised, common scoter will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 6.80: Summary of effects on the Firth of Forth SPA (Common scoter) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature common scoter is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	None Unlikely to suffer collision, but general displacement likely to occur, birds also flightless during post breeding moult	EMMP, Vessel routing plan,	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.81: Summary of effects on the Firth of Forth SPA (Velvet scoter)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 101 km away, and disturbance velvet scoters are highly localised, eider will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 6.81: Summary of effects on the Firth of Forth SPA (Velvet scoter) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature velvet scoter is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.82: Summary of effects on the Firth of Forth SPA (Goldeneye)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None, SPA is 101 km away, and disturbance effects are highly localised, goldeneye will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 6.82: Summary of effects on the Firth of Forth SPA (Goldeneye) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature goldeneye is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.83: Summary of effects on the Firth of Forth SPA (Red-throated diver)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, SPA is 101 km away, and disturbance effects are highly localised, red-throated diver will be displaced to other suitable habitats along coast
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Divers are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	None
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	None

Table 6.83: Summary of effects on the Firth of Forth SPA (Red-throated diver) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	None, amount of seabed lost in comparison with total habitat available to SPA feature red-throated diver is negligible.
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	None, effects highly localised
	Increased vessel movements	Increased collision risk between birds and vessels	None birds are displaced by vessel movements	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	None, effects highly localised
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

Table 6.84: Summary of effects on the Firth of Forth SPA (Oystercatcher)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None,
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, oystercatcher are sensitive to sudden loud noise	None	None, effects highly localised , temporary and of short duration
	Increased physical seabed disturbance	Seabed habitat disturbances	None		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	None	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.84: Summary of effects on the Firth of Forth SPA (Oystercatcher)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Creation of breakwaters should provide roosting sites	None
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour,	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour,	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	Yes	Dimmed lighting, and directional lighting	None

Table 6.85: Summary of effects on the Firth of Forth SPA (Ringed plover)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None,
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, ringed plover are sensitive to sudden loud noise	None	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	None		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.85: Summary of effects on the Firth of Forth SPA (Ringed plover) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Creation of breakwaters should provide roosting sites	None
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	Yes	Dimmed lighting, and directional lighting	None, based on low/negligible numbers of birds using the site

Table 6.86: Summary of effects on the Firth of Forth SPA (Curlew)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None,
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, curlew are sensitive to sudden loud noise	None	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	None		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.86: Summary of effects on the Firth of Forth SPA (Curlew) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Creation of breakwaters should provide roosting sites	None
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour,	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour,	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	Yes	Dimmed lighting, and directional lighting	None, based on low/negligible numbers of birds using the site

Table 6.87: Summary of effects on the Firth of Forth SPA (Turnstone)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None,
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, turnstone are sensitive to sudden loud noise	None	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	None		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.87: Summary of effects on the Firth of Forth SPA (Turnstone) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Creation of breakwaters should provide roosting sites	None
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	Yes	Dimmed lighting, and directional lighting	None, based on low/negligible numbers of birds using the site

Table 6.88: Summary of effects on the Firth of Forth SPA (Redshank)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None,
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, redshank are sensitive to sudden loud noise	None	None, effects highly localised
	Increased physical seabed disturbance	Seabed habitat disturbances	None		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	None	None	None
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.88: Summary of effects on the Firth of Forth SPA (Redshank) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Creation of breakwaters should provide roosting sites	None
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	Yes	Dimmed lighting, and directional lighting	None, based on low/negligible numbers of birds using the site

Table 6.89: Summary of effects on the Firth of Forth SPA (Sandwich tern)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	None
Drilling			None	None	None
Blasting			None	None	None
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	None, effects highly localised and of short duration.
	Increased physical seabed disturbance	Seabed habitat disturbances	Localised reduction in potential prey abundance.		
		Increased SSC	None		
		Deposition of sediment plumes	Yes, reduction in visibility in foraging for prey		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Yes	None	None, Effects highly localised
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None

