

MARINE SCOTLAND LICENSING OPERATIONS TEAM (MS-LOT) CONSIDERATION OF A PROPOSAL AFFECTING A DESIGNATED SAC OR SPA

APPLICATION FOR A MARINE LICENCE UNDER THE MARINE (SCOTLAND) ACT 2010 FOR CONSTRUCTION AND OPERATION OF THE NOVA TIDAL ARRAY- BLUEMULL SOUND, SHETLAND

SITE: NOVA Innovation Tidal Turbine, Bluemull Sound.

Foreword: The application for the Nova tidal array was received by Marine Scotland early in 2013, and the AA was completed on 2nd May 2013 (doc ref A6047102). There have been significant delays in the application being determined and also changes to the turbine design from a 3 bladed turbine to a 2 bladed turbine. In addition since the AA was completed in 2013 there have been advances in collision risk models and additional survey data. Marine Scotland have therefore revised the appropriate assessment to ensure that the most up to date information and best available evidence is included.

Marine Scotland consider that the installation methods considered in the previous AA have not changed significantly and that this previous AA is adequate to conclude no adverse effect on site integrity on the designated sites from the installation of the devices. It is the operation of the turbines that is being reconsidered in this AA. A licence was issued to Nova on the 28th August 2015 for the installation of the turbines. A condition was placed on the licence which restricts the operation to only one turbine for 6 hours per day until further consultation is carried out and this AA was completed.

APPROPRIATE ASSESSMENT (AA) CONCLUSION: Marine Scotland Licensing Operations Team (MS-LOT) conclude that, based on the content of the following assessment the proposed Nova Tidal Array will not on its own, or in-combination with other developments adversely affect the integrity of the Yell Sound SAC or the Hermaness, Saxa Vord and Valla Field SPA if conditions in 3d are complied with.

Introduction

This is a record of the appropriate assessment (AA) of the Nova Tidal Array proposal. The assessment has been undertaken by MSS and MS-LOT. This assessment is required under Regulation 48 of the Conservation (Natural Habitats, &c.) Regulations 1994. This AA is in accordance with Council Directive 92/43/EEC on the conservation of natural habitats under wild fauna and flora ("the Habitats Directive") and Council Directive 2009/147/EC on the conservation of wild birds ("the Birds Directive"). MS-LOT, as the 'competent authority' under the Regulations, has to be satisfied that the project will not cause an adverse effect to the integrity of any European site (special areas of conservation (SACs) and special protection areas (SPAs)) before it can grant consent for the project.

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

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

1. Yell Sound Coast Special Area of Conservation

http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8409

2. Hermaness, Saxa Vord and Valla Field Special Protection Area

http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8512

1b. European qualifying interests & whether priority/non-priority:

1. Yell Sound Coast Special Area of Conservation

Lutra lutra (otter) – no LSE not considered further

Phoca vitulina (Common / Harbour Seal) - LSE considered further below

2. Hermaness, Saxa Vord and Valla Field Special Protection Area

Catharacta skua (Great skua) no LSE not considered further

Morus bassana (Gannet) - LSE considered further below

Fratercula arctica (Puffin) – LSE considered further below

Gavia Stellata (Red-throated diver) – LSE considered further below

Seabird Assemblage :

Fulmarus glacialis (Fulmar) no LSE not considered further

Rissa tridactyla (Kittiwake) no LSE not considered further

Uria aalge (Guillemot) - LSE considered further below

Phalacrocorax aristotelis (Shag) - LSE considered further below

1c. Conservation objectives for qualifying interests:

Conservation Objectives

To avoid deterioration of the habitats of the qualifying species (listed above for both the Yell Sound Coast Special Area of Conservation and Hermaness, Saxa Vord and Valla Field Special Protection Area) 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:

1. Population of the species as a viable component of the site
2. Distribution of the species within site
3. Distribution and extent of habitats supporting the species
4. Structure, function and supporting processes of habitats supporting the species
5. No significant disturbance of the species

PROPOSAL DETAILS

2a. Proposal title Bluemull Sound - Shetland Tidal Array	
2b. Date of Consultation: SNH initially responded on the 4th April 2013 to consultation on the draft application for the Nova tidal array under the Marine Scotland Act 2010. Following the change from 3 bladed turbines to 2 bladed turbines SNH provided further advice on the 28 th August 2015. Following this advice, MSS requested consideration of some additional aspects and further responses were provided by SNH on the 16 th and 28 th September 2015	
2c. Type of Case: Tidal – deployment and operation of five 100 kW tidal turbines in the Bluemull Sound, Shetland	

