Project Title	Seagreen Wind Energy Ltd
Document Reference Number	LF000009-CST-OF-MST-002

Offshore Transmission Asset Construction Method Statement

Marine Licence 04678/19/0 Condition 3.2.2.4 and Marine Licence 07050/19/0 Condition 3.1.1

for the approval of Scottish Ministers

Rev	Date	Reason for Issue	Originator	Checker	ECoW	Approver
02	21/05/2020	For approval	[Redacted]			

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Consent Plan Overview

Purpose of the Offshore Transmission Asset (OTA) Construction Method Statement (CMS)

This Offshore Transmission Asset (OTA) Construction Method Statement (CMS) is submitted (i) by Seagreen Wind Energy Limited on behalf of Seagreen Alpha Wind Energy Limited (SAWEL) and Seagreen Bravo Wind Energy Limited (SBWEL) to address the specific requirements of the relevant conditions attached to the OTA Marine Licence granted by the Scottish Ministers under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 on 10 October 2014, as amended by the revised marine licence granted by the Scottish Ministers on 6 March 2019 (reference 04678/19/0) in respect of the Seagreen Offshore Transmission Assets (OTA) associated with the Seagreen Alpha and Seagreen Bravo Wind Farms (OWFs) (as varied, the OTA Marine Licence); and (ii) by Seagreen Wind Energy Limited to address the specific requirements of the relevant conditions attached to the Marine Licence granted by the Scottish Ministers under the Marine (Scotland) Act 2010 on 21 November 2019 (reference 07050/19/0) in respect of the Alternative Landfall Cable Installation Methodology (Alternative Landfall Cable Installation Methodology Marine Licence).

The overall aims and objectives of the OTA CMS are to set out the construction procedures and good working practices for the installation of the Seagreen OTA infrastructure. The OTA CMS demonstrates that the construction procedures to be employed align with those set out within the Environmental Statement (ES), ES Addendum and Environmental Report (ER) for the Alternative Landfall Cable Installation Methodology, and that construction related mitigation measures detailed within the ES, ES Addendum and ER will be applied during installation.

All Seagreen Contractors (including their Sub-Contractors) involved in the Seagreen OTA Project are required to comply with this OTA CMS through conditions of contract.

Structure of the OTA CMS

The **OTA CMS** is structured as follows:

Section 1&2	Provides an overview of the Seagreen OTA Project and the licence requirements that underpin the content of this OTA CMS. It also sets out linkages with other consent plans, construction management and the process for making updates and amendments.
Section 3	Sets out the scope and objectives of the OTA CMS and outlines the structure of the document.
Section 4	Outlines the relevant roles of the personnel involved in the construction of the OTA project, the responsibilities of each role and the chain of command throughout the construction phase.
Section 5	Sets out the Seagreen construction management framework for the Seagreen OTA Project with reference to industry guidance, including in relation to health and safety and environmental management, and provides information on Seagreen's expectations for training and experience for those involved in the construction of the project.
Section 6	Provides the construction procedures for each component of the Seagreen OTA Project including key parameters and methodologies and highlights relevant mitigation commitments and good working practices.
Section 7	Demonstrates compliance with the application and commitments made.
Section 8	Lists the references made within this OTA CMS.
Appendix A	List of abbreviations and definitions
Appendix B	The OTA CMS change management procedure
Appendix C	Compliance with the ES parameters and process
Appendix D	Summary of mitigation commitments
Appendix E	Pro-forma and contact details for key Seagreen personnel, contractors and sub-contractors

Scope of the OTA CMS

This OTA CMS covers, in line with the requirements of condition 3.2.2.4 of the OTA Marine Licence and condition 3.1.1 of the Alternative Landfall Cable Installation Methodology Marine Licence, and in line with industry standards and good practice, the following:

- Construction procedures in relation to Offshore Substation Platforms (OSPs), OSP interconnection cables, export cables and landfall installation of the export cable up to mean high water springs (MHWS);
- Good working practices to be employed during construction;
- Details of the roles and responsibilities, chain of command and contact details of company personnel, contractors and sub-contractors; and
- Details of how construction related mitigation steps proposed in the ES, ES Addendum and ER for the Alternative Landfall Cable Installation Methodology are to be delivered.

OTA CMS Audience

This OTA CMS will be submitted for approval to the Scottish Ministers/Licensing Authority in consultation with other stakeholders in relation to monitoring compliance with the specific requirements of the relevant consent conditions.

Compliance with this OTA CMS will be monitored by: Seagreen's Ecological Clerk of Works (ECoW); Seagreen's appointed Contractors, and the Marine Scotland Licensing and Operations Team (MS-LOT).

Copies of this OTA CMS are to be held in the following locations:

- Seagreen's head office;
- Seagreen's construction office and Marine Co-ordination Centre;
- At the premises of any Contractor, including the Seagreen ECoW, appointed by Seagreen; and
- Aboard any vessel engaged in the OTA construction operations.

1. Introduction

This Offshore Transmission Asset (OTA) Construction Method Statement (CMS) is submitted to address the specific requirements of the relevant conditions attached to the OTA Marine Licence granted by the Scottish Ministers under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 on 10 October 2014, as amended by the revised marine licence granted by the Scottish Ministers on 6 March 2019 (reference 04678/19/0) in respect of the Seagreen Offshore Transmission Assets (OTA) associated with the Seagreen Alpha and Seagreen Bravo Wind Farms (OWFs) (as varied, the OTA Marine Licence); and to address the specific requirements of the relevant conditions attached to the Marine Licence granted by the Scottish Ministers under the Marine (Scotland) Act 2010 on 21 November 2019 (subsequently amended on 24 February 2020) (reference 07050/20/0) in respect of the Alternative Landfall Cable Installation Methodology (Alternative Landfall Cable Installation Methodology Marine Licence).

The overall aims and objectives of the OTA CMS are to set out the construction procedures and good working practices for the installation of the Seagreen OTA infrastructure. The OTA CMS demonstrates that the construction procedures to be employed align with those set out within the Environmental Statement (ES), ES Addendum and Environmental Report (ER) for the Alternative Landfall Cable Installation Methodology, and that construction related mitigation measures detailed within the ES, ES Addendum and ER will be applied during installation.

A separate CMS (LF000009-CST-OF-MST-0001) has been prepared for the Seagreen OWF infrastructure.

2. Project Background and Consents

2.1 Project Overview

Seagreen Alpha and Seagreen Bravo Offshore Wind Farms (OWFs) and the Offshore Transmission Asset (OTA) are collectively referred to as the '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 Seagreen OWF Project (the WTGs, their foundations, associated array cabling and WTG to OSP cables), together with associated infrastructure of the Seagreen OTA Project (OSPs, their foundations, OSP interconnection cables and the offshore export cables up to MHWS to facilitate the export of renewable energy to the national electricity transmission grid. The location of the Seagreen Project is shown in Figure 2.1.

The Seagreen Project will consist of the following key components:

- 150 WTGs comprising;
- 114 WTGs installed on three leg steel jacket foundations, each installed on suction bucket caissons;
- 36 WTGs installed on up to four leg steel jacket pin pile foundations;
- 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 on suction bucket caissons together and to connect these WTGs to the OSP;

- Circa 55km of inter-array cables to connect strings of WTGs on piled foundations together and to connect these WTG to the OSP; and
- Circa 3km of OSP interconnection 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 190 km in length, to transmit electricity from the primary OSP 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. The three subsea export cables will be approximately 63.2 km, 63.2 km and 63.4 km in length respectively. Export cables will be buried where possible and where burial is not possible cable protection will be provided.