Table 6.89: Summary of effects on the Firth of Forth SPA (Sandwich tern) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes loss of rocky foreshore	Creation of breakwaters should provide roost and crèche sites	None
		Introduction of new seabed habitats	None		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	None
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	None
	Vessel noise	Avoidance due to increased vessel noise and presence	None	None	None
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	None
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	None
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	None
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	None

6.4.13 Outer Firth of Forth and Tay Bay Complex dSPA

Eider, long-tailed duck, common scoter, velvet scoter, goldeneye, red-throated diver, gannet, puffin, razorbill, guillemot, common tern, kittiwake, common gull and herring gull are proposed qualifying features of the Outer Firth of Forth and Tay Bay Complex dSPA, which is located 70 km from the proposed development. As a draft site, no conservation objectives are currently set. Further information on these proposed qualifying species is presented within ES Chapter 14: Marine Ornithology.

No conservation objectives currently exist for the potential draft SPA (dSPA) designation that has been discussed in respect of these species. Until the Scottish Ministers issue a decision on the progression of the designation, and until formal conservation objectives are issued, the effect of the project on the integrity of the Outer Firth of Forth and Tay Bay Complex dSPA cannot be fully assessed. However, a summary of the potential impacts of the project and effects on the qualifying species can be viewed in Table 6.90 and a summary of the EIA findings can be viewed in Table 6.91 to Table 6.104.

Table 6.90: Potential Impacts to Eider, Long-tailed duck, Common scoter, Velvet scoter, Goldeneye, Red-throated diver, Gannet, Puffin, Razorbill, Guillemot, Common tern, Kittiwake, Common gull and Herring gull of the Outer Firth of Forth and Tay Bay Complex dSPA

Impact and Source	Nature of Impact on Receptor (Effect)
Introduction of infrastructure on the seabed (breakwaters and quays) - operation	Permanent loss of habitat and feeding grounds
Capital and maintenance dredging of inner basin and approach channel (construction and operation) • Seabed disturbance • Increased SSC	Permanent loss of habitat and feeding grounds Reduced prey availability
Reduced water chemical quality (construction and operation): • Accidental spills from vessels during construction and operation • Accidental spills from on-site storage of fuels and chemicals • Use of anti-fouling chemicals • Sediment disturbance (from dredging and propeller wash) – release of sediment contaminants and reduced DO	Avoidance Temporary loss of habitat and feeding grounds Reduced prey availability Mortality (in severe cases)
Seabed disturbances (construction and operation): • Capital dredging • Maintenance dredging • Seabed scour and changes to coastal processes • Increased turbidity and siltation	
Increased noise and vibration (construction and operation): • Drilling, piling, dredging, blasting activities • Increased vessel movements	Temporary avoidance
Visual (construction and operation): • Presence of vessels and onshore plant	Permanent avoidance

6.4.13.1 Summary of Effects on Outer Firth of Forth and Tay Bay Complex dSPA

Table 6.91: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Eider)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are prone to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.91: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Eider) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely although adults are flightless during post breeding moult	EMMP, Vessel routing plan,	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.92: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Long-tailed duck)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.92: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Long-tailed duck) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.93: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Common scoter)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.93: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Common scoter) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None Unlikely to suffer collision, but general displacement likely to occur, birds also flightless during post breeding moult	EMMP, Vessel routing plan,	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.94: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Velvet scoter)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.94: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Velvet scoter) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.95: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Goldeneye)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.95: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Goldeneye) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.96: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Red-throated diver)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Divers are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.96: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Red-throated diver) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None birds are displaced by vessel movements	None	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.97: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Gannet)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Birds likely to be displaced.	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	N/A

Table 6.97: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Gannet) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.98: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Puffin)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	None	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Auks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.98: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Puffin) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely	EMMP, Vessel routing plan,	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.99: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Razorbill)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	None	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Auks are prone to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.99: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Razorbill) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely although adults and juveniles are flightless during post breeding moult	EMMP, Vessel routing plan,	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.100: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Guillemot)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Auks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.100: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Guillemot) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely although adults and juveniles are flightless during post breeding moult	EMMP, Vessel routing plan,	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.101: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Common tern)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	None		
		Increased SSC	None		
		Deposition of sediment plumes	Yes, reduction in visibility in foraging for prey		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	N/A

