Dales Voe – Capital Dredge
Shadow Habitats Regulations Appraisal (HRA)

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CONTROL SHEET

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EXECUTIVE SUMMARY

EnviroCentre Limited were commissioned by Arch Henderson LLP to undertake a shadow Habitats Regulations Appraisal (HRA) to provide regulators with the information required to determine if proposed plans to undertake capital dredging will have any adverse impacts on European Sites.

An HRA is required to assess whether the project, alone or in combination with other projects, will have an adverse impact on the integrity of European designated sites. It is the responsibility of the competent authority to conduct the HRA (the Marine Directorate, in this case). This document aims to provide the information necessary for them to undertake the appraisal.

The proposed capital dredging works are driven by an urgent requirement to improve navigational safety through the harbour due to ever increasing vessel size and number being experienced in the port.

The following sites were scoped in to be screened for Likely Significant Effects (LSEs), based on their connectivity with the site, with those in bold screened in and taken forward to Appropriate assessment as it wasn't possible to rule out LSE for all qualifying features:

- **East Mainland Coast, Shetland Special Protection Area (SPA)**
- Noss SPA
- **Mousa Special Area of Conservation (SAC)**
- Mousa SPA
- Pobie Bank Reef SAC
- The Vadills SAC
- **Yell Sound Coast SAC**
- Lochs of Spiggie and Brow SPA

The potential impacts arising from the proposed works which could affect the conservation objectives for the qualifying features screened in are:

- Capital dredging and dredge disposal could give rise to suspended sediments within the water, which may affect water quality and indirectly affect the prey abundance for qualifying interests of the designated sites.
- Dredging and transportation of sediment could increase the risk of a pollution incident.
- Increased marine traffic as a result of dredging and transporting sediment could also cause increased risk of collision with marine mammals, as well as disturbance.
- Dredging, drilling, blasting and vessel movements may result in the generation of underwater noise, which can cause injuries and result in Temporary Threshold Shift (TTS) or Permanent Threshold Shift (PTS) in hearing of marine mammals and birds.

It is anticipated that these impacts can be reduced and avoided through the implementation of standard mitigation protocols. These include:

- A Vessel Management Plan;
- A Construction Environmental Management Plan (CEMP); and
- Presence of a Marine Mammal Observer (MMO) and Ornithologist.

It is considered that if the above mitigation is implemented it will be sufficient to avoid LSEs on any of the qualifying interests identified as being impacted by works. As such, there will be no adverse effects on site integrity for the designated sites those features are qualifying interests of.

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1 INTRODUCTION

1.1 Terms of Reference

EnviroCentre Limited were commissioned by Arch Henderson LLP to undertake a shadow Habitats Regulations Appraisal (HRA) to provide regulators with the information required to determine if proposed plans to undertake capital dredging will have any adverse impacts on European Sites.

1.2 Background

MDLOT licence MS-00011213 for Dales Voe is currently in place – the dredge quantity on the licence states 168,000 WT with similar disposal.

A Phase 1 contract in June / July 2025 to remove all soft dredge material using trailer suction dredger (TSD) from MDLOT licenced areas is nearing substantial completion with approx. 33,000m^3 removed.

Since the original dredging campaign was planned and after current engagement with clients preferred dredging contractor there is a desire to undertake amendments to the Dales Voe dredging works to improve further the navigational safety of the harbour.

1.3 Scope of Report

A HRA is required to assess whether the project, alone or in combination with other projects, will have an adverse impact on the integrity of European designated sites. It is the responsibility of the competent authority to conduct the HRA (the Marine Directorate, in this case). This document aims to provide the information necessary for them to undertake the appraisal by:

- Providing information on the proposed works;
- Identifying European designated sites that are connected to and/or could potentially be affected by the proposed works;
- Identifying how the proposed works may affect the qualifying features of the European designated site(s), the test of Likely Significant Effects (LSE);
- Giving consideration to other projects that may have an ‘in combination’ effect on European designated sites;
- Recommending European designated sites that need to be taken forward for further assessment if LSEs to their qualifying features cannot be ruled out;
- Conducting an ‘Appropriate Assessment’ for those qualifying features for which LSE cannot be ruled out; and
- Proposing mitigation that would be required to avoid adverse impacts on the qualifying features of the European designated sites.

1.4 Legislative Context

The Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (hereafter called the Habitats Directive) requires ‘appropriate assessment’ of plans and projects that are likely to have a significant effect on European designated sites.

Article 6(3) establishes the requirement for Appropriate Assessment (AA):

"Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans and projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implication for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public".

Article 6(4) goes on to discuss alternative solutions, the test of 'imperative reasons of overriding public interest' (IROPI) and compensatory measures:

"If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted".

A number of guidance documents on the appropriate assessment process have been referred to during the preparation of this HRA. These are:

- Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Circular NPW 1/10 & PSSP 2/10.
- Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (2000).
- Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (Nov. 2001 – updated 2021).
- EU Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC (2007).
- Scottish Government Guidance Note; EU Exit: The Habitats Regulations Scotland (2020).
- NatureScot Guidance on Habitats Regulations Appraisal[1]
- East Mainland Coast, Shetland SPA Conservation and Management Advice. NatureScot (2022).
- Mousa SAC Conservation and Management Advice. NatureScot (2024)
- Yell Sound Coast SAC Conservation and Management Advice. NatureScot (2024)

Should a decision be reached to the effect that it cannot be said with sufficient certainty that the development will not have any significant effect on the European site, then, as stated above, it is necessary and appropriate to carry out an AA of the implications of the development for the sites in view of their conservation objectives.

The EEC (2001) guidance for AA states (Section 3.2 pg. 25):

"It is the competent authority's responsibility to carry out the Appropriate Assessment. However, the assessment process will include the gathering and consideration of information from many stakeholders, including the project or plan proponents, national, regional and local nature conservation authorities and relevant NGOs. As with the EIA process, the Appropriate Assessment will usually involve the submission of information by the project or plan proponent for consideration by the competent authority. The authority may use that information as the basis of consultation with internal and external experts and other stakeholders. The competent authority may also need to commission its own reports to ensure that the final assessment is as comprehensive and objective as possible.

[1] Available online at: https://www.nature.scot/professional-advice/planning-and-development/environmental-assessment/habitats-regulations-appraisal-hra (Accessed 13/02/2024)

In this stage, the impact of the project or plan (either alone or in combination with other projects or plans) on the integrity of the Natura 2000 site is considered with respect to the conservation objectives of the site and to its structure and function."

It should be noted that following EU Exit, sites designated under the Habitats Directive are no longer part of the Natura network and are referred to only as European designated sites which are part of a UK site network. The protection and guidance quoted above is, however, still applicable.

1.4.1 Special Areas of Conservation (SACs)

SACs are designated under Article 3 of the Habitats Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. It is transposed into Scottish law through the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). This network comprises Annex I habitats - *"natural habitat types of community interest whose conservation requires the designation of Special Areas of Conservation"* and the habitats of Annex II species - *"animal and plant species of community interest whose conservation requires the designation of Special Areas of Conservation"*. Candidate SACs (cSACs) are sites that have been submitted to the Scottish Government, but not yet formally adopted. They are given the same level of protection as SACs.

1.4.2 Special Protection Areas (SPAs)

SPAs are designated under Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds (the Birds Directive), transposed into Scottish law through the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). Under the Directive, Scotland is obliged to protect the habitats of birds which are vulnerable to habitat change or due to their low population numbers i.e. rarity, especially species on Annex 1 of the Directive. Aspects of habitat protection are in the context of pollution, deterioration of habitat and disturbance.

1.4.3 Conservation Objectives

The overriding objective of the Habitats Directive is to ensure that the habitats and species covered achieve 'Favourable Conservation Status' and that their long-term survival is secured across their entire natural range within the European Union (EU). In its broadest sense, favourable conservation status means that an ecological feature is being maintained in a satisfactory condition, and that this status is likely to continue into the future. Definitions as per the EU Habitats Directive are given below.

Favourable Conservation Status as defined by Articles 1 (e) and 1(i) of the Habitats Directive

The conservation status of a natural habitat is the sum of the influences acting on it and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species. The conservation status of a natural habitat will be taken as favourable when:

- its natural range and areas it covers within that range are stable or increasing; and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and
- the conservation status of its typical species is favourable'.

The conservation status of a species is the sum of the influences acting on the species that may affect the long-term distribution and abundance of its populations. The conservation status will be taken as 'favourable' when:

- the population dynamics data on the species concerned indicate that it is maintaining itself on a long term basis as a viable component of its natural habitats; and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Site-specific conservation objectives define the desired condition or range of conditions that a habitat or species should be in, in order for these selected features within the site to be judged as favourable. At site level, this state is termed 'favourable conservation condition.' Site conservation objectives also contribute to the achievement of the wider goal of biodiversity conservation at other geographic scales, and to the achievement of favourable conservation status at national level and across the features natural range.

1.5 Report Usage

The information and recommendations contained within this report have been prepared in the specific context stated above and should not be utilised in any other context without prior written permission from EnviroCentre Limited.

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2 METHODOLOGY

2.1 The Habitat Regulations Appraisal Process

The Habitats Regulations Appraisal is a four-stage process with specific issues and tests outlined at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required. The stages are summarised in Table 2-1.

Table 2-1: Key Stages in the HRA Process

Stage 1	
Screening for Likely Significant Effect (LSE)	- Identify European sites in and around the project area. - Examine conservation objectives of the interest feature(s) (where available). - Review plan policies and proposals and consider potential effects on UK sites (magnitude, duration, location, extent). - Examine other plans and programmes that could contribute to 'in combination' effects.
	- If no effects likely – report no likely significant effect. - If effects are judged likely or uncertainty exists – the precautionary principle applies, proceed to Stage 2. - If following screening the project is reviewed and includes integral mitigation which will ensure no likely significant effects, then no further Appropriate Assessment needed.
Stage 2	
Appropriate Assessment (AA)	- Complete additional scoping work including the collation of further information on sites as necessary to evaluate impact in light of conservation objectives. - Agree scope and method of AA with the competent authority. - Consider how the project 'in combination' with other projects will interact when implemented (the Appropriate Assessment). - Consider how effects on integrity of the site could be avoided by changes to the project and the consideration of alternatives. - Develop mitigation measures (including timescale and mechanisms). - Report outcomes of AA including mitigation measures.
	- If the project will not adversely affect European site integrity proceed with plan. - If effects or uncertainty remain following the consideration of alternatives and development of mitigation proceed to Stage 3.
Stage 3	
Alternative Solutions	- Consider alternative solutions, delete from project or modify. - Consider if priority species/habitats affected - identify 'imperative reasons of overriding public interest' (IROPI), economic, social, environmental, human health, public safety (only applicable in highly exceptional circumstances).
Stage 4	
Imperative Reasons of Overriding Public Interest (IROPI)	- Stage 4 is the main derogation process of Article 6(4) which examines whether there are imperative reasons of overriding public interest (IROPI) for allowing a plan or project that will have adverse effects on the integrity of a UK site to proceed in cases where it has been established that no less damaging alternative solution exists. - The extra protection measures for Annex I priority habitats come into effect when making the IROPI case. Compensatory measures must be proposed and assessed. The Scottish Government must be informed of the compensatory measures. Compensatory measures must be practical, implementable, likely to succeed, proportionate and enforceable, and they must be approved by the Ministers.

2.2 Overview of Screening Methodology

Screening determines whether or not the project is likely to (or potentially could) have significant effects on the national site network. All SACs, cSACs, SPAs and potential SPAs (pSPAs) that are within the predicted Zone of Influence (ZoI), designated for mobile species which have the potential to be affected by the proposed development, or are hydrologically connected to the site, were considered and the qualifying interest features noted. Following this, the key environmental conditions (conservation objectives) needed to support site integrity were detailed for each site.

With reference to the NatureScot Guidance[2] the screening stage determines whether Appropriate Assessment is required by:

- Determining whether a project (or plan) is directly connected with or necessary to the conservation management of any European sites;
- Describing the details of the project (or plan) proposals and other projects that may cumulatively affect any European sites;
- Describing the characteristics of relevant European sites; and
- Appraising likely significant effects of the proposed project on relevant European sites.

The guidance gives the following definition of LSE:

*"A likely effect is one that cannot be ruled out on the basis of objective information. The test is a 'likelihood' of effects rather than a 'certainty' of effects. Although some dictionary definitions define 'likely' as 'probable' or 'well might happen', in the Waddenzee case the European Court of Justice ruled that a project should be subject to Appropriate Assessment "**if it cannot be excluded, on the basis of objective information, that it will have a significant effect on the site, either individually or in combination with other plans and projects**". Therefore, 'likely', in this context, should not simply be interpreted as 'probable' or 'more likely than not', but rather whether a significant effect can objectively be ruled out."*

Throughout the screening process the precautionary principle, established by the European Court of Justice in C 127/02, Waddenzee, was applied:

"*The authorisation of a plan or project may only be granted if the Competent National Authority is certain that it will not have any adverse effect on the integrity of the site concerned. That is where no reasonable scientific doubt remains as to the absence of such effect*."

