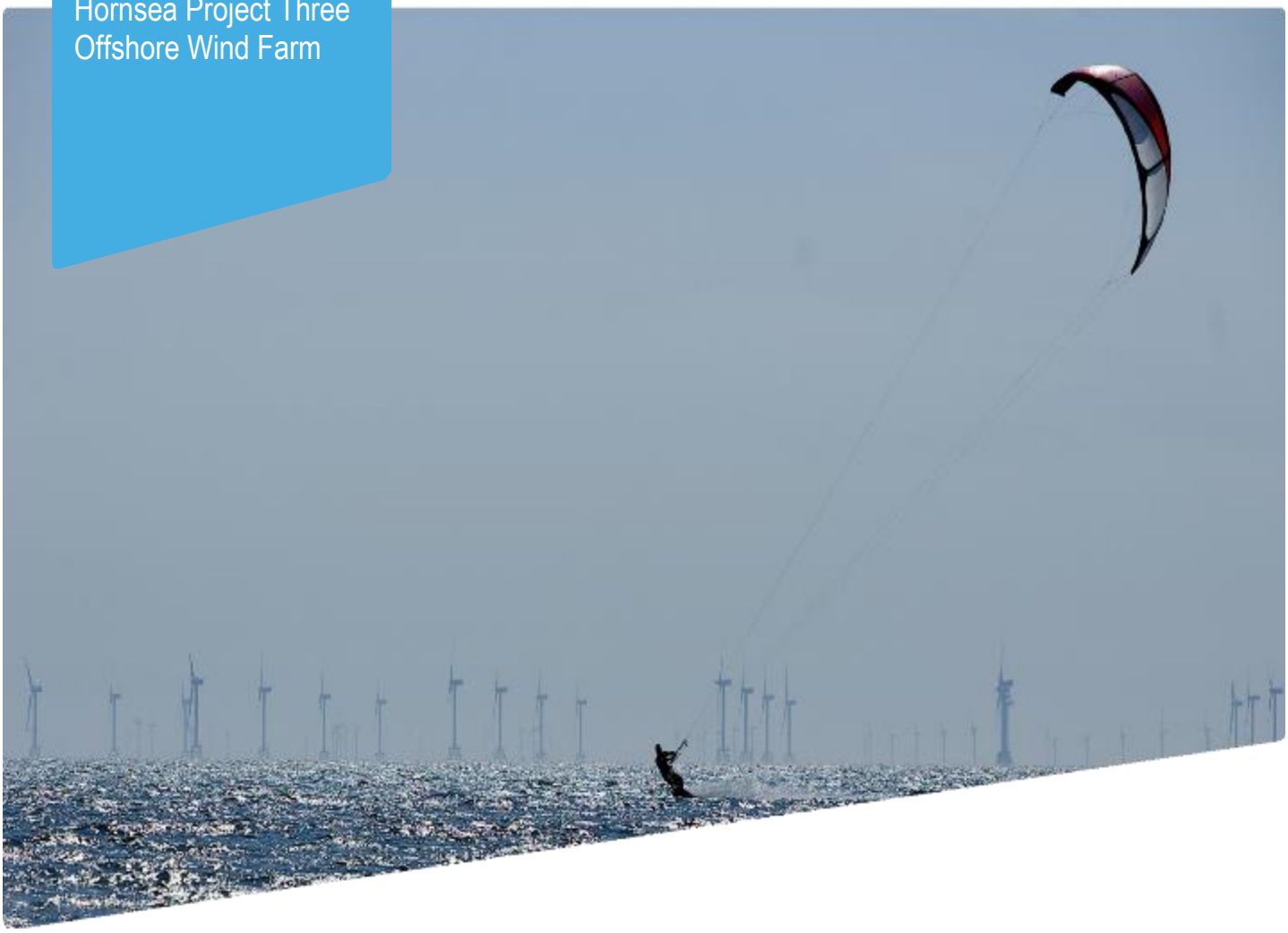
Hornsea Project Three
Offshore Wind Farm



Hornsea Project Three

Offshore Wind Farm

Appendix 38 to Deadline 7 submission – Neart na Gaoithe HRA

Date: 14th March 2019

Hornsea 3
Offshore Wind Farm

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Front cover picture: Kite surfer near a UK offshore wind farm © Ørsted Hornsea Project Three (UK) Ltd., 2019.

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APPROPRIATE ASSESSMENT FOR THE NEART NA GAOITHE OFFSHORE WIND FARM.

SCOTTISH MINISTERS' ASSESSMENT OF THE PROJECT'S IMPLICATIONS FOR DESIGNATED SPECIAL AREAS OF CONSERVATION ("SAC"), SPECIAL PROTECTION AREAS ("SPA") AND PROPOSED SPECIAL PROTECTION AREAS ("pSPA") IN VIEW OF THE SITES' CONSERVATION OBJECTIVES.

APPLICATION FOR CONSENT UNDER SECTION 36 OF THE ELECTRICITY ACT 1989 (AS AMENDED) AND FOR MARINE LICENCES UNDER THE MARINE (SCOTLAND) ACT 2010 FOR THE CONSTRUCTION AND OPERATION OF THE NEART NA GAOITHE OFFSHORE WIND FARM AND ASSOCIATED OFFSHORE TRANSMISSION INFRASTRUCTURE.

SITE DETAILS: NEART NA GAOITHE OFFSHORE WIND FARM AND EXPORT CABLE CORRIDOR BOUNDARY – APPROXIMATELY 15.5KM EAST OF FIFE NESS IN THE FIRTH OF FORTH.

Name	**Assessor or Approver**	**Date**
[Redacted]	Assessor	09/10//2018
[Redacted]	Assessor	09/10/2018
[Redacted]	Approver	02/11/2018

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SECTION 1: BACKGROUND

1 Introduction

1.1.1 This appropriate assessment ("AA") relates to the application ("the Application") submitted by Neart na Gaoithe Offshore Wind Ltd ("NnGOWL" or "the Company") for consent under section 36 ("s.36") of the Electricity Act 1989 (as amended) ("the Electricity Act 1989") to construct and operate an offshore generating station 15.5km to the east of Fife Ness in the Firth of Forth ("the Development"), comprising up to 54 wind turbine generators ("WTGs"), with a combined maximum generating output of around 450MW.

1.1.2 The assessment has been undertaken by Scottish Ministers and is required under regulation 48 of the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and regulation 63 of the Conservation of Habitats and Species Regulations 2017 (herein collectively referred to as "the Habitats Regulations"). This AA is in accordance with Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora ("the Habitats Directive") and Council Directive 2009/147/EC on the conservation of wild birds ("the Birds Directive"). Scottish Ministers, as the competent authority under the Habitats Regulations, must be satisfied that the Development will not adversely affect the integrity of any European site or European offshore marine site (special areas of conservation ("SAC") and special protection areas ("SPA")) either in isolation or in-combination with other plans or projects before they can grant consent for the Development.

1.1.3 A detailed AA has been undertaken and Scottish Natural Heritage ("SNH") has been consulted.

2 Appropriate assessment ("AA") conclusion

2.1.1 This AA concludes that there will be no adverse effects on the site integrity of the Forth Islands SPA, Fowlsheugh SPA, St Abb's Head to Fast Castle SPA, Buchan Ness to Collieston Coast SPA, Outer Firth of Forth and St Andrews Bay Complex pSPA, Moray Firth SAC, Firth of Tay and Eden Estuary SAC, Berwickshire and North Northumberland Coast SAC or Isle of May SAC (where each SAC, SPA or pSPA is taken as a whole) from the Development either in isolation or in-combination with other plans or projects, providing that the conditions set out in Section 4 are complied with.

2.1.2 Scottish Ministers consider that the most up to date and best scientific evidence available has been used in reaching the conclusion that the Development will not

adversely affect the integrity of these sites and are satisfied that no reasonable scientific doubt remains.

3 Background to including assessment of proposed SPAs

3.1.1 In Scotland, the Scottish Ministers are currently in the process of identifying a suite of new marine SPAs. In 2014, advice was received from the statutory nature conservation bodies ("SNCBs") on the sites most suitable for designation and at this stage they became draft SPAs ("dSPA"). Once the Scottish Ministers have agreed the case for a dSPA to be the subject of a public consultation, the proposal is given the status of proposed SPA ("pSPA") and receives policy protection, which effectively offers the sites the same level of protection as designated sites, from that point forward until a decision on classification of the site is made. This policy protection for pSPAs is provided by Scottish Planning Policy (paragraph 210), the UK Marine Policy Statement (paragraph 3.1.3) and Scotland's National Marine Plan (paragraph 4.45).

3.1.2 It is not a legal requirement under the Habitats Directive or the Habitats Regulations for this assessment to assess the implications of the Development on any pSPAs. This AA includes an assessment of implications upon these sites in accordance with domestic policy. The Scottish Ministers are also required to consider article 4(4) of the Birds Directive in respect of pSPAs. The considerations under article 4(4) of the Birds Directive are separate and distinct to the considerations which must be assessed under this Habitats Directive assessment but they are, nevertheless, set out within this AA (see paragraphs 22.4.1-22.4.2).

3.1.3 In accordance with the Habitats Regulations the Scottish Ministers will, as soon as reasonably practicable following the formal designation of the pSPA, review their decisions if the Development is authorised. If required this will include a supplementary AA being undertaken concerning the implications of the Development on the site as designated (as the site is currently a pSPA, at present, the conservation objectives are in draft form and will be finalised at the point that the site is designated).

4 Details of proposed operation

4.1.1 NnGOWL has submitted two separate marine licence applications in respect of the generating station and the transmission works under part 4 of the Marine (Scotland) Act 2010. In addition, NnGOWL has submitted an Application for s.36 consent under in respect of the Development. A full description of the Development can be found in Chapter 4 of the Environmental Impact Assessment Report ("EIA Report") (as submitted in March 2018). The s.36 consent and marine licences applied for are for a period of 50 years.

4.1.2 NnGOWL proposes to construct and operate a large-scale offshore wind farm and associated offshore transmission infrastructure, located 15.5km to the east of Fife Ness in the Firth of Forth. This Development will consist of a maximum of 54 WTGs. The turbine foundations will consist of a steel lattice jacket with a piled foundation design. In addition to the WTGs, up to two offshore substation platforms ("OSPs") and one meteorological mast is proposed. Should two OSPs be installed, an inter-connector cable will be required to connect the OSPs. Two 43km offshore export cables ("OECs") are proposed, which will run from the OSPs to the landfall point at Thorntonloch, south of Torness Power Station in East Lothian.

4.1.3 NnGOWL previously received s.36 consent and associated marine licences to construct and operate the Neart na Gaoithe Offshore Wind Farm in October 2014 ("the Original Consent"). At the time of granting the Original Consent, a combined AA ("the 2014 AA") was completed for the Original Consent, Inch Cape Offshore Wind Farm, Seagreen Alpha Offshore Wind Farm and Seagreen Bravo Offshore Wind Farm (collectively known as the "Forth and Tay Developments"). The Forth and Tay Developments were subject to judicial review proceedings, and although the consents have been upheld, the projects have not been built out.

4.1.4 Inch Cape Offshore Limited ("ICOL") submitted s.36 consent and marine licence applications in respect of the revised design for the Inch Cape Offshore Wind Farm and transmission infrastructure in August 2018. Seagreen Wind Energy Limited ("Seagreen") submitted s.36 consent and marine licence applications in respect of revised designs for the Seagreen Alpha and Seagreen Bravo Offshore Wind Farms in September 2018 (Seagreen have not submitted marine licence applications for the transmission infrastructure as the marine licences issued in 2014 are still valid, and this part of the project has not changed). In this AA, the Inch Cape and Seagreen 2018 applications are referred to as 2017 scenarios, as the projects were considered by NnGOWL as detailed in the Inch Cape and Seagreen 2017 scoping reports.

4.1.5 The 2014 AA concluded that the Forth and Tay Developments would not adversely affect any European sites or European offshore marine sites, either in isolation or in-combination with other plans and projects.

4.1.6 The Original Consent was subsequently varied in 2015 to increase the maximum rated turbine capacity and the maximum turbine hub heights and platform heights ("the Original Varied Consent"). An AA was undertaken in 2015 ("the 2015 AA") to assess these impacts. The 2015 AA concluded that the Original Varied Consent would not adversely affect any European sites or European offshore marine sites either in isolation or in-combination with other plans and projects.

4.1.7 NnGOWL submitted a scoping report and a request for a scoping opinion to Scottish Ministers in May 2017. Following consultation with statutory and other consultees, a scoping opinion in respect of the Development was issued by Scottish Ministers on 8 September 2017 ("Scoping Opinion"), advising on the scope of assessment required in respect of the Application. The Scoping Opinion included advice on the Habitats Regulations Appraisal ("HRA") requirements and advised that information to inform the HRA ("HRA Report") must be submitted in conjunction with the EIA Report.

4.1.8 The Application has been developed and proposed in order to take advantage of technological developments in the intervening time period since the Original Varied Consent was granted. Table 1 below provides a summary of the parameters of the design envelopes for the Development and the Original Varied Consent.

Table 1 Comparison of the Development and Original Varied Consent Envelope Parameters

Design Envelope Parameter	**Development**	**Original Varied Consent**
Maximum number of WTGs	54	75
Maximum rotor tip height (above LAT)	208 metres	197 metres
Maximum hub height	126 metres	115 metres
Maximum rotor diameter	167 metres	126-152 metres
Minimum spacing between WTGs	800 metres	450 metres
Blade clearance above LAT	35 metres	30.5 metres
Maximum number of piles per foundation (Offshore Substation Platforms)	8	8
Number of piles per foundation (turbines)	6	4
Foundation Options	Jackets	1. Gravity Base Structures 2. Jackets

Inter-array cables	Up to 10 WTGs per collector unit Up to 14 circuits 14km cable length	Up to 6 WTGs per collector unit Up to 15 circuits 75- 120km cable length
Offshore Substation Platforms – maximum level of topside above LAT	21 metres	18 metres
Offshore Export Cable Length (per cable)	43km	33km

4.1.9 Steel jackets with pile foundations are considered the most appropriate turbine foundation design due to the prevailing site conditions and, therefore, are the only foundation option assessed in the EIA Report. There will be a maximum of 6 piles per foundation, with a penetration depth of 50 metres. The piles will be installed via: driven only piling; drive-drill-drive; or drill only. The EIA Report was completed on an estimation of 6-21 hours of pile driving per foundation (for up to 6 piles) or 62-180 hours for pile drilling (for up to 6 piles) (including time for setting up and changing equipment between piling locations). Jacket installation is anticipated to take 12-24 hours and the impacts of concurrent piling activities (pile driving or pile drilling at two locations concurrently (either on the same vessel or an independent vessel)) was assessed as a worst-case scenario for piling activities. Preliminary geotechnical investigations suggest that 0-10% of piling can be installed by driving and 90-100% of piles can be installed using one or either of drive-drill-drive method or the drill only method.

Table 2 Pile Installation Parameters

Parameter	**Maximum Design Envelope**
Soft start duration	30 minutes
Applied hammer energy during soft start	360 Kilojoules (kJ) (20% of max. energy for an IHC 1800 hammer)
Driving duration at maximum energy	Up to 180 minutes
Applied hammer energy at maximum energy	1, 635kJ (approx. 90% of max. energy for an IHC 1800 hammer)

4.1.10 An indicative construction programme is included in Chapter 4 of the EIA Report and is set out below at Table 3:

Table 3 Indicative Construction Timescales

Activity	Indicative Timescale
Onshore Construction	Q3 2019 – Q3 2021
Intertidal Construction	Q3 2021
Export Cable Works Offshore	Q2 – Q3 2021
Piling Activities	Q1 – Q4 2021
Jacket Installation	Q2 – Q4 2021
OSS Topside Installation	Q2 – Q3 2021
Offshore inter-array cabling works	Q3 2021 – Q2 2022
Offshore WTG installation	Q2 – Q3 2022
Final Commissioning & Transfer to Operation & Maintenance Activities	Q4 2022

4.1.11 Figure 1 provides a chart detailing the Development area, including the Offshore Export Cable Corridor.

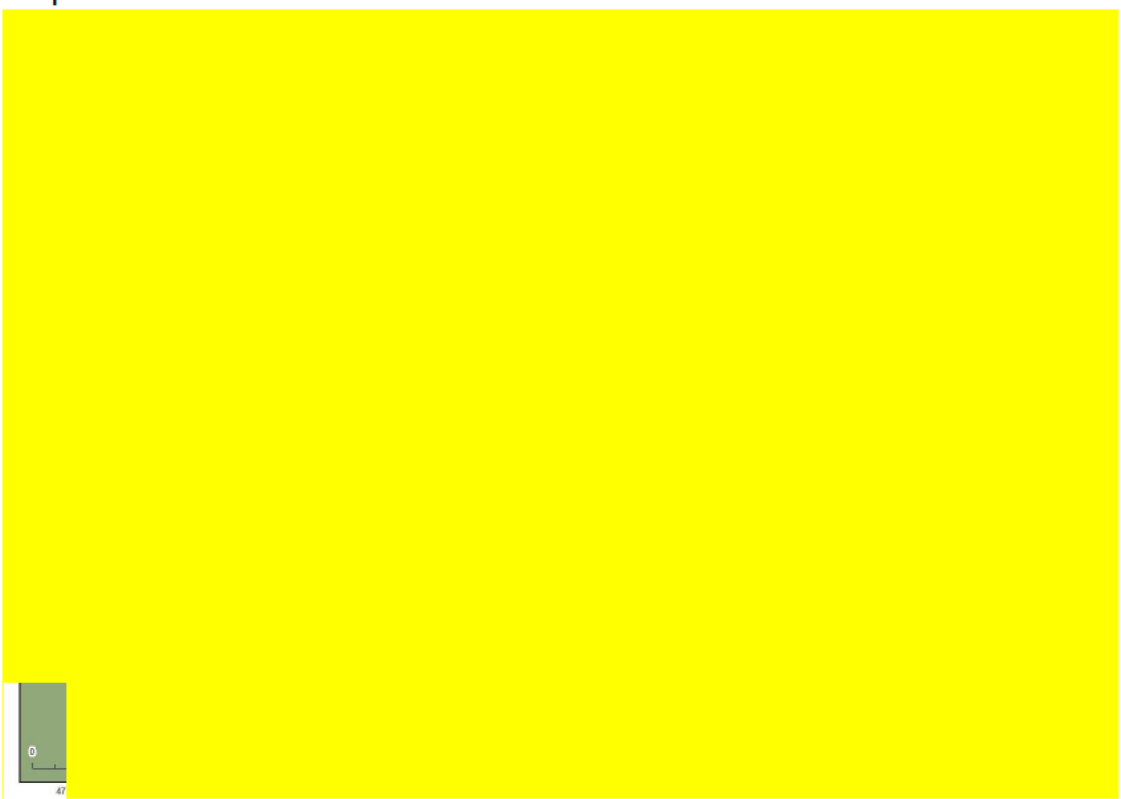

Figure 1 Chart of Generating Station and Cable Corridor

Source: HRA Report http://www.gov.scot/Resource/0053/00533370.pdf

5 Consultation

5.1.1 NnGOWL submitted its Application, including the EIA Report and HRA Report, on 16 March 2018. Scottish Ministers accepted the Application and sent copies of it to SNH and other relevant consultees on 28 March 2018 for a 30 day consultation period.

5.1.2 An addendum of additional information ("the EIA Addendum") was subsequently provided and was circulated for consultation on 27 July 2018 for a 30 day consultation period. The EIA Addendum corrected errors in the ornithology assessment.

5.1.3 Detailed comments were received from SNH, the Royal Society for the Protection of Birds Scotland ("RSPB Scotland") and Whale and Dolphin Conservation ("WDC"). Marine Scotland Science ("MSS") provided scientific advice on the information provided.

6 Main points raised during consultation

6.1.1 The main points by each of the respondents that included HRA specific comments are summarised below. Copies of all consultation responses received by Scottish Ministers can be accessed here. Copies of all consultation responses to the EIA Addendum report can be accessed here.

6.2 SNH

Ornithology

6.2.1 In its response dated 11 May 2018, SNH advised that impacts from the Development would be less than the impacts from the Original Varied Consent.

6.2.2 SNH advised that it was content with all aspects of the assessment methodology. SNH advised that the in-combination effects on the Forth Islands SPA and Fowlsheugh SPA were the most significant natural heritage constraint and that it was unlikely that the Scottish Ministers would be able to ascertain whether there will be any adverse effect on the integrity of these sites from the Development in-combination with the other wind farm proposals for either 25 or 50 year operational lifespans.

6.2.3 SNH advised that it was unable to provide advice on the guillemot and razorbill qualifying interests, as the incorrect population data was used in the population modelling. SNH requested that the population models were re-run for both species using the correct data and analysed, with population viability analysis ("PVA") metrics provided, to allow them to provide advice on these qualifying interests. This information was later provided in the EIA Addendum.

6.2.4 SNH advised that there would be no adverse effect on site integrity of any classified SPA or the Outer Forth and St Andrew's Bay pSPA with respect to the following qualifying interests for the Development in-combination with the other Forth and Tay Developments:

- Forth Islands - herring gull, puffin;
- Fowlsheugh - herring gull;
- St. Abb's Head to Fast Castle - herring gull, puffin;
- Buchan Ness to Collieston Coast - herring gull, kittiwake;
- Outer Firth of Forth and St Andrews Bay Complex - gannet, kittiwake, herring gull, puffin, little gull, common gull, black-headed gull

6.2.5 SNH provided a further response on 7 September 2018 in relation to the EIA Addendum, to be considered in conjunction with its previous response, dated 11 May 2018. SNH submitted an objection on the basis of predicted significant adverse effects on the Forth Islands SPA (for gannet and kittiwake) and Fowlsheugh SPA (for kittiwake) in-combination with the existing consents for Inch Cape, Seagreen Alpha and Seagreen Bravo offshore wind farms.

6.2.6 SNH advised that the Development could have an adverse effect on the site integrity of the Forth Islands and Fowlsheugh SPAs in respect of kittiwake and the Forth Islands SPA in respect of gannet in-combination with the 2018 proposals for the Inch Cape and Seagreen offshore wind farms.

6.2.7 SNH advised that the Development could have an adverse effect on the site integrity of the Forth Islands and Fowlsheugh SPAs in respect of razorbill in-combination with the other Forth and Tay Developments, however, SNH advised that further clarification was required in relation to population modelling, apportioning and the calculation of certain metrics to allow them to provide more certain advice.

6.2.8 SNH was able to provide advice regarding the guillemot qualifying interest, based on the content of the EIA Addendum. SNH advised that the Development will not have an adverse effect on the site integrity of any SPA in respect of guillemot, either alone or in-combination with the other Forth and Tay Developments.

