Project Title	Seagreen Wind Energy Ltd / Seagreen 1A Ltd
Document Reference Number	LF000009-CST-MA-PRG-0003

The Seagreen and Seagreen 1A Projects Decommissioning Programme [Consultation Draft]

Section 105 of the Energy Act 2004

Seagreen Offshore Wind Farms Section 36 Consents - Condition 3

Seagreen Offshore Transmission Assets Marine Licence MS-00010078 - Condition 3.2.2.2

Seagreen 1A Marine Licence MS-00009923 – Condition 3.1.25

For the approval of the Scottish Ministers

Rev	Date	Reason for Issue	Originators	Checker	ECoW	Approver
05	02/11/2022	Consultation draft for review by Interested Parties	E. Maxwell C. Houston	E. Noble	-	E. Noble

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1. Executive Summary

Seagreen Wind Energy Limited ('SWEL'), a joint venture between SSE Renewables and Total, was awarded Section 36 Consent under the Electricity Act 1989 by Scottish Ministers in October 2014 for the Seagreen Alpha and Seagreen Bravo Offshore Wind Farms (OWFs). Marine Licences for Seagreen Alpha OWF and Seagreen Bravo OWF and the Offshore Transmission Asset (OTA) were also awarded by Scottish Ministers in October 2014 under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009. Together the Seagreen Alpha and Seagreen Bravo OWFs and the OTA collectively comprise 'the Seagreen Project'. All consents have been subsequently varied to take account of changes to the project design.

On 8 December 2014, following consultation with the Scottish Ministers, the Secretary of State (SoS) issued two notices requiring SWEL 'to submit a Decommissioning Programme (DP), pursuant to section 105 (S105) of the Energy Act 2004 ('the Act'), prior to the commencement of construction of the Project'. (Seagreen note that since these notices were issued the responsibility for approval of decommissioning programmes has been fully devolved to the Scottish Ministers).

SWEL submitted a DP to the Scottish Ministers for the decommissioning of the Seagreen Project on 26 August 2020 pursuant to S105 of the Act, the Seagreen Alpha and Seagreen Bravo OWF Section 36 Consents Condition 3 and the OTA Marine Licence Condition 3.2.2.2.

On 24 March 2022, 18 months after the original submission of the Seagreen Project DP, Marine Scotland - Licensing Operations Team (MS-LOT) on behalf of the Scottish Ministers, notified SWEL that the DP was rejected pursuant to Section 106 (S106) of the Act. The reasons for rejection of the DP are set out in Annex A to the S106 and were primarily due to the decommissioning methodology proposed for inter array and export cables which was to leave these elements in-situ.

As part of the same communication, notice was served under S105 of the Act, requiring SWEL resubmit a DP for the decommissioning of the Seagreen Project to the Scottish Ministers by no later than 24 September 2022. The S105 issued on 24 March 2022 requests that SWEL consults the bodies specified in Schedule 2 on the draft DP and makes the consultation draft of the DP publicly available for a minimum period of 30 days. In advance of the consultation period, SWEL is required to provide a copy of the consultation draft of the DP and details of the proposed consultation process to MS-LOT.

On 8 December 2021, Seagreen 1A Ltd ('Seagreen 1A') was granted a Marine Licence under the Marine (Scotland) Act 2010 and Marine and Coastal Access Act 2009 to construct and operate a single HVDC cable connecting the Seagreen Project to a new landfall at Cockenzie in East Lothian (the 'Seagreen 1A Project').

Seagreen 1A received a notice under Section 105(2) of the Energy Act 2004 from the Marine Scotland Licensing Operations Team (MS-LOT) on 21 June 2022. This notice, together with condition 3.1.25 of the Marine Licence, requires Seagreen 1A to submit, for approval by Scottish Ministers, a Decommissioning Programme (DP) setting out the measures to be taken in connection with the decommissioning of the assets specified in Schedule 1 to the notice.

The S105 Notice requests that Seagreen 1A consults the bodies specified in Schedule 2 on the draft DP and makes the consultation draft of the DP publicly available for a minimum period of 30 days. In advance of the

consultation period, Seagreen 1A is required to provide a copy of the consultation draft of the DP and details of the proposed consultation process to MS-LOT.

All related onshore assets are consented under the Town and Country Planning (Scotland) Act 1997 and are therefore not considered in this DP.

This document constitutes a consultation draft DP intended to give regulatory authorities and key stakeholders an opportunity to comment on the proposals regarding the decommissioning of the Seagreen Project and the Seagreen 1A Project ('the Projects'). Comments received during a defined consultation period will be addressed in a subsequent version of the DP which will be submitted to MS-LOT for approval.

The proposed measures set out in this DP, as summarised in Table 1-1 below, adhere to the existing Scottish, UK and international legislation, environmental requirements and guidance notes that are in force at the time of writing, and have regard to decommissioning good practice. Additionally, Seagreen has undertaken a detailed review of the S106 Notice Annex A and all reasons for rejection which have been considered in this revised DP.

In considering appropriate decommissioning provisions, SWEL and Seagreen 1A have sought to adhere to the key principles set out in the documents listed below, namely the Best Practicable Environmental Option (BPEO), the safety of surface and subsurface navigation, other uses of the sea and health and safety considerations:

- Decommissioning of offshore renewable energy installations under the Energy Act 2004: Guidance notes for industry (England and Wales) (BEIS, March 2019) – the 'BEIS Guidance'
- *Decommissioning of offshore renewable energy installations in Scottish Waters or in the Scottish art of the Renewable Energy Zone under the Energy Act 2004: Guidance notes for industry* (Scotland) (Scottish Government, July 2022) – the 'Scottish Government Guidance'

Table 1-1 - Proposed decommissioning measures

Project Component	Proposed Decommissioning Measures
Wind Turbines	Complete removal from site.
Wind Turbine Support Structures	Complete removal from site.
OSP Topsides	Complete removal from site.
OSP Support Structures	Entire jacket structure removed. Pin pile foundations to be cut at 1m below the surface of the seabed so that the remaining parts do not pose a danger for shipping or fishing vessels, even if sediments should become relocated, and cut sections removed from site.
Cables (marine export, inter-array and interconnector)	Complete removal from site *except* where there is a high risk to other assets (cable crossings) or to the marine environment, or health and safety concerns (in addition to extreme costs required for the removal). Where cable protection (loose rock) is to remain in-situ, the cable underneath will also remain in-situ.
Intertidal HDPE Ducts	Decommissioning in-situ. Removal of the ducts is likely to require significant excavation of the sea defences and intertidal areas resulting in disturbance that is not considered commensurate with the environmental benefits associated with removal. Additionally, the process for Seagreen 1A (Cockenzie landfall) would require construction of a cofferdam requiring a significant campaign which in light of the environmental benefits associated with removal would have unacceptable risks to personnel and the marine environment and extreme costs.
Cable/Scour Protection	Decommissioning measures will be dependent on the type, quantity and extent of cable protection used. Where loose rock is used, this will be left in-situ since recovery entails significant impacts on the benthic environment, health and safety risks and extreme costs when balanced against the decommissioning guiding principles. The proposed decommissioning measures for cable protection will be considered further in future updates of the DP once the type and quantity of any installed protection is known and will be subject to further environmental assessment.

Methods outlined are presented based on current available technology. It is expected that by the time of decommissioning, technological changes may result in different approaches to decommissioning activities and that any relevant changes will be reflected in future revisions of the DP.

The DP details the methods associated with the future end of life decommissioning of the assets. It has been prepared based on known site characteristics and consent conditions. The DP is informed and supported by the Environmental Statement (ES) prepared for the Seagreen Project (April 2012) (and further information provided via the ES Addendum dated May 2013) and the Environmental Impact Assessment Report (EIAR) prepared for the Seagreen 1A Project. In advance of decommissioning, the ES will be reviewed to assess the potential impacts that may arise and are not covered in the initial EIA process and subsequent reviews.

The Projects have an anticipated operational period of 25 years following final commissioning, and in the absence of any extension of life, decommissioning would be required at the end of the operational period. The required operational life of the Seagreen 1A Project is directly linked to that of the Seagreen Project and any proposals to re-power or life-extend the Seagreen Project assets.

A cost estimate for the DP has been estimated by means of a ground up decommissioning cost model based on the vessel, equipment and personnel requirements and the duration of the works. Financial security has been carefully considered to ensure that the liability will be met. The financial appendix has been provided to MS-LOT on a confidential basis separately for review.

This DP meets the requirements set out under Section 105(8) of the Energy Act 2004, and the S105 Notices. The submission of this DP to MS-LOT therefore satisfies Condition 3 of the S36 Consents, Condition 3.2.2.2 of the OTA Marine Licence and Condition 3.1.25 of the Seagreen 1A Marine Licence.

2. Introduction

2.1 Background

Seagreen Wind Energy Limited ('SWEL'), a joint venture between SSE Renewables and Total, was awarded Section 36 Consent (S36 Consent) under the Electricity Act 1989 by Scottish Ministers in October 2014 for Seagreen Alpha and Seagreen Bravo Offshore Wind Farms (OWFs). Marine Licences for Seagreen Alpha OWF and Seagreen Bravo OWF and the Offshore Transmission Asset (OTA) were also awarded by Scottish Ministers in October 2014 under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009. Together the wind farms Seagreen Alpha and Seagreen Bravo and the OTA collectively comprise 'the Seagreen Project'.

In 2018, following application by SWEL, the S36 Consents, Alpha Marine Licence and Bravo Marine Licence were varied by Scottish Ministers. Subsequently, in 2019, the OTA Marine Licence was also varied by Scottish Ministers. In addition, a Marine Licence was granted in 2019, and subsequently varied in 2020, providing an alternative landfall cable installation method. The S36 Consents, Alpha Marine Licence, Bravo Marine Licence and OTA Marine Licence were further varied in 2022 following application by SWEL.

In December 2021, a further Marine Licence was granted to Seagreen 1A Limited ('Seagreen 1A') for the installation of an additional export cable connecting the Seagreen Project to a new landfall and onshore grid connection at Cockenzie in East Lothian. These works are known as the 'Seagreen 1A Project'.

SWEL (company number 06873902) and Seagreen 1A both have their registered office at No.1 Forbury Place, 43 Forbury Road, Reading, RG1 3JH and are joint ventures between SSE Renewables Services (UK) Limited and TotalEnergies Renewables Seagreen Holdco Limited. For the purposes of this DP, SWEL and Seagreen 1A are collectively referred to as 'Seagreen'.

2.2 Licence Conditions and Section 105 and 106 Notices

On 8 December 2014, following consultation with the Scottish Ministers, the Secretary of State (SoS) issued two notices requiring SWEL 'to submit a Decommissioning Programme (DP), pursuant to Section 105 (S105) of the Energy Act 2004 ('the Act'), prior to the commencement of construction of the Project'. (Seagreen note that since these notices were issued the responsibility for approval of decommissioning programmes has been fully devolved to the Scottish Ministers).

SWEL submitted a DP to the Scottish Ministers for the decommissioning of the Seagreen Project on 26 August 2020 pursuant to S105 of the Act, the S36 Consents Condition 3 and the OTA Marine Licence Condition 3.2.2.2.

On 24 March 2022, MS-LOT on behalf of the Scottish Ministers notified SWEL that the DP was rejected pursuant to S106 of the Act. At the same time notice was served under S105(2) of the Act, requiring SWEL to resubmit a DP for the Seagreen Project which was to be provided to MS-LOT no later than 24 September 2022. A copy of the S105 Notice is included at Appendix B.

On 21 June 2022, a S105 notice was issued to Seagreen 1A requiring the submission (no later than 31 December 2022) and approval of a programme for decommissioning of the Seagreen 1A Project. A copy of the S105 Notice is included at Appendix B.

This DP has been produced in accordance with the most recent S105 Notices and, in relation to the Seagreen Project, the reasons for rejection set out in the S106 Notice. In addition, the DP is also intended to discharge Condition 3 of the S36 Consents, Condition 3.2.2.2 of the OTA Marine Licence and Condition 3.1.25 of the Seagreen 1A Marine Licence as set out in Table 2-1. For completeness, reference has also been made to the requirements of a decommissioning programme under the Energy Act 2004.

Table 2-1 - Relevant S105 Notice requirements, S36 and Marine Licence conditions and Energy Act 2004 requirements

Condition Reference	Condition Text	Relevant Section of this DP
Seagreen Project		
S36 Consents Condition 3	Where the Secretary of State has, following consultation with the Scottish Ministers, given notice requiring the Company to submit to the Secretary of State a Decommissioning Programme, pursuant to section 105(2) and (5) of the Energy Act 2004, then construction may not begin on the site of the Development until after the Company has submitted to the Secretary of State a Decommissioning Programme in compliance with that notice.	The submission of this DP in accordance with the S105 notice issued for the project satisfies the condition
OTA Marine Licence (MS-00010078) Condition 3.2.2.2	Where the Secretary of State has, following consultation with the Licensing Authority, given notice requiring the Licensee to submit to the Secretary of State a DP, pursuant to section 105(2) and (5) of the Energy Act 2004, then construction may not begin on the Site of the Works until after the Licensee has submitted to the Secretary of State a DP in compliance with that notice.	The submission of this DP in accordance with the S105 notice issued for the project satisfies the condition
S105 Notice Paragraph 1	The Scottish Ministers, in exercise of their powers under section 105(2) of the Energy Act 2004 ("the Act"), hereby requires Seagreen Wind Energy Limited, on behalf of Seagreen Alpha Wind Energy Limited and Seagreen Bravo Wind Energy Limited ("Seagreen"), to submit to the Scottish Ministers a decommissioning programme for the Seagreen Alpha Offshore Wind Farm and the Seagreen Bravo Offshore Wind Farm located in the Firth of Forth ("the Seagreen Project"). The decommissioning programme relates to a renewable energy installation used for purposes connected with the production of energy from water or winds as defined in section 104(3) of the Act.	The submission of this DP will satisfy the requirement

Condition Reference	Condition Text	Relevant Section of this DP
S105 Notice Paragraph 2	The decommissioning programme must include an estimate of expenditure likely to be incurred in carrying out decommissioning, in accordance with the template provided in Schedule 1 of this notice. The decommissioning programme will need to satisfactorily address all of the reasons for refusal and advice from MS-LOT in Annex A of the S106 notice served on 24 March 2022	Section 8, Appendix D
S105 Notice Paragraph 3 Part 1	The Scottish Ministers, pursuant to section 105(7) of the Act, hereby further requires Seagreen to consult the bodies specified in Schedule 2, as well as any other consultees identified by Seagreen and any further persons subsequently identified by the Scottish Ministers, on the draft decommissioning programme and make the consultation draft of the decommissioning programme publicly available for a minimum period of 30 days	Section 7, Appendix E and Appendix F (to be populated upon receipt of responses and before submission of DP for approval by the Scottish Ministers)
S105 Notice Paragraph 3 Part 2	In advance of the consultation period, Seagreen should provide a copy of the consultation draft of the decommissioning programme and details of the proposed consultation process to Marine Scotland - Licensing Operations Team ("MS-LOT")	The submission of this draft DP satisfies the requirement
S105 Notice Paragraph 4	The decommissioning programme should be submitted to MS-LOT within one month of the completion of the consultation. This latest draft of the decommissioning programme should include details of the consultation process, including the comments from each consultee (including 'nil returns'). Information should be provided on how any consultation responses have been reflected in the submitted draft of the decommissioning programme. You should ensure that each consultee named in Schedule 2 of this notice acknowledges receipt of the consultation document	Section 7 outlines the consultation process. Appendix E will demonstrate how each consultation response has been reflected in the DP

Condition Reference	Condition Text	Relevant Section of this DP
S105 Notice Paragraph 5	Following conclusion of the consultation period, the decommissioning programme should demonstrate consideration of the representations made during the consultation(s) and should be submitted to MS-LOT within one month of the completion of the consultation. If this date is not met, the Scottish Ministers, in exercise of powers under section 107 of the Act, may prepare and approve their own decommissioning programme in relation to the Seagreen Project and charge all costs incurred to Seagreen or other relevant persons.	Appendix E will demonstrate how each consultation response has been reflected in the DP
Seagreen 1A Project		
Export Cable Marine Licence (MS-00009923) Condition 3.1.25	No activity authorised under the licence may take place until a decommissioning programme, as defined in any section 105 notice served by the appropriate Minister, has been approved under section 106 of the Energy Act 2004 by the appropriate Minister	The submission of this DP in accordance with the S105 notice issued for the project satisfies the condition
S105 Notice Paragraph 1	The Scottish Ministers, in exercise of their powers under section 105(2) of the Energy Act 2004 ("the Act"), hereby requires Seagreen 1A Ltd to submit a decommissioning programme for the Seagreen 1A export cable corridor. The decommissioning programme relates to a proposal to construct a relevant object in waters regulated by Chapter 3 of the Energy Act	The submission of this DP in accordance with the S105 notice issued for the project satisfies the condition
S105 Notice Paragraph 2	The decommissioning programme must include an estimate of expenditure likely to be incurred in carrying out decommissioning, in accordance with the template provided in Schedule 1 of this notice	Section 8, Appendix D
S105 Notice Paragraph 3	The Scottish Ministers, pursuant to section 105(7) of the Energy Act, hereby further requires Seagreen 1A Ltd to consult the bodies specified in Schedule 2, as well as any other consultees identified by Seagreen 1A Limited and any further persons subsequently identified by the Scottish Ministers, on the draft decommissioning programme and make the consultation draft of the decommissioning programme publicly available for a minimum period of 30 days	Section 7, Appendix E and Appendix F (to be populated upon receipt of responses and before submission of DP for approval by the Scottish Ministers)

Condition Reference	Condition Text	Relevant Section of this DP
S105 Notice Paragraph 4	In advance of the consultation period, Seagreen 1A Ltd should provide a copy of the consultation draft of the decommissioning programme and details of the proposed consultation process to Marine Scotland - Licensing Operations Team ("MS-LOT"). Following the consultation, a copy of the latest draft of the decommissioning programme should be provided to MS-LOT no later than 31 December 2022, for review	The submission of this draft DP satisfies the requirement
S105 Notice Paragraph 5	The decommissioning programme should be submitted to MS-LOT within one month of the completion of the consultation. This latest draft of the decommissioning programme should include details of the consultation process, including the comments from each consultee (including 'nil returns'). Information should be provided on how any consultation responses have been reflected in the submitted draft of the decommissioning programme. You should ensure that each consultee named in Schedule 2 of this notice acknowledges receipt of the consultation document	Section 7 outlines the consultation process. Appendix E will demonstrate how each consultation response has been reflected in the DP
Energy Act requirements		
Energy Act 2004 S105 (8)	A decommissioning programme—	
	(a) must set out measures to be taken for decommissioning the relevant object	Section 5 outlines measures to be taken for decommissioning
	(b) must contain an estimate of the expenditure likely to be incurred in carrying out those measures	Appendix D provides decommissioning costs
	(c) must make provision for the determination of the times at which, or the periods within which, those measures will have to be taken	Appendix C provides the indicative decommissioning schedule
	(d) if it proposes that the relevant object will be wholly or partly removed from a place in waters regulated under this Chapter, must include provision about restoring that place to the condition that it was in prior to the construction of the object; and must include provision about whatever continuing monitoring and maintenance of the object will be necessary	Section 12 details provision for restoration of the site

Condition Reference	Condition Text	Relevant Section of this DP
	(e) if it proposes that the relevant object will be left in position at a place in waters regulated under this Chapter or will not be wholly removed from a place in such waters, must include provision about whatever continuing monitoring and maintenance of the object will be necessary	Section 13 details post-decommissioning monitoring, maintenance and management of the site

2.3 Relevant Guidance

This draft DP has been prepared in accordance with the latest relevant guidance as follows:

- *Decommissioning of offshore renewable energy installations under the Energy Act 2004: Guidance notes for industry* (England and Wales) (BEIS, March 2019) – the 'BEIS Guidance'
- *Decommissioning of offshore renewable energy installations in Scottish Waters or in the Scottish art of the Renewable Energy Zone under the Energy Act 2004: Guidance notes for industry* (Scotland) (Scottish Government, July 2022) – the 'Scottish Government Guidance'
- OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development, 2008.
- *Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone* (IMO, October 1989)
- *Guidance Notes: Decommissioning of Offshore Oil and Gas Installations and Pipelines* (BEIS, November 2018)
- *Guidelines for Environmental Risk Assessment and Management – Green Leaves III* (Defra, November 2011)

2.4 Updates and Amendments

This draft DP has been prepared to facilitate consultation with key stakeholders on the proposed approach to be taken by Seagreen to the decommissioning of the Projects at the end of their operational life. Feedback and comments received during consultation will be incorporated into this document, which once updated will comprise the final DP which will be submitted to Scottish Ministers for approval.