As per the People vs Wind Judgement (CJEU C-323/17 People Over Wind and Peter Sweetman vs Coillte Teoranta.) the LSE screening has not taken into consideration mitigation which is not an integral part of the project design.

2.3 Appropriate Assessment

The Appropriate Assessment establishes whether or not a project's LSE identified during the screening stage will have an adverse effect on the integrity of the affected site with regard to its conservation objectives. Based on the guidance provided by NatureScot the effects of the proposal on the designated sites' qualifying features are determined by:

- Gathering information required to assess impacts (from site documents, scientific literature, EU and UK guidance on impact assessment and impact assessments from similar projects);

[2] NatureScot (2019. Available at: https://www.nature.scot/sites/default/files/2019-07/Habitats%20Regulations%20Appraisal%20of%20Plans%20-%20plan-making%20bodies%20in%20Scotland%20-%20Jan%202015.pdf (Accessed June 2024)

- Predicting the type and nature of impacts e.g. direct or indirect, short or long term;
- Assessing whether there will be adverse effects on the integrity of the site as defined by the conservation objectives and the status of the site. The Precautionary Principle must be applied at this stage. If it cannot be demonstrated with supporting evidence that there will be no adverse effects then adverse effects will be assumed; and
- Ascertaining if it is possible to mitigate adverse effects.

2.4 In Combination Effects

Under Regulation 43(1)(a) of the Habitats Regulations 1994 (as amended) it is necessary to consider whether a plan or project is likely to have a significant effect on the national site network "*either alone or in combination with other plans or projects."*

These should include:

- Approved but as yet uncompleted plans or projects;
- Plans and projects for which an application has been made and which are currently under consideration but not yet approved by the competent authorities; and
- Permitted ongoing activities such as discharge consents or abstraction licences.

3 DESCRIPTION OF THE PROPOSED WORKS

3.1 Site Location and Description

Dales Voe is a seawater inlet to the northwest of Lerwick, with the Dales Voe base which is currently owned by Lerwick Port Authority (LPA) lying on the eastern shore of the inlet and extending southwest to northeast along the shorelines. There is open land to the east, and a road runs parallel to the southern edge of the site, connecting it with other areas of the island. The site is centred at OSGR HU 46002 45773, with the site location map provided in Appendix A.

The base was designed for inspection, repair and maintenance of drilling rigs, and in 2015 a multi-purpose deep water facility was developed to meet the needs of offshore industries, in particular decommissioning and renewables. It is now also recognised as a key site for supporting the assembly and deployment of large-scale floating structures for offshore windfarms.

The marine portion of the site falls under the East Mainland Coast, Shetland SPA.

3.2 Purpose and Programme of Works

The proposed capital dredging works (hereafter referred to as the 'proposed works') are driven by an urgent requirement to improve navigational safety at the Dales Voe base in response to ever increasing vessel size and number being experienced in the port.

Capital dredging works are currently underway at the Dales Voe base, (approximate centre point OSGR HU 45578 45711). These works are being undertaken under MD-LOT licence MS-00011213 original capital dredge proposals were developed over 18 months ago, with an application to MD-LOT made in July 2024, which was granted and is the licence under which the current works (Phase 1) are being undertaken and are now nearing substantial completion.

In liaison between the client and dredging contractor, the remaining capital dredge campaign will be undertaken as 'Phase 2', which is currently being re-programmed while an additional MD-LOT licence application is updated to introduce some pre-treatment of harder rock strata using drill and blast technique and allowance for contractor over dredge. Revisions include the below and are shown in Appendix A:

1. Pre-treatment of hard rock strata using blasting over a duration of 3.5 weeks, and may be undertaken 24 hours a day, seven days a week.
2. Larger dump vessels proposed to reduce return trips to designated dredge disposal site from 24No / day previously assessed down to 5No per day.
3. Contingency over dredge volume allowance based on contractor's methods that may not all be required (current contingency allowance of 29,000m^3 has been calculated).
4. While the dredging duration remains unchanged, dredging may be undertaken partly in winter.

Dredged material is will be disposed at the nearest existing licensed sea disposal site (FI080) for LPA, which is approximately 350m offshore north of Bressay (centre point approximately OSGR HU 48277 45111), hereafter referred to as the 'disposal site'. The disposal site is located in naturally deep water with ease of access, has a large capacity with a footprint of 145,000m^2 in 30m of water and is anticipated to be active for the foreseeable future.

It should be noted that the dredging works at Dales Voe will be undertaken under the same contract as dredging works at North Harbour (See Section 4.4 for further information). The current intention is to

undertake the dredges consecutively with North Harbour completed first and then Dales Voe, over a period of 11 weeks.

3.3 Capital Dredging

Dredging will be undertaken using trailer suction and backhoe methods to remove material from the seabed. The dredged material will be transferred to a split hopper barge. This material will then be deposited at the disposal site.

A Dredging Best Practicable Environmental Option Report (BPEO)[3] has been produced for the proposed development, informed by sediment sampling at both the Dales Voe dredge site and the disposal site. Samples from Dales Voe were noted to be largely either sand (23% to 92%) or gravel (2% to 37%) sized fractions with limited silt fractions recorded. Silt sized particles ranged from 2% to 12% in samples submitted for analysis. The BPEO included with the original application confirmed volumes in m^3 and below table shows these together with additional volumes from the proposed revised dredging together with a further contingency allowance for any over dredge due to specific dredging techniques:

Table 3-1: Summary of Dredge Volumes and Depths

Dredge Area	Dredge Volume (m^3)	Target Dredge Depth (m below Chart Datum)
Dales Voe -12.5 / -14.5m CD	42,044	-14.6
Dales Voe -16.5m CD	34,363	-16.5
Dales Voe Total Volume	**76,407**	
Additional Material		
Over Dredge (est. 500mm ave.)	29,000	
Dales Voe Total Volume (Revised)	**105,407**	

Due to the fact the majority of the dredge material is of a coarse nature, plumes generated as a result of the dredging works will be very localised and short term in duration and any sands and gravels lost to the water column during dredging will fall out of suspension quickly at both the dredge and disposal sites. The disposal site is a sacrificial disposal ground with a large footprint and as such there is considered to be an allowance for some lateral dispersal of materials within the area of disposal over time due to sites typically being dispersive, rather than retentive.

The BPEO report[3] concluded that one sample contained levels of contaminants above Marine Directorate Revised Action Level (RAL) 1 for Polycyclic Aromatic Hydrocarbons (PAH), but there were no exceedances of RAL2. Despite this, assessment of the key receptors identified from the Water Framework Directive assessment for estuarine and coastal waters concluded there is a low risk of the sediments impacting upon the overall ecological or chemical status classifications. The levels of contaminants encountered are typically within levels accepted for sea deposit of dredged material. Additionally, the contaminant levels recorded in the sediment are not considered likely to have a significant adverse impact once placed within the disposal site.

It is noted that the Lerwick disposal grounds have been utilised for historic dredge spoil disposal and water quality classification for chemical status of the waterbody which accommodates the disposal grounds was classified by SEPA as “good” in 2022[4]. On this basis, the associated risk with degradation

[3] EnviroCentre (2024). Dales Voe and Lerwick Harbour North Best Practicable Environmental Option. Document number 14356.
[4] https://map.environment.gov.scot/sewebmap/

of water quality directly associated with the proposed disposal is considered to be very low i.e. unlikely to cause a change in status of the waterbodies in question at both the dredge and disposal sites.

3.4 Drilling and Blasting

Rock that cannot be directly dredged using backhoe or trailer dredger, either because of rock strength or low fracture rate, will require pre-treatment using drill and blast methodologies. The drilling and charging will continue on a 24 hours a day, 7 day a week basis.

Drilling and blasting will occur from a specialist drill platform 'Rockmate' equipped with two marine drill tower units. The 'Rockmate' is 41 x 18m and utilises four spud legs (avoiding the requirement for anchor spread).

3.4.1 Drilling

For each area at the starting position of the 'Rockmate' a test-blast location will be determined in a less sensitive area to gather information on vibration. Drilling will start at the minimum rock layer depth meaning explosive placed into the hole can be reduced, so the MIC (Maximum Instantaneous Charge) will also be small.

The drill pattern will vary between the areas based on design thickness, rock strength and locality to structures. The space between drill points will vary from 2.5m – 4.5m, covering approximately $6m^2$ to $20m^2$ for each drill point. The drill pattern will be adjusted as required. Drilling will extend up to 2m below design to ensure the later dredging can fully remove the rock to the required design level and to reduce the number of pinnacles created during the blasting operation. Drill holes can vary in diameter from 85mm to 165mm.

To ensure that the blasting extends over the full dredge area it will be necessary to drill up to 1-2m beyond the planned extents of the dredge area.

3.4.2 Blasting

Offshore Kemiitti Explosives, a liquid explosive, with packaged boosters and detonators will be used for the works. These explosives are specifically tailored to be used in underwater rock blasting. In addition, provision for EXEM 100 50mm diameter packaged emulsion provided by EPC for required controlled works to manage MC (Maximum Instantaneous Charge Weights) and thus controlling vibration as required.

Trial blasting is required to ascertain the site parameters for vibration predictions. Initial trial blasting will be carried out as part of the production, but with charged levels reduced to ensure vibration levels at nearby structures stay below the normal operational safe limits. Several trail blasts over the first days will be used to take these trial measurements. A blast warning procedure will also be implemented. Underwater noise monitoring will be undertaken during the trial blasting.

The quantity of explosives in each hole will be dependent on the layer of rock. However, it has been estimated that it would range from approximately 20kg to 100kg per hole. It is also estimated that 9-90 holes will be drilled in for each field. Therefore, it is estimated[5] that as a worst-case scenario, the charge size used for blasting is expected to be approximate 0.7kg explosives / m^3 rock. Charges will

[5] Contractors have advised that it is hard to estimate the total amount of explosives required per field as this is dependent on a variety of factors, including substrate type etc.

go off at the beginning and end of each day. This would equate to approximately 900kg – 2,500kg per 12 hrs shift, and an estimated maximum of 1,250kg per blast assuming two blasts per day.

Blasting is expected to occur over a duration of 3.5 weeks and could be undertaken at any time of year.

3.5 Vessel Movements Associated with Works

The dredging works will include associated vessel movements with dredging itself and then barges moving between the dredge site and the disposal site.

It was initially expected there would be one split hopper barge moving between the dredge site and disposal site, with a large barge expected to be utilised and works undertaken 24 hours a day (dependent on the appointed Contractor and weather), seven days a week. It is anticipated there will be one barge transit per hour throughout the 11 week period, which would equate to 3700 vessel movements. However, a reduction in vessel movements by a factor of approx. five, is now being proposed, whereby larger dump vessels would be used, which would reduce return trips to the designated dredge disposal site from 24 per day to five per day. This overall would equate to 770 total vessel movements.

The vessel route is expected to run from the dredge location in adjacent to the Dales Voe base, north east out of Dales Voe, before then heading southeast towards the disposal site off the north coast of Bressay. The vessel route is approximately 4.5km long.

3.5.1 Drilling and Blasting

The explosives will be delivered in 75 tonne loads by coaster to Lerwick, taking station at one of the three Dangerous Goods anchorages specified by Lerwick Port Authority.

Once area requiring pre-treatment has been established, the ‘Rockmate’ will be towed to the location and positioned using the onboard RTK/ DGPS positioning equipment.

4 SCREENING FOR LIKELY SIGNIFICANT EFFECTS

4.1 Zone of Influence for the Proposed Works

For significant effects to arise, there must be a risk enabled by having a 'source' (e.g. construction works at a proposed development site), a 'receptor' (e.g. a European site or its qualifying interests), and a pathway between the source and the receptor (e.g. mobile marine species travelling between the proposed development site and the designated site). The identification of a pathway does not automatically mean that significant effects will arise. The likelihood for significant effects will depend upon the characteristics of the source (e.g. duration of construction works), the characteristics of the pathway (e.g. what species and the number of individuals travelling between the two sites) and the characteristics of the receptor (e.g. the sensitivities of the European site and its qualifying interests).

NatureScot (2015)[6] guidance states that sites with mobile species should be considered within the screening process where there is a significant ecological link between the designated site and the proposed development site. It also states that for developments which could increase recreational pressures on designated sites, all sites within reasonable travel distance of the development should be considered for screening. It is also necessary to consider sites which are part of the same coastal ecosystem, where the proposed development may affect coastal processes.

Sites within 30km of the proposed works were identified for screening. The following sites have been scoped in for assessment due to them being within proximity to the site and / or considered connected to the site via dispersal of designated mobile species:

- East Mainland Coast, Shetland SPA
- Noss SPA
- Mousa SAC
- Mousa SPA
- Pobie Bank Reef SAC
- The Vadills SAC
- Yell Sound Coast SAC
- Lochs of Spiggie and Brow SPA

4.2 Potential Impacts to Qualifying Interests

It is anticipated that the proposed works described in Section 3 could give rise to the following impacts if no mitigation is employed during dredging or vessel movements to transport sediment:

- Capital dredging and dredge disposal could give rise to suspended sediments within the water, which may affect water quality and indirectly affect the prey abundance for qualifying interests of the designated sites.
- Dredging and transportation of sediment could increase the risk of a pollution incident.
- Dredging, drilling, blasting and transportation of sediment, and the resulting increase in marine traffic, could cause increased risk of collision with qualifying interests (particularly marine mammals), as well as disturbance.