6.2.9 A meeting was held between SNH, MSS and the Company on 18 September 2018 to discuss ornithology. Due to some inconsistencies in the NnGOWL information provided to inform the AA, Scottish Ministers consulted SNH further on extracts of this AA for the key species (gannet, kittiwake, razorbill and guillemot) where Scottish Ministers have used information from other sources to inform the assessment. SNH provided further responses on 5 and 8 October

2018, advising that in its view the Development in-combination with the existing consents for Inch Cape Offshore Wind Farm and Seagreen Alpha and Bravo Offshore Wind Farms would have an adverse effect on site integrity as follows:

- Forth Islands SPA – with respect to gannet, kittiwake and razorbill;
- Fowlsheugh SPA – with respect to kittiwake and razorbill;
- St Abb's Head to Fast Castle SPA – with respect to kittiwake.

6.2.10 SNH did advise that impacts from the Development would be less than for the Original Varied Consent.

Marine Mammals

6.2.11 SNH advised that the greatest level of impacts will arise during the construction phase of the proposed works. SNH welcomed the commitment to implement mitigation and consent conditions and provided further advice on these measures.

6.2.12 SNH highlighted that the outputs of the model of the interim Population Consequences of Disturbance ("iPCoD") used by NnGOWL (version 3) are unreliable, due to known issues in the code and uncertainties regarding the input parameters. As these outputs cannot be relied upon, SNH provided a qualitative assessment of the effects of Permanent Threshold Shift ("PTS") and disturbance from NnGOWL piling events (both single and concurrent events) in its advice. SNH advised that if an updated model becomes available the model should be rerun.

6.2.13 Following revisions to the iPCoD model a workshop was held between Marine Scotland and SNH on 7 September 2018. This resulted in SNH running various agreed in-combination scenarios for bottlenose dolphin and grey seal to inform its advice. SNH provided further advice on 26 September 2018

6.2.14 SNH advised that there would be no adverse effect on the integrity of any SACs with marine mammal qualifying interests from the Development alone or in-combination with other projects

6.3 RSPB Scotland

6.3.1 RSPB Scotland submitted an objection to the proposed Development on 13 May 2018 and stated that it strongly disagreed with the conclusions contained with the submitted HRA and EIA Reports. RSPB Scotland advised that the impacts of the worst-case in-combination scenario are wholly unacceptable and would result in significant and irreversible impacts to seabird populations in the region,

particularly northern gannet, black--legged kittiwake, Atlantic puffin, razorbill and common guillemot. RSPB Scotland objected to the proposed Development both in isolation and in-combination with the other Forth and Tay Developments.

6.3.2 RSPB Scotland did acknowledge that the potential impacts of the Development are reduced from the Original Varied Consent.

6.3.3 RSPB submitted a further response to the EIA Addendum on 7 September 2018 confirming that its previous objection still stands. RSPB provided comments on the information contained within the EIA Addendum and stated that the contents of the EIA Addendum added further weight to its objection.

6.4 WDC

6.4.1 WDC stated in its response dated 23 May 2018 that it had concerns about the likely effects of the Development in isolation, and in-combination with other plans or projects, on cetaceans, especially harbour porpoise. Likely significant effects on harbour porpoise as a qualifying feature of the Inner Hebrides and Minches candidate SAC on the west coast of Scotland have not been identified and, therefore, this qualifying interest is not considered further within this AA. Harbour porpoise is considered in the EIA Report.

6.4.2 WDC highlighted that the inclusion of pile driving (for the turbine foundations) within the EIA Report means that there should be a commitment to noise mitigation and monitoring during the construction of the entire wind farm, to assess if the conclusions from the noise modelling contained with the EIA and HRA Reports are accurate. WDC provided advice on a number of issues of relevance to the proposed mitigation measures.

6.4.3 WDC also highlighted the need for adequate monitoring pre-construction and requested involvement in the preparation of various post-consent plans (piling strategy, vessel management plan, environmental management plan, project environmental monitoring plan), should any new consent be granted.

SECTION 2: INFORMATION ON NATURA SITES

7 Background information and qualifying interests for the relevant Natura sites

7.1.1 This section provides links to the SNH Interactive website, where background information on the sites being considered in this assessment is available. The qualifying interests for the sites are listed below at Table 5 and the conservation

objectives at Table 6. Figure 2 provides a chart of the SPA, pSPA and SAC considered within this AA.

Table 4 Name of Natura sites affected and current status

SPA:

Forth Islands SPA
http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8500

Fowlsheugh SPA
http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8505

St Abb's Head to Fast Castle SPA
http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8579

Buchan Ness to Collieston Coast SPA
http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8473

SAC:

Moray Firth SAC
http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8327

Firth of Tay and Eden Estuary SAC
http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8257

Berwickshire and North Northumberland Coast SAC
http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8207

Isle of May SAC
http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8278

pSPA:

Outer Firth of Forth and St Andrews Bay Complex pSPA
http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=10478

Table 5 European qualifying interests

Forth Islands SPA

- Arctic tern (*Sterna paradisaea*), breeding
- Common tern (*Sterna hirundo*), breeding

- Cormorant (*Phalacrocorax carbo*)*, breeding
- Gannet (*Morus bassanus*), breeding
- Guillemot (*Uria aalge*)*, breeding
- Herring gull (*Larus argentatus*)*, breeding
- Kittiwake (*Rissa tridactyla*)*, breeding
- Lesser black-backed gull (*Larus fuscus*), breeding
- Puffin (*Fratercula arctica*), breeding
- Razorbill (*Alca torda*)*, breeding
- Roseate tern (*Sterna dougallii*), breeding
- Sandwich tern (*Sterna sandvicensis*), breeding
- Shag (Phalacrocorax aristotelis), breeding
- Seabird assemblage, breeding

*indicates assemblage qualifier only

Fowlsheugh SPA

- Fulmar (*Fulmarus glacialis*)*, breeding
- Guillemot (*Uria aalge*)*, breeding
- Herring gull (*Larus argentatus*)*, breeding
- Kittiwake (*Rissa tridactyla*), breeding
- Razorbill (*Alca torda*)*, breeding
- Seabird assemblage, breeding

St Abb's Head to Fast Castle SPA

- Guillemot (*Uria aalge*)*, breeding
- Herring gull (*Larus argentatus*)*, breeding
- Kittiwake (*Rissa tridactyla*)*, breeding
- Razorbill (*Alca torda*)*, breeding
- Shag (Phalacrocorax aristotelis)*, breeding
- Seabird assemblage, breeding

Buchan Ness to Collieston Coast SPA

- Fulmar (*Fulmarus glacialis*)*, breeding
- Guillemot (*Uria aalge*)*, breeding
- Herring gull (*Larus argentatus*)*, breeding
- Kittiwake (*Rissa tridactyla*)*, breeding
- Shag (Phalacrocorax aristotelis)*, breeding
- Seabird assemblage, breeding

Moray Firth SAC

- Subtidal sandbanks
- Bottlenose dolphin (*Tursiops truncatus)*

Firth of Tay and Eden Estuary SAC

- Estuaries
- Intertidal mudflats and sandflats
- Subtidal sandbanks
- Harbour seal (Phoca vitulina)

Berwickshire and North Northumberland Coast SAC

- Intertidal mudflats and sandflats
- Reefs
- Sea caves
- Shallow inlets and bays
- Grey seal (Halichoerus grypus)

Isle of May SAC

- Reefs
- Grey seal (Halichoerus grypus)

Outer Firth of Forth and St Andrews Bay Complex pSPA

- Red-throated diver (*Gavia stellata)*, non-breeding
- Little gull (*Hydrocoloeus minutus),* non-breeding
- Common tern (*Sterna hirundo)*, breeding
- Gannet (*Morus bassanus)*, breeding
- Arctic tern (Sterna paradisaea), breeding
- Guillemot (*Uria aalge)*, breeding and non-breeding
- Slavonian grebe (*Podiceps auritus),* non-breeding
- Eider (*Somateria mollissima)*, non-breeding
- Long-tailed duck (*Clangula hyemalis)*, non-breeding
- Common scoter (*Melanitta nigra)*, non-breeding
- Velvet scoter (*Melanitta fusca),* non-breeding
- Goldeneye (*Bucephala clangula),* non-breeding
- Red-breasted merganser (*Mergus serrator)*, non-breeding
- Manx shearwater (*Puffinus puffinus)*, breeding
- Razorbill (*Alca torda)*, non-breeding

- Puffin (Fratercula arctica), breeding
- Black-headed gull (*Chroicocephalus ridibundus)*, non-breeding
- Common gull (*Larus canus),* non-breeding
- Herring gull (*Larus argentatus),* breeding and non-breeding
- Kittiwake (*Rissa tridactyla),* breeding and non-breeding
- Shag (*Phalacrocorax aristotelis),* breeding and non-breeding
- Waterfowl assemblage, non-breeding
- Seabird assemblage, breeding and non-breeding

Table 6 Conservation objectives

SPA:

Forth Islands SPA, Fowlsheugh SPA, St Abb's Head to Fast Castle SPA and Buchan Ness to Collieston Coast SPA

To avoid deterioration of the habitats of the qualifying species (listed above) 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:

i. Population of the species as a viable component of the site
ii. Distribution of the species within site
iii. Distribution and extent of habitats supporting the species
iv. Structure, function and supporting processes of habitats supporting the species
v. No significant disturbance of the species

SAC:

Conservation Objectives for the following Qualifying Habitats:

SAC	**Qualifying Habitat(s)**
Moray Firth SAC	Subtidal Sandbanks
Firth of Tay and Eden Estuary SAC	Estuaries Intertidal mudflats and sandbanks Subtidal sandbanks
Berwickshire and North Northumberland Coast	Intertidal mudflats and sandflats

SAC	Reefs Sea caves Shallow inlets and bays
Isle of May SAC	Reefs

To avoid deterioration of the qualifying habitats (listed above) thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving the 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:

i. Extent of the habitat on site
ii. Distribution of the habitat within site
iii. Structure and function of the habitat
iv. Processes supporting the habitat
v. Distribution of typical species of the habitat
vi. Viability of typical species as components of the habitat
vii. No significant disturbance of typical species of the habitat

Conservation Objectives for the following Qualifying Interests:

SAC	**Qualifying Interest(s)**
Firth of Tay and Eden Estuary SAC	Harbour seal
Berwickshire and North Northumberland Coast SAC	Grey seal
Isle of May SAC	Grey seal

To avoid deterioration of the habitats of the qualifying species (listed above) 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:

i. Population of the species as a viable component of the site
ii. Distribution of the species within site
iii. Distribution and extent of habitats supporting the species

iv. Structure, function and supporting processes of habitats supporting the species
v. No significant disturbance of the species

Conservation Objectives for the following Qualifying Interests:

SAC	Qualifying Interest(s)
Moray Firth SAC	Bottlenose dolphin

To avoid deterioration of the habitats of the qualifying species (listed above) 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:

i. Population of the species as a viable component of the site
ii. Distribution of the species within site
iii. Distribution and extent of habitats supporting the species
iv. Structure, function and supporting processes of habitats supporting the species
v. No significant disturbance of the species

pSPA:

Outer Firth of Forth and St Andrews Bay Complex pSPA (Draft Conservation Objectives)

The following conservation objectives are still in draft form and have not yet been finalised.

To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, subject to natural change, thus ensuring that the integrity of the site is maintained in the long-term and it continues to make an appropriate contribution to achieving the aims of the Birds Directive for each of the qualifying species.

This contribution will be achieved through delivering the following objectives for each of the site's qualifying features:

a. Avoid significant mortality, injury and disturbance of the qualifying

features, so that the distribution of the species and ability to use the site are maintained in the long-term;

b. To maintain the habitats and food resources of the qualifying features in favourable condition.

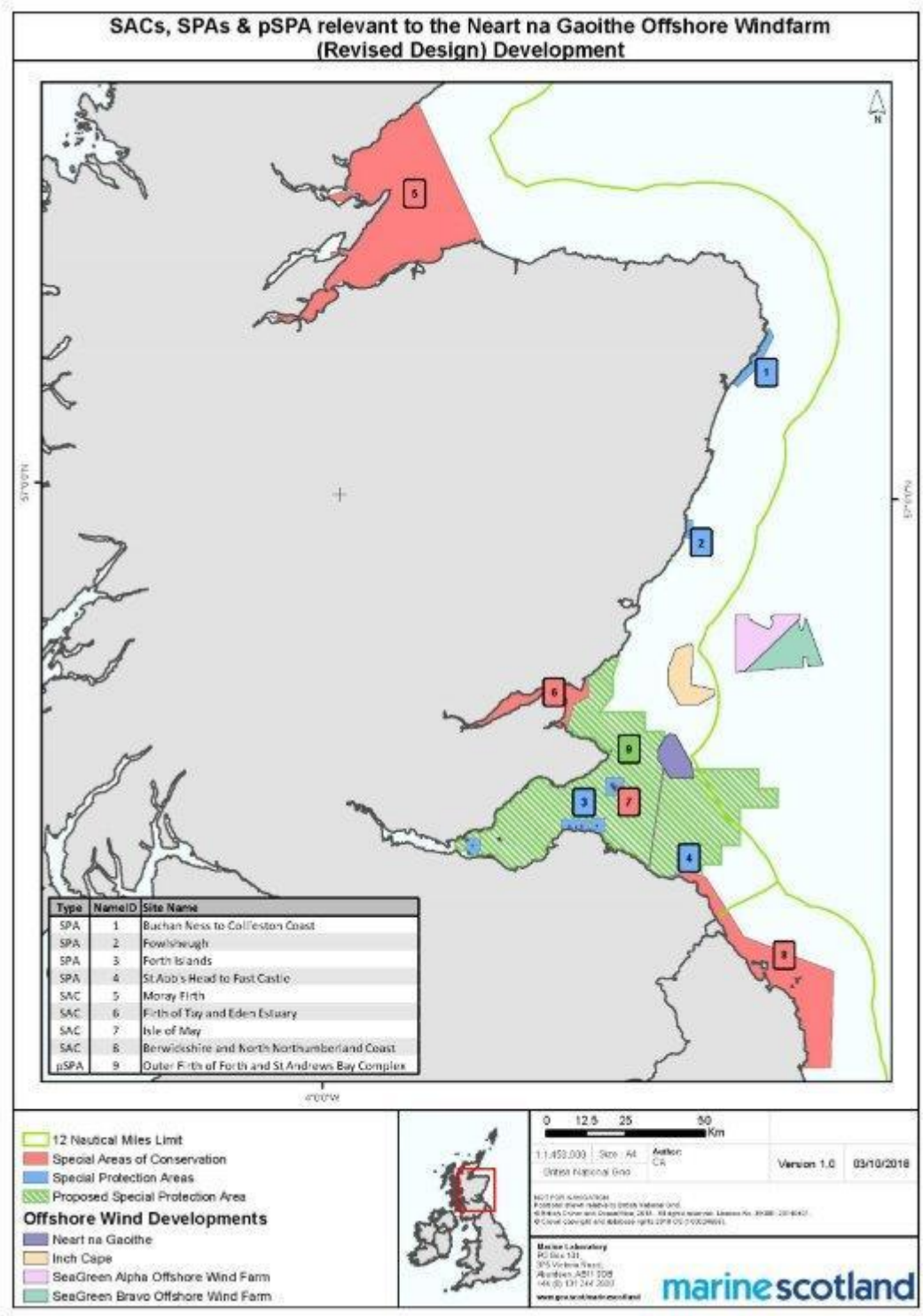

Figure 2 SPAs, pSPA and SACs considered within this AA

SECTION 3: ASSESSMENT IN RELATION TO REGULATION 48 OF THE CONSERVATION (NATURAL HABITATS, &C.) REGULATIONS 1994 (AS AMENDED) AND REGULATION 63 OF THE CONSERVATION OF HABITATS AND SPECIES REGULATIONS 2017

8 Requirement for appropriate assessment

8.1 Is the operation directly connected with or necessary to conservation management of the site?

8.1.1 The operation is not directly connected with or necessary to conservation management of the site.

8.2 Is the operation likely to have a significant effect on the qualifying interests?

8.2.1 The Scoping Opinion identified likely significant effects on the following qualifying interests of the SACs, SPAs and pSPA:-

MARINE MAMMALS

Moray Firth SAC
- Bottlenose dolphin

Firth of Tay and Eden Estuary SAC
- Harbour seal

Berwickshire and North Northumberland Coast SAC & Isle of May SAC
- Grey seal

8.2.2 The HRA Report (section 1.6.) identified that there could be likely significant effects on the qualifying interests of the above SACs during the operational and maintenance phase of the Development arising from;
- mortality or physical injury as a result of noise;
- displacement or disturbance as a result of noise;
- physical impact from vessels; and
- secondary impacts on prey.

8.2.3 In its advice of 11 May 2018, SNH advised that there will be likely significant effects on the qualifying interests listed above arising from disturbance and

displacement during the construction phase of the Development, in particular piling activities associated with the installation of the WTG and OSP foundations.

ORNITHOLOGY

Forth Islands SPA

- Gannet
- Kittiwake
- Herring gull
- Puffin
- Guillemot
- Razorbill

Fowlsheugh SPA

- Kittiwake
- Herring gull
- Guillemot
- Razorbill

St Abb's Head to Fastcastle SPA

- Kittiwake
- Herring gull
- Guillemot
- Razorbill

Buchan Ness to Collieston Coast SPA

- Kittiwake
- Herring gull
- Guillemot

Outer Firth of Forth and St Andrews Bay Complex pSPA

- Gannet
- Kittiwake
- Herring gull
- Puffin
- Guillemot
- Razorbill

8.2.4 SNH also advised that if the turbines overlap with the Outer Firth of Forth and St Andrews Bay Complex pSPA boundary, there would be a likely significant effect on the following qualifying interests of the pSPA:

- Little gull
- Common gull
- Black-headed gull

8.2.5 The Development area does overlap with the pSPA boundary. NnGOWL has stated that approximately 32% of the wind farm area overlaps with the pSPA, however, it has not yet been determined how many WTGs will lie within the pSPA boundary. Once operational, the Development could result in collision and displacement effects on the qualifying seabird interests of the pSPA. The HRA Report calculated that, based on the published current pSPA boundary, the Development footprint overlaps the pSPA by a maximum of 34km, corresponding to approx. 1.3% of the overall pSPA area. The Development may also result in direct habitat loss within the pSPA due to the installation of WTGs and there may be temporary loss arising from cable laying activities.

8.2.6 Within the HRA Report, it has been assumed that, for each species considered, the pSPA population is spread evenly across the pSPA. Further detail regarding this approach is included at page 65 onwards of the HRA Report.

8.2.7 The pSPA was not at the "proposed" stage at the time of the 2014 AA. Whilst most of the construction impacts have been scoped out of the assessment for the designated SPAs, the construction impacts on the pSPA arising from the installation of the WTGs, transmission infrastructure and export cables are considered within this AA. During the construction phase of the Development, there is the potential for likely significant effects on the qualifying interests of the pSPA due to potential impacts on prey availability.

8.2.8 The HRA Report (section 1.6.1) identified that there would be likely significant effects on the qualifying interests of the pSPA and SPAs listed above during the operational and maintenance phase of the proposal arising from:

- mortality as a result of direct collision with turbines during the operational phase of the Development;
- displacement and disturbance resulting in effective habitat loss from an area around turbines and other offshore (e.g. by vessels) activities during the construction, operational and decommissioning phases of the Development;
- barrier effects caused by the physical presence of turbines; and
- direct habitat loss during construction, operation and decommissioning.

8.2.9 In its consultation response, dated 11 May 2018, SNH confirmed that the Development is likely to have a significant effect on a number of qualifying interests of the Forth Islands SPA, Fowlsheugh SPA, St Abb's Head to

Fastcastle SPA, Buchan Ness to Collieston Coast SPA, Firth of Tay and Eden Estuary SAC, Berwickshire and North Northumberland Coast SAC, Isle of May SAC and Outer Firth of Forth and St Andrews Bay Complex pSPA.

8.2.10 Scottish Ministers agree with the advice provided by SNH and have undertaken an AA for the qualifying interests and sites listed above.

9 Appropriate assessment of the implications for the site in view of the site's conservation objectives.

9.1.1 The following assessment is based upon the information contained in the HRA Report and the advice received from SNH and MSS. Consideration has also been given to other consultation responses detailed above. Consideration of the effect on site integrity for each European site or European offshore marine site and qualifying interest(s) follows below.

9.1.2 For each of the qualifying interests the worst case scenario ("WCS") has been considered and details of the WCS has been provided in the HRA Report. For the ornithology in-combination assessment, the WCS is considered to be the Development in-combination with the 2014 consents granted for Inch Cape, Seagreen Alpha and Seagreen Bravo. Other smaller scale projects included in the in-combination assessment are as described at Appendix 1 of this AA.

10 Marine Mammal SACs - Moray Firth SAC, Berwickshire and North Northumberland Coast SAC, Isle of May SAC and Firth of Tay and Eden Estuary SAC

10.1.1 The HRA Report provides a full explanation of the assessment methods starting from page 105. The marine mammal assessments firstly undertake noise propagation modelling based on the WCSs for pile driving. Secondly, the number of individual animals from different populations of species that are affected by the noise is estimated. The predicted estimate of individuals that experience a permanent threshold shift ("PTS") in their audible hearing range provides a proxy for injury, and the estimated number at risk of disturbance is also calculated. Lastly the population level consequences of these effects were estimated using the iPCoD framework. The assessment results are provided for NnGOWL alone and in-combination with the Forth and Tay Developments, Beatrice Offshore Wind Farm, Moray East Offshore Wind Farm, Moray West Offshore Wind Farm and other relevant construction projects as detailed in paragraph 616 of the HRA Report and Appendix 1. The Aberdeen Harbour Expansion Project ("AHEP"), for which use of explosive blasting was assessed, is also included.

10.1.2 The assessment methods used for marine mammals (as advised in the Scoping Opinion) differ from those that informed the 2014 AA in a number of ways. For

example, there are differences in the model used for noise propagation by NnGOWL and the one used to inform the 2014 AA. The thresholds for onset of PTS and disturbance use the National Oceanic and Atmospheric Administration ("NOAA") (2016)[1] thresholds whereas the Southall *et al* (2007)[2] thresholds, which are also presented as part of the HRA Report, were exclusively relied upon previously. The previous assessment estimated the population consequences using a different population model to the one used in the iPCoD framework. There are also differences in the WCS piling strategies (e.g. number of piling events, hammer energies, timing and duration of piling).

10.1.3 Advice provided by SNH and MSS highlights a number of issues that provide relevant context for this AA. The modelling presented by NnGOWL is precautionary. The results are sensitive to assumptions relating to WCS, particularly with respect to information presented on the other developments detailed in 10.1.1 above considered in-combination. For example, SNH note that all piling is assumed to be drive only using maximum hammer energy when in practice only 10% of the piles are predicted to be drive only, and maximum hammer energy will only be used occasionally. Care is advised with respect to interpretation of the iPCoD results provided in the HRA Report, owing to bugs in the code of the version used to inform their appraisal. In addition NnGOWL used particularly precautionary assumptions regarding piling schedules. For the project alone piling was assumed to take place over 15 months for a single piling event or 9 months for concurrent piling events. For the in-combination assessment, the assumption was made that there would be continuous piling between 2019 and 2028. Realistically, piling durations will be much shorter, for example table 4.3 in the EIA Report records that each foundation would take 6-21 hours to install using pile driving or 62-180 hours using pile drilling.