Although the DP will be finalised for approval, it will remain a live document throughout the operational life of the Projects. Consequently, there will be a requirement for the DP to be reviewed and updated on a regular basis to take into account changing market regimes and regulatory requirements, increased knowledge and understanding of the marine environment including the availability of new information, advancements in technology and working practices, changes to nearby infrastructure and navigational routes and any changes in cost estimates or financial security arrangements.

The DP will be reviewed and, where necessary, updated every 5 years throughout the life of the Projects. As such, it is anticipated that this DP will be revised and, where necessary, updated 5 years after approval by the Scottish Ministers and every 5 years thereafter throughout the life of the Projects.

Consultee bodies listed in the Section 105 notices, and any additional consultees identified by MS-LOT or Seagreen will be provided with the opportunity to comment on the DP prior to it being finalised. It is anticipated that the final revision process will commence two years prior to the initiation of decommissioning.

In addition, the DP is expected to be reviewed and, where necessary, updated at the following specific points in time, as per the BEIS Guidance and the Scottish Government Guidance:

- Post-construction report to be submitted to Scottish Ministers within one year of completion of construction. This report will include information on any issues raised during construction which may impact eventual decommissioning methods and costs
- A comprehensive review 12-18 months before the first security provision is due to identify any changes in assumptions on costs and risks where these might affect size or timings of financial securities
- Annual reviews to be carried out from payment of the first security to ensure the financial security provisions are on track. Any changes that could affect these financial security provisions are to be reported to Scottish Ministers
- Consultation on the EIA required to inform the final decommissioning proposals should be commenced at least 3 years prior to commencing decommissioning with a final comprehensive review of the DP carried out at least two years prior to commencement of decommissioning

2.5 Structure of this Decommissioning Programme

This DP is divided into the sections summarised in Table 2-2 below and reflects the structure for the DP as set out in Annex C of both the BEIS Guidance and the Scottish Government Guidance.

Table 2-2 – Decommissioning Programme structure

Section	Title	Summary of Content
1	Executive Summary	Summary highlighting essential features of the DP
2	Introduction	Summary of S36 Consent, Marine Licence and Energy Act 2004 requirements for a Decommissioning Programme. Confirmation of the companies that are party to the programme and their ownership status
3	Background Information	Relevant background information including: • A description of the Projects to be decommissioned and their location • The physical, biological and human environment in the development area • Names and locations of nature conservation designated sites that may be affected by the decommissioning activities
4	Description of Items to be Decommissioned	A full description of all items associated with the Projects to be decommissioned
5	Description of Proposed Decommissioning Measures	An overview of the proposed approach to decommissioning the Projects including: • The guiding principles and industry guidance followed in the preparation of the DP • The proposed decommissioning processes for each component of the Projects • A summary of the items to be left in-situ • Proposed waste management solutions
6	Environmental Impact Assessment	Details of the EIAs that were prepared for the Projects and their consideration of decommissioning activities A description of the proposed approach to EIA of the decommissioning activities
7	Consultation with Interest Parties	The consultation process undertaken for the draft DP and future revisions to the DP
8	Costs and Financial Security	Cost information will be provided in line with the BEIS Guidance, Scottish Government Guidance and S105 notice, in a Confidential Appendix to this DP
9	Schedule	Details of the proposed decommissioning timescale, noting that final details of the schedule are only required towards the end of the life of the Projects

Section	Title	Summary of Content
10	Project Management and Verification	Information on how Seagreen will manage the implementation of the DP and provide verification to the Scottish Ministers concerning progress and compliance
11	Seabed Clearance and Restoration of the Site	Description of how Seagreen intends to restore the site as far as is reasonably practicable, to the condition that it was in prior to construction of the project Proposals for confirming that, following decommissioning, the site has been cleared. This includes information on site surveys
12	Post-Decommissioning Monitoring, Maintenance and Management of the Site	Details of the post decommissioning monitoring, maintenance and management activities that will be required
13	Supporting Studies	Details of supporting studies used to inform this DP
14	References	A list of references made in this DP
Appendices		Appendix A – List of Abbreviations and Definitions Appendix B – Section 105 and Section 106 Notices Appendix C – Decommissioning Schedule Appendix D – Decommissioning Costs and Financial Security Information (Confidential) Appendix E – Consultation Matrix Appendix F – Consultation Responses

3. Background Information

3.1 Seagreen Project

The Seagreen Project is located in the North Sea, in the outer Firth of Forth and Firth of Tay region and comprises the OWFs (the wind turbine generators (WTGs), their foundations and associated array cabling), together with associated infrastructure of the OTA (Offshore Substation Platforms - OSPs), their foundations and the offshore export cable), to facilitate the export of renewable energy to the national electricity transmission grid.

The Seagreen Project will consist of the following key components:

- 150 WTGs comprising installed on three-legged steel jackets, each installed on suction bucket caissons
- Two OSPs, each installed on up to 12 pin pile foundations
- A network of inter-array subsea cables as detailed below:
  - Circa 300km of inter-array cables to connect strings of WTGs to OSP 1
  - Circa 55km of inter-array cables to connect strings of WTGs to OSP 2
  - Circa 3km of interconnector cable to connect the two OSPs
  - Inter-array cables will be buried where possible and where burial is not possible cable protection will be provided
- Three subsea export cables, totalling circa 190km in length, to transmit electricity from the OSPs to the landfall at Carnoustie and connecting to the onshore export cables for transmission to the onshore substation and connection to the National Grid network. Export cables will be buried where possible and where burial is not possible cable protection will be provided.
- Four sections of HDPE duct of approximately 400m in length running from MHWS

The location of the Seagreen Project is shown in Figure 3-1. Figure 3-2shows the proposed layout of the Project which is:

- West of Berwick Bank OWF (pre-consent)
- East and south of Inch Cape OWF (post-consent)
- North and west of Neart na Gaoithe OWF (under construction)

Construction of the Seagreen Project is underway having commenced main offshore works in September 2021 and is expected to be fully installed by late 2025.

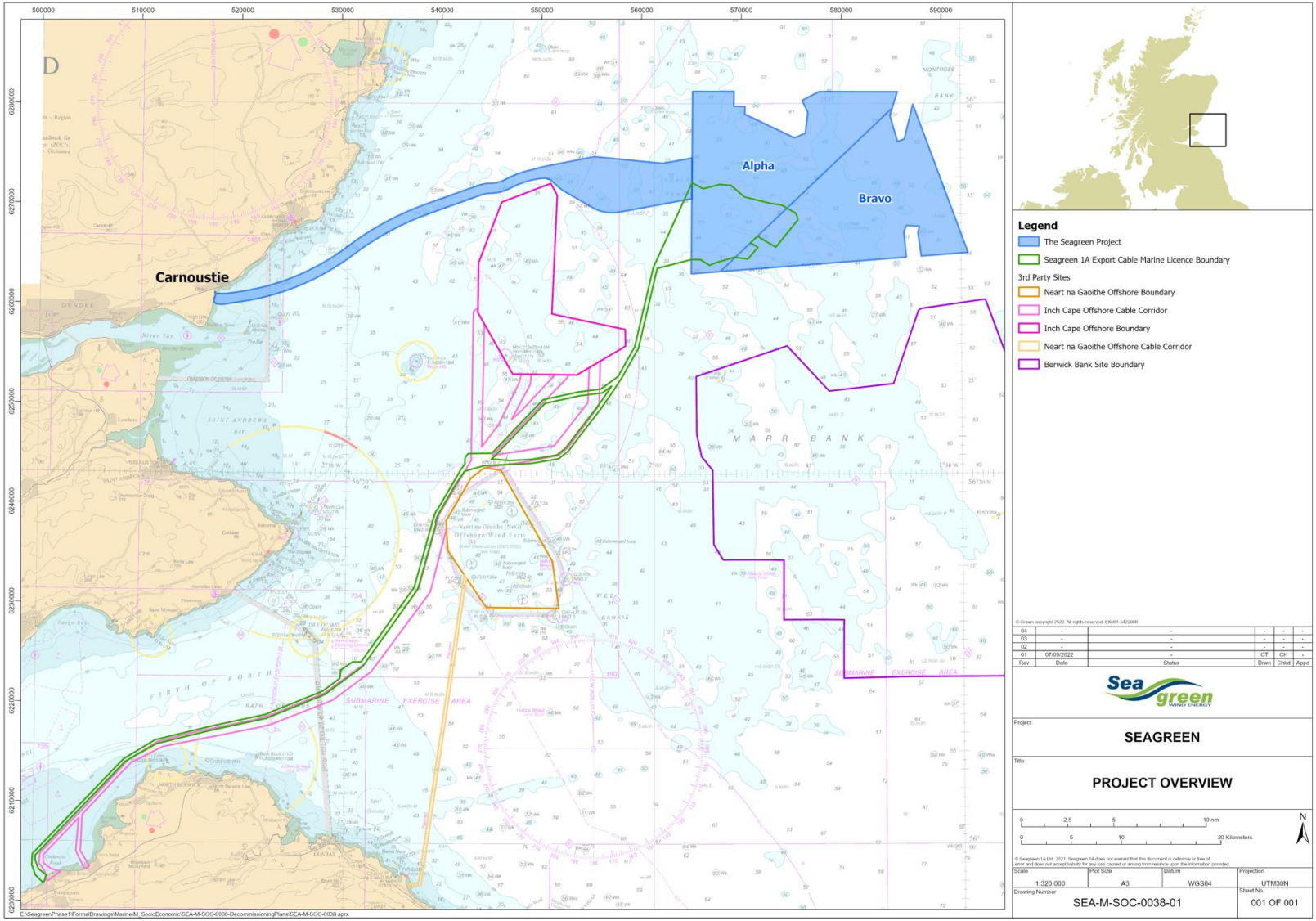


Figure 3-1 – Seagreen Project Location

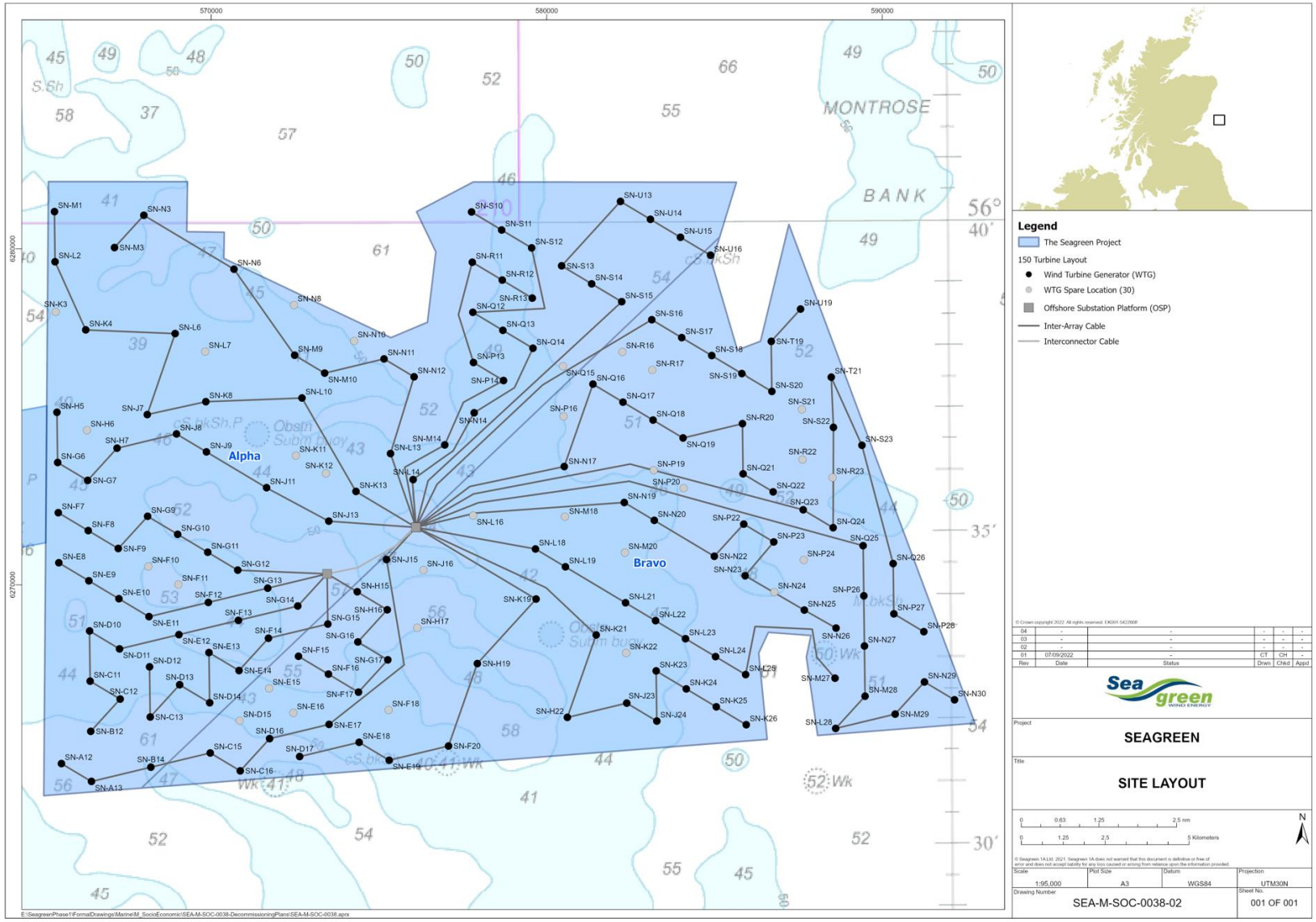


Figure 3-2 – Seagreen OWFs Project Layout

3.2 Seagreen 1A Project

The Seagreen 1A Project is located in the Firth of Forth and the outer Firth of Tay region of North Sea and consists of one buried HVAC subsea export cable, approximately 110km in length. The cable will connect one of the two Seagreen Project offshore substation platforms (OSPs), to landfall at Prestonpans Beach, east of the former Cockenzie power station in East Lothian.

At landfall, the offshore export cable will connect to an onshore export cable for transmission to an onshore substation and connection to the National Grid network thereby facilitating the export of renewable energy to the national electricity transmission grid.

The cable will be laid within a licensed cable corridor, running in a generally south-westerly direction from the Seagreen Project turbine array area to the landfall. The cable will be buried wherever possible. Additional protection (primarily loose rock) will be used where burial cannot be achieved to the target depth.

The location of the Seagreen 1A Project is shown in Figure 3-3. The export cable corridor commences within the Seagreen Project array area and passes:

- West of (and partially overlaps with) Berwick Bank OWF (pre-consent)
- East and south of Inch Cape OWF (post-consent), crossing the consented export cable corridors for this project
- North and west of Neart na Gaoithe OWF (under construction)

The export cable corridor is located parallel to the consented Inch Cape export cable corridor to landfall.

It is currently anticipated that offshore construction of the export cable (including landfall construction works and installation of cable protection) will take approximately 12 months.

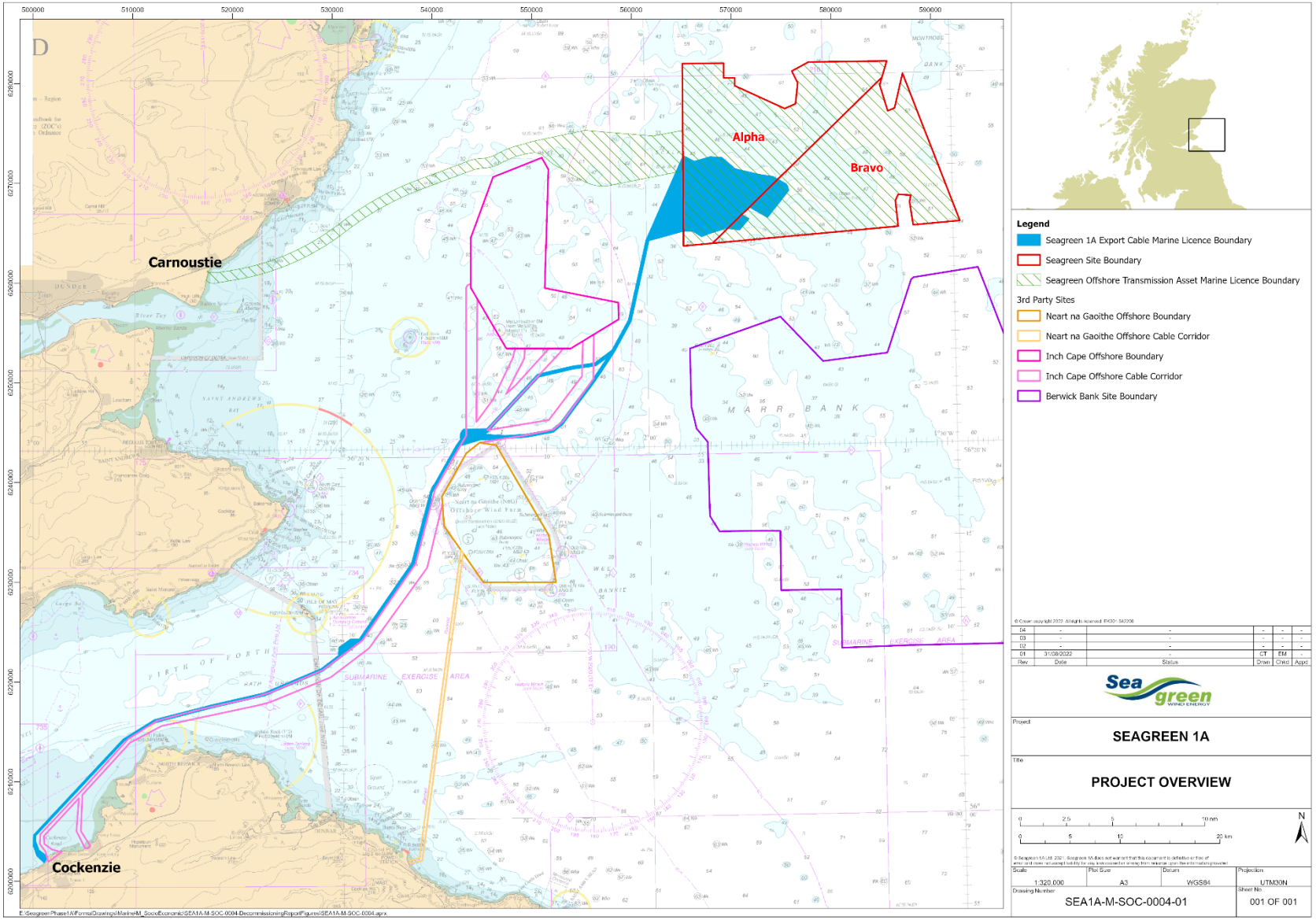


Figure 3-3 – Seagreen 1A Project Location

3.3 Seagreen Project Area Characteristics

A range of surveys have been completed by Seagreen to establish the characteristics of the Project Area. These studies informed the EIA for the Project, reported as part of the ES and ES Addendum. The following sections provides a summary of information from those documents to inform consideration of the decommissioning provisions and is reflective of environmental attributes identified in the Scottish Government Guidance and the BEIS Guidance. Refer to the ES and ES Addendum for full baseline descriptions, data sources and references.

3.3.1 Physical Characteristics

3.3.1.1 Met-Ocean Conditions

Strong winds can occur throughout the North Sea, with wave heights varying greatly due to fetch limitations and water depth effects. Waves in the northern North Sea can be generated either by local winds or from remote wind systems.

In the stormiest event over the 18-month wave buoy deployment (Dec 2010 to May 2012) as part of the Seagreen metocean survey a significant wave height of 6.7 m was recorded on 3 January 2012 which correlates with a 1 in 1 year sea wave climate return period event.