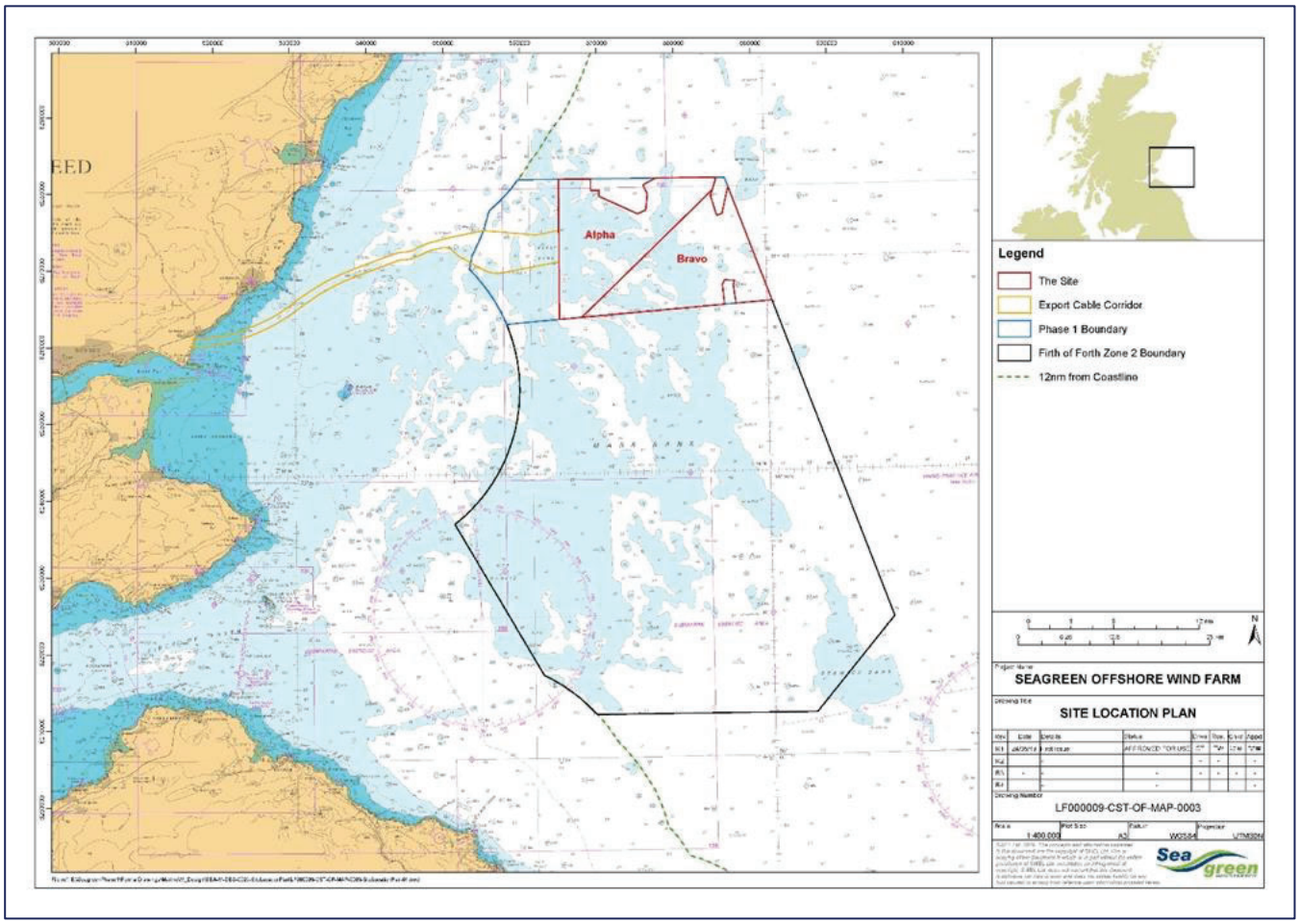


Figure 2.1: Project Location.

2.2 Consent and Licence Requirements

This OTA CMS has been prepared to discharge condition 3.2.2.4 of the OTA Marine Licence (Licence 04678/19/0) and condition 3.1.1 of the Alternative Landfall Cable Installation Methodology Marine Licence (Licence Number 07050/20/0) as set out in Table 2.1.

Table 2.1: Consent Conditions to be discharged by this OTA CMS.

Consent document	Condition reference	Condition text	Reference to relevant section of this OTA CMS
OTA Marine Licence (Licence 04678/19/0)	Condition 3.2.2.4	The Licensee must, no later than 6 months prior to the Commencement of the Works submit a CMS, in writing, to the Licensing Authority for their written approval	• The submission of the OTA CMS document satisfies the condition
		Such approval may only be granted following consultation by the Licensing Authority with the Joint Nature Conservation Committee (JNCC), Scottish Natural Heritage (SNH), the Scottish Environment Protection Agency (SEPA), the Maritime and Coastguard Agency (MCA), the Northern Lighthouse Board (NLB), Angus Council and any such other advisors or organisations as may be required at the discretion of the Licensing Authority.	• Consultation will be carried out by MS-LOT as part of the approval process
		The CMS must set out the construction procedures and good working practices for constructing the Works.	• Section 5 - Seagreen Construction Management Framework • Section 6 - Construction procedures, mitigation and good working practices
		The CMS must also include details of the roles and responsibilities, chain of command and contact details of company personnel, any contractors or sub-contractors involved during the construction of the Works.	• Section 4 - Roles and responsibilities • Appendix E – Pro Forma and contact details
		The CMS must be in accordance with the construction methods assessed in the Application and must include details of how the construction related mitigation steps proposed in the Application are to be delivered.	• Section 6 - Construction procedures, mitigation and good working practices

Consent document	Condition reference	Condition text	Reference to relevant section of this OTA CMS
			• Appendix C - Compliance with the ES parameters and processes • Appendix D - Summary of mitigation commitments
		The CMS must, so far as is reasonably practicable, be consistent with the Design Statement ("DS"), the EMP, the Vessel Management Plan ("VMP"), the Navigational Safety Plan ("NSP"), the Piling Strategy ("PS"), the Cable Plan ("CaP") and the Lighting and Marking Plan ("LMP").	• See Section 2.3 - Linkages with other consent plans and Consent Conditions
Alternative Landfall Cable Installation Marine Licence (Licence 07050/19/0)	3.1.1	The Licensee must ensure that, where the Works authorised by the licence are carried on as an alternative to nearshore cable laying operations under marine licence number 04678/14/0, that the works authorised by the licence are appropriately covered in the plans submitted under marine licence number 04678/14/0. Such plans are PEMP, EMP, DP, CoP, CMS, VMP, NSP, CaP, OMP, LMP and PS, as required by conditions 3.2.1.1, 3.2.1.2, 3.2.1.7, 3.2.2.3, 3.2.2.4, 3.2.2.8, 3.2.2.9, 3.2.2.10, 3.2.3.2, 3.2.2.14, and 3.2.2.5 of marine licence number 04678/19/0.	• See Section 2.3 - Linkages with other consent plans and Consent Conditions • Section 5 - Seagreen Construction Management Framework • Section 6 - Construction procedures, mitigation and good working practices • Appendix D - Summary of mitigation commitments

2.3 Linkages with other consent plans and Consent Conditions

The OTA CMS will, so far as reasonably practicable, be consistent with a number of other consent plans as set out in Marine Licence condition 3.2.2.4. These are set out in Table 2.2 below with details of the linkages presented and cross referenced as appropriate.

It should be noted that information is not repeated across consent plans, rather, where pertinent information is available in linked consent plans, the relevant consent plans are referred to. The plans are not required for approval of the OTA CMS but are provided for information.

Table 2.2: Linkages with other consent plans.

Reference (consent plan title)	Consent (condition in parenthesis)	Linkage with the OTA CMS	Cross-reference in this OTA CMS
Design Statement (DS)	Marine Licence 04678/19/0 (3.2.2.7)	The DS includes representative OTA visualisations from key viewpoints, based upon the final Design Specification and Layout Plan (DSLP).	• Section 6 - Construction procedures, mitigation and good working practices • Appendix C - Compliance with the ES parameters and processes
Environmental Management Plan (EMP)	Marine Licence 04678/19/0 (3.2.1.2)	The EMP provides the overarching framework for environmental management during the construction and operational phases of the Seagreen OTA Project. Environmental management measures have been integrated into the construction procedures set out within this OTA CMS, with cross-reference to the EMP.	• Section 4 - Roles and responsibilities • Section 6 - Construction procedures, mitigation and good working practices • Section 9 - Compliance with the ES, ES Addendum and ER • Appendix C - Compliance with the ES parameters and processes • Appendix D - Summary of mitigation commitments
Vessel Management Plan (VMP)	Marine Licence 04678/19/0 (3.2.2.8)	The VMP sets out the number, types and specification of vessels required during construction and operation, including vessel management procedures and vessel coordination, and location of ports and vessel transit corridors.	• Section 6.3 - Construction Ports and Marine Coordination Centre • Section 7 - Compliance with the ES, ES Addendum and ER
Navigational Safety Plan (NSP)	Marine Licence 04678/19/0 (3.2.2.9)	The NSP addresses navigational safety measures, construction exclusion zones, Notice(s) to Mariners and Radio Navigation Warnings, anchoring areas, temporary construction lighting and	• Section 6 - Construction procedures, mitigation and good working practices

Reference (consent plan title)	Consent (condition in parenthesis)	Linkage with the OTA CMS	Cross-reference in this OTA CMS
		marking, emergency response and coordination arrangements for the construction, operation and decommissioning phases of the works, and buoyage.	• Section 9 - Compliance with the ES, ES Addendum and ER • Appendix C - Compliance with the ES parameters and processes • Appendix D - Summary of mitigation commitments
Piling Strategy (PS)	Marine Licence 04678/19/0 (3.2.2.5)	The PS is required in the event that pile foundations are used, to include details of the proposed method and anticipated duration of pile-driving, details of soft-start piling procedures and anticipated maximum piling energy required, and details of any mitigation and monitoring to be employed during pile-driving.	• Section 6.6 - Stage 3: OSP jacket foundation substructure assembly and installation
Cable Plan (CaP)	Marine Licence 04678/19/0 (3.2.2.10)	The CaP provides details of the location and installation techniques for the OSP interconnection and export cables, the results of survey work to inform cable routing, technical specification of the cables, a burial risk assessment, and methodologies for survey and monitoring of cables during the operational phase.	• Section 6 - Construction procedures, mitigation and good working practices • Section 6.8 - Stage 5: OSP interconnection cable installation • Section 6.9 - Stage 6: Subtidal export cable installation
Lighting and Marking Plan (LMP)	Marine Licence 04678/19/0 (3.2.2.14)	The LMP provides the aviation and navigational lighting and marking arrangements for the OSPs.	• Section 6 - Construction procedures, mitigation and good working practices
Project Environmental Monitoring Programme (PEMP)	Marine Licence 04678/19/0 (3.2.1.1)	The PEMP sets out the environmental monitoring measures for the Seagreen OTA Project, covering diadromous fish, benthic communities, seabed scour and local sediment deposition and sandeels. It	• Section 6 – Construction procedures, mitigation and good working practices

Reference (consent plan title)	Consent (condition in parenthesis)	Linkage with the OTA CMS	Cross-reference in this OTA CMS
		also covers the participation by Seagreen in surveys carried out in relation to marine mammals. Where relevant, environmental monitoring is integrated into the construction procedures set out in this OTA CMS, with cross-reference to the PEMP.	• Section 9 – Compliance with the ES, ES Addendum and ER • Appendix D - Summary of mitigation commitments

2.4 Updates and Amendments

Should any updates to this OTA CMS become necessary, the change management process for any such updates, including resubmission of consent plans for approval, is outlined in Appendix B – The OTA CMS Change Management Procedure.

3. Scope and Objectives of the OTA CMS

3.1 Scope and Objectives

This OTA CMS has been prepared to address the specific requirements of the relevant conditions attached to the Marine Licence issued to Seagreen in 2014 (subsequently varied in 2019) for the Seagreen OTA project and the Marine Licence issued to Seagreen in 2019 (subsequently varied in 2020) for the Alternative Cable Landfall Installation Methodology and applies to all construction as required to be undertaken prior to the final commissioning of the works.