2d. Details of proposed operation

Background

The proposal is for the installation, operation and decommissioning of five 2 bladed 100 kW tidal turbines. The proposed devices are bottom mounted, gravity anchored, non-yawing horizontal axis tidal turbines comprising of a cylindrical nacelle unit, rotor and gravity base to secure it to the sea bed (no seabed drilling or additional site works are required). The negatively buoyant nacelle is securely connected to the base by means of a latching system. The rotor rotates in the tidal stream and powers a generator that is housed within the nacelle. The turbine has a rotor diameter of 10m and a hub height of 9m, making the total height 14m from the bottom of the feet to the tip of the blades. In the Bluemull Array the devices will be installed in water depths greater than 30 m, so clearance will be more than 15 m below mean tide. The footprint of the device is 13.5 x 12.2 m, and the weight in water is 80 tonnes. The device will operate in a maximum sustained tidal speed of 2.6 m/s

The noisy works associated with this project are temporary and result from both the installation and the decommissioning of each turbine, with noise associated with vessels, installation of the substructures, and ballast weight. The devices will be on site for a period of approximately 20 years (2015- 2035).

The installation of the tidal devices involves the use of a multicat vessel typically used to service nearby salmon fishery interests and will be used for all installation, maintenance and decommissioning operations. The cable will be deployed from a tensioned reel located on a multicat vessel. The cable is not fixed to the seabed, but lies on top of the sea bed with concrete mattresses and cast-iron clam shell protection utilised for stability and protection as required.. The turbine and structure will then be surface towed to the site and sunk to mate with the gravity foundation by use of a secure latching system.

Each turbine nacelle will be periodically removed from its base and taken back to Cullivoe Pier for servicing on land, following which it will be returned to its base.

The rotor rotates in the tidal stream and drives a generator that is housed within the nacelle. The electricity produced by the generator is exported to the grid by the subsea cable to the shore. All electrical power conditioning and control is based onshore at the grid connection point on Cullivoe pier.

Communication to the machines is via a fibre optic cable embedded in the power cable, which can be accessed by a secure ISDN/broadband communications link, allowing each individual turbine to be accessed remotely over the internet. It is therefore possible to control and monitor the turbines locally and remotely.

Location

The Ness of Cullivoe is a narrow headland about 1 km long in the north-east of Yell. The development area is within the Bluemull Sound, a stretch of water separating Yell and Unst. The devices will be located 200 m east of the Ness of Cullivoe and in water approximately 30-40 m deep, each will have a dedicated sub-sea cable back to land at the Cullivoe pier.