10.1.4 SNH also provides advice that compares the impacts of the Development on its own with the Original Consent. Based on the use of both Southall *et al* (2007) and NOAA (2016) thresholds, the impacts of the Development on cetaceans are lower than the Original Consent for the species considered in this assessment (bottlenose dolphins, grey seals and harbour seals).

11 BOTTLENOSE DOLPHIN - Moray Firth SAC

[1] NOAA (2016) Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts. (U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-55, 178 p. National Marine Fisheries Service).

[2] Southall, B., Bowles, A., Ellison, W., Finneran, J., Gentry, Ro., Greene Jr., C., Kastak, D., Ketten, D., Miller, J., Nachtigall, P., Richardson, W., Thomas, J. and Tyack, P. (2007). Marine Mammal Noise Exposure Criteria: Initial Scientific recommendations. (Aquatic Mammals. 33(4): 411-521).

11.1.1 The HRA Report references the bottlenose dolphin population as being estimated to be 195 individuals (95% 162 – 253). The potential for the un-impacted population size to grow and for the current favourable status of the SAC population are noted. The HRA Report estimates the number of animals at risk of onset of PTS and disturbance. For the Development in isolation, <1 animal is estimated to be at risk of PTS, and 2 animals to be at risk of disturbance. NnGOWL presents information on the population consequences based on the outputs of the iPCoD framework. NnGOWL predicts that the Development in isolation will not have a population level effect. The in-combination assessment with the projects detailed in 10.1.1 above estimates a total of <8 animals at risk of PTS and no more than 19 at risk of disturbance at any one time over a period of 11 years. The median of the ratio of impacted to un-impacted population size for the in-combination assessment is presented as 0.53 after 24 years, n.b. ratio values are referred to in the HRA Report as the counterfactuals.

11.1.2 On 11 May 2018, SNH advised that the predictions for both PTS and disturbance are at low levels. The SNH opinion of no adverse effect on site integrity takes account of the precautionary nature of the assessment and the requirement for conditions that will ensure mitigation of the potential effects of PTS and disturbance during the construction period.

11.1.3 To provide further reassurance regarding its conclusions, SNH re-ran the iPCoD framework based on a realistic WCS for the cumulative impact, providing advice to Scottish Ministers on 26 September 2018. Its results, using the median ratio of the impacted to un-impacted population size, concluded that the in-combination assessment after 24 years was 0.94. This indicates that the WCS impacts would be substantially less than those assessed by NnGOWL.

11.1.4 In reaching their conclusion Scottish Ministers have considered the conservation objectives, the population at the site, the predicted levels of effect and population consequences, the fact that the effects are less than in 2014, the precaution in the assessment methods and the advice from SNH. Scottish Ministers conclude that subject to the appliance of conditions, the Development will not adversely affect the site integrity of the Moray Firth SAC with respect to bottlenose dolphin, either alone or in-combination with the other Forth and Tay Developments, Beatrice Offshore Wind Farm, Moray East Offshore Wind Farm, Moray West Offshore Wind Farm, AHEP and the other projects detailed in Appendix 1.

12 GREY SEAL - Berwickshire and North Northumberland Coast SAC and Isle of May SAC

12.1.1 The HRA Report estimates the number of animals from the East Coast Scotland seal management unit area (“ECMA”) at risk of onset of PTS and disturbance.

The HRA Report references the latest population estimate for grey seals in this area as 9,607 (95% CI 8,028 – 11,958). For the purposes of this assessment the population of the ECMA is taken to be the population of both SACs. The growth and favourable status of this population is noted. For the Development in isolation, 1 animal is estimated to be at risk of PTS. The number estimated to be at risk of disturbance from the Development in isolation, varies depending on whether a single pile driving event or concurrent pile driving events are assumed. For a single event the estimate is 821 and for concurrent events the estimate is 1,357. NnGOWL presents information on the population consequences based on the outputs of the iPCoD framework. The median of the ratio of impacted to un-impacted population size for the project in isolation is presented as 0.95 for the WCS of single pile driving events. The in-combination assessment estimates a total of 5 animals at risk of PTS and no more than 1,103 at risk of disturbance at any one time. The median of the ratio of impacted to un-impacted population size for the in-combination assessment is presented as 0.71.

12.1.2 On 11 May 2018, SNH advised that grey seals are predicted to experience PTS and disturbance as a result of the Development, but the effects are less than those predicted for the Original Consent. SNH advised that the population of grey seals along the east coast is increasing and is relatively robust. Grey seals are protected at the Isle of May during the breeding season and during this time, the seals are more likely to be hauled out and, therefore, less exposed to potential impacts. Outwith the breeding season, the seals are more wide-ranging and are able to avoid exposure to impacts.

12.1.3 SNH advised that there will be no adverse effect on site integrity of the Berwickshire and North Northumberland Coast SAC and Isle of May SAC, with respect to grey seals, subject to the implementation of conditions. Its opinion takes account of precautionary nature of the assessment and the requirement for conditions that will provide further mitigation of the potential effects of PTS and disturbance during the construction period.

12.1.4 To provide further reassurance regarding its conclusions, SNH re-ran the iPCoD framework based on a realistic WCS for the cumulative impact, providing advice to Scottish Ministers on 26 September 2018. Its results, using the median ratio of the impacted to un-impacted population size, concluded that the in-combination assessment, with the Forth and Tay Developments, after 24 years was 0.999. This indicates that the WCS impacts would be substantially less than those assessed by NnGOWL.

12.1.5 In reaching their conclusion Scottish Ministers have considered the conservation objectives, the population at the site, the predicted levels of effect and population consequences, the fact that the effects are less than in 2014, the precaution in the assessment methods and the advice from SNH. Scottish Ministers conclude

that, subject to the appliance of conditions, the Development will not adversely affect the site integrity of the Berwickshire and North Northumberland Coast SAC and Isle of May SAC with respect to grey seal, either alone or in-combination with the other Forth and Tay Developments, and the other projects detailed in Appendix 1.

13 HARBOUR SEAL - Firth of Tay and Eden Estuary SAC

13.1.1 The HRA Report estimates the number of animals from the ECMA at risk of onset of PTS and disturbance. The current ECMA population estimate is 311 (95% CI 254 – 415). The population has rapidly declined over a number of years and is considered to be in an unfavourable condition, with no animals forecast to remain even under un-impacted conditions by 2030. For the purposes of this assessment the population of the ECMA is used. For the Development in isolation, 1 animal is estimated to be at risk or PTS. The number estimated to be at risk of disturbance from the Development in isolation, varies depending on whether a single pile driving event or concurrent pile driving events is assumed. For a single event the estimate is 8 and for concurrent events the estimate is 10. The in-combination assessment estimates a maximum total 8 animals at risk of PTS and no more than 11 at risk of disturbance at any one time. NnGOWL presents information on the population consequences based on the outputs of the iPCoD framework. The median of the ratio of impacted to un-impacted population size for the in-combination assessment is presented as 1, the reason for this being that the baseline population is estimated at 0 making it impossible for the impacted population to be less. This is the case for both the Development in isolation and in-combination.

13.1.2 SNH advised that harbour seals are predicted to experience very low PTS and disturbance and the impacts are less than those predicted for the Original Consent.

13.1.3 SNH advised that there will be no adverse effect on site integrity to harbour seals as a qualifying feature of the Firth of Tay and Eden Estuary SAC, subject to the implementation of conditions.

13.1.4 In reaching their conclusion Scottish Ministers have considered the conservation objectives, the population at the site, the predicted levels of effect and population consequences, the fact that the effects are less than in 2014, the precaution in the assessment methods and the advice from SNH. Scottish Ministers conclude that, subject to the appliance of conditions, the Development will not adversely affect the site integrity of the Firth of Tay and Eden Estuary SAC with respect to harbour seal, either alone or in-combination with the other Forth and Tay Developments, and the projects detailed in Appendix 1.

14 Seabird SPAs – Forth Islands SPA, Fowlsheugh SPA, Buchan Ness to Collieston Coast SPA, St Abb's Head to Fast Castle SPA and Outer Firth of Forth and St Andrews Bay Complex pSPA

14.1.1 The Scoping Opinion directed that the primary focus of the HRA Report should be the conservation objectives relating to the maintenance of the relevant qualifying species as a viable component of the sites. As also directed, further justification was provided in the HRA Report regarding why other conservation objectives were less relevant. Consideration was also given to pSPA conservation objective (b), relating to deterioration of habitat, in relation to construction impacts.

14.1.2 The HRA Report provides a full explanation of the assessment methods starting from page 25. The ornithology assessments firstly estimated the predicted levels of effect (collision and/or displacement, depending on the species). Secondly, the numbers of individuals that are affected for each species assigned to age classes (e.g. breeding and non-breeding juveniles). These individuals are then apportioned to SPA breeding colonies. Lastly, where advised through the Scoping Opinion, the population level consequences of these effects were estimated using population viability analysis ("PVA"). PVA was undertaken assuming both a 25 year and 50 year operational life. The assessment results are provided for the Development in isolation and in-combination with the Forth and Tay Developments and other offshore wind farm projects and proposals identified in paragraph 148 of the HRA Report and detailed in Appendices 1 and 2. Further detail on the projects considered in-combination by Scottish Ministers is provided at Appendices 1 and 2 of this assessment.

14.2 Differences with the 2014 Assessment

14.2.1 The assessment methods used for ornithology differ from those that informed the 2014 AA in a number of ways. For example, option 2 of the Band 2012 collision risk model was used in the current assessment for kittiwake and gannet compared with option 3 in 2014. Different avoidance rates have been used in the collision risk assessment based on agreement on more appropriate avoidance rates.

14.2.2 With regards to displacement and barrier effects in 2014, the Centre for Ecology and Hydrology ("CEH") Searle *et al* 2014[3] model was used. This model simulates the movements of individual birds from breeding colonies. The model estimates changes to adult survival and productivity based on estimated changes in adult

[3] Searle, K., Mobbs, D., Butler, A., Bogdanova, M., Freeman, S., Wanless, S. & Daunt, F. (2014) Population consequences of displacement from proposed offshore wind energy developments for seabirds breeding at Scottish SPAs (CR/2012/03). (Final Report to Marine Scotland Science).

body mass and provisioning rates of chicks. Data from tagged individuals is used in the model. In this AA, the use of the matrix approach for displacement estimates the percentage of birds displaced from the Development area and from that the percentage of those displaced adults that do not survive. This more simplistic approach was advised in the Scoping Opinion and is informed by data on seabird densities collected at the development sites.

14.2.3 The population consequences of the effects have been assessed using a different approach to population modelling in these assessments. The 2014 AA was informed by Bayesian state-space models produced by CEH. This AA is informed by stochastic leslie-matrix PVAs.

14.2.4 A table detailing the differences between the methods used in the 2014 AA and this AA is included at Appendix 3 to this AA.

14.3 In-combination assessment – approach

14.3.1 The Scoping Opinion required that two different in-combination assessments with the Forth and Tay Developments were undertaken. These were as follows;

Table 7 In-combination assessment scenarios

Scenario 1
Quantitatively for the Development in isolation and in-combination with the WCS (for each species) from: • Inch Cape (2014, as consented) or Inch Cape (2017 scoping report); • Seagreen Alpha and Bravo (2014, as consented) or Seagreen (2017 scoping report); and • Qualitative assessment of the breeding season effects from other wind farms.
Scenario 2
Quantitatively for the Development in isolation and in-combination with: • Inch Cape (2017 scoping report); • Seagreen (2017 scoping report); and • Qualitative assessment of the breeding season effects from other wind farms.

14.3.2 The HRA Report concluded that the outputs from the in-combination assessment for the 2014 as-consented Inch Cape and Seagreen Alpha and Bravo wind farms represented the worst-case scenario. The in-combination impacts with the Hywind, Kincardine and Forthwind offshore wind farms were considered by NnGOWL during the breeding season. Details of the other projects considered qualitatively in this AA are included in Appendix 1. During the non-breeding

season impacts with an additional 25 North Sea wind farm developments were also considered for gannet and kittiwake (these are listed in full at Appendix 2).

14.3.3 A summary of the design envelope parameters for the 2014 consents and the 2018 applications for Inch Cape, Seagreen Alpha and Seagreen Bravo is included at paragraphs 26.3 and 26.2 of Appendix 1.

Table 8 Summary of in-combination scenarios presented in the HRA Report

Impact	Worst Case Design Scenario	Justification
In-combination collision impacts	Breeding Season: The Development and other Forth and Tay Developments (both scenarios) and Hywind, Kincardine and Forthwind. Non-Breeding Season: Forth and Tay Developments, more distant UK North Sea wind farm projects included for kittiwake and UK North Sea and English Channel for gannet.	Species from breeding SPA colonies are within the mean max. foraging range of the Forth and Tay Developments but not more distant projects. This approach was recommended in the Scoping Opinion.
In-combination impacts arising from displacement	Breeding Season: The Development and other Forth and Tay Developments. Non-Breeding Season: For guillemot and razorbill displacement effects The Forth and Tay Developments were included.	Displacement and mortality rates as per Scoping Opinion guidance. This approach was recommended in the Scoping Opinion.

15 GANNET – Forth Islands SPA and Firth of Forth and St Andrews Bay Complex pSPA

15.1 Forth Islands SPA – Gannet – Development in Isolation

15.1.1 The Forth Islands SPA has the largest colony of gannet in the UK. The SPA is reported to be increasing in size with the last census (2014) estimating the population being 75,259 pairs (compared with a population of 21,600 pairs at the time of designation). The gannet qualifying feature of the SPA is considered to be in a favourable condition (SNH, 2017b).[4] During the breeding season birds from the colony range widely across the North Sea, at times travelling as far as the Norwegian coast (Hamer et al. 2007).[5] Regular feeding movements occur to the north-east of the colony with concentrations of feeding locations off north-east Scotland (Hamer et al. 2011).[6] Outwith the breeding season, gannets disperse widely across the North Sea and move southward with birds wintering in the Bay of Biscay and off West Africa.

15.1.2 In its HRA Report, NnGOWL presented collision risk modelling using the methodologies outlined in the Scoping Opinion (and detailed in Appendix 3). This assessment considered the WCS design envelope of 54 turbines.

15.1.3 Based on this, a total of 93 gannets (91 adults and two immature birds) were estimated to be impacted during the breeding season and 15 gannets (14 adults and one immature bird) were estimated for the non-breeding season (October to mid-March), giving a total of 108 collisions per year for all ages for the Development in isolation as detailed in the HRA Report.

15.1.4 PVA was undertaken by NnGOWL over a period of 25 and 50 years for the Forth Islands SPA gannet population. Assuming all gannet collisions from the Development are apportioned to the Forth Islands SPA population, after 25 years, the median of the ratio of impacted to un-impacted population size for the Development in isolation is 0.99 (n.b. ratio values are referred to in the HRA Report as the counterfactuals). After 50 years, the ratio value is 0.97.

15.1.5 The HRA Report concluded that the loss of up to 108 additional gannets across the year will not adversely affect the integrity of the Forth Islands SPA, in light of the qualifying interest, its condition and vulnerabilities and the conservation objectives. The 2014 AA estimated the number of individuals experiencing

[4] SNH (2017b). Sitelinks. Scottish Natural Heritage https://gateway.snh.gov.uk/sitelink/index.js

[5] Hamer K.C., Humphreys E.M., Garthe S., Hennicke J., Peters G., Grémillet D., Phillips R.A., Harris M.P. & Wanless S. (2007) Annual variation in diets, feeding locations and foraging behaviour of Gannets in the North Sea: flexibility, consistency and constraint. (Marine Ecology Progress Series, 338, 295-305)

[6] Hamer, K.C., Holt, N. & Wakefield, E. (2011). The distribution and behaviour of northern gannets in the Firth of Forth and Tay area. A review on behalf of the Forth and Tay Offshore Wind Developers Group. Institute of Integrative & Comparative Biology, University of Leeds

mortality from the Original Consent in isolation to be 233, more than double the estimate in this AA.

15.1.6 SNH advised the Development on its own would not result in an adverse effect on site integrity to the Forth Islands SPA with respect to gannet.

15.2 Forth Islands SPA – Gannet - Development In–combination

15.2.1 This AA is based upon the WCS which means that the Development is assessed in-combination with the 2014 consents for Inch Cape and Seagreen Alpha and Bravo. The estimated impacts of Inch Cape 2017 and Seagreen Alpha and Bravo 2017 proposals on gannet are substantially less than the values used in this AA.

15.2.2 This AA uses collision estimates that are taken from more than one source to estimate the cumulative totals. When reviewing the HRA Report and EIA Addendum inconsistencies were detected in the way in which NnGOWL had calculated the in-combination effects from the Seagreen project. Seagreen also responded to the consultation on 7 September 2018, highlighting that the figures attributed to the Seagreen Alpha and Bravo wind farms by NnGOWL should not be relied on.

15.2.3 Scottish Ministers have reviewed the predicted effects from the Seagreen Alpha and Bravo offshore wind farms that are presented in the Inch Cape application documents and consider these should be relied upon in this assessment. Therefore for the purposes of the gannet assessment the figures are taken from NnGOWL's EIA Report, HRA Report and EIA Addendum for the effects from the Development and the Inch Cape wind farm, and from the Inch Cape application documents for the Seagreen effects, as MSS advised these sources provide the best available evidence. See Table 9 below.

Table 9 Estimated annual in-combination number of gannet collisions based on Band model option 2 and an avoidance rate of 98.9%

Project	Individuals	Source
NnG (2017)	108	NnGOWL EIA ornithology, chapter 9 Tables 9.53, 9.55 & 9.57
Inch Cape (2014)	436	NnGOWL EIA Addendum, Table 9.140 & Table 9.142

Seagreen Alpha (2014)	302	Inch Cape 2018 EIA Report, Appendix 11C Table 11C.10
Seagreen Bravo (2014)	202	Inch Cape 2018 EIA Report, Appendix 11C Table 11C.10
Additional non-breeding season	139	Inch Cape EIA Report, Appendix 11B, Table 11B.4
Total	1,187	

15.2.4 The HRA Report was overly-precautionary in apportioning the effects on gannet to the SPA in that all effects during the breeding and non-breeding season were apportioned to the SPA. This overestimates the effects on the SPA population, particularly during the non-breeding season when birds from other colonies are likely to be present in the Development area. Consequently this AA is based on apportioning carried out by SNH and provided in advice to Scottish Ministers on 26 September 2018. The apportioned numbers are provided in Table 10 below.

Table 10 Estimated annual in-combination effects apportioned to Forth Islands SPA

Project	Individuals
NnG (2017)	100
Inch Cape (2014)	406
Seagreen Alpha (2014)	282
Seagreen Bravo (2014)	180
Additional non-breeding season	59
Total	1,027

15.2.5 The cumulative total number of individuals experiencing annual mortality is assessed to be 1,027 which is less than the cumulative total of 1,169 estimated in the 2014 AA.

15.2.6 PVA was undertaken by NnGOWL for gannets breeding in the Forth Islands SPA over 25 year and 50 year periods for a number of scenarios, none of which equate exactly to the assessed cumulative total of 1,027 individuals per year due to inconsistencies in the estimated in-combination effects. However these effects

sit between 2 scenarios for which NnGOWL do present PVA outputs, one of which is for a larger effect scenario of 1,302 individuals and another smaller effect scenario of 668 individuals. After 25 years the median of the ratio of impacted to un-impacted population size for the in-combination assessment is 0.85 for the larger scenario and 0.92 for the lower scenario. After 50 years the ratio values are 0.73 and 0.85. The ratio value for the assessed cumulative total of 1,027 individuals will sit between the larger and smaller PVA scenarios presented by NnGOWL.

15.3 Firth of Forth and St Andrews Bay Complex pSPA – Gannet – Development in Isolation and In-combination

15.3.1 The HRA Report considered that because the Forth Islands SPA borders the pSPA, for the purposes of the assessment the pSPA population during the breeding season was that assumed for the Forth Islands SPA i.e. 75,259 pairs.

15.3.2 The HRA Report states that as details of the number of turbines likely to be placed within the part of the Development area that overlaps with the pSPA were not yet available, the proportion of the Development within the pSPA was applied to results from Collision Risk Modelling ("CRM"), to allow the appropriate number of gannet collisions to be estimated. Approximately 32% of the Development area overlaps with the pSPA.

15.3.3 For the worst-case design scenario (54 turbines), a total of 93 gannet collisions (91 adults and two immature birds) were estimated for the Development during the breeding season. Assuming that the number of gannets estimated to be in the Development area during baseline surveys were evenly distributed, then 32% of all breeding season collisions would occur in the overlapping pSPA area: an estimated total of 30 collisions.

15.3.4 As there is no overlap between the Inch Cape or Seagreen Alpha and Bravo offshore wind farms and the pSPA there is no requirement to consider the in-combination collision effects from these wind farms. Effects on prey availability and habitat loss in relation to the pSPA are considered in paragraphs 22.3.1-22.3.3.

15.3.5 SNH advised that there would be no adverse effect on the site integrity of the Firth of Forth and St Andrews Bay Complex pSPA in respect of gannet as a result of the Development in isolation or in-combination with the other wind farm proposals detailed in Appendices 1 and 2.

15.4 Gannet – Precaution in the Assessment

15.4.1 There are a number of precautionary assumptions made in this AA which mean that the estimated cumulative collision total and their population consequences are highly likely to be over-estimates.

15.4.2 For example, the seabird collision avoidance study undertaken at Thanet offshore wind farm lends support to the view that the avoidance rates used in this assessment are likely to be highly precautionary (Skov *et al*, 2018).[7]

15.4.3 The research at Thanet has also provided valuable information on bird flight speeds. The Scoping Opinion advised that flight speed data for use in CRM be taken from published data (Pennycuick 1997;[8] Alerstam et al. 2007).[9] These flight speeds are based on very small sample sizes (32 gannet). The laser rangefinder track data collected at Thanet recorded by Skov et al. (2018) offers species-specific empirical data on flight speeds from large numbers of individuals (683 gannet). This information was not available at the time of NnGOWL's Application, however the Seagreen EIA report estimates that using the flight speeds recorded at Thanet would reduce gannet collisions by 6%. MSS have advised that the reduction in estimated number of collisions indicated by Seagreen is correct.

15.4.4 The WCS assessment completed by NnGOWL for the 50 year operational life of the Development in-combination with the Forth and Tay Developments ("50 Year Assessment") assumes a 50 year operational life, within the PVA, for the Inch Cape and Seagreen Alpha and Bravo wind farms, whereas the 2014 consents for these projects are only for 25 years. Therefore the in-combination 50 Year Assessment over-estimates the effects.