Tidal measurements undertaken at 8 moorings across the Project Area demonstrated a strong semi-diurnal signal throughout the duration of metocean deployment (Dec 2010-May 2012). A maximum current speed of up to 0.9m/s was recorded. Flood and ebb current directions are aligned generally parallel with the adjacent coastline. The maximum tidal range is 4.4m, mean spring tide range at the site is 3.3m, and the mean neap tidal range is 1.6m. The greatest Highest Astronomical Tide (HAT) and Lowest Astronomical Tide (LAT), relative to Mean Sea-Level (MSL) were 2.6 m and -2.6 m, respectively.

The tidal regime within the Project Area is semi-diurnal in nature and characterised by a variable mean spring tidal range. Currents are primarily driven by tides with a residual component generally dominated by storm driven currents (Ramsay & Brampton, 2000). The pattern of tidal elevations across the outer Firth of Forth is governed by a southerly directed flood tide that moves along the eastern coastline of Scotland into the Firth of Forth and around Fife Ness.

3.3.1.2 Bathymetry

The water depth across both the Alpha and Bravo OWF sites is generally in the range 40–60m (above lowest astronomical tide, LAT), with a greater area in Alpha at the shallower end of this range. The seabed comprises undulating coarse sands and gravels with occasional clusters of boulders. The maximum depth (86.2m LAT) is observed to the northwest of Project Alpha where a relatively deep northeast to southwest orientated channel crosses the sea floor. The shallowest areas occur along the north-south orientated Scalp Bank to the west of Project Alpha. There are limited areas of steeply sloping seabed associated with the channel feature across the northwest of Project Alpha however the majority of the seabed across Project Alpha and Project Bravo can be characterised as having a slight gradient (0° to 5°).

Depths along the OTA Corridor range from 3m above LAT close to the coast to approximately 69m below LAT in close proximity to Project Alpha.

Seabed levels within the central section of the OTA Corridor undulate between 39m below LAT and 69m below LAT, as the route crosses a series of frequently broad, gently-sloping (≤2.6°) ridges or mounds of gravelly sands/ sandy gravels.

3.3.1.3 Geology and Seabed Sediments

Megaripples are the predominant feature across the seabed, with isolated sand waves in the western half of the OWF sites. Boulders are prevalent across the sites and are either represented as isolated boulders or as clusters. All of the features are characteristic of various stages of sediment erosion and transportation produced by fluid movement (waves and currents) over sediments.

Variable, generally granular sediments are present on the seabed across much of the OTA Corridor. The seabed sediments comprise silty fine sands, only broken by a number of irregular patches of coarser grained, fine to medium sands and larger patches of much coarser sandy gravels, with frequent small boulders.

3.3.2 Biological Environment

3.3.2.1 Benthic

Surveys were undertaken to characterise the marine plants and animals on the seabed within the Project Area as part of the EIA. The Project Alpha and Project Bravo OWF sites were found to be typical of the region and contained large areas of featureless, sediment dominated seabed with patchy communities of worms and shellfish. The only species of conservation importance found to be living within Project Alpha and Project Bravo OWF sites was the long-lived ocean quahog (*Arctica islandica*), however only small numbers of young specimens were identified.

Ross Worm *(Sabellaria spinulosa)* was present across the OWF sites which is a common and widely distributed species of high conservation value when found growing in reef structures. However, there was no evidence that it was forming reef structures within the surveyed areas.

A slightly more diverse range of species and habitats were found along the OTA Corridor, but no further species of conservation importance were identified. A survey of the landfall location at Carnoustie indicated it to be typical of a sand beach with few species present.

3.3.2.2 Fish and Shellfish Ecology

The lesser sandeel (*Ammodytes marinus*) was the most numerous species caught during the benthic trawl surveys, followed by common dab (*Limanda limanda*), goby (*Pomatoschistus norvegicus*), pogge (*Agonus cataphractus*) and butterfish (*Pholis gunnellus)*.

Landings data indicated that key fish and shellfish species of commercial importance occurring within or in proximity to the Project Area include scallop (*Pecten maximus and Aequipecten opercularis*), crab (*Cancer pegarus*), lobster (*Homarus gammarus*) and nephrops (*Nephrops norvegicus*).

The wider study area of the project overlaps or is in close proximity to spawning and nursery grounds for cod (*Gadus morhua*), lemon sole (*Microstomus kitt*), herring (*Clupea harengus*), Nephrops (*Nephrops norvegicus*), mackerel (*Scomber scombrus*), plaice (*Pleuronectes platessa*), sandeel (Ammodytes marinus), saithe *(Pollachius virens*), sprat (*Sprattus sprattus*) and whiting (Merlangius merlangus).

Sandeel (a PMF and Scottish Biodiversity List species) are found in sandy substrates only so are unlikely to be present at high densities in muddy substrates. The highest density of this population is focused on the Wee Bankie, some 30km south of the Project Area however sandeels were found in the benthic trawls and drop-down camera surveys across the OWF sites and within the OTA Corridor.

Nephrops are found in high densities in the muddy substrates throughout the Firth of Forth and within the Project Area. However, nephrops were not recorded in any of the benthic surveys commissioned for the EIA. Additionally, it is noted that Nephrops have a relatively high tolerance to seabed disturbance due to their natural behaviour of burrowing.

Scallops are found in relatively low numbers within the Project Area. Scallops are sedentary and specifically settle on clean, firm sand, fine gravel or sandy gravel which is recorded small sections of the offshore part of the Project Area only.

It is assumed from the EIA and existing studies in the region that Atlantic salmon (Salmo salar) may utilise the Project Area for migration. Atlantic salmon is an Annex II species under the Habitats Directive, a Scottish Biodiversity Species and is of cultural, recreational and commercial importance in Scotland.

3.3.2.3 **Marine Mammals**

In support of the EIA, marine mammal activity in the Project Area was characterised using data from boat-based surveys, seal tracking studies, aerial surveys and existing published sources. A collaborative approach was adopted with the other wind farm developers in the Firth of Forth, via the Forth and Tay Offshore Wind Developers Group (FTOWDG). The key cetacean species are harbour porpoise (*Phocoena phocoena*) and bottlenose dolphin (*Tursiops truncatus*). Harbour seal (*Phoca vitulina*) and grey seal (*Halichoerus grypus*) are also of particular importance due to the proximity of internationally designated haul out and breeding sites.

Noise impacts from pile driving have the greatest potential to cause a significant effect to mammal species. It should be noted that as a result of Seagreen adopting a suction caisson solution for the WTG foundations, noise impacts from piling are limited to the two offshore substation platform installations.

3.3.2.4 **Ornithology**

The offshore areas of the Project Area (approximately 4 to 30km from the coast) are well within the regular forging range of several seabird species breeding on islands in the Firth of Forth, in particular Isle of May, Bass Rock and Craigleith. All these islands are part of the Forth Islands SPA and support large numbers of breeding seabirds in particular, gannet, European shag, gull species (herring gull, lesser black-backed gull and kittiwake), tern species (Sandwich tern, common tern and Arctic tern and the very rare roseate tern) and auk species (common guillemot, razorbill and puffin). A number of seabird species regularly occur as passage migrants or winter visitors, most notably little gull (a species listed on Annex 1 of EU Birds Directive), Sandwich tern, Arctic skua and little auk.

3.3.3 Human Environment

3.3.3.1 Offshore Wind Farms

The Alpha and Bravo OWFs are close to the Inch Cape and Neart na Gaoithe offshore wind farms which lie in Scottish territorial waters (<12nm) approximately 9km to the west and 27km to the southwest respectively. Under 5km to the south of the Bravo project boundary lies the northern boundary of the Berwick Bank OWF.

3.3.3.2 Oil and Gas Exploration Activities

There are no known active oil and gas licence blocks located within or in close proximity to the OWF sites. The majority of blocks surrounding the Project Area are open but have never been licensed. The blocks at the northwest boundary of the Project Area, are open and were previously licensed. A single historical exploratory well (found to be dry, plugged and abandoned in 1985) is present within the Bravo site.

The nearest marine gas pipeline (FM13, owned and operated by National Grid) is approximately 7.5 km east of the export cable route in the mouth of the River Tay. The next closest gas pipeline is over 100km (St Fergus), and the nearest oil pipeline is 75km away (Cruden Bay).

3.3.3.3 Subsea Cables

There are no known active or disused, subsea cables located within the Project Area. The nearest active cables are Cantat 3 and Pangea North (both telecommunications cables) located over 200km south of the project.

3.3.3.4 Ports and Harbours

There are several ports in the vicinity of the Project Area including Montrose, Arbroath, the Port of Dundee and Aberdeen South Harbour.

3.3.3.5 Shipping and Navigation

The Alpha and Bravo OWF sites are located in an area of relatively low commercial shipping density. The main east-west shipping routes through the sites are between the Firth of Forth ports, Dundee or Montrose and destinations in Europe. The main north-south routes through the site run north to south between Aberdeen and the south of England or European destinations. There are other north-south routes that pass inshore or offshore of the sites. Those passing inshore cross the OTA Corridor. On average less than one vessel per day use any of these routes.

3.3.3.6 Commercial Fisheries

Principal Commercial Fisheries activities in the Project Area have been identified as:

- Scallop Fishing by boat dredges.
- Whitefish (principally haddock) by seine netters and demersal trawlers.
- Squid Fishing by trawlers.
- Crab and lobster fishing with creels.

The principal fishing activity occurring within the OWF sites is boat dredging for scallops. The large majority of activity is recorded by nomadic vessels over 15m in length. The crab and lobster static gear (creels) fishery extends across a wide area where seabed conditions are suitable, with grounds overlapping the OTA Corridor and western boundary of Project Alpha.

Static gear fishing is the main activity in nearshore waters, largely undertaken by locally based small (<10m) vessels. The scallop fishery is cyclical in nature, with activity currently relatively high. The static gear fishery is year-round but is at its lowest during winter. Squid trawling is an increasingly important fishery. Activity takes place during summer and autumn and catches are variable. Most squid fishing activity takes place inshore of the Alpha and Bravo OWF sites.

While the key Nephrops grounds are south of the OTA Corridor going into the Firth of Forth a limited, but locally important Nephrops fishery occurs off the Arbroath coast. An area named locally as the Goaty Trink is crossed by the OTA Corridor, which is considered by the local fishermen to be a gateway to other local inshore grounds.

It is recognised that potential changes to the commercial fisheries baseline are anticipated over the lifetime of the project prior to decommissioning. Communication with the fisheries and mitigation and management of any issues arising during operation of the wind farm are being managed on an ongoing basis via the Fisheries Mitigation and Management Strategy (FMMS) plan and regular meetings with the fisheries. This interaction will be maintained throughout the operational life of the windfarm and during decommissioning.

3.3.3.7 Aviation and Military Interests

The export cable landfall at Carnoustie is adjacent to the MOD Barry Buddon firing range, which is used for small weapons practice. The OTA Corridor lies within the firing range danger area that extends approximately 2km from the shoreline. Agreement of a management plan with the MOD will be required to enable offshore cable installation to take place at the landfall end.

The OWFs are in line of sight of the air traffic control (ATC) radar for RAF Leuchars in Fife and the National Air Traffic Service (NATS) radar at Perwinnes in Aberdeenshire. The wind farms also have the potential to interfere with the operation of the air defence radars at Buchan in Aberdeenshire and Brizlee Wood in Northumberland. Both MOD and NATS raised objections to the OWF applications based on these effects. These objections were removed subject to conditions requiring mitigation to be implemented.

No aviation issues have been identified regarding the OTA.

3.3.4 Nature Conservation Designations

Table 3-1 lists the Special Areas of Conservation (SAC) and Special Protection Areas (SPAs) that were screened as having the potential to interact with the Seagreen Project, and their relevant qualifying features that required further assessment.

Table 3-1 – Nature Conservation Designations

Site	Type	Qualifying features requiring further assessment	Assessment outcome
Forth Islands	SPA	All qualifying features	No Likely Significant Effect
Fowlsheugh	SPA	All qualifying features	No Likely Significant Effect
St Abbs Head to Fast Castle	SPA	All qualifying features	No Likely Significant Effect
Outer Firth of Forth and St Andrews Bay	SPA	All seabird and waterfowl qualifying features	No Likely Significant Effect
Firth of Forth	SPA	All seabird and waterfowl qualifying features	No Likely Significant Effect
Berwickshire and North Northumberland Coast	SAC	All qualifying features	No Likely Significant Effect
Isle of May	SAC	Grey seals, reefs	No Likely Significant Effect
Firth of Tay and Eden Estuary	SAC	Harbour seals	No Likely Significant Effect
Moray Firth	SAC	Bottle nose dolphin	No Likely Significant Effect
South Esk, Tay, Teith, Tweed SAC	SAC	All qualifying features	No Likely Significant Effect
Firth of Forth Banks Complex	NCMPA	Ocean quahog aggregations	No Likely Significant Effect

3.4 Seagreen 1A Project Area Characteristics

A range of desktop studies and in-field surveys were completed by Seagreen 1A to establish the characteristics of the Project Area. These studies informed the scoping process undertaken as part of the EIA for the Seagreen 1A Project and are presented in the EIA Report (Seagreen 1A, 2021 – see also section 6) or, in the case of those topics scoped out of the EIA, in the Scoping Report (Seagreen 1A, 2020). The following subsections provides a summary of information from those documents to inform consideration of the decommissioning provisions. Refer to the EIA Report and Scoping Report for full baseline descriptions, data sources and references.

3.4.1 Physical Characteristics

3.4.1.1 Metocean Conditions

The mean spring tidal range across the Firth of Forth is in the order of 4m, increasing from outer areas towards the inner firth and estuary, due to the funnelling effect of the coastline the mean spring tidal range increases from approximately 4.4m in the vicinity of the Seagreen Project site to approximately 5.2m in proximity to the landfall. The duration of the flood is longer, corresponding to faster flow speeds on the ebb. The flow directions are mostly parallel to the coastline, resulting in variations in the flow direction along the

Project Area. The mean spring current speeds along the Project Area range between 0.25 and 1.0m/s, increasing across the entrance of the Firth of Forth. Mean neap current speeds are slower at speeds of between 0 and 0.5m/s along the Project Area.

Waves across the Project Area have an approach from the east to northeast associated with long-period swell waves and from the southwest associated with fetch limited locally generated wind waves. The dominant wave direction along much of the Project Area is from the northeast. The characteristic wave properties along the Project Area generally reduces towards the coast, due to depth limited influence of the seabed and the sheltering afforded by the coastline. Therefore, the most common significant wave heights associated with winter conditions can vary between less than 0.75m on approach to the landfall to up to 2m, in proximity to the Seagreen Project, with isolated events of up to 5m. Significant wave heights associated with summer conditions are considerably lower, with maximum heights of 1m at the offshore extent.

3.4.1.2 Bathymetry

The seabed slopes relatively smoothly from the coast to around 50m water depth on the Wee Bankie. Across the outer Firth of Forth and towards the Inch Cape, Seagreen, Neart na Gaoithe and Berwick Bank offshore wind developments, there are a number of bedforms and deeps ranging in depth between 40m and 80m. Tidally dominated seabed bedforms from mega-ripples to sandbanks are present along the Project Area, with evidence of movement associated with these features.

3.4.1.3 Geology and Seabed Sediments

There are several bedrock lithologies along the Project Area. The Firth of Forth is underlain by Carboniferous rocks which characterise the bedrock geology. The Carboniferous geology includes a zone of Coal Measures, which extends across the firth at Edinburgh. Elsewhere, the pre-Coal Measures (Namurian) sandstones and mudstones are largely of deltaic and fluvial origin, including oil-shales and thin limestones. Notably, some of these geological features are unconformably exposed at the coast, resulting in the designations associated with the Firth of Forth Site of Special Scientific Interest (SSSI).

The seabed sediment across much of the Firth of Forth predominantly comprises Holocene deposits of unconsolidated sand and gravel, particularly in the outer firth, with increasing silt and mud content towards the inner firth. Sediments range from sand to gravelly muddy sand with the mid-section of the Project Area characterised by muddy sand or sandy mud, in some cases with a very small proportion of gravel. Muddier sediments are present closest to the landfall with sediments grading to sandier sediments in the mid-section and offshore section of the Project Area. Sediments with the highest percentage of sand are found furthest offshore (within the Seagreen Project array area).

3.4.2 Biological Environment

3.4.2.1 Benthic

Three biotopes were identified during benthic validation surveys conducted in support of the EIA, consistent with the mud and sand sediments present within the Project Area:

- SS.SMu.ISaMu.MelMagThy (*Melinna palmata* with *Magelona* spp. and *Thyasira* spp. in infralittoral sandy mud)
- SS.SMu.CSaMu.AfilMysAnit (*Amphiura filiformis*, *Mysella bidentata* and *Abra nitida* in circalittoral sandy mud)
- SS.SMu.CFiMu.SpnMeg (seapens and burrowing megafauna in circalittoral fine mud)

A sea pen and burrowing megafauna community assessment identified that SS.SMu.CFiMu.SpnMeg is present across the majority of the mid-section of the Project Area. This is a protected habitat, being listed as a Scottish PMF, an OSPAR threatened and declining habitat as well as being component of the Scottish PMF 'burrowed mud'.

Sabellaria was recorded at low abundance and did not indicate the presence of *Sabellaria* reef habitat in the offshore section of the Project Area. Sampling within the Forth of Firth Banks Complex NCMPA recorded sand and mud habitats with small areas of gravelly sediment which reflects the designated features of the NCMPA.

3.4.2.2 Fish and Shellfish Ecology

A review of fish sensitivity data undertaken for the EIA indicates that the Project Area is within reported spawning and nursery grounds for cod (*Gadus morhua*), plaice (Pleuronectes platessa), lemon sole (*Microstomus kitt*), sandeel (*Ammodytes marinus* and *Ammodytes tobianus*), nephrops (*Nephrops norvegicus*) and whiting (*Merlangius merlangus*).

In addition, the Project Area is within or near nursery grounds for anglerfish, blue whiting, common skate, European hake, ling, mackerel, saithe, spotted ray, spar, spurdog and tope shark.

Sandeel (a PMF and Scottish Biodiversity List species) are found in sandy substrates only so are unlikely to be present at high densities in muddy substrates which comprise the majority of the Project Area. Existing studies indicate that sandeel may be present further offshore in the north-eastern part of the Project Area.

Nephrops are found in high densities in the muddy substrates throughout the Firth of Forth and within the Project Area. It is understood that Nephrops have a relatively high tolerance to seabed disturbance due to their natural behaviour of burrowing.

Scallops are found in relatively low numbers within the Project Area. Scallops are sedentary and specifically settle on clean, firm sand, fine gravel or sandy gravel which is recorded in the offshore part of the Project Area only.

Key fish and shellfish species of commercial importance occurring within or in proximity to the Project Area include scallop (*Pecten maximus*), crab (*Cancer pegarus*), lobster (*Homarus gammarus*) and nephrops. There are no significant whitefish landings from the area.

It is assumed from the Seagreen Project EIA and existing studies in the region that Atlantic salmon (*Salmo salar*) may utilise the Project Area for migration. Atlantic salmon is an Annex II species under the Habitats Directive, a Scottish Biodiversity Species and is of cultural, recreational and commercial importance in Scotland.

The Project Area, or waters in the vicinity, may be used by sea lamprey (*Petromyzon marinus*) and, occasionally, European eel (*Anguilla* anguilla) during migration from Scottish rivers.

3.4.2.3 **Marine Mammals**

Four cetacean species are known to frequently or seasonally visit the waters off the east coast of Scotland, including the Firth of Forth, which have been recorded in the region around the Project Area: harbour porpoise; bottlenose dolphin; minke whale (*Balaenoptera acutorostrata*) and white-beaked dolphin (*Lagenorhynchus albirostris*). Several other species may visit infrequently or seasonally in low abundance.

Density estimates from the most recent SCANS-III surveys indicated harbour porpoise are the most abundant species within the vicinity of the Project Area, with an estimated density of between 0.5 and 0.6 animals/km². This estimate is high compared with density estimates for bottlenose dolphin, white-beaked dolphin and minke whale.

There are no protected sites immediately adjacent to the Project Area designated for cetaceans. The closest is the Southern Trench NCMPA located 91.7km north of the Project Area.