The overall aims and objective of the OTA CMS are to set out the construction procedures and good working practices for installing the Seagreen OTA Project. The OTA CMS includes:

- Detailed construction procedures in relation to foundations and substructures, OSPs, OSP interconnection cables, export cables and landfall installation of the export cable up to MHWS;
- Details of the roles and responsibilities, chain of command and contact details of company personnel, contractors and sub-contractors; and
- Details of how the construction related mitigation steps proposed in the ES, ES Addendum and ER for the alternative landfall cable installation methodology are to be delivered.

The OTA CMS is in accordance with the construction methods assessed in the Application and is consistent with other Seagreen consent plans as far as is reasonably practicable.

4. Roles and responsibilities

4.1 Overview

This section sets out the key roles and responsibilities and chain of command in relation to the OTA CMS. It identifies each key role involved in the construction phase of the Seagreen OTA Project and lists responsibilities associated with each role in relation to the OTA CMS. It should be noted that there will be two Main contractors responsible for the construction of the OTA; one with responsibility for the export cable construction, and the other responsible for the OSP jacket, foundations and topside. The chain of command below will be replicated for each Main contractor.

Figure 4.1 illustrates the key roles and chain of command in relation to the OTA CMS.

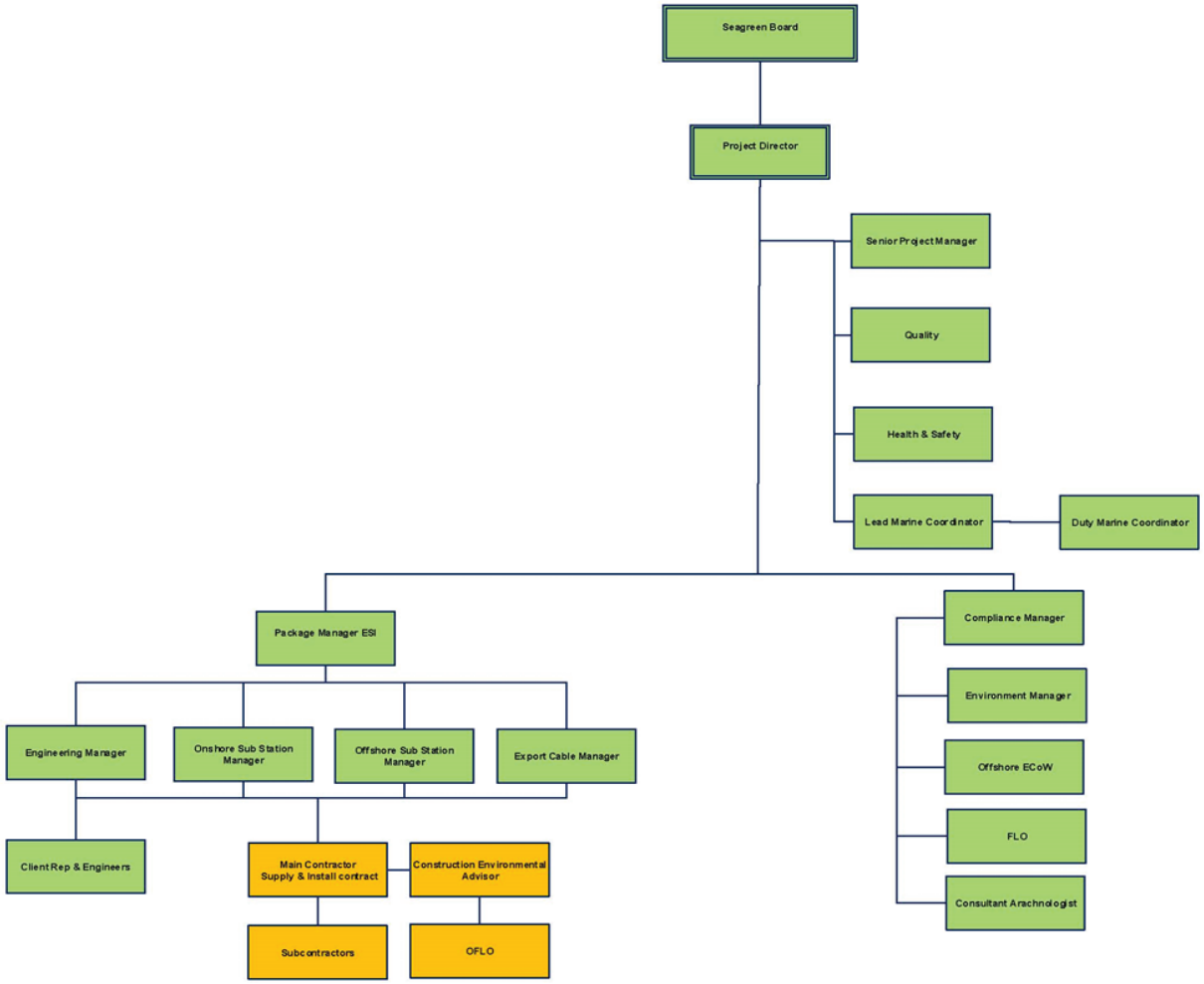


Figure 4.1: Chain of command and lines of communication.

For full details of roles and responsibilities in relation to environmental management of the Seagreen OTA Project construction phase please refer to the Offshore CEMP (LF000009-CST-OF-PLN-0014).

4.1.1 Seagreen Project Director

The Seagreen Project Director is accountable to the Seagreen board and has overall responsibility for requiring that the Seagreen OTA Project is built and operated in accordance with the OTA CMS and associated consent plans. The Seagreen Project Director has overall responsibility for project delivery and governance.

4.1.2 Seagreen Project Manager

The Seagreen Project Manager has responsibility for overseeing the construction phase of the Seagreen OTA Project and requiring compliance with all consent conditions and associated consent plans.

4.1.3 Seagreen Quality Manager

The Seagreen Quality Manager is responsible for requiring the maintenance of high quality standards throughout delivery of the Seagreen OTA Project.

4.1.4 Seagreen Safety Health and Environment (SHE) Manager

The Seagreen SHE Manager is responsible for advising on SHE aspects of the Seagreen OTA Project and is responsible for the overall incident reporting process (see Incident Reporting Procedure - LF000009-HSE-MA-PRO-0008).

4.1.5 Seagreen Lead Marine Coordinator

The Seagreen Marine Coordinator is responsible for the monitoring of people, vessels and offshore structures with regards to the safe preparation and execution of offshore construction activities. The Lead Marine Coordinator is supported by each of the Duty Marine Coordinators. The Duty Marine Coordinator is the person responsible for the role when they are on duty.

4.1.6 Seagreen Package Managers

The role of the Seagreen Package Managers is to oversee the delivery of discreet construction work packages and establishing contractual obligations for contractors (and their sub-contractors) in relation to the OTA CMS and requiring compliance with these contracts. These roles include the Engineering Manager, Offshore Sub-station Manager and Export Cable Manager.

4.1.7 Seagreen Client Representatives

The Seagreen Client Representatives will be based on site or aboard construction vessels and will be responsible for monitoring the implementation of the agreed construction procedures.

4.1.8 Seagreen Compliance Manager

The Seagreen Compliance Manager (CM) manages a team (the 'Compliance Team') responsible for monitoring contractor compliance with the Seagreen OTA Project consents and environmental legislation, on behalf of Seagreen.

The responsibilities extend across both Offshore and Onshore activities so that a consistent approach to compliance and environmental management is applied. The Compliance Team includes the Seagreen Environment Manager (EM), the Ecological Clerk of Works (ECoW), and the Fisheries Liaison Officer (FLO) and a supporting Consents Team as required. Responsibilities of the ECoW are defined further below. The role of the EM and the FLO are outlined in the CEMP (LF000009-CST-OF-PLN-0014) and are not repeated in this OTA CMS.

4.1.9 Seagreen Ecological Clerk of Works (Offshore ECoW)

The ECoW is a key role required by the Seagreen OTA Project consents.

Responsibilities of the ECoW in relation to the OTA CMS include:

- Quality Assurance of this OTA CMS;
- Providing advice to Seagreen on compliance with the OTA CMS;
- Monitoring compliance with the OTA CMS and associated consent plans;
- Reporting on compliance with the OTA CMS to Seagreen and to MS-LOT;
- Ensuring appropriate training is provided in relation to construction-related environmental measures and consent compliance; and ensuring delivery of toolbox talks as appropriate, in liaison with the Seagreen EM; and

4.1.10 Seagreen Fisheries Liaison Officer (FLO)

The FLO will provide liaison with the local fishing industry and notification of planned works and vessel movements.

4.1.11 Contractors Construction Environmental Advisor

The CEA is dedicated to delivering the requirements of the Seagreen consent conditions and wider environmental matters

4.1.12 Consultant Archaeologist

The consultant archaeologist will provide advice in relation to marine archaeological matters during the works.

4.1.13 Seagreen Main Contractor

As previously stated, there will be two Main contractors responsible for the construction of the OTA. The specific contractors are yet to be confirmed. However, once confirmed these contractors will adhere to the chain of command as outlined in Figure 4.1.

4.1.14 Contact Details

Contact details for key Seagreen personnel, contractors and sub-contractors will be provided to MS-LOT, in line with consent conditions, when available and prior to engagement in the works through the submission of the proforma included in Appendix E.

5. Seagreen Construction Management Framework

5.1 Overview

This section provides an overview of the overarching Seagreen construction management framework within which the Seagreen OTA Project will be delivered. It details the industry guidance available to inform the Seagreen construction management framework, highlights wider obligations under the Construction (Design and Management) Regulations 2015 (CDM Regulation) and the Seagreen offshore CEMP, provides details of training and competence requirements before summarising contractor and sub-contractor obligations.

The Seagreen construction management framework will ensure the safe, compliant installation of the Seagreen OTA Project components as described in this OTA CMS.

