APPLICATION TO VARY ANNEX 1, ANNEX 2 (CONDITION 7) AND ANNEX 3 OF THE NEART NA GAOITHE OFFSHORE WIND LIMITED SECTION 36 CONSENT UNDER SECTION 36C(1) OF THE ELECTRICITY ACT 1989 (VARIATION OF SECTION 36 CONSENTS) IN ACCORDANCE WITH THE ELECTRICITY GENERATING STATIONS (APPLICATIONS FOR VARIATION OF CONSENT) (SCOTLAND) REGULATIONS 2013.

MARINE SCOTLAND'S CONSIDERATION OF A PROPOSAL AFFECTING

DESIGNATED SPECIAL AREAS OF CONSERVATION ("SACs")

OR SPECIAL PROTECTION AREAS ("SPAs")

SITE DETAILS:

Neart na Gaoithe Offshore Windfarm Limited development ("NNGOWL"), approximately 15.5 km to the east of Fife Ness in the outer Firth of Forth.

APPROPRIATE ASSESSMENT CONCLUSION: Marine Scotland Licensing Operations Team ("MS-LOT") concludes that, based upon the content of the following assessment the proposed NNGOWL variation will not, on its own or in combination with the other Forth and Tay offshore wind farms: Inch Cape ("ICOL"), Seagreen Alpha ("SAWEL") and Seagreen Bravo ("SBWEL") (or where appropriate for consideration, other developments already licenced), adversely affect the integrity of the Buchan Ness to Collieston Coast SPA, Fowlsheugh SPA, Forth Islands SPA, St Abb's Head to Fast Castle SPA, Moray Firth SAC, Firth of Tay and Eden Estuary SAC, Isle of May SAC, Berwickshire & North Northumberland Coast SAC, River South Esk SAC, River Tay SAC, River Dee SAC, River Teith SAC or River Tweed SAC (where each SPA or SAC is taken as a whole), provided that the conditions included in the NNGOWL consent as varied are complied with.

Following Marine Scotland Science ("MSS") advice, and having had regard to advice from the Statutory Nature Conservation Bodies ("SNCBs") MS-LOT 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, either alone or in combination with other projects and MS-LOT are satisfied that no reasonable scientific doubt remains.

Introduction

Proposal Details

On the 10th October 2014, consent was granted under section 36 of the Electricity Act 1989 by the Scottish Ministers to construct and operate a 450 megawatt ("MW") offshore wind farm in the Firth of Forth. This consent was for:

An offshore wind turbine generating station, located as shown in Figure 1 below, with

a gross electrical output capacity of up to 450 MW comprising:

1. not more than 75 three-bladed horizontal axis wind turbines each with a maximum blade tip height of up to 197 metres and a maximum rated capacity of up to 6MW;

2. for each wind turbine generator ("WTG"), a jacket or gravity base foundation;

3. for each WTG, a transition piece (including access ladders / fences and landing platforms), turbine tower, blades and nacelle; and

4. inter array cabling between the turbines and the offshore substation platforms.

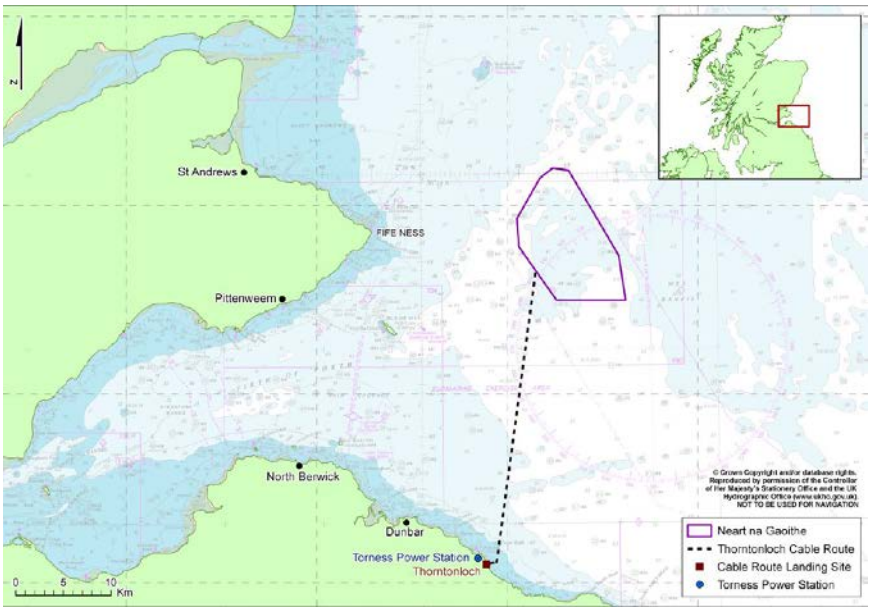

Figure 1: location of offshore wind turbine generating station

On the 16th July 2015 an application was made to vary this consent. The variation proposed is to –

Vary Annex 1, Annex 2 (condition 7) and Annex 3 of the consent to allow:

1. An increase in the maximum rated turbine capacity from 6MW to 7MW (the maximum generating capacity of the Development will continue to be limited to 450MW);

2. A change in maximum turbine hub heights from 107.5m to 115m above Lowest Astronomical Tide ("LAT"); and

3. A change in maximum turbine platform height from 18m to 21m above LAT.

Of the above changes, those which could affect the findings of the Forth and Tay Regional Assessment completed in October 2014 are:

1. The increase in maximum rated capacity to 7 MW, means that fewer turbines would be required to fulfil the 450MW capacity, resulting in fewer bird collisions, and potentially less displacement.

2. The change in the maximum hub height – if the turbines were higher, fewer birds would be within the flight height risk window for collision.

Legislative Requirement for an AA

There is no commitment by NNGOWL to raise the lowest permitted hub height or the lower turbine capacity, therefore the worst case is the same as that assessed in the Forth and Tay Regional AA.

Since that AA was completed however advice on some of the assessment methodologies have been revised. In particular the Marine Scotland commissioned British Trust for Ornithology ("BTO") report on avoidance rates of bird species with offshore wind farms has been finalised, and MS now consider that this provides the best available information on avoidance rates. In addition the Hywind offshore pilot park has been consented so there are further in-combination effects to consider in addition to those considered in the Forth and Tay Regional AA.

Therefore this is a record of the AA for the NNGOWL variation application. The assessment has been undertaken by MS-LOT and MSS on behalf of the Scottish Ministers. This assessment is required to be undertaken under Council Directive 92/43/EEC on the conservation of natural habitats of wild fauna and flora ("the Habitats Directive") and Council Directive 79/409/EEC on the conservation of wild birds (as amended, and codified by Directive 2009/147/EC of the European Parliament and of the Council) ("the Wild Birds Directive") as implemented, in particular, by Regulation 61 of The Conservation of Habitats and Species Regulations 2010 ("The Habitats Regulations") for section 36 applications in Scotland.

MS-LOT, on behalf of the Scottish Ministers as the 'competent authority' under the Habitats Regulations, has to be satisfied that the projects will not adversely affect the integrity of any European protected sites (SACs and SPAs) before it may recommend the grant of consent for the project. The precautionary principle requires to be applied when complying with obligations under the Habitats Directive and in preparing an AA. In accordance with the ECJ case of Waddenzee[1] the Scottish Ministers may only authorise a development if they are certain that it will not adversely affect the integrity of European protected sites; and "that is the case where no reasonable scientific doubt remains as to the absence of such effects".

On the 22nd December 2015 the UK made a complete resubmission of data for all Natura 200 sites (SPAs). This submission referred to as Tranche 50 has no impact on the findings of this AA. Further information on Tranche 50 can be found on the JNCC website.

Consultation

A detailed AA has been undertaken and the SNCBs have been consulted, as is required, under the Habitats Regulations. SNH in their response dated 18th September 2015 advised that the proposed variation reduces the estimates of collision risk that may be presented to seabirds, and could potentially reduce the predicted levels of seabird displacement. The SNCBs responded to a draft of this AA on the 12th January 2016 stating that "it makes sense to rely upon the existing appropriate assessment undertaken for the Forth & Tay wind farms, simply noting that the variation for Neart na Gaoithe reduces the impacts predicted from this scheme". As detailed above, however, MS-LOT on behalf of Scottish Ministers have completed this AA to incorporate the best available evidence and update the in-combination assessment.

The Habitats Regulations allow for the competent authority to consult the general public on the AA if they consider it appropriate. This has not been done as the general public have already had the opportunity to respond to the applications through the variation process, no public representations were received.

The RSPB Scotland responded to the consultation, and welcomed the proposed changes in that they are likely to reduce the predicted impacts, in particular collision risk to seabirds. However the RSPB Scotland consider that the impacts and uncertainty around them are still unacceptable. RSPB Scotland objected to the original application in isolation and in-combination with the other 3 Forth and Tay

[1] ECJ Case no - C-127/02 – judgment issued on 07.09.2004.

offshore wind farm proposals. RSPB Scotland lodged a legal challenge to Scottish Ministers' decisions to grant these four consents and Scottish Ministers are currently awaiting a decision on the judicial review which was heard in late May/ early June 2015. Appendix 1 addresses the specific concerns raised by RSPB Scotland in relation to this application for variation of consent.

