Aberdeen Harbour Expansion Project

Clarification Note for Scottish Natural Heritage and RSPB Scotland

Effects on eider duck

1. Introduction

Scottish Natural Heritage (SNH) and the Royal Society for the Protection of Birds (RSPB) Scotland, in their responses to the consultation on the three consent applications for the Aberdeen Harbour Expansion Project (AHEP), raised a concern that the information in the Environmental Statement (ES) and Habitats Regulations Appraisal was not sufficient to conclude that there would not be an adverse effect to the integrity of Special Protection Areas (SPAs) for eider duck *Somateria mollissima* on the east coast of Scotland, in particular, the Ythan Estuary, Sands of Forvie and Meikle Loch SPA.

AHB and its consultants attended meetings with SNH on 27 January and 17 February 2016 to discuss this issue in more detail. To support their own research, SNH have requested that AHB clarify the following: the extent of suitable foraging habitat for eider in the existing Nigg Bay; the suitability of the new structures (e.g. breakwaters) and other areas within the new operational harbour that would provide suitable foraging habitat; and what mitigation measures could be implemented to enhance the quality of these habitats. This clarification note addresses each of these three items in turn, drawing on information presented in the ES.

2. Existing foraging habitat within Nigg Bay and loss of habitat

As reported in Section 14.5.4 within Chapter 14 of the ES, eider use Nigg Bay and the wider area for feeding, roosting and moulting. Although the numbers recorded are in themselves not sufficiently high for the area to receive either national or international designations, it nevertheless demonstrates connectivity with other areas along the coast which are designated, specifically the Ythan Estuary, Sands of Forvie and Meikle Loch SPA.

The largest roost flocks within Nigg Bay are generally found on the water, but some birds roost on the rocky shores on the north and south sides of Nigg Bay. Occasionally, relatively large numbers are seen roosting on the beach – these roosts tend to be seen in early mornings, and it is likely that beach roosting birds are frequently disturbed by activities such as dog walking and bait digging.

Figure 14.3 within Chapter 14 of the ES shows the distribution of eider within Nigg Bay and the headlands to the north and south, as observed during the vantage point surveys. The figure indicates that eider use the area to the south and east of Nigg Bay during strong south-westerly winds; the area to the north and west during the summer months; and the area around the Girdle Ness headland and the mouth of the River Dee.

Eider feed by diving in shallow waters up to 12 m depth and typically within 1 km of the shore. Eider target crustaceans and molluscs, with mussels being the favoured prey.

2.1 Direct loss of habitat

Figure 12.2 within Chapter 12 of the ES shows an intertidal biotope map, and further information on biotopes is provided in ES Appendices 12-A (intertidal) and 12-B (subtidal). The key eider foraging biotopes are the intertidal mussel-dominated biotopes LR.HLR.MusB.Sem.LitX / Sem.Sem / MusB.MytB). The other biotopes identified are likely to constitute relatively poorer eider foraging habitat.

The areas covered by these three biotopes within the benthic survey area have been calculated, including Nigg Bay and the Girdle Ness and Greg Ness headlands. The areas and percentages of these biotopes that would be lost (i.e. within the footprint of the quays, breakwaters or dredged areas) have also been calculated, and the results are presented in Table 1 below.

Table 1: Extent of mussel-dominated biotopes (existing and lost)

Biotope	**Total area of biotope present**		**Total area of biotope lost**		**Proportion lost within development area**
	km²	**m²**	**km²**	**m²**	**%**
LR.HLR.MusB.MytB	0.0022	2,218	0	0	0
LR.HLR.MusB.Sem. LitX	0.0012	1,193	0.0003	326	27
LR.HLR.MusB.Sem. Sem	0.0334	33,399	0.0192	19,239	58
Total	**0.0368**	**36,810**	**0.0195**	**19,565**	**53**

Of the three intertidal biotopes, LR.HLR.MusB.MytB is considered to be of the highest value eider foraging habitat. As shown in Table 1, there will be no direct loss of this habitat. LR.HLR.MusB.Sem.Sem, which will experience the greatest loss (58%) of the three biotopes, is considered to be of the lowest value. The total proportion of all three biotopes that will be lost is 53%; however, the vast majority of this is attributed to the lowest value biotope (LR.HLR.MusB.Sem.Sem).