15.4.5 Lastly, basing this assessment on the WCS for Inch Cape and Seagreen (i.e. their 2014 consents) is very precautionary because they are highly unlikely to be constructed. If their current proposals were used in this assessment it would substantially reduce the effects associated with those projects.

15.5 Gannet - Conclusion

15.5.1 Based on the information presented in NnGOWL's EIA Report, HRA Report and EIA Addendum (which estimated effects which are higher than those in this AA), SNH advised on 7 September 2018 that the Development will have an adverse effect on site integrity for gannet as a qualifying interest of the Forth Islands SPA

[7] Skov, H., Heinanen, S., Norman, T., Ward, R.M., Mendez-Roldan, S. & Ellis, I. 2018. ORJIP Bird Collision and Avoidance Study. Final report – April 2018. The Carbon Trust. United Kingdom

[8] Pennycuick, C.J., 1997. Actual and 'Optimum' Flight Speeds: Field Data Research. The Journal of Experimental Biology, 200, pp. 2355-2361.

[9] Alerstam, T., Rosén, M., Bäckman, J., Ericson, P.G. & Jellgren, O. (2007). Flight speeds among bird species: allometric and phylogenetic effects. PLoS Biology, 5(8), e197

in-combination with the existing 2014 consents for Inch Cape, Seagreen Alpha and Seagreen Bravo.

15.5.2 As the information used in this AA comes from various sources, Scottish Ministers consulted SNH on the figures used to inform this gannet assessment. SNH responded on 5 and 8 October 2018 to advise that its previous advice in relation to gannet still stood.

15.5.3 In reaching their conclusion Scottish Ministers have considered the conservation objectives, the populations at the sites, the predicted levels of effect and population consequences, the fact that the effects are less than in 2014, the precaution in the assessment methods and the advice from SNH. Scottish Ministers conclude that, subject to the appliance of conditions, there will be no adverse effect on the site integrity of Forth Islands SPA in respect of the gannet qualifying interest as a result of the Development in isolation or in-combination with the other Forth and Tay Developments or projects detailed in Appendices 1 and 2.

16 KITTIWAKE – Forth Islands SPA, Fowlsheugh SPA, St Abb's to Fast Castle SPA and Buchan Ness to Collieston Coast SPA and Firth of Forth and St Andrews Bay Complex pSPA

16.1.1 Scottish kittiwake populations have experienced significant declines over the last 30 years and this decline was highlighted in advice received from both SNH and RSPB. The reasons for the decline are uncertain, although factors such as climate change and changes to prey distribution are very likely to be key drivers. The results of the modelling for collision and displacement impacts were presented in the HRA Report, as per the Scoping Opinion.

16.1.2 In its HRA Report, NnGOWL presented collision risk modelling using the methodologies outlined in the Scoping Opinion. This assessment considered the maximum design envelope of 54 turbines. Displacement effects were also assessed, using the matrix approach.

16.1.3 For the same reasons as have been described above for gannet, this AA uses collision risk and displacement estimates that are taken from more than one source to estimate the cumulative totals. When reviewing the HRA Report and EIA Addendum, inconsistencies were detected in the way in which NnGOWL had calculated the in-combination effects for kittiwake from the Seagreen projects. Seagreen also responded to the consultation on 7 September 2018, highlighting that the figures attributed to the Seagreen Alpha and Bravo wind farms by NnGOWL should not be relied on.

16.1.4 Scottish Ministers have reviewed the predicted effects from the Seagreen Alpha and Bravo offshore wind farms that are presented in the Inch Cape application documents and consider these should be relied upon in this assessment. Therefore for the purposes of the kittiwake assessment, the figures are taken from NnGOWL's EIA Report, HRA Report and EIA Addendum for the effects from the Development and the Inch Cape wind farm, and from the Inch Cape application documents for the Seagreen effects, as MSS advised these sources provide the best available evidence. See Table 11 below.

Table 11 Estimated annual in-combination effects on kittiwake from collisions and displacement based on Band model option 2 and an avoidance rate of 89.9% & the matrix approach

Project	Individuals	Source
NnG (2017)	54	NnGOWL EIA Report, ornithology chapter 9, Tables 9.14,9.17,9.20,9.60,9.61 & 9.62
Inch Cape (2014)	538	NnGOWL EIA Addendum, Tables 9.146 & 9.148
Seagreen Alpha (2014)	250	Inch Cape 2018 EIA Report, Appendix 11C, Table 11C.10
Seagreen Bravo (2014)	220	Inch Cape 2018 EIA Report, Appendix 11C, Table 11C.10
Additional non-breeding season	1,077	Inch Cape 2018 EIA Report, Appendix 11B, Table 11B.6
Total	2,139	

16.1.5 The HRA Report was overly-precautionary in apportioning the effects on kittiwake to the SPA colonies in that all effects during the non-breeding season were apportioned to the SPAs. This overestimates the effects on the SPA populations. Consequently this AA is based on apportioning carried out by SNH and provided in advice to Scottish Ministers on 26 September 2018. The apportioned numbers are provided in Table 9 below.

16.2 Forth Islands – Kittiwake – Development in Isolation

16.2.1 The kittiwake population at the Forth Islands SPA is in an unfavourable and declining condition (SNH, 2017b)[10] having declined from 9,380 pairs at the time of SPA review undertaken in 2001 to 4,333 pairs in 2015.

16.2.2 Using apportioning advised by SNH, a mortality of 15 individuals (13.08 adults and 1.31 immatures) is estimated for the Forth Islands SPA population as a result of collision and displacement from the Development.

16.2.3 PVA was undertaken by NnGOWL for kittiwake breeding at the Forth Islands SPA over 25 year and 50 year periods for a number of scenarios, none of which match exactly the assessed figure of 15 individuals per year. The closest modelled scenario was 9 individuals. For this level of effect after 25 years the median of the ratio of impacted to un-impacted population size for the Development in isolation is 0.99, and after 50 years the value is 0.97. The assessed effect of 15 mortalities will be close to these figures.

16.2.4 SNH advised that there would be no adverse effect on the site integrity of the Forth Islands SPA in respect of kittiwake as a result of the Development in isolation.

16.3 Forth Islands – Kittiwake – Development In-combination

16.3.1 As detailed in paragraphs 15.2.2-15.2.3 and Table 11 this AA uses collision estimates that are taken from more than one source to estimate the cumulative totals.

16.3.2 This AA is based upon the WCS which means that the Development is assessed in-combination with the 2014 consents for Inch Cape and Seagreen Alpha and Bravo. The estimated effects of the Inch Cape 2017 and Seagreen 2017 proposals are substantially less than the values used in this AA.

Table 12 Estimated annual in-combination number of kittiwake collisions and displacement apportioned to Forth Islands SPA based on Band model option 2 and an avoidance rate of 89.9% & the matrix approach

Project	Individuals
NnG (2017)	15
Inch Cape (2014)	59
Seagreen Alpha & Bravo (2014)	19
Additional non-breeding season	9
Total	102

[10] SNH (2017b). Sitelinks. Scottish Natural Heritage. https://gateway.snh.gov.uk/sitelink/index.jsp

16.3.3 The cumulative total number of individuals experiencing annual mortality is assessed to be 102 which is less than the cumulative total of 135 estimated in the 2014 AA. The 135 estimate from the 2014 AA was based upon the assessment of adults only. The adults only estimate for this assessment is 92.

16.3.4 PVA was undertaken by NnGOWL for kittiwake breeding at the Forth Islands SPA over 25 year and 50 year periods for a number of scenarios, none of which match exactly the assessed cumulative total of 102 individuals per year. However these effects sit between 2 scenarios for which NnGOWL do present PVA outputs, one of which is for a larger scenario of 120 individuals and another smaller scenario of 91 individuals. After 25 years the median of the ratio of impacted to un-impacted population size for the in-combination assessment is 0.82 for the larger scenario and 0.85 for the lower scenario. After 50 years the ratio values are 0.67 and 0.73. The ratio value for the assessed cumulative total of 102 individuals will sit between the larger and smaller PVA scenarios presented by NnGOWL.

16.4 Fowlsheugh SPA – Kittiwake – Development in Isolation

16.4.1 The kittiwake population at the Fowlsheugh SPA is reported as in a favourable and maintained condition (SNH, 2017b).[11] However, the kittiwake population has declined from 36,350 pairs at the time of site designation in 1992 to 9,655 pairs in 2015. The HRA Report therefore considered it was unlikely that the SPA is in favourable condition.

16.4.2 Using apportioning advised by SNH a mortality of 2 individuals (1.98 adults and 0.43 immatures) is estimated for the Fowlsheugh SPA population as a result of collision and displacement from the Development.

16.4.3 PVA was undertaken by NnGOWL for kittiwake breeding at the Fowlsheugh SPA over 25 year and 50 year periods for a number of scenarios, none of which match exactly the assessed figure of 2 individuals per year. The closest modelled scenario was 12 individuals. For this level of effect after 25 years the median of the ratio of impacted to un-impacted population size for the Development in isolation is 0.99, and after 50 years the value is 0.98. The assessed effect of 2 mortalities will be less than these figures.

16.4.4 SNH advised that there would be no adverse effect on the site integrity of the Fowlsheugh SPA in respect of kittiwake as a result of the Development in isolation.

[11] SNH (2017b). Sitelinks. Scottish Natural Heritage

16.5 Fowlsheugh SPA – Kittiwake – Development In-combination

16.5.1 The in-combination assessment for Fowlsheugh SPA uses the same sources of information for the estimate of effects as detailed above in paras 15.2.2-15.2.3 and Table 11.

16.5.2 This AA is based upon the WCS which means that the Development is assessed in-combination with the 2014 consents for Inch Cape and Seagreen Alpha and Bravo. The estimated impacts of Inch Cape 2017 and Seagreen 2017 proposals are substantially less than the values used in this assessment.

16.5.3 The HRA Report was overly-precautionary in apportioning the effects on kittiwake to the SPAs in that all effects during the non-breeding season were apportioned to the SPAs. This overestimates the effects on the SPA populations. Consequently this AA is based on apportioning carried out by SNH and provided in advice to Scottish Ministers on 26 September 2018. The apportioned numbers are provided in Table 13 below.

Table 13 Estimated annual in-combination number of kittiwake collisions and displacement apportioned to Fowlsheugh SPA based on Band model option 2 and an avoidance rate of 89.9% & the matrix approach

Project	Individuals
NnG (2017)	2
Inch Cape (2014)	98
Seagreen Alpha & Bravo (2014)	104
Additional non-breeding season	26
Total	230

16.5.4 The cumulative total number of individuals at risk of mortality is assessed to be 230 which is more than the cumulative total of 212 estimated in the 2014 AA and less than the cumulative threshold of 317 identified in the 2014 AA. The 212 estimate from the 2014 AA was based upon the assessment of adults only. The adults only estimate for this assessment is 205 which is less than the 2014 AA total.

16.5.5 PVA was undertaken by NnGOWL for kittiwake breeding in the Fowlsheugh SPA over 25 year and 50 year periods for a number of scenarios, none of which match exactly the assessed cumulative total of 230 individuals per year. However these effects sit between 2 scenarios for which NnGOWL do present PVA outputs, one of which is for a larger scenario of 262 individuals and another smaller scenario of 138 individuals. After 25 years the median of the ratio of impacted to un-impacted population size for the in-combination assessment is

0.84 for the larger scenario and 0.88 for the lower scenario. After 50 years the ratio values are 0.72 and 0.79. The ratio value for the assessed cumulative total of 230 individuals will sit between the larger and smaller PVA scenarios presented by NnGOWL, and is likely to be closer to the results of the larger scenario (i.e. 0.84 after 25 years and 0.72 after 50 years).

16.6 St Abb's Head to Fast Castle SPA – Kittiwake – Development in Isolation

16.6.1 The kittiwake population at the St Abb's Head to Fast Castle SPA is reported as in an unfavourable and declining condition (SNH, 2017b).[12] The population has declined from 21,170 pairs at the time of site designation in 1992 to 3,334 pairs in 2016.

16.6.2 Considering apportioning advised by SNH a mortality of 2 individuals (2.03 adults and 0.29 immatures) is estimated for the St Abb's Head to Fast Castle SPA population as a result of collision and displacement from the Development.

16.6.3 PVA modelling was not undertaken for this SPA.

16.6.4 SNH advised that there would be no adverse effect on the site integrity of the St Abb's Head to Fast Castle SPA in respect of kittiwake as a result of the Development in isolation.

16.7 St Abb's Head to Fast Castle SPA – Kittiwake – Development In-combination

16.7.1 The HRA Report was overly-precautionary in apportioning the effects on kittiwake to the SPA in that all effects during the non-breeding season were apportioned to the SPA. This overestimates the effects on the SPA population. Consequently this AA is based on apportioning carried out by SNH and provided in advice to Scottish Ministers on 26 September 2018. The apportioned numbers are provided in Table 14 below.

Table 14 Estimated annual in-combination number of kittiwake collisions and displacement apportioned to St Abb's Head to Fast Castle SPA based on Band model option 2 and an avoidance rate of 89.9% & matrix approach

Project	Individuals
NnG (2017)	2
Inch Cape (2014)	12
Seagreen Alpha & Bravo (2014)	8
Additional non-	9

[12] SNH (2017b). Sitelinks. Scottish Natural Heritage

breeding season	
Total	32 (due to rounding)

16.7.2 The cumulative total number of individuals experiencing annual mortality is assessed to be 32 which is less than the cumulative total of 60 estimated in the 2014 AA. The 60 estimate from the 2014 AA was based upon the assessment of adults only. The adults only estimate for this assessment is 27.

16.8 Buchan Ness to Collieston Coast SPA – Kittiwake – Development in Isolation

16.8.1 The kittiwake population at the Buchan Ness to Collieston Coast SPA is reported as in an unfavourable (SNH, 2017b).[13] The population has declined from 30,452 pairs at the time of site designation in 1998 to 11,482 pairs in 2016.

16.8.2 The HRA Report considered that the Development area lies 125km to the south of this SPA and is beyond the mean maximum foraging range of breeding kittiwakes. There is therefore a very small risk of any adult breeding kittiwakes from the SPA occurring in the Development area during the breeding season.

16.8.3 During the non-breeding season kittiwakes from the SPA will disperse and may occur within the Development area. The HRA Report estimated that a total of 2 kittiwakes from the colony may be impacted each year from a combination of collision and displacement. The loss of 2 kittiwakes per year is 0.008% of the current breeding population.

16.8.4 PVA modelling was not undertaken for this SPA.

16.8.5 SNH advised that there would be no adverse effect on the site integrity of the Buchan Ness to Collieston Coast SPA in respect of kittiwake as a result of the Development in isolation.

16.9 Buchan Ness to Collieston Coast SPA – Kittiwake – Development In-combination

16.9.1 The HRA Report estimated that based on the worst-case in-combination scenario, there will be an estimated 21 adult kittiwakes from the Buchan Ness to Collieston Coast SPA during the breeding season impacted by collisions and 2 from displacement effects. A further 60 birds (adult and immature) may be impacted by collisions during the non-breeding season. Consequently, it is estimated that a total of 83 kittiwakes from the Buchan Ness to Collieston Coast

[13] SNH (2017b). Sitelinks. Scottish Natural Heritage

SPA could be impacted each year from in-combination impacts. The Development is beyond the mean maximum foraging range indicating that negligible breeding season effects would occur, and only 2 impacts are estimated arise from the Development during the non-breeding season.

16.9.2 No PVA was undertaken for the in-combination effects.

16.9.3 The inconsistencies detected in relation to NnGOWL's estimates for the Seagreen effects on kittiwake in relation to the Forth Islands and Fowlsheugh SPAs above, and the issues with apportioning are also relevant here, however the figures have not been re-assessed. Therefore the figures presented in the HRA Report and used in this AA in relation to the in-combination effects for kittiwake at Buchan Ness to Collieston Coast SPA are an overestimate.

16.10 Outer Firth of Forth and St Andrews Bay Complex pSPA – Kittiwake – Development in Isolation and In-combination

16.10.1 For the purposes of collision estimates the HRA Report assumed that 32% of the Development area overlapped with the pSPA. For the purposes of displacement the HRA Report assumed that 46% of the Development area overlapped with the pSPA (due to the 2km buffer area being included).

16.10.2 For kittiwake, both the Forth Islands SPA (4,663 pairs), and St. Abb's Head to Fast Castle SPA (3,334 pairs) border the pSPA, therefore, the HRA Report used the total of 7,997 pairs in the assessment during the breeding season.

16.10.3 The HRA Report indicated that 3 kittiwake collisions are estimated to occur during the breeding season within the pSPA and further 6 kittiwakes may be at risk of mortality due to the effects from displacement. Therefore, an estimated total of 9 kittiwakes may suffer mortality during the breeding season. This is equivalent to 0.05% of the breeding population at the two SPAs.

16.10.4 During the non-breeding season, the site selection population for the pSPA is 3,191 birds (SNH 2016). During the non-breeding season an estimated 6 kittiwakes may be impacted by collisions and a further 6 from the effects of displacement: a total of 12 kittiwakes. The loss of up to 12 kittiwakes during the non-breeding season is 0.4% of the population.

16.10.5 The HRA Report concluded that the loss of 0.05% of the kittiwake population during the breeding season and the highly precautionary potential loss of up to 0.4% of the kittiwake population during the non-breeding season will not affect the species remaining as a viable component to the site and therefore not adversely affect the integrity of the Outer Firth of Forth and St Andrews Bay

Complex pSPA in light of the qualifying interests, their condition and vulnerabilities and the conservation objectives.

16.10.6 As there is no overlap between the Inch Cape or Seagreen Alpha and Bravo offshore wind farms and the pSPA there is no requirement to consider the in-combination collision or displacement effects from these wind farms. Effects on prey availability and habitat loss in relation to the pSPA are considered in paragraphs 22.3.1-22.3.3.

16.10.7 SNH advised that there would be no adverse effect on the site integrity of the Firth of Forth and St Andrews Bay Complex pSPA in respect of kittiwake as a result of the Development in isolation or in-combination with the other wind farm proposals.

16.11 Kittiwake – Precaution in the Assessment

16.11.1 There are a number of precautionary assumptions made in this assessment which mean that the estimated cumulative total number of individuals impacted and the population consequences are highly likely to be over-estimates.

16.11.2 SNH, in its scoping advice, advised that displacement for kittiwake did not require to be included in the assessment due to emerging evidence that kittiwake are not affected by displacement. The inclusion of displacement in this assessment is likely to be precautionary, and does not take into account the potential for habituation. The assumption that all birds are displaced from a 2km buffer around each project is likely to be very precautionary.

16.11.3 Another example comes from the seabird collision avoidance study undertaken at Thanet offshore wind farm which lends support to the view that the avoidance rates used in this assessment are likely to be highly precautionary (Skov et al, 2018).[14]

16.11.4 The Scoping Opinion advised that flight speed data for use in CRM be taken from published data (Pennycuick 1997;[15] Alerstam et al. 2007[16]). These flight speeds are based on very small sample sizes (2 kittiwake). The laser rangefinder track data collected at Thanet recorded by Skov et al. (2018) offers species-specific empirical data on flight speeds from large numbers of individuals (287 kittiwake). This information was not available at the time of NnGOWL's

[14] Skov, H., Heinanen, S., Norman, T., Ward, R.M., Mendez-Roldan, S. & Ellis, I. 2018. ORJIP Bird Collision and Avoidance Study. Final report – April 2018. The Carbon Trust. United Kingdom

[15] Pennycuick, C.J., 1997. Actual and 'Optimum' Flight Speeds: Field Data Research. The Journal of Experimental Biology, 200, pp. 2355-2361

[16] Alerstam, T., Rosén, M., Bäckman, J., Ericson, P.G. & Jellgren, O. (2007). Flight speeds among bird species: allometric and phylogenetic effects. PLoS Biology, 5(8), e197

Application, however the Seagreen EIA report estimates that using the flight speeds recorded at Thanet would reduce kittiwake collisions by 19%. MSS have advised that across the Forth and Tay Developments, using the Skov 2018 flight speeds would reduce kittiwake collisions by between 20-30% depending on the wind farm site (average 24%).

16.11.5 The NnGOWL 50 Year Assessment assumes a 50 year operational life, within the PVA, for the Inch Cape and Seagreen Alpha and Bravo wind farms, whereas the 2014 consents for these projects are only for 25 years. Therefore the in-combination 50 Year Assessment over-estimates the effects.

16.11.6 Lastly, basing this assessment on the WCS for Inch Cape and Seagreen (i.e. their 2014 consents) is very precautionary as they are highly unlikely to be constructed due to advances in technology. If their current proposals were used in this assessment it would substantially reduce the effects associated with those projects.

16.12 Kittiwake - Conclusion

16.12.1 On 11 May 2018, SNH advised that the Development will not have an adverse effect on the site integrity for kittiwake as a qualifying interest of the Buchan Ness to Collieston Coast SPA, and the Firth of Forth and St Andrews Bay Complex pSPA in-combination with the existing 2014 consents for Inch Cape, Seagreen Alpha and Seagreen Bravo.

16.12.2 Based on the information presented in NnGOWL's EIA Report, HRA Report and EIA Addendum (which estimated effects which are higher than those in this AA), SNH advised on 7 September 2018 that the Development will have an adverse effect on site integrity for kittiwake as a qualifying interest of the Forth Islands SPA and Fowlsheugh SPA in-combination with the existing 2014 consents for Inch Cape, Seagreen Alpha and Seagreen Bravo.

16.12.3 As the information used in this AA comes from various sources, Scottish Ministers consulted SNH on the figures used to inform this kittiwake assessment. SNH responded on 5 and 8 October 2018 to advise that its previous advice in relation to kittiwake still stood and that in addition there would also be an adverse effect on the integrity of St Abb's Head to Fast Castle SPA with respect to kittiwake when the Development is considered in-combination with the existing 2014 consents for Inch Cape, Seagreen Alpha and Seagreen Bravo.

16.12.4 In reaching their conclusion Scottish Ministers have considered the conservation objectives, the populations at the sites, the predicted levels of effect and population consequences, the fact that the effects are less than in 2014, the precaution in the assessment methods and the advice from SNH. Scottish

Ministers conclude that, subject to the appliance of conditions, there will be no adverse effect on the site integrity of the Forth Islands SPA, Fowlsheugh SPA, St Abb's Head to Fast Castle SPA, Buchan Ness to Collieston Coast SPA or the Firth of Forth and St Andrews Bay Complex pSPA in respect of the kittiwake qualifying interest as a result of the Development in isolation or in-combination with the other Forth and Tay Developments and projects detailed in Appendices 1 and 2.

17 HERRING GULL – Forth Islands SPA, Fowlsheugh SPA, St Abb's Head to Fast Castle SPA, Buchan Ness to Collieston Coast SPA and Outer Firth of Forth and St Andrews Bay Complex pSPA

17.1.1 The closest largest breeding colonies of herring gulls to the Development are on the islands in the Firth of Forth and Isle of May, part of the Forth Islands SPA. Results from site-specific monitoring indicate that herring gulls are present in the Development wind farm area throughout the year, although during the breeding season (April to August) numbers are generally lower. The Buchan Ness to Collieston Coast SPA is beyond the mean max. foraging range for this qualifying interest, however, impacts upon this SPA have been considered as birds from this SPA could occur in the wind farm area during the non-breeding season. The Scoping Opinion required that only collision impacts were assessed in respect of this qualifying interest for both the breeding and non-breeding seasons.