The Moray Firth SAC is located 147.7m northeast of the Project Area and is designated for supporting the only known resident population of bottlenose dolphins in the North Sea. It is recognised that small sub-groups of bottlenose dolphins from the Moray Firth SAC may transit along the coast to the Firth of Forth, though they predominantly utilise the more accessible sheltered waters of estuaries further north. Given their affiliation for very shallow waters, the Project Area is not considered to form important habitat for this species.

Both harbour and grey seals may be present within the Project Area. Grey and harbour seals forage in coastal and offshore waters, depending on the seasonal distribution of their prey. However, both species tend to be concentrated close to shore, particularly during the breeding and pupping seasons which occurs from May to July for harbour seals and September to December for grey seals. Tagging studies indicate that at-sea habitat use by both harbour and grey seal is low compared to other locations in Scotland and to other regions in the North Sea, respectively.

The Isle of May SAC (designated for the protection grey seals) is located 3.9km northwest of the Project Area, and the Firth or Tay and Eden Estuary SAC (designated for the protection of harbour seals) is location 30km north of the Project Area.

3.4.2.4 **Ornithology**

The **offshore** areas of the Project Area (approximately 4 to 30km from the coast) are well within the regular forging range of several seabird species breeding on islands in the Firth of Forth, in particular Isle of May, Bass Rock and Craigleith. All these islands are part of the Forth Islands SPA and support large numbers of breeding seabirds in particular, gannet, European shag, gull species (herring gull, lesser black-backed gull and kittiwake), tern species (Sandwich tern, common tern and Arctic tern and the very rare roseate tern) and auk species (common guillemot, razorbill and puffin). A number of seabird species regularly occur as passage migrants or winter visitors, most notably little gull (a species listed on Annex 1 of EU Birds Directive), Sandwich tern, Arctic skua and little auk.

The ornithological importance of the offshore part of the Project Area is recognised through two nature conservation designations: the Forth Islands SPA and Outer Firth of Forth and St Andrews Bay SPA. The Project Area overlaps with both sites.

The south-western most 16 km of the Project Area (i.e. the marine parts to the southwest of North Berwick headland) pass thorough **inshore** marine waters. These differ from the offshore areas (though the change occurs gradually) in having greater shelter, shallower depths (<25m) and being closer to the coast (1 to 4km). These inshore waters provide foraging for breeding seabirds in particular shag, gull and tern species. They also provide important foraging and resting habitat for wintering red-throated diver, grebe and seaduck species.

The ornithological importance of the inshore waters part of the Project Area is recognised through three nature conservation designations, all of which overlap the Project Area: Firth of Forth SPA, Forth Islands SPA and Outer Firth of Forth and St Andrews Bay SPA.

Note: Impacts on ornithological receptors were scoped out of the EIA for the Project due to the scope, nature, and duration of the construction (and decommissioning) works.

3.4.3 Human Environment

3.4.3.1 Seascape, Landscape and Visual

SLV was scoped out of the EIA as there are no impact pathways for a subsea cable during the operational phase. The presence of up to two installation vessels in an active shipping area was not considered to have any SLV impacts. Visual disturbance for landfall works, which are close to residential receptors, were considered as part of the onshore planning application and supporting environmental information.

3.4.3.2 Marine Archaeology and Cultural Heritage

No marine cultural heritage statutory designations are present within the Project Area.

Current research indicates that there is potential for submerged Holocene sediments and prehistoric remains evidencing human activity to survive in this part of the North Sea, but the chances of survival are low for remains of moderate or higher importance.

Five known shipwrecks are understood to be located within the Project Area, although the history of military activity means the presence of other shipwrecks, aircraft, UXO and other archaeological and heritage assets is possible. Magnetic anomalies identified during geophysical surveys of the Project Area will be assessed for their anthropogenic potential and avoided as the primary mitigation strategy.

3.4.3.3 Shipping and Navigation

A total of twelve months AIS data from January to December 2019 was used to inform the baseline shipping analysis. A study area was defined as a 5 nm buffer around the Project Area. There was an average of 34 unique vessels recorded per day within the study area during the 12-month period. The most common vessel type recorded within the study area was fishing vessels which accounted for 32% of the overall distribution,

followed by tankers (26%) and cargo vessels (19%). It is noted that recreational craft and small fishing vessels less than 15 m in length may be under-represented due to AIS carriage requirements.

There are various ports and terminals in close proximity to the Project Area. Within the Firth of Forth are the ports of Leith, Rosyth and Grangemouth, the oil terminal at Hound Point and the gas terminal at Braefoot.

Forth Ports Limited exercises jurisdiction over all the waters of Firth of Forth and the River Forth. Approximately 31 km of the offshore Project Area lies within the limit of authority of Forth Ports Ltd.

A number of designated anchorage areas and anchor berths are located in the Firth of Forth and along the east coast of Scotland, one of which intersects the Project Area.

3.4.3.4 Commercial Fisheries

Commercial fisheries activity in and the vicinity of the Project Area primarily consists of:

- *Nephrops* (demersal trawls)
- Scallop (dredging)
- Squid (demersal trawls)
- Lobster and crab (static gear - creels)

Nephrops fishing is most intensive in nearshore areas, corresponding to the muddy substrates in this area. Lobster and crab fisheries are generally located further offshore with scallop dredging predominating at the central and northern sections of the Project Area (and within the Seagreen Project array area).

3.4.3.5 Military and Civil Aviation

Military and aviation were scoped out of the EIA as there are no impact pathways for a subsea cable during the operational phase. The presence of up to two installation vessels in an active shipping area was not considered to have any impacts on aviation.

The Project Area intersects a number of Ministry of Defence (MOD) practice and exercise areas (PEXA), including submarine exercise and firing practice areas. No restrictions are placed on the right to transit the firing practice areas at any time. Exercises and firing only take place when the areas are clear of all shipping and therefore are not expected to impact upon decommissioning works.

3.4.3.6 Other Human Activities

The Project Area is in close proximity to, or crosses/overlaps the Neart na Gaoithe, Inch Cape and Berwick Bank OWF projects. These projects are in construction, pre-construction and pre-consent phases respectively.

Crossing and proximity agreements will be entered into with the owners of these projects as required. Crossing of the Inch Cape OWF export cables will be required and the existence of one or more crossings may have implications for export cable removal (see section 5.4).

No oil and gas exploration or extraction infrastructure are located in the vicinity of the Project Area. A National Grid gas pipeline crosses the Project Area. No other pipeline or submarine cable infrastructure is known to be present.

3.4.4 Nature Conservation Designations

Table 3-2 lists the SACs and SPAs that were screened as having the potential to interact with the Seagreen 1A Project, and their relevant qualifying features that required further assessment.

Table 3-2 – Designated sites screened for further assessment

Site	Type	Qualifying features requiring further assessment	Assessment outcome
Firth of Forth Banks Complex	NCMPA	Ocean quahog aggregations	Not Capable of Affect
Forth Island	SPA	All qualifying features	No Likely Significant Effect
Outer Firth of Forth and St Andrews Bay	SPA	All seabird and waterfowl qualifying features	No Likely Significant Effect
Firth of Forth	SPA	All seabird and waterfowl qualifying features	No Likely Significant Effect
Isle of May	SAC	Grey seals	No Likely Significant Effect
Firth of Tay and Eden Estuary	SAC	Harbour seals	No Likely Significant Effect

No in-combination effects with other projects on any of the designated sites assessed were identified.

4. Description of items to be Decommissioned

This section describes the key components of the Projects that will be decommissioned. Further details of the decommissioning process are set out in Section 5.

It should be noted that the transmission assets (defined in sections 4.3, 4.5 and 4.6) will be sold to an OFTO and thereafter the responsibility for decommissioning will transfer to the OFTO.

4.1 Wind Turbine Generators

Horizontal axis WTGs will be used which are made up of three main external components as follows.

- Rotor – comprised of the blades, hub, spinner and spinner bracket
- Nacelle - housing the electrical generator, the control electronics and gearbox, adjustable speed drive or continuously variable transmission
- Structural support - including the tower and rotor yaw mechanism which allows the WTG rotor to turn against the wind

The main components to be decommissioned are summarised in Table 4-1.

Table 4-1 – WTG components to be decommissioned

Component	Quantity	Image
Wind turbine tower sections	150 towers in up to 3 sections	
Wind turbine nacelles	114 Mitsubishi Vestas Offshore Wind (MVOW) nacelles 36 Siemens Gamesa Renewable Energy (SGRE) nacelles	
Wind turbine blades	150 x 3 rotor blades	

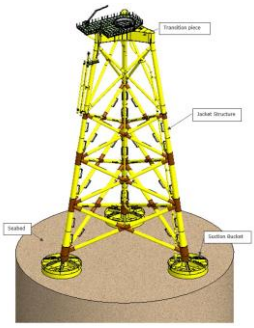
4.2 Wind Turbine Support Structures (Foundations and Substructures)

The selected WTG foundation type for the Project is a steel lattice jacket structure supported by suction bucket caissons. Each foundation structure will be comprised of the suction bucket caissons, the jacket structure and the jacket transition piece.

Note: Suction bucket caissons are the confirmed foundation type for the 114 turbines comprising Phase 1 of the Seagreen Project. They are the most likely foundation option for the 36 turbines comprising Phase 1A. However, should an alternative foundation option be selected for Phase 1A, this DP will be reviewed and updated in accordance with section 2.4.

The main components to be decommissioned are summarised in Table 4-2.

Table 4-2 – Support structure components to be decommissioned

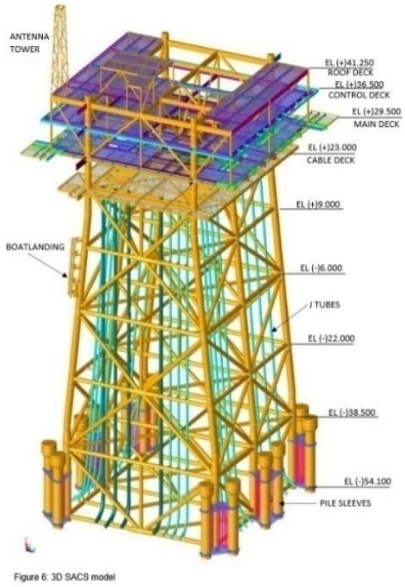
Component	Quantity	Suction Caisson Jacket
3- or 4-legged jacket structures	150	 
Suction bucket caissons	450 (150 x 3)	
Transition Piece	150	

4.3 Offshore Substation Platforms (OSPs)

Two OSPs will be installed to collect the generated electricity and convert from 66 kV to 220 kV for transmission to shore by the three export cables.

Each of the OSPs is comprised of two main elements: the topside and the support structure. The main components to be decommissioned are summarised in Table 4-3.

Table 4-3 – Summary of OSP components to be decommissioned

Component	Description	OSP drawing
OSPs	Two OSPs comprising: • Two OSP topside modules • Two 6-legged jacket substructures with 2 pin piles per leg (12 pin piles in total per OSP) • Pin piles will be cut 1m below the seabed and left in-situ	

4.4 Inter-array and OSP Interconnector Cables

The inter-array cables are the cables which connect the WTGs to each other and to the OSPs. An interconnector cable will be installed between the two OSPs. The main components to be decommissioned are summarised in Table 4-4.

Table 4-4 – Summary of array cable components to be decommissioned

Component	Description	Image
Inter-array cabling	3-core 66kV armoured submarine cable Circa 355km of inter-array cables to connect strings of WTGs on suction bucket caissons together and to connect these WTGs to the OSPs	Example 3 core cable 
Interconnector cable	3-core 66kV armoured submarine cable circa 3 km in total length	

4.5 Offshore Transmission Works - Export Cables

HVAC export power cables will connect to the OSPs and run to the cable landfall points at Carnoustie (Seagreen Project) and Cockenzie (Seagreen 1A Project) where they will connect with the respective onshore transmission works. The main components to be decommissioned are summarised in Table 4-5.

Table 4-5 – Summary of export cabling to be decommissioned

Component	Description	Image
Export cables (Seagreen)	From OSP to landfall (approx. 63 km length, 190 km total): One armoured submarine 3-core 220kV cable per circuit (three circuits) consisting of aluminium/copper conductors with a cross-sectional area of 1200mm²	Example 3 core cable 
Export cables (Seagreen 1A)	From OSP to landfall (approximately 110 km length) One armoured submarine 3-core 220kV or 275kV cable consisting of aluminium/copper conductors with a cross-sectional area of 1200mm²	

4.6 HDPE Duct

High-density polyethylene (HDPE) ducts will be installed under the coastal defence at both landfalls. The export cables will be pulled through the ducts from a winch positioned in the transition bay onshore (above MHWS). The duct facilitates installation and provides protection to the cable. The main components to be decommissioned are summarised in Table 4-6.

Table 4-6 – Summary of duct components to be decommissioned

Component	Description	Image
HDPE Duct (Seagreen)	Three 400m sections of HDPE duct running from the transition joint bay on the landward side of MHWS to 400m offshore from MHWS	Example duct 
Export cables (Seagreen 1A)	One section of HDPE duct running from the transition joint bay on the landward side of MHWS to a point offshore from MHWS (length to be confirmed)	

4.7 Cable and Scour Protection

Cable protection will only be installed where necessary. The preference is for the cable to be buried, however there may be certain areas of harder ground conditions where the cable cannot be buried to a depth which provides the necessary protection. In these areas, the cable may require some form of additional protection. Cable protection will also be used where the Seagreen 1A cable crosses other cables and pipelines.

Cable protection will primarily consist of crushed rock berms on the free-span sections of cable. The rock berms will typically be 6m wide and 1m high. Crushed rock is the industry standard solution for protecting long sections of cable and installation has cost, practicality, safety and programme benefits over other forms of cable protection. Approximately 10% of the Seagreen Project export cable route, 10% of the inter-array cables and 20% of the Seagreen 1A Project is estimated to require rock protection.

The Marine Licences allow for the use of grout bags, rock nets and concrete mattresses although it is not currently foreseen that these will be used in significant quantities. Cast-iron shells may be installed at OSP J-tube exits and may also be used to protect the cable in shallow waters adjacent to the landfalls. The licenced volumes of cable and scour protection materials under the Seagreen project consents is provided in Table 4-7.

Table 4-7 – Summary of licenced cable protection and scour materials

Consent/Licence	Cable/scour protection material			
	Stone / Rock / Gravel (size range 50-200 mm)	Concrete Bags/ Mattresses	Grout Bags	Cast Iron Shell Segments
Seagreen Alpha OWF Marine Licence	1,720,000 m^3	30,000 no. 6m x 3m x 1.5m, 1,720,000 m^3	-	-
Seagreen Bravo OWF Marine Licence	1,720,000 m^3	30,000, 6m x 3m x 1.5m, 1,720,000 m^3	-	-
Seagreen OTA Marine Licence	435,000 m^3	No. 15,000, 6m x 3m x 1.5m, 390,000 m^3	-	-
Seagreen 1A Marine Licence	24,000 tonnes (rock)	4,000 tonnes	4,000 tonnes	40 No.

The need for, and type of cable protection used, will be confirmed following installation and the amount of protection that is deposited will be within the envelope of the parameters assessed within the ES and EIAR provided in Table 4-7. In future versions of the DP, Seagreen will update the volumes to reflect the actual seabed deposits for cable and scour protection.

5. Description of Proposed Decommissioning Measures

5.1 Introduction

Decisions will need to be taken as to the next steps for the Projects once they approach the end of their operational life.

Further information on options for end-of-life asset management, the guiding principles considered when developing approaches for decommissioning and the proposed decommissioning measures are provided in this section.

The proposed decommissioning approach for each component is based on current technology, methodologies and good practice. The final details of the DP will be reviewed and confirmed prior to decommissioning of the Project to consider any changes in legislation, guidance, technology, decommissioning methods and good practice.

5.2 End of Life Asset Management

Decommissioning of the Projects is expected to occur at the end of the their operational life (which, in accordance with the Section 36 Consents and Marine Licences for the Seagreen Project is 25 years from the date of commissioning). However, there is potential for these timescales to vary depending on whether Seagreen seeks to repower the wind farm or explore other options for extending the operational life of the Project, subject to securing the necessary consents.

All decisions for end-of-life asset management will be informed by environmental surveys and assessment carried out towards the end of the operational life of the asset. These surveys will be used to provide an assessment of the condition of the infrastructure, the state of the environment and any safety considerations to inform decisions on the best practicable environmental option (BPEO) with regard to proposals for end-of-life asset management. Where no future uses for the export cable asset can be identified, it shall be decommissioned. For the purpose of this programme, full decommissioning at the end of the lifetime of the Seagreen Project is currently the baseline approach.

An overview of the options for end-of-life asset management and repowering for the Seagreen Project are presented below.

5.2.1 Decommissioning and Construction of a New Wind Farm

In the case that wind power is still economically attractive at the time of decommissioning, but the technical integrity of the Seagreen Project is in decline, Seagreen may consider decommissioning and construction of a new wind farm. This would facilitate the installation of modern technology which would likely be preferable to increasing the operations and maintenance (O&M) effort for extending the existing wind farms operational life. Under such a scenario, and subject to all necessary consents being granted, the existing wind farm would be decommissioned, and a new wind farm constructed.

5.2.2 Re-powering

Where the technical integrity of the WTGs is declining but the electrical infrastructure and possibly the foundations remain sound, Seagreen may consider installation of new WTGs on existing foundations. The lifetime of the electrical infrastructure could be up to 50 years and from reference to the oil and gas industry it is anticipated that the lifetime of foundations can be extended outside the design specifications. By closely monitoring the structural integrity of the asset, it could be possible, subject to all necessary consents being granted, to re-use electrical infrastructure and foundations in a re-powering of the wind farm by fitting new WTGs to the existing foundation and electrical systems.

5.2.3 Life Extension

This scenario assumes that most of the Seagreen Project WTGs will continue to perform sufficiently beyond 25 years . Under this scenario, the Seagreen Project operational life would be extended subject to obtaining the relevant consents and would be decommissioned gradually as the WTGs technical integrity declined. A decommissioning campaign would most likely be undertaken when the entire wind farm is shut down, but this could be undertaken in a phased manner if this was found to be more cost effective or if the prevailing regulatory regime required this approach.

5.2.4 Removal

This scenario assumes it is not preferable to invest in new technology and that WTGs and/or their foundations will not continue to perform sufficiently beyond the 25-year lifetime. In this scenario the offshore wind farm and associated components (WTGs, OSP topsides, cables) are removed with no intention of redeveloping the site.

OSP foundations will be cut 1m below the natural level of the seabed, and the approach to decommissioning scour and cable protection will be considered in the final DP, where the approach taken will be in line with the position set out in the Scottish Government guidance (i.e. with the presumption of full removal unless this creates unacceptable risks to personnel or to the marine environment, be technically unfeasible or involve extreme cost.

The asset owners will liaise with other (including future) OWF developers and/or offshore transmission owners (OFTOs) in the vicinity of the Projects to evaluate any potential opportunities for synergy or economies of scale through decommissioning assets at the same time.

5.3 Guiding Principles

The principal aim of the provisions of sections 105 to 114 of the Energy Act 2004 is to restore the marine environment so that it can be used for other purposes including safe navigation. In all cases, the base case is complete removal of all offshore infrastructure, ensuring standards set for removal do not fall below those set by the IMO in 1989.

Seagreen has also considered the UK's commitments under the United Nations Convention for the Law of the Sea (UNCLOS) and the work of the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR).

This means that **Seagreen's starting assumption for decommissioning is the complete removal of the entire offshore wind farm and cable infrastructure**, with the offshore components being transported to shore for re-use, recycling or energy recovery leaving a clear seabed which does not pose a risk or restriction to other users of the sea in line with IMO guidance. This approach aligns with the presumption for full removal set out in section 7.2 of the BEIS Guidance and section 7.5 of the Scottish Government Guidance.

Where there is a requirement to consider alternative solutions involving partial removal, leaving some infrastructure in situ, these alternatives will only be considered where:

- Full removal would involve an unacceptable risk to personnel.
- Full removal would involve an unacceptable risk to the marine environment.
- Full removal would be technically unfeasible.
- Full removal would involve extreme cost. It is considered that design decisions should, as far as possible, result in installations which are affordable to remove but it is recognised that some elements may nonetheless be costly to remove.