The National Trust for Scotland ("NTS") responded to the consultation and raised some queries regarding the collision risk modelling. NTS mention the same issue as RSPB around the most appropriate version of the Band model and avoidance rate based on recent advice from the SNCBs; as previously stated this AA uses the recommendations of the recent BTO avoidance rate review to estimate kittiwake and gannet collisions. NTS point out that the CRM completed by NNGOWL in the documents which was submitted in support of the application for variation only considers the project in isolation. This AA considers both the project in isolation and other projects already consented as detailed in section 3c. NTS in their response ask some questions regarding the hub height and reduction in predicted collisions. NNGOWL responded to NTS clarifying the points raised. Although the CRM of the revised turbine parameters predict a reduction in the collisions for kittiwake and gannet, this AA focuses on the original parameters as these represent the worst case.

A map showing the locations of the NNGOWL site and other Forth and Tay wind farms already along with the European protected sites which are considered in this assessment is presented below.

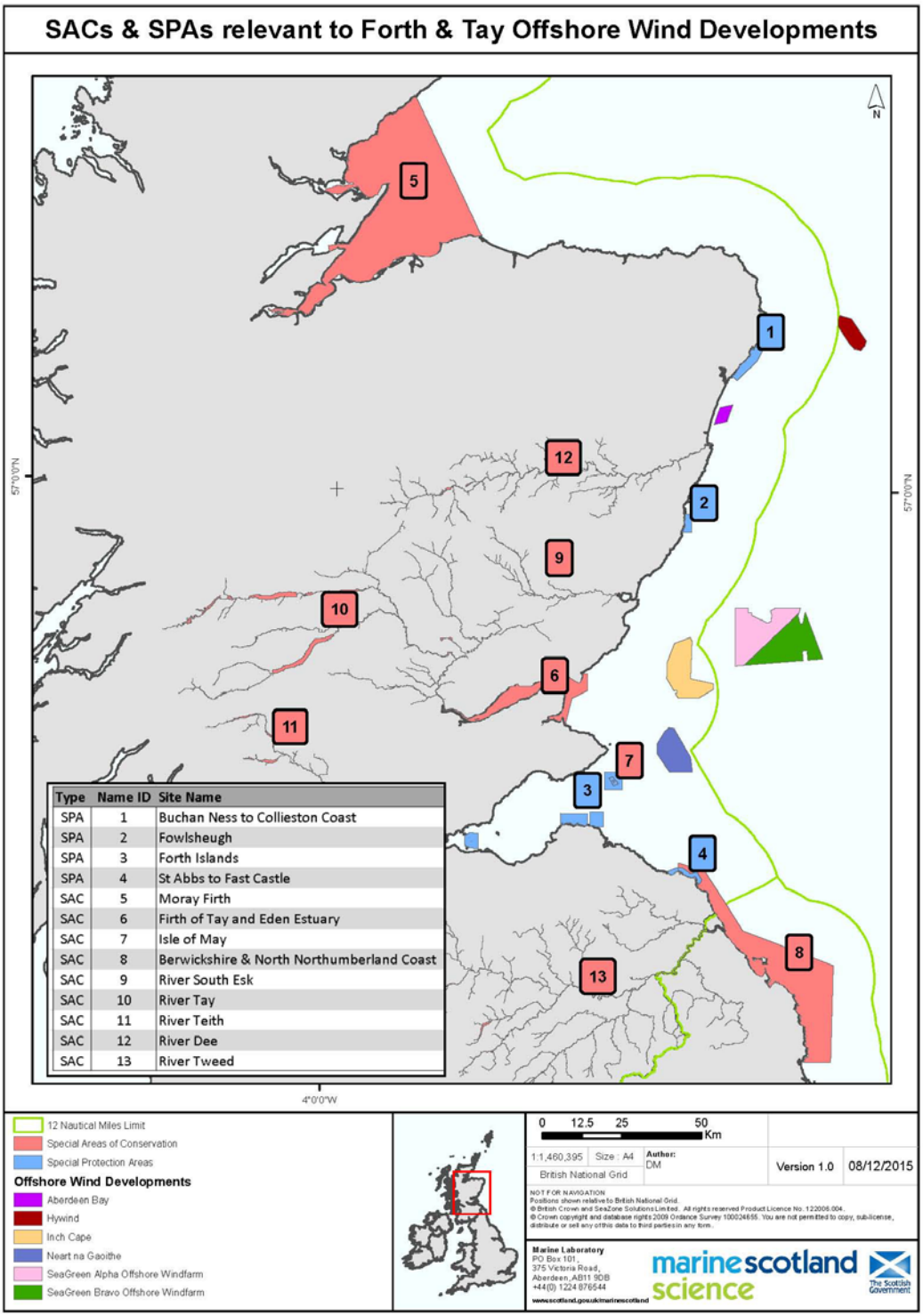

Figure 2: locations of the NNGOWL development and other Scottish developments included in the in-combination assessment along with the European protected sites which are considered in this assessment.

Section 1a. provides links to the Scottish Natural Heritage Interactive ("SNHi") website where the background information on the sites being considered in this assessment is available. Section 1b. details the qualifying features of the SACs and SPAs in this assessment. The conservation objectives being considered are detailed in section 1c. For the qualifying interests where likely significant effect ("LSE") has been identified (section 3b), the appropriate assessment assesses whether or not the relevant conservation objectives will be achieved. This enables a conclusion to be made in relation to whether or not the NNGOWL alone and in combination with the other Forth and Tay Developments, and other projects, will adversely affect the integrity of the sites which have been assessed.

1a. Name of Natura site affected & current status available from:

1. Buchan Ness to Collieston Coast SPA http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8473
2. Fowlsheugh SPA http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8505
3. Forth Islands SPA http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8500
4. St Abb's Head to Fast Castle SPA http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8579
5. Moray Firth SAC http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8327
6. Firth of Tay and Eden Estuary SAC http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8257
7. Isle of May SAC http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8278
8. Berwickshire & North Northumberland Coast SAC http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8207
9. River South Esk SAC http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8364
10. River Tay SAC http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8366

11. River Teith SAC http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8368
12. River Dee SAC http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8357
13. River Tweed SAC http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8369

1b. Qualifying interests of each Natura site:

1. Buchan Ness to Collieston Coast SPA • Fulmar (breeding) • Guillemot (breeding) • Herring gull (breeding) • Kittiwake (breeding) • Shag (breeding) • Seabird assemblage (breeding)	**2. Fowlsheugh SPA** • Fulmar (breeding) • Guillemot (breeding) • Herring gull (breeding) • Kittiwake (breeding) • Razorbill (breeding) • Seabird assemblage (breeding)
3. Forth Islands SPA • Arctic tern (breeding) • Common tern (breeding) • Cormorant (breeding) • Fulmar (breeding) • Gannet (breeding) • Guillemot (breeding) • Herring gull (breeding) • Kittiwake (breeding) • Lesser black-backed gull (breeding) • Puffin (breeding) • Razorbill (breeding) • Roseate tern (breeding) • Sandwich tern (breeding) • Shag (breeding) • Seabird assemblage (breeding)	**4. St Abb's Head to Fast Castle SPA** • Guillemot (breeding) • Herring gull (breeding) • Kittiwake (breeding) • Razorbill (breeding) • Shag (breeding) • Seabird assemblage (breeding)

5. Moray Firth SAC • Bottlenose dolphin • Subtidal sandbanks	**6. Firth of Tay and Eden Estuary SAC** • Common (harbour) seal • Estuaries • Intertidal mudflats and sandflats • Subtidal sandbanks
7. Isle of May SAC • Grey seal • Reefs	**8. Berwickshire & North Northumberland Coast SAC** • Grey seal • Intertidal mudflats and sandflats • Reefs • Sea caves • Shallow inlets and bays
9. River South Esk SAC • Atlantic salmon • Freshwater pearl mussel	**10. River Tay SAC** • Atlantic salmon • Sea lamprey • Brook Lamprey • River Lamprey • Otter • Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels
11. River Teith SAC • Atlantic salmon • Sea lamprey • Brook Lamprey • River Lamprey	**12. River Dee SAC** • Atlantic salmon • Freshwater pearl mussel • Otter
13. River Tweed SAC • Atlantic salmon • Sea lamprey • Brook Lamprey • River Lamprey • Otter • Rivers with floating vegetation often dominated by water-crowfoot	

1c. Conservation objectives for qualifying interests:

The conservation objectives being assessed are the same as in the original Forth and Tay Regional AA:

Buchan Ness to Collieston Coast, Fowlsheugh, Forth Islands and St Abb's Head to Fast Castle SPAs – breeding seabirds

To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and

To ensure for the qualifying species that the following are maintained in the long term:

(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

*As the potential effects of the proposed development, as identified, occur outside the SPA itself, any disturbance to the qualifying interests is only considered to be significant in terms of the relevant conservation objective if it could undermine the conservation objectives relating to population viability.