5.2 Industry Guidance

Industry guidance documents that have been produced to guide good working practices in relation to construction management for offshore wind farms, including offshore transmission works, are shown below in Table 5.1. These guidance documents have been used to inform this OTA CMS, where relevant, and Table 5.1 provides a cross-reference to the relevant section of the OTA CMS informed by the industry guidance presented.

Table 5.1: Offshore transmission assets construction guidance.

Author	Title	Scope	Cross reference to relevant section in this OTA CMS
Health and safety			
G+/DROPS, published through the Energy Institute (June 2019)	Reliable securing booklet for offshore wind	Provides information to help eliminate the risk of dropped objects, explaining the requirement for worksite hazard management and illustrates good practice recommendations. Information applies to all personnel, tools, equipment and structures associated with design, supply, transportation, installation, maintenance, operation and dismantlement activities across the industry.	All of section 6

Author	Title	Scope	Cross reference to relevant section in this OTA CMS
The G+, published through the Energy Institute (July 2018)	Working at height in the offshore wind industry (2nd Ed.)	Describes how to reduce the need for working at height (WAH) and how to make suitable provision and preparation for WAH. Covers design, construction, commissioning, operations, maintenance and decommissioning phases. Gives topic guidance on common requirements for WAH – training, fitness requirements, PPE, responsibilities of those undertaking, supervising and/or procuring work – and common hazards with recommendations on how to reduce risk. Also provides guidance on creating procedure flowcharts, and national/ EU regulations and requirements.	Sections 6.6 and 6.7
RenewableUK (Mar 2014)	Offshore Wind and Marine Energy H&S Guidelines	Guidelines consider health and safety risks in relation to offshore wind and marine energy projects. Covers project definition and design, construction, commissioning, operations, maintenance and decommissioning phases, including supporting activities to these phases (e.g. survey and geophysical). Covers most significant hazards and activities relevant to offshore wind and marine projects.	All of Section 6
RenewableUK (Dec 2013)	H&S First Aid Needs Assessment	Guidance on how duty holders can assess provision of adequate and appropriate equipment, facilities and personnel to ensure employees receive proper attention if they are injured or taken ill at work. Sets out key issues to consider when conducting a first aid needs assessment.	All of Section 6
Vessels and equipment			
The G+, published through the Energy Institute (Jan 2018)	The safe management of small service vessels used in the offshore wind industry (2nd Ed.)	Addresses small service vessels of less than 500GT, e.g. crew transfer vessels, guard vessels, survey vessels and construction support vessels. Applicable to all offshore wind farms globally; consistent with national requirements. Covers responsibilities for parties involved in management of service vessels, audit and inspection of wind farm service vessels, operating procedures for marine operations and vessel activities, management of vessel traffic, training and competence of crew and passengers, and vessel safety equipment.	All of Section 6
RenewableUK (2015)	Vessel Safety Guide	Guidance in the process of selection and management of vessels and interface of equipment to ensure all are Fit	All of Section 6

Author	Title	Scope	Cross reference to relevant section in this OTA CMS
		for Purpose and operated within a robust Health and Safety management system.	
The Crown Estate (Sep 2014)	Construction vessel guideline for the offshore renewables industry	Provides guidance to developers and supply chain for the construction of a UK offshore wind farm project. Follows on from 'Vessel Safety Guide – Guidance for offshore renewable energy developers (Vessel Safety Guide)' published by RenewableUK in 2012.	All of Section 6
RenewableUK (Nov 2013)	Guidelines for Selection and Operation of Jack-ups in Marine Renewable Energy Industry	Guidelines for good industry practice to be followed for selection and operation of jack-ups. Relevant to jack up owners/ operator's technical staff and crews responsible for the operation of jack-ups, and to project managers in the offshore renewables energy industry.	Section 6.4,6.6 and 6.7
Communication with other sea users			
Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) / The Crown Estate (Jan 2014)	FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison	Provides information to allow offshore renewables developers and the fishing industry to liaise on potential impacts and/ or interactions in regard to the planning, construction and operation of offshore renewables projects.	Sections 4 and 6.2
RenewableUK (Dec 2013)	Safety Circular: Notices to Mariners. Guidance for Offshore Wind & Marine Projects	Guidance on accepted scope and format for issuing Notices to Mariners (NtoM).	Section 6.2

5.3 Construction (Design and Management) Regulations 2015 (CDM regulations)

The Seagreen OTA Project is a notifiable project for the purposes of the Construction (Design and Management) Regulations 2015 (CDM regulations). The aim of the CDM Regulations is to improve health and safety for all personnel and roles in the construction sector.

Seagreen will require compliance with the CDM regulations in the design and construction of the Seagreen OTA Project and will require that all personnel involved in the construction process follow the company SHE

standards and risk management procedures. All contractors and sub-contractors will be expected to comply with Seagreen Employer SHE Requirements (see LF000009-HSE-MA-STD-0001).

5.4 Emergency Response Cooperation Plan (ERCoP).

The Seagreen ERCoP will be developed prior to Commencement of Works. The ERCoP is a live document and will be reviewed and updated in consultation with MCA throughout the project lifetime.

5.5 Environmental management

The environmental management procedures which will be followed during the construction of the Seagreen OTA Project are set out in full in a number of associated consent plans, in particular the offshore CEMP (LF000009-CST-OF-PLN-0014).

5.6 Training and Competence

Seagreen will require that all personnel engaged in the construction of the Seagreen OTA Project have adequate relevant experience and training, in order to safely perform the duties that are required of them within their remit. Seagreen will ensure that all employed personnel are adequately supported at all levels. Where training or certification is required to perform duties under a role, Seagreen will require that relevant certification and training records are made available for inspection where necessary.

Contractors will provide appropriate training and certification of training and will require sub-contractors adhere to the Seagreen requirements in regard to training and competence through conditions of contract.

Seagreen personnel, contractors and sub-contractors will undergo site inductions prior to commencing work on site and will be required to attend regular toolbox talks on relevant topics where an update or specific sensitivity has been identified.

5.7 Contractor and sub-contractor obligations

Seagreen requires contractors and sub-contractors, in undertaking the construction of the Seagreen OTA Project, to comply with all relevant environmental and maritime legislation and that all necessary licences and permissions are obtained by the contractors and their sub-contractors, through conditions of contract. Seagreen therefore requires that embedded design measures and good working practices (see Section 6.2) are applied throughout the construction phase (see the Offshore CEMP - LF000009-CST-OF-PLN-0014).

The Contractor's Construction Environmental Advisors (CEAs), will ensure implementation of construction management framework measures throughout the duration of the construction period. All contractors and sub-contractors will ensure compliance with the Seagreen Employer SHE Requirements (see LF000009-HSE-MA-STD-0001).

6. Construction procedures, mitigation and good working practices

6.1 Overview

This section presents the construction methods and procedures for each component of the Seagreen OTA Project. The construction process for the Seagreen OTA Project is comprised of seven broad stages, which are summarised in Figure 6.1.

Each individual stage is described separately in Sections 6.4 to 6.10.

Table 6.1 below outlines the major construction milestones for each stage of the Seagreen OTA Project. Details of the construction programme for the works described in this OTA CMS are provided in the Construction Programme ("CoP") (LF000009-CST-OF-PRG-0002). It is currently anticipated that the majority of offshore construction works will be carried out year-round and around the clock (i.e. 24 hours working, 7 days a week).

Table 6.1: Key construction milestone for the installation of the Seagreen OTA project.

Anticipated Commencement Date	Milestone
Q3 2020	Commencement of Offshore Construction under the *Transmission Asset Marine Licence / Alternative Cable Installation Marine Licence*
Q3 2020	Stage 1: Install landfall cable ducts transition joint to MHWS
Q2 2020	Stage 2: Seabed clearance
Q2 2021	Stage 3: OSP jacket foundation substructure assembly and installation
Q3 2021	Stage 4: OSP topside installation
Q2 2023	Stage 5: OSP interconnection cable installation
Q2 2021	Stage 6: Subtidal export cable installation[1]
Q3 2021	Stage 7: Commissioning and testing

[1] Note: With reference to the Construction Programme Consent Plan (LF000009-CST-OF-PRG-0002), there may be a time gap between the installation of the WTGs on suction bucket foundations and the WTGs on jackets with piled foundations. During this gap, certain WTGs on suction buckets may be commissioned and begin generating. The installation of the second OSP may not be sequential as outlined above but regardless, the process followed will be identical.