The BEIS guidance further recommends considering the application of the Comparative Assessment Framework developed for the oil and gas industry and detailed within the *Decommissioning of Offshore Oil and Gas Installation and Pipelines Guidance Notes* (BEIS, 2018) to determine the best approach for decommissioning infrastructure where complete removal may not be the most appropriate option.

The approach taken by Seagreen to decommissioning the Projects will be informed by the guiding principles set out in Table 5-1below. These are in accordance with the BEIS Guidance and the Scottish Government Guidance and are underpinned by the following:

- Health and safety considerations.
- Best Practicable Environmental Option (BPEO), that is the option which provides the most benefit or least damage to the environment as a whole, at an acceptable cost. This involves balancing the reduction in environmental risk with practicality and cost of reducing the risk.
- Safety of surface and subsurface navigation.
- Other uses of the sea

Table 5-1 - Comparative Assessment criteria and Seagreen objectives

Assessment Criteria	Key Considerations	Seagreen Objectives
Safety	No harm to people	Seagreen is committed to adhering to the highest standards for safety during the life of the Seagreen Project, including the decommissioning phase.
	Consider the rights and needs of legitimate users of the sea	Minimising any real or perceived safety risk to other stakeholders active in the vicinity of the Projects during or after decommissioning.
Environmental	Minimise environmental impact	The option which provides the most benefit or least damage to the environment as a whole in both the long and short term (BPEO).
	Maximise re-use of materials	Seagreen will seek to maximise re-use and recycling according to the waste hierarchy.
Technical	Ensure practical integrity	Methods necessary to achieve the objectives should be practicable, meaning feasible and realistic in the working environment.
Societal	Promote sustainable development	Ensure that future generations do not suffer from a diminished environment or have a compromised ability to use available marine resources.
	Adhere to the Polluter Pays Principle	Recognising the responsibility to sustain the costs associated with the impact on the environment.
Economic	Ensure commercial viability	The BATNEEC (Best Available Technique Not Entailing Excessive Costs) solution will be sought to ensure the commercial viability of the Projects.

5.4 Proposed Decommissioning Process

The approach to decommissioning of the Projects described below builds on the guiding principles set out in Table 5.1 and reflects the UK and Scotland's commitment to seek decommissioning provisions in accordance with national and international legislation and standards.

There will be a requirement to carry out a number of pre-decommissioning studies and surveys in order to determine the most appropriate methods for decommissioning and finalise their detailed design. Results from these pre-decommissioning studies and surveys will be presented in an EIA Report which will be submitted with any application(s) for Marine Licence(s) that will be required for decommissioning of the Projects.

In considering the proposed DP for the Projects, Seagreen has sought solutions for each element of the Projects that follow the guiding principles described in Table 5-1and discussed in Section 5.3. The proposed approach to decommissioning the various components of the Project is presented is Table 5-3below. Each of these approaches are discussed in more detail in the following subsections.

Table 5-2 – Summary of proposals for decommissioning of the Seagreen and Seagreen 1A Projects

Project Component	Proposed Decommissioning Method
Wind Turbines	Complete removal from site
Wind Turbine Support Structures	Complete removal from site
OSP (topsides)	Complete removal from site
OSP Support Structures	Entire jacket structure removed Pin pile foundations to be cut at 1m below the surface of the seabed so that the remaining parts do not pose a danger for shipping or fishing vessels, even if sediments should become relocated, and cut sections removed from site
Cables (inter-array and interconnector)	Complete removal from site *except* where there is a high risk to marine environment. It is anticipated that cable protection (loose rock) and the cable underneath will be left in situ, subject to further environmental assessment
Cables (marine export)	Complete removal from site *except* where there is a high risk to other assets (cable crossings) or to the marine environment, or health and safety concerns (in addition to extreme costs required for the removal). Where cable protection (loose rock) is to remain in-situ, the cable underneath will also remain in-situ.
HDPE duct	Decommissioning in-situ. Removal of the ducts is likely to require significant excavation of the sea defences and intertidal areas resulting in disturbance that is not considered commensurate with the environmental benefits associated with removal. Additionally, the process for Seagreen 1A (Cockenzie landfall) would require construction of a cofferdam requiring a significant campaign which in light of the environmental benefits associated with removal would have unacceptable risks to personnel and the marine environment and extreme costs.
Cable protection	Decommissioning measures will be dependent on the type, quantity and extent of cable protection used. Where loose rock is used, this will be left in-situ since recovery entails significant impacts on the benthic environment, health and safety risks and extreme costs when balanced against the decommissioning guiding principles The proposed decommissioning measures for cable protection will be considered further in future updates of the DP once the type and quantity of any installed protection is known, and will be subject to further environmental assessment

5.4.1 WTGs

WTG decommissioning is carried out step by step with the aid of a crane in reverse order to the installation. The dismantled parts are unloaded on the decommissioning vessel or another suitable vessel. Once the WTGs are disconnected from the electrical distribution and SCADA systems the following approach will be taken:

- De-energise WTGs and isolate from the grid
- Mobilise heavy lift vessel and support vessels
- Removal of three WTG blades (three lifts)
- Removal of the nacelle and hub (single lift)
- Successive dismantling of the tower sections (up to three lifts)
- Transportation by vessels to onshore decommissioning port
- Once onshore the WTGs will be broken down for recycling and/ or disposal:
    - All steel components will be sold and recycled
    - Blades are made of fibreglass and therefore will be transported to a suitable waste facility

Onshore, all components of the wind turbines are dismantled to manageable quantities to be reused or recycled. All remaining hazardous substances will be removed from the WTGs and supplied to a proven recovery facility according to the regulations in force at the time of the dismantling. All steel components are anticipated to be recycled as scrap. The rotor blades made of fibre composites and will be disposed of according to the regulation valid at the time of dismantling.

Table 5.3 below provides an assessment of the WTG decommissioning process against the guiding principles set out in Table 5-1.

Table 5-3 – Assessment of proposed WTG decommissioning process against Guiding Principles

Guiding principle	Complete removal of the WTGs
No harm to people	Safest option involving standard procedures
Consider the rights and needs of legitimate users of the sea	Complete removal of the WTGs is considered the best long-term solution. Appropriate notification and consultation prior to temporary works to minimise disruption
Minimise environmental impact	Very low risk to the environment. Risk of oil leak is low due to the nacelle being a fully contained unit and being removed in a single lift. The remaining WTG components will be dismantled onshore therefore minimising potential for pollution incidents
Maximise re-use of materials	All WTG components will be recycled with exception of the blades which will be disposed of in line with relevant regulations
Ensure practical integrity	Removal methods are tried and tested
Promote sustainable development	WTGs and support structures completely removed from site ensures no ongoing environmental impacts and no restriction on future use of marine resources
Adhere to the Polluter Pays Principle	Consistent, assuming suitable recycling option is found for steel components and a suitable disposal method is adopted for blades
Ensure commercial viability	Extensive cost of removal. Costs associated with removal may be partially offset by recycling of scrap metal

5.4.2 WTG Support Structure

The foundations comprising jacket structure and suction bucket caisson will be decommissioned by 'reverse installation' – the component parts will be removed in the reverse order to that of the original installation. The foundations will be removed following completion of the WTG decommissioning activities and will follow the below methodology:

- Prior to removing the suction bucket jacket foundations, the array cable will be cut after the J-tube exit. The cable within the J-tube and any cable protection at the J-tube exit will be removed with the foundation.
- The foundations will be removed using a heavy lift vessel (HLV). A high-capacity vessel similar to the Saipem 7000 has been assumed. The foundations will be placed on a barge for transport to shore once they are removed.
- The suction bucket foundations will be removed by pumping water into the caisson to release the suction buckets from the mudline, they will then be lifted by the HLV.
- Prior to pumping water into the suction buckets the grout within the suction bucket must be drilled through. It is assumed that this drilling operation takes place from a multi-purpose vessel

(MPV) fitted with a remotely operated vehicle (ROV) and drilling equipment prior to the HLV arriving on site.

- The pumping equipment will be deployed from the HLV, and all three suction buckets will undergo pumping at the same time to release the foundation.
- In tandem to the pumping operation the crane on the HLV will lift the foundation out of the seabed.
- The crane will lift from a connection point on the transition piece and will recover the entire foundation (transition piece, jacket and suction caissons) to a transport barge ready for transportation to the decommissioning port.
- Following removal of the foundation the seabed will be inspected and any debris will be removed leaving a clear seabed surface.

Once the foundations have been returned to shore, they will be dismantled ready for recycling. The foundations contain no environmentally hazardous materials and can be recycled as steel scrap.

Table 5-4 below provides an assessment of the WTG decommissioning process against the guiding principles set out in Table 5-1.

Table 5-4 – Assessment of proposed foundation decommissioning process against Guiding Principles

Guiding principle	Complete removal of the foundations
No harm to people	Safest option involving standard procedures (reverse installation)
Consider the rights and needs of legitimate users of the sea	Complete removal of the foundation is considered the best long-term solution. Appropriate notification and consultation prior to temporary works to minimise disruption
Minimise environmental impact	Very low risk to the environment. The foundations contain no environmentally hazardous materials. Following removal, the seabed will be inspected and restored
Maximise re-use of materials	All foundation components will be recycled
Ensure practical integrity	Removal methods are tried and tested
Promote sustainable development	The foundations are completely removed from site leaving no buried infrastructure ensures no ongoing environmental impacts and no restriction on future use of marine resources
Adhere to the Polluter Pays Principle	Consistent, assuming suitable recycling option is found for steel components
Ensure commercial viability	Extensive cost of removal. Costs associated with removal may be partially offset by recycling of scrap metal

5.4.3 Offshore Substation Platforms (OSPs)

The decommissioning of the OSPs is anticipated to be carried out by a jack-up vessel or HLV. Prior to the commencement of decommissioning, the electrical systems will be de-energised, any liquids, chemicals present will be emptied, and loose items will be removed. The OSP topside will then disconnected from the foundation, rigged to the HLV crane and will be lifted to the HLV or separate barge deck and sea fastened ready for transportation.

For the OSP foundations, the pin piles will be cut at least 1 meter below the seabed using an internal cutting method where possible or if required, excavation by dredging to allow access for an external diamond wire cutting tool which is clamped on to the pile. Once cut the pile is recovered to the decommissioning vessel and the remaining pin pile will covered and left *in situ*. The cut structure (entire jacket and short section of pile) will then be lifted to a the HLV or barge deck and sea fastened ready for transportation to shore. Following removal of the foundation the seabed will be inspected and any debris will be removed leaving a clear seabed surface.

Currently there is not a technical solution to remove entire pin piles from the seabed however should a suitable method be established during the operational life of the wind farm SWEL will reconsider the decommissioning options for the piles. This will be undertaken as part of the ongoing DP reviews proposed at 5 year intervals.

It is anticipated that the substations will be transported from the wind farm area to the decommissioning yard for recycling or re-use. The complete removal of the topsides is seen as the safest option and causes the minimum disruption to the local environment. All dismantling of the offshore substations will take place onshore minimising the risk of liquid spills and allowing maximum potential for reuse of materials.

Table 5-5 below presents an assessment of the WTG decommissioning process against the guiding principles set out in Table 5-1.

Table 5-5– Assessment of OSP decommissioning options against Guiding Principles

Guiding principle	Complete removal of the topside, jacket structure and pin piles	Removal of the topside and jacket with pin piles cut 1m below seabed and left in-situ
No harm to people	Significant excavation of the seabed down to penetration depth (max. 45m) required to remove seabed material prior to pin pile removal. Excavation of any surface sediment would be required to expose the pin pile at the rock layer requiring significant offshore activity. Breaking the grouted connection within the rock layer would require significant time resource and would therefore increase offshore activity. Currently complete excavation and removal of the pin piles is not technically feasible.	Significantly less activity required over a shorter campaign. Depending on the cutting method adopted it may be possible to avoid the use of divers, minimising risk to personnel. Provided the pin pile is cut below the seabed surface there will be no enduring health and safety risk to other sea users. Post decommissioning site monitoring will identify any unlikely exposure with the result that safety risk is insignificant.
Consider the rights and needs of legitimate users of the sea	Full removal would require longer campaigns and may result in significant excavation leaving significant scour holes. Currently complete excavation and removal of the pin piles is not technically feasible.	Negligible risk provided the pin pile is cut at a suitable depth below the seabed surface to ensure the risk of future exposure is minimised. The removal campaign would be significantly shorter causing less disturbance to other sea users.
Minimise environmental impact	Excavation pits over a wide area causing potentially significant impact to marine environment. Associated dumping of excessive volume of excavated waste material may be required. Disturbance would take place over long time period.	Considerably reduced works footprint relative to complete removal. Works would take place over reduced time period and involve less equipment. Seabed recovery time shorter than complete removal scenario.
Maximise re-use of materials	Maximum number of piled foundations potentially available for re-use.	Less foundation material available for re-use relative to complete removal. However, the entirety of the recovered material will be recycled to scrap metal.
Ensure practical integrity	As noted above, not technically viable. Significant risk associated with HLV, considerable excavation needed with associated storage or disposal of large volume of waste. Removal of the pin piles may not be possible in harder substrates.	Tried and tested procedures and equipment, and reduced risk due to minimising of offshore activity.

Guiding principle	Complete removal of the topside, jacket structure and pin piles	Removal of the topside and jacket with pin piles cut 1m below seabed and left in-situ
Promote sustainable development	In the long-term complete removal affords maximum flexibility over use of seabed.	Providing the buried pin piles do not become exposed, future activities will not be affected. The seabed will recover entirely following reinstatement. Note that there are only two OSPs each with six sets of two pin piles (12 in total) and therefore the area affected by the OSPs is very small relative to the wider wind farm area.
Adhere to the Polluter Pays Principle	Consistent in principle, assuming a suitable disposal solution can be found for the excavated waste material and that the seabed can be restored.	Consistent as far as is reasonably practicable, all remains of piled foundations to be below seabed level.
Ensure commercial viability	Costs are considered extreme - excavation and lifting involves major equipment requirements over longer periods of time. Campaign costs significantly higher due to level of risk. As noted above there is currently not a suitable technical and cost effective method of removing pin piles.	Less expensive alternative to complete removal, involving minimal or no excavation and minimising environmental impacts.

5.4.4 Inter-Array, Interconnector and Export Cables

5.4.4.1 General Approach

The proposed baseline approach to the decommissioning of the buried cable is full removal. This approach acknowledges the preferences stated in the BEIS Guidance and the Scottish Government Guidance. However, the final methods that will be used to remove the cables will depend on the outcome of surveys and studies carried out to inform any pre-decommissioning EIA, and conclusions from the assessment of potential effects on benthic habitats and species that have colonised along the export and inter array cable routes, as well as other users of the seabed.

Where, based on the outcome from the pre-decommissioning surveys, studies and EIA, it emerges that there is potential for significant adverse effects on any benthic habitats and species, it *may* be necessary to consider an alternative approach to decommissioning where it may be more appropriate to leave some sections of cable in-situ (see section 5.4.1.2). This will only be the case where removal would create unacceptable risks to personnel or to the marine environment, be technically unfeasible or involve extreme costs.

Cable removal will be completed by reversing the installation process using a similar vessel and equipment spread to that of the installation campaign. The approximate sequence of operations for decommissioning cables is as follows:

- De-burial of the cable routes using a mass flow excavation (MFE) tool. The MFE equipment will use high flow hydraulic pumps to focus water on the seabed to agitate the soil sending seabed material into suspension in the water column and depositing it in a spoil berm adjacent to the focus point of the tool. See below note on MFE in regard to environmental impacts.
- A Remotely Operated Vehicle (ROV) will be used to cut cable at the bell mouth of the OSP or WTG foundation using shears at the bottom of the jackets
- The ROV will then attach a recovery clamp to the end of the cable and connect to the cable lay vessel winch wire
- The vessel will then transit towards shore while recovering the cable to the cable carousel on the vessel
- Once the carousel capacity is reached the cable will be cut and the cable end will be placed on temporary wet store rigging
- The vessel will transit to shore and offload the recovered cable
- The process will be repeated until the entire export, inter array or interconnector cable is recovered

At the decommissioning port, cables would likely be cut into manageable lengths ready for recycling of the suitable components and subsequent disposal.

Any cable protection system used at the J tube exit would be removed from site at this time and recycled. If the foundation is removed ahead of the array or export cable removal, the end of the cable on the seabed will be appropriately protected to prevent risks to other sea users. This will most likely be achieved by burying the cable to the burial depths stated in the relevant Cable Plan or through the use of guard vessels.

It should be noted that MFE is significantly different to the method of jetting used to install the cable. The installation of the cable is undertaken using the method of laying the cable on the seabed followed by a post-burial campaign using a jetting tool. The jetting tool is dragged over the centre point of the cable and using water jets either side of the cable, fluidises the seabed sediment over a relatively small area around the cable (3 m to 5 m wide), the cable sinks to the desired burial depth and the fluidised sediment then settles on top of the buried cable. MFE uses the same principles, however the jets of water are significantly more powerful and instead of fluidising the immediate area of the cable, MFE cuts a wide trench with very shallow angled side walls and positions the spoil from the excavation adjacent to the trench. The trench will be approximately 15 to 20 m in width. The method of cutting a wide trench is required to ensure that the trench remains open for the period between the de-burial and cable retrieval campaigns. As a result of this, the area of impact is larger for decommissioning than construction and it is anticipated that the impacts will also be more significant. As noted in the introduction to this section, pre-decommissioning surveys will be undertaken to establish the ecology baseline and EIA will likely be required to understand the significance of any potential impacts that may be caused by MFE. In the case that potential impacts are significant it may be deemed more appropriate to leave certain sections of cable in-situ.

5.4.4.2 Exceptions

Complete removal may not be the best environmental or safe option and it may therefore be necessary to leave sections of cable in situ where:

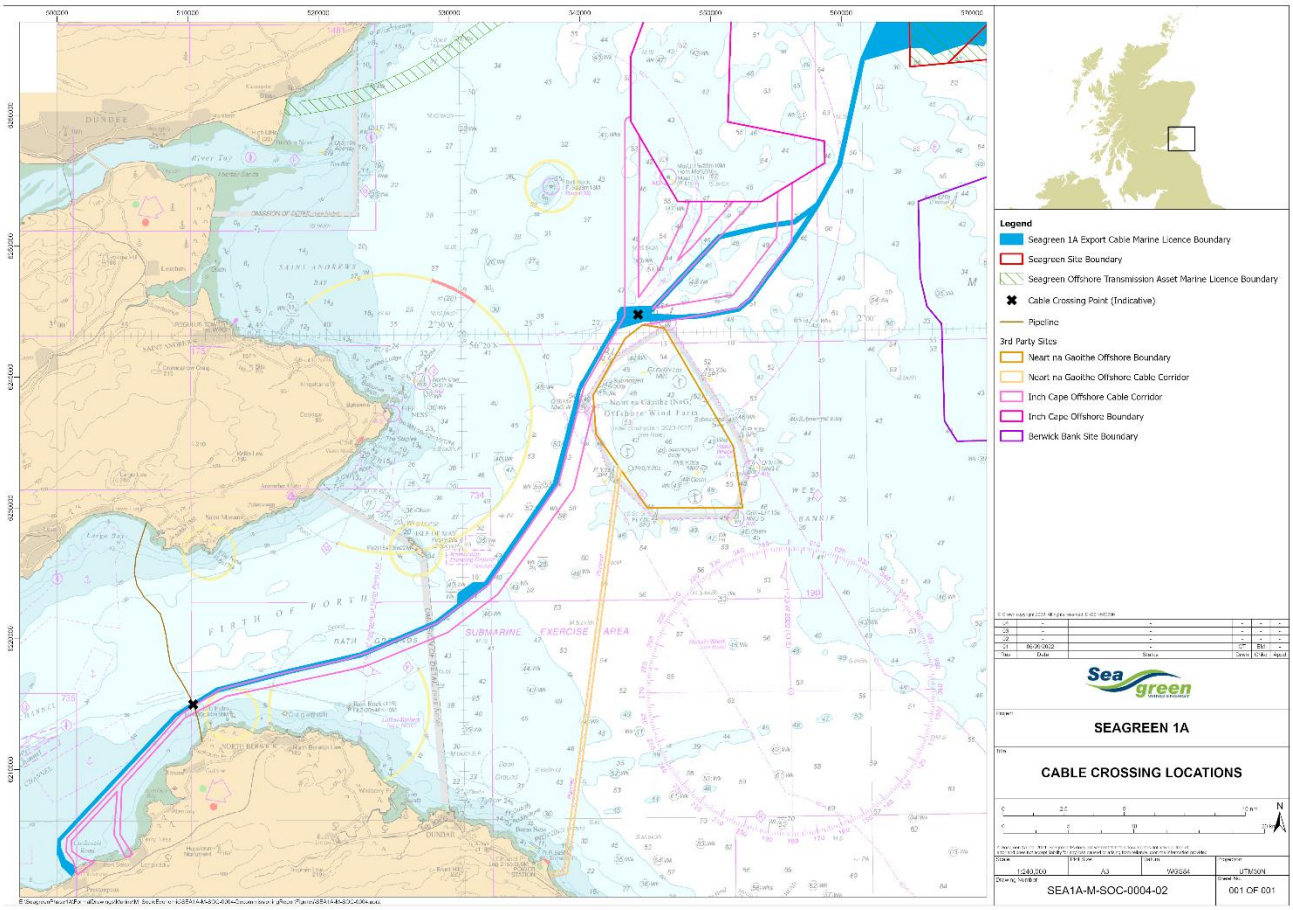
- Full removal would have the potential to impact on existing subsea cables or gas pipelines, either at crossing areas or in areas of close proximity, and through direct disturbance during cable cutting/removal activities or by anchoring of vessels
- Environmental impact assessment indicates that the impacts associated with removal (MFE) are significant and outweigh the benefits of leaving the cable in-situ
- The cable is covered by loose rock protection berms (see section 5.4.6 below)

The Seagreen 1A export cable will cross the Inch Cape OWF export cables and one existing National Grid gas pipeline, as shown in

Figure 5-1 below. At these crossings, the removal of the cable may present an unacceptable operational risk to the crossed or crossing assets. In these circumstances, the cable would be cut a suitable distance each side of the crossing leaving a short length in-situ. Note however that should the Inch Cape export cables be installed first, it may be possible to remove the SG1A (laid on top) without impacting upon the Inch Cape cables underneath.