Table 6.101: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Common tern) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes loss of rocky foreshore	Creation of breakwaters should provide roost and crèche sites	N/A
		Introduction of new seabed habitats	None		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	None	None	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.102: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Kittiwake)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Birds might be displaced, conversely some might be attracted.	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	N/A

Table 6.102: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Kittiwake) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Breakwaters are likely to provide a roost site	N/A
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.103: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Common gull)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Birds might be displaced, conversely some might be attracted.	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	N/A

Table 6.103: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Common gull) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	Breakwaters are likely to provide a roost site	N/A
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.104: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Herring gull)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Birds likely to be displaced.	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	N/A

Table 6.104: Summary of effects on the Outer Firth of Forth and Tay Bay Complex dSPA (Herring gull) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Yes		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

6.4.14 Ythan Estuary and Sands of Forvie dSPA

Little tern and sandwich tern are proposed qualifying features of the Ythan Estuary and Sands of Forvie dSPA, which is located 2.5 km from the proposed development. As a draft site, no conservation objectives are currently set. Further information on little tern and sandwich tern is presented within ES Chapter 14: Marine Ornithology.

No conservation objectives currently exist for the potential draft SPA (dSPA) designation that has been discussed in respect of little tern and sandwich tern. Until the Scottish Ministers issue a decision on the progression of the designation, and until formal conservation objectives are issued, the effect of the project on the integrity of the Ythan Estuary and Sands of Forvie dSPA cannot be fully assessed. However, a summary of the potential impacts of the project and effects on the proposed qualifying species can be viewed in Table 6.105 and a summary of the EIA findings can be viewed in Table 6.106 and Table 5.108.

Table 6.105: Potential Impacts to Little tern and Sandwich tern of the Ythan Estuary and Sands of Forvie SPA

Impact and Source	Nature of Impact on Receptor (Effect)
Introduction of infrastructure on the seabed (breakwaters and quays) - operation	Permanent loss of habitat and feeding grounds
Capital and maintenance dredging of inner basin and approach channel (construction and operation) • Seabed disturbance • Increased SSC	Permanent loss of habitat and feeding grounds Reduced prey availability
Reduced water chemical quality (construction and operation): • Accidental spills from vessels during construction and operation • Accidental spills from on-site storage of fuels and chemicals • Use of anti-fouling chemicals • Sediment disturbance (from dredging and propeller wash) – release of sediment contaminants and reduced DO	Avoidance Temporary loss of habitat and feeding grounds Reduced prey availability Mortality (in severe cases)
Seabed disturbances (construction and operation): • Capital dredging • Maintenance dredging • Seabed scour and changes to coastal processes • Increased turbidity and siltation	
Increased noise and vibration (construction and operation): • Drilling, piling, dredging, blasting activities • Increased vessel movements	Temporary avoidance
Visual (construction and operation): • Presence of vessels and onshore plant	Permanent avoidance

6.4.14.1 Summary of Effects on Ythan Estuary and Sands of Forvie dSPA

Table 6.106: Summary of effects on the Ythan Estuary and Sands of Forvie dSPA (Little tern)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	None		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	None	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	N/A

Table 6.106: Summary of effects on the Ythan Estuary and Sands of Forvie dSPA (Little tern) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	None	None	N/A
		Introduction of new seabed habitats	None		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	None	None	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.107: Summary of effects on the Ythan Estuary and Sands of Forvie dSPA (Sandwich tern)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	None		
		Increased SSC	None		
		Deposition of sediment plumes	Yes, reduction in visibility in foraging for prey		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Yes	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	None	None	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	N/A

Table 6.107: Summary of effects on the Ythan Estuary and Sands of Forvie dSPA (Sandwich tern) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes loss of rocky foreshore	Creation of breakwaters should provide roost and crèche sites	N/A
		Introduction of new seabed habitats	None		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	None	None	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	None	None	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

6.4.15 Moray Firth dSPA

Eider, long-tailed duck, common scoter, velvet scoter, goldeneye, red-throated diver and great northern diver are proposed qualifying features of the Moray Firth dSPA, which is located 118 km from the proposed development. As a draft site, no conservation objectives are currently set. Further information on the proposed qualifying species is presented within ES Chapter 14: Marine Ornithology.