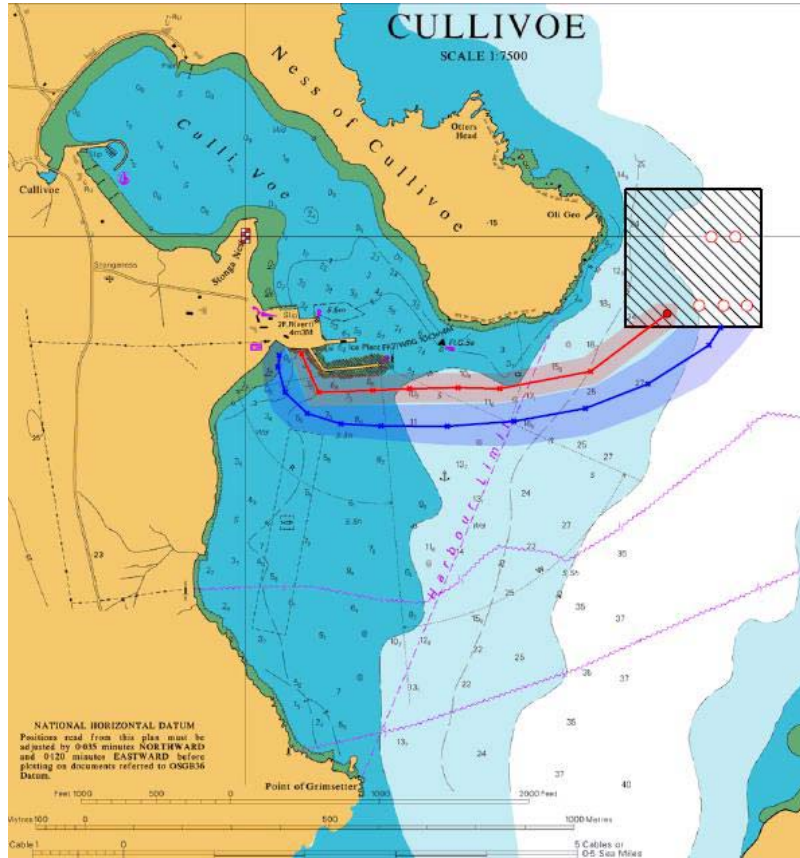


Figure 1 Source: Nova Innovation 2014

- The cross-hatched rectangle shows the requested lease area.
- The existing Nova 30 demonstrator turbine located on the site is marked with a red dot. The red line shows the path of the cable from this turbine to shore; the red shaded area is the Crown Estate lease area for this cable.
- The location of the five proposed array turbines are marked with open circles. The exact location of each turbine will be communicated to UKHO following deployment to be marked on hydrographic charts. The five array cables will follow the track of the blue line to shore, and will lie within the blue shaded area.

ASSESSMENT IN RELATION TO REGULATION 20 or 48

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

The operation is 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? Repeat for each interest on the site.

SNH advised that the proposed installation of the Nova tidal array would be likely to have a significant effect on the qualifying interests of two Natura sites listed in Section 1b above. The primary concern was the potential for the physical interaction between the species qualifying interests and the operation of the tidal turbine.

Of the species listed in Section 1b, no LSE was concluded for otter as there is no connectivity due to the distance of the SAC from the development area. No LSE was concluded for great skua, fulmar and kittiwake as these are not diving species and so would not come into contact with the tidal turbines.

In relation to Yell Sound Coast SAC and Hermaness, Saxa Vord and Valla Field SPA, the conclusion of likely significant effect on the species qualifying interests has been reached for: common / harbour seal at Yell Sound Coast SAC and gannet, guillemot, puffin, red throated diver and shag at Hermaness, Saxa Vord and Valla Field SPA.

SNH advised in 2013 that the conservation objectives that require to be considered further are:

1. Population of the species as a viable component of the site
5. No significant disturbance of the species

SNH consider that the proposal is of a sufficiently small scale so as not to require consideration under the following conservation objectives:

2. Distribution of the species within site
3. Distribution and extent of habitats supporting the species
4. Structure, function and supporting processes of habitats supporting the species

3c. Appropriate assessment of the implications for the site in view of the site's conservation objectives.

Background to this assessment

Due to the proximity of the SAC and SPA with respect to the location of the proposed tidal turbine array, and the changes to the proposed devices MSS and MS-LOT have fully assessed the site conservation objectives identified in 3b in the light of potential impacts arising from the operation of the Nova tidal turbines on harbour seals from the Yell Sound Coast SAC as well as potential impacts on gannet, guillemot, puffin, red throated diver and shag at the Hermaness, Saxa Vord and Valla Field SPA. This appraisal also takes account of the advice submitted to LOT by SNH.

The previous AA dated May 2013 used theoretical collision risk and transit models, developed by MSS. Since then more sophisticated models have been developed, and this assessment is based on the encounter rate model described in the draft SNH publication "Assessing Collision Risks Between Underwater Turbines and Marine Wildlife" by Bill Band which is currently out to [public consultation](#). In the draft document 3 models are described: encounter rate model (ERM), collision risk model (CRM) and exposure time population model (ETPM). The ERM model estimates the encounter rate, that is, the collision rate which would occur with no avoidance. The draft SNH guidance describes the need to apply an avoidance factor to take account of the likelihood that animals will avoid the site completely, or choose routes of safe passage between the turbines, or take successful evasive action in an escape response, or even be swept clear of the rotor blades if the hydrodynamic forces on the animal are sufficient. Ideally such avoidance factors should be based on evidence derived by monitoring collisions and/or avoidance behaviour at previously-installed tidal turbines. However, at the time of writing (2015) such evidence is scarce and avoidance factors are mainly based on guesses or informed estimates, by experts with a knowledge of the behavioural characteristics of each species. e.g. prey preferences/availability, seasonality and stages in an animal's life history.

Nova have one 30kW tidal turbine that has been operating in Bluemull Sound since 2014. Video footage of the installed turbine during 500 hours of a 4 month summer period, including 55 hours when in operation, resulted in no birds or marine mammals being observed in close proximity to the machine.

Information on the protected sites and their qualifying interests considered by this assessment.