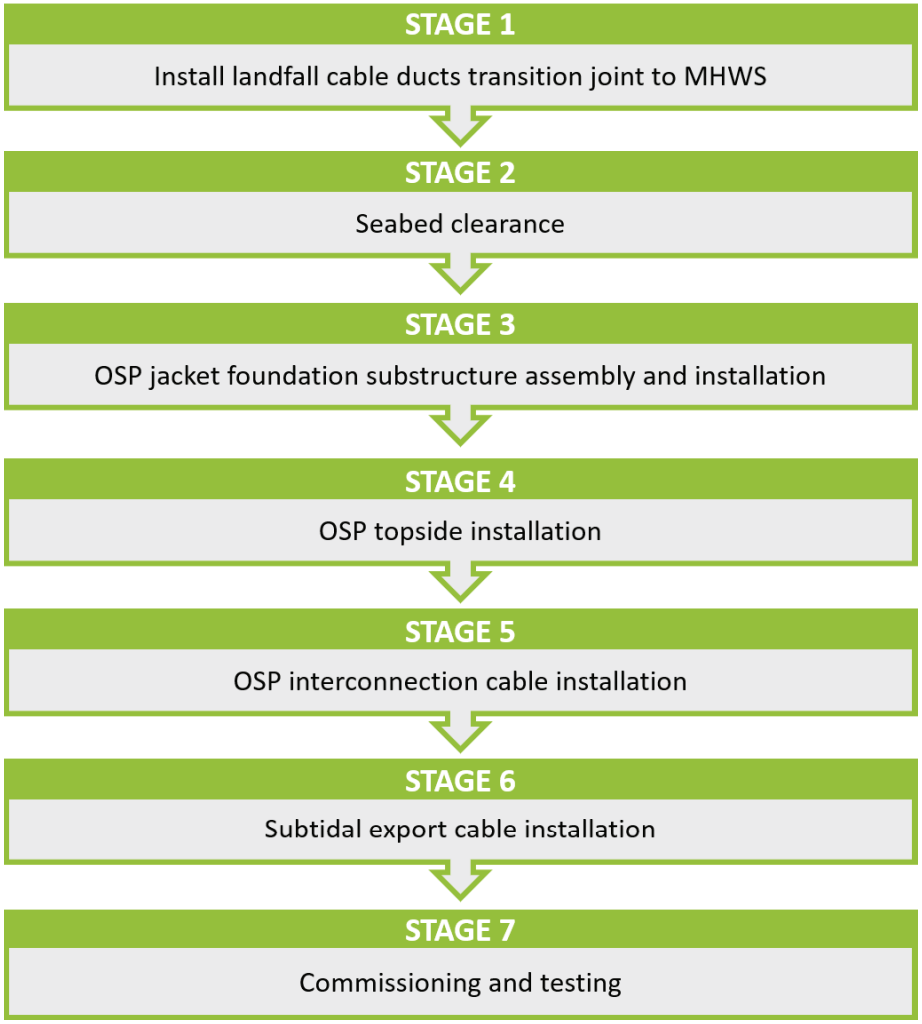


Figure 6.1: Overview of construction sequence.

6.2 Mitigation and Good Working Practices

The overarching mitigation measures and good working practices, as committed to in the ES, ES Addendum and ER and which will be applied to all stages of the Seagreen OTA Project installation, are set out in Appendix D - Summary of mitigation commitments.

A complete register of the mitigation, management and monitoring commitments made in the ES, ES Addendum and ER, are set out in the commitments register, included as part of the Offshore CEMP (LF000009-CST-OF-PLN-0014).

Those mitigation commitments and good working practices which are unique to particular stages of the installation of the Seagreen OTA Project are highlighted in each relevant section below.

For the purposes of this OTA CMS, good working practice is taken to mean the following:

- Managing the construction process to reduce the potential for harm to construction personnel or third parties; and

- Reducing potential effects on the environment and other users of the marine environment are minimised as far as reasonably practicable in line with the commitments made in the ES, ES Addendum and ER.

6.3 Construction Ports and Marine Coordination Centre

This section presents the proposed arrangements for the construction ports and Marine Co-ordination Centre (MCC) which will support the Seagreen OTA Project construction and operational phase activities.

Montrose, Able Seaton and Vlissingen (NL) will be used as construction ports for the Seagreen Project. In addition, a number of other ports may also be utilised but these cannot be confirmed at this time. The MCC will be based at Montrose Harbour. The MCC facility will be used during both the construction and operational phases of the Seagreen OTA Project.

6.4 Stage 1: Landfall installation up to MHWS

6.4.1 Introduction

Export cable installation activities at landfall will be undertaken using one of the two methods – open cut trenching or horizontal directional drilling (HDD) as described in the following sections.

6.4.2 Horizontal Directional Drilling

HDD is a trenchless method for installing underground ducts and cables in a shallow arc along a prescribed bore path by using a surface launched drilling rig. HDD is used to install cable ducts beneath the coastal defence to bring the cables ashore. The cable ducts will be installed from the landward side to an exit point seaward of the coastal defence, within the lower intertidal zone.

The sequence of events and indicative durations undertaken during an HDD operation are provided in Figure 6.2 below

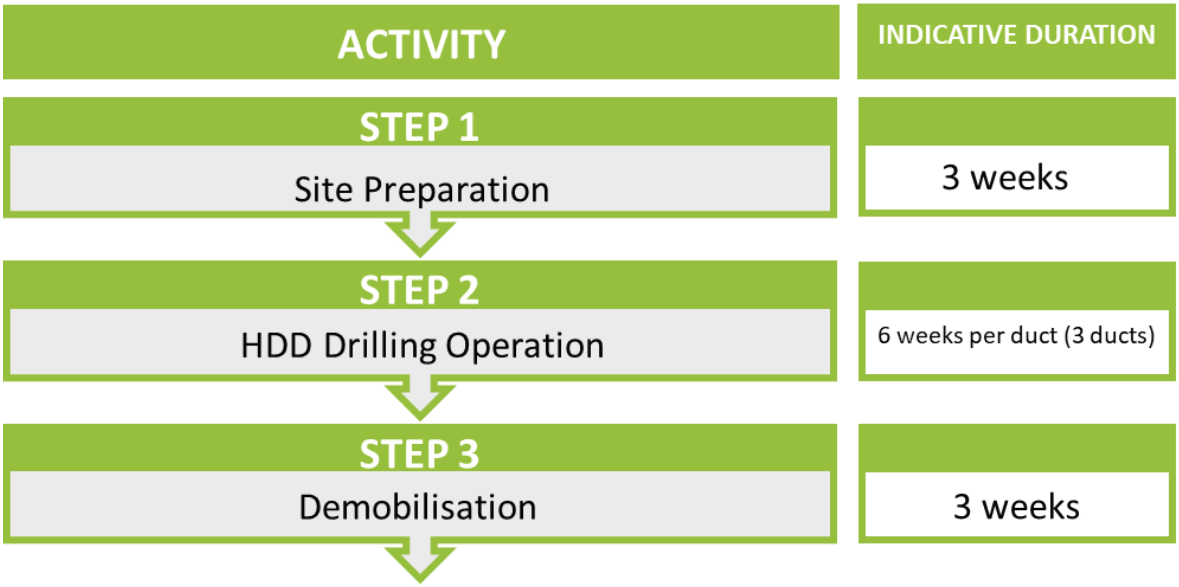


Figure 6.2: Overview of HDD Process

6.4.3 Key equipment and methodology

The key equipment and methodologies for cable installation at the landfall using HDD are presented in Table 6.2 below

Table 6.2: Key parameters – landfall Installation up to MHWS utilising HDD approach.

Equipment/Vessels	Methodology
Step 1: Preparation of the Site	
HDD Launch Pit Site	• Rectangular area (HDD launch pit) prepared • HDD plant would access launch pit site • Regular supply of fresh water provided for mixing with the slurry/drilling mud • Pit/settling pond excavated at site to contain slurry and settle out tailings arising from HDD bore.
Step 2: HDD Drilling Operation	
HDD Drill Rig	• Surveyors set out launch and reception points and HDD rig would be manoeuvred to the launch point • Rig will be anchored in position.

Equipment/Vessels	Methodology
	• HDD rig will undertake the pilot bore. (Does not break out at offshore end). • Borehole will then be reamed to the correct diameter and break out at the seabed end on final reaming pass. • Duct pipe lengths (HDPE) are joined together onshore and ends sealed and pulling head fitted. • Duct pipe (HDPE)is floated out to the offshore exit point and pulled though the bore towards the launch area by the drill rig • Duct ends are temporarily sealed until cables can be pulled in later.
Step 3: Demobilisation	
	• HDD Equipment is removed • Drill tailings are removed for disposal • Working area reinstated

6.4.4 Open Cut Trenching

Export cable installation activities at the landfall, under Marine Licence 07050/20/0 may consist of open cut trenching through the rock revetment down to the 2.5 m (Lowest Astronomical Tide (LAT)) depth contour (approximately 190 m below Mean Low Water Springs (MLWS)). Three High Density Polyethylene (HDPE) pipes will be installed, with the three cables pulled through each of these pipes. The open cut trenching will cover three distinct zones below MHWS: namely the rock revetment, intertidal zone, and the subtidal zone. The distance between the toe of the rock revetment and the 2.5 m LAT depth contour based on charted data is 360 m. Figure 6.3 shows the rock revetment at Carnoustie through which open cut trenching is proposed. At 2.5 m LAT depth, the trenching will continue offshore under the OTA Marine Licence (04678/19/0), as outlined in Stage 6: Subtidal export cable installation. The sequence of events and indicative durations for landfall installation up to MHWS is illustrated in Figure 6.4.

Figure 6.3: Aerial Photo of the Landfall Location Showing Carnoustie Golf Course behind the Rock Revetment