No conservation objectives currently exist for the potential draft SPA (dSPA) designation that has been discussed in respect of these species. Until the Scottish Ministers issue a decision on the progression of the designation, and until formal conservation objectives are issued, the effect of the project on the integrity of the Moray Firth dSPA cannot be fully assessed. However, a summary of the potential impacts of the project and effects on the proposed qualifying species can be viewed in Table 6.108 and a summary of the EIA findings can be viewed in Table 6.109 to Table 15.116.

Table 6.108: Potential Impacts to Eider, Long-tailed duck, Common scoter, Velvet scoter, Goldeneye, Red-throated diver and Great northern diver of the Moray Firth dSPA

Impact and Source	Nature of Impact on Receptor (Effect)
Introduction of infrastructure on the seabed (breakwaters and quays) - operation	Permanent loss of habitat and feeding grounds
Capital and maintenance dredging of inner basin and approach channel (construction and operation) • Seabed disturbance • Increased SSC	Permanent loss of habitat and feeding grounds Reduced prey availability
Reduced water chemical quality (construction and operation): • Accidental spills from vessels during construction and operation • Accidental spills from on-site storage of fuels and chemicals • Use of anti-fouling chemicals • Sediment disturbance (from dredging and propeller wash) – release of sediment contaminants and reduced DO	Avoidance Temporary loss of habitat and feeding grounds Reduced prey availability Mortality (in severe cases)
Seabed disturbances (construction and operation): • Capital dredging • Maintenance dredging • Seabed scour and changes to coastal processes • Increased turbidity and siltation	
Increased noise and vibration (construction and operation): • Drilling, piling, dredging, blasting activities • Increased vessel movements	Temporary avoidance
Visual (construction and operation): • Presence of vessels and onshore plant	Permanent avoidance

6.4.15.1 Summary of Effects on Moray Firth dSPA

Table 6.109: Summary of effects on the Moray Firth dSPA (Eider)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are prone to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.109: Summary of effects on the Moray Firth dSPA (Eider) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely although adults are flightless during post breeding moult	EMMP, Vessel routing plan,	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.110: Summary of effects on the Moray Firth dSPA (Long-tailed duck)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.110: Summary of effects on the Moray Firth dSPA (Long-tailed duck) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.111: Summary of effects on the Moray Firth dSPA (Common scoter)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.111: Summary of effects on the Moray Firth dSPA (Common scoter) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None Unlikely to suffer collision, but general displacement likely to occur, birds also flightless during post breeding moult	EMMP, Vessel routing plan,	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.112: Summary of effects on the Moray Firth dSPA (Velvet scoter)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.112: Summary of effects on the Moray Firth dSPA (Velvet scoter) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.113: Summary of effects on the Moray Firth dSPA (Goldeneye)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.113: Summary of effects on the Moray Firth dSPA (Goldeneye) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.114: Summary of effects on the Moray Firth dSPA (Red-throated diver)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Divers are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.114: Summary of effects on the Moray Firth dSPA (Red-throated diver) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None birds are displaced by vessel movements	None	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.115: Summary of effects on the Moray Firth dSPA (Great northern diver)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Divers are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.115: Summary of effects on the Moray Firth dSPA (Great northern diver) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

6.4.16 Pentland Firth and Scapa Flow dSPA

Eider, long-tailed duck, goldeneye, red-throated diver, black-throated diver, great northern diver and guillemot are proposed qualifying features of the Pentland Firth and Scapa Flow dSPA, which is located 180 km from the proposed development. As a draft site, no conservation objectives are currently set. Further information on the proposed qualifying species is presented within ES Chapter 14: Marine Ornithology.