Moray Firth SAC - Bottlenose dolphin

To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and

To ensure for the qualifying species that the following are established then maintained in the long term:

(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

*As the potential effects of the proposed development, as identified, occur outside the SAC itself, any disturbance to the qualifying interests is only considered to be

significant in terms of the relevant conservation objective if it could undermine the conservation objectives relating to population viability.

Firth of Tay and Eden Estuary SAC – Harbour seal, and Isle of May and Berwickshire & North Northumberland Coast SACs – Grey seal

To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and

To ensure for the qualifying species that the following are maintained in the long term:

(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

*As the potential effects of the proposed development, as identified, occur outside the SAC itself, any disturbance to the qualifying interests is only considered to be significant in terms of the relevant conservation objective if it could undermine the conservation objectives relating to population viability.

River South Esk, River Tay, River Teith, River Dee and River Tweed SACs – Migratory fish and Freshwater Pearl Mussel

To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and

To ensure for each species that the following are maintained in the long term:

(i) Population of the species, including range of genetic types for salmon, as a viable component of the SACs*

(ii) Distribution of the species within site

(iii) Distribution and extent of habitats supporting each species

(iv) Structure, function and supporting processes of habitats supporting each species

(v) No significant disturbance of the species

And for freshwater pearl mussel in particular, to ensure that the following are maintained in the long term:

(vi) Distribution and viability of freshwater pearl mussel host species*

(vii) Structure, function and supporting processes of habitats supporting freshwater pearl mussel host species

*As the potential effects of the proposed development, as identified, occur outside the SAC itself, any disturbance to the qualifying interests is only considered to be significant in terms of the relevant conservation objective if it could undermine the conservation objectives relating to population viability.

ASSESSMENT IN RELATION TO REGULATION 61 OF THE CONSERVATION OF HABITATS AND SPECIES REGULATIONS 2010.

3a. Is the operation directly connected with or necessary to conservation management of the site?

The operations are not connected with or necessary to conservation management of the sites.

3b. Is the operation likely to have a significant effect on the qualifying interest?

<u>SPAs</u>

Likely significant effect identified remains the same as that identified in the original Forth and Tay AA as follows:

- Collision risk and/or displacement to kittiwake of Buchan Ness to Collieston Coast, Forth Islands, Fowlsheugh and St Abb's Head to Fast Castle SPAs.
- Collision risk and/or displacement to gannet of Forth Islands SPA.
- Displacement to Atlantic puffin of Forth Islands SPA.
- Displacement to common guillemot of Buchan Ness to Collieston Coast, Forth Islands, Fowlsheugh and St Abb's Head to Fast Castle SPAs.
- Displacement to razorbill of Forth Islands, Fowlsheugh and St Abb's Head to Fast Castle SPAs.
- Collision risk to herring gull of Buchan Ness to Collieston Coast, Forth Islands, Fowlsheugh and St Abb's Head to Fast Castle SPAs.
- Collision risk to lesser black-backed gull of Forth Islands SPA.
- Collision risk and/or displacement to Northern fulmar of Buchan Ness to Collieston Coast, Forth Islands and Fowlsheugh SPAs.
- Collision risk and/or displacement to common & Arctic tern species of Forth Islands SPA (NNGOWL and ICOL only).

The remaining species listed in the SPA citations in 1b are scoped out of further consideration in this AA as no LSE was identified - these species were either not recorded in significant numbers on-site, or else there is no pathway for significant impact and/or there is no connectivity with any SPAs.

The Firth of Forth SPA, designated for wintering wildfowl and waders, and post-breeding Sandwich terns is close to the Forth and Tay Development sites. The SNCBs advised no LSE for this SPA; they support the strategic collision risk assessment commissioned by Marine Scotland and undertaken by the Wildfowl & Wetlands Trust ("WWT") and MacArthur Green Ltd. This project presents a strategic assessment of potential collision risk to migrating wildfowl, waders and other non-seabird species from all current offshore wind farm proposals in Scotland and Robin Rigg, in operation. The modelling confirms that the risk presented by the Forth and Tay Developments would not be significant on their own, nor cumulatively with each other or recently consented Moray Firth offshore wind farms (Beatrice Offshore Wind Farm Limited ("BOWL") and the Moray Offshore Renewables Limited ("MORL") developments), to any of these migratory non-seabird populations. The SNCBs have also advised that there is no connectivity between post-breeding Sandwich terns and the Forth and Tay Development sites. Therefore this qualifying interest of the Forth Islands SPA is not considered further in this assessment.

SACS

Likely significant effect identified remains the same as that identified in the original Forth and Tay regional AA as follows:

- Bottlenose dolphins as the qualifying feature of the Moray Firth SAC.
- Harbour seals as a qualifying feature of the Firth of Tay and Eden Estuary SAC.
- Grey seals as a qualifying feature of the Isle of May SAC and the Berwickshire & North Northumberland Coast SAC.
- Atlantic salmon as a qualifying feature of the River South Esk, River Tay, River Teith, River Dee and River Tweed SACs
- Freshwater pearl mussel ("FWPM") as the qualifying feature of the River South Esk and River Dee SACs.
- Lamprey species as qualifying features of the River Tay, River Teith and River Tweed SACs

The original Forth and Tay Regional AA provides further detail on the reasons why LSE was identified.

The remaining species and habitats listed in the SAC citations in 1b are scoped out of further consideration in this AA as no LSE was identified.

3c. APPROPRIATE ASSESSMENT of the implications for the site in view of the site's conservation objectives.

Qualifying interests of Special Areas of Protection

The assessment for birds is based on the project proposal summarised above under "Proposal details". Although the proposed changes to the turbine parameters through the application for variation is shown to reduce the predicted collisions (as demonstrated by the information provided by NNGOWL in support of the application for variation), this assessment is based on the worst case parameters presented in the NNGOWL ES and Supplementary Environmental Information Statement (75 turbines and minimum turbine height of 93.5 m above LAT).

3. The Scope of In Combination Effects

For certain species, where considered appropriate, in-combination effects have also been considered from projects further afield:

Aberdeen Bay Offshore Wind Farm - to be located 2 to 4.5 km off the coast at Blackdog, Aberdeenshire, comprising 11 turbines with a generating capacity of up to 100 MW. This development was consented in 2013 construction has not yet commenced, consent is for a period of 22 years. This proposal is relevant to consider in respect of kittiwake at Buchan Ness to Collieston Coast SPA and Fowlsheugh SPA.

Hywind Scotland Pilot Park – to be located approximately 25 km off the coast of Peterhead, comprising 5 floating turbines with a generating capacity of 30 MW This development was consented in November 2015, with construction likely to commence next year. The marine licence granted is for a period of 22 years. This proposal is relevant to consider in respect of kittiwake at Buchan Ness to Collieston Coast SPA and Fowlsheugh SPA.

Methil Wind Turbine – located on the coast at Methil, Fife. A single turbine with a generating capacity of up to 7 MW. This development is currently operating and has consent to operate for a period of up to 5 years. This proposal is relevant to consider in respect of gannet at Forth Islands SPA.

Blyth Offshore Wind Farm – located just off the Northumberland coast, comprising 2 turbines with a generating capacity of 4 MW. This small development has been operating since 2000. This proposal is relevant to consider in respect of gannet at Forth Islands SPA.

Blyth Offshore Wind Demonstration Site - located just off the Northumberland coast, comprising 15 turbines with a generating capacity of up to 100 MW. This development was consented in 2013. This proposal is relevant to consider in respect of gannet at Forth Islands SPA.

Teesside Offshore Wind Farm – located off the coast of Teesside, England, comprising 27 turbines with a generating capacity of 62 MW. Construction was completed in 2013, and the turbines are currently operating. This proposal is relevant to consider in respect of gannet at Forth Islands SPA.

Inch Cape Offshore Wind Farm – to be located 15 km to the east off the Angus coastline, to the east of the Firth of Tay, comprising up to 110 turbines with a maximum generating capacity of 784 MW. Consent was granted in October 2014, construction has not yet commenced, consent is for a period of 25 years. This project is relevant to consider with respect to gannet, razorbill, puffin, lesser black-backed gull, herring gull and kittiwake at Forth Islands SPA as well as kittiwake at Buchan Ness to Collieston Coast SPA, Fowlsheugh SPA, and herring gull and kittiwake at St Abb's Head to Fast Castle SPA.

Seagreen Alpha and Seagreen Bravo Offshore Wind Farms – to be located 27 km and 38 km to the east off the Angus coastline respectively, comprising up to 75 turbines each, with a maximum generating capacity of 525 MW each. Consent was granted in October 2014, construction has not yet commenced, consent is for a period of 25 years. These projects are relevant to consider with respect to gannet, razorbill, puffin, lesser black-backed gull, herring gull and kittiwake at Forth Islands SPA as well as kittiwake at Buchan Ness to Collieston Coast SPA, Fowlsheugh SPA, and herring gull and kittiwake at St Abb's Head to Fast Castle SPA.