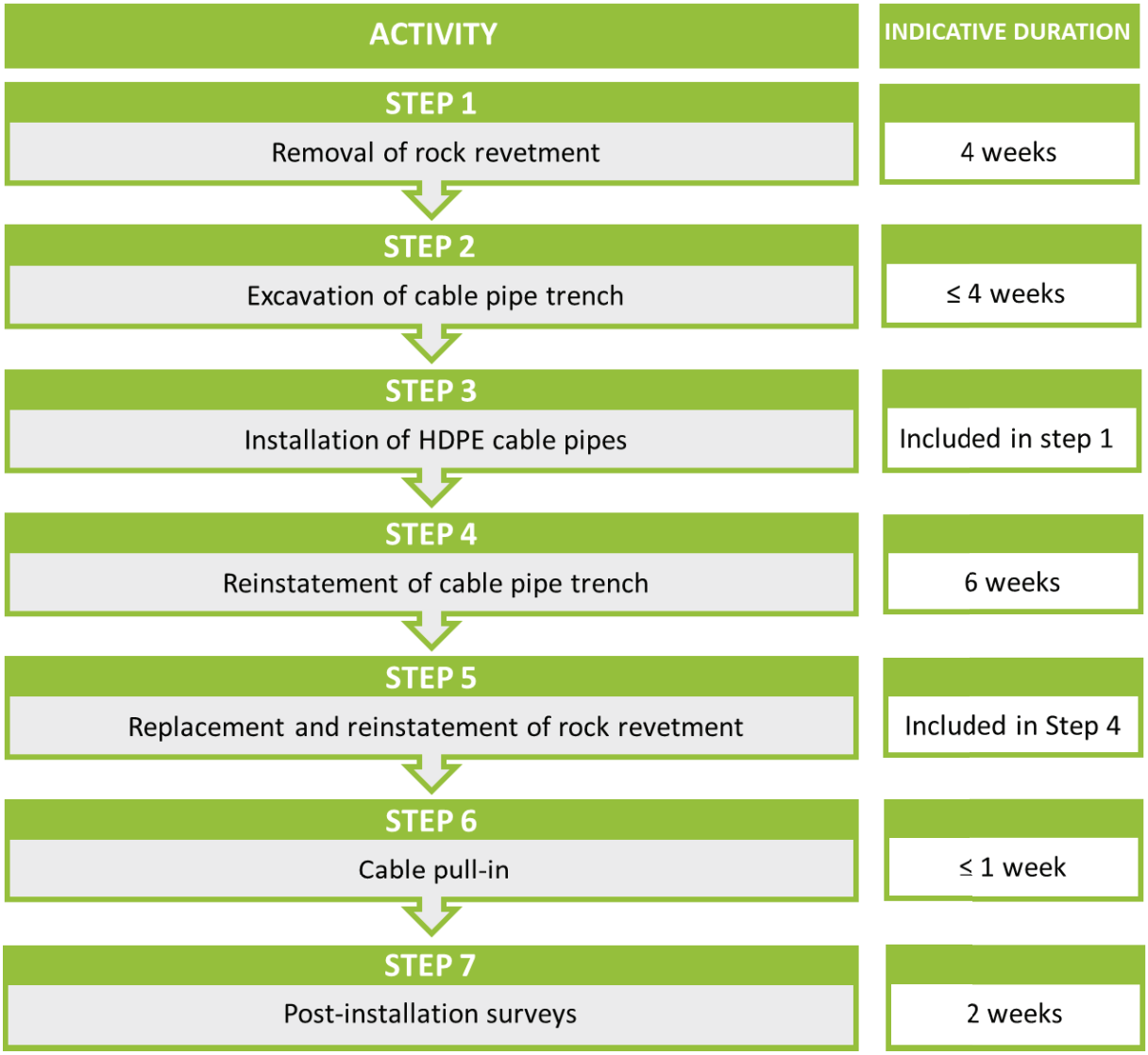


Figure 6.4: Overview of landfall installation up to MHWS utilising open cut trenching.

6.4.5 Key equipment and methodology

The key equipment and methodologies for cable installation at the landfall and up to MHWS utilising open cut trenching are presented in Table 6.3 and Table 6.4. Three trenches (3 m x up to 360 m x 3 m) will be excavated which will each contain one HDPE pipe and associated cable.

Equipment and materials are likely to be transported by sea (e.g. by barge) directly to the landfall installation site, as access to the intertidal and rock revetment areas for vehicles and materials is limited by tidal conditions. The total duration of activities including installation of the HDPE pipes from the onshore joint pits through the rock revetment, intertidal and subtidal zones is expected to take up to four months (excluding weather downtime).

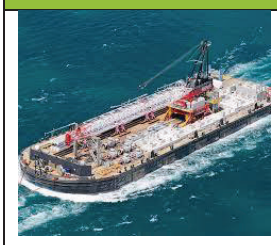
Table 6.3: Key parameters – landfall Installation up to MHWS (open cut trenching).

Parameter	Indicative Value
Revetment	
Number of trenches	1
Number of HDPE pipes in trench	3
Trench width x length x depth	70 m (includes working areas) at top and 30 m at base (trapezoid shape to provide stability) x 32 m x 10 m
Intertidal and Subtidal	
Number of trenches	3
Trench width x length x depth	3 m (at top) x up to 360 m (190 m subtidal) x 3 m
Burial depth	Anticipated to be approximately 2 m to a water depth of 3 m below MLWS, 1 m from this point onwards.

Table 6.4: Installation methodology – landfall installation up to MHWS (open cut trenching).

Equipment/Vessels	Methodology
Step 1: Removal of rock armour	
Crawler crane and clamshell bucket/rock grapple  Source: Seagreen LF00009-CST-REP-0021) Vibro-piling equipment	• Remove rock in layers to ensure effective reinstatement. • Stockpile material suitable for re-use. Transport remaining material to a licenced onshore disposal site using a licensed waste carrier. • Remove Geofabric rock under layer. • Install sheet piles using vibro-piling.
Step 2: Excavation of cable pipe trenches	

Equipment/Vessels	Methodology
Pontoon or jack-up mounted excavator/ Elevated backhoe excavator  Source: Seagreen LF00009-CST-REP-0021) Trench boxes	• Excavate trenches by pontoon or barge/jack-up mounted excavator. • Remove sediment in layers to ensure effective reinstatement. • Install trench boxes (intertidal zone). • Install sheet piles (subtidal zone).
Step 3: Installation of HDPE pipes	
HDPE pipes  Source: Seagreen LF00009-CST-REP-0021)	• Install HDPE pull-in pipes if required to aid subsequent cable pull-in. • Pipes will be fitted with concrete collars to weigh them down. • If sea bed conditions permit, HDPE pipes may not be required in the intertidal and subtidal sections. • The seaward end of the pipes will be fitted with a messenger line and temporarily capped to allow cable pull-in. • Temporary ballast (e.g. concrete bags/clamps) may be attached to the pipe ends for stabilisation. • Concrete will be poured over the pipes for stabilisation underneath the rock revetment.
Step 4: Reinstatement of cable pipe trench	
Elevated backhoe excavator (see Step 2)	• Remove trench boxes and sheet piles. • Backfill excavated material. • Site reinstated to original status.
Step 5: Replacement and reinstatement of rock armour	
Crawler crane and clamshell bucket/rock grapple (see Step 1) Barge	• Remove sheet piles. • Replace Geofabric rock under layer. • Replace and reinstate rock armour. Use of additional rock where required, delivered by sea using a barge.

Equipment/Vessels	Methodology
 Source: mmaoffshore.com	
Step 6: Cable pull-in	
Offshore vessel  Source: https://www.vanoord.com/activities/cable-laying-vessel	• Cable pulled through the HDPE pipes from the cable installation vessel towards the onshore jointing bay. • Burial of pipe ends to a depth of 2 m.
Step 7: Post-installation surveys	
N/A	• Survey of HDPE pipe depth within revetment, intertidal and subtidal zones. • Topographical survey within revetment, intertidal and subtidal zones.

6.4.6 Mitigation and Good Working Practices

Following completion of works, the beach and foreshore will be returned to the original profile, or as close as reasonably practicable. All temporary construction material must also be removed at this time. The overarching mitigation measures and good working practices as committed to in the ES, ES Addendum and ER and which will be applied to all stages of the Seagreen OTA Project installation, are set out in Appendix D - Summary of mitigation commitments, Table D.1. The mitigation and good working practices specific to the cable installation at landfall up to MHWS are set out in Appendix D - Summary of mitigation commitments, Table D.2.

6.5 Stage 2: Subtidal seabed preparation

6.5.1 Introduction

Seabed preparation activities may be required in advance of OSP foundation installation activities, OSP interconnection cable installation activities and subtidal export cable installation activities to remove any boulders. These activities may require further licensing. If a licence is required, this will be applied for by Seagreen under the Marine (Scotland) Act 2010 for dredging and disposal activities within 12 NM of the coast. The sequence of events and indicative durations for seabed preparation is illustrated in Figure 6.5

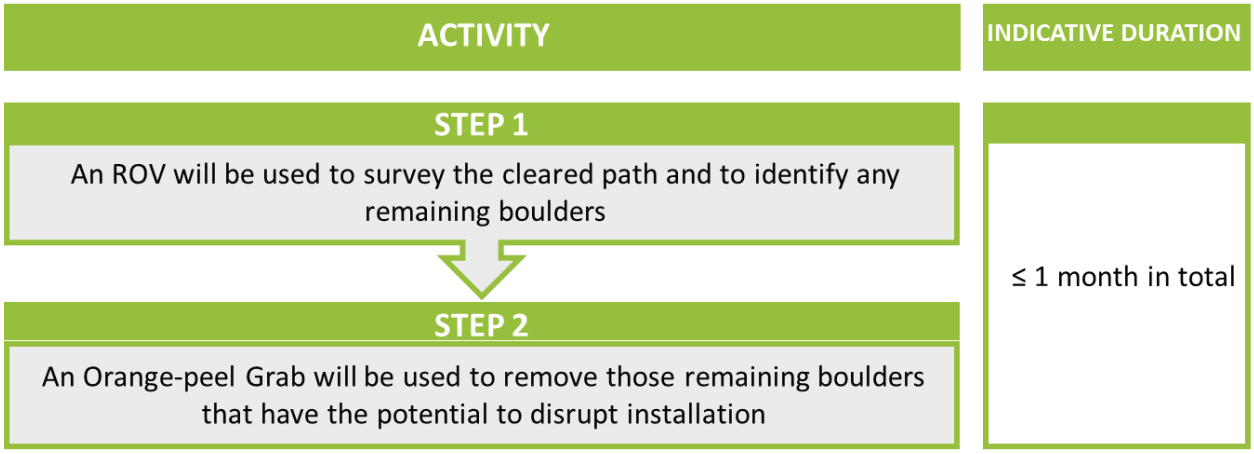
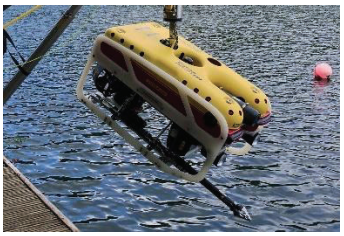


Figure 6.5: Overview of subtidal seabed preparation activities.