No conservation objectives currently exist for the potential draft SPA (dSPA) designation that has been discussed in respect of these species. Until the Scottish Ministers issue a decision on the progression of the designation, and until formal conservation objectives are issued, the effect of the project on the integrity of the Pentland Firth and Scapa Flow dSPA cannot be fully assessed. However, a summary of the potential impacts of the project and effects on the proposed qualifying species can be viewed in Table 6.116 and a summary of the EIA findings can be viewed in Table 6.117 to Table 6.123.

Table 6.116: Potential Impacts to Eider, Long-tailed duck, Common scoter, Velvet scoter, Goldeneye, Red-throated diver and Great northern diver of the Moray Firth dSPA

Impact and Source	Nature of Impact on Receptor (Effect)
Introduction of infrastructure on the seabed (breakwaters and quays) - operation	Permanent loss of habitat and feeding grounds
Capital and maintenance dredging of inner basin and approach channel (construction and operation) • Seabed disturbance • Increased SSC	Permanent loss of habitat and feeding grounds Reduced prey availability
Reduced water chemical quality (construction and operation): • Accidental spills from vessels during construction and operation • Accidental spills from on-site storage of fuels and chemicals • Use of anti-fouling chemicals • Sediment disturbance (from dredging and propeller wash) – release of sediment contaminants and reduced DO	Avoidance Temporary loss of habitat and feeding grounds Reduced prey availability Mortality (in severe cases)
Seabed disturbances (construction and operation): • Capital dredging • Maintenance dredging • Seabed scour and changes to coastal processes • Increased turbidity and siltation	
Increased noise and vibration (construction and operation): • Drilling, piling, dredging, blasting activities • Increased vessel movements	Temporary avoidance
Visual (construction and operation): • Presence of vessels and onshore plant	Permanent avoidance

6.4.16.1 Summary of Effects on Pentland Firth and Scapa Flow dSPA

Table 6.117: Summary of effects on the Pentland Firth and Scapa Flow dSPA (Eider)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are prone to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.117: Summary of effects on the Pentland Firth and Scapa Flow dSPA (Eider) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely although adults are flightless during post breeding moult	EMMP, Vessel routing plan,	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.118: Summary of effects on the Pentland Firth and Scapa Flow dSPA (Long-tailed duck)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.118: Summary of effects on the Pentland Firth and Scapa Flow dSPA (Long-tailed duck) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.119: Summary of effects on the Pentland Firth and Scapa Flow dSPA (Goldeneye)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Sea ducks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.119: Summary of effects on the Pentland Firth and Scapa Flow dSPA (Goldeneye) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.120: Summary of effects on the Pentland Firth and Scapa Flow dSPA (Red-throated diver)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Divers are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.120: Summary of effects on the Pentland Firth and Scapa Flow dSPA (Red-throated diver) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None birds are displaced by vessel movements	None	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.121: Summary of effects on the Pentland Firth and Scapa Flow dSPA (Black-throated diver)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Divers are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.121: Summary of effects on the Pentland Firth and Scapa Flow dSPA (Black-throated diver) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.122: Summary of effects on the Pentland Firth and Scapa Flow dSPA (Great northern diver)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Divers are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.122: Summary of effects on the Pentland Firth and Scapa Flow dSPA (Great northern diver) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	None	None	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater to provide noise barrier on outside edge of harbour, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

Table 6.123: Summary of effects on the Pentland Firth and Scapa Flow dSPA (Guillemot)