Dogger Bank Creyke Beck A & B, and Teeside A & B Offshore Wind Farms – these projects are located on Dogger Bank approximately 130 km off the coast of Yorkshire. Creyke Beck was granted consent in February 2015, and is for up to 400 turbines with a generating capacity of up to 2.4 GW. Consent was granted to Teeside A & B in August 2015, also for up to 400 turbines and a total generating capacity of up to 2.4 GW. These proposals are relevant to consider in respect of gannet at Forth Islands SPA.

<u>Projects not included in this in-combination assessment</u>

Kincardine Offshore Wind Demonstrator – this development is a commercial demonstrator site which will use floating foundation technology. Located south-east of Aberdeen, 15 km from the coastline. The project which is in the pre-application stage is for 6-8 turbines with a maximum generating capacity of 50 MW. The in-combination effects from this project are not being considered in the AA for NNGOWL. A further AA will be required for the Kincardine project prior to any consent being granted and that AA will take account of the in-combination effects of NNGOWL and the other projects above as appropriate.

Forthwind Offshore Wind Demonstrator - this development is a commercial demonstrator site, to be located 1.5 km from the Fife coastline near Methil. The application was received by MS in July 2015 and is currently being considered. The proposal is for 2 turbines with a maximum generating capacity of 9 MW. The in-combination effects from this project are not being considered in the AA for NNGOWL. A further AA will be required for the Forthwind project prior to any consent being granted and that AA will take account of the in-combination effects of NNGOWL and the other projects above as appropriate.

4. Assessment Methods

Background information on the bird species considered in this assessment can be found at http://seabird.wikispaces.com/. In addition SNH Commissioned Report No. 804 "A review of literature on the qualifying interest species of Special Protection Areas (SPAs) in the Firth of Forth and development related influences" provides useful information.

The assessment methods used here largely follow those applied in the Forth and Tay Regional Assessment and are not repeated here. The only exception is the avoidance rates and version of the Band collision risk model used for collision risk estimations of kittiwake and gannet collision mortality. This is in response to the British Trust for Ornithology ("BTO") review of Avoidance Rates of Collision Between Birds and Offshore Turbines, which was published in November 2014 i.e. became available after the Forth and Tay Regional Assessment was completed. Use of the BTO recommended avoidance rates and versions of the collision model for these species result in reduced collision rates when compared to those assumed in the Forth and Tay Regional Assessment.

As detailed in section 1c, as the potential effects identified occur outside of the SPAs themselves, the relevant conservation objective for each qualifying interest is to "ensure the population of the species as a viable component of the site" is maintained in the long term. In order to assess the potential effects of the NNGOWL Development, alone and in combination, on the achievement of this conservation objective the assessments for relevant species involved the estimation of the level of predicted effect, and the setting of a precautionary level of acceptable change to the population given the statutory requirements. Where it can be shown that the populations of all qualifying interests of concern can be maintained within the thresholds of change it can be concluded that the proposed developments will not adversely affect site integrity.

The main effects to bird species are due to:

a. Collision with Turbines (of greatest relevance to species which may regularly fly at the same height as the rotating blades e.g. gulls and gannet), and

b. Displacement and Barrier Effects resulting in birds either being displaced from foraging areas or having to fly around a wind farm to reach a foraging area (of greatest relevance to species with more limited foraging ranges or greater flight energetic costs e.g. kittiwake and puffin).

I. Collision with Turbines

NNGOWL presented Band Collision Risk Model ("CRM") outputs in their ES, SEIS and subsequent variation application, and the SNCBs and MSS support the use of the Band CRM. Band (2012) provides guidance on how to use the CRM for seabird species in respect of offshore wind farms. It includes a 'basic' model (Options 1 and 2) and an 'extended' version (Option 3) as described below:

Option 1 – The 'Basic' model. It assumes a uniform distribution of flight heights and collision risk between lowest and highest levels of the rotors. It also uses figures for the proportion of birds at risk height derived from site-specific surveys.

Option 2 – As Option 1 but the proportion of birds at risk height is derived from modelled flight height data. Johnston et al, (2014 *corrigendum*) provides the most up to date information on modelled flight heights and effectively supersedes the previous flight height model (Cook *et al*, 2012).

Option 3 – The 'Extended' model. This differs methodologically from the 'Basic' model in that it does not assume that the density of flying birds is uniform across all heights between the minimum and maximum rotor swept height. Instead, this option uses flight height values for specific height bands (1 m flight bands by default) from modelled data to calculate collision rate in each part of the rotor swept area and then integrates that across the rotor disk. It accounts for a number of factors that change with height across the rotor swept area which together result in the collision risk varying with height. For example, the breadth of the circle (and therefore the number of birds flying through the circle) varies with height and the collision risk on transit through the swept area also depends on height (due to for example, variation in rotor speed across the radius). If the density of birds in flight also varies with height (as observed in most seabird species) rather than being uniform, then the result is a different number of predicted collisions than if the flight height distribution were assumed to be uniform (as in Options 1 and 2). The author of the Band model has clearly stated that the extended model undertakes the more correct calculation and should be used in preference over the basic model where appropriate flight height

data allow (emailed note to Avoidance Rate Review project steering group received 14/05/14).

Option 4 – As Option 3 above, but with flight height data obtained for the site under consideration.

A review of available data on seabird avoidance behaviour around wind farms undertaken by the BTO recommended that, based on available information for black-legged kittiwake and northern gannet, it was not possible to calculate appropriate avoidance rates for these species to be used with the extended version of the band CRM (Cook *et al,* 2014). This recommendation was supported by the SNCBs in their Joint Response.

The SNCBs advised that for black-legged kittiwake, an avoidance rate of 98.9% i.e. lower than the 99.2% recommended by the BTO for use with the Basic version of the CRM should us used. However, MSS advice in December 2014 was that until new information became available the recommendations made by the BTO, which they consider are precautionary, in terms of CRM version and avoidance rates should be followed.

For the 'large gulls' (great black-backed, lesser black-backed and herring gull), the BTO recommended avoidance rates of 99.5% with the Basic version of the Band collision risk model, and 98.9% with the Extended version of the Band model. This recommendation was supported by the SNCBs in their Joint Response.

The SNCBs also advised that collision estimates be calculated for avoidance rates assuming +/- 2 standard deviations ("SD"). Whilst the resultant avoidance rates for gannet and kittiwake are presented below (Tables 1 and 3), this assessment does not rely upon the collision rates that would result from the use of the +/- 2 SD avoidance rates. At this stage the assessment merely notes that the BTO indicated that their recommended avoidance rates were precautionary, and considered that the avoidance rate for kittiwake assuming a 2 SD ranged from 97.8% to >100%, for gannet ranged between 98.7% to 99.1%. For the large gulls, avoidance rates range between 99.4% and 99.6% for the Basic version of the Band model, and 98.7% and 99.2% for the Extended version depending upon the species of large gull concerned. The utility of uncertainties around estimated avoidance rates may increase when incorporated into probabilistic collision risk models.

The Forth and Tay Regional Assessment for collision mortality was based on the Extended version (Option 3) of the Band model as this was considered to be the most appropriate at the time based on the evidence available. However, the subsequently available BTO report is now considered to represent the best available evidence, and this assessment takes account of the recommendations made in that report.

For black-legged kittiwake and northern gannet, collision estimates used in this assessment are calculated using the Basic version of the model, generic flight height data (Johnston et al 2014), and the avoidance rates recommended by the BTO. In order to undertake the assessment of in combination effects, collisions estimates for the other consented Forth and Tay wind farms (ICOL, SAWEL and SBWEL) have also been recalculated using the Basic version of the CRM and BTO recommended avoidance rates. The Hywind Appropriate Assessment was already able to take account of the BTO recommendations in the estimation of collision effects.

For herring gull at Forth Islands, Buchan Ness, Fowlsheugh and St Abb's Head to Fast Castle SPAs, and lesser black-backed gull at Forth Islands SPA collision effects were identified by the SNCBs in their advice of March 7th 2014 having Likely Significant Effect. For these species and SPAs, the SNCBs concluded no significant effect on site integrity in their March 7th 2014 and June 6th 2014 advice. This advice was based on the use of a 98% avoidance rate with the Basic version of the Band collision model. Adoption of the BTO recommended avoidance rates for these two species would result in a halving of collision rates compared to those on which the SNCBs based their advice. In this assessment, collision rates for these species have not been revisited and should be seen as highly precautionary.

II. Displacement and Barrier Effects

It is recognised that increased activity in a sea area, or the establishment of structures such as wind farms, has the potential to displace birds. Initial monitoring of other European offshore wind farms shows contrasting results between species and for the same species, (e.g. Leopold *et al*., 2011, Canning *et al*., 2012, Furness *et al*., 2013).

The assessment of displacement and barrier effects used in this assessment mirrors that undertaken in the Forth and Tay Regional Assessment as no additional information to inform the assessment has been identified (see pages 21-23 of the Forth and Tay Regional Assessment).

III. Acceptable level of Effect

The thresholds of acceptable change identified for species / SPA combinations of interest are based on the same approaches used by the Forth and Tay (see pages 24-30 of the Forth and Tay Regional Assessment). For kittiwake and gannet the effect on productivity from adult collision mortality is based on the collision risk model version and avoidance rates advised by the BTO.