6.5.2 Key equipment and methodology

The key equipment and methodology for seabed preparation activities is presented in Table 6.5. Delivery of equipment will be directly to the seabed preparation site from port or a previous operational location and will be by sea transport. All equipment will be launched from a Platform Supply Vessel (PSV) or equivalent.

Table 6.5: Key equipment and methodology – subtidal seabed preparation.

Equipment/Vessels	Methodology
Step 1: ROV survey	
ROV:  Source: https://www.rovco.com/services/rov/	• The ROV will survey the cleared path to identify any remaining boulders.

Equipment/Vessels	Methodology
Step 2: Removal of remaining boulders with Orange Peel Grab	
Orange-peel grab:  Source: http://www.fisheroffshore.com/equipment/subsea-tooling/recovery/boulder-grabs/	• May be deployed from PSV or similar vessel. • Deployment of orange-peel grab to relocate remaining boulders (if necessary).

6.5.3 Mitigation and Good Working Practices

The overarching mitigation measures and good working practices as committed to in the ES, ES Addendum and ER and which will be applied to all stages of the Seagreen OTA Project installation, are set out in Appendix D - Summary of mitigation commitments, Table D.1.

6.6 Stage 3: OSP jacket foundation substructure assembly and installation

6.6.1 Introduction

Two OSP jacket substructures will be fixed to the seabed by piled foundations, each jacket shall have up to 12 post-installed piles (see Piling Strategy LF000009-CST-OF-PLN-0003). Delivery of main components will be directly to the OSP installation sites by sea transport (Heavy Lift Vessel, HLV, or towed barge) from the site of fabrication. The sequence of events and indicative durations for OSP piled foundation substructure assemblies and installation is illustrated in Figure 6.6.

It should be noted that there may be a time gap between the installation of the WTGs on suction bucket foundations and the WTGs on jackets with piled foundations. Prior to this gap the first OSP will have been installed so that during the gap, certain WTGs on suction buckets may be commissioned and begin generating.

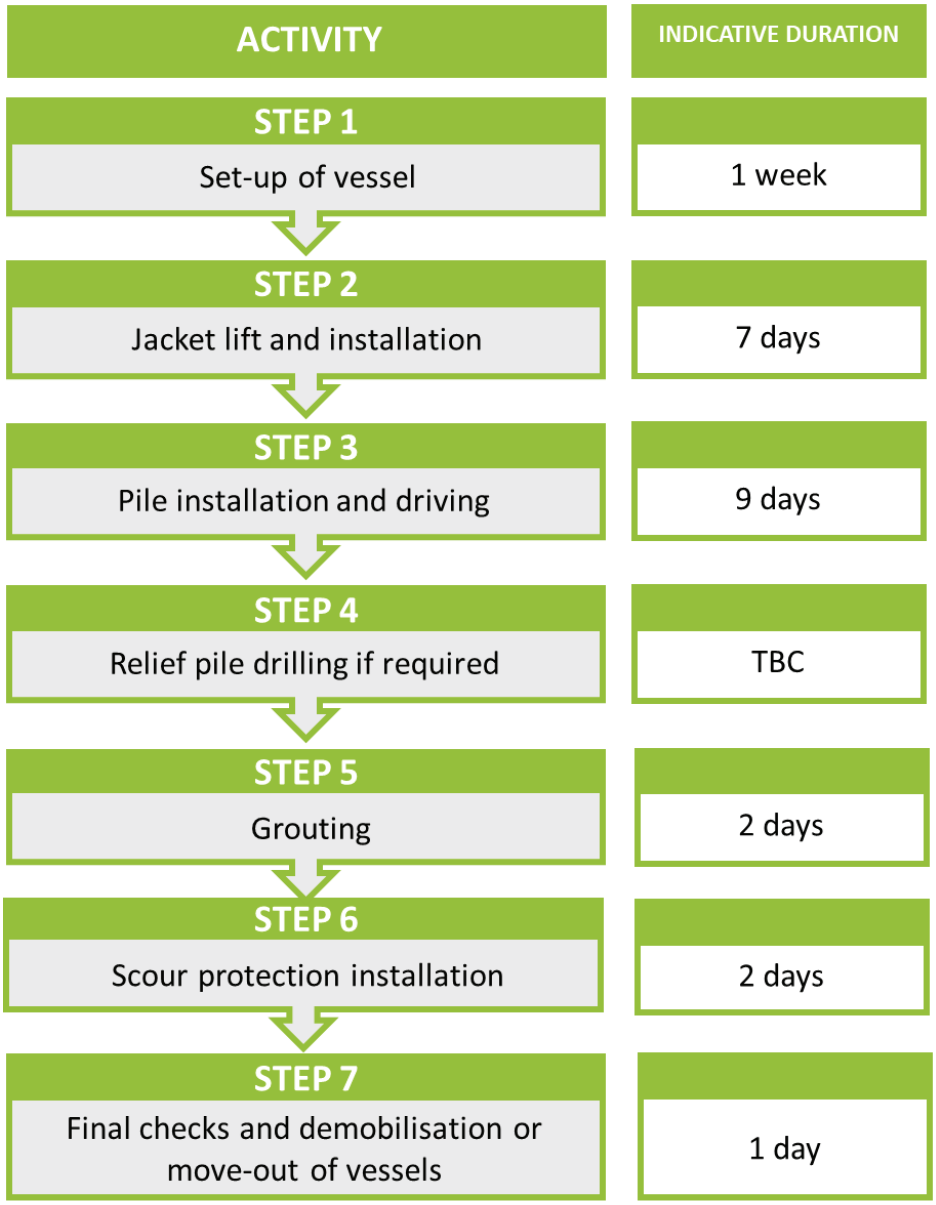


Figure 6.6: Overview of OSP jacket foundation substructure assembly and installation.

6.6.2 Key equipment and methodology

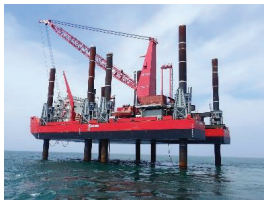
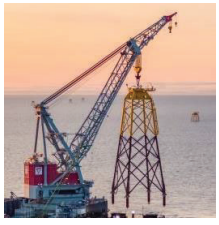
Key parameters associated with the OSP jacket foundation design are set out in Table 6.6, with the installation methodology and equipment outlined in Table 6.7.

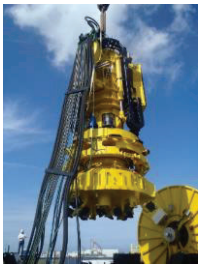
It should be noted that at this stage the need for scour protection is still to be confirmed and shall be confirmed in due course upon analysis of in-place geotechnical parameters. The amount of protection to be constructed will be within the envelope of the parameters assessed within the ES and ES Addendum.

Table 6.6: Key parameters – OSP jacket foundation substructure assembly and installation.

Parameter	Value
Jacket Foundation	
No of OSP jacket foundations	2
Piles per OSP jacket	Up to 12

Table 6.7: Installation methodology – OSP jacket foundation substructure.

Equipment/Vessels	Methodology
Step 1: Set-up of vessel	
Heavy Lift Vessel (HLV)  Source: Marine Traffic	• Jacket delivered to site by either HLV or towed barge. • Vessel arrives at proposed foundation installation location and positions ready for operations.
Step 2: Jacket lift and installation	
Heavy Transport Vessel (HTV)/ Installation Vessel:  Source: http://www.fugro.com Crane:  Source: www.crownestatescotland.com	• Lifting equipment connected to the jacket on the barge/HLV • Temporary sea fastenings are released, and the jacket is upended to a vertical position • Jacket is positioned and lowered to the seabed in preparation for pile installation.
Step 3: Pile installation and driving	
Pile-driving hammer	• Each of the piles is lifted and inserted into pile sleeves attached to the foot of each jacket leg.

Equipment/Vessels	Methodology
 Source: ihciqip.com Crane (see Step 2)	• The piles are driven into the seabed to the desired depth using a suitable hydraulic impact hammer. • A 'soft-start' process will be undertaken before ramping up to the required hammer energy. • Pile driving will be undertaken until pile refusal or the target penetration depth is reached. • Relief drilling may be required prior to final pile driving to reach full penetration (see Step 4 below) • See Piling Strategy (LF000009-CST-OF-PLN-0003).
Step 4: Relief pile drilling (if required)	
Reverse circulation drilling unit (subsea drilling tool):  Source: tms-supplies.nl	• The piling hammer is withdrawn and a reverse circulation drilling unit deployed. • A subsea drilling tool is lowered from the installation vessel and fitted over the partially installed pile. • Material inside the pile is drilled out with removed material deposited on the adjacent seabed. • Drilling continues until required depth is achieved or obstruction is passed. • Pile driving may resume.
Step 5: Grouting	
Grouting spread: 	• Grout will be mixed using fresh water on board the installation vessel and stored in grout silos ready for use. • Grout is pumped into the joint between the jacket and the pile. • The grout cures and hardens. • Temporary support is provided via pile grippers during the grout curing duration
Step 6: Scour protection installation	
Fall pipe vessel:  Source: Marine Traffic ROV (see Table 6.5, Step 2)	• Scour protection installed using a fall pipe. • An ROV positioned at the end of the pipe is used to adjust the delivery point relative to the vessel. • The ROV is used to survey the position and shape of the scour protection.

Equipment/Vessels	Methodology
Step 7: Completion and move-out of vessels	
HLV (see Step 1)	• The HLV moves to next installation location or departs site. • The foundation will be surveyed to ensure integrity of the infrastructure.

6.6.3 Mitigation and good working practices

The mitigation and good working practices specific to the OSP jacket foundation substructure assemblies and installation are set out in Table D.1 in Appendix D - Summary of mitigation commitments. Specific measures related to the mitigation of underwater noise are identified in the Seagreen Piling Strategy (LF000009-CST-OF-PLN-00021).