17.1.2 During the breeding season, herring gulls from other breeding colonies, which may not be SPAs, may also be present within the Development area and, therefore, at risk from collision impacts. The potential impacts on all non-SPA breeding colonies and across all SPA colonies, for which herring gull is a qualifying interest, within the mean max. foraging range have been apportioned to take account of the presence of these birds.

17.2 Forth Islands SPA – Herring Gull – Development in Isolation

17.2.1 The herring gull population decreased between the time of designation and counts undertaken in 2014, however has increased again since 2014 and is in a favourable and maintained condition. The herring gull breeding population in the Forth Islands SPA is 6,580 pairs. The CRM presented in the HRA Report estimated that there could be a loss of 5 herring gull from this SPA throughout the year. This would result in an increase in the mortality of the breeding population by 0.04% as a result of collision impacts.

17.3 Fowlsheugh SPA – Herring Gull – Development in Isolation

17.3.1 The herring gull population has decreased significantly since the time of designation when the population was 3,190 pairs to the latest population

estimate of 125 pairs. The population is in an unfavourable and declining condition (SNH, 2017b).[17] The outputs of the CRM calculated that approx. 0.03 birds per year would be impacted by collision during the non-breeding season and none during the breeding season.

17.4 St Abb's Head to Fast Castle SPA – Herring Gull – Development in Isolation

17.4.1 The herring gull population has decreased significantly since the time of designation when the population was 1,160 pairs to the latest population estimate of 325 pairs. The population is in an unfavourable and declining condition (SNH, 2017b). Results from the CRM indicated that 0.04 herring gulls from the SPA would be impacted during the breeding season and 0.12 during the non-breeding season, equating to less than one herring gull per year from the SPA. This equates to an increase in mortality of 0.16 birds per year as a result of collision impacts.

17.5 Buchan Ness to Collieston Coast SPA – Herring Gull - Development in Isolation

17.5.1 The herring gull population has decreased significantly since the time of designation when the population was 4,292 pairs to the latest population estimate of 3,115 pairs. The population is in an unfavourable condition (SNH, 2017b). The Development wind farm area is beyond the mean max. foraging range for this qualifying interest during the breeding season and therefore birds from this SPA are unlikely to be present at the wind farm area during the breeding season. The HRA Report estimated that 0.07 of birds from this SPA may be impacted each year during the non-breeding season (equating to less than 0.001% of the breeding population).

17.6 Outer Firth of Forth and St Andrews Bay Complex pSPA – Herring Gull - Development in Isolation

17.6.1 The Scoping Opinion advised that for herring gull the assessment carried out for at the breeding colony SPAs should also be used for the assessment at the pSPA.

17.6.2 The HRA Report states that for herring gull, both the Forth Islands SPA (6,580 pairs), and St. Abb's Head to Fast Castle SPA (325 pairs) border the pSPA, therefore, for the purposes of this assessment, the pSPA population during the breeding season was estimated at 6,905 pairs.

[17] SNH (2017b). Sitelinks. Scottish Natural Heritage

17.6.3 For the worst-case scenario (54 turbines) the HRA Report estimated a total of 2 herring gull collisions (both adults) for the breeding season. Assuming that all herring gulls recorded in the wind farm area during the baseline survey were evenly distributed across the wind farm area, then 32% of all breeding season collisions, could occur in the area of the wind farm overlapping with the pSPA, therefore less than one bird is predicted to be impacted during the breeding season.

17.6.4 During the non-breeding season, an estimated four herring gulls are predicted to be impacted. Assuming that all herring gulls recorded in the wind farm area during the baseline survey were evenly distributed across the wind farm area, then 32% of all non-breeding season collisions could occur in the area of the wind farm area overlapping with the pSPA. An estimated one herring gull may be impacted during the non-breeding season.

17.7 Forth Islands SPA, Fowlsheugh SPA, St Abb's Head to Fast Castle SPA, Buchan Ness to Collieston Coast SPA and Outer Firth of Forth and St Andrews Bay Complex pSPA - Herring Gull – In-combination

17.7.1 No in-combination assessment was undertaken by NnGOWL. The HRA Report recognised that there is the potential for in-combination impacts, but concluded that, due to the very low level of impacts predicted on herring gull, an in-combination assessment was not required.

17.8 Herring Gull – Conclusion

17.8.1 The HRA Report stated that the predicted level of increase in herring gull mortality resulting from collision impacts for the Outer Firth of Forth and St Andrews Bay Complex pSPA, Forth Islands SPA, Fowlsheugh SPA, Buchan Ness to Collieston Coast SPA and St Abb's Head to Fast Castle SPA would not hinder the achievement of the conservation objectives of each of the sites.

17.8.2 SNH advised that there would be no adverse effect on the site integrity of the for the Outer Firth of Forth and St Andrews Bay Complex pSPA, Forth Islands SPA, Fowlsheugh SPA, Buchan Ness to Collieston Coast SPA and St Abb's Head to Fast Castle SPA in respect of the herring gull qualifying interest from the Development in isolation or in-combination with other projects.

17.8.3 The 2014 AA identified a -0.1% decline in adult survival for the Forth Islands SPA. This is higher than the decline in adult survival rate calculated in the HRA Report of 0.04% for the Development.

17.8.4 In reaching their conclusion Scottish Ministers have considered the conservation objectives, the populations at the sites, the predicted levels of effect and

population consequences, the fact that the effects are less than in 2014, and the advice from SNH. Scottish Ministers conclude that, subject to the appliance of conditions, there will be no adverse effect on the site integrity of the Outer Firth of Forth and St Andrews Bay Complex pSPA, Forth Islands SPA, Fowlsheugh SPA, Buchan Ness to Collieston Coast SPA and St Abb's Head to Fast Castle SPA in respect of the herring gull qualifying interest as a result of the Development in isolation or in-combination with the Forth and Tay Developments and other projects detailed in Appendix 1.

18 RAZORBILL – Forth Islands SPA, Fowlsheugh SPA, St Abb's Head to Fast Castle SPA and Firth of Forth and St Andrews Bay Complex pSPA

18.1.1 The Scoping Opinion advised that NnGOWL was only required to consider displacement effects as razorbill fly lower than the height of the turbine blades so are not at risk from collision.

18.1.2 As the footprints of the Development site and the Inch Cape and Seagreen Alpha and Bravo sites have not changed, the displacement effects from the 2014 consents will be no different to those from the 2018 applications, therefore it was not necessary to assess the revised scenarios as it was for the collision risk assessment. However methods of assessment for displacement have changed since 2014 as detailed in Appendix 3.

18.1.3 The closest large razorbill colonies to the Development are at the Isle of May (part of the Forth Islands SPA), St Abb's Head to Fast Castle SPA and Fowlsheugh SPA. These three SPAs were identified as being at possible risk from the impacts of displacement. The population sizes at Forth Islands SPA and Fowlsheugh SPA have increased significantly since the time of designation.

18.1.4 Tracking studies on 18 razorbills breeding on the Isle of May (2010) indicated that that razorbills did not use the Development wind farm area for non-flight activities such as foraging or resting (Daunt et al. 2011a).[18] Similar tracking studies were repeated by CEH in 2012, 2013 and 2014, albeit with a smaller sample size, which confirmed that there was little activity within the Development area.

18.1.5 This assessment follows the advice on displacement of razorbill provided in the Scoping Opinion and assesses the wind farm areas plus 2km buffers. A 60% displacement rate and 1% mortality rate are assumed during the breeding and non-breeding seasons. Results are summarised in Table 15 below.

[18] Daunt, F., Bogdanova, M., Newell, M., Harris, M. & Wanless, S. (2011a). GPS tracking of common guillemot, razorbill, black-legged kittiwake on the Isle of May Summer 2010. Report for FTOWDG. Centre for Ecology and Hydrology, Edinburgh.

Table 15 Estimated annual displacement effects on razorbill

Project	Individuals	Source
NnG (2017)	25	NnGOWL EIA Report, ornithology chapter 9, Tables 9.36 & 9.39
Inch Cape (2014)	49	NnGOWL EIA Report, ornithology chapter 9, Tables 9.126 & 9.138
Seagreen Alpha & Bravo (2014)	25	NnGOWL EIA Report, ornithology chapter 9, Tables 9.126 & 9.138
Total	99	

18.2 Forth Islands SPA – Razorbill – Development in Isolation

18.2.1 The razorbill population at Forth Islands SPA is in a favourable maintained condition with an increase in population from 2,800 birds at the time of site designation to 7,792 birds in 2017(SNH, 2017b).[19]

18.2.2 NnGOWL provided clarification of how it had apportioned effects in its note to Scottish Ministers on 25 September 2018, and subsequently SNH provided Scottish Ministers with updated calculations of the breeding and non-breeding season effects on 26 & 27 September 2018. The values presented in this AA are taken from SNH's advice. It is estimated that 5 razorbills from the Forth Islands SPA may be impacted by displacement mortality during the breeding season and a further 5 birds of all ages may be impacted during the non-breeding season. The potential loss is assessed as 10 razorbills across the year.

18.2.3 PVAs were undertaken by NnGOWL for Forth Islands SPA over a period of 25 and 50 years. The assessed loss of 10 razorbills is not one of the scenarios for which PVA outputs are provided. The nearest scenario is for the loss of 8 individuals (EIA Addendum appendix July 2018).

18.2.4 Assuming an effect of 8 mortalities, for Forth Islands SPA after 25 years, the median of the ratio of impacted to un-impacted population size for the Development in isolation is 0.98. After 50 years, the ratio value is 0.95 for displacement impacts (Table 8 of EIA addendum appendix July 2018). The ratio

[19] SNH (2017b). Sitelinks. Scottish Natural Heritage. https://gateway.snh.gov.uk/sitelink/index.jsp

value for the assessed figure if 10 individuals will be smaller than the PVA scenario presented by NnGOWL i.e. the population level effect will be greater.

18.2.5 SNH advised the Development on its own would not result in an adverse effect on site integrity to the Forth Islands SPA with respect to razorbill.

18.3 Forth Islands SPA – Razorbill – Development In-combination

18.3.1 Table 16 below presents the apportioned total effects (breeding and non-breeding seasons) on Forth Islands SPA based on the information provided by SNH on 26 & 27 September 2018.

Table 16 Estimated annual displacement effects on Forth Islands SPA – razorbill

Project	Individuals
NnG (2017)	10
Inch Cape (2014)	14
Seagreen Alpha & Bravo (2014)	5
Total	30 (due to rounding)

18.3.2 PVA was undertaken by NnGOWL for razorbill breeding in the Forth Islands SPA over 25 year and 50 year periods for a number of scenarios, none of which match exactly the assessed cumulative total of 30 individuals per year. However this effect is closest to the scenario of 25 individuals for which NnGOWL do present PVA outputs (EIA addendum appendix July 2018). After 25 years the median of the ratio of impacted to un-impacted population size for the in-combination assessment is 0.91. After 50 years the ratio value is 0.83 (Table 20 of EIA Addendum appendix). The ratio value for the assessed cumulative total of 30 individuals will be smaller than the PVA scenarios presented by NnGOWL i.e. the population level effect will be greater.

18.3.3 The 2014 AA estimated a loss of 41 individual adults only, which is larger than the effects estimated by this assessment. The adults only estimate for the current assessment is 19.

18.4 Fowlsheugh SPA – Razorbill – Development in Isolation

18.4.1 The razorbill population is in a favourable maintained condition with an increase in population from 5,800 birds at the time of site designation to 7,426 birds in 2017 (SNH, 2017b).[20]

18.4.2 Using the information provided by SNH on 26 & 27 September the estimated number of individual razorbills from Fowlsheugh SPA that may be impacted by displacement mortality during the breeding season is less than 1 and during the non-breeding season is 7, giving a seasonally combined total of 7.

18.4.3 PVAs were undertaken by NnGOWL for Fowlsheugh SPA over a period of 25 and 50 years. Due to errors in the PVAs for razorbill in the HRA Report, the PVA was recalculated and presented in the EIA Addendum.

18.4.4 There are no PVA outputs for Fowlsheugh SPA that provide an exact match for the assessed loss of 7 individuals. However these effects are closest to the scenario of 11 individuals for which NnGOWL do present PVA outputs (EIA Addendum appendix July 2018). After 25 years, the median of the ratio of impacted to un-impacted population size for the Development in isolation is 0.96. After 50 years, the ratio value is 0.94 for displacement impacts (Table 11 of the EIA Addendum appendix). The assessed loss of 7 individuals would result in smaller changes in the PVA outputs i.e. a larger population ratio value.

18.4.5 SNH advised the Development on its own would not result in an adverse effect on site integrity to the Fowlsheugh SPA with respect to razorbill.

18.5 Fowlsheugh SPA – Razorbill – Development In-combination

18.5.1 Table 17 below presents the apportioned total effects (breeding and non-breeding seasons) on Fowlsheugh SPA based on the information provided by SNH on 26 & 27 September 2018.

Table 17 Estimated annual displacement effects on Fowlsheugh SPA - razorbill

Project	Individuals
NnG (2017)	7
Inch Cape (2014)	17
Seagreen Alpha & Bravo (2014)	11
Total	35

[20] SNH (2017b). Sitelinks. Scottish Natural Heritage

18.5.2 There are no PVA outputs for Fowlsheugh SPA that provide an exact match for the assessed loss of 35 individuals. The closest scenario is for a loss of 33 individuals (EIA Addendum appendix July 2018). After 25 years, the median of the ratio of impacted to un-impacted population size for the Development in isolation is 0.93. After 50 years, the ratio value is 0.85 for displacement impacts (Table 23 of the EIA Addendum appendix). The assessed loss of 35 individuals would result in slightly greater differences in the PVA outputs i.e. a smaller population ratio value.

18.5.3 The 2014 AA estimated negligible effects on razorbill at Fowlsheugh SPA as that assessment was based on a different approach using the Searle *et al*. (2014)[21] model. Although there were practically no effects on razorbill at Fowlsheugh, the 2014 AA did identify a threshold of acceptable level of impact. This ratio of impacted to un-impacted population size was 0.79. the effects identified above are less than this value i.e. produce a larger population ratio value.

18.6 St Abb's Head to Fast Castle SPA – Razorbill – Development in Isolation

18.6.1 The razorbill population is in a favourable maintained condition with an increase in the population since the time of designation from 2,180 birds to 2770 in 2016 (although a decrease since 2014 when the population was 4,230).

18.6.2 Using the information provided by SNH on 26 & 27 September 2018 the estimated number of individual razorbills from St Abb's Head to Fast Castle SPA that may be impacted by displacement mortality during the breeding season is less than 1 and during the non-breeding season is 2, giving a seasonally combined total of 3.

18.6.3 PVA modelling was not undertaken for this SPA.

18.6.4 SNH advised the Development on its own would not result in an adverse effect on site integrity to the St Abb's Head to Fast Castle SPA with respect to razorbill.

18.7 St Abb's Head to Fast Castle SPA – Razorbill – Development In-combination

18.7.1 Table 18 below presents the apportioned total effects (breeding and non-breeding seasons) on St Abb's Head to Fast Castle SPA based on the information provided by SNH on 26 & 27 September 2018.

[21] Searle, K., Mobbs, D., Butler, A., Bogdanova, M., Freeman, S., Wanless, S. & Daunt, F. (2014) Population consequences of displacement from proposed offshore wind energy developments for seabirds breeding at Scottish SPAs (CR/2012/03). (Final Report to Marine Scotland Science).

Table 18 Estimated annual displacement effects on St Abb's Head to Fast Castle SPA - razorbill

Project	Individuals
NnG (2017)	3
Inch Cape (2014)	5
Seagreen Alpha & Bravo (2014)	2
Total	10

18.7.2 PVA modelling was not undertaken for this SPA.

18.8 Firth of Forth and St Andrews Bay Complex pSPA – Razorbill – Development in Isolation

18.8.1 The Firth of Forth and St Andrews Bay Complex pSPA has razorbill as a qualifying feature during the non-breeding season only. During the non-breeding season the estimated pSPA razorbill population is 5,481 birds (SNH 2016).[22]

18.8.2 The HRA Report estimated that 3 razorbill may be affected by impacts from displacement. This is 0.02% of the wintering population. The HRA Report concluded that this is a very low level of impact would not affect the species being a viable component of the site. Consequently, it concluded that impacts from displacement will not adversely affect the integrity of the Outer Firth of Forth and St Andrews Bay Complex pSPA in light of the qualifying interests, their condition and vulnerabilities and the conservation objectives.

18.8.3 As there is no overlap between the Inch Cape or Seagreen Alpha and Bravo offshore wind farms and the pSPA there is no requirement to consider the in-combination displacement effects from these wind farms.

18.8.4 SNH advised that there would be no adverse effect on the site integrity of the Firth of Forth and St Andrews Bay Complex pSPA in respect of razorbill as a result of the Development in isolation or in-combination with the other Forth and Tay Developments.

18.9 Razorbill – Precaution in the Assessment

[22] SNH. (2016). Outer Firth of Forth and St Andrews Bay Complex Proposed Special Protection Area (pSPA) NO. UK9020316. SPA Site Selection Document: Summary of the scientific case for site selection. Scottish Natural Heritage.

18.9.1 Scottish Ministers consider that the assessment completed by NnGOWL with respect to razorbill is precautionary. In particular, the inclusion of a 2km buffer to all the Forth and Tay wind farm sites, and no habituation to the wind farms. The inclusion of the 2km buffer in the displacement assessment has led to predicted displacement effects which are much greater than if the wind farm areas had been considered without the buffer.

18.9.2 The NnGOWL 50 Year Assessment assumes a 50 year operational life, within the PVA, for the Inch Cape and Seagreen Alpha and Bravo wind farms, whereas the 2014 consents for these projects are only for 25 years. Therefore the in-combination 50 Year Assessment over-estimates the effects.

18.10 Razorbill – Conclusion

18.10.1 In its advice provided on 7 September 2018, SNH stated that for razorbill, as a qualifying interest of the Forth Islands SPA and Fowlsheugh SPA, the Development could have an adverse effect on the site integrity in-combination with Inch Cape and Seagreen Alpha and Bravo wind farms. SNH raised concerns regarding its understanding of the methodology for the razorbill assessment. At a meeting on 18 September 2018 with NnGOWL, clarification on the methodology was provided and SNH confirmed that it did not require any further information.

18.10.2 As the information used in this AA comes from various sources, Scottish Ministers consulted SNH on the figures used to inform this razorbill assessment. SNH responded on 5 and 8 October 2018 to advise that in its view, when the Development is considered in-combination with the existing 2014 consents for Inch Cape, Seagreen Alpha and Seagreen Bravo, there would be an adverse effect on the integrity of the Forth Islands SPA and Fowlsheugh SPA with respect to razorbill.

18.10.3 In reaching their conclusion Scottish Ministers have considered the conservation objectives, the populations at the sites, the predicted levels of effect and population consequences, the fact that the effects are less than in 2014 (except for Fowlsheugh SPA), the precaution in the assessment methods and the advice from SNH. Scottish Ministers conclude that, subject to the appliance of conditions, the Development will not adversely affect the site integrity of the Forth Islands SPA, Fowlsheugh SPA, St Abb's Head to Fast Castle SPA and the Firth of Forth and St Andrews Bay Complex pSPA with respect to razorbill, either alone or in-combination with the other Forth and Tay Developments and projects detailed in Appendix 1.

19 GUILLEMOT - Forth Islands SPA, Fowlsheugh SPA, St Abb's Head to Fast Castle SPA, Buchan Ness to Collieston Coast SPA and Outer Firth of Forth and St Andrews Bay Complex pSPA

19.1.1 The Scoping Opinion advised that NnGOWL was only required to consider displacement effects as guillemot fly lower than the height of the turbine blades so are not at risk from collision.

19.1.2 As the footprints of the Development site and the Inch Cape and Seagreen Alpha and Bravo sites have not changed, the displacement effects from the 2014 consents will be no different to those from the 2018 applications, therefore it was not necessary to assess the different scenarios. However methods of assessment for displacement have changed since 2014 as detailed in Appendix 3.

19.1.3 The closest large guillemot colonies to the Development are at Forth Islands SPA, Fowlsheugh SPA, St Abb's Head to Fast Castle SPA and Buchan Ness to Collieston Coast SPA. These four SPAs were identified as being at possible risk from the impacts of displacement.

19.1.4 This assessment follows the advice on displacement of guillemot provided in the Scoping Opinion and assesses the wind farm areas plus 2km buffers. A 60% displacement rate and 1% mortality rate are assumed during the breeding and non-breeding seasons. The information to inform the guillemot assessment is taken from NnGOWL's EIA Report, HRA Report, EIA Addendum and consultation responses. Due to errors in the PVA results presented in the HRA Report, the PVAs for guillemot were re-run and presented in the EIA Addendum appendix July 2018. Displacement effects on guillemot are summarised in Table 19 below.

Table 19 Estimated annual displacement effects on guillemot

Project	Individuals	Source
NnG (2017)	61	NnGOWL HRA Report, tables 2.66 & 2.68
Inch Cape (2014)	56	NnGOWL HRA Report, tables 2.66 & 2.68
Seagreen Alpha	66	NnGOWL HRA Report, tables 2.66 & 2.68
Seagreen Bravo (2014)	59	NnGOWL HRA Report, tables 2.66 & 2.68

Total	242	

19.2 Forth Islands SPA – Guillemot – Development in Isolation

19.2.1 The guillemot population is in a favourable maintained condition with an increase in population from 8,000 birds at the time of site designation to 28,786 birds in 2017(SNH 2017b).[23]

19.2.2 The HRA Report states that the impacts from displacement during the breeding season based on 60% rate of displacement and 1% mortality during the breeding and non-breeding seasons indicates a total of 38 guillemots may suffer mortality due to the effects from displacement.

19.2.3 PVAs were undertaken by NnGOWL for Forth Islands SPA over a period of 25 and 50 years (EIA Addendum appendix July 2018). The assessed loss of 38 guillemot is not one of the scenarios for which PVA outputs are provided. The nearest scenario is for the loss of 36 individuals (EIA Addendum appendix July 2018).

19.2.4 Assuming a loss of 36 individuals from Forth Islands SPA after 25 years, the median of the ratio of impacted to un-impacted population size for the Development in isolation is 0.99 (Table 14 of EIA Addendum appendix July 2018). After 50 years, the ratio value is 0.96 for displacement impacts (Table 14 of EIA addendum appendix July 2018). The ratio value for the assessed figure of 38 individuals will be marginally larger than the PVA scenario presented by NnGOWL i.e. the population level impact will be greater.

19.2.5 SNH advised the Development on its own would not result in an adverse effect on site integrity to the Forth Islands SPA with respect to guillemot.