Estimated effects and thresholds of acceptable change are presented within this assessment using a number of metrics in order to aid understanding of the implications of the NNGOWL project either alone or in combination with other relevant projects.

The scope of this Appropriate Assessment includes the effects of the offshore wind farm projects during the breeding season on the breeding populations. The population consequences of the collision risk effects on breeding adults resulting in changes to both adult survival rates and productivity rates are considered.

3. Consideration of SPAs and Qualifying Interests where LSE was Identified

Northern gannet, Forth Islands SPA

For this assessment, the avoidance rates for gannet recommended by the BTO (and advised by the SNCBs) have been used (Table 1) with the Basic version (Option 2) of the Band collision risk model to estimate collision rates (Table 2). This approach has been applied to NNGOWL in isolation, and also to all Forth and Tay wind farms and Hywind in the assessment of in combination effects (the calculation of collisions from Hywind uses Option 1 for reasons provided on page 13 of the Hywind AA).

Table 1: *Northern gannet Avoidance Rates recommended for use with the Basic version of the Band model by the BTO and advised by the SNCBs*.

	Gannet				
Source	**Avoidance Rate**	**-/+ 1SD**		**-/+ 2SD**	
BTO & SNCB	0.989	0.988	0.990	0.987	0.991

The overall outcome of applying the revised avoidance rate with the Basic version of the Band collision model is a reduction in the cumulative annual adult mortality rate from c. 1.05% to 0.91%.

For the Forth and Tay assessments, both the SNCBs and MSS advised a threshold for gannet at Forth Islands SPA of 1300 adults per year. The cumulative total for gannet of 1009 is well below this threshold.

The cumulative effect of 1009 adult gannet collisions per breeding season would result in a counterfactual of population size ("CPS") after 25 years of 0.82 i.e. 82% of

the increasing population forecast to be present after 25 years would be present should the estimated collision rate occur. This compares to a CPS of 0.79 estimated for the Forth and Tay Regional Assessment, which assumed 95% avoidance rate with the Extended version of the collision model.

Table 2: *Estimated combined wind farm effects as percentage of SPA population and number of individuals from collision mortality and displacement on gannet from NNGOWL in isolation and in combination with recently consented offshore wind farms in the Forth and Tay and Hywind. For context, estimated effects are presented for the original Regional Assessment undertaken for the Forth and Tay, as well as those assuming the BTO recommended avoidance rates that have been used for this assessment.*

Species	**Gannet**			
SPA	**Forth Islands**			
SPA populatuion (individuals)			**110964**	
CRM Model	**95% Extended**		**98.9% Basic**	
	Indivs	**% SPA**	**Indivs**	**% SPA**
NnG	223	0.20%	193	0.17%
F&T AA Cumulative Effect	1169	1.05%	1005	0.91%
F&T + Hywind Cumulative Effect			1009	0.91%
Cummulative Effect CPS			82%	

The gannet collision estimate is precautionary in that it does not consider attraction of gannets to vessels (inflating density estimates), the assumption that all birds identified as adult plumaged during surveys were adult and breeding birds, and in the use of the BTO recommended avoidance rates which the authors indicated were precautionary. The population level effects are precautionary as they are based on a density independent model.

A recent paper (Cleasby et al 2015) has suggested that gannet flight heights may be greater than in currently available flight height distribution (e.g. Johnston et al 2014). This would result in a greater proportion of birds flying at risk height, and therefore greater collision rates than estimated using published flight height distribution data. A number of questions were raised by MS and the SNCBs over the methods and results presented in Cleasby et al 2015. The authors have responded to these questions however SNH have advised that although the response provides clarity it would not at this stage necessitate any requirement to change the gannet

assessment in the AA. The issues identified by MSS are discussed in Appendix 1 of the recent Hywind AA.

The cumulative total of collisions for gannet using the basic Band model are presented in the appropriate assessments for Blyth Offshore Wind Demonstrator undertaken by the Marine Management Organisation ("MMO") in 2013, for Blyth Offshore Demonstration project combined with the existing offshore turbines at Blyth and the Teesside project. The annual predicted mortality is 30, with the assessment recording that breeding birds would be most likely to be from Bass Rock which is within the Forth Islands SPA. This is a low number when considered against the identified threshold of 1300. The Aberdeen Bay appropriate assessment records up to 17 collisions per year for the Aberdeen Offshore Wind Farm using the basic Band model, and indicates that the majority of these birds are likely to be from Troup Head on the Moray coast. SNH have advised the Planning Inspectorate that the magnitude of effects to Forth Islands SPA from the Dogger Bank Teeside A & B projects during the breeding season is in the order of 1% of the effects associated with the Forth and Tay projects, which is approximately 14 collisions per year.

ICOL have intimated that their design envelope will be revised downward. A number of options have been provided by ICOL, the worst case of which in terms of collision estimates (ICOL scenario B) would result in gannet collisions at ICOL reducing by 35%, and the cumulative total by more than 12%. However, this has not been taken into consideration by this assessment when reaching conclusions on site integrity.

In their advice dated 3rd July 2015 (in response to the Hywind consultation), the SNCBs advised that adverse effect on site integrity could not be ruled out for Forth Islands SPA with respect to gannet, due to the in-combination effects with the Forth and Tay offshore wind farms, for which the SNCBs have previously advised that predicted impacts from consented developments exceed levels that would allow a conclusion of no adverse impact on site integrity. Following consideration of a re-assessment of collision rates completed by MSS using the Basic Band model and the BTO recommended avoidance rates, the SNCBs changed their position and on the 3rd September 2015 concluded no adverse effect on site integrity (from Hywind in-combination with the Forth and Tay offshore wind farms) as the revised collision mortality for gannet brings the predicted total mortality apportioned to this population below previously advised thresholds.

As the predicted effects are below the identified threshold MS-LOT concludes that the NNGOWL proposal will not adversely affect the site integrity of the Forth Islands SPA with respect to gannet, either alone or in-combination with the other recently consented Forth and Tay Offshore Wind Farms, Hywind, Aberdeen Bay Offshore Wind Farm, Blyth Offshore Wind Demonstrator, the constructed Blyth and Teesside Offshore Wind Farm developments, and the consented projects on Dogger Bank.

Kittiwake – Fowlsheugh, Forth Islands, Abb's Head to Fast Castle, Buchan Ness to Collieston Coast SPAs

The BTO concluded (page 135 of the BTO Avoidance Rate Report) for kittiwake that based on the currently available information, only avoidance rates for the Basic version of the Band model could be recommended. The SNCBs produced a response to the BTO review recommendations, advising that the "all gulls" rate should be used for kittiwake, though the rationale behind disregarding the BTO's considered recommendations is not clear. MSS advised that until additional relevant information became available, the avoidance rates recommended by the BTO should be applied for all species. The BTO recommended and the SNCB advised avoidance rates for kittiwake, alongside -/+ 1 and 2 standard deviations, are presented in Table 3. Assuming the avoidance rates recommended by the BTO, for kittiwake, the application of -/+ 2 SD would result in collision rates between zero and approximately 2.7 times the mean value presented.

Table 3: *Kittiwake Avoidance Rates for use with the Basic model recommended by the BTO and advised by the SNCBs.*

		Kittiwake				
Source	**Collision Risk Model**	**Avoidance Rate**	**-/+ 1SD**		**-/+ 2SD**	
BTO	Basic	0.992	0.985	0.999	0.978	1.006
SNCB	Basic	0.989	0.988	0.990	0.987	0.991

For this assessment, the rates recommended by the BTO have been used with the Basic version of the Band collision risk model and generic flight height data to estimate collision rates. Results of the collision risk modelling are presented in the summary of cumulative effects upon kittiwake at Fowlsheugh and Forth Islands SPAs (Tables 4 & 5). This summary incorporates adult mortality and productivity effect from both displacement and barrier effects, and adult mortality and productivity effects resulting from collision mortality. Due to synergies within the CEH displacement modelling (Searle *et al*. 2014), for kittiwake the cumulative displacement effects for the Forth and Tay windfarms are not the sum of the individual project effects. For ease of comparison, the estimated effects assuming 95% avoidance rate and the Extended version of the collision risk model that was used in the Forth and Tay Regional Assessment are also presented. Finally,

estimated effects assuming the SNCBs advised avoidance rates have also been presented.

Kittiwake, Fowlsheugh SPA

Application of the BTO advised kittiwake avoidance rate of 99.2% with the Basic version of the collision risk model results in an estimated collision mortality from NNGOWL of 1 adult bird per breeding season, or <0.01% of the Fowlsheugh SPA population. Application of the BTO recommended avoidance rates to the Forth and Tay windfarms results in their effects on Fowlsheugh SPA reducing from the 1.14% reduction in adult survival assumed in that Regional Assessment, to 0.94%. The addition of the Hywind project does not increase the cumulative effect upon Fowlsheugh SPA from 0.94% of the SPA population compared to cumulative effects from the Forth and Tay wind farms only. Application of the SNCB advised avoidance rate of 98.9% for kittiwake, would result in a cumulative effect total of 1.16% i.e. fractionally higher than the value assumed in the Forth and Tay Regional Assessment (1.14%).