[6] NatureScot (2015) '*Habitats Regulations Appraisal of Plans, Guidance for Plan-Making Bodies in Scotland V3*'. Available at: https://www.nature.scot/sites/default/files/2019-07/Habitats%20Regulations%20Appraisal%20of%20Plans%20-%20plan-making%20bodies%20in%20Scotland%20-%20Jan%202015.pdf [Accessed June 2024).

- Dredging and vessel movements may result in the generation of underwater noise, which can cause injuries and result in Temporary Threshold Shift (TTS) or Permanent Threshold Shift (PTS) in hearing of qualifying interests (particularly marine mammals).

4.3 Screening Assessment

The screening assessment for LSE of the proposed development on the qualifying features of the European designated sites are shown in Table 4-1 below.

Table 4-1: Screening Assessment for LSE of the Proposed Development

Site Name (Distance to Proposed Works[7])	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
East Mainland Coast, Shetland SPA (under footprint of proposed works)	1. To ensure that the qualifying features of the East Mainland Coast, Shetland SPA are in favourable condition and make an appropriate contribution to achieving Favourable Conservation Status 2. To ensure that the integrity of the East Mainland Coast, Shetland SPA is maintained in the context of environmental changes by meeting objectives 2a, 2b and 2c for each qualifying feature: 2a. The populations of the qualifying features are	Great northern diver (*Gavia immer*), non-breeding	Pathway for LSE identified Great Northern Diver could be directly impacted during the dredging activities through disturbance from blasting activities and / or vessel movements. They may also be impacted if pollutants are released into the water, which could have an indirect effect on this species if their prey availability is affected. If prey item availability is affected, this could result in death or injury to individuals and loss of condition or reduction in breeding success. LSE cannot be ruled out for Great Northern Diver.	**Screened in**
		Red-throated diver (*Gavia stellata*), breeding	Pathway for LSE identified. Red-throated Diver from the SPA may utilise coastal water in the vicinity of the proposed works for foraging. Red-throated Diver could be directly impacted during the dredging activities through disturbance from blasting activities and / or vessel movements. They may also be impacted if pollutants are released into the water, which could have an indirect effect on this species if their prey availability is affected. If prey item availability is affected,	**Screened in**

[7] Distance is measured from the closest points around the coastlines rather than 'as the crow flies', unless otherwise specified.

Site Name (Distance to Proposed Works[7])	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
	viable components of the site. 2b. The distributions of the qualifying features throughout the site are maintained by avoiding significant disturbance of the species. 2c. The supporting habitats and processes relevant to qualifying features and their prey/food resources are maintained		this could result in death or injury to individuals and loss of condition or reduction in breeding success. LSE cannot be ruled out for Red-throated Diver.	
		Slavonian Grebe (*Podiceps auratus*), non-breeding	Slavonian Grebe could be directly impacted during the dredging activities through disturbance from blasting activities and / or vessel movements. They may also be impacted if pollutants are released into the water, which could have an indirect effect on this species if their prey availability is affected. If prey item availability is affected, this could result in death or injury to individuals and loss of condition or reduction in breeding success. LSE cannot be ruled out for Slavonian Grebe.	**Screened in**
Noss SPA (c. 6.3km by sea, c. 4.6km as the crow flies)	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:	Gannet (*Morus bassanus*), breeding	Pathway for LSE identified. Gannet from the SPA may utilise coastal water in the vicinity of the proposed works for foraging. It is possible that foraging gannet within the vicinity of the proposed works could experience disturbance from increased noise and vibration during the dredging and associated vessel movements. Gannet could also be impacted during the dredging activities if pollutants are released into the water, which could have a direct or indirect effect on this species if their prey availability is affected. If prey item availability is affected, this could result in death or injury	Screened out

Site Name (Distance to Proposed Works[7])	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
	• Population of the species as a viable component of the site • Distribution of the species within site • Distribution and extent of habitats supporting the species • Structure, function and supporting processes of habitats supporting the species • No significant disturbance of the species		to individuals and loss of condition or reduction in breeding success. However, it is considered that there is sufficient resource for gannet within the SPA and other surrounding areas in terms of foraging, such that disturbance or pollution relation impacts experienced outside the SPA would have a negligible impact on the population. In addition, given that there are already considerable noise and vessel movements associated with the Dales Voe base, vessel movements are unlikely to result in disturbance to gannet already utilising the site. No LSEs are predicted for gannet in the Noss SPA.	
		Great skua (*Stercorarius skua*), breeding	Pathway for LSE identified. Great skua from the SPA may utilise coastal water in the vicinity of the proposed works for foraging. It is possible that foraging great skua within the vicinity of the proposed works could experience disturbance from increased noise and vibration during the dredging and associated vessel movements. Great skua could also be impacted during the dredging activities if pollutants are released into the water, which could have a direct or indirect effect on this species if their prey availability is affected. If prey item availability is affected, this could result in death or injury to individuals and loss of condition or reduction in breeding success.	Screened out

Site Name (Distance to Proposed Works[7])	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
			However, it is considered that there is sufficient resource for great skua within the SPA and other surrounding areas in terms of foraging, such that disturbance or pollution relation impacts experienced outside the SPA would have a negligible impact on the population. In addition, given that there are already considerable noise and vessel movements associated with the Dales Voe base, vessel movements are unlikely to result in disturbance to great skua already utilising the site. No LSEs are predicted for great skua in the Noss SPA.	
		Guillemot (*Uria aalge*), breeding	Pathway for LSE identified. Guillemot from the SPA may utilise coastal water in the vicinity of the proposed works for foraging. It is possible that foraging guillemot within the vicinity of the proposed works could experience disturbance from increased noise and vibration during the dredging and associated vessel movements. Guillemot could also be impacted during the dredging activities if pollutants are released into the water, which could have a direct or indirect effect on this species if their prey availability is affected. If prey item availability is affected, this could result in death or injury to individuals and loss of condition or reduction in breeding success. However, it is considered that there is sufficient resource for guillemot within the SPA and other surrounding areas in terms of foraging, such that disturbance or pollution relation impacts	Screened out

Site Name (Distance to Proposed Works[7])	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
			experienced outside the SPA would have a negligible impact on the population. In addition, given that there are already considerable noise and vessel movements associated with the Dales Voe base, vessel movements are unlikely to result in disturbance to guillemot already utilising the site. No LSEs are predicted for guillemot in the Noss SPA.	
		Seabird assemblage, breeding – in addition to the above: • Atlantic puffin (*Fraterna arctica)* • Fulmar (*Fulmaris glacialis*) • Kittiwake (*Rissa tridactyla*)	Pathway for LSE identified. The breeding seabird assemblage from the SPA may utilise coastal water in the vicinity of the proposed works for foraging, loafing and / or roosting. It is possible that foraging birds within the vicinity of the proposed works could experience disturbance from increased noise and vibration during the dredging and associated vessel movements. The seabird assemblage could also be impacted during the dredging activities if pollutants are released into the water, which could have a direct or indirect effect on this species if their prey availability is affected. If prey item availability is affected, this could result in death or injury to individuals and loss of condition or reduction in breeding success. However, it is considered that there is sufficient resource for birds within the SPA and other surrounding areas in terms of foraging, such that disturbance or pollution relation impacts experienced outside the SPA would have a negligible impact on the population.	Screened out

Site Name (Distance to Proposed Works[7])	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
			In addition, given that there are already considerable noise and vessel movements associated with the Dales Voe base, vessel movements are unlikely to result in disturbance to birds already utilising the site. No LSEs are predicted for the breeding seabird assemblage in the Noss SPA.	
Mousa SAC (c. 20km)	1. To ensure that the qualifying features of Mousa SAC are in favourable condition and make an appropriate contribution to achieving Favourable Conservation Status. 2. To ensure that the integrity of Mousa SAC is restored in the context of environmental changes by meeting objectives 2a, 2b and 2c for each qualifying feature: *Reefs and submerged or partially submerged sea caves:*	Harbour seal (*Phoca vitulina*)	Pathway for LSE identified. Harbour seals are mobile species known to range up to 50km from haul out sites in search of food, with the nearest haul out site to the works being Holm of Beosetter, approximately 500m east by sea from the proposed works. Hence, although the SAC is c. 20km from the proposed works, it is feasible that individuals from the SAC could forage in the waters in the vicinity of the proposed works. During the dredging, any pollutants released into the water could have temporary impacts on harbour seal either directly, or indirectly if prey items are affected. Toxic pollutants could result in habitat avoidance, injury or death of individuals and / or reduced prey availability, leading to loss of condition. There is already considerable noise and vessel movements associated with the Dales Voe base, however, it is noted the works will result in an increased in vessel movements. Vessel movements can result in disturbance and / or collision related injury / mortality to harbour seal utilising the site.	**Screened in**

Site Name (Distance to Proposed Works[7])	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
	2a. Extent and distribution of the habitat within the site. 2b. Structure and function of the habitat and the supporting environment on which it relies. 2c. Distribution and viability of typical species of the habitat. *Harbour seal:* 2a. Harbour seal is a viable component of Mousa SAC. 2b. The distribution of harbour seal throughout the site is maintained by avoiding significant disturbance. 2c. The supporting habitats relevant to harbour seal are maintained.		In addition, dredging, drilling, blasting and vessel movements may result in the generation of underwater noise, which can cause injuries and result in TTS or PTS in hearing of marine mammals. LSE cannot be ruled out for harbour seal.	
		Reefs	No pathway for LSE identified. At its nearest point the site is c. 20km south of the proposed works. No alterations to coastal processes are predicted at these distances, and there will be no sediment transportation of this significance. Therefore, there is no connectivity.	Screened out
		Sea caves (submerged or partially submerged)	No pathway for LSE identified. At its nearest point the site is c. 20km south of the proposed works. No alterations to coastal processes are predicted at these distances, and there will be no sediment transportation of this significance. Therefore, there is no connectivity.	Screened out
Mousa SPA (c. 21km)	To avoid deterioration of the habitats of the qualifying species (listed below) or significant disturbance to the	Arctic tern (*Sterna paradisaea*), breeding	No pathway for LSE identified.	Screened out

Site Name (Distance to Proposed Works[7])	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
	qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species that the following are maintained in the long term: • Population of the species as a viable component of the site • Distribution of the species within site • Distribution and extent of habitats supporting the species • Structure, function and supporting processes of habitats supporting the species • No significant disturbance of the species		The mean foraging distance for Arctic tern is 4.4km. Mousa SPA is 21km at its nearest point to the proposed development. Therefore, there is no connectivity.	
		Storm petrel (*Hydrobates pelagicus*), breeding	No pathway for LSE identified. Research of storm petrel foraging[8] from the Mousa SPA indicates that they typically forage south of Shetland, as far as south-east Orkney (~300km). Additionally, the foraging areas within Lerwick harbour and at the disposal site are likely sub-optimal for this species. Therefore, there is no connectivity.	Screened out

[8] Bolton, M. (2021). GPS tracking reveals highly consistent use of restricted foraging areas by European Storm-petrels Hydrobates pelagicus breeding at the largest UK colony: implications for conservation management. Bird Conservation International. Available at: https://www.cambridge.org/core/journals/bird-conservation-international/article/gps-tracking-reveals-highly-consistent-use-of-restricted-foraging-areas-by-european-stormpetrels-hydrobates-pelagicus-breeding-at-the-largest-uk-colony-implications-for-conservation-management/DE6A57A1B5C3141DAB63A854610334D7 [Accessed June 2024].