Yell Sound Coast – Special Area of Conservation

Harbour seal

Approximately 30% of European harbour seals are found in the UK although this proportion has declined from approximately 40% in 2002. Harbour seals are widespread around the west coast of Scotland and throughout the Hebrides and Northern Isles. Scotland holds approximately 85% of the UK harbour seal population. The Nova array is approximately 25 km from the Yell Sound Coast SAC designated for harbour seal (*Phoca vitulina*) and therefore well within average foraging distance.

Each year, SMRU carries out surveys of harbour seals during the moult in August. Seals spend the largest proportion of their time on land during the moult and they are therefore visible during this period to be counted in the surveys. Recent survey counts and overall estimates are summarised in SCOS-Main Advice (2014). Surveys of harbour seals around the Scottish coast are carried out on an approximately five yearly cycle, with the exception of the Moray Firth and Firth of Tay which are surveyed annually. Since 2000 there have been major declines in harbour seal numbers around Scotland with declines of up to 50% in Shetland, Orkney the Moray Firth and the Firth of Tay

(SCOS-Main Advice, 2014). In response to the observed declines in harbour seal numbers around the UK, the survey effort has been increased recently and an attempt was made to survey the entire Scottish and the English east coast populations during 2007 and 2008. Areas missed in 2007 (the Western Isles, the far north and west coast and the Small Isles) were surveyed in 2008, with the exception of Shetland which was surveyed in 2009. The latest figure for the Shetland population of harbour seals is approximately 3,000 (SCOS Report 2014). There is an apparent decline in the number of harbour seals in areas such as Orkney and Shetland with the populations decreasing by around 42% since the 2001 survey was undertaken. For this reason, condition at the site is recorded as unfavourable, declining. The last survey at this SAC counted 115 harbour seals in 2009 (Duck & Morris, 2010).

SNH advised that in addition to collision risk it is also necessary to consider the likely significant effects (LSE) of the development on the distribution of harbour seals within the Yell Sound Coast SAC. The main mechanisms of disturbance will be the noise and an increase in vessel movements arising during the installation (and decommissioning) operations as well as potential collisions with the devices.

Hermaness, Saxa Vord and Valla Field – Special Protection Area

The Nova array is approximately 3 km from the Hermaness, Saxa Vord and Valla Field SPA for the bird species detailed in section 1b.

Atlantic puffin (*Fratercula arctica*)

Shetland forms a principal breeding 'area' for puffins, particularly Fair Isle and Foula. SNH advise that the British population totals more than 449,000 pairs. Hermaness, Saxa Vord and Valla Field SPA is one of nine puffin colonies in the UK that supports more than 1% of the international breeding population. The SPA supports a breeding assemblage of Atlantic puffins totalling approximately 6% of the British population or 55,000 individuals. Condition at the site is recorded as favourable, maintained.

SNH advised that it is necessary to consider the likely significant effects (LSE) of the development in relation to conservation objectives 1 & 5 for the Hermaness, Saxa Vord and Valla Field SPA. The main concern is the potential for collision with the devices.

Red-throated diver (*Gavia stellata*)

There are estimated to be 935 breeding pairs of red-throated diver with strongholds in Shetland, Orkney, the Western Isles, Sutherland and Wester Ross (Gibbons *et al.* 1993). Subsequent population expansion has been recorded in Islay, Jura, Perthshire and South West Scotland. Hermaness, Saxa Vord and Valla Field SPA contains an average of 26 proven breeding pairs which make up 3% of the British breeding population. Condition at the site is recorded as favourable, maintained.

SNH advised that it is necessary to consider the likely significant effects (LSE) of the development in relation to conservation objectives 1 & 5 for the Hermaness, Saxa Vord and Valla Field SPA. The main concern is the potential for collision with the devices.

Northern gannet (*Morus bassanus*)

The Hermaness, Saxa Vord and Valla Field SPA supports a breeding population of gannets. In the UK, counts have been taken at gannet colonies for nearly a century during which time the population has consistently increased in size with new colonies being formed. Current growth of the gannet

population in the UK is estimated to be increasing by around 2.4% per annum. Hermaness, Saxa Vord and Valla Field SPA supports 16,400 breeding pairs of gannets which makes up 8% of the British population and 6% of the world population of the species. Condition at the site is recorded as favourable, maintained.

SNH advised that it is necessary to consider the likely significant effects (LSE) of the development in relation to conservation objectives 1 & 5 for the Hermaness, Saxa Vord and Valla Field SPA. The main concern is the potential for collision with the devices.