Table 4: *Estimated combined adult kittiwake mortality effects as percentage of Fowlsheugh SPA population and number of individuals resulting from collision and displacement effects from NNGOWL in isolation, and in combination with the other recently consented offshore wind farms in the Forth and Tay and Hywind. For context, estimated effects for the original Regional Assessment undertaken for the Forth and Tay are presented as well as those assuming the BTO recommended avoidance rates that have been used for this assessment. The productivity effects assumed in this assessment are also presented (see text).*

Fowlsheugh : Kittiwake								
SPA population (Individuals)					**18674**			
	NnaG		**F&T Cumulative**		**Hywind**		**Hywind + F&T CIA**	
	% SPA	**Inds**	**% SPA**	**Inds**	**% SPA**	**Inds**	**% SPA**	**Inds**
Displacement effects (CEH displacement model, flat prey map)								
Adult survival	**0.00**	**0**	**-0.35**	**-66**	**0.00**	**0**	**-0.35**	**-66**
Chick survival	**0.00**	**0**	**-1.67**	**-312**	**0.00**	**0**	**-1.67**	**-312**
Collision Effects (Band CRM)								
Option 3 95% (as in F&T Assessment)	-0.01		-0.81					
Option 2 98.9% (SNCB advice)	-0.01	-2	-0.80	-150	0.00	-4	-0.80	-150
Option 2 99.2% (BTO recommendation)	**-0.01**	**-1**	**-0.58**	**-109**	**0.00**	**-3**	**-0.58**	**-109**
Total Effects								
Adult Survival (F&T AA, Extended CRM, 95%)	-0.01		-1.14					
Adult Survival (SNCB advised Basic CRM, 98.9%)	-0.01	-2	-1.16	-216	0.00	-4	-1.16	-216
Adult Survival (BTO recommended Basic CRM, 99.2%)	**-0.01**	**-1**	**-0.94**	**-175**	**0.00**	**-3**	**-0.94**	**-175**
Productivity effect assumed (sum of chick survival effect + collsion rate)	**-0.01**	**-1**	**-2.25**	**-421**	**0.00**	**-3**	**-2.25**	**-421**

The in combination productivity effect for the Forth and Tay wind farms in combination with Hywind was estimated in the Hywind Appropriate Assessment as a reduction in productivity of 2.25% (1.67% from the CEH displacement model plus a precautionary 0.58% based on CRM adult mortality estimates). This estimate remains unchanged for this assessment.

For the Forth and Tay Regional Assessment, both the SNCBs and MSS advised a threshold for kittiwake at Fowlsheugh SPA of a 1.3% reduction in adult survival and a 2.3 % reduction in productivity. The SNCBs did not agree with the conclusion of no adverse effect on site integrity for Fowlsheugh SPA with respect to kittiwake in the Forth and Tay Regional Assessment as their preferred method for estimating collision risk meant that the threshold was exceeded. In a response to the Hywind application on the 24th September 2015, following their consideration of the MSS re-assessment of the predicted impacts on kittiwake using the Basic Band model and the BTO and SNCBs recommended avoidance rates, The SNCBs accepted the mortality figures for kittiwake estimated by MSS and agreed that these were below

the threshold applied in the Forth and Tay AA. The SNCBs did advise that the kittiwake population at Fowlsheugh is in decline and that, while the drivers of this decline are unclear, additional mortality over and above that from the consented Forth & Tay wind farms will further contribute to the decline.

Based on the population forecasts from the CEH Population Viability Analysis ("PVA") report, the estimated adult mortality and productivity effects described above would result in a CPS value of between 0.62 and 0.82 (based on the CEH scenarios assuming 1% adult survival + 1% productivity, or 2% adult survival and 5% productivity respectively). For context, the CEH population model forecasts that the Fowlsheugh kittiwake population will decline by 85% in the absence of any wind farm effects. The RSPB have suggested previously that climate change is a key driver of declines in UK seabird populations, including kittiwake, and this has been supported by a number of studies (Carroll et al 2015; Frederiksen et al 2007).

As the predicted effects (using both the MSS advised and SNCBs advised avoidance rates) are below the identified thresholds MS-LOT conclude that the NNGOWL proposal will not adversely affect the site integrity of the Fowlsheugh SPA with respect to kittiwake, either alone or in-combination with the recently consented Forth and Tay Offshore Wind Farms, Hywind, Aberdeen Bay Offshore Wind Farm and the constructed Methil turbine.

Kittiwake, Forth Islands SPA

For Forth Islands SPA, application of the BTO advised kittiwake avoidance rate of 99.2% with the Basic version of the CRM results in an estimated collision mortality from NNGOWL of 5 adult birds per breeding season, or 0.07% of the SPA population. Application of the BTO recommended avoidance rates to the four Forth and Tay windfarms results in their effects on Forth Islands SPA reducing from the 1.78% reduction in adult survival assumed in that Regional Assessment, to 1.69%. Hywind was not considered to have LSE on kittiwake from Forth Islands SPA, therefore does not increase the cumulative effect from 1.69% of the SPA population. Application of the SNCBs advised avoidance rate of 98.9% for kittiwake, would result in a cumulative effect total of 1.79% i.e. only fractionally higher than the value assumed in the Forth and Tay regional AA (1.78%).

Table 5: *Estimated combined wind farm adult kittiwake mortality effects as percentage of Forth Islands SPA population and number of individuals resulting from collision and displacement effects from NNGOWL in isolation, and in combination with the other recently consented offshore wind farms in the Forth and Tay, and Hywind. For context, estimated effects are presented for the original Regional Assessment undertaken for the Forth and Tay as well as those assuming the BTO*

recommended avoidance rates that have been used for this assessment. The productivity effects assumed in this assessment are also presented (see text).

Forth Islands : Kittiwake								
SPA population (Individuals)					**7552**			
	NnaG		**F&T Cumulative**		**Hywind**		**Hywind + F&T CIA**	
	% SPA	**Inds**	**% SPA**	**Inds**	**% SPA**	**Inds**	**% SPA**	**Inds**
Displacement effects (CEH displacement model, flat prey map)								
Adult survival	**-0.88**	**-66**	**-1.42**	**-107**	**0.00**	**0**	**-1.42**	**-107**
Chick survival	**-0.93**	**-70**	**-1.18**	**-89**	**0.00**	**0**	**-1.18**	**-89**
Collision Effects (Band CRM)								
Option 3 95% (as in F&T Assessment)	-0.11		-0.37					
Option 2 98.9% (SNCB advice)	-0.10	-7	-0.37	-28	0.00	0	-0.37	-28
Option 2 99.2% (BTO recommendation)	**-0.07**	**-5**	**-0.27**	**-20**	**0.00**	**0**	**-0.27**	**-20**
Total Effects								
Adult Survival (F&T AA, Extended CRM, 95%)	-0.99		-1.78					
Adult Survival (SNCB advised Basic CRM, 98.9%)	-0.98	-74	-1.79	-135	0.00	0	-1.79	-135
Adult Survival (BTO recommended Basic CRM, 99.2%)	**-0.95**	**-72**	**-1.69**	**-127**	**0.00**	**0**	**-1.69**	**-127**
Productivity effect assumed (sum of chick survival effect + collsion rate)	**-1.00**	**-76**	**-1.45**	**-110**	**0.00**	**0**	**-1.45**	**-110**

Assuming the BTO advised avoidance rates, the in combination productivity effect for the Forth and Tay wind farms is estimated as 1.45% (1.18% from the CEH displacement model plus a precautionary 0.27% from the collision model adult mortality estimates), and does not change with the inclusion of Hywind. This is a reduction from the 1.55% assumed for the Forth and Tay Regional Assessment estimate. Adoption of the avoidance rate suggested by the SNCBs would result in a productivity effect of 1.55%, i.e. unchanged from that assumed in the Forth and Tay Regional Assessment.

For the Forth and Tay Regional Assessment, the SNCBs advised a threshold for kittiwake at Forth Islands SPA of a 1.5% reduction in adult survival and a 3.0 % reduction in productivity, whilst MSS advised a threshold of 2.4% reduction in adult survival and a 1.45% reduction in productivity. The estimated effects are therefore below the thresholds advised by MSS. The estimated productivity effect is well below the threshold advised by the SNCBs (1.45% vs 3.0%) whilst the adult survival effect is slightly above that threshold advise by the SNCBs (1.79% vs 1.5%).

Based on the population forecasts from the CEH Population Viability Analysis ("PVA") report, the estimated adult mortality and productivity effects described above would result in a CPS value of between 0.64 and 0.80 (based on the CEH scenarios assuming 1% adult survival + 1% productivity, or 2% adult survival and 5% productivity respectively). For context, the CEH population model forecasts that the Forth Islands kittiwake population will decline by approximately 40% in the absence of any wind farm effects. The RSPB have suggested previously that climate change is a key driver of declines in UK seabird populations, including kittiwake, and this has been supported by a number of studies (Carroll et al 2015; Frederiksen et al 2007).