Site Name (Distance to Proposed Works[7])	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
Pobie Bank Reef SAC (c. 26 km)	Subject to natural change, maintain or restore the reef in / to favourable condition, such that: • the natural environmental quality and processes supporting the habitat • the extent of the habitat on site • the physical structure, community structure , function, diversity and distribution of the habitat and typical species representative of the reef in the *Northern North Sea* regional sea are maintained or restored, thereby ensuring the integrity of the site and also making an appropriate contribution to favourable conservation status of the Annex 1 habitats.	Offshore reefs	No pathway for LSE identified. At its nearest point the site is c. 26km north-east of the proposed works. No alterations to coastal processes are predicted at these distances, and there will be no sediment transportation of this significance. Therefore, there is no connectivity.	Screened out
The Vadills SAC (c. 120km	1. To ensure that the lagoons at The Vadills SAC are in	Lagoons	No pathway for LSE identified.	Screened out

Site Name (Distance to Proposed Works[7])	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
by sea, c. 19km as the crow flies)	favourable condition and make an appropriate contribution to achieving Favourable Conservation Status. 2. To ensure that the integrity of The Vadills SAC is maintained in the context of environmental changes by meeting objectives 2a, 2b and 2c for lagoons: 2a. Extent and distribution of the habitat within the site. 2b. Structure and function of the habitat and the supporting environment on which it relies. 2c. Distribution and viability of typical species of the habitat.		At its nearest point via hydrological connectivity the site is c. 120km west of the proposed works. No alterations to coastal processes are predicted at these distances, and there will be no sediment transportation of this significance, particularly given the site is on the opposite side of Shetland. Therefore, there is no connectivity.	
Yell Sound Coast SAC (c. 28km)	1. To ensure that the qualifying features of Yell Sound Coast SAC are in favourable condition and make an appropriate	Harbour seal	Pathway for LSE identified. Harbour seals are mobile species known to range up to 50km from haul out sites in search of food, with the nearest haul out site to the works being Holm of Beosetter, approximately 500m by sea from	**Screened in**

Site Name (Distance to Proposed Works[7])	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
	contribution to achieving Favourable Conservation Status. 2. To ensure that the integrity of Yell Sound Coast SAC is restored in the context of environmental changes by meeting objectives 2a, 2b and 2c for each qualifying feature: 2a. Harbour seal and otter are viable components of the Yell Sound Coast SAC. 2b. The distribution of harbour seal and otter throughout the site is maintained by avoiding significant disturbance. 2c. The supporting habitats and processes relevant to harbour seal and otter are maintained, including prey resources for otter.		the closest aspect of the proposed works (the disposal site). It is therefore possible that individuals from the SAC could forage in the waters in the vicinity of the proposed works, given it is c. 28km away as the seal swims. During the dredging, any pollutants released into the water could have temporary impacts on harbour seal either directly, or indirectly if prey items are affected. Toxic pollutants could result in habitat avoidance, injury or death of individuals and / or reduced prey availability, leading to loss of condition. There is already considerable noise and vessel movements associated with the Lerwick Harbour, however, it is noted the works will result in an increase in vessel movements. Vessel movements can result in disturbance and / or collision related injury / mortality to harbour seal utilising the site. In addition, dredging, drilling, blasting and vessel movements may result in the generation of underwater noise, which can cause injuries and result in TTS or PTS in hearing of marine mammals. LSE cannot be ruled out for harbour seal.	
		Otter (*Lutra lutra*)	Pathway for LSE identified. The proposed development site is within feasible commuting distance for otter residing within the Yell Sound Coast SAC.	Screened out

Site Name (Distance to Proposed Works[7])	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
			It is possible that commuting, foraging and resting otter within the vicinity of the proposed works could experience disturbance from increased noise and vibration during the dredging and associated vessel movements. They could also be affected directly or indirectly by a pollution event. It is considered that there is sufficient resource for otters within the SAC and other surrounding areas in terms of foraging, commuting and resting habitat that disturbance or impacts from pollution experienced outside the SAC would have a negligible impact on the population. No LSEs are therefore predicted for otter within the Yell Sound Coast SAC.	
Lochs of Spiggie and Brow SPA (c. 29.7km as the crow flies, no hydrological connectivity.	To avoid deterioration of the habitats of the qualifying species (listed below) 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:	Whooper swan (*Cygnus cygnus*), non-breeding	No pathway for LSE identified. Whooper swan may utilise some coastal habitats such as saltmarsh and mudflats however, they predominantly utilise agricultural fields and freshwater bodies for foraging and roosting. These habitats are unlikely to be affected by the proposed works. In addition, the core foraging range of whooper swan is less than 5km[9], and the nearest point as the crow flies from the proposed works to the Lochs of Spiggie and Brow SPA is 29.7km. Hence, there is no connectivity.	Screened out

[9] NatureScot (2016). Assessing Connectivity with Special Protection Areas (SPAs). Available at: https://www.nature.scot/sites/default/files/2022-12/Assessing%20connectivity%20with%20special%20protection%20areas.pdf [Accessed June 2024].

Site Name (Distance to Proposed Works[7])	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
	• Population of the species as a viable component of the site • Distribution of the species within site • Distribution and extent of habitats supporting the species • Structure, function and supporting processes of habitats supporting the species • No significant disturbance of the species			

4.4 In Combination Effects

A review of the Shetland Islands Council Planning Portal, The MD-LOT portal and information provided by LPA identified the following projects in the vicinity of the site which may have the potential for in combination effects. Full details are provided in Table 4-2.

Table 4-2: Projects identified with potential for in combination effects.

Proposal Details	Local Authority and Ref No.	Applicant	Status / Decision	Conclusion
Dales Voe - Extension to open storage area	Shetland Islands Council - 2023/289/PPF	Captain Calum Grains	Pending Consideration	No in combination effects. A consultation response from NatureScot concluded that "*on the basis of the information provided, if the proposal is carried out strictly in accordance with the following mitigation, our conclusion is that the proposal will not adversely affect the integrity of the site: Surface water drainage management must be detailed so that Shetland Islands Council is satisfied that significant release of sediment and other pollutants into Dales Voe will be avoided, including during extreme rainfall events.*"
The Proposed Development replaces two previously consented wind turbines at Luggies Knowe, Gremista and will comprise the construction and operation of one wind turbine with a ground to blade tip height of up to 149.9 m, battery energy storage system units, site access tracks and associated infrastructure	Shetland Islands Council - 2024/006/PPF	Mr Brendan Hall	Pending Consideration	No in combination effects. A consultation response from NatureScot concluded that although *"There are natural heritage interests of international importance on the site… our advice is that these will not be adversely affected by the proposal"*
Peatland Restoration	Shetland Islands Council - 2023/189/PN	Mr Eric Graham	Prior Approval Not Required	No in combination effects. A consultation response from NatureScot concluded that they *"do not intend to offer formal comment on this proposal as it does not meet our criteria for consultation, as outlined in our document, How and when to consult NatureScot"*
New Shellfish Farm - Muckle Ayre, Dales Voe, Shetland	MD-LOT - 06865	Blueshell Mussels Ltd	Marine Licence Granted – start 2019-	No in combination effects.

Proposal Details	Local Authority and Ref No.	Applicant	Status / Decision	Conclusion
			04-25 and end 2025-04-24	There is no information available on the MD-LOT planning portal to advise whether this development was likely to have LSEs on qualifying interests of any designated sites.
Arlanda Quay Development and Reclamation - The requirement for reclamation arises from the need for more shoreline land for development use. The scheme will use material for land reclamation from an LPA owned source.	MD-LOT – N/A	Lerwick Port Authority	Pre-application	No in combination effects. The Arlanda Quay will not be undertaken simultaneously with the capital dredge at North Harbour and / or Dales Voe.
Capital Dredge North Harbour - The proposed dredging works are driven by an urgent requirement to improve navigational safety through the harbour due to ever increasing vessel size and number being experienced in the port. It is anticipated the dredge volume will be 301,150m^3, to a maximum depth of -10.5 m below Chart Datum. The proposed works are anticipated to be undertaken in summer 2025 for 11 weeks, subject to time taken to obtaining the relevant permits and suitable weather conditions for dredging and associated vessel movements. It should be noted that the dredging works at North Harbour will be undertaken under the same contract as dredging works at Dales Voe, but it has not been identified how long the dredges at each site will take. Please see Section 3 for more information on the proposed works (which will follow the same method as the dredge at Dales Voe).	MD-LOT – N/A	Lerwick Port Authority	Pre-application	No in combination effects. The current intention to undertake the dredges consecutively with North Harbour completed first and then Dales Voe. The two dredges will not be undertaken simultaneously.

Proposal Details	Local Authority and Ref No.	Applicant	Status / Decision	Conclusion
Dales Voe Ultra-Deep Water Quay (UDWQ) – The proposed works include the construction of temporary bunds, excavation, capital dredging, controlled blasting, land reclamation, construction of quay and laydown area and construction of potential industrial site.	MD-LOT – N/A	Lerwick Port Authority	Pre-application	No in combination effects. It is expected that works at Dales Voe UDWQ will commence a number of years after the capital dredge at Dales Voe will be undertaken.

4.5 Screening Conclusion

The outcome of screening for Appropriate Assessment is to reach one of the following determinations:

a) A Stage 2 AA of the proposed development is required if it is concluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site.
b) A Stage 2 AA of the proposed development is not required if it can be concluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will not have a significant effect on a European site.

Following an examination, analysis and evaluation of the relevant information including, in particular, the nature of the proposed development, it is the professional opinion of the authors that at present it is not possible to rule out likely (or possible) LSEs to the specified qualifying interests of the following sites:

- East Mainland Coast, Shetland SPA (Red-throated Diver)
- Mousa SAC (harbour seal)
- Yell Sound SAC (harbour seal)

As such, an AA for the proposed development will therefore be required to ascertain whether or not the proposed works will adversely impact the integrity of the designated sites' qualifying features.

The projects detailed fully in Section 4.4 are not anticipated to result in any in combination effects.

5 APPROPRIATE ASSESSMENT: EAST MAINLAND COAST, SHETLAND SPA

5.1 Designated Site Description

The East Mainland Coast, Shetland SPA comprises a total area of 23,333ha starting in the north at Fish Holm and Lunna Ness before extending south and encompassing most of Whalsay before ending on the north coast of Bressay. Much of the site water depths are generally less than 40m, but in the north the depth increases rapidly. A lot of the shore on the east coast of Shetland consists of cliff, though interspersed with sandy beaches and bays such that the sediments are largely gravel and sand. The east coast is also relatively sheltered compared to the west. The diversity of fish, polychaete worms, gastropod and bivalve molluscs dependent upon the sediments and seaweeds present provide potential prey for seabirds foraging in the area.

The SPA supports the following species:

- Non-breeding population of Great Northern Diver (c. 7.3% of the GB population or 182 individuals);
- Breeding population of Red-throated Diver (c. 15.8% of the GB population or 205 pairs); and
- Non-breeding population of Slavonian Grebe (c. 4.9% of the GB population of 54 individuals).

None of the qualifying interests have been assessed for their condition, and have no negative pressures identified. Only Red-throated Diver is discussed further within this AA, given the other two qualifying interests were screened out at Stage 1: Screening (see Section for further details).

5.2 Summary of Red-throated Diver Occurrence at Proposed Works

The SPA site selection document[10] details the identification of protected foraging areas for breeding Red-throated Diver, which is based on modelled outputs underpinned by survey data from the Red-throated Diver national survey undertaken in 2006[11], and further boat-based surveys to inform the habitat model[12]. The resulting predicted usage of the site is shown in Figure 5.1, with the SPA within foraging range of 205 pairs of Red-throated Diver breeding on the nearby islands.

The predicted usage shows that Red-throated Diver likely to be present in moderate numbers within Dales Voe (where the proposed dredging is to be undertaken) but likely absent from the disposal site (where dredged material is to be disposed of), and the majority of the vessel route between the two as it comes out of Dales Voe and into the North Sea.

Wintering and breeding bird surveys have been undertaken at Dales Voe since October 2023. Table 5-1 details the average and peak numbers of Red-throated Diver at Dales Voe. The data shows that small numbers are present within 500m of the harbour during the critical chick rearing period (June to August), with a peak of two birds in July. Larger numbers are present between 1km and 2km of the

[10] NatureScot (2019). Marine Special Protection Areas – Final Advice to Scottish Government. Available at: https://www.nature.scot/doc/marine-special-protection-areas-final-advice-scottish-government [Accessed June 2024).
[11] Dillon, I.A., Smith, T.D., Williams, S.J., Haysom, S. and Eaton, M.A. (2009). Status of Red-throated Divers Gavia stellata in Britain in 2006. Bird Study 56(2), 147-157.
[12] Black, J., Dean B.J., Webb A., Lewis, M., Okill D. and Reid J.B. (2015). Identification of important marine areas in the UK for red-throated divers (*Gavia stellata*) during the breeding season. JNCC Report No 541. Available at: https://data.jncc.gov.uk/data/aa2b2c8d-950f-4328-bb80-89b4453c78c6/JNCC-Report-541-FINAL-WEB.pdf [Accessed June 2024].

harbour, with a peak of 5 birds. There was a spike in numbers in October, presumably with the addition of juvenile birds.