2.2 Indirect loss of habitat

At the meeting on 17 February, SNH queried whether any effects were predicted on the intertidal and subtidal habitats around the Girdle Ness and Greg Ness headlands resulting from the presence of the breakwaters (i.e. changes to the hydrodynamic regime).

The results of the hydrodynamic modelling undertaken to inform the ES are presented in Chapter 6 of the ES. As shown in Figure 6.12 within this chapter, the predicted changes in water levels under a storm surge scenario around Greg Ness and Girdle Ness headlands are very small: decreases of 0 – 0.01 m at Greg Ness; and increases of 0.004m to 0.006m at Girdle Ness.

As shown on Figure 6.13 within Chapter 6 of the ES, there are no predicted changes to tidal currents at Girdle Ness headland, and very small predicted decreases of 0.05 – 0.20 m/s at Greg Ness headland.

Figure 6.14 within Chapter 6 of the ES shows the predicted changes in significant wave heights during a 1 in 200 wave event. There are no changes observed at Girdle Ness headland. A reduction of 4 m significant wave height is predicted only in close proximity to the southern breakwater at Greg Ness.

Figure C-18 within ES Appendix 6-B shows a comparison of deposition and erosion patterns between the baseline and operational phase of the AHEP, and it can be seen that there are negligible differences around the Girdle Ness and Greg Ness headlands.

As the predicted changes to the hydrodynamic regime around the two headlands are extremely small, there is no mechanism for adverse effects on the biotopes in these areas. There are, therefore, no indirect effects predicted on the quality or quantity of the eider foraging habitat in these areas.

3. Available foraging habitat within the operational harbour

As identified during discussions with SNH on 17 February, eider are known to habituate well to disturbance caused by human activities, as demonstrated at Faslane and Sullom Voe, for example. It is considered likely, therefore, that once the AHEP is operational, eider are unlikely to be displaced as a result of day-to-day activities within the harbour such as vessel movements and quayside operations. In addition, personal observations by AHB staff demonstrate that eider flocks are regularly present in busy operational water areas within the existing Aberdeen Harbour.

Notwithstanding the ability of eider to habituate to disturbance, it is necessary to demonstrate that the operational AHEP will provide suitable foraging and roosting habitats for eider, in order to demonstrate that eider can continue to use Nigg Bay once the harbour is operational. This section describes the artificial structures and undeveloped areas within and adjacent to Nigg Bay, and provides evidence from the ES to demonstrate that these areas will provide suitable foraging and roosting habitat for eider.

3.1 Breakwaters

As shown in Figure 3.3 within Chapter 3 of the ES, two large breakwater structures will be constructed to form the harbour, extending from the north and south headlands. The length of each breakwater is approximately 700 m, and the height is approximately 12 m above Chart Datum (see Table 3.3 within Chapter 3 of the ES for further details).

The intertidal and subtidal sections of the breakwaters are considered to provide excellent potential for mussel habitat, and therefore eider foraging habitat. On the northern breakwater, only the outer face will be available as foraging habitat, as the inner face forms part of the East Quay. Both faces of the southern breakwater will provide suitable habitat. The irregular nature of the concrete armour units will provide rough surfaces with niches and crevices, upon which mussels are known to colonise: mussels are frequently observed on established port and harbour infrastructure.

Table 2 shows the minimum surface area of potential mussel habitat, based on the breakwater information provided in Chapter 3 of the ES. These calculations are based on a flat solid surface, whereas in reality the crevices created by the breakwater armour units will create a significantly greater surface area. In addition, the calculations are based on the straight faces of the breakwaters only; it does not take into account the roundheads at the end of each breakwater.

Table 2: Extent of potential mussel habitat on breakwaters

Location	Distance between highest astronomical tide mark and breakwater toe (m)	Length of breakwater (m)	Total surface area of potential mussel habitat (m^2)
Outer face of northern breakwater	9	700	6,300
Outer face of southern breakwater	10	670	6,700
Inner face of southern breakwater	12	670	8,040
Total			**21,040**

As shown in Table 2, a minimum of 21,040 m^2 of mussel habitat (and, therefore, suitable eider foraging habitat) will be created by the breakwaters. This is greater than the area of foraging habitat that is anticipated to be lost as a result of the AHEP (19,565 m^2 – see Table 1).