In the case that the Seagreen 1A cable crossing sections can be decommissioned without disturbing the third-party assets it crosses, the same method as described in Section 5.4.4.1 will be adopted.

Figure 5-1 – Location of proposed crossing with the Inch Cape OWF export cables and gas pipeline



Seagreen will obtain studies and evidence to support the cable decommissioning methods closer to the time of decommissioning. Where these studies (including EIA) indicate that valuable benthic features (such as PMFs, Scottish Biodiversity List species or Annex I habitats) have colonised parts of the cable routes, or otherwise where EIA indicates cable removal would result in a significant and unacceptable environmental impact, consultation with MS-LOT and NatureScot would be initiated to determine the most appropriate decommissioning option which may include leaving 'high risk' sections in-situ.

Where sections of cable are to be left in-situ, the cables will be cut, and the cable ends weighted to ensure that they are securely buried below the seabed reducing the risk of exposure. Additionally, where cables are decommissioned in-situ ongoing monitoring would be undertaken in order to ascertain if there is any risk of exposure in the future. The cable will not contain fluids and therefore there is no enduring pollution risk associated with cables remaining in-situ.

Cable protection is dealt with separately in section 5.4.6. However it should be noted that where it is considered more appropriate to leave rock protection *in-situ*, the cable section underneath the rock protection is also proposed to be left *in-situ*. Any such decision will be supported by further assessment closer to the time of decommissioning.

5.4.4.3 Assessment of Decommissioning Impacts and Guiding Principles

The following section provides a high-level assessment of the potential impacts of the decommissioning of the cables at the Projects. The potential impacts are identified as major, moderate, minor, and negligible. Major and moderate impacts are generally considered significant and warrant further consideration and discussion.

Table 5-6 - Environnemental Assessment Matrix

Value/Sensitivity	Magnitude of potential environmental impact			
	High	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

This method is consistent with previous EIAs for the Seagreen Project which were accepted by regulatory stakeholders. All potential impacts are considered adverse unless expressed otherwise.

Table 5-7 - Significance definitions

Impact Significance	Definition
Major	Very large or large changes in site / asset conditions, which are likely to be important considerations at a regional or district level because they could result in exceedance of statutory objectives and / or breaches of legislation.
Moderate	Intermediate change in site conditions, which are likely to be important considerations at a local level.
Minor	Small change in site / asset conditions, which may be raised as local issues but are unlikely to be important in the decision-making process.
Negligible	A barely discernible change which may not be detectable in site / asset condition and is likely to have a negligible influence on the site / asset.
No Impact	No discernible change in site / asset conditions, likely to have no measurable influence, irrespective of other effects.

Table 5-9 provides an assessment of the buried cable decommissioning options against the guiding principles outlined in Table 5-1 above.

Table 5-8 presents a high-level assessment of the construction impacts compared to the decommissioning impacts. Table 5-9 provides an assessment of the buried cable decommissioning options against the guiding principles outlined in Table 5-1 above.

Table 5-8 - Construction and Decommissioning Impacts of the Cable Protection and Cables

Receptor	Residual Construction Impacts	Decommissioning - Potential Impact Removal	Decommissioning - Potential Impact In-Situ	Decommissioning Impact	
				Removal	In-Situ
Water Quality & Sediments	All impacts assessed as minor or negligible	Sediment disturbance in immediate area and turbidity increase. The area of influence is expected to be significantly larger than for construction (approx. 15 – 20m trench width).	No environmental or pollution impacts given the inherent properties of the cables.	Minor	Negligible
		Hydrocarbon pollution due to fuel and oil spills from during decommissioning.		Negligible	
Benthic Ecology	All impacts assessed as Negligible following implementation of mitigation	Displacement, damage, and/or crushing of benthic communities in immediate area due to ground disturbing activities and removal of protective structures with an estimated recovery time of approximately 1 year depending on species resilience.	Attraction of non-native species to artificial reef.	Minor / Moderate (further assessment required prior to decommissioning)	Negligible
Fish and Shellfish Ecology	All impacts assessed as Negligible following implementation of mitigation	Local turbidity from sediment disruption may persist up to a few days and reduce visibility which impacts the feeding ability of fish that detect prey visually.	Attraction of non-native species to artificial reef.	Minor	Negligible

Receptor	Residual Construction Impacts	Decommissioning - Potential Impact Removal	Decommissioning - Potential Impact In-Situ	Decommissioning Impact	
				Removal	In-Situ
		Displacement, disturbance or injury to burrowing fish such as sandeel in immediate area.		Minor	Negligible
		Removal of artificial reef may reduce fish density in local area.		Minor	Negligible
		Disturbance, damage, and removal of shellfish species due to hard surface removal such as the pipes, rock revetment and protective structures.		Minor	Negligible
Marine Mammals	All impacts assessed as Negligible following implementation of mitigation	Vessel collisions with marine mammals may lead to injury or death.	No change	Negligible	No Impact
		Disturbance of essential functions due to noise pollution.		Negligible	No Impact
		Reduced health due to water quality.		Negligible	No Impact
Ornithology	All impacts assessed as Negligible following implementation of mitigation (cable installation)	Temporary changes to intertidal and subtidal habitats possibly affecting food sources in immediate/local area.	No change	Negligible	No Impact

Receptor	Residual Construction Impacts	Decommissioning - Potential Impact Removal	Decommissioning - Potential Impact In-Situ	Decommissioning Impact	
				Removal	In-Situ
Shipping and Navigation	All impacts assessed as Negligible following implementation of mitigation	Temporary disruption of path around the project area.	Damage or movement of exposed cable due to anchor drag.	Negligible	Negligible
Commercial Fishing	Negligible	Temporary disruption of fishing vessels in immediate area.	Damage or movement of HDPE Duct or damage to fishing equipment from snagging on exposed cable.	Negligible	Negligible

Table 5-9 – Assessment of buried export cable decommissioning proposals against the guiding principles

Guiding principle	Complete removal of cable	Leave in-situ (where an exception applies)
No harm to people	Risk to personnel due to the requirement for extensive offshore operations, however risk is not considered excessive.	No works required (after cutting and reburial of cable ends) minimising risks to personnel.
Consider the rights and needs of legitimate users of the sea	Removal affords maximum flexibility over use of seabed, with no ongoing risks to other users of the sea.	Negligible risk presented providing adequate consultation and notification, burial is to a sufficient depth and site is monitored post decommissioning to identify any (unlikely) cable exposure. Cable left in-situ at crossings protects other legitimate users and their assets.
Minimise environmental impact	Given the considerable length of cable and the need for MFE techniques, removal would cause substantial disruption to the seabed and benthic habitats. Impacts are likely to be comparable to, or exceed, those reported in the original ES. As no infrastructure will be left in-situ, there will be no lasting impact on the environment.	Minimal disturbance after the temporally and spatially limited cable cutting and cable end re-burial operation. Inert materials (containing no fluid contaminants) resulting in no lasting environmental impact from cable left in-situ.
Maximise re-use of materials	Maximum material, e.g., aluminium, copper, lead, plastics, potentially available for re-use.	Cable material not available for re-use, although in the case of crossings, total volume of material not significant.
Ensure practical integrity	Removal is feasible but would require disturbance of seabed along full length of cable route during exposure and recovery.	Standard procedures and equipment. Reduced risk due to minimising offshore activity.
Promote sustainable development	Disturbance of the seabed in the short-medium term, although complete removal would allow flexibility over use of seabed in the longer term.	Providing remaining cable lengths do not become exposed, most future activities will not be affected.
Adhere to the Polluter Pays Principle	Consistent, assuming suitable disposal (recycling) option is found for cable components.	Consistent as far as practicable. Cables left in-situ will remain below seabed level (or below the sea defence) where they will pose minimal risk to the environment or other users of the sea. Decision to leave in situ will be balanced with risks to other assets and to benthic and other ecological receptors.
Ensure commercial viability	Extreme cost of removal where cable is buried by rock protection. Costs associated with removal may be partially offset by recycling of scrap cable where appropriate.	Minimal costs – simultaneously minimises environmental disturbance and impacts to other renewable energy assets.

5.4.5 HDPE Duct

5.4.5.1 General Approach

As described in section 5.4.4, the proposed approach is that the export cables will be removed as part of the decommissioning. This includes the section of export cables that are located within the HDPE ducts installed at the landfalls, in so far as engineering and environmental studies and surveys carried out pre-decommissioning do not provide compelling evidence that this would create unacceptable risks to personnel or to the marine environment, be technically unfeasible or involve extreme cost. However, where there is potential for cable removal to affect the integrity of the duct, which is to remain in-situ as discussed below, it may be necessary for the cable to also be left in-situ, with cable end cut well within the duct to ensure it remains buried well beneath the seabed/ground and therefore are not at risk of becoming exposed in the future.

Given the proposed depth of burial of the cable duct below the sea defence and the intertidal area (at least 2m below the seabed), it is proposed that the duct is left in-situ. This is on the basis that removal of the duct is likely to require significant excavation of the sea defence and intertidal area resulting in disturbance that is not considered commensurate with the guiding principles set out in Table 5-1. Additionally, decommissioning at Carnoustie is expected to require construction of a cofferdam due to the ground conditions and therefore costs are expected to be extreme. Further details of the cost assessments for duct removal have been provided in Appendix D – Decommissioning Costs and Financial Security Information which has been shared with MS-LOT on a confidential basis for review.

Leaving the duct in-situ long term is not considered to have any environmental or pollution impacts given the inherent properties of HDPE; nor is it considered to pose safety risks to mariners, navigation and commercial fisheries, or public land users at the landfall. As part of the landfall duct design and specification, studies will be undertaken to determine a suitable depth for the duct below the seabed and to demonstrate that it is unlikely to become exposed.

Post decommissioning, a monitoring programme will be in place to ensure the buried ducts remain buried. Where exposures are identified, appropriate remediation (re-burial) will be carried out.

5.4.5.2 Assessment of Decommissioning Impacts and Guiding Principles

A comparison of the construction and decommissioning impacts is presented in Table 5-10 for key receptors using the assessment matrix presented in Table 5-6. Table 5-11 provides an assessment of the buried export cable decommissioning proposals against the guiding principles outlined in Table 5-1 above. The below table is limited to receptors of relevance to the inter-tidal area with all other receptors having no impact.

Table 5-10 – Construction and Decommissioning Impacts

Receptor	Residual Construction Impacts	Decommissioning - Potential Impact Removal	Decommissioning - Potential Impact In-Situ	Decommissioning Impact	
				Removal	In-Situ
Water Quality & Sediments	All impacts assessed as Minor or Negligible	Sediment disturbance in immediate area and turbidity increase lasting approximately a few days.	No environmental or pollution impacts given the inherent properties of HDPE.	Minor	Negligible
		Hydrocarbon pollution due to fuel and oil spills from during decommissioning.		Negligible	
Benthic Ecology	All impacts assessed as Negligible following implementation of embedded mitigation	Displacement, damage, and/or crushing of benthic communities in immediate area due to ground disturbing activities and removal of protective structures with an estimated recovery time of approximately 1 year depending on species resilience.	Positive - Attraction of non-native species to artificial reef.	Minor	Negligible
Commercial Fishing	Negligible	Temporary disruption of fishing vessels in immediate area.	Damage or movement of HDPE Duct or damage to fishing equipment from snagging on exposed HDPE Duct.	Negligible	Negligible

Table 5-11 – Assessment of HDPE duct decommissioning proposals against the guiding principles

Guiding principle	Removal	Leave in-situ
No harm to people	Risk to personnel would be greater (than leaving in situ) due to increased offshore operations – and requirement for high-risk diving operations.	No works required (after cutting and reburial of duct end) minimising risks to personnel.
Consider the rights and needs of legitimate users of the sea	Removal affords maximum flexibility over use of seabed, with no ongoing risks.	Negligible risk presented providing adequate consultation and notification, burial is to a sufficient depth and site is monitored post decommissioning to identify any (unlikely) duct exposure.
Minimise environmental impact	Removal would cause disruption to the seabed and benthic habitats. Impacts may exceed those reported in the original ES and alternative landfall installation ER Due to the extent of the excavation required.	No impact as no works required. Inert materials resulting in no lasting environmental impact from duct left in-situ.
Maximise re-use of materials	Material available for re-use or recovery.	Duct material not available for re-use, although total volume of material not considered significant.
Ensure practical integrity	Removal is feasible using standard techniques and equipment but would require significant disturbance of seabed and sea defence.	Standard procedures and equipment. Reduced risk due to minimising offshore activity.
Promote sustainable development	Disturbance of the seabed in the short term, although removal would allow full flexibility over use of seabed in the longer term.	Providing remaining ducts do not become exposed future activities are unlikely to be affected. Note that due to water depths, existing activities in the shallow water nearshore area are minimal.
Adhere to the Polluter Pays Principle	Consistent, assuming suitable disposal (recycling or recovery) option is found for removed ducting.	Consistent as far as practicable. Ducts left in-situ will remain buried below seabed level (or below the sea defence) where they will pose minimal risk to the environment or other users of the sea.
Ensure commercial viability	Costs are considered excessive due to the extent of excavation (including through sea defence) required.	Minimal costs – simultaneously minimises environmental disturbance/impacts.

5.4.6 Cable Protection

5.4.6.1 General Approach

Where cable protection is required during the construction or operational phase of the Projects a determination of the decommissioning procedure will be presented in the final DP. For the purposes of this DP and in recognition of BEIS Guidance and Scottish Government Guidance around BPEO - and IMO Standards - **any loose rock protection covering cables will be left in situ** to preserve the marine habitat that will have established over the life of the wind farm, on the assumption that to do so would not have a detrimental impact on the environment, conservation aims, the safety of navigation and other uses of the sea. Where this is the case, sections of cable underneath the protection would also therefore remain in-situ for the same reasons. IMO Standards recognise that assets may be left in-situ if:

- It can be left without causing unjustifiable interference with other uses of the sea
- Entire removal is not technically feasible or would involve extreme cost, or an unacceptable risk to personnel or the marine environment

The BEIS Guidance and the Scottish Government Guidance do not make specific reference to suitable decommissioning measures for loose rock cable protection beyond the requirement to undertake a comparative assessment of the available options. However, equivalent guidance for the oil and gas industry recognises that removal of rock-protected pipelines is 'unlikely to be practicable and it is generally assumed that the rock dump and the pipeline will remain in place'.

In their assessment of currently available options for the removal of cable protection, Natural England (2022) concluded that 'given the nature of the loose rock, it is very difficult and time consuming to remove extensive sections of rock dump'. All practical removal methods assessed in the research had risks (health, safety or environmental) or limitations which preclude their use in the recovery of the quantity of rock protection likely to be required for the Seagreen Project. All were assessed as having a significant impact on the benthic environment with potential long-term damage to marine habitats.

Future iterations of the decommissioning programme will review the type of cable protection installed and the available technology at the time and will update the proposed decommissioning procedures accordingly taking into account the principles outlined in section 5.3. Any options would be subject to an updated comparative assessment. An EIA would likely be required to support this assessment to ensure the relative risks to the benthic environment and to future users of the seabed are appropriately considered. At this stage, it is not envisaged that cable protection other than loose rock berms will be used in significant quantities or as permanent deposits due to current project design and limited quantities consented in the Marine Licence. Any such cable protection will be subject to an assessment of its condition before determining that there is sufficient evidence to rebut the presumption of full removal.

5.4.6.2 Supporting Assessment

In support of the preparation of the Seagreen decommissioning programme, SWEL engaged specialist cable and pipeline engineering consultants Acteon[1] to undertake a technical review of the potential decommissioning options for the cable protection and export and array cables. The review considered the technical options for retrieving the rock protection and included a ground up Capex modelling assessment to estimate the projected costs of decommissioning the cable protection. The cost assessment for cable protection removal has been included in Appendix D – Decommissioning Costs and Financial Security Information which has been provided to MS-LOT for review on a confidential basis. A summary of the technical assessment is provided below.

It should be noted that there is not currently a bespoke solution for cable protection removal and further there is no precedent within either the oil and gas or offshore renewables industries. Acteon conducted a high-level search of emerging technologies in the offshore energy industry and concluded that one possible applicable method could be to utilise deep sea mining vehicles deployed from supersized purpose-built recovery ships, however at the time of writing, this technology is unproven and still in long term development. The expected daily cost of a vessel large enough to carry high flow, high pressure pumps, a rock transportation system capable of lifting tonnes of rock per second from the seafloor in 20-60m of water and operate large mining style trencher vehicles is expected to be an order of magnitude above even the most expensive cable lay vessels of today. Acteons review therefore focused on technology and vessels currently available to the OSW market.

To remove the cable protection on top of the buried cables, a subsea excavator would be deployed and operated from a dynamically positioned Construction Support Vessel (CSV) equipped with a large open deck and a subsea crane. It should be noted that at the time of writing there are only a small number of suppliers of subsea excavators as this type of work is deemed highly specialist. Furthermore, they are not designed to undertake this type of material recovery and therefore the method proposed below has been adapted.

The excavator used would be based on a land-based excavator combined with an ROV and fitted with a large industry standard subsea dredger. The machine would be launched from a dedicated A-Frame or offshore vessel crane, the vehicle is powered and operated from surface as with a conventional ROV system. As the machine is tracked it is not sensitive to current forces and is therefore expected to only be recovered when adverse weather requires the vessel to leave site or to undertake maintenance.

The main components of the vehicle are the articulated digger arm and large capacity Subsea dredge. The high flow suction system has few moving parts and utilises a pump which is adjacent to the suction hose but not in the firing line of the material being transported minimising the risk of rocks becoming lodged in the pump. In a conventional configuration the digger sucks individual rocks into a flexible hose travelling up the arm and along the length of the vehicle and they are jettisoned out of an exhaust port onto the seabed. For the purposes of this application, where the rock dump is returned to surface, the exhaust hose will be extended and routed into a heavy-duty subsea basket capable of holding 20Te or more of material which will

[1] https://acteon.com/

then be recovered to surface ready for offloading in port. The expected maximum volume of material which can be moved in this application per hour is ten cubic metres at which point a heavy-duty basket will be full and require recovery to deck using the vessel crane and replacement with an empty unit.