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Construction					
Piling	In-air noise and vibration	Disturbance and avoidance	None	None	N/A
Drilling			None	None	N/A
Blasting			None	None	N/A
Dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes, birds are likely to be displaced, either elsewhere in the Bay or further afield	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Destruction of potential prey		
		Increased SSC	None		
		Deposition of sediment plumes	None		
		Temporary release of sediment contaminants	None		
		Reduced prey availability	Localised	None	N/A
Construction vessel and plant activities	Accidental spills	Water quality changes Increase in bioavailability of sediment contaminants	Auks are vulnerable to oil spills	EMMP Marine Pollution Contingency Plans (MPCP)	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely to suffer collision, but general displacement likely to occur	EMMP, Vessel routing plan, exclusion zones, co-ordination between MMOs/ECoW, Guard Vessel and Marine Co-ordinators	N/A

Table 6.123: Summary of effects on the Pentland Firth and Scapa Flow dSPA (Guillemot) continued

Activity	Impact	Effect	Effect Pathway	Proposed Mitigation	Adverse Effect on Site Integrity
Operation					
Infrastructure foundations and scour material	Footprint on the seabed	Net loss of habitat	Yes	None	N/A
		Introduction of new seabed habitats	Potentially beneficial, although depends on level of disturbance to whether this new habitat can be exploited		
	Retention of pollutants entering Nigg Bay	Water quality changes	None	None	N/A
Vessel movements	Disturbance of seabed by propellers	Temporary increases in SSC and reduced prey availability	None	None	N/A
	Vessel noise	Avoidance due to increased vessel noise and presence	Yes	EMMP, Vessel routing plan,	N/A
	Increased vessel movements	Increased collision risk between birds and vessels	Unlikely although adults and juveniles are flightless during post breeding moult	EMMP, Vessel routing plan,	N/A
Maintenance dredging and disposal of dredged material	In-air noise and vibration	Disturbance and avoidance	Yes	Construction of breakwater, EMMP, post construction monitoring, vessel routing plan and exclusion zones	N/A
	Increased physical seabed disturbance	Seabed habitat disturbances	Yes	EMMP	N/A
		Increased SSC			
		Deposition of sediment plumes			
		Temporary release of sediment contaminants			
		Reduced prey availability			
Safety or navigational lighting or shading from buildings or over-water structures	Changes to the ambient underwater illumination	Behavioural changes	None	None	N/A

7. CONCLUSION

This HRA is submitted to Marine Scotland, Aberdeen City Council, Transport Scotland and their statutory nature conservation advisors, SNH and JNCC, to enable an AA to be undertaken on the following Natura 2000 sites and qualifying species:

- River Dee SAC: Atlantic salmon, otter and freshwater pearl mussel;
- Moray Firth SAC: bottlenose dolphin;
- Isle of May SAC: grey seal;
- Berwickshire and North Northumberland Coase SAC: grey seal;
- Ythan Estuary, Sands of Forvie and Meikle Loch SPA: eider, redshank, little tern, sandwich tern and common tern;
- Fowlsheugh SPA: fulmar, razorbill, guillemot, kittiwake, herring gull;
- Buchan Ness to Collieston Coast SPA: fulmar, guillemot, kittiwake, herring gull;
- Montrose Basin SPA: eider, oystercatcher, redshank;
- Loch of Strathbeg SPA: sandwich tern;
- Inner Moray Firth SPA: goldeneye, oystercatcher, curlew, redshank, common tern;
- Troup, Pennan and Lion's Heads SPA: fulmar, razorbill, guillemot, kittiwake, herring gull;
- Firth of Tay and Eden Estuary SPA: eider, long-tailed duck, common scoter, velvet scoter, goldeneye, oystercatcher, redshank, little tern;
- Forth Islands SPA: fulmar, gannet, puffin, razorbill, guillemot, sandwich tern, common tern, kittiwake, lesser black-backed gull, herring gull;
- Firth of Forth SPA: eider, long-tailed duck, common scoter, velvet scoter, goldeneye, red-throated diver, oystercatcher, ringed plover, curlew, turnstone, redshank, sandwich tern.

Based on data obtained from site specific surveys and the published information available from SNH and JNCC websites, it is considered that sufficient information is presented within the HRA to inform an AA. It is also anticipated that, based on the information presented, there will be no adverse effect on site integrity of the SACs and SPAs listed above.

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