3.1.1 Wind and wave exposure on the breakwaters

Appendix 6-A of the ES describes the wind and wave conditions in the vicinity of Nigg Bay. Wind data was collected from a meteorological station at the location shown on Figure 1.1 within ES Appendix 6-A. Appendix G within this report contains a wind rose diagram showing a frequency distribution of wind speed against direction. The most common wind direction is south westerly (over land), in agreement with the dominant wind direction across the UK. The fastest wind speeds were observed to approach from the south west and the south.

Appendix A of this report contains two wave rose diagrams and frequency tables at two marine monitoring locations show on Figure 1.1 within ES Appendix 6-A. The wave roses show that all the wave energy at the West monitoring location approached from the east and the south east (between 50 and 170 °T). The wider direction band observed at the East monitoring location reflects the greater level of exposure of this location; records were observed in all but 2 of the 10° direction bands. The largest waves approach both locations from a south easterly direction band (140-150 °T and 120–130 °T at the West and East monitoring locations, respectively).

When the wind direction is from the north, north-west, west, south-west and south (i.e. over land), the entire bay is well sheltered due to the natural topography of the bay. When winds and waves are approaching from the south and south-east, due to the orientation of the breakwaters, the outer face of the northern breakwater and the inner (northern) face of the southern breakwater will be relatively sheltered.

The outer face of the northern breakwater will be exposed when winds and waves are approaching from the east; however, at these times the inner face of the southern breakwater and the rocky areas to the west of the southern breakwater (see below) would be sheltered.

In summary, in the majority of wind and wave conditions, the breakwaters will be relatively sheltered, providing favourable conditions for eider and other bird species.

3.1.2 In-built mitigation measures on breakwater structures

Public access to the breakwaters will be prohibited, and the only human access will be by harbour staff and contractors for emergency or maintenance purposes. Both breakwaters will be secured from public access, which will also help to preclude access by foxes and other terrestrial predators.

The breakwaters are low-maintenance structures and there is no requirement to treat the concrete armour units or keep them free of marine growth.

Light levels will be carefully controlled within the AHEP: all external lighting will be controlled in zones, as needed for operational purposes, using an advanced computer-based software package, which will be monitored and controlled from the Security Gate House. Although there will be a requirement to maintain a low level of lighting at night for safety and security, lights will be used at full power only when they are required, not constantly during night time hours. An externally mounted photo electrical cell will provide the computer system with actual daylight levels at any time. The system will switch on the lighting gradually based on the actual daylight level.

Drawing 0022-LAY-001 (Electrical services – harbour and car park flood lighting layout) in Appendix 1 of this note shows the light levels within the operational harbour when all lights are fully illuminated. It can be seen that all lights are directed inwards to the harbour, and that levels decrease to 1 lux along the crest of the northern breakwater, which in general terms is the equivalent of a full moon on a clear night. There will be minimal artificial light on the southern breakwater.

The in-built mitigation measures described above will increase the value of the breakwaters as a foraging and roosting habitat for eider and other bird species.

3.2 Rocky outcrops inside the breakwaters

The area between the southern end of the West Quay and the southern breakwater will be re-profiled during the construction of the AHEP. The beach in front of the cliff within the Nigg Bay Site of Special Scientific Interest will be graded to provide a stable slope, and if necessary a part of the slope will be reinforced with rock armour. Sections of the rocky outcrops to the east of the beach will be re-profiled to increase wave dissipation in this area. Once the AHEP is operational, this entire area will be outside the operational harbour area and will remain undeveloped.

This area will be well sheltered during most wind and wave states; only when winds and waves are approaching from the north-east will the area be exposed. It is difficult to access the rocky outcrops on foot so this area will be relatively undisturbed by human activity.

Although this area will be disturbed during the construction phase, during the operational phase it will be left undisturbed and it is expected to be colonised by mussels and other marine life, i.e. it is expected to return to its baseline state with a variety of biotopes including the mussel-dominated LR.HLR.MusB.Sem.Sem (see Figure 4 within ES Appendix 12-A).

3.3 Headlands outside the breakwaters

As described in Section 2.2, there are not anticipated to be any changes to the existing habitats at Girdle Ness and Greg Ness outside of the breakwaters.