MS-LOT concludes that the NNGOWL project will not adversely affect the site integrity of Forth Islands SPA with respect to kittiwake, either alone or in-combination with the recently consented Forth and Tay Offshore Wind Farms, Hywind, Aberdeen Bay Offshore Wind Farm and the constructed Methil turbine.

Kittiwake – St Abb's Head to Fast Castle SPA

The Forth and Tay Regional Assessment estimated for St Abb's Head to Fast Castle SPA a cumulative collision effect of 0.3% adult mortality. The collision calculations have not been revisited in this assessment due to their low magnitude, and the limited change in value that would result in the application of the revised avoidance rates and the Basic version of the Band model. The recently consented Hywind wind farm did not identify any effects upon kittiwake at St Abb's Head to Fast Castle SPA.

MS-LOT concludes that the NNGOWL project will not adversely affect the site integrity of the St. Abb's Head to Fast Castle SPA with respect to kittiwake, either alone or in combination with the Forth and Tay and Hywind wind farms.

Kittiwake - Buchan Ness to Collieston Coast SPA

The Forth and Tay Regional Assessment estimated for Buchan Ness to Collieston Coast SPA a cumulative collision effect of 0.07% adult mortality. The collision calculations have not been revisited in this assessment due to their low magnitude, and the limited insignificant change in value that would result in the application of the revised avoidance rates and the Basic version of the Band model. The recently consented Hywind wind farm identified negligible effects upon kittiwake at Buchan Ness to Collieston Coast SPA.

MS-LOT concludes that the NNGOWL project will not adversely affect the site integrity of the Buchan Ness to Collieston Coast SPA with respect to kittiwake, either alone or in combination with the other Forth and Tay and Hywind wind farms.

Puffin – Forth Islands SPA

The Forth and Tay Regional Assessment estimated for Forth Islands SPA a cumulative displacement and barrier effect on puffin of 2.01% adult mortality or 4.02% productivity. These calculations have not been revisited in this assessment as the methods applied in the Forth and Tay Regional Assessment still stand. The recently consented Hywind wind farm identified negligible effects on puffin at Forth Islands SPA. The SNCBs concluded for the Forth and Tay Regional Assessment and the Hywind AA that adverse effect on integrity could not be rule out for Forth Islands SPA with respect to puffin.

MS-LOT however concludes that the NNGOWL proposal will not adversely affect the site integrity of the Forth Islands SPA with respect to puffin, either alone or in combination with the other Forth and Tay and Hywind wind farms. The full reasons for this conclusion and for not agreeing with the views of the SNCBs are provided at pages 36-40 of the Forth and Tay Regional Assessment.

Razorbill - Forth Islands, Fowlsheugh, St Abb's Head to Fast Castle SPAs

In the Forth and Tay Regional Assessment, the SNCBs and MSS agreed that the Forth and Tay Developments will not adversely affect the integrity of the Fowlsheugh and St. Abb's Head to Fast Castle SPAs with respect to razorbill. SNCB advice was that adverse effect on site integrity of the Forth Islands SPA with respect to razorbill cannot be ruled out. MSS advice is that no adverse effect on site integrity of the Forth Islands SPA with respect to razorbill is demonstrated based on the thresholds that they advise and their view that the thresholds take account of the trajectories of the species assessed and therefore as long as the threshold is not exceeded a conclusion of no adverse effect on site integrity is appropriate. MSS also consider that there is uninformative precaution built into the estimation of the effect: e.g. the reduced displacement rates advised by MSS and the SNCBs for SAWEL, SBWEL and ICOL have not been accounted for. The recently consented Hywind wind farm identified negligible effects on razorbill at Fowlsheugh SPA, and no effects on razorbill at the other SPAs included within this assessment.

MS-LOT recognise that the estimated effects are likely to be over-estimates due to the modelling not taking account of the reduced displacement rates advised by the SNCBs and MSS at the SAWEL, SBWEL and ICOL sites. MS-LOT therefore concludes that NNGOWL alone or in-combination with the other Forth and Tay offshore wind farm projects (and Hywind with respect to Fowlsheugh SPA) will not adversely affect the site integrity of the Forth Islands, Fowlsheugh or St. Abb's Head to Fast Castle SPAs with respect to razorbill. The full reasons for this conclusion and for not agreeing with the conclusions reached by the SNCBs for Forth Islands SPA are provided at pages 40-41 of the Forth and Tay Regional Assessment.

Guillemot - Buchan Ness to Collieston Coast, Forth Islands, Fowlsheugh, St Abb's Head to Fast Castle SPAs

In the Forth and Tay Regional Assessment, the effects of displacement upon guillemot were modelled for the colonies at Buchan Ness to Collieston Coast, Fowlsheugh, Forth Islands and St. Abb's Head to Fast Castle SPAs. No effects were identified, either alone or in combination, with the exception of the NNGOWL project on Forth Islands SPA. The effect of -0.3% decline in adult survival is below the identified threshold using ABC of -0.8%. The SNCBs advised that the Forth and Tay Developments would not adversely affect the integrity the four SPAs with respect to guillemot. MSS agree with this conclusion. The recently consented Hywind wind farm identified negligible effects on guillemot at Buchan Ness SPA, and no effects on guillemot at the other SPAs included within this assessment.

MS-LOT concludes that the NNGOWL project will not adversely affect the site integrity of the Forth Islands, Buchan Ness to Collieston Coast, Fowlsheugh or St. Abb's Head to Fast Castle SPAs with respect to guillemot, either alone or in combination with the other Forth and Tay and Hywind wind farms.

Herring gull - Buchan Ness to Collieston Coast, Forth Islands, Fowlsheugh, St Abb's Head to Fast Castle SPAs

Collision risk modelling identified practically no effects upon herring gull at Buchan Ness to Collieston Coast, Forth Islands, Fowlsheugh and St. Abb's Head to Fast Castle SPAs. An effect of -0.1% decline in adult survival for Forth Islands SPA from NNGOWL was identified but this is against a threshold of -2.0%. Based on collision estimates assuming an avoidance rate of 98% rather than the 99.5% recommended by the BTO (i.e. which would more than half the estimated number of collisions), the SNCBs advised that the Forth and Tay Developments would not adversely affect the integrity of the four SPAs with respect to herring gull. MSS agree with this conclusion. At Aberdeen Bay offshore wind farm the breeding season adult mortality was predicted to be 11 birds of which 2 birds were attributed to Buchan Ness to Collieston Coast SPA and 1 bird to Fowlsheugh SPA. The recently consented Hywind wind farm estimated a collision rate of 0.4 adult herring gulls per breeding season, which would need to be apportioned back to either Buchan Ness SPA or other, non- SPA colonies.

MS-LOT concludes that the NNGOWL project will not adversely affect the site integrity of the Buchan Ness to Collieston Coast, Forth Islands, Fowlsheugh and St. Abb's Head to Fast Castle SPAs with respect to herring gull, either alone or in combination with the other Forth and Tay and Hywind wind farms.

Lesser black-backed gull – Forth Islands SPA

In the Forth and Tay Regional Assessment, collision risk modelling identified practically no effects upon lesser black-backed gull at Forth Islands SPA. An effect of < -0.1% decline in adult survival for Forth Islands SPA from NNGOWL was identified but this is against a threshold of -1.8%. The SNCBs advised (based on an avoidance

rate of 98% rather than the currently accepted 99.5%) that the Forth and Tay Developments would not adversely affect the integrity of the Forth Islands SPA with respect to lesser black-backed gull. MSS agree with this conclusion. The recently consented Hywind wind farm did not identify any effects upon lesser black-backed gull at Forth Islands SPA.

MS-LOT concludes that NNGOWL project will not adversely affect the site integrity of the Forth Islands SPA, with respect to lesser black-backed gull, either alone or in combination with the other Forth and Tay wind farms.

Fulmar - Buchan Ness to Collieston Coast, Forth Islands, Fowlsheugh SPAs

The Forth and Tay Regional Assessment concluded that insignificant numbers of fulmar were at collision risk height, therefore the main potential for impact is considered to be from displacement. The SNCBs advised that fulmar have large foraging ranges and are adapted for efficient gliding flight, so that the energetic costs of covering extra distances due to displacement will be small and will not give rise to significant impacts on this species. The SNCBs advised that the Forth and Tay developments would not adversely affect the integrity the three SPAs with respect to fulmar. MSS agree with this conclusion. At Aberdeen Bay Offshore Wind farm the effect on adult mortality was predicted to be only 7 birds per year. The recently consented Hywind wind farm did not identify any effects upon fulmar at Buchan Ness to Collieston Coast, Forth Islands, or Fowlsheugh SPAs.

MS-LOT concludes that the NNGOWL project will not adversely affect the site integrity of the Buchan Ness to Collieston Coast, Forth Islands, Fowlsheugh and with respect to fulmar, either alone or in combination with the other Forth and Tay wind farms.