19.3 Forth Islands SPA – Guillemot – Development In-combination

19.3.1 Table 20 below presents the apportioned total effects (breeding and non-breeding seasons) on Forth Islands SPA based on the information in NnGOWL's HRA Report (Tables 2.67 & 2.69).

Table 20 Estimated annual displacement effects on Forth Islands SPA – guillemot

Project plus 2km buffer	Individuals
NnG (2017)	38

[23] SNH (2017b). Sitelinks. Scottish Natural Heritage

Inch Cape (2014)	14
Seagreen Alpha (2014)	6
Seagreen Bravo (2014)	6
Total	64

19.3.2 PVA was undertaken by NnGOWL for guillemot breeding in the Forth Islands SPA over 25 year and 50 year periods for a number of scenarios, none of which match exactly the assessed cumulative total of 64 individuals per year. However this effect is closest to the scenario of 36 individuals for which NnGOWL do present PVA outputs (EIA addendum appendix July 2018). After 25 years the median of the ratio of impacted to un-impacted population size for the in-combination assessment is 0.99. After 50 years the ratio value is 0.96 (Table 14 of EIA Addendum appendix July 2018). The ratio value for the assessed cumulative total of 64 individuals will be larger than the PVA scenarios presented by NnGOWL i.e. the population level impact will be greater.

19.3.3 SNH advised on 7 September 2018 that the Development in-combination with Inch Cape and Seagreen Alpha and Bravo wind farms would not result in an adverse effect on site integrity to the Forth Islands SPA with respect to guillemot.

19.4 Fowlsheugh SPA – Guillemot – Development in Isolation

19.4.1 The guillemot population is in a favourable maintained condition with a small decrease in population from 56,450 birds at the time of site designation to 55,507 birds in 2017 (SNH, 2017b).[24]

19.4.2 The HRA Report states that the impacts from displacement during the breeding season based on 60% rate of displacement and 1% mortality during the breeding season indicates that 1 adult guillemot may suffer mortality due to the effects from displacement and a further 4 birds of all ages may be impacted during the non-breeding season. The potential loss of 5 guillemots across the year is <0.001% of the current breeding population.

19.4.3 PVAs were undertaken by NnGOWL for Fowlsheugh SPA over a period of 25 and 50 years (EIA Addendum appendix July 2018). The assessed loss of 5 guillemot is not one of the scenarios for which PVA outputs are provided. The nearest scenario is for the loss of 21 individuals (EIA Addendum appendix July 2018). After 25 years the median of the ratio of impacted to un-impacted population size for the loss of 21 individuals is 0.99. After 50 years the ratio value

[24] SNH (2017b). Sitelinks. Scottish Natural Heritage

remains at 0.99 (Table 5 of EIA Addendum appendix). The ratio value for the assessed total of 5 individuals will be smaller than the PVA scenarios presented by NnGOWL i.e. the population level impact will be less.

19.4.4 SNH advised the Development on its own would not result in an adverse effect on site integrity to the Fowlsheugh SPA with respect to guillemot.

19.5 Fowlsheugh SPA – Guillemot – Development In-combination

19.5.1 Table 21 below presents the apportioned total effects (breeding and non-breeding seasons) on Fowlsheugh SPA based on the information in NnGOWL's HRA Report (Tables 2.67 & 2.69).

Table 21 Estimated annual displacement effects on Fowlsheugh SPA – guillemot

Project plus 2km buffer	Individuals
NnG (2017)	5
Inch Cape (2014)	28
Seagreen Alpha (2014)	45
Seagreen Bravo (2014)	40
Total	118

19.5.2 PVA was undertaken by NnGOWL for guillemot breeding in the Fowlsheugh SPA over 25 year and 50 year periods for a number of scenarios, none of which match exactly the assessed cumulative total of 118 individuals per year. However this effect is closest to the scenario of 71 individuals for which NnGOWL do present PVA outputs (EIA addendum appendix July 2018). After 25 years the median of the ratio of impacted to un-impacted population size for the in-combination assessment is 0.99. After 50 years the ratio value is 0.97 (Table 17 of EIA Addendum appendix). The ratio value for the assessed cumulative total of 118 individuals will be larger than the PVA scenarios presented by NnGOWL i.e. the population level impact will be greater.

19.5.3 SNH advised on 7 September 2018 that the Development in-combination with Inch Cape and Seagreen Alpha and Bravo wind farms would not result in an adverse effect on site integrity to the Fowlsheugh SPA with respect to guillemot.

19.6 St Abb's Head to Fast Castle SPA – Guillemot – Development in Isolation

19.6.1 The guillemot population is in a favourable maintained condition with an increase in the population from 31,750 birds at the time of site designation to 36,206 birds in 2017 (SNH 2017b).[25]

19.6.2 The HRA Report considered that the impacts from displacement during the breeding season based on 60% rate of displacement and 1% mortality during the breeding season indicates that 4 adult guillemots may suffer mortality due to the effects from displacement and a further 10 birds of all ages may be impacted during the nonbreeding season. The potential loss of 14 guillemots across the year is <0.04% of the current breeding population.

19.6.3 No PVA was undertaken for this SPA.

19.6.4 SNH advised the Development on its own would not result in an adverse effect on site integrity to the St Abb's Head to Fast Castle SPA with respect to guillemot.

19.7 St Abb's Head to Fast Castle SPA – Guillemot – Development In-combination

19.7.1 Table 22 below presents the apportioned total effects (breeding and non-breeding seasons) on St Abb's Head to Fast Castle SPA based on the information in the HRA Report (Tables 2.67 & 2.69).

Table 22 Estimated annual displacement effects on St Abb's Head to Fast Castle SPA – guillemot

Project plus 2km buffer	Individuals
NnG (2017)	16
Inch Cape (2014)	8
Seagreen Alpha (2014)	6
Seagreen Bravo (2014)	6
Total	36

19.7.2 PVA modelling was not undertaken for this SPA.

19.7.3 The HRA Report considered that the loss of an estimated 36 adult guillemots across the year due to in-combination impacts is 0.1% of the breeding population. The loss of an estimated 14 birds during the breeding season is 0.04% of the breeding population.

[25] SNH (2017b). Sitelinks. Scottish Natural Heritage

19.7.4 SNH advised the Development in-combination with Inch Cape and Seagreen Alpha and Bravo wind farms would not result in an adverse effect on site integrity to the St Abb's Head to Fast Castle SPA with respect to guillemot.

19.8 Buchan Ness to Collieston Coast SPA – Guillemot – Development in Isolation

19.8.1 The guillemot population is in a favourable maintained condition with an increase in the population from 17,280 birds at the time of site designation to 33,632 birds in 2017 (SNH, 2017b).[26]

19.8.2 The HRA Report considered the impacts from displacement during the breeding season based on 60% rate of displacement and 1% mortality during the breeding season indicates that no guillemots from the Buchan Ness to Collieston Coast SPA are predicted to be impacted by the Development and therefore there will be no population level effects on guillemots from this SPA.

19.8.3 No PVA was undertaken for this SPA.

19.8.4 SNH advised the Development on its own would not result in an adverse effect on site integrity to the Buchan Ness to Collieston Coast SPA with respect to guillemot.

19.9 Buchan Ness to Collieston Coast SPA – Guillemot – Development In-combination

19.9.1 Table 23 below presents the apportioned total effects (breeding and non-breeding seasons) on Buchan Ness to Collieston Coast SPA based on the information in the HRA Report (Tables 2.67 & 2.69).

Table 23 Estimated annual displacement effects on Buchan Ness to Collieston Coast SPA – guillemot

Project plus 2km buffer	Individuals
NnG (2017)	1
Inch Cape (2014)	2
Seagreen Alpha (2014)	3
Seagreen Bravo (2014)	3
Total	9

[26] SNH (2017b). Sitelinks. Scottish Natural Heritage

19.9.2 PVA modelling was not undertaken for this SPA.

19.9.3 The HRA Report concluded that the very low predicted displacement effects will not impact on the guillemot remaining as a viable component of the site and will not adversely affect the integrity of the Buchan Ness to Collieston Coast SPA, in light of the qualifying interest, their condition and the site's conservation objectives.

19.9.4 SNH advised the Development in-combination with Inch Cape and Seagreen Alpha and Bravo wind farms would not result in an adverse effect on site integrity to the Buchan Ness to Collieston Coast SPA with respect to guillemot.

19.10 Firth of Forth and St Andrews Bay Complex pSPA – Guillemot – Development in Isolation and In-combination

19.10.1 The Firth of Forth and St Andrews Bay Complex pSPA has guillemot as a qualifying feature during both the breeding and non-breeding seasons.

19.10.2 For guillemot, both the Forth Islands SPA (28,786 birds), and St. Abb's Head to Fast Castle SPA (36,206 birds) border the pSPA, therefore, for the purposes of this assessment, the pSPA population during the breeding season was estimated at 64,992 birds.

19.10.3 The HRA Report estimated that 14 birds (seven adults and seven immature or non-breeding adults) may be impacted during the breeding season.

19.10.4 During the non-breeding season the pSPA guillemot population is 21,968 birds (SNH 2016). The HRA Report estimated that up to 21 guillemots may suffer mortality during this season, if displacement occurs out to 2km beyond the Development area. This is 0.01% of the non-breeding population.

19.10.5 The HRA Report concluded that impacts from displacement will not adversely affect the integrity of the Outer Firth of Forth and St Andrews Bay Complex pSPA with respect to the guillemot qualifying interest.

19.10.6 SNH advised the Development in-combination with Inch Cape and Seagreen Alpha and Bravo wind farms would not result in an adverse effect on site integrity to the Firth of Forth and St Andrews Bay Complex pSPA with respect to guillemot.

19.11 Guillemot – Precaution in the Assessment

19.11.1 Scottish Ministers consider that the assessment completed by NnGOWL with respect to guillemot is precautionary. In particular, the inclusion of a 2km buffer to all the Forth and Tay wind farm sites, and no habituation to the wind farm. The inclusion of the 2km buffer in the displacement assessment has led to predicted displacement effects which are much greater than if the wind farm areas had been considered without the buffer.

19.11.2 The NnGOWL 50 Year Assessment assumes a 50 year operational life, within the PVA, for the Inch Cape and Seagreen Alpha and Bravo wind farms, whereas the 2014 consents for these projects are only for 25 years. Therefore the in-combination 50 Year Assessment over-estimates the effects.

19.12 Guillemot - Conclusions

19.12.1 In its advice provided on 7 September 2018, SNH stated that for guillemot as a qualifying interest of the Forth Islands SPA, Fowlsheugh SPA, St Abb's Head to fast Castle SPA, Buchan Ness to Collieston Coast SPA and The Firth of Forth and St Andrews Bay Complex pSPA, the Development would not have an adverse effect on the site integrity in-combination with Inch Cape and Seagreen Alpha and Bravo wind farms. This advice was confirmed by SNH on 5 October 2018 having considered in the information being used in this guillemot assessment.

19.12.2 In reaching their conclusion Scottish Ministers have considered the conservation objectives, the populations at the sites, the predicted levels of effect and population consequences, the precaution in the assessment methods and the advice from SNH. Scottish Ministers conclude that, subject to the appliance of conditions, the Development will not adversely affect the site integrity of the Forth Islands SPA, Fowlsheugh SPA, St Abb's Head to Fast Castle SPA and the Firth of Forth and St Andrews Bay Complex pSPA with respect to guillemot, either alone or in-combination with the other Forth and Tay Developments and projects detailed in Appendix 1.

20 PUFFIN - Forth Islands SPA and Outer Firth of Forth and St Andrews Bay Complex pSPA

20.1.1 The Scoping Opinion advised that NnGOWL was only required to consider displacement effects as puffin fly lower than the height of the turbine blades so are not at risk from collision. Displacement impacts during the non-breeding season were not required to be assessed as, following breeding, puffins disperse widely and are not present within the Forth and Tay region in significant numbers.

20.1.2 As the footprints of the Development site and the Inch Cape and Seagreen Alpha and Bravo sites have not changed the displacement effects from the 2014 consents will be no different to those from the 2018 applications, therefore it was not necessary to assess the different scenarios as it was for the collision risk assessment. However methods of assessment for displacement have changed since 2014 as detailed in Appendix 3.

20.1.3 The closest large puffin colony to the Development is located on the Isle of May which is part of the Forth Island SPA. The population is in a favourable maintained condition with an increase in population from 14,000 pairs at the time of site designation to 45,005 pairs between 2009 and 2017(SNH, 2017b).[27]

20.1.4 This assessment follows the advice on displacement of puffin provided in the Scoping Opinion and assesses the wind farm areas plus 2km buffers. A 60% displacement rate and 2% mortality rate are assumed during the breeding season.

20.2 Puffin – Forth Islands SPA – Development in Isolation

20.2.1 The HRA Report estimated that 3,704 puffin could be displaced from the Development area and 2km buffer during the breeding season. Using the 2% mortality rate this equated to a mortality of up to 37 adult birds and up to 37 immature birds. (see Table 2.42, HRA Report). A displacement mortality of 37 adults during the breeding season corresponds to 0.04% of the Forth Islands SPA adult breeding population.

20.2.2 When the impacts were apportioned across all colonies within the mean max. foraging range, it was estimated that 35 puffins from the Forth Islands SPA may be impacted, and 2 puffins from other colonies within the mean max. foraging range.

20.2.3 PVA undertaken by NnGOWL concluded that there would be no decrease in the current population, with a continued significant increase in the breeding population over the next 25 and 50 years. Over 25 years it is predicted that the population will have increased from its current level of 45,005 pairs to 174,231 pairs, with no wind farms present. The additional estimated mortality arising from displacement effects from the proposed wind farm may cause a reduced level of population increase with the future population predicted to be 172,875 pairs with the wind farm present. After 25 years, the median of the ratio of impacted to un-impacted population size for Development in isolation is 0.99 (n.b. ratio values are referred to in the HRA Report as the counterfactuals). After 50 years, the ratio value is 0.98.

[27] SNH (2017b). Sitelinks. Scottish Natural Heritage

20.2.4 SNH advised the Development on its own would not result in an adverse effect on site integrity to the Forth Islands SPA with respect to puffin.

20.3 Puffin – Forth Islands SPA – Development in-combination

20.3.1 The HRA Report estimated that 134 puffins could suffer mortality due to in-combination displacement impacts (see Table 24 below, n.b the value of 134 includes 3 additional mortalities from other wind farms outwith the Forth and Tay). This figure equates to 0.15% of the current breeding population. The PVA analysis indicated that after 25 years, the median of the ratio of impacted to un-impacted population size for Development in isolation is 0.97. After 50 years, the ratio value is 0.96. The HRA Report concluded that there would be no adverse effect on the site integrity of the Forth Islands SPA with respect to puffin resulting from in-combination effects.

Table 24 Estimated adult puffin mortality from displacement impacts from Forth and Tay wind farms in the breeding season

Project	Adults (Development area + 2km buffer)
NnG	37
Inch Cape	46
Seagreen A	21
Seagreen B	27
TOTAL	131

20.3.2 SNH advised the Development in-combination with Inch Cape, Seagreen Alpha and Seagreen Bravo would not result in an adverse effect on site integrity to the Forth Islands SPA with respect to puffin.

20.4 Puffin - Outer Firth of Forth and St Andrews Bay Complex pSPA – Development in Isolation and In-combination

20.4.1 The Forth Islands SPA borders the pSPA and, therefore, NnGOWL have, for the purposes of their assessment, estimated the population during the breeding season as 45,005 pairs. The 3 year peak mean population of puffins recorded in the wind farm area during the breeding season was 6,173 birds. The area of overlap with the pSPA (including the 2km buffer) equates to 46% and therefore, it was calculated that 46% of the 3 year peak mean population, equating to 2,840 individuals, could be displaced during the breeding season. Assuming a 60% displacement rate and 2% rate mortality rate, the HRA Report estimated that 34 birds (17 adults and 17 immature or non-breeding adults) may be impacted during the breeding season.

20.4.2 PVA was undertaken for the Forth Islands SPA over 25 and 50 year periods. The loss of 17 birds per year within the pSPA is below the level at which PVA modelling is predicted to cause a decrease in the breeding puffin population.

20.4.3 As there is no overlap between the Inch Cape or Seagreen Alpha and Bravo offshore wind farms and the pSPA there is no requirement to consider the in-combination displacement effects from these wind farms.

20.4.4 SNH advised the Development in isolation and in-combination with Inch Cape, Seagreen Alpha and Seagreen Bravo would not result in an adverse effect on site integrity to the Outer Firth of Forth and St Andrews Bay Complex pSPA with respect to puffin.

20.5 Puffin - Conclusion

20.5.1 The 2014 AA estimated a much greater effect on puffin from the Forth and Tay wind farms, the total estimated mortalities in 2014 was 1251 puffin per year from the Forth Islands SPA. This was due to the different assessment methodologies advised in 2014. The assumptions in the 2014 AA were overly precautionary for example a mortality rate of 50% was assumed for puffin. The mortality rate used in the current assessment is 2%, which was advised by SNH, and detailed in the Scoping Opinion. The 2014 AA concluded that there would be no adverse effect on site integrity, the predicted effects in the current AA are significantly less.

20.5.2 SNH advised that, based on the information contained within the EIA and HRA Report, there would be no adverse effect on the site integrity of the Forth Islands SPA or Outer Firth of Forth and St Andrews Bay Complex pSPA in respect of the puffin qualifying interest as a result of the Development in isolation and in-combination with the other Forth and Tay Developments.

20.5.3 In reaching their conclusion Scottish Ministers have considered the conservation objectives, the populations at the sites, the predicted levels of effect and population consequences, the fact that the effects are less than in 2014 and the advice from SNH. Scottish Ministers conclude that, subject to the appliance of conditions, the Development will not adversely affect the site integrity of Forth Islands SPA or Outer Firth of Forth and St Andrews Bay Complex pSPA with respect to puffin in isolation or in-combination with the other Forth and Tay Developments and projects detailed in Appendix 1.

21 BLACK-HEADED GULL, LITTLE GULL AND COMMON GULL - Outer Firth of Forth and St Andrews Bay Complex pSPA

21.1.1 The Scoping Opinion required that assessments of displacement and collision impacts were undertaken for the black-headed gull, little gull and common gull

qualifying interests of the pSPA if the Development area overlapped the pSPA boundary for the non-breeding season only.

21.1.2 RSPB stated that the Development would lead to: the loss of the distribution and extent of habitats, deterioration of the habitats of the qualifying interests and that this will infringe on the maintenance of the species as a viable component of the site and the ability of the qualifying interests to utilise important parts of the site. RSPB therefore stated that the Development would have an adverse effect on the site integrity of the pSPA.

21.1.3 Non-breeding season impacts have been calculated using the populations presented in the pSPA site selection document (SNH, 2016).[28] However, the HRA Report states that these figures present the minimum numbers of birds likely to be present and for the little gull qualifying interest a larger population figure has been assumed.

21.2 Little gull

21.2.1 The estimated population for little gull during the non-breeding is given as 126 birds. NnGOWL highlighted, however, that the size of the regional autumn passage population is unknown, which presented a constraint when completing their assessment. The HRA Report provided a summary of recent research outputs, which suggests that the species may be more common than originally appreciated. Therefore, the upper limit of birds (3,000 individuals) has been used as a precaution.

21.2.2 The HRA Report concluded that based on the outputs of the CRM there will be no impacts on little gulls from collision. Based on an overlap of 46% and assuming a displacement rate of 30% and a mortality rate of 2%, it was estimated that 1 bird may be impacted by displacement effects during the non-breeding season, which equates to 0.8% of the cited SPA population and 0.03% of the higher population figure.

21.3 Black-headed gull

21.3.1 The CRM predicted no impacts on black-headed gulls from collisions. The HRA Report concluded that 6 birds may suffer mortality during the non-breeding season, based on an overlap of 46% and assuming a displacement rate of 30% and a mortality rate of 2%. This would equate to a total of 0.02% of the pSPA population. The HRA Report considered that these impacts would be unlikely to

[28] SNH. (2016). Outer Firth of Forth and St Andrews Bay Complex Proposed Special Protection Area (pSPA) NO. UK9020316. SPA Site Selection Document: Summary of the scientific case for site selection. Scottish Natural Heritage.

occur as evidence from other operational wind farms has shown little, if any, displacement behaviour on other species of gull.

21.4 Common gull

21.4.1 The CRM predicted no impacts on common gulls from collisions during the breeding season. Based on an overlap of 46% and assuming a displacement rate of 30% and a mortality rate of 2%, it was estimated that 6 birds may be impacted by displacement during the non-breeding season, equating to 0.02% of the pSPA population. Again, the HRA Report considered that these impacts would be unlikely to occur based on evidence gathered from other operational wind farms regarding displacement behaviour.

21.5 Little gull, common gull, black-headed gull – In-combination

21.5.1 The HRA Report states that, as collision impacts and displacement effects will only affect birds within the pSPA, not all the estimated impacts from the Development will affect birds within the pSPA as the whole of the Development does not overlap with the pSPA. Although the HRA Report recognised that in-combination impacts could occur with projects outwith the pSPA, these in-combination impacts have already been assessed against the relevant terrestrial populations which make up the reference pSPA population. Therefore, no additional in-combination assessment has been undertaken for the pSPA by NnGOWL.

21.6 Little gull, common gull, black-headed gull - Conclusion

21.6.1 These qualifying interests were not considered within the 2014 AA as the SPA was not proposed for designation at this time.

21.6.2 SNH advised that there would be no adverse effect on the site integrity of the Outer Firth of Forth and St Andrews Bay Complex pSPA arising from the Development in isolation in respect of the above listed qualifying interests.

21.6.3 In reaching their conclusion Scottish Ministers have considered the conservation objectives, the populations at the site, the predicted levels of effect, and the advice from SNH. Scottish Ministers conclude that, subject to the appliance of conditions, there will be no adverse effect on the site integrity of the Outer Firth of Forth and St Andrews Bay Complex pSPA in respect of the little gull, common gull or black-headed gull qualifying interests as a result of the Development in isolation or in-combination with other plans and projects.

22 PREY AVAILABILITY AND HABITAT LOSS - Outer Firth of Forth and St Andrews Bay Complex pSPA

22.1.1 Likely significant effects on the qualifying interests of the pSPA are predicted as a result of indirect impacts resulting from prey availability and habitat loss (due to the physical presence of the WTG and cable protection). Temporary impacts arising from disturbance to the seabed during cable laying operations may also occur during the construction phase.

22.2 Habitat Loss

22.2.1 The HRA Report included consideration of the degree of habitat loss arising from the installation of the WTGs on the seabed and accompanying scour protection. The assessment was conducted assuming a worst-case scenario of 54 wind turbines. As approximately 68% of the Development area falls outwith the pSPA boundary, the appraisal assumed that 68% of the turbines would be installed outwith the pSPA boundary and would subsequently have no physical impact on the pSPA. In addition, the impacts of the installation of an OSP and two OECs (including cable protection) were considered – equating to a total potential area of seabed habitat loss of 0.1527km^2 or 0.0056% of the physical habitat.