4. Additional mitigation measures

It has been established that no net loss of potential eider foraging habitat is anticipated. The list below sets out the mitigation measures that are proposed to enhance the value of the breakwater structures as foraging habitat. This is in addition to the in-built mitigation measures described in Section 3.1.2 (e.g. limited access to the breakwaters, minimal lighting).

- Installation of seeded mussel ropes on the breakwater structures. This technique is common in aquaculture, and although no examples could be found in the literature of this method being used for conservation purposes, it is considered that this would be a viable technique. Further investigation of this mitigation measure is provided in Section 4.1 below.
- No anti-fouling paints or coatings with biocidal effects will be used on any of the breakwater armour units.
- Modification of selected concrete armour units to increase the roughness of the surface.

The details of how these mitigation measures will be achieved will be set out in the Construction Environmental Management Plan (CEMP), which will be developed once a contractor has been appointed.

4.1 Use of seeded mussel ropes

At the request of SNH and RSPB Scotland, AHB have further investigated the feasibility of the proposal to attach seeded mussel ropes to the breakwater structures. As indicated above, limited information is available; however, discussions with specialists at Centre for Marine Resources and Mariculture (C-Mar), the Scottish Association for Marine Science (SAMS), and the benthic ecologists at Fugro EMU who produced the marine ES chapters, have revealed that the use of seeded mussel ropes in this way is likely to result in improved colonisation of the breakwater structures.

The detailed methodology will be developed once a contractor has been appointed, as it will be dependent on the breakwater construction methodology and the materials to be used.

At the request of RSPB Scotland, Fugro EMU have investigated the likely time taken for mussels to colonise and grow to an appropriate size to provide a suitable food source for eider, considering the prevailing weather and sea conditions. This has included discussions with experts with Marine Scotland Science and SNH.

Growth of mussels is influenced by three factors, the first two of which should remain unchanged once the AHEP is in place:

- Temperature
- Food availability
- Tidal exposure

The current presence of mussel-based biotopes in the north and south of Nigg Bay and around the Girdle Ness and Greg Ness headlands (see Section 2) indicates that the mussels are able to tolerate the relatively exposed wind and wave conditions that exist: as reported in Section 3.1.1 above, the largest waves approach both locations from a south easterly direction band. As reported in Section 2, of the three intertidal biotopes, LR.HLR.MusB.MytB is considered to be of the highest value eider foraging habitat, and there will be no direct or indirect loss of this habitat during the construction or operation of the AHEP.

It is considered that mussel spat are likely to settle and establish within one year, and that a layer of mussels a few centimetres thick would appear after two to three years.

4.2 Construction phase mitigation

At the meeting on 17 February, SNH queried whether the construction of the breakwaters could be scheduled to commence prior to June, when eider numbers have begun to increase in Nigg Bay ready to moult (and when they will be unable to move away from any disturbance). It is intended to commence breakwater construction at the end of the winter period as soon as weather conditions allow.

RSPB Scotland have requested further details of the measures that will be in place during the construction phase to minimise effects on eider from vessel activity. Section 26.3.5 within Chapter 26 of the ES describes the Vessel Management Plan, which will be developed in detail once a contractor has been appointed. In practice, it will be difficult for vessels to avoid aggregations of sea ducks within Nigg Bay during the construction phase.

At a meeting with RSPB Scotland on 16 March, it was agreed that the Vessel Management Plan will include an 'exclusion zone' to prevent vessels associated with the construction of the AHEP from passing close to the shore in the vicinity of Greyhope Bay. Vessels will not pass within 100 m of the low water mark between Nigg Bay and the existing Aberdeen Harbour, except in an emergency situation.

Chapter 14 of the ES identifies Greyhope Bay as an important area for eider and terns, for roosting and crèches of young. This area is sheltered from Nigg Bay by the Girdle Ness headland, and will therefore continue to provide roosting and foraging habitat for eider throughout the construction programme.

5. Conclusion

It is the conclusion of this clarification note that although some areas of eider foraging habitat will be lost as a result of the AHEP, the artificial structures and remaining undeveloped areas of Nigg Bay will provide sufficient substitute habitat, so there will be no net loss of eider foraging habitat, and therefore no adverse effects on eider using Nigg Bay.

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Appendix 1

Drawing 0022-LAY-001: Electrical services – harbour and car park flood lighting layout