Rock would be recovered to a pair of 1,650mT capacity Hopper barges to provide a constant offloading capability which would allow the CSV to remain on location for up to 30 days but ship to ship transfer of 25Te baskets is complex and highly weather limited. Therefore, for the purposes of the study it has been assumed that the CSV will also be equipped with a rock handling machine such as an excavator which can transfer the recovered rock from baskets directly into the hopper barge tied up alongside. The Hopper barge will be accompanied by an attendant tug which will tow full barges to port for offloading and collect an empty barge to restart the process of rock transfer.

Based on the estimated rock protection volumes for export cables (both Projects), Acteon's assessment estimates the rock removal campaign to need approximately 307 days and require over 160 round trips to shore.

For the array cables the same method as described above would be utilised and the total campaign duration is estimated at 274 days and require approximately 150 round trips to shore.

For the array, interconnector and export cables the total offshore campaign duration to remove the rock protection is estimated to be 581 days (exclusive of weather and other contingencies) and will require significant resourcing and vessels.

Note that the activities associated with the handling of the rock onshore for recycling and/or disposal have not been considered in this study but are also expected to require significant resourcing, health and safety risks associated with the lifting and handling of materials and have potentially significant environmental effects.

The total duration of the campaign, the health and safety risks and the costs associated with these operations are considered to be extreme when balanced against the benign nature of the material, the marginal overall environmental benefits associated with removal and when assessed against the decommissioning guiding principles.

5.4.6.3 Assessment of Decommissioning Impacts and Guiding Principles

Table 5-12 below provides a comparison of the construction and decommissioning impacts for the cable protection decommissioning using the assessment matrix presented in Table 5-6. Decommissioning impacts for rock removal are anticipated to be more severe than for construction.

Table 5-13 provides an assessment of the cable protection (loose rock) decommissioning proposals against the guiding principles outlined in Table 5-1 above.

Table 5-12 - Construction and Decommissioning Impacts of the Cable Protection and Cables

Receptor	Residual Construction Impacts	Decommissioning - Potential Impact Removal	Decommissioning - Potential Impact In-Situ	Decommissioning Impact	
				Removal	In-Situ
Water Quality & Sediments	All impacts assessed as minor or negligible.	Sediment disturbance in immediate area and turbidity increase.	No environmental or pollution impacts given the inherent properties of the rock protection and cables underneath.	Minor	Negligible
		Hydrocarbon pollution due to fuel and oil spills from during decommissioning.		Negligible	
Benthic Ecology	All impacts assessed as Negligible following implementation of mitigation	Displacement, damage, and/or crushing of benthic communities in immediate area due to ground disturbing activities and removal of protective structures with an estimated recovery time of approximately 1 year depending on species resilience.	Attraction of non-native species to artificial reef.	Minor	Negligible
Fish and Shellfish Ecology	All impacts assessed as Negligible following implementation of mitigation	Local turbidity from sediment disruption may persist up to a few days and reduce visibility which impacts the feeding ability of fish that detect prey visually.	Attraction of non-native species to artificial reef.	Minor	Negligible
		Displacement, disturbance or injury to burrowing fish such as sandeel in immediate area.		Minor	Negligible
		Removal of artificial reef may reduce fish density in local area.		Minor	Negligible
		Disturbance, damage, and removal of shellfish species due to hard surface removal such as the pipes, rock revetment and protective structures.		Minor	Negligible

Receptor	Residual Construction Impacts	Decommissioning - Potential Impact Removal	Decommissioning - Potential Impact In-Situ	Decommissioning Impact	
				Removal	In-Situ
Marine Mammals	All impacts assessed as Negligible following implementation of mitigation	Vessel collisions with marine mammals may lead to injury or death.	No change	Negligible	No Impact
		Disturbance of essential functions due to noise pollution.		Negligible	No Impact
		Reduced health due to water quality.		Negligible	No Impact
Ornithology	All impacts assessed as Negligible following implementation of mitigation (cable installation)	Temporary changes to intertidal and subtidal habitats possibly affecting food sources in immediate/local area.	No change	Negligible	No Impact
Shipping and Navigation	All impacts assessed as Negligible following implementation of mitigation	Temporary disruption of path around the project area.	Damage or movement of exposed cable due to anchor drag.	Negligible	Negligible
Commercial Fishing	Negligible	Temporary disruption of fishing vessels in immediate area.	Damage or movement of HDPE Duct or damage to fishing equipment from snagging on exposed cable.	Negligible	Negligible

Table 5-13 – Assessment of cable protection (rock berms) decommissioning proposals against the guiding principles

Guiding principle	Removal	Leave in-situ
No harm to people	Risk to personnel would be significantly greater (than leaving in situ) due to lengthy, offshore operations (up to 1.5 years). Repeated lifting and handling of high volumes of rock to a vessel/barge is considered a high-risk activity.	No works required minimising risks to personnel.
Consider the rights and needs of legitimate users of the sea	Removal affords maximum flexibility over use of seabed, with no ongoing risks.	Minimal residual risks remain to specific users but can be mitigated by adequate consultation and notification to other users of the sea.
Minimise environmental impact	Removal would cause substantial disruption to or destruction of benthic habitats that are likely to have formed on and near the rock berms following installation. Impacts associated with removal may exceed those reported in the original ES.	Minimal impact as leaving in-situ avoids further disturbance to the benthic environment (and protects habitats that are likely to have formed on and near the rock berms following installation) and avoids the need for long offshore campaign and significant use of transportation vehicles.
Maximise re-use of materials	Material available for re-use or recovery.	Material not available for re-use.
Ensure practical integrity	Removal has been assessed as technically feasible using available techniques and equipment but at extreme cost. Removal of this volume of material is unproven.	No offshore activity required.
Promote sustainable development	Significant disturbance of the seabed in the short term, although removal would allow greater flexibility over use of seabed in the longer term.	Does not preclude the reuse of the seabed for most purposes.
Adhere to the Polluter Pays Principle	Consistent, assuming suitable disposal (recycling) option is found for recovered rock.	Consistent as far as practicable. Rock berms will present a minimal risk to the environment or other users of the sea and may result in biodiversity gain due to the introduction of the rock substrate.
Ensure commercial viability	Costs considered to be extreme due to the volume of rock requiring recovery, the technical difficulty in recovering the rock, the long offshore campaign and significant onshore handling costs.	Minimal costs – simultaneously minimises environmental disturbance/impacts.

5.4.7 Items to Remain In-Situ

To summarise the preceding subsections, and in line with the evidence of unacceptable risks to personnel or to the marine environment, technical unfeasibility or extreme cost set out above, it is proposed that the following items will remain in-situ following decommissioning:

- HDPE duct
- Cable protection consisting of loose rock (subject to further comparative and technical assessment closer to the date of decommissioning)
- Lengths of cable protected by loose rock cable protection

The following items *may* remain in-situ following decommissioning, where subsequent assessment demonstrates compelling evidence that full removal would present an unacceptable risk to personnel or to the marine environment, be technically unfeasible or involve extreme cost:

- Cable protection consisting of grout or rock bags or concrete mattresses (subject to an assessment of their condition and comparative assessment of decommissioning options)
- Lengths of cable at cable and pipeline crossings (noting the potential to remove these lengths when the crossed infrastructure is removed)
- Lengths of cable where environmental assessment indicates it is not appropriate to fully remove the cable (noting Seagreen's assumption that cable removal will be maximised and only remain in-situ where there is a compelling environmental or operational justification to do so)

5.5 Proposed Waste Management Solutions

Seagreen is committed to maximising the re-use of waste materials and will give full regard to the 'waste hierarchy' which suggests that re-use should be considered first, followed by recycling, incineration with energy recovery and, lastly, disposal. In any event, waste management will be carried out in accordance with all relevant legislation and with any necessary disposal taking place at licensed facilities.

The proposed approach to the disposal of the main components of the development is set out in

Table 5-14 below.

Table 5-14 – Proposed disposal route for components to be removed

Waste material	Pre-treatment	Re-use/recycle/disposal
WTG and OSP support structures	Establish remaining design life	Re-use by repowering with new/superior WTGs or other renewable generation technology or dismantle and recycle the recovered material as much as possible
WTG tower and nacelle	Break down into transportable size	Recycle
Glass-fibre Reinforced Epoxy (GRE) from wind turbine blades	Break down into transportable size	Recycle where facilities exist or disposal if no alternative
OSP topside	Break down into transportable size	Recycle
Inter array, Interconnector and Export cables	Cut into transportable lengths. Split and separate into components	Aluminium/copper/lead/steel and insulation plastics – recycle Other components – recycle where facilities exist, otherwise energy recovery
Cast-iron shell segments	Dismantle to transportable size	Recycle
Concrete mattresses, grout and rock bags (if used and recoverable)	None	Re-use (if condition allows) Crush and re-use for other purposes Netting, fixings etc recycled or recovered as appropriate

5.6 Potential for Phasing and Integration

It is possible that there may be synergies and interactions between the decommissioning of the Projects and that of other nearby developments.

Seagreen will promote formal industry collaboration on this issue and, as a minimum, will approach the developers of the Neart na Gaoithe and Inch Cape OWFs to consider potential opportunities as part of the ongoing DP review process. However, Seagreen's starting assumption is that decommissioning will be undertaken in isolation such that the provisions can be fully costed, and sufficient financial security provided. The status and requirements of surrounding projects will be carefully considered in the planning and execution of the decommissioning process. Any sharing of decommissioning activities would influence the phasing of the works.

6. Environmental Impact Assessment

In support of the consent applications SWEL undertook an EIA for the Seagreen Project as reported in the ES dated April 2012, with further information provided via the ES Addendum dated May 2013. Similarly, Seagreen 1A prepared an EIAR for the Seagreen 1A Project in support of the Marine Licence application.

As required by the EIA Directive, a lifecycle approach was taken in assessing the impacts of the Project and in seeking to mitigate and minimise the effect of the works. In all instances a 'worst case', Rochdale Envelope approach was taken to the assessment and the impact assessment included the process of decommissioning so far as it could be predicted at the time.

In consultation with MS-LOT, the information relating to decommissioning in the ES, ES Addendum and EIAR will be reviewed when the final details of the DP are confirmed prior to decommissioning activities taking place.

The following key criteria will inform the decision as to the need for a new or updated EIA:

- The understanding of the baseline environment at the time just prior to decommissioning, informed by the findings of the environmental monitoring of the project and engineering/ asset surveys such as cable burial monitoring and Annex 1 habitat monitoring undertaken prior to decommissioning
- A review of other marine use (fishing, navigation, etc.) with potential to be affected by decommissioning
- Amenities, the activities of communities and on future uses of the environment
- Historic environment interests
- Seascape and landscape interests

If required, the decommissioning EIA will supplement existing information in relation to these issues and would also describe the measures envisaged to avoid, reduce and, if possible, remedy any likely significant adverse impacts arising from the decommissioning process. The conclusions of the EIA will be used to inform the final decommissioning options that will be detailed in the final DP.

7. Consultation with Interested Parties

7.1 Introduction

Seagreen recognises effective and open communication and consultation as essential elements to the successful development of the Projects. These principles have been adopted throughout the development of the Projects and will be applied during the life of the Projects including the decommissioning phase.

7.2 Consultation on Draft Decommissioning Programme

7.2.1 Consultation Process

Section 105(7) of the Energy Act 2004 provides that a notice given under Section 105 may require the recipient of the notice to carry out consultation specified in the notice before submitting a decommissioning programme. Schedule 2 to the S105 Notices issued to SWEL and Seagreen 1A by the Scottish Ministers sets out those organisations who should receive a copy of this draft DP for comment as presented in Table 7-1.

Table 7-1 - Consultees listed in Section 105 Notices

Consultees listed in the Section 105 Notices	
Aberdeen Harbour Authority	Marine Scotland Science
Angus Council	Maritime and Coastguard Agency
Arbroath Harbour Authority	Ministry of Defence
British Marine Aggregate Producers Association	Montrose Harbour Authority
Crown Estate Scotland	NatureScot
Dundee City Council	Northern Lighthouse Board
Dundee Harbour Authority	Royal Yacht Association (Scotland)
East Lothian Council	Scottish Borders Council
Fife Council	Scottish Environment Protection Agency
Forth Ports Authority	Scottish Fisherman's Federation
Joint Nature Conservation Committee	UK Chamber of Shipping
Health and Safety Executive	UK Hydrographic Office
Historic Environment Scotland	

The draft DP will be issued to all consultees listed above for a 30-day consultation period in line with the Scottish Government Guidance. The draft DP will also be made available on the Project's websites. Responses

received during the consultation period will be reported in this DP (Appendix E) and updates will be made where necessary. The full consultation responses will be attached to this DP at Appendix F.

The Financial Security Information (Appendix D) associated with the DP will be subject to a separate consultation and approval process and will not be circulated as part of the Section 105 consultation. The approved Financial Security Information will form a confidential appendix to this document (Appendix D).

7.2.2 Consultation Responses

Table 7-2 below provides a summary of the consultees who provided comment and those who did not provide comments on the DP.

Table 7-2 – Consultees listed in the Section 105 Notices and summary of those providing comments on the draft DP

Consultee	Comment received?
Aberdeen Harbour Authority	
Angus Council	
Arbroath Harbour Authority	
British Marine Aggregate Producers Association	
Crown Estate Scotland	
Dundee City Council	
Dundee Harbour Authority	
East Lothian Council	
Fife Council	
Forth Ports Authority	
Joint Nature Conservation Committee	
Health and Safety Executive	
Historic Environment Scotland	
Marine Scotland Science	
Maritime and Coastguard Agency	
Ministry of Defence	
Montrose Harbour Authority	
NatureScot	
Northern Lighthouse Board	
Royal Yacht Association (Scotland)	
Scottish Borders Council	

Consultee	Comment received?
Scottish Environment Protection Agency	
Scottish Fisherman's Federation	
UK Chamber of Shipping	
UK Hydrographic Office	

7.3 Ongoing Consultation and Notifications

As per Section 2.4, throughout the lifespan of the Projects, the DP will be reviewed and updated at least every 5 years as new information relevant to the decommissioning strategy becomes available. Consultees listed in the S105 Notices, and any additional consultees identified by MS-LOT, SWEL or Seagreen 1A, will be provided with the opportunity to comment on the final DP prior to it being finalised. It is anticipated that the final revision process will commence two years prior to the initiation of decommissioning (see Section 10).

At the time of decommissioning, Seagreen will issue Notices to Mariners (NtMs) and other navigational warnings of the position and nature of the decommissioning activities taking place. Efforts will be made to ensure that this information reaches mariners in the shipping and fishing industry as well as recreational mariners. The UK Hydrographic Office (UKHO) will be notified as appropriate on the progress and completion of the works.

8. Costs and Financial Security

The decommissioning cost information required by Scottish Ministers is provided in confidence as Appendix D to this DP.

9. Schedule

A full decommissioning schedule will be provided closer to the point of decommissioning setting out the detailed programme of the proposed decommissioning works for consultation with the relevant authorities.

At this stage it is proposed that decommissioning would commence approximately 25 years after final commissioning of the Seagreen Project, coinciding with the end of the design life of Project (subject to any life-extension or re-powering options being pursued and consented).

The DP will be reviewed periodically throughout the operational phase in accordance with the BEIS guidance. A final review of the DP will commence at year 23, two years prior to the scheduled start of the decommissioning operations.

Offshore decommissioning and any necessary onshore dismantling of the decommissioned infrastructure would run in parallel. The total duration of the decommissioning campaign is estimated at approximately 2 years.

10. Project Management and Verification

Seagreen intends to undertake internal reviews of the DP throughout the lifetime of the project and formally update the plan a minimum of every 5 years. The review schedule will be agreed with MS-LOT taking account of the review points suggested in paragraph 5.7.4 of the BEIS guidance. Once the Projects are nearing the end of their operational period, and in any event, no later than two years prior to the commencement of decommissioning operations, Seagreen will initiate a final review of the DP and finalise the detail of the decommissioning provisions. This will include project management arrangements, the schedule, costs and the verification processes to ensure decommissioning is completed.

It should be noted that the transmission assets (defined in sections 4.3, 4.5 and 4.6) will be sold to one or more OFTOs and thereafter the responsibility for decommissioning will transfer to the OFTO.

Following completion of the decommissioning works a Decommissioning Report will be submitted to the appropriate regulatory authorities. In accordance with the Scottish Government Guidance, the decommissioning report will include:

- Independent third-party verification that decommissioning took place in accordance with the approved DP (e.g., statement from a third-party contractor or an independent observer) and a statement detailing any deviations from the approved DP with justification
- Evidence (e.g., photographic evidence of infrastructure out of the water, or survey footage of the seabed) that all infrastructure that was due to be removed, according to the DP, has been removed
- Where infrastructure has been left in-situ, evidence that it has been cut off/buried/otherwise treated in accordance with the DP
- A compliance statement setting out how relevant regulations (environment, health and safety) have been complied with together with any instances of non-compliance
- References to compliance with relevant EIAs and Appropriate Assessments
- References to any future monitoring and maintenance set out in the DP
- A cost breakdown to enable Scottish Ministers to understand the actual cost of decommissioning compared to the predicted cost, and an explanation of any major variances from forecast costs

11. Seabed Clearance and Restoration of the Site

Seagreen is committed to restoring the seabed areas occupied by the Projects, as far as is reasonably practicable, to the condition that it was in prior to installation of the assets. Consistent with the decommissioning provisions detailed in section 5, and where there is compelling evidence of unacceptable risks to personnel or to the marine environment, technical unfeasibility or extreme cost that justifies anything short of full removal, the key restoration work will relate to ensuring that:

- Where left in-situ, HDPE duct end is adequately buried
- OSP pin-piles that are left in-situ are adequately buried, or otherwise protected
- Any sections of cable (including cut ends) that are left in-situ are adequately buried, or otherwise protected
- Any rock protection left in-situ is re-profiled following cable removal works, should this be required for continued safety of other sea users
- Open trenches resulting from MFE are reinstated and the seabed returned to its original profile, where practicable

It is anticipated that upon completion of the decommissioning works, a survey will be undertaken to ensure that all debris has been removed. The survey will enable identification and recovery of any debris located on the seabed which may have arisen from activities related to the decommissioning process and which may pose a risk to navigation or other users of the sea. The process of collecting and presenting evidence that the site is cleared is required to be independent of Seagreen. Seagreen proposes that an independent survey company complete the surveys and that the results of these surveys will be issued to MS-LOT for review and comment and circulated to stakeholders as agreed in advance with the Scottish Ministers.

The required survey area/corridor would be determined during the decommissioning phase of the project, taking into account good practice at the time and the views of stakeholders.

Analysis of any survey data gathered will also ensure that items for removal and disposal relate only to the asset. Consultation with relevant stakeholders will be conducted if other anomalies of archaeological interest are identified during seabed clearance.

Further details on how the site will be restored will be provided in the updated DP towards the end of the life of the Projects.

12. Post-Decommissioning Monitoring, Maintenance and Management of the Site

Given that Seagreen are not proposing to fully remove all assets, some post-decommissioning activities may be required, to identify and mitigate any unexpected risks to navigation or other users of the sea.

The requirement for monitoring and the extent and approach taken will be determined based on the scale of the remaining materials the risk of exposure and the risk to marine users and will be agreed upon with Marine Scotland in subsequent revisions of the Decommissioning Programme as the project matures.

It should be reiterated that Seagreen propose to fully remove all cables unless there is an overriding environmental justification for leaving sections in-situ. It is expected that any cable left in-situ will be limited to short sections where the cable is mechanically protected. Periodic monitoring of deep-buried HDPE ducts may be required if exposure risk is identified. Requirements for monitoring of any cable protection left in-situ will be determined only after the type and extent of protection is known.

Post-decommissioning monitoring surveys of the seabed will be carried out following the completion of the decommissioning works. Surveys are expected to comprise geophysical survey (such as swathe bathymetry, sidescan sonar and magnetometer). Surveys will be undertaken in line with the final DP, and in line with survey scopes consulted on with MS-LOT and relevant stakeholders. Compliance will be verified by means of independent third-party survey upon completion of the works.