Common guillemot (*Uria aalge*)

The main concentrations of breeding guillemots are located in the north of Scotland and population increases of 121% have been recorded in the Shetland population. Currently, the UK population of guillemots numbers approximately 703,500 breeding pairs of a total North Atlantic population of 2,250,000 pairs. Of this UK total, around 25,000 individuals have been recorded at Hermaness, Saxa Vord and Valla Field SPA. This equates to 2% of the British population. Condition at the site is recorded as favourable, maintained.

SNH advised that it is necessary to consider the likely significant effects (LSE) of the development in relation to conservation objectives 1 & 5 for the Hermaness, Saxa Vord and Valla Field SPA. The main concern is the potential for collision with the devices.

European shag (*Phalacrocorax aristotelis*)

The European shag is considered as an important component of the breeding seabird assemblage at Hermaness, Saxa Vord and Valla Field SPA. A breeding population of 450 pairs occur within this SPA from a total UK population of 37,500 pairs. The Hermaness, Saxa Vord and Valla Field SPA population makes up 1% of the British population. Condition at the site is noted as unfavourable, declining.

SNH advised that it is necessary to consider the likely significant effects (LSE) of the development in relation to conservation objectives 1 & 5 for the Hermaness, Saxa Vord and Valla Field SPA. The main concern is the potential for collision with the devices.

Harbour seal assessment

Harbour Seal – modelling of collision risk

In their advice dated 16th and 28th September 2015, SNH used the updated ERM model with a 98% avoidance rate to estimate the numbers of harbour seals which may collide with the turbines. The results are detailed in Table 1 below. The figures used in the 2013 AA are presented as a comparison.

Table 1: harbour seal comparison of collision risk estimates

Species	Original CRM (2013) – Used in the SNH response and previous AA.	Updated ERM model with updated turbine parameters – BREEDING SEASON ONLY	Updated ERM model with updated turbine parameters – ALL YEAR	Updated ERM model with updated turbine parameters – Seals-at-sea density (availability accounted for)
Harbour seal	0.15	0.14	3.30	3.33

These calculations are based on the assumption that the devices are operating for 73% of the time as estimated by Nova.

The breeding season density estimates are derived from the period spanning June to August. However, for completeness the ‘all year’ collision risk estimates are presented with the collision risk estimate using the seals-at-sea density figure.

Marine Mammal Management Unit - Permitted Biological Removal (PBR) values for harbour seals

The PBR is intended to ensure that the total numbers of seals for which licences may be issued in each Seal Management Area do not reach a level that may result in unacceptable adverse impacts on local seal populations. Each Management Unit PBR takes into account the status of the local seal populations for each species and reflects recent population trends. For example, the PBR for harbour seals in areas where this species have been subject to local declines will be correspondingly low as a result. It means that some applications for seal licences may, in some cases, be refused or the number of seals reduced. The 2015 PBR for harbour seals in the Shetland area is 18. The Encounter Rate Model estimates an additional mortality from the Nova Innovation project of 3.33 seals. This is less than 20% of the current PBR.

Cumulative effects: Nova also have a Marine Licence for the deployment and operation of a single 30kW tidal turbine. This, together with the Nova array, has the potential for cumulative impacts.

Cumulative effects on the seal population arise from other causes of seal mortality, primarily the granting of seal licences. Marine Scotland has consulted with the seal licensing team to ensure that the overall seal licences issued and the potential 3.33 animals calculated using the collision risk model do not put the population into unacceptable decline. The PBR for harbour seals in Shetland is 18. Licences have been issued for 6 seals. The cumulative mortality is approximately half of the PBR. MSS agrees with SNH that it is unlikely that this development, alone or in combination with other licensed activities in Shetland, is likely to cause more than 18 individuals to be removed from the harbour seal population.

SNH advise that the rate of collision predicted from the updated modelling during the breeding season is very similar to what was previously calculated (0-1 seal per year). They are content that this collision rate is unlikely to lead to an adverse effect on site integrity for Yell Sound Coast SAC. They also note the value of ongoing monitoring in support of this conclusion.

Marine Scotland also conclude that the distance of the Yell Sound Coast SAC from the proposed Nova Innovation tidal turbine (~ 25 Km) is such that the operations will not affect the long term distribution of harbour seals within the Yell Sound Coast SAC.

MS-LOT conclude that the proposed Nova Tidal Array will not adversely affect the integrity of the Yell Sound Coast SAC, either alone or in combination with other projects or in

combination with seals taken through seal licensing.