Table 5-1: Average and Peak Numbers of Red-throated Diver at Dales Voe

Species	Distance	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Red-throated Diver	Up to 500m	0.3 (1)	0.3 (1)	0 (0)	0.3 (1)	0.8 (2)	0.5 (1)	1.5 (2)	1 (1)	2 (4)	2 (3)	0.8 (2)	0.3 (1)
	Up to 1km	0.3 (1)	0.5 (1)	0 (0)	0.5 (2)	1 (2)	0.5 (1)	2 (2)	1 (1)	2.5 (4)	5.3 (7)	1.5 (3)	0.5 (2)
	Up to 2km	0.3 (1)	0.8 (2)	1 (2)	2.8 (5)	2 (4)	0.5 (1)	4 (5)	1 (1)	3 (4)	6 (8)	1.8 (3)	1.3 (4)

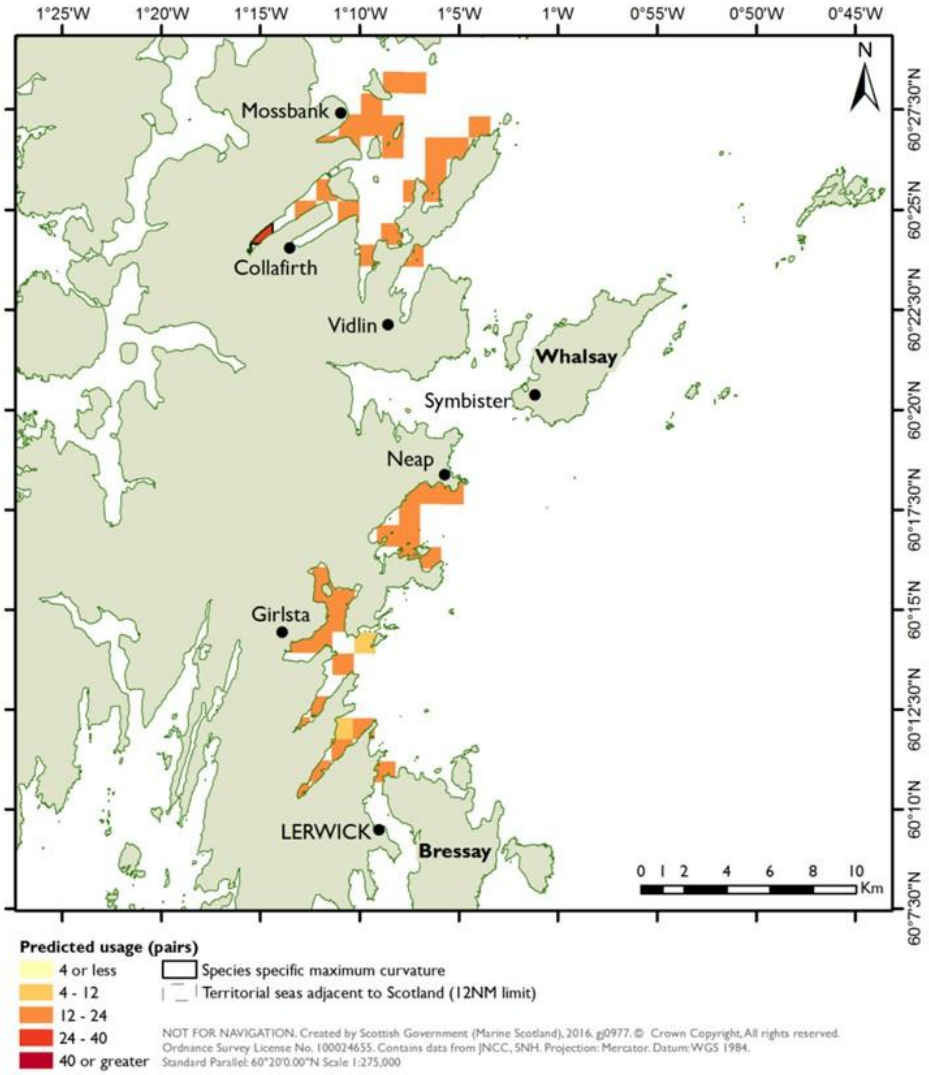


Figure 5.1: The predicted usage of Red-throated Diver in Shetland, including within the East Mainland Coast, Shetland SPA

5.3 Summary of Great Northern Diver Occurrence at Proposed Works

Wintering and breeding bird surveys have been undertaken at Dales Voe since October 2023. Table 5-2 details the average and peak numbers of Great Northern Diver, which were recorded on all winter

surveys, with small numbers lingering into the summer. Peak counts of 13-28 within 2km of the proposed works site were recorded in the late autumn (October) and spring (March to May), with the maximum count of 28 made in March, which is during the flightless moult period extending from February to mid-April. Midwinter counts ranged between 13 and 22 from late November to early March. Great Northern Diver were recorded throughout the voe, with the highest densities away from the proposed works (1-2km distance).

Table 5-2: Average and Peak Numbers of Great Northern Diver at Dales Voe

Species	Distance	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Great Northern Diver	Up to 500m	2.5 (5)	4.3 (7)	3.8 (5)	6.3 (10)	5 (7)	1 (2)	0.5 (1)	0.5 (1)	0 (0)	2.7 (5)	3.3 (4)	2.8 (4)
	Up to 1km	7.3 (15)	7 (9)	9.8 (15)	10.3 (13)	7.3 (11)	1 (2)	1 (2)	0.5 (1)	0 (0)	4.7 (10)	6.5 (8)	5.3 (8)
	Up to 2km	13.8 (22)	10 (13)	17.5 (28)	14.3 (19)	10.5 (19)	1 (2)	1.5 (3)	0.5 (1)	0 (0)	7 (13)	9.8 (13)	8 (11)

5.4 Summary of Slavonian Grebe Occurrence at Proposed Works

Wintering and breeding bird surveys have been undertaken at Dales Voe since October 2023. Table 5-3 details the average and peak numbers of Slavonian Grebe, which were only infrequently recorded within Dales Voe during surveys, being present only in October, December and January, and all sightings far away from the proposed works (1-2km distance). 1-

Table 5-3: Average and Peak Numbers of Slavonian Grebe at Dales Voe.

Species	Distance	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Slavonian Grebe	Up to 500m	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	Up to 1km	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	Up to 2km	1.3 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.7 (2)	0 (0)	1.3 (3)

5.5 Assessment Against the Conservation Objectives

As discussed in Section 5.2 - 5.3, the surveys show that Red-throated Diver and Great Northern Diver are present in the blasting and dredging works area, and are likely present at the disposal site and vessel route between the two. Slavonian Grebe is not present in the vicinity of the works (only between 1 and 2km distance) and dredge disposal site, and only in very small numbers along the proposed vessel route.

The predicted numbers and survey results are relatively low in comparison to the wider SPA population for Red-throated Diver and there is ample alternative foraging habitat within the SPA. For Great Northern Diver, peak numbers (28) are high, representing 15% of the SPA population, with the peak average count (17.5) representing 9.6% of the SPA population. Closer to the proposed works (within 500m), numbers of Great Northern Diver are significantly lower, with a peak of 10 birds and a

peak average of 6.3 birds representing 5.5% and 3.5% of the SPA population respectively. As with Red-throated Diver, there is ample alternative foraging habitat within the wider SPA, and as such it is considered that the populations of Red-throated Diver and Great Northern Diver will remain as viable components of the site and hence there will be no adverse effect on site integrity.

Other direct effects (i.e. disturbance) are dealt with in Objective 2b, and indirect effects (i.e. impacts on water quality) are dealt with in Conservation Objective 2c.

5.5.1 Objective 2b. The distributions of the qualifying features throughout the site are maintained by avoiding significant disturbance of the species.

Disturbance may occur through drilling, blasting, dredging and vessel movements. Blasting is likely to give rise to the most significant potential disturbance. Quantifying any additional sea surface disturbances due to blasting is difficult at this time and is likely to relate to the depth and weight of the explosive charge used, the geometry of the seabed holes into which the charges are placed and the sea conditions at the time of detonation amongst other possible factors. Divers are expected to be temporarily displaced from the immediate vicinity of blast sites due to associated vessel movements and charge laying activities and so are unlikely to be caught in blasts or within domes of disturbed water.

To mitigate any potential disturbance, an ornithologist will be present to monitor the works within 500m of the Proposed Development and record behavioural responses within this zone (the species to be monitored will depend on timing of works). If impacts are recorded, then the disturbance zone shall be increased.

It is highly likely that birds will be displaced from the working area (but acknowledging that the wider SPA has the capacity to accommodate displaced birds) a sufficient distance such that noise disturbance does not cause an impact.

Mitigation, including adaptive management measures through the provision of an ornithologist monitoring works (both dredging and blasting) and determining the need to increase or decrease disturbance buffers would limit any potential disturbance impact. This localised and temporary impact would not result in significant impacts to both diver species within the SPA.

Vessel movements to and from the disposal site will be much reduced (from 24/day to 5/day) from previous approved movements. Therefore, disturbance through vessel movements is not considered significant. This localised and temporary impact would not result in adverse effects on site integrity with regard to this species.

5.5.2 Objective 2c. The supporting habitats and processes relevant to qualifying features and their prey/food resources are maintained

Although some aspects of the proposed works are within the boundary of the SPA (a small section of the dredge area, the disposal site and vessel route between the dredge site and disposal site), there will be no direct habitat loss from the SPA considering the nature of the works.

As described in NatureScot's Conservation and Management Advice Document for the East Mainland Coast, Shetland SPA[13], the key supporting processes for Red-throated Divers, Great Northern Divers and Slavonian Grebe are water quality (nutrients and turbidity), tidal cycles and water flow, which

[13] NatureScot (2022). Conservation and Management Advice: East Mainland Coast, Shetland SPA. Available at: https://sitelink.nature.scot/site/10482 [Accessed June 2024].

underpin the supply of food resource for the species. The proposed works are not anticipated to have a permanent impact on tidal cycles and water flow but have been assessed as having the potential for LSEs as a result of pollutants being released into the water, which could have an indirect effect on both diver species and Slavonian Grebe if their prey availability affected.

The dredge budget is expected to consist of largely either sand or silt sized fractions, with some gravel (see Section **Error! Reference source not found.** for full details). This, combined with the weak tidal c urrents in the vicinity of the proposed dredge pockets, will result in very localised and short-term plumes from dredging. The magnitude of the sediment discharge and dispersion from dredging works will be low within the dredge area and its immediate vicinity, and similarly it is expected that the majority of deposited material will fall out of suspension quickly at the disposal site with limited lateral spread. Further, the BPEO report concluded that although several samples taken from North Harbour contained levels of contaminants above RAL1, there is a low risk of the sediments impacting upon the overall ecological or chemical status classifications.

Therefore, any changes to water quality, which may have indirect effect on Red-throated Divers prey availability, are anticipated to be localised, minor and temporary. Thus, the supporting habitats for Red-throated Diver, Great Northern Diver and Slavonian Grebe beyond the proposed works will be maintained in the long term and there will be no adverse effects on site integrity in regard to this species.

5.5.3 Objective 1. To ensure that the qualifying features of the East Mainland Coast, Shetland SPA are in favourable condition and make an appropriate contribution to achieving Favourable Conservation Status

It is predicted that, with standard mitigation, there will be no significant impacts on Conservation Objectives 2a, 2b and 2c. Therefore, the favourable condition of Red-throated Diver, Great Northern Diver and Slavonian Grebe in the East Mainland Coast, Shetland SPA will be maintained, and there will be no adverse effects on site integrity.

6 APPROPRIATE ASSESSMENT: HARBOUR SEAL

This section forms the AA for the Mousa SAC and Yell Sound Coast SACs, as the Stage 1: Screening identified that there may be LSEs on harbour seal as a qualifying interest of both of these SACs. As the wording of the conservation objectives pertaining to each site have slight differences though the same intent, they have been generalised for the purposes of this AA. Please see Section **Error! Reference s ource not found.** for specific wording of the conservation objectives pertaining to each site.

The following sources were used to conduct a desk-based assessment to inform this AA, occurrence of harbour seals at the proposed works and general ecology of the species.

- NatureScot[14]&[15]&[16];
- National Biodiversity Network (NBN) Atlas[17] (search within 10km of the site within the last 10 years, excluding non-confirmed and CC-BY-NC records);
- Marine Scotland website for designated haul-out sites for seals[18];
- Relevant research[19]; and
- Scottish Marine Animal Stranding Scheme (SMASS)[20].

6.1 Designated Site Descriptions

6.1.1 Mousa SAC

Mousa SAC comprises a total area of 259.74ha, encompassing the uninhabited island of Mousa and some of the waters around it. The SAC supports the following qualifying interests:

- Reefs;
- Submerged or partially submerged sea caves; and
- Harbour seal (c. 1% of the UK population).

The first two qualifying interests are not discussed further in this AA, given they were screened out at Stage 1: Screening (see Section 4.4 for full details).

The Mousa SAC supports one of the largest groups of harbour seal in Shetland; of particular importance to them are the large rocky tidal pools regularly used by seals for pupping, breeding and moulting. Areas of the island provide shelter from the exposed conditions on the open coast.

The feature condition for harbour seal have been assessed as “unfavourable declining”, which corresponds to about a 98% decline in the SAC population since the 1990s. This does not reflect the

[14] NatureScot Seals available at: https://www.nature.scot/plants-animals-and-fungi/mammals/marine-mammals/seals [Accessed June 2024]
[15] NatureScot (2024). Mousa SAC Conservation and Management Advice. Available at: https://sitelink.nature.scot/site/8333 [Accessed June 2024]
[16] NatureScot (2024). Yell Sound Coast SAC Conservation and Management Advice. Available at: https://sitelink.nature.scot/site/8409 [Accessed June 2024]
[17] NBN Atlas, Available at: https://nbnatlas.org/ [Accessed, June 2024]
[18] Marine Scotland, Designated haul-out sites for seals (Protection of Seals Orders). Available at: https://marine.gov.scot/maps/446 [Accessed June 2024]
[19] Carter et al. (2022). Sympatric Seals, Satellite Tracking and Protected Areas: Habitat-Based Distribution Estimates for Conservation and Management. Available at: https://www.frontiersin.org/journals/marine-science/articles/10.3389/fmars.2022.875869/full [Accessed June 2024].
[20] Species reported within a 10km (sea route) from 2001-2020 to Scottish Marine Animal Stranding Scheme (SMASS) available at: https://strandings.org/map/ [Accessed June 2024)

trend of the Shetland Seal Management Area, with a 40% decline between 2001 and 2005, with the wider Shetland population remaining stable since 2006 though showing no sign of recovery. No specific reason has been attributed to the unfavourable condition, with research ongoing in an effort to determine whether wider influences such as predation, competition for prey, prey quality and availability, and toxin exposure from harmful algae may be contributing factors. Some research indicates that killer whale (*Orcinus orca*) predation rate on harbour seal in Shetland in particular may be high[21].