Common and Arctic Tern – Forth Islands SPA

In the Forth and Tay Regional Assessment, NNGOWL and ICOL recorded low numbers of common and Arctic tern on-site during the breeding season. There was no connectivity between these species and SAWEL or SBWEL. The SNCBs advised that the Forth and Tay Developments would not adversely affect the integrity of the Forth Islands SPA with respect to common or Arctic tern. MSS agree with this conclusion. The recently consented Hywind wind farm did not identify any effects upon common nor Arctic terns at Forth Islands SPA.

MS-LOT concludes that the NNGOWL project will not adversely affect the site integrity of Forth Islands SPA with respect to Arctic tern or common tern, either alone or in combination with the other Forth and Tay wind farms.

Qualifying interests of Special Areas of Conservation

With respect to the qualifying interests of SACs, the assessments and conclusions of the original Forth and Tay Regional AA are unchanged by the application under consideration in this AA. For further details reference should be made to the pages specified below in that document.

1. Bottlenose dolphins as the qualifying feature of the Moray Firth SAC (pages 47-51).
2. Harbour seals as a qualifying feature of the Firth of Tay and Eden Estuary SAC (pages 51-53).
3. Grey seals as a qualifying feature of the Isle of May SAC and the Berwickshire & North Northumberland Coast SAC (page 53).
4. Atlantic salmon as a qualifying feature of the River South Esk, River Tay, River Teith, River Dee and River Tweed SACs (pages 54-55)
5. Freshwater pearl mussel ("FWPM") as the qualifying feature of the River South Esk and River Dee SACs (pages 55-56).
6. Lamprey species as qualifying features of the River Tay, River Teith and River Tweed SACs (page 56).

Hywind is a floating turbine development and so impact piling will not be required during construction. LSE was identified on bottlenose dolphin as a qualifying feature of the Moray Firth SAC from the Hywind development due to the potential for disturbance from the installation of the cable route. When considered together with the impacts predicted in the Forth and Tay Regional AA, MS-LOT conclude no adverse effect on site integrity.

Conclusion

Having determined that the NNGOWL development, alone or in combination with other projects, will not have a negative effect on the constitutive elements of the sites concerned, on having regard to the reasons for which the sites were designated and their associated conservation objectives, MS-LOT concludes that the proposed development will not, on its own or in combination with the other Forth and Tay offshore wind farms (or where appropriate for consideration, other developments already licensed) adversely affect the integrity of the Buchan Ness to Collieston Coast SPA, Fowlsheugh SPA, Forth Islands SPA, St Abb's Head to Fast Castle SPA, Moray Firth SAC, Firth of Tay and Eden Estuary SAC, Isle of May SAC, Berwickshire & North Northumberland Coast SAC, River South Esk SAC, River Tay SAC, River Dee SAC, River Teith SAC or River Tweed SAC (where each SPA or SAC is taken as a whole), subject to the compliance of conditions.

Following MSS advice, MS-LOT consider that the most up to date and best scientific evidence available has been used in reaching the conclusion that any decision to

approve the NNGOWL variation, will not adversely affect the integrity of the sites concerned when considered in-combination with other projects as detailed in this assessment. MS-LOT are satisfied that no reasonable scientific doubt remains.

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3d. Conditions proposed.

Conditions required to ensure no adverse effect on site integrity are the same as those detailed in the Forth and Tay Regional AA (pages 58-66)

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Date:	9/12/2015
Name of approver:	Gayle Holland
Date:	11/03/2016

Appendix 1 - Addressing concerns raised by RSPB Scotland

RSPB Scotland consider that the assessment completed by NNGOWL in the supporting environmental information document did not use the most recent SNCB recommendations on the most appropriate impact assessment using Collision Risk Modelling (CRM)[2]. NNGOWL used the same methods as in the original assessment in order to maintain consistency. RSPB Scotland advised that Scottish Minister's decisions must be made using the best available evidence, which will require re-running of the collision risk modelling with the correct model option and avoidance rates, for both the project in isolation and in-combination with the other Forth and Tay projects. This has been done, this AA completed by MS uses the recommendations made in the Marine Scotland commissioned BTO Avoidance Rate Review report[3].

It is the view of RSPB Scotland that "when using best available science and taking a suitable precautionary approach, it cannot be concluded that there will be no adverse effects on relevant SPAs in the region, either due to the proposal in isolation or in-combination with the three other consented offshore wind farms in the Forth and Tay region". This however is not the test under the Habitats Regulations. The AA completed has concluded that there will be no adverse effect on the integrity of the relevant SPAs, where each SPA is taken as a whole. MS consider that the best available science has been used in the assessment and that the assessment has been precautionary. The original Forth and Tay Regional AA details the precaution built in to the assessment.

RSPB Scotland consider that the Acceptable Biological Change tool does not represent an acceptable end point for the decision making process. An outline of this tool is provided in Appendix 2 of the original Forth and Tay AA and the RSPB concerns with the tool are addressed in Appendix 1 of that AA.

RSPB Scotland note that impacts to the draft marine SPA network have not been considered in the Habitats Regulations Appraisal, and it is their view that these require consideration prior to any decision being granted. The NNGOWL site overlaps with the draft Outer Firth of Forth and Tay Bay Complex marine SPA. Scottish Ministers are currently considering advice received from the SNCBs on sites suitable for designation as SPAs and SACs, these sites are currently given "draft" status (dSPAs and dSACs). Once Ministers have agreed the case for the draft

[2] UK SNCBs, 2014. Joint response from the statutory nature conservation bodies to the Marine Scotland Science avoidance rate review (http://www.snh.gov.uk/docs/A1464185.pdf)

[3] Cook, A.S.C.P., Humphries, E.M., Masden, E.A., and Burton, N.H.K. (2014). The avoidance rates of collision between birds and offshore turbines. BTO research Report No 656 to Marine Scotland Science.(http://www.gov.scot/Resource/0046/00464979.pdf)

designations to be the subject of a public consultation, the proposals will be given the status of 'pSPA and pSAC' and will receive policy protection from that point forward until a decision on classification of the sites are made. This policy protection for proposed sites is provided by Scottish Planning Policy (paragraph 210), the UK Marine Policy Statement (paragraph 3.1.3) and the National Marine Plan for Scotland (paragraph 4.45).

Regulation 63(1) of The Conservation of Habitats and Species Regulations 2010 requires that:

"*Where, before the date on which a site becomes a European site or European offshore marine site, a competent authority have decided to undertake, or have given any consent, permission or other authorisation for, a plan or project to which regulation 61(1) would apply if it were to be reconsidered as of that date, the authority must as soon as reasonably practicable –*

(a) review their decision or, as the case may be, the consent, permission or other authorisation; and

(b) affirm, modify or revoke it.

(2) They must for that purpose make an appropriate assessment of the implications for the site in view of that site's conservation objectives; and the provisions of regulation 61(2) to (4) apply, with the appropriate modifications, in relation to such a review……"

Therefore if these draft sites become designated and LSE is identified then it will be necessary to complete a further AA and depending on the findings of the AA, either affirm, modify or revoke the consent.

RSPB Scotland also make reference to the emerging research led by Leeds University that uses data loggers to track gannet flight heights and foraging tracks. This research has indicated that gannets fly at higher altitudes to that estimated by other methods and as such birds are at higher risk of collision with turbines. The paper by Cleasby et al 2015[4] was published in September 2015. A number of questions were raised over the methods and results presented in Cleasby et al 2015 (discussed in Appendix 1 of the recent Hywind AA). The authors recently responded to the questions raised by the SNCBs (see email from the paper's author Hamer to MSS and SNH dated 04.02.16). The questions asked related to validation of the barometric altimeter data, flight height estimates, at sea densities, and collision modelling. Following receipt of the answers MSS advised that the response to the question regarding the effect of flight speed on pressure and how that influences the estimation of flight heights is still unclear (see email from MSS to MS-LOT 10.02.16). Having considered the responses from the author SNH have advised that "neither the paper or the subsequent clarification on aspects of the paper change the advice we have provided previously," and "the response we have

[4] Cleasby, IR, Wakefield, ED, Bearhop, S, Bodey, TW, Votier, SC and Hamer, KC (2015) Three dimensional tracking of a wide-ranging marine predator: flight heights and vulnerability to offshore wind farms. Journal of Applied Ecology. ISSN 0021-8901

received, although providing clarity would not at this stage necessitate any requirement to change the gannet assessment in the AA" (see email SNH to MS-LOT 10.03.16 and 11.03.16). Due to the issues identified, it would be inappropriate to simply multiply existing gannet collision estimates by the values discussed in Cleasby et al. Whilst acknowledging that uncertainty in flight height distribution exists, as discussed above, this AA is based on a number of precautionary assumptions; the at sea density estimates of gannets used in the CRMs; that all adult plumaged birds are assumed to be part of the breeding population; and density independent population models. Marine Scotland consider that there are outstanding questions regarding the approach adopted by Cleasby et al, and that the associated scientific uncertainties do not support any meaningful re-assessment of the potential effects on gannet. Considering the precautionary assessment completed MS are certain that the NNGOWL development in combination with other projects will not adversely affect the integrity of the Forth Islands SPA with respect to gannet; and that is the case where no reasonable scientific doubt remains.