Seabird assessment

SNH in their advice dated 28th September 2015, provided updated estimates of bird collisions. Previous estimates provided on 28th August 2015 were revised following input from MSS. Table 2 below contains the collision risk estimates from the updated ERM model with a 98% avoidance rate applied for the 5 SPA breeding bird species for which LSE was previously identified. The figures used in the 2013 modelling exercise are included as a comparison. SNH manually extracted the monthly densities for gannet and shag in order to be able to calculate the breeding season more accurately. SNH did not do this for puffin, red-throated diver or common guillemot, and so the breeding season for these three species is taken as March to October, reflecting the way in which the survey data was presented to them.

Table 2: Collision risk estimates for SPA qualifying features

Species	Original CRM (2013) – Used in the SNH response and AA.	Updated ERM model with updated turbine parameters – BREEDING SEASON	Updated ERM model with updated turbine parameters – ALL YEAR	SPA Breeding population
Atlantic puffin	0.54	1.21	1.13	55000
Red-throated diver	0.07 (breeding = 0.05)	0.11	0.12	52
Northern gannet	1.17	0.00	0.00	32800
Common guillemot	0.21	0.31	0.30	25000
European shag	2.46 (breeding = 0.69)	4.06	9.37	9000

For all of the above mentioned species with the exception of shag, the collision risk estimates (using a 98% avoidance rate) are of a magnitude similar to previous predictions (see table above). SNH advised that these collision rates are unlikely to lead to an adverse effect on site integrity for Hermaness, Saxa Vord and Valla Field SPA.

With respect to shag, SNH have undertaken an apportioning exercise to more fully understand what the impacts may be within the context of all breeding shag colonies within foraging range of the Shetland Tidal Array development. The estimated number of collisions during one breeding season is 4 birds (4.06 predicted). Stable population structure calculations show that 43% of these birds will likely be adults. Of those 2 (1.72) adult birds, between zero and one bird would be expected to originate from the Hermaness, Saxa Vord and Valla Field SPA breeding population. SNH advised that this collision rate is unlikely to lead to an adverse effect on site integrity for Hermaness, Saxa Vord and Valla Field SPA.

SNH also advised that based on their appraisal of the Nova proposal and their knowledge of other developments/activities in Shetland, any potential cumulative and in-combination effects will not adversely affect the integrity of this SPA.

Marine Scotland also consider that there is no evidence to suggest that potential disturbance during construction and operation of the project will result in changes to the vital rates of any of the seabird species through alteration of time and energy budgets of individual foraging animals.

Cumulative effects: Nova have a Marine Licence for the deployment and operation of a single 30kW tidal turbine. This, together with the Nova array, has the potential for cumulative impacts.

In combination effects can arise from interactions with other causes of additional mortality. MS are not aware of any other licensed operations in this area that have the potential to cause additional

mortality of these species, and therefore there are no other in combination effects to be taken into account.

The advice provided by SNH has informed the content of this assessment. The largest effects are the collision risk to shag. MSS is satisfied that the magnitude of the effects will not undermine the conservation objectives for any of the qualifying interests. A robust EMMP should enable the scientific uncertainties associated with collision risk to be further addressed.

MS-LOT conclude that the proposed Nova Tidal Array will not adversely affect the integrity of the Hermaness, Saxa Vord and Valla Field SPA, either alone or in combination with other projects.

Conclusion

Having determined that the Nova Tidal Array 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 other projects adversely affect the integrity of the Yell Sound SAC or Hermaness, Saxa Vord and Valla Field SPA (where each site is taken as a whole), subject to the compliance of conditions in 3d. Following SNH and MSS advice, MS-LOT consider that the most up to date and best scientific evidence available has been used in reaching this conclusion and are satisfied that no reasonable scientific doubt remains.

3d. Conditions required.

The Licensee must ensure that the works are carried out in accordance with the agreed EMMP. If through monitoring, as directed by the EMMP, it is determined that the devices could have an adverse effect on site integrity then further mitigation measures may be required at the discretion of the licensing authority.

Reason: to protect natura interests

4. RESPONSE

a) Marine Scotland Comments

For Marine Scotland advice to other authorities:

Provided that the EMMP which is to be prepared by the developer and agreed with SNH and MS LOT is adhered to, the installation, operation and decommissioning of the Nova Innovation tidal turbines at the Bluemull Sound will not adversely affect the integrity of the Yell Sound Coast SAC or the Hermaness, Saxa Vord and Valla Field SPA.

Name of assessor	Jared Wilson and Finlay Bennet of MSS
Date	14 October 2015
Approved by	Gayle Holland (MS-LOT EIA/HRA compliance manager)
Date	5 November 2015