22.2.2 The HRA Report considered the installation methods to be utilised and site conditions and concluded that the trenching of cables will cause only a local and temporary impact on habitats within the pSPA. The HRA report concluded that these impacts were of negligible magnitude, as the area of habitat predicted to be lost will not cause a significant reduction in the extent, distribution or quality of habitats that support the qualifying interests of the Outer Firth of Forth and St Andrews Bay Complex pSPA.

22.2.3 The Inch Cape offshore wind farm does not overlap with the pSPA, except for part of the cable route. The Inch Cape HRA Report estimates that 85% of their cable corridor overlaps with the pSPA, which equates to 0.7% of the area of the pSPA being affected.

22.2.4 The Seagreen Alpha and Bravo offshore wind farms do not overlap with the pSPA except for a small percentage of the cable corridor which has landfall at Carnoustie.

22.3 Prey Availability

22.3.1 Further indirect impacts on the bird qualifying interests may arise during the construction phase of the Development. Construction works have the potential to impact benthic and fish receptors, resulting in a reduction in prey availability for the bird qualifying interests. SNH advised that there were no likely significant effects arising from the Development on the fish and benthic qualifying interests of the sites and therefore, these qualifying interests are not considered further in

this AA. Impacts on prey were considered at page 132 of the HRA Report, including details of proposed mitigation measures to reduce impacts on prey, such as the piling strategy and vessel management plan. These conditions are listed in Section 4 of this AA.

22.3.2 The HRA Report concluded that the impacts on prey availability will be localised and short-term and, therefore, the distribution and extent of the species will be maintained in the long-term.

22.3.3 In reaching their conclusion Scottish Ministers have considered the conservation objectives, the limited impacts on prey species and the large area of habitat available. Scottish Ministers conclude that there will be no adverse effect on the site integrity of the Outer Firth of Forth and St Andrews Bay Complex pSPA as a result of impacts arising from prey availability or habitat loss from the Development in isolation or in-combination with the Forth and Tay Developments.

22.4 Consideration of the pSPA under Article 4(4) of the Birds Directive

22.4.1 As detailed in paragraph 3.1.2, as the Outer Firth of Forth and St Andrews Bay Complex pSPA has not yet been designated, it also falls within the regime governed by the first sentence of Article 4(4) of the Birds Directive as follows:

> "In respect of the protection areas referred to in paragraphs 1 and 2, Member States shall take appropriate steps to avoid pollution or deterioration of habitats or any disturbances affecting the birds, in so far as these would be significant having regard to the objectives of this Article. Outside these protection areas, Member States shall also strive to avoid pollution or deterioration of habitats."

22.4.2 The Scottish Ministers have considered the information contained within the HRA Report and the advice provided by SNH and conclude that the works will not cause pollution or deterioration of habitats and any disturbance will be negligible.

23 Overall Conclusion

23.1.1 In the ornithology assessments above Scottish Ministers have considered the conservation objective of "maintaining the population of the species as a viable component of the site" on the individual qualifying features of the SPAs, as well as additional conservation objectives in relation to the pSPA.

23.1.2 For the qualifying interests of the sites concerned Scottish Ministers have determined that the Development in isolation and in-combination will not affect the populations as viable components of the SPAs. Scottish Ministers also

conclude that the Development will not, on its own or in-combination with the projects detailed in Appendices 1 and 2, adversely affect the integrity of the Forth Islands SPA, Fowlsheugh SPA, Buchan Ness to Collieston Coast SPA, St Abb's Head to Fast Castle SPA, or the Outer Firth of Forth and St Andrews Bay Complex pSPA, where each SPA is taken as a whole.

23.1.3 In reaching their conclusion Scottish Ministers consider that the most up to date and best scientific evidence available has been used and are satisfied that no reasonable scientific doubt remains. The Scottish Ministers conclude that, subject to the appliance of conditions, the Development with a 50 year operational life will not have an adverse effect on the site integrity of the Isle of May SAC, Berwickshire and North Northumberland Coast SAC, Firth of Tay and Eden Estuary SAC, Moray Firth SAC, Forth Islands SPA, Fowlsheugh SPA, Buchan Ness and Collieston Coast SPA, St Abb's Head to Fast Castle SPA, and the Outer Firth of Forth and St Andrews Bay Complex pSPA in isolation or in-combination with the Inch Cape and Seagreen Alpha and Bravo offshore wind farms and other projects detailed in Appendices 1 and 2.

23.2 Reasons for diverging from SNH advice

23.2.1 In reaching their conclusions Scottish Ministers have given considerable weight to SNH's advice. The methods advised by SNH through scoping, and additional information requested by SNH, have been fully incorporated into this assessment. As such, divergence from their advice is limited to differing conclusions in relation to site integrity for gannet at Forth Islands SPA, kittiwake at Forth Islands SPA, Fowlsheugh SPA, and St Abb's Head to Fast Castle SPA and razorbill at Forth Islands SPA and Fowlsheugh SPA. In reaching a different conclusion Scottish Ministers note that SNH's advice on the level of impact being adverse to site integrity is a subjective opinion. In reaching their own conclusions, Scottish Ministers have taken proper account of the entire context of this assessment, in particular its highly precautionary assumptions, which make it very unlikely the number of impacted individuals will be as large as the values presented in the assessment. For these reasons Scottish Ministers consider the levels of assessed impact to be reasonable and are convinced there will be no adverse impacts on site integrity of any of the SACs, SPAs or the pSPA considered in this AA.

SECTION 4: CONDITIONS

24 Requirement for conditions

24.1.1 The requirement for the below conditions is as a result of NnGOWL's commitments in the EIA and HRA Reports, along with SNH's advice regarding mitigation measures to ensure that there will be no adverse effect on the site integrity of the natura sites listed above.

24.1.2 The conditions below relate to natura concerns as well as covering other interests. The conditions here are written in their complete form and so may also refer to non-natura interests. Where reference is made to other conditions these are numbered as per the condition numbers which will be used in the s.36 consent if granted.

1. Duration of the Consent

The consent is for a period of 50 years from the date of Final Commissioning of the Development.

Written confirmation of the date of First and Final Commissioning must be provided by the Company to the Scottish Ministers and to Angus Council, Dundee City Council, East Lothian Council, Fife Council, Scottish Borders Council and Scottish Ministers no later than one calendar month after these respective dates.

Reason: *To define the duration of the consent.*

2. Decommissioning

The Development will be decommissioned and will cease to generate electricity by no later than the date falling 50 years from the date of Final Commissioning of the Development.

There must be no Commencement of Development unless a Decommissioning Programme ("DP") has been submitted to and approved in writing by the Scottish Ministers. The DP must outline measures for the decommissioning of the Development, restoration of the sea bed and will include without limitation, proposals for the removal of the Development, the management and timing of the works and, environmental management provisions.

The Development must be decommissioned in accordance with the approved DP, unless otherwise agreed in writing in advance with the Scottish Ministers.

***Reason**: To ensure the decommissioning and removal of the Development in an appropriate and environmentally acceptable manner, and in the interests of safety and environmental protection.*

3. **Construction Method Statement**

The Company must, no later than six months prior to the Commencement of the Development submit a Construction Method Statement ("CMS"), in writing, to the Scottish Ministers for their written approval. Such approval may only be granted following consultation by the Scottish Ministers with SNH, SEPA, MCA, NLB, RSPB Scotland, Forth Ports ("FP"), Angus Council, Dundee City Council, East Lothian Council, Fife Council, Scottish Borders Council and any such other advisors or organisations as may be required at the discretion of the Scottish Ministers.

The CMS must include, but not be limited to:

a. Details of the commencement dates, duration and phasing for the key elements of construction, the working areas, the construction procedures and good working practices for installing the Development.

b. Details of the roles and responsibilities, chain of command and contact details of company personnel, any contractors or sub-contractors involved during the construction of the Development.

c. Details of how the construction related mitigation steps proposed in the Application are to be delivered.

The CMS must adhere to the construction methods assessed in the Application. The CMS also must, so far as is reasonably practicable, be consistent with the Design Statement ("DS"), the Environmental Management Plan ("EMP"), the Vessel Management Plan ("VMP"), the Navigational Safety Plan ("NSP"), the Piling Strategy ("PS"), the Cable Plan ("CaP") and the Lighting and Marking Plan ("LMP").

***Reason**: To ensure the appropriate construction management of the Development, taking into account mitigation measures to protect the environment and other users of the marine area.*

4. **Piling Strategy**

The Company must, no later than six months prior to the Commencement of the Development, submit a Piling Strategy ("PS"), in writing, to the Scottish Ministers for their written approval. Such approval may only be granted following consultation by the Scottish Ministers with SNH, River Tweed Commission ("RTC"), Whale and Dolphin Conservation ("WDC"), Scottish Borders Council and any such other advisors as may be required at the discretion of the Scottish Ministers.

The PS must include, but not be limited to:

a. Details of expected noise levels from pile-drilling/driving in order to inform point d below;

b. Full details of the proposed method and anticipated duration of piling to be carried out at all locations;

c. Details of soft-start piling procedures and anticipated maximum piling energy required at each pile location; and

d. Details of any mitigation such as Passive Acoustic Monitoring ("PAM"), Marine Mammal Observers ("MMO"), use of Acoustic Deterrent Devices ("ADD") and monitoring to be employed during pile-driving, as agreed by the Scottish Ministers.

The PS must be in accordance with the Application and must also reflect any monitoring or data collection carried out after submission of the Application. The PS must demonstrate how the exposure to and/or the effects of underwater noise have been mitigated in respect to harbour porpoise, minke whale, bottlenose dolphin, harbour seal, grey seal, Atlantic salmon and sea trout.

The PS must, so far as is reasonably practicable, be consistent with the EMP, the Project Environmental Monitoring Programme ("PEMP") and the CMS.

Reason*: To mitigate the underwater noise impacts arising from piling activity.*

5. **Environmental Management Plan**

The Company must, no later than six months prior to the Commencement of the Development, submit an Environmental Management Plan ("EMP"), in writing, to the Scottish Ministers for their written approval. Such approval may only be granted following consultation by the Scottish Ministers with, SNH, SEPA, RSPB Scotland, WDC, RTC, Tay District Salmon Fisheries Board ("Tay DSFB"), Esk District Salmon Fisheries Board ("Esk DSFB"), Forth District Salmon Fisheries Board ("Forth DSFB"), Fisheries Management Scotland ("FMS") and any such other advisors or organisations as may be required at the discretion of the Scottish Ministers.

The EMP must provide the over-arching framework for on-site environmental management during the phases of development as follows:

a. All construction as required to be undertaken before the Final Commissioning of the Development; and

b. The operational lifespan of the Development from the Final Commissioning of the Development until the cessation of electricity generation (environmental management during decommissioning is addressed by the Decommissioning Programme provided for by condition **Error! Reference source not found.**).

The EMP must be in accordance with the Application insofar as it relates to environmental management measures. The EMP must set out the roles, responsibilities and chain of command for the Company personnel, any contractors or sub-contractors in respect of environmental management for the protection of environmental interests during the construction and operation of the Development. It must address, but not be limited to, the following over-arching requirements for environmental management during construction:

a. Mitigation measures to prevent significant adverse impacts to environmental interests, as identified in the Application and pre-consent and pre-construction monitoring or data collection, and include the relevant parts of the CMS (refer to condition 10);

b. A pollution prevention and control method statement, including contingency plans;

c. Management measures to prevent the introduction of invasive non-native marine species;

d. A site waste management plan (dealing with all aspects of waste produced during the construction period), including details of contingency planning in the event of accidental release of materials which could cause harm to the environment. Wherever possible the waste hierarchy of reduce, reuse and recycle should be encouraged; and

e. The reporting mechanisms that will be used to provide the Scottish Ministers and relevant stakeholders with regular updates on construction activity, including any environmental issues that have been encountered and how these have been addressed.

The EMP must be regularly reviewed by the Company and the Scottish Ministers or Forth and Tay Regional Advisory Group ("FTRAG"), at intervals agreed by the Scottish Ministers. Reviews must include, but not be limited to, the reviews of updated information on construction methods and operations of the Development and updated working practices.

The EMP must be informed, so far as is reasonably practicable, by the baseline monitoring or data collection undertaken as part of the Application and the PEMP.

Reason: *To ensure that all construction and operation activities are carried out in a manner that minimises their impact on the environment, and that mitigation measures contained in the Application, or as otherwise agreed are fully implemented.*

6. **Vessel Management Plan**

The Company must, no later than six months prior to the Commencement of the Development, submit a Vessel Management Plan ("VMP"), in writing, to the Scottish

Ministers for their written approval. Such approval may only be granted following consultation by the Scottish Ministers with SNH, WDC, FP, MCA, NLB, SFF and any such other advisors or organisations as may be required at the discretion of the Scottish Ministers.

The VMP must include, but not be limited to, the following details:

a. The number, types and specification of vessels required;

b. How vessel management will be coordinated, particularly during construction but also during operation;

c. Location of working port(s), the routes of passage, how often vessels will be required to transit between port(s) and the site and indicative vessel transit corridors proposed to be used during construction and operation of the Development; and

d. A fishing gear De-Confliction Notice. The De-Confliction Notice must lay out guidelines for vessels operating in around the site and transiting into the site from relevant ports.

The confirmed individual vessel details must be notified to the Scottish Ministers in writing no later than 14 days prior to the Commencement of the Development, and thereafter, any changes to the details supplied must be notified to the Scottish Ministers, as soon as practicable, prior to any such change being implemented in the construction or operation of the Development.

The VMP must, so far as is reasonably practicable, be consistent with the CMS, the EMP, the PEMP, the NSP, and the LMP.

Reason: *To mitigate the impact of vessels.*

7. **Cable Plan**

The Company must, no later than six months prior to the Commencement of the Development, submit a Cable Plan ("CaP"), in writing, to the Scottish Ministers for their written approval. Such approval may only be granted following consultation by the Scottish Ministers with, SNH, MCA, SFF and any such other advisors or organisations as may be required at the discretion of the Scottish Ministers. The CaP must be in accordance with the Application.

The CaP must include, but not be limited to, the following:

a. The vessel types, location, duration and cable laying techniques for the inter array cables;

b. The results of monitoring or data collection work (including geophysical, geotechnical and benthic surveys) which will help inform cable routing;

c. Technical specification of inter array cables, including a desk based assessment of attenuation of electro-magnetic field strengths and shielding;

d. A burial risk assessment to ascertain burial depths and where necessary alternative protection measures;

e. Methodologies for surveys (e.g. over trawl) of the inter array cables through the operational life of the wind farm where mechanical protection of cables laid on the sea bed is deployed; and

f. Methodologies for inter array cable inspection with measures to address and report to the Scottish Ministers any exposure of inter array cables.

Any consented cable protection works must ensure existing and future safe navigation is not compromised. The Scottish Ministers will accept a maximum of 5% reduction in surrounding depth referenced to Chart Datum. Any greater reduction in depth must be agreed in writing by the Scottish Ministers.

Reason: *To ensure all environmental and navigational issues are considered for the location and construction of the inter array cables.*

APPENDIX 1: IN-COMBINATION ASSESSMENT – OTHER PLANS AND PROJECTS

25 In-Combination Assessment (Other Plans & Projects) - Introduction

25.1.1 The AA above provides a detailed in-combination assessment with the Inch Cape and Seagreen Alpha and Bravo offshore wind farms (and where relevant other UK wind farms) for ornithology and also with the Moray East, Moray West and Beatrice offshore wind farms for bottlenose dolphin.

25.1.2 Scottish Ministers are aware of a number of activities which currently have a marine licence and/or s.36 consent and where LSE was identified on the qualifying interests of the Forth Islands SPA, Fowlsheugh SPA, St Abb's Head to Fast Castle SPA, Buchan Ness to Collieston Coast SPA, Outer Firth of Forth and St Andrews Bay Complex pSPA, Moray Firth SAC, Firth of Tay and Eden Estuary SAC, Berwickshire and North Northumberland Coast SAC and Isle of May SAC. Scottish Ministers have considered these other projects in reaching their conclusions above.

25.1.3 Table 25 below provides a summary of the projects which have been considered in this assessment. An overall conclusion regarding in-combination effects is included within the main body of the AA.

Table 25 Projects for which there is currently an active marine licence or s.36 consent and where LSE was identified on the qualifying interests of the sites

Project Name	Licence/Consent Type(s)	Relevant site(s)
Aberdeen Harbour Expansion Project ("AHEP")	Construction	• Moray Firth SAC • Berwickshire & North Northumberland Coast SAC • Isle of May SAC • Forth Islands SPA • Fowlsheugh SPA • Buchan Ness to Collieston Coast SPA
Beatrice Offshore Wind Farm	Offshore wind farm	• Moray Firth SAC
Dounreay Tri – Hexicon	Offshore wind farm	• Forth Islands SPA • Fowlsheugh SPA

		• Buchan Ness to Collieston Coast SPA • Outer Firth of Forth and St Andrews Bay Complex pSPA
European Offshore Wind Deployment Centre (“EOWDC”)	Offshore wind farm (operational phase only)	• Moray Firth SAC • Fowlsheugh SPA • Buchan Ness to Collieston Coast SPA
Forth Ports – Leith and Rosyth	Maintenance dredge and sea disposal	• Outer Firth of Forth and St Andrews Bay Complex pSPA
Forth Road Bridge	Maintenance works	• Forth Islands SPA
Forthwind, Methil	Offshore wind farm	• Outer Firth of Forth and St Andrews Bay Complex pSPA
Hywind Scotland Pilot Park	Offshore wind farm (Operational phase only)	• Moray Firth SAC • Forth Islands SPA • Fowlsheugh SPA • Buchan Ness to Collieston Coast SPA
Kincardine Offshore Wind Farm	Offshore wind farm	• Moray Firth SAC • Forth Islands SPA • Fowlsheugh SPA • Buchan Ness to Collieston Coast SPA • Outer Firth of Forth and St Andrews Bay Complex pSPA
Meygen	Offshore tidal array	• Moray Firth SAC
Moray East Offshore Transmission Infrastructure	Offshore transmission infrastructure	• Moray Firth SAC
Moray Offshore Eastern Development	Offshore wind farm	• Moray Firth SAC
ORE Catapult – Levenmouth Demonstration Turbine	Offshore wind farm	• Outer Firth of Forth and St Andrews Bay Complex pSPA
Port of Cromarty	Construction,	• Moray Firth SAC

Firth – Phase 4 (Invergordon)	dredging, sea disposal and land reclamation	
University of St Andrews, Guardbridge, Fife	Seawall repair	• Firth of Tay and Eden Estuary SAC

26 Project Descriptions

26.1.1 Descriptions of the projects considered in the in-combination assessment are detailed below.

Offshore Renewables Projects

26.2 Seagreen Alpha and Bravo Offshore Wind Farms

26.2.1 Installation and operation of the Seagreen Alpha and Bravo Offshore Wind Farms, located 27km off the Angus coastline, in the outer Firth of Forth and Firth of Tay region. Consent was granted in respect of both wind farms and the associated transmission infrastructure in October 2014. In total the project covers an area of approximately 391km^2. The operational lifespan for both projects is expected to be 25 years. The offshore transmission infrastructure will consist of up to 5 offshore substation platforms and 6 offshore export cables, in addition to inter-array cabling and scour protection. The consents for both wind farms were subsequently varied in 2018, to remove the maximum generating capacity for each wind farm site.

26.2.2 In September 2018, Seagreen Wind Energy Limited submitted applications for the revised designs for the Seagreen Alpha and Bravo Offshore Wind Farms, within the same boundary as the consented projects. A new application has been submitted to reflect technological advancements since the consents were granted in 2014. The operational lifespan of the revised design is expected to be 25 years. The wind farms will utilise the existing marine licence granted in respect of the offshore transmission infrastructure. It is anticipated that construction activities would take place over a period of four years.

Table 26 Summary of design parameters for the as-consented Seagreen Alpha and Bravo projects (2014) and new applications (2018)

Design Parameter	As-consented (2014)	Application (2018)
Maximum number of WTGs	150	120

Rotor diameter	220m	167m
Blade tip height	209.7m	280m
Minimum blade tip clearance above LAT	29.8m	32.5m
Foundation options	Gravity base structures, pin piled jackets, suction caisson	As per 2014, expanded to include monopile foundation option at up to 70 WTG locations

26.2.3 A full project description of the existing consents can be found here and a description of the new applications can be found here.

26.3 Inch Cape Offshore Wind Farm

26.3.1 Construction and operation of the Inch Cape Offshore Wind Farm and associated Offshore Transmission Infrastructure, located 15km east off the Angus coastline, for which consent was granted in October 2014. The operational lifespan of the project is expected to be 25 years. The project covers a total area of approx. 150km^2

26.3.2 In August 2018, Inch Cape Offshore Limited submitted applications for marine licences and s.36 consent in respect of the revised design for the wind farm and offshore transmission infrastructure (with landfall at Cockenzie, East Lothian) to take advantage of technological advancements in the time period since consent was granted. The operational lifespan of the revised design is expected to be 50 years. Construction activities are anticipated to take approximately 24 months over a 3 year period.

Table 27 Summary of design parameters for the as-consented Inch Cape Offshore Wind Farm (2014) and new application (2018)

Design Parameter	**As-consented (2014)**	**Application (2018)**
Maximum number of WTGs	110	72
Blade tip height (above LAT)	215m	291m
Rotor diameter	Up to 172m	Up to 250m
Offshore substation platforms	5	2
Offshore Export Cables	6	2
Foundation options	Jackets and driven piles, jacket and suction piles, jacket and drilled piles,	As per 2014, but with the inclusion of monopiles for jackets and driven

	jacket and gravity based and gravity base	piles
Inter-array cable length	353km	190km
Export cable length	83km	8km

26.3.3 A full project description of the existing consents can be found here and a description of the new applications can be found here.

26.4 Beatrice Offshore Wind Farm

26.4.1 Installation and operation of the Beatrice Offshore Wind Farm which is located in the outer Moray Firth 13.5km from the Caithness coast. The total area of the development is 131.5km^2. The operational lifespan of the wind farm is expected to be 25 years.

26.4.2 The original application was for a design envelope of up to 277 wind turbine generators ("WTGs") and a maximum generating capacity of up to 1,000MW. Since consent was granted in 2014, the design has been revised and the development will comprise 84 turbines. Piling operations and cable laying activities are now complete.

26.4.3 Also included in the infrastructure is:

- Up to a maximum of three Offshore Substation Platforms ("OSPs");
- Up to a maximum of three meteorological masts; and
- Up to 350km of inter-array cabling linking the turbines, OSPs and meteorological masts.

26.4.4 Construction started in April 2017 and will continue until approximately the end of 2019. A full project description can be found here.