A post-decommissioning report shall be submitted with an agreed timescale and will include (in accordance with paragraph 7.18 of the Scottish Government Guidance):

- Evidence that all infrastructure that was due to be removed, according to the DP, has been removed
- Where infrastructure is left in-situ, evidence that it has been cut-off, buried or otherwise treated in accordance with the DP
- References to any future monitoring, maintenance and mitigation as set out in the DP
- References to compliance with permitting obligations
- A comparative analysis of predicted and actual costs

Post-decommissioning hydrographic surveys will be undertaken in accordance with the requirements set out in the MGN543 or relevant guidance in place at the time.

If an obstruction appears above the seabed following decommissioning which is attributable to the Project, it will be marked so as not to present a hazard to other sea users and remediated as required. Any remediation method will be agreed with Marine Scotland. The navigational marking will remain in place until such time as the obstruction is removed or no longer considered a hazard due to suitable remediation. The monitoring of the obstruction will be built into any monitoring and maintenance programme.

Details of the post-decommissioning monitoring, maintenance and management will be discussed with stakeholders close to the point of decommissioning and will consider relevant guidelines and industry standard good practice at the time and where possible this will take the form of non-intrusive survey techniques.

13. Supporting Studies

The documents for the Seagreen Project Phase 1 Environmental Statement and Addendum can be accessed online, on the Seagreen website www.seagreenwindenergy.com.

The Seagreen 1A Project EIAR can be accessed online, on the Seagreen 1A website www.seagreen1a.com.

14. References

Note: Data sources and references for section 3.2 can be found in the ES and ES Addendum, as referenced below. Data sources and references for section 3.3 can be found in the Seagreen 1A Screening Report and EIAR, as referenced below.

Department for Business, Energy and Industrial Strategy (BEIS). 2018. *Decommissioning of Offshore Oil and Gas Installations and Pipelines Guidance Note*

Department for Business, Energy and Industrial Strategy (BEIS). 2019. *Decommissioning of offshore renewable energy installations under the Energy Act 2004: Guidance notes for industry* [the 'BEIS Guidance']

International Maritime Organisation (IMO). 1989. *Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone*

OSPAR Convention for the Protection of the Marine Environment of the North East Atlantic. 1988

Scottish Government. 2022. *Decommissioning of Offshore Renewable Energy Installations in Scottish Waters or in the Scottish Part of Renewable Energy Zone under the Energy Act 2004: Guidance Notes for Industry (in Scotland)* [the 'Scottish Government Guidance']

United Nations Convention for the Law of the Sea (UNCLOS). 1982

OGUK. 2015. *Guidelines for Comparative Assessment in Decommissioning Programmes*

Natural England. 2022. *Scour and Cable Protection Decommissioning Study (Report NECR403)*

Seagreen Alpha and Bravo Environmental Statement, September 2012

Seagreen Environmental Statement Addendum, October 2013

Seagreen 1A Ltd. 2020. *Seagreen 1A Export Cable Corridor Screening Report*. Document reference: LF000012-CST-OF-LIC-DEV-REP-0001

Seagreen 1A Ltd. 2021. *Offshore Export Cable Corridor – Environmental Impact Assessment Report*. Document reference: LF000012-CST-OF-LIC-DEV-REP-0003

Appendix A – List of Abbreviations and Definitions

Term	Description
the Act	Energy Act 2004
BEIS	Department for Business, Energy and Industrial Strategy
Cable protection	Items installed over or around the cable to provide addition protection where burial is not possible or does not prove sufficient protection. Includes loose rock berms, grout bags, rock nets, concrete mattresses and cast-iron shells
DECC	Department for Energy and Climate Change [defunct]
Defra	Department of Environment, Food and Rural Affairs
DP	Decommissioning Programme
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
ES	Environmental Statement
HDPE	High Density Polyethylene
HLV	Heavy Lift Vessel
HVAC	High Voltage Alternating Current
IMO	International Maritime Organisation
Licencing Authority	Marine Scotland acting on behalf of the Scottish Ministers
Licensee	Seagreen Wind Energy Ltd in respect of the Seagreen Project, and Seagreen 1A Limited in respect of the Seagreen 1A Project
Marine Licence	A licence granted by the Scottish Ministers under the Marine (Scotland) Act 2010 and/or the Marine and Coastal Access Act 2009
MFE	Mass Flow Excavation
MS-LOT	Marine Scotland Licensing and Operations Team
NCMPA	Nature Conservation Marine Protected Area
OTA	Offshore Transmission Assets, comprising the OSPs and the export cables required to connect the wind farm assets to the onshore transmission works from the OSPs to the MHWS at the landfall at Carnoustie [part of the Seagreen Project]
OTA Corridor	The area in which the Seagreen Project export cables (connecting to Carnoustie) will be installed, as shown in Part 4 of the OTA Marine Licence (marked 'Export Cable Route (ECR) Corridor')
OTA Marine Licence	Marine Licence granted by the Scottish Ministers under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 in respect of the OTA on 10 October 2014 (as amended)

Term	Description
OFTO	Offshore Transmission Owner
OSP	Offshore Substation Platform
OWF	Offshore Wind Farm
(The) Projects	The Seagreen Project and Seagreen 1A Project collectively
Project Area	In relation to the Seagreen 1A Project: The area within which the Seagreen 1A Project will be constructed, as defined in Annex 1 to the Seagreen 1A Marine Licence In relation to the Seagreen Project: The area within which the Seagreen Project will be constructed, as defined Annex 1 to the S36 Consents
ROV	Remotely Operated Vehicle
S105	Section 105 of the Energy Act 2004
S106	Section 106 of the Energy Act 2004
S36 Consents	Consents under section 36 of the Electricity Act 1989 granted by the Scottish Ministers on 10 October 2014 in respect of the Seagreen Alpha and Seagreen Bravo OWFs (both as subsequently varied)
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
Seagreen	SWEL and Seagreen 1A collectively
Seagreen Project	The construction and operation of the Seagreen Alpha OWF, Seagreen Bravo OWF and the OTA
Seagreen 1A	Seagreen 1A Limited, a company with number 12575047 and having its registered office at No.1 Forbury Place, 43 Forbury Road, Reading, RG1 3JH
Seagreen 1A Marine Licence	Marine Licence granted by the Scottish Ministers under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 in respect of the Seagreen 1A Project on 8 December 2021 (as amended)
Seagreen 1A Project	The installation and operation of an export cable connecting the Seagreen Project to landfall at Cockenzie, East Lothian
SWEL	Seagreen Wind Energy Limited, a company with number 06873902 and having its registered office at No.1 Forbury Place, 43 Forbury Road, Reading, RG1 3JH
WTG	Wind Turbine Generator

Appendix B – S105 and S106 notices

See following pages.

marinescotland
E: ms.marinerenewables@gov.scot

Scottish Government
Riaghaltas na h-Alba
gov.scot

DECOMMISSIONING NOTICE UNDER SECTION 105 OF THE ENERGY ACT 2004

21 June 2022

To:

SEAGREEN 1A LIMITED
C/O SSE Renewables
Waterloo Street
Glasgow
G2 6AY

ENERGY ACT 2004
REQUIREMENT TO PREPARE DECOMMISSIONING PROGRAMME UNDER SECTION 105.

The Scottish Ministers, in exercise of their powers under section 105(2) of the Energy Act 2004 ("the Energy Act"), hereby requires Seagreen 1A Limited, to submit a decommissioning programme for the Seagreen 1A export cable corridor. The decommissioning programme relates to a proposal to construct a relevant object in waters regulated by Chapter 3 of the Energy Act.

The decommissioning programme must include an estimate of expenditure likely to be incurred in carrying out decommissioning, in accordance with the template provided in Schedule 1 of this notice.

The Scottish Ministers, pursuant to section 105(7) of the Energy Act, hereby further requires Seagreen 1A Limited to consult the bodies specified in Schedule 2, as well as any other consultees identified by Seagreen 1A Limited and any further persons subsequently identified by the Scottish Ministers, on the draft decommissioning programme and make the consultation draft of the decommissioning programme publically available for a minimum period of 30 days.

In advance of the consultation period, Seagreen 1A Limited should provide a copy of the consultation draft of the decommissioning programme and details of the proposed consultation process to Marine Scotland - Licensing Operations Team ("MS-LOT"). Following the consultation, a copy of the latest draft of the decommissioning programme should be provided to MS-LOT no later than 31 December 2022, for review.

The decommissioning programme should be submitted to MS-LOT within one month of the completion of the consultation. This latest draft of the decommissioning programme should include details of the consultation process, including the comments from each consultee (including 'nil returns'). Information should be provided on how any consultation responses have been reflected in the submitted draft of the decommissioning programme. You should ensure that each consultee named in Schedule 2 of this notice acknowledges receipt of the consultation document.

marinescotland
E: ms.marinerenewables@gov.scot

Schedule 1

DECOMMISSIONING PROGRAMME FINANCIAL APPENDIX TEMPLATE

Financial Information Requirements

Developers/operators must utilise the templates below when submitting decommissioning programmes to estimate the decommissioning expenditure to be incurred. Developers/operators should ensure that robust decommissioning costs are provided, including costs of disposal. Details of how the costs were developed should be provided alongside separate third party verification. If decommissioning is assumed to be taking place over multiple years, the ''Year' columns in the table below must be expanded and costs should be set out in the template for each individual year.

Work Package	Year 20XX £'000	Year 20XX £'000	Description of the work to be undertaken including for example vessel day rates, number of turbines etc.
Preparation of Assets			
Removal of foundations			
Removal of all of cables			
Seabed clearance and restoration			
Recycling and Waste Management[2]			
Monitoring			
VAT*			
Exchange rate fluctuation**			
Inflation***			
Optimism Bias****			
Contingency*****			
Total Security Per year			
Total Overall Security Fund			

Costs should be reviewed in line with decommissioning review timelines and altered as required. This includes any changes to the VAT rate, exchange rate and inflations.
Developers/owners should not offset scrappage value from their cost assumptions.

[2] This should include the costs of dealing with marine growth on structures / equipment.

***VAT**

Unlike the developers/owners, the Scottish Government has no exemption from VAT should it fall to the Scottish Ministers to decommission. Therefore, to understand the full costs relating to a scenario where the Scottish Ministers have to fund decommissioning, VAT will have to be factored into the financial securities.

The VAT regime only applies within territorial waters (i.e. up to 12 nautical miles from the shore baseline). Projects primarily located outside of territorial water will therefore need to set out how they have calculated VAT for a limited proportion of their decommissioning costs (for example removal of cables within territorial water, and any on-land recycling or disposal costs).

Costs	£'000	Description of costs
Costs within territorial waters		
VAT (20%) Costs		
Costs out with territorial waters		

****Exchange Rate Fluctuations**

For any decommissioning works to be undertaken using non-sterling currency, exchange rate hedging should be applied. Guidance is included within the HM Treasury's *Managing Public Money.*

Steps taken to manage exchange rate fluctuations	

*****Inflation Calculator**

Developers should ensure that inflation across the lifetime of the project is included with the security. The rate at which inflation should be assessed is in the Office of Budget Responsibility's ("OBR") forecast for inflation as measured by the Consumer Price Index ("CPI").

Inflation should be forecast until the proposed date for decommissioning. If the current OBR forecast does not go up to the end of the subsidy period then an average inflation figure should be assumed for the years not yet covered by OBR forecasts.

Inflation should be charged again the total cost of decommissioning (excluding optimism Bias and Contingency).

Year	20XX	20X1	20X2	20X3	20X4	20X5	20X6	20X7	Total

Inflation Rate (%)									
Inflation uplift per Annum (%)									
Total Costs to apply to inflation (£'000)	[redacted]								
Inflation cost (£'000)									

******Optimism Bias**

HM Treasury *Green Book* guidance should be utilised in the calculation of optimism bias. Optimism bias should be applied to the full cost of security, including exchange rate and inflation rate costs. Varying optimism bias rates can be applied to the different elements of decommissioning, based on the extent to which contributory factors are mitigated.

Work package	**Work package cost (£'000)**	**Optimism bias rate applied (%)**	**Optimism bias cost (£'000)**	**Reason for rate used including mitigating factors**

*******Contingency**

Contingency percentage applied should reflect the sum of measured risk. The assumptions made in determining the contingency percentage should be included in the reasons for the contingency rate applied.

Contingency Applied	**Reason for rate used**

Schedule 2 – Consultees

Angus Council

Chamber of Shipping

Crown Estate Scotland

Dundee City Council

East Lothian council

Fife Council

Forth Ports Authority

Health and Safety Executive

Historic Environment Scotland

Maritime and Coastguard Agency

Ministry of Defence

NatureScot

Northern Lighthouse Board

Royal Yachting Association (Scotland)

Scottish Borders Council

Scottish Environment Protection Agency

Scottish Fishermen's Federation

The UK Chamber of Shipping

UK Hydrographic Office

marinescotland

E: MS.MarineRenewables@gov.scot

Scottish Government
Riaghaltas na h-Alba
gov.scot

NOTICE UNDER SECTION 105 OF THE ENERGY ACT 2004
DECOMMISSIONING OF RENEWABLE ENERGY INSTALLATIONS

24 March 2022

To:

Mr Michael Walker
Consent Team Manager
Seagreen Alpha Wind Energy Limited &
Seagreen Bravo Wind Energy Limited
No. 1 Forbury Place
43 Forbury Road
Reading
RG1 3JH

Seagreen Alpha Offshore Wind Farm and Seagreen Bravo Offshore Wind Farm located in the Firth of Forth

The Scottish Ministers, in exercise of their powers under section 105(2) of the Energy Act 2004 ("the Act"), hereby requires Seagreen Wind Energy Limited, on behalf of Seagreen Alpha Wind Energy Limited and Seagreen Bravo Wind Energy Limited ("Seagreen"), to submit to the Scottish Ministers a decommissioning programme for the Seagreen Alpha Offshore Wind Farm and the Seagreen Bravo Offshore Wind Farm located in the Firth of Forth ("the Seagreen Project"). The decommissioning programme relates to a renewable energy installation used for purposes connected with the production of energy from water or winds as defined in section 104(3) of the Act.

The decommissioning programme must include an estimate of expenditure likely to be incurred in carrying out decommissioning, in accordance with the template provided in Schedule 1 of this notice. The decommissioning programme will need to satisfactorily address all of the reasons for refusal and advice from MS-LOT in Annex A of the 106 notice served on 24 March 2022.

The Scottish Ministers, pursuant to section 105(7) of the Act, hereby further requires Seagreen to consult the bodies specified in Schedule 2, as well as any other consultees identified by Seagreen and any further persons subsequently identified by the Scottish Ministers, on the draft decommissioning programme and make the consultation draft of the decommissioning programme publically available for a minimum period of 30 days. In advance of the consultation period, Seagreen should provide a copy of the consultation draft of the decommissioning programme and details of the proposed consultation process to Marine Scotland - Licensing Operations Team ("MS-LOT"). Following the consultation, a copy of the latest draft of the decommissioning programme should be provided to MS-LOT no later than 24 September 2022.

The decommissioning programme should be submitted to MS-LOT within one month of the completion of the consultation. This latest draft of the decommissioning programme should include details of the consultation process, including the comments from each consultee (including 'nil returns'). Information should be provided on how any consultation responses have been reflected in the submitted draft of the decommissioning programme. You should

ensure that each consultee named in Schedule 2 of this notice acknowledges receipt of the consultation document.

Following conclusion of the consultation period, the decommissioning programme should demonstrate consideration of the representations made during the consultation(s) and should be submitted to MS-LOT within one month of the completion of the consultation. If this date is not met, the Scottish Ministers, in exercise of powers under section 107 of the Act, may prepare and approve their own decommissioning programme in relation to the Seagreen Project and charge all costs incurred to Seagreen or other relevant persons.

Schedule 1

DECOMMISSIONING PROGRAMME ESTIMATED COSTS APPENDIX TEMPLATE

Developers/operators should utilise the templates below when submitting decommissioning programmes to estimate the decommissioning expenditure to be incurred. Developers/operators should ensure that robust decommissioning costs are provided, including costs of disposal. Details of how the costs were developed should be provided alongside separate third party verification. If decommissioning is assumed to be taking place over multiple years, the ''Year' columns in the table below must be expanded and costs should be set out in the template for each individual year.

Work Package	Year 20XX £'000	Year 20XX £'000	Description of the work to be undertaken including for example vessel day rates, number of turbines etc.
Preparation of Assets			
Removal of generators			
Removal of foundations			
Removal of offshore substations			
Removal of all of cables			
Seabed clearance and restoration			
Recycling and Waste Management[6]			
Monitoring			
VAT*			
Exchange rate fluctuation**			
Inflation***			
Optimism Bias****			
Contingency*****			
Total Security Per year			
Total Overall Security Fund			

Costs should be reviewed in line with decommissioning review timelines and altered as required. This includes any changes to the VAT rate, exchange rate and inflations. Developers/owners should not offset scrappage value from their cost assumptions.

[6] This should include the costs of dealing with marine growth on structures / equipment.

***VAT**

Unlike the developers/owners, the Scottish Government has no exemption from VAT should it fall to the Scottish Ministers to decommission. Therefore, to understand the full costs relating to a scenario where the Scottish Ministers have to fund decommissioning, VAT will have to be factored into the financial securities.

The VAT regime only applies within territorial waters (i.e up to 12 nautical miles from the shore baseline). Projects primarily located outside of territorial water will therefore need to set out how VAT has been calculated for a limited proportion of their decommissioning costs (for example removal of cables within territorial water, and any on-land recycling or disposal costs).

Costs	£'000	Description of costs
Costs within territorial waters		
VAT (20%) Costs		
Costs out with territorial waters		

****Exchange Rate Fluctuations**

For any decommissioning works to be undertaken using non-sterling currency, exchange rate hedging should be applied. Guidance is included within the HM Treasury's *Managing Public Money.*

Steps taken to manage exchange rate fluctuations	

*****Inflation Calculator**

Developers should ensure that inflation over the lifetime of the project is included in the proposed security. The rate at which inflation should be assessed is in the Office of Budget Responsibility's ("OBR") forecast for inflation, as measured by the Consumer Price Index ("CPI").

Inflation should be forecast until the proposed date for decommissioning. If the current OBR forecast does not go up to the end of the subsidy period then an average inflation figure should be assumed for the years no yet covered by OBR forecasts.

Inflation should be charged again the total cost of decommissioning (excluding optimism Bias and Contingency).

Year	20XX	20X1	20X2	20X3	20X4	20X5	20X6	20X7	Total
Inflation Rate (%)									
Inflation uplift per									

Annum (%)									
Total Costs to apply to inflation (£'000)	[redacted]								
Inflation cost (£'000)	[redacted]								

******Optimism Bias**

HM Treasury *Green Book* guidance should be utilised in the calculation of optimism bias. Optimism bias should be applied to the full cost of security, including exchange rate and inflation rate costs. Varying optimism bias rates can be applied to the different elements of decommissioning, based on the extent to which contributory factors are mitigated.

Work package	**Work package cost (£'000)**	**Optimism bias rate applied (%)**	**Optimism bias cost (£'000)**	**Reason for rate used including mitigating factors**

*******Contingency**

Contingency percentage applied should reflect the sum of measured risk. The assumptions made in determining the contingency percentage should be included in the reasons for the contingency rate applied.

Contingency Applied	**Reason for rate used**

Schedule 2 – Consultees

Angus Council

British Marine Aggregate Producers Association

Chamber of Shipping

Crown Estate Scotland

Fife Council

Joint Nature Conservation Committee

Health and Safety Executive

Historic Environment Scotland

Marine Scotland Science

Maritime and Coastguard Agency

Ministry of Defence

NatureScot

Northern Lighthouse Board

Royal Yacht Association (Scotland)

Relevant Harbour Authorities – Aberdeen, Dundee, Arbroath and Montrose

Scottish Environment Protection Agency

Scottish Fisherman's Federation

UK Hydrographic Office

Appendix C – Decommissioning Schedule

[To be provided in future versions of the DP]

Appendix D – Decommissioning Costs and Financial Security Information

[To be submitted under separate cover as confidential appendix]

Appendix E – Consultation Matrix

See following pages.

[To be populated following receipt of consultation responses]

Reference	Consultee	Consultee Comment	Seagreen Response	Amendment(s) to DP (if required)

Appendix F – Consultee Responses

See following pages.

[To be appended to final DP]