Female harbour seal give birth in June or July, often returning to haul-out sites they were born at themselves. Harbour seal moult between July and September. These are considered particularly sensitive times for this species.

6.1.2 Yell Sound Coast SAC

The Yell Sound Coast SAC comprises a total area of 1544.44ha, encompassing rocky shores, uninhabited islands and skerries within Yell Sound. The SAC supports the following qualifying interests:

- Otter; and
- Harbour seal (over 1% of the UK population).

Otter are not discussed further in this AA, given they were screened out at Stage 1: Screening (see Section for full details).

The Yell Sound SAC is one of the most northerly UK designated sites selected for harbour seal and supports one of the largest groups of harbour seal in Shetland; of particular importance to them are the beaches and gently sloping rocky shores along the coast of mainland Shetland, Yell and the islands in Yell Sound for hauling out.

The feature condition for harbour seal have been assessed as “unfavourable no change”, which corresponds to the population trends described in Section 6.1.1above.

6.2 Summary of Harbour Seal Occurrence at Proposed Works

Research has generated estimates of mean seal density at-sea on a 5 x 5km grid, as shown in Figure 6.1. The values given present the percentage of the UK and Ireland at-sea population estimated to be present at any one time during the main foraging season per 25km^2.

The results indicate that the waters around Dales Voe and the disposal site (where impacts will be experienced), are expected to be less well used than other areas. A mean percentage at-sea population per 25km^2 ranges between >0.0.5 to <=0.01% and >0.025 to <=0.1% is estimated within the proposed works, but up to >0.05 to <=0.1% is estimated for elsewhere in Shetland, particularly in the immediate vicinity of the two haul out sites nearby (Holm of Beosetter c. 500m east and E South Shetland c. 7.7km south of the proposed works).

There are no records of stranded seals within the proposed works area.

[21] SCOS (2021). Scientific Advice on Matters Related to the Management of Seal Populations 2021, Sea Mammal Research Unit, University of St Andrews. Available at: https://www.smru.st-andrews.ac.uk/files/2022/08/SCOS-2021.pdf [Accessed June 2024].

A search of NBN Atlas returned eight records of harbour seal, but none within the proposed works area, and the closest record approximately 1.5km north (location OSGR HU 47207 48861) of the anticipated vessel route between the dredge site and disposal site.

In addition, over the whole survey period from 2023-2024 at Dales Voe for birds, only a total of 20 seals were noted within the waters within proximity to the development, comprising 10 harbour seals, five grey seals and five seals unidentifiable to species.

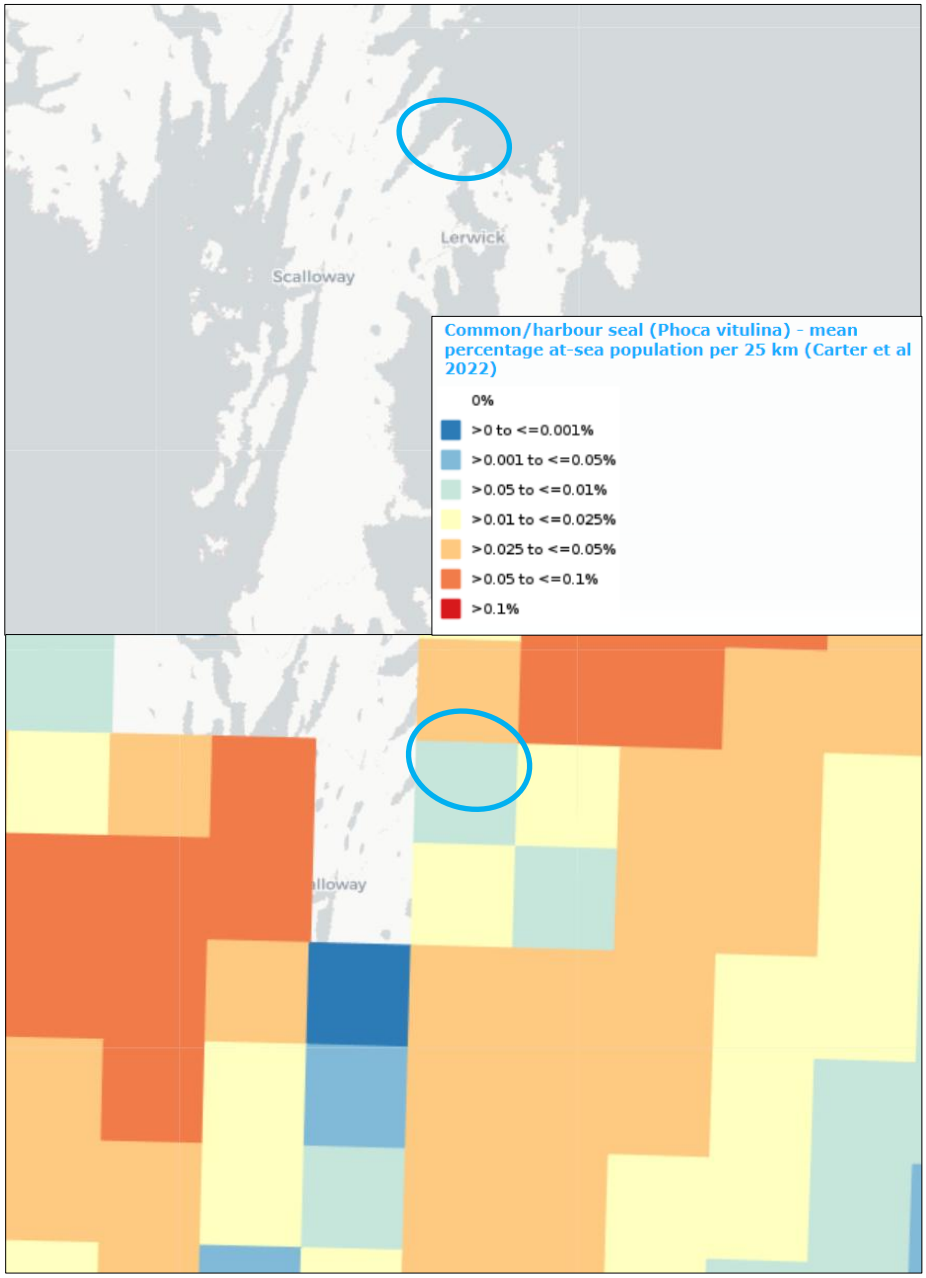


Figure 6.1: Estimated at-sea density of seals within the vicinity of the proposed works (approximate location indicated by blue circle), relative to the overall UK seal population.

6.3 Assessment Against the Conservation Objectives

6.3.1 Objective 2a. Harbour seal is a viable component of the SAC

Given that Dales Voe is already an established quay, the baseline level of vessel movements is moderate in and around the proposed works. Figure 6.2 below shows the annual average vessel density for all vessel types, within the vicinity of the site, with the image taken from the National Marine Plan Interactive (NMPi) map[22]. However, it is anticipated that there will be an increase in vessel movements as a result of the proposed works (as described in Section 3.5), albeit temporary and short term. It should also be noted that as described in Section 3.5, it is anticipated the given the smaller

[22] Marine Scotland (2024). Vessel Density Annual Averages - All types (EMODnet WMS) NMPi Map. Available at: https://marinescotland.atkinsgeospatial.com/nmpi/default.aspx?layers=1972 [Accessed June 2024]

dredge volume at Dales Voe, the number of vessel movements associated with these proposed works is likely to be considerably lower than that of North Harbour.

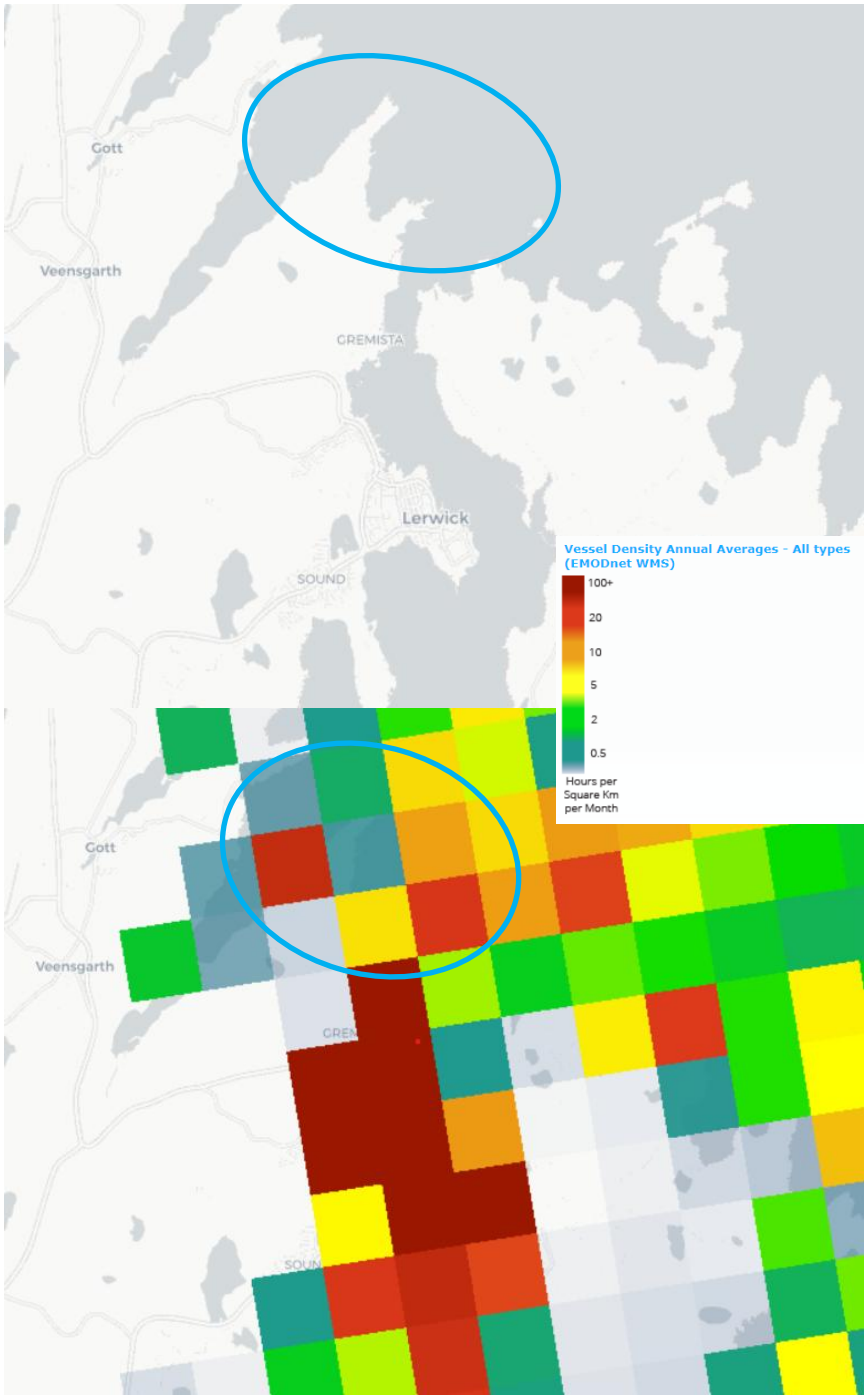


Figure 6.2: Annual average vessel density based on vessel Automatic Identification System (AIS) data. The basemap showing the location of Lerwick harbour is shown above, with the vessel density below, and approximate location of works indicated by blue circle.

In the absence of mitigation, increased vessel movements could result in an increased risk of collisions resulting in injury or death of individuals. Individual collisions are unlikely to have an impact on longer-

term viability but cumulatively and considered in-combination with existing vessel movements there is potential for effects at the population level.

However, vessel strikes are generally more associated with larger and less agile marine mammals, and so the numbers of harbour seals affected will likely be minimal. The effects of these impacts will be highly localised and unlikely to affect the conservation status of this species. If there is some displacement from areas of high activity, it is considered that there is sufficient alternative habitat for foraging and commuting. Further, is anticipated that a Vessel Management Plan will detail measures to reduce collision related impacts (see Section 7 for further information).

Dredging and increased vessel movements will result in underwater noise which can cause injuries and result in a PTS or TTS in hearing. Prolonged exposure to underwater noise below the PTS and TTS thresholds can reduce individual fitness as it interferes with individuals' ability to communicate with others, feed and navigate in an effect known as masking. In extreme cases, exposure to high levels of underwater noise can result in death. Vessel movements associated with the proposed works will lead to an increase in continuous low level underwater noise, but this is unlikely to result in physical trauma to individuals.