26.5 Hywind Scotland Pilot Park

26.5.1 Five 6MW turbines have been installed approximately 25km off the coast at Peterhead, north east Scotland, just outside the 12 nautical mile territorial water limit. The project will be expected to produce up to 135GWh per year of electricity. The turbines are positioned between 800 to 1,600m apart and attached to the seabed by a three-point mooring spread and anchoring system. Three anchors are required per turbine and the radius of the mooring system extends 600 to 1,200m out from each turbine.

26.5.2 The turbines are connected by inter-array cables which may require stabilisation in some locations. The export cable, which transports electricity from the Pilot

Park to shore at Peterhead, is buried where seabed conditions allow. Where this is not possible cable protection in the form of concrete mattresses and rock is required. Both the inter-array and export cables have 33kV transfer voltage. The export cable comes ashore at Peterhead and connects to the local distribution network at SSE Peterhead Grange substation. The onshore project infrastructure comprises an underground cable approximately 1.5km in length and a small switchgear yard facility close to Peterhead Grange substation.

26.5.3 This project has now finished construction and moved into the operational phase. A full project description can be found here.

26.6 Dounreay Trì Floating Wind Demonstration Project

26.6.1 The Development will consist of a demonstration floating offshore wind farm called Dounreay Trì which shall consist of:

- A two turbine offshore wind farm with an installed capacity of between 8 to 12MW, at least 6km off Dounreay, Caithness;
- A single, 33kV, export cable to bring the power to shore immediately to the west of the Dounreay Restoration Site fence line; and
- Subject to a Connection Offer from Scottish and Southern Energy Power Distribution ("SSEPD"), the associated onshore electrical infrastructure to connect the project at, or near, the existing substation at Dounreay.

26.6.2 The main offshore components will include:

- Two offshore wind turbines;
- A floating foundation;
- Mooring clump weight;
- Mooring chain and/or steel lines;
- Drag embedment anchors;
- One cable to bring the renewable electricity ashore; and
- Scour protection for the anchors and the export cable, where necessary.

26.6.3 A full project description can be found here.

26.6.4 The AA for this project concluded that there would be no adverse effect on the site integrity of any SPAs provided the conditions set out in the AA were complied with.

26.7 ORE Catapult Levenmouth Demonstration Turbine ("LDT")

26.7.1 The project involves the construction, operation and decommissioning of a site for the testing of new designs of offshore wind turbines with a capacity of up to 7MW at the Fife Energy Park, Methil. The development will be operational for 15 years, until 2029. During this timescale there is potential for more than one turbine model to be tested at the site. Once one turbine has been tested it will be removed from the site and replaced with a new turbine which falls within the same design parameters (maximum hub height of 110m, rotor diameter of 172m, and maximum height to turbine tip from MSL of 196m). Only one turbine will ever be installed at any one time. The base will remain in place throughout the development.

26.7.2 The development comprises:

- A single, three bladed demonstration wind turbine with an installed capacity of up to 7MW. The turbine tower is up to 110m tall, from Mean Sea Level ("MSL") including the base jacket. The turbine has a maximum rotor diameter of 172m, giving a maximum level from the MSL to turbine tip of up to 196m;
- A personnel bridge connection between the Fife Energy Park ("FEP") and turbine tower;
- Construction of an onshore crane pad on the FEP; and
- Construction of an onshore control compound

26.7.3 A full project description can be found here.

26.7.4 The AA for this project concluded that, based on the outputs of surveys during the first three years of operation, the population level impacts arising from the displacement of the wintering sea duck qualifying interests would not result in an adverse effect on the site integrity of the SPA.

26.8 Forthwind Offshore Development – Methil

26.8.1 The current licence and s.36 consent in respect of this project, is for the construction and operation of the Forthwind Offshore Wind Demonstration Project ("Forthwind"), approximately 1km from the coast of Methil, Fife. The Forthwind development consists of 2, two-bladed lattice structure WTGs, associated infrastructure, 2 electricity offshore export cables with an overall project footprint of 37,400m^2. The WTG parameters are as follows:

- Maximum hub height 121m (measured from LAT)
- Generating capacity of up to 9MW per turbine
- Maximum rotor diameter of 155m
- 3 pin piled foundations per turbine

26.8.2 Construction has not yet commenced but is anticipated to take place over a 3 to 6 month period, followed by testing and commissioning before becoming operational.

26.8.3 A full project description can be found here. At present, the timescales for commencement of construction activities are unclear and the current marine licence expires on 12 September 2037.

26.8.4 The AA for this project concluded that there would be no adverse effect on the site integrity of any SPA.

26.9 Kincardine Offshore Wind Farm

26.9.1 The works consist of the construction and operation of a demonstrator floating offshore wind farm development, located to the south east of Aberdeen, approximately eight miles from the Scottish coastline. The development is considered a commercial demonstrator site, which will utilise floating semi-submersible technology to install six or eight WTGs, with a combined maximum generating capacity of 50MW, in approximately 60 to 80m of water. The proposal also includes inter-array cabling to the connection point at the onshore Redmoss substation, Altens, Aberdeen. A full project description can be found here. The construction works are scheduled to take place in three phases between March 2018 and June 2020.

26.10 European Offshore Wind Deployment Centre ("EOWDC")

26.10.1 Installation and operation of a European Offshore Wind Deployment Centre consisting of 11 turbines, inter-array and export cables located 2 to 4.5 km east of Blackdog, Aberdeenshire. Construction commenced in November 2017, beginning with foundations and cabling. Construction works are concluded and the project is now in the operational phase. A full project description can be found here.

26.10.2 The AA for this project concluded that there would be no adverse effect on any SPAs or SACs subject to conditions attached to the consent.

26.11 Moray Offshore Eastern Development

26.11.1 The Moray Offshore Eastern Development consists of three proposed wind farm sites: the Telford, Stevenson and MacColl wind farms all situated within the development area. The original design envelope was for up to 339 WTGs with a maximum generating capacity of up to 1,500MW. This has since been reduced to a design with a maximum generating capacity of up to 1,116MW and for a maximum of 186 WTGs. The proposals are located on the Smith Bank in the

outer Moray Firth (approximately 2km from the Caithness coastline, in water depths of 38 – 57m). The operational lifespan of the wind farms is expected to be 25 years.

26.11.2 Substructure and foundation design for the WTGs will consist of either a mixture of, or one design option of:

- concrete gravity base foundation with ballast and a gravel/grout bed, or
- steel lattice jackets with pin piles.

26.11.3 A full project description for the Moray Offshore Eastern Development can be found here.

26.11.4 Construction is anticipated to commence in April 2019, with piling activities due to commence in July 2019.

26.12 Moray East Modified Offshore Transmission Infrastructure

26.12.1 The construction and operation of offshore transmission infrastructure in the Outer Moray Firth, to support the Moray Offshore Eastern Development, consisting of:

- Up to 2 OSPs with associated substructures and foundations;
- Inter-platform cabling within the three consented Telford, Stevenson and MacColl wind farms; and
- Up to 4 triplecore submarine export cables between the OSPs and the shore.

26.12.2 Recent project updates advised construction is likely to commence in March 2019.

Large-scale construction projects

26.13 Aberdeen Harbour Expansion Project ("AHEP") – construction works, capital dredging and sea disposal operations

26.13.1 Development of a new harbour facility at Nigg Bay, Aberdeen, approximately 0.8km south of the existing harbour in Aberdeen City centre. The works include the construction of two breakwaters, quaysides and associated infrastructure, as well as a large-scale capital dredge and dredge spoil deposit operation. Works commenced in late 2016 and are scheduled to take place over a 3-year period. Construction works began in May 2017 with the construction of the northern breakwater.

26.13.2 Dredging operations are expected to last until September 2018, which is when their dredging licence expires. Blasting operations are expected to commence in August 2018 for a maximum of 7 consecutive months, however, these timescales may be subject to change. Impact piling will no longer be used and rotary piling used instead, which is thought to produce less noise. All marine elements of the works are scheduled to be complete by February 2020.

26.13.3 Full details of the project can be found in the documentation here.

26.13.4 The AA for this project concluded that there would be no adverse effect on the site integrity of any SPAs or SACs provided that the conditions set out in the AA were complied with.

26.14 Port of Cromarty Firth Phase 4 – Construction of Laydown Area & Capital Dredging

26.14.1 These works involve land reclamation to provide an additional 4.5Ha of laydown space to the west of the previously completed phase 3 development, including the construction of 215m of quay wall to create a new berth adjacent to the existing berth 5, providing a 369m long combined quay face. Fendering will then be installed along berth 5 and the new berth 6.

26.14.2 A rock armour revetment will be constructed along the north and west sides of the new laydown area with a tubular and sheet piled wall forming the new quay. The existing rock armour will be removed from the western edge of the phase 3 development and re-used on phase 4. The area will then be lined with a geotextile membrane and infilled, before appropriate drainage, bollards and services are installed prior to surfacing.

26.14.3 Dredging will be required along the toe of the new revetment structure and a second campaign will be required to create a finished depth of 12 metres along the new berth. The total dredge volume is estimated to be 110,000m^3. It is anticipated that up to 60,000m^3 of dredge material will be suitable for re-use within the land reclamation and that the remainder will be deposited at the Sutors dredge spoil deposit area.

26.14.4 The works are scheduled to take place between 1 November 2018 and 31 March 2020.

Dredging operations, maintenance works and small-scale construction projects

26.15 Forth Road Bridge - Maintenance Works

26.15.1 Bridge maintenance works, incorporating various schemes as outlined in the supporting information submitted to Marine Scotland as part of the marine licence application. The programme of works is scheduled for an initial period of 5 years, with the option for 5 additional 1 year extensions and is currently anticipated to conclude by October 2020.

26.15.2 The AA for this project concluded that there would be no adverse effect on the site integrity of any SPA due to the extensive alternative areas of habitat available for wintering birds. SNH advised that population, displacement and disturbance effects would be minor, temporary and very limited in area.

26.16 Rosyth and Leith Docks - Maintenance dredging and sea disposal operations

26.16.1 Maintenance dredge and sea disposal at the Leith and Rosyth docks and approaches. The Leith works comprise maintenance dredging of the docks and approach channel consisting of 100,000m^3 of spoil per year and disposal at Narrow Deep B spoil ground for a period of 3 years. The Rosyth works comprise maintenance dredging of the docks and approach channel consisting of 400,000m^3 of spoil per year and disposal at the Oxcars spoil ground for a period of 3 years.

26.16.2 A combined AA was undertaken for these activities due to the close proximity, complete overlap of active licence period and potentially affected Natura sites. The AA concluded that there would be no adverse effect on the site integrity of the Firth of Forth SPA.

26.17 Old Guardbridge Paper Mill – Seawall Repairs

26.17.1 Repair to the East Seal Wall in Guardbridge, Fife, which forms the boundary between the old Guardbridge Paper Mill and the Eden Estuary. The repairs will be over 385m of sewall and include the removal and replacement of wall cope, removal of rubble behind the seawall, concrete repairs to the seawall and replacement of revetment using concrete and rock armour. Works will be carried out over four phases during 2018-2021. Works cannot be carried out between 1 October and 31 April in any calendar year, thus ensuring works are carried out outside the period that the qualifying interests of the Firth of Tay and Eden Estuary SAC are present.

27 Assessment of in-combination effects

27.1 Assessment of in-combination effects on the Fowlsheugh SPA

27.1.1 The following projects have the potential to have a likely significant effect on the relevant qualifying interests of the Fowlsheugh SPA in addition to the Forth and Tay Developments considered in detail above:

- Aberdeen Harbour Expansion Project ("AHEP")
- European Offshore Wind Deployment Centre ("EOWDC")
- Hywind Scotland Pilot Park Project
- Kincardine Offshore Wind Farm

27.1.2 The AAs for these projects concluded that there would no adverse effect on the site integrity of the Fowlsheugh SPA, either in isolation or in-combination with other plans or projects, provided that the conditions set out in the AAs and marine licences and s.36 consents were implemented and complied with. The proposed timeframes for the Development will overlap with the operational phases of the projects listed above. The AAs for these projects identified likely significant effects on the relevant qualifying interests of the SPA during the operational phases of the works as a result of collision risk and displacement and barrier effects.

27.1.3 Scottish Ministers have considered these projects in the in-combination assessment completed.

27.2 Assessment of in-combination effects on the St Abb's Head to Fast Castle SPA

27.2.1 The Scottish Ministers identified no additional projects to the Forth and Tay Developments which would have an in-combination effect with the Development on the site integrity of the St Abb's Head to Fast Castle SPA.

27.3 Assessment of in-combination effects on the Buchan Ness to Collieston Coast SPA

27.3.1 The following projects have the potential to have a likely significant effect on the relevant qualifying interests of the Buchan Ness to Collieston Coast SPA:

- AHEP
- Dounreay Tri – Hexicon
- EOWDC
- Hywind Scotland Pilot Park Project
- Kincardine Offshore Wind Farm

27.3.2 The AAs for these projects concluded that there would no adverse effect on the site integrity of the Buchan Ness to Collieston Coast SPA, either in isolation or in-

combination with other plans or projects, provided that the conditions set out in the AAs and marine licences and s.36 consents were implemented and complied with. The proposed timeframes for the Development will overlap with the operational phases of the projects listed above. The AAs for these projects identified likely significant effects on the relevant qualifying interests of the SPA during the operational phases of the works as a result of collision risks and displacement and barrier effects.

27.3.3 Scottish Ministers have considered these projects in the in-combination assessment completed.

27.4 Assessment of in-combination effects on the Forth Islands SPA

27.4.1 The following projects have the potential to have a likely significant effect on the relevant qualifying interests of the Forth Islands SPA:

- AHEP
- Dounreay Tri – Hexicon
- Forth Road Bridge Maintenance Works
- Hywind Scotland Pilot Park Project
- Kincardine Offshore Wind Farm

27.4.2 The AAs for these projects concluded that there would no adverse effect on the site integrity of the Forth Islands SPA, either in isolation or in-combination with other plans or projects, provided that the conditions set out in the AAs and marine licences and s.36 consents were implemented and complied with. The AAs for these projects identified likely significant effects on the relevant qualifying interests of the SPA. Conditions were attached to the respective AAs, marine licences and consents to mitigate the impacts on the relevant qualifying interests of the SPA.

27.4.3 Scottish Ministers have considered these projects in the in-combination assessment completed.

27.5 Assessment of in-combination effects on the Outer Firth of Forth and St Andrews Bay Complex pSPA

27.5.1 The following projects have the potential to have a likely significant effect on the relevant qualifying interests of the Outer Firth of Forth and St Andrews Bay Complex pSPA:

- Dounreay Tri – Hexicon
- Forthwind, Methil

- Kincardine Offshore Wind Farm
- ORE Catapult – Levenmouth Demonstration Turbine
- Rosyth and Leith Harbour Maintenance Dredge and Sea Disposal

27.5.2 The Rosyth and Leith Harbour Maintenance Dredge and Sea Disposal operations are anticipated to conclude by February 2021, therefore, there may be minimal temporal overlap with the indicative construction schedule for the Development. The AA for these works concluded that there would be no adverse effect on site integrity due to the availability of extensive alternative areas of habitat, the ability of marine birds to move away from the disposal operations and the long history of dredge spoil disposal at the location to be utilised.

27.5.3 The AAs for the offshore wind farm projects listed above (Dounreay Tri, Forthwind, Kincardine and ORE Catapult) concluded that there would no adverse effect on the site integrity of the Outer Firth of Forth and St Andrews Bay Complex pSPA, either in isolation or in-combination with other plans or projects, provided that the conditions set out in the AAs and marine licences and s.36 consents were implemented and complied with. Conditions were attached to the respective AAs, marine licences and consents to mitigate the impacts on the relevant qualifying interests of the SPA.

27.5.4 Scottish Ministers have considered these projects in the in-combination assessment completed.

27.6 Assessment of in-combination effects on the Moray Firth SAC

27.6.1 In addition to the Forth and Tay wind farms the following projects have the potential to have a likely significant effect on the relevant qualifying interests of the Moray Firth SAC:

- AHEP
- Beatrice Offshore Wind Farm
- EOWDC
- Hywind Scotland Pilot Park Project
- Moray East Offshore Transmission Infrastructure
- Moray Offshore Eastern Development
- Port of Cromarty Firth – Phase 4 (Invergordon)

27.6.2 The AAs for these projects concluded that there would no adverse effect on the site integrity of the Moray Firth SAC, either in isolation or in-combination with other plans or projects, provided that the conditions set out in the AAs and marine licences and s.36 consents were implemented and complied with.

The construction works for the AHEP works and Port of Cromarty Firth Phase 4 development are scheduled to conclude by the end of February 2020 and March 2020 respectively and, therefore, prior to the commencement of offshore activities for the Development.

27.6.3 The AA for the Hywind, Beatrice and Moray East offshore wind farm works concluded that there would be LSE on the bottlenose dolphin qualifying interest of the SAC as a result of construction activities. Scottish Ministers have considered these projects in the in-combination assessment completed.

27.7 Assessment of in-combination effects on the Firth of Tay and Eden Estuary SAC

27.7.1 Repair works to the seawall, Guardbridge, Fife was the only project identified by Scottish Ministers as having a potential in-combination effect on the site integrity of the Firth of Tay and Eden Estuary SAC. The works will conclude by September 2021, therefore there may be temporal overlap with the timeframes for the Development. The works are of relatively small-scale and are scheduled to be carried out outside the period that the qualifying interests are present (1 October – 31 April each year).

27.7.2 Scottish Ministers have considered this project in the in-combination assessment completed.

27.8 Assessment of in-combination effects on the Berwickshire and North Northumberland Coast SAC

27.8.1 The Scottish Ministers identified no plans or projects apart from the Forth and Tay developments which would have an in-combination effect with the Development on the site integrity of the Berwickshire and North Northumberland Coast SAC.

27.9 Assessment of in-combination effects on the Isle of May SAC

27.9.1 The Aberdeen Harbour Expansion Project was the only plan or project in addition to the Forth and Tay Developments identified by the Scottish Ministers as having potential in-combination effects on the Isle of May SAC with the Development. The AHEP AA concluded that there would be no adverse effect on the site integrity of the Isle of May SAC during the construction or operational phase of the works, provided that the conditions set out in the AA, to mitigate the impacts of underwater noise, vessel movements, reduced water quality and prey availability on the grey seal qualifying interest of the SAC.

27.9.2 Scottish Ministers have considered this project in the in-combination assessment completed.

APPENDIX TWO: IN-COMBINATION ASSESSMENT – NORTH SEA WIND FARMS

List of the North Sea wind farms assessed for non-breeding season effects:

1. East Anglia 3
2. East Anglia 1
3. Hornsea 3
4. Blyth Demonstrator
5. Dogger Creke Beck A&B
6. Dogger Teeside A&B
7. Dudgeon
8. Hornsea 1
9. Hornsea 2
10. Humber Gateway
11. Lincs
12. Race Bank
13. Sheringham Shoal
14. Teeside
15. Triton Knoll
16. Westermost Rough
17. Aberdeen demonstrator
18. Beatrice
19. Galloper
20. Greater Gabbard
21. Kentish Flats
22. London Array
23. Moray Firth 1
24. Thanet
25. Rampion

APPENDIX THREE: DIFFERENCES BETWEEN 2014 AND 2018 SEABIRD ASSESSMENT METHODS

The table below identifies the main differences between the 2014 and 2018 assessment methodologies. These differences mean that a direct comparison of the results of the 2014 and 2018 assessments is not appropriate. Consequently, where results from 2014 and 2018 are presented in this document, the methodological differences identified here provide context.

Table 28 Differences in methodologies between the 2014 and 2018 assessments

Difference	**2018 Method(s)**	**2014 Method(s)**
1. Displacement (required for puffin, guillemot, razorbill and kittiwake).		
1. a) Overall method	Matrix approach used for all species, which applies an assumed displacement rate to the number of birds estimated to be present in the wind farm and surrounding buffer, and then a mortality rate is applied to those displaced birds. The Scoping Opinion noted the development of the Seabird Offshore Renewable Development ("SeaBORD") displacement model which is an updated version of the Searle *et al* model used in the 2014 AA. The model has not been used to inform this assessment as there is not yet agreement on how it should be used (i.e.	Assessment of kittiwake, razorbill and guillemot used effect estimated in Searle *et al* (2014) individual based simulation model of impacts of changes to time and energy budgets resulting from displacement from the wind farm and buffer on survival. Puffin assessment used the matrix approach.

	what assumptions should be made when running the model).	
1. b) seabird data informing method	At sea density estimates	Tracking data from adult birds tagged at breeding colonies
1. c) output	Change to adult survival rate	Changes to adult survival and productivity rates
1. d) buffer area	All birds displaced from 2km buffer around offshore wind farm	All birds avoid a 1km buffer around offshore wind farm
1. e) non-breeding season	Assessed for Forth and Tay offshore wind farms	Not assessed
2. Collision Risk Modelling (CRM) differences		
2 a) (CRM) – Band model option	Assessment is based on Band model Option 2. The Option 2 model assumes an even distribution of birds across the rotor swept heights,	Assessment was based on Band model Option 3. The Option 3 model assumes the observed distribution of birds across the rotor swept heights and calculates the appropriate collision risk at each height.
2 b) CRM - avoidance rates	Kittiwake & gannet 98.9% Herring gull 99.5%	All species 95%
2 d) CRM- nocturnal activity	Nocturnal activity scores of 2 (25%) should be used for herring gull and kittiwake and 1 (0%) for gannet).	Nocturnal activity scores of 2 (25%) should be used for herring gull and kittiwake and 2 (25%) for gannet).
2 f) CRM – non breeding season	Scope of quantitative assessment includes all UK offshore wind farms for gannet and kittiwake.	Scope of quantitative assessment limited to Forth and Tay offshore wind farms, with qualitative consideration given to other UK offshore wind farms.

3. Apportioning		
3. a) non-breeding season	BDMPS (Furness, 2015) used for gannet and kittiwake following SNH scoping advice.	None
3. b) non-breeding season months	Gannet – Autumn, October to November; Spring, December to mid-March Kittiwake – Autumn, September to December; Spring, January to mid-April Guillemot and razorbill all non-breeding season impacts should be assigned to SPA as per the breeding season.	N/A
3. c) Age classes	Using proportions derived from at sea survey data or, if not available, PVA stable age structure	
3. d) breeding season	Apportioned to SPA and non-SPA colonies using seabird 2000 data and then between SPA colonies using most recent count data. Used SNH apportioning approach for all species.	Species and colonies included in Searle et al displacement model did not require apportioning of displacement effects. For other species and collision effects, the SNH approach and seabird 2000 data were used.
4. Population Viability Analysis ("PVA")		
4. a) population modelling approach	Stochastic Leslie matrix PVA	Bayesian state-space models for most populations.
4. b) effect period	25 and 50 years	25 years
4, c) effect scenarios	Reductions in survival of all age classes	A range of reductions in adult survival and

	estimated for the wind farm in isolation, with the other existing 2014 consented Forth and Tay Developments, and with the other consented or operational offshore wind farms in the eastern UK.	productivity values that were selected and run prior to the wind farm/s effects being known.