Research[23] has found that a trailing suction hopper dredger, similar to that anticipated to be used in the proposed works, emit sound levels at frequencies below 500Hz and the source level noise within 1m is 186dB - 188dB re 1µPa rms. Similar research[24] conducted in Shetland recorded backhoe dredgers indicate source level noise within 1m as 163dB re 1µPa rms. Southall *et al* (2019)[25] reported that for continuous (non-impulsive) noise, the TTS and PTS threshold for seals are 181 and 201dB re1 µPa^{2}s, respectively. As such, the noise emitted by backhoe dredgers is under both the PTS and TTS threshold for seals, whereas for trailing suction hopper dredgers the noise emitted is within the TTS threshold. However, it should be noted that the continuous thresholds detailed above are based on animals staying in close proximity to the sound source for 24 hours, and the source level noise for the dredger is experienced within 1m. It is likely that once dredging commences, any individuals within the area will move away from the sound source fairly quickly. Therefore, the likelihood of dredging resulting in physical trauma or death to individuals is considered to be low. The disturbance related effects of harbour seal moving away from works are addressed in Section 6.3.3below.

Drilling through hard sediment can be significantly noisy, and given that the drilling will be part of the wider blasting activity and will occur up to 24hour a day and a 7 day a week basis, the noise from drilling will not be dominated by the acoustic impact of the blasting. Drilling will be undertaken for approximately 50 holes per field during which, there would likely be a noise increase in the water environment over a 3.5 week period. The noise that drilling generates is considered to vary mainly depending on bed substrate type being drilled, with some drilling noise levels for underwater being found to range up to approx. 190dB re 1µPa rms[26], whilst a detailed analysis of underwater noise during offshore exploratory drilling found noise levels to be 155.9dB re 1µPa rms[27]. As the PTS and TTS thresholds for seals related to continuous noise range between 186-188dB re 1µPa rms it is considered that drilling would be unlikely to have major auditory impacts. However, the implementing of a Marine Mammal Observer (MMO), pre-works checks and soft-start for drilling will reduce general noise disturbance to seals.

[23]CEDA (2011). CEDA Position Paper – Underwater Sound In Relation to Dredging. Available at: https://dredging.org/media/ceda/org/documents/resources/cedaonline/2011-11_ceda_positionpaper_underwatersound_v2.pdf [Accessed July 2024]
[24] Todd, V. L. G., Todd, I. B., Gardiner, J. C., Morrin, E. C. N., MacPherson, N. A., DiMarzio, N. A., and Thomsen, F. A review of impacts of marine dredging activities on marine mammals. – ICES Journal of Marine Science, doi: 10.1093/icesjms/fsu187
[25] Southall, B. L., *et al* (2019). Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. Aquatic Mammals, 125-232. doi:10.1578/AM.45.2.2019.125.
[26] OSPRA Commission, Assessment of environmental impact of underwater noise (2009)
[27] Huang L-F, Xu X-M, Yang L-L, Huang S-Q, Zhang X-H and Zhou Y-L (2023) Underwater noise characteristics of offshore exploratory drilling and its impact on marine mammals. *Front. Mar. Sci.* 10:1097701. doi: 10.3389/fmars.2023.1097701

The charge size used for blasting as a worst case scenario is expected to be on average 14kg per hole with approximately 90 holes per field (seven fields), over a 3.5 week period. Charges will go off at the beginning and end of each day. This would equate to approximately 2500kg per day, and an anticipated maximum of 1250kg per blast (assuming two blasts per day). To estimate the L_p (peak pressure), the same approach as used by OSC was undertaken whereby values were sourced from Robinson *et al*. (2020) and Subacoustech Environmental Ltd. (2018) and a formula was used to estimate the L_p from a 1250kg charge. Figure 6-3 shows the formula from the fitted line.

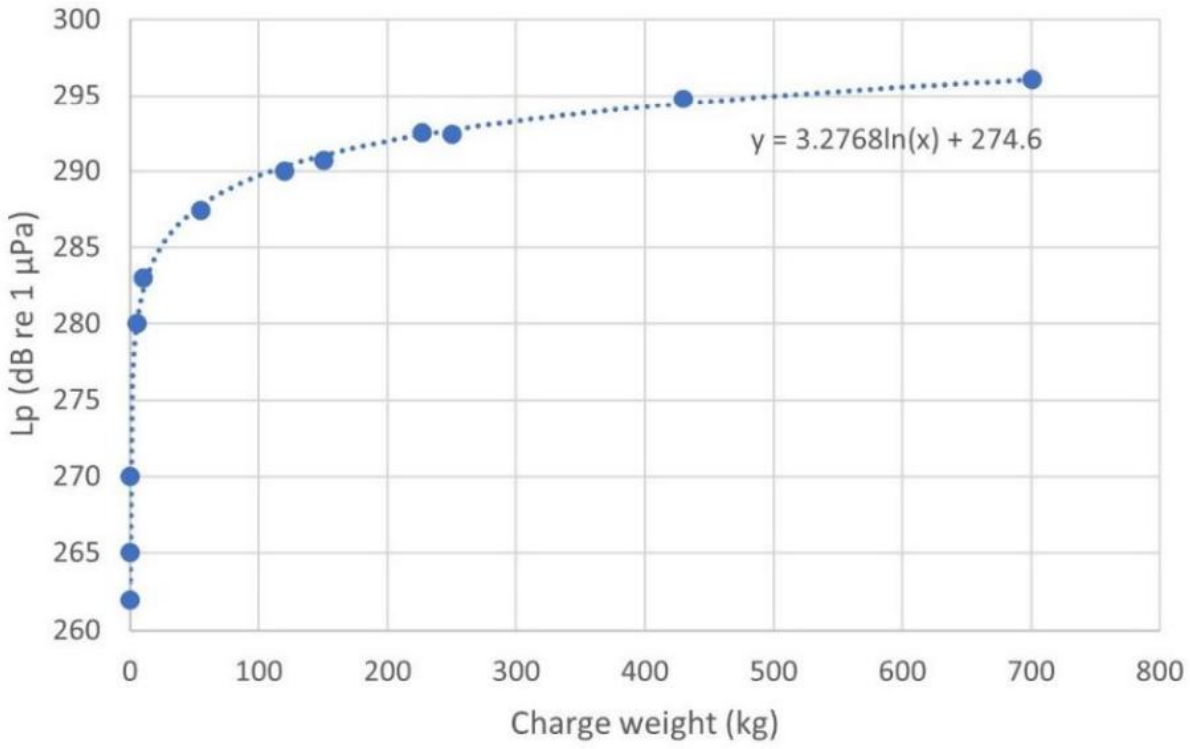


Figure 6-3: Peak sound pressure level (L_p) from blasting for different charge weights with fitted line. Source: values from Robinson *et al*. (2020) and Subacoustech Environmental Ltd. (2018)

From the formula, the L_p from a 1250kg single charge (worst-case scenario) is expected to be 298 dB re 1µPa. Southall *et al* (2019) unweighted impact thresholds for unweighted TTS and PTS for impulsive noise (based on L_p) range from 212-218 dB re 1 µPa, respectively. Therefore, both TTS and PTS is above the threshold for seals. This means that where seals are in the vicinity of blasting, auditory injury may occur (permanent and temporary). As the blasting has no slow build-up of noise or soft-start and leaves no time for seals to vacate the area. However, the noise produced from blasting is based on a worst-case scenario and in reality, not all areas will require 90 holes with approx. 14kg charge per hole. With mitigation put in place, including MMO to ensure seals are clear of the area prior to blasting. This would reduce the likelihood of auditory impacts occurring to seals. In addition, as drilling will occur continuously between blasts, there will be a constant noise source occurring within the vicinity of the blasting area and this will likely discourage seals from using the area of works ahead of blasting occurring.

Other direct effects (i.e. disturbance) are dealt with in Objective 2b, and indirect effects (i.e. impacts on water quality) are dealt with in Conservation Objective 2c. With no predicted impacts on either of these conservation objectives also, it is considered that the population of harbour seal will remain a viable

component of the Mousa SAC or the Yell Sound Coast SAC and hence there will be no adverse effect on site integrity.

6.3.2 Objective 2b. The distribution of harbour seal throughout the site is maintained by avoiding significant disturbance.

Given that Dales Voe base is already part of an established port, the baseline level of vessel movements is relatively high in and around the proposed works. Figure 6.2 above shows the annual average vessel density for all vessel types, within the vicinity of the site, with the image taken from the National Marine Plan Interactive (NMPi) map[22]. However, it is anticipated that there will be an increase in vessel movements as a result of the proposed works (as described in Section 3.5), albeit temporary and short term.

Increased vessel movements, dredging, drilling and blasting could result in altered distribution as a result of disturbance. It is not anticipated that there will be any disturbance to harbour seals or their habitats within the SAC itself. However, harbour seals are known to travel up to 50km between haul outs and feeding areas, and there are two designated haul-out sites within 4km of works: Holm of Beosetter c. 500m east and E South Shetland c. 7.7km south of the proposed works. Hence, although the SAC is c. 20km from the proposed development as the seal swims, it is possible seals from the SAC population could be present within waters surrounding the proposed works for foraging or utilising the haul-out sites nearby. Disturbance to the haul-out site at Holm of Beosetter is feasible given the proximity of the disposal site, particularly on the south to west aspects of the island. However, this location would support only a very small proportion of the SAC population, and there are alternative haul out locations between the SAC and the proposed works (particularly E South Shetland) which are more likely used by the SAC population. In addition, harbour seals are known to habituate to some levels of disturbance over time (for example the same boat passing by a haul-out every day). As such, the likelihood of disturbance in the existing operational port area is small, and any disturbance to a small number of individuals at this location is unlikely to result in effects at the SAC population level.

As detailed in Section 6.2, the area within the proposed works is not estimated to be an area with a particularly high usage by harbour seal for foraging. The vessel movements to facilitate the proposed works are along established routes. As such, any seals already utilising the waters in this area will be somewhat habituated to vessel activity associated with the various industries at the Dales Voe base. If there is some displacement from areas of high activity, it is considered that there is sufficient alternative habitat for foraging and commuting in the wider area. Further, is anticipated that a Vessel Management Plan will detail measures to reduce disturbance related impacts (see Section 7 for further information).

Dredging, drilling, blasting and increased vessel movements will result in underwater noise, behavioural responses to which include avoidance behaviours either by hauling out or moving away from the underwater noise source. These may result in reduced foraging time and/or increased energy expenditure. The effects of this will most likely be temporary displacement of individuals from the waters surrounding the proposed works. As detailed above, it is not considered that the habitat in the immediate vicinity of the works is particularly important for breeding, mating or resting and that there are sufficient alternative foraging areas for them to utilise.

As such, it is unlikely that disturbance will result in a significant effect on distribution of harbour seal throughout the Mousa SAC or Yell Sound Coast SAC, and hence there will not be adverse effects on site integrity as a result of the proposed works.

6.3.3 Objective 2c. The supporting habitats and processes relevant to harbour seal are maintained.

There will not be habitat loss from the SAC as a result of the proposed works.

As described in NatureScot's Conservation and Management Advice Document for the Mousa SAC[15], the key supporting habitat, in the context harbour seal, relates to the characteristics of the haul-out areas used by harbour seals for breeding and moulting. The proposed works will not result in impacts to the haul-out areas in the vicinity of the works (the closest being Holm of Beosetter c. 500m east). However, they have been assessed as having the potential for LSEs as a result of pollutants potentially being released into the water which could have an indirect effect on harbour seal if their prey availability is affected.

The dredge budget is anticipated to consist mainly of either sand or gravel sized fractions, with limited silt fractions (see Section 3.3 for full details). This will result in very localised and short-term plumes from dredging, with sands and gravels lost to the water column during dredging expected to fall out of suspension quickly. Therefore, the magnitude of the sediment discharge and dispersion from dredging works will be low within the dredge area and its immediate vicinity, and similarly it is expected that the majority of deposited material will fall out of suspension quickly at the disposal site with limited lateral spread. Further, the BPEO report concluded that although one sample taken from Dales Voe contained a minor exceedance of RAL1, there is a low risk of the sediments impacting upon the overall ecological or chemical status classifications. Therefore, any changes to water quality, which may have indirect effects on harbour seal prey availability, are anticipated to be localised, minor and temporary. Thus, the supporting habitats for harbour seal beyond the proposed works will be maintained in the long term and there will be no adverse effects on site integrity in regard to this species.

6.3.4 Objective 1. To ensure that the qualifying features of Mousa SAC are in favourable condition and make an appropriate contribution to achieving Favourable Conservation Status

It is predicted that, with mitigation, there will be no significant impacts on Conservation Objectives 2a, 2b and 2c. Therefore, the favourable condition of harbour seal in the Mousa SAC and Yell Sound Coast SAC will be maintained, and there will be no adverse effects on site integrity.

7 MITIGATION

It is anticipated that potential impacts described above could be avoided by implementation of standard best practice mitigation measures.

- Production of a Vessel Management Plan which will detail vessel routes, number of movements between sites and speed restrictions to minimise, and where possible, avoid any disturbance and mortality related impacts;
- Adherence to measures set out in the Construction Environmental Management Plan (CEMP) document;
- The following good practice guidelines shall be adhered to and incorporated into the CEMP:
    - GPP 5: Works and maintenance in or near water;
    - GPP 6: Working at construction and demolition sites;
    - PPG 7: Safe Storage – The safe operation of refuelling facilities;
    - GPP 21: Pollution and incident response planning; and
    - GPP 22: Dealing with spills.
- An acoustic deterrent device (ADD) will be utilised pre-blasting.
- A suitably qualified Marine Mammal Observer (MMO), competent in the identification of marine mammals, will be present during dredging and blasting activities to monitor for the presence of harbour seal (and other marine mammals) in the vicinity of the proposed works. An MMO Protocol will be put in place prior to works, which should include (but may not be limited to) the below as per JNCC guidance[28] [29]:
    - For dredging, a 500m mitigation zone, and for blasting up to a 1km mitigation zone, will be implemented. This represents the area in which the MMO will monitor visually for the presence of harbour seal prior to dredging and blasting activities. The MMO will be situated on either the dredge vessel or safe pre-determined location for blasting to ensure effective coverage of the mitigation zone.
        - At present a 1km mitigation zone for blasting is considered precautionary. The suitability of this will be determined by evaluation of the trial blast underwater noise monitoring in comparison to the values sourced from Robinson *et al.* (2020) and Subacoustech Environmental Ltd (2018) formula. Depending on the outcome of this, it is considered that there may be potential for the mitigation zone to be reduced, in discussion with the MMO.
    - The mitigation zone will be monitored visually by the MMO for a minimum of 30 minutes prior to dredging or blasting commencing. Dredging or blasting should not commence if harbour seal are detected within the mitigation zone, or until 20 minutes after the last detection.
    - If there is a pause in dredging of a period of greater than 10 minutes, then the pre-dredging search procedure will be repeated before dredging recommences.
        - Note that where dredging is being undertaken at night, a pre-dredging search must be undertaken by the MMO during daylight hours. If dredging pauses for more than 10 minutes during night time hours, works must cease until daylight hours when an MMO search can be undertaken.
    - The MMO will compile appropriate reports whish should include but may not limited to: Marine Mammal Reporting Forms (MMRFs), details of works (date, location, duration), soft-

[28] JNCC Statutory Nature Conservation Agency Protocol for Minimising the Risk of Injury to Marine Mammals from Piling Noise (2010) available at: http://jncc.defra.gov.uk/pdf/JNCC_Guidelines_Piling%20protocol_August%202010.pdf [Accessed July 2024]
[29] JNCC Guidelines for minimising the risk of injury to marine mammals from explosive use in the marine environment (2025) available at: https://data.jncc.gov.uk/data/24cc180d-4030-49dd-8977-a04ebe0d7aca/jncc-guidelines-marine-mammals-and-explosive-use.pdf [Accessed July 2025]

start techniques implemented, occasions where dredging was delayed or stopped due to presence of harbour seals, watches conducted and instances of non-compliance.

- The deployment of an ornithologist to monitor works around Dales Voe out to 500m and record behavioural responses from SPA qualifying species. If impacts are recorded, then the disturbance zone shall be increased.
- All personnel on the site should be made aware of the environmental sensitivities of the site (proximity to designated sites) via the site induction and additional task specific toolbox talks as required.

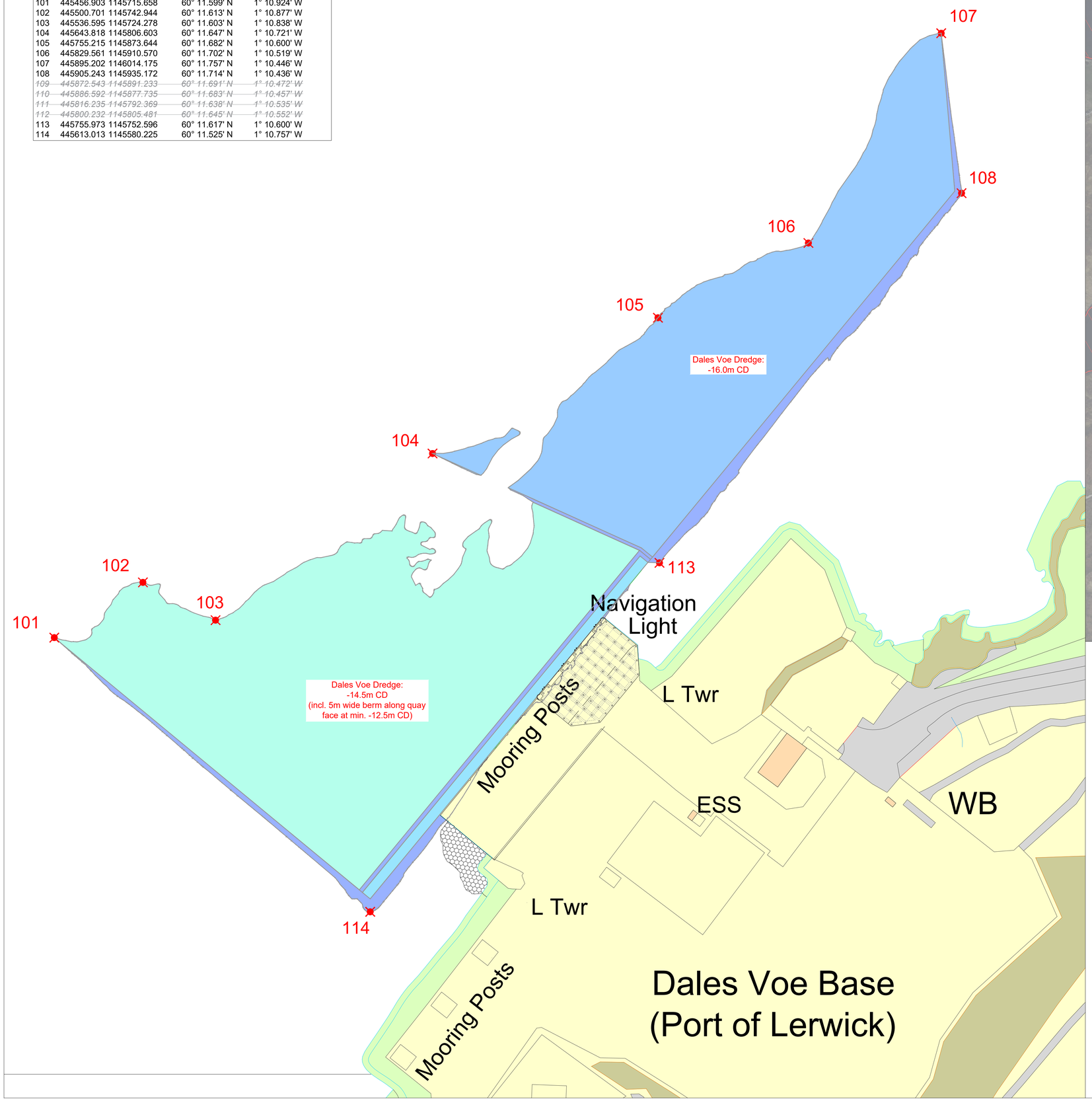
It is considered that if the above mitigation is implemented it will be sufficient to avoid LSEs on any of the qualifying interests identified as being impacted by works. As such, there will be adverse effects on site integrity for the designated sites those features are qualifying interests of.

8 CONCLUSIONS

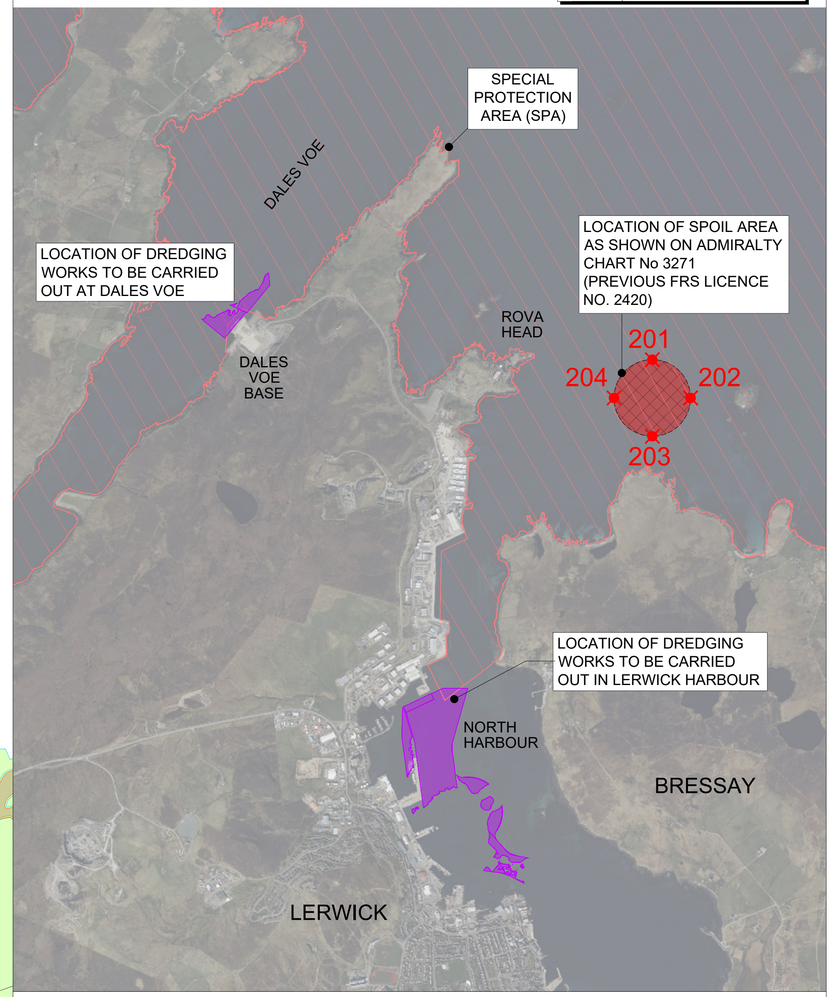
There is potential for LSE to arise on qualifying features of the East Mainland Coast, Shetland SPA which is partially within the proposed works area, and Mousa and Yell Sound Coast SACs (harbour seal) which are hydrologically connected to the site. If no mitigation is implemented, there could be adverse effects on site integrity of these designated sites. However, it is anticipated that any potential impacts could be avoided by the implementation of standard best practice mitigation measures. No impacts to the favourable conservation status of any of designated sites or their qualifying features is therefore anticipated.

A APPENDIX A: LOCATION OF PROPOSED WORKS

Point	OSGB36 Easting	Northing	WGS84 Lat	Long
101	445456.903	1145715.658	60° 11.599' N	1° 10.924' W
102	445500.701	1145742.944	60° 11.613' N	1° 10.877' W
103	445536.595	1145724.278	60° 11.603' N	1° 10.838' W
104	445643.818	1145806.603	60° 11.647' N	1° 10.721' W
105	445755.215	1145873.644	60° 11.682' N	1° 10.600' W
106	445829.561	1145910.570	60° 11.702' N	1° 10.519' W
107	445895.202	1146014.175	60° 11.757' N	1° 10.446' W
108	445905.243	1145935.172	60° 11.714' N	1° 10.436' W
~~109~~	~~445872.543~~	~~1145891.233~~	~~60° 11.691' N~~	~~1° 10.472' W~~
~~110~~	~~445886.592~~	~~1145877.735~~	~~60° 11.683' N~~	~~1° 10.457' W~~
~~111~~	~~445816.235~~	~~1145792.369~~	~~60° 11.638' N~~	~~1° 10.535' W~~
~~112~~	~~445800.232~~	~~1145805.481~~	~~60° 11.645' N~~	~~1° 10.552' W~~
113	445755.973	1145752.596	60° 11.617' N	1° 10.600' W
114	445613.013	1145580.225	60° 11.525' N	1° 10.757' W



DENOTES SPECIAL PROTECTION AREA (SPA)



LOCATION PLAN
Scale 1: 20,000

0 750 1500 Metres

N

DALES VOE DREDGING WORKS COORDINATES
Scale 1: 1,000

0 50 100 Metres

REV	DATE	REVISION	DRN	CHK
A	12.05.2025	ITT -16.0mCD dredge pocket removed	PRN	SSJ
-	16.12.2024	Invitation to Tender	PRN	APS

Arch Henderson 1919
Civil Engineers
Structural Engineers
Architects
CDM Co-ordinators
Geotechnical services
Environmental services
Stewart Building, Lerwick, Shetland. ZE1 0LL.
Tel : 01595 695512
www.arch-henderson.co.uk - email : lerwick@arch-henderson.co.uk
Aberdeen; Dundee; Glasgow; Lerwick; Inverness; Thurso; Stromness; Southampton; Falkland Islands

PROJECT :
Lerwick Port Authority
Lerwick Harbour Dredging

TITLE :
ITT
Dales Voe Dredging Coordinates

DRAWN :	DATE :	CHECKED :	APPROVED :
PRN	Dec 2024	APS	SSJ

SCALE : (A1)	DRAWING STATUS :
1:2,500	ITT

DRAWING No : 232029-ITT-204 REV : A