6.7 Stage 4: OSP topside Installation

6.7.1 Introduction

The OSP topsides will be delivered directly to site on either a barge or a HLV, direct from the location of fabrication. There will be two OSP topsides which will contain transformers and associated switchgear and which will be supported by the piled jacket substructures (see Stage 3 above). Total duration of OSP topside installation is approximately eight days from arrival at OSP installation location. An illustration of a typical OSP topside attached to a jacket foundation substructure is provided in Figure 6.7 below. The sequence and indicative durations of events for OSP topsides installation is illustrated in Figure 6.8.

Figure 6.7: OSP at the Greater Gabbard OWF (source Seagreen Alpha and Bravo ES courtesy of Greater Gabbard OWF).

Again, it should be noted that there may be a time gap between the installation of the WTGs on suction bucket foundations and the WTGs on jackets with piled foundations. Prior to this gap the first OSP will have been installed so that during the gap, certain WTGs on suction buckets may be commissioned and begin generating. The installation of the second OSP may not be sequential as outlined in this section but regardless, the process followed will be identical.

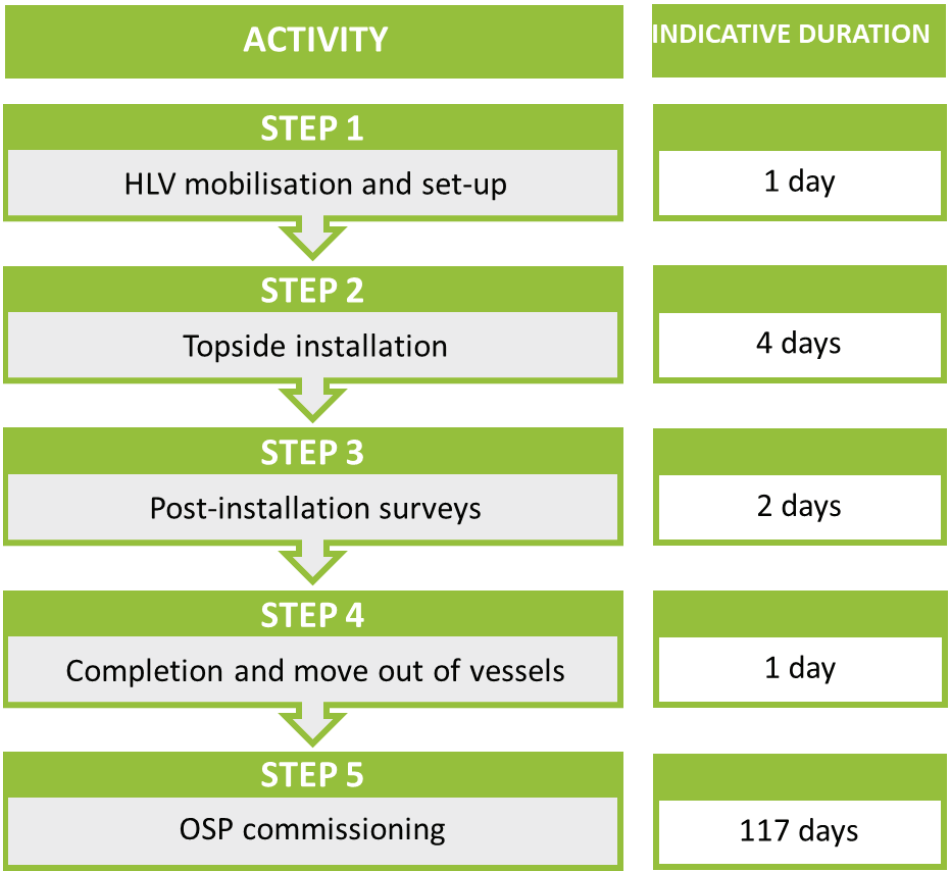


Figure 6.8: Overview of OSP topside installation activities.

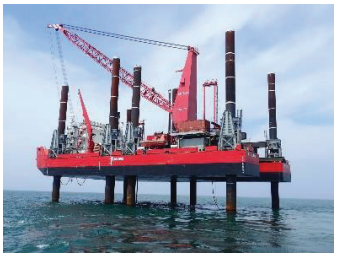
6.7.2 Key parameters and methodology

The key parameters of the OSP topsides are set out in Table 6.8, with the installation methodology and equipment outlined in Table 6.9.

Table 6.8: Key parameters – OSP topsides.

Parameter	Indicative Value
OSP topsides	2
Length x width	Approx. 52.0m x 35.0m
Height of topside structure (relative to Lowest Astronomical Tide)	Approx. 45.0mm
Height of topside structure including lightning protection (relative to Lowest Astronomical Tide)	Approx. 70.0m (including comms mast)

Table 6.9: Installation Methodology – OSP topsides.

Equipment/Vessels	Methodology
Step 1: HLV mobilisation and set-up	
HLV:  Source: Marine Traffic	• Vessel arrives and is anchored at location where OSP topside is to be installed.
Step 2: Topside installation	
Barge:  Source: http://www.fugro.com HLV (see Step 1).	• OSP topside is assembled prior to transporting to the installation location by barge. • Temporary sea fastenings are released and HLV lifts OSP topside onto pre-installed jacket foundation structure (see Stage 3). • Welding of topside legs to jacket foundation substructure.
Step 3: Post-installation surveys	
ROV (see Table , Step 2)	• The base of the jacket structure will be surveyed to ensure integrity of infrastructure.
• Step 4: Completion and move out of vessels	
HLV (see Step 1)	• The HLV will leave site on installation of the first OSP and will return when the installation of the second OSP is undertaken (see Construction Programme, LF000009-CST-OF-PRG-0002).
• Step 5: OSP commissioning	
N/A	• Set-up of communication systems (e.g. lighting, fire-fighting system). • Commissioning of OSP electrical systems.

6.7.3 Mitigation and good working practices

The overarching mitigation measures and good working practices as committed to in the ES, ES Addendum and ER and which will be applied to all stages of the Seagreen OTA Project installation, are set out in Appendix D - Summary of mitigation commitments, Table D.1.

6.8 Stage 5: OSP interconnection cable installation

6.8.1 Introduction

The OSP interconnection cable connects the two OSPs. The OSP interconnection cable will be trenched and buried in the seabed, to a target depth of at least 1 m to provide protection to the cable. This will be carried out by either a subsea jet trenching tool or an engineered rock placement solution where trenching to the required depth has not been possible. An overview of the OSP interconnection cable installation process and indicative durations is provided in Figure 6.9.

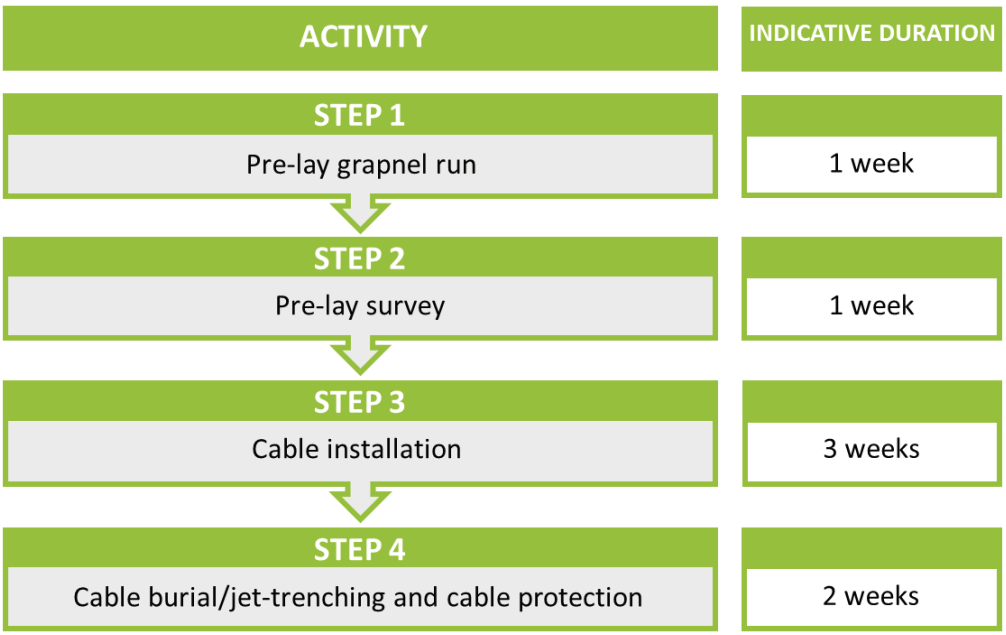


Figure 6.9: Overview of OSP interconnection cable installation process.

6.8.2 Key Parameters and methodology

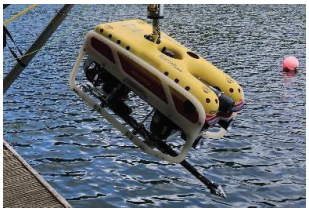
Key parameters for the OSP interconnection cable are set out in Table 6.10 with the installation methodology and equipment set out in Table 6.11.

Table 6.10: Key parameters – OSP interconnection cable.

Parameter	Indicative Value
OSP interconnection cable	
Length	Approximately 3 km between the two OSPs
Burial depth	1 m (minimum)
Width of trench	3 m
Width of sea bed disturbance	10 m

Parameter	Indicative Value
Cable voltage	66kv
Cable protection	
Material (type)	Rock, armouring or concrete mattressing
Cable protection length x width x height	Included in the 35.5 km x 7 m x 1 m cable protection volume assessed for both Alpha and Bravo respectively

Table 6.11: Installation methodology – OSP interconnection cable.

Equipment/Vessels	Methodology
Step 1: Pre-lay grapnel run	
Grapnel assembly:  Source: http://eta-ltd.com/img/grapnels/tiger.jpg Pre-lay Grapnel Vessel (PLGV)	• The cable route will be cleared of any remaining obstructions by undertaking a pre-lay grapnel run (PLGR). • The PLGR vessel will tow the grapnel rig along the centreline of the cable route with a tolerance of +/- 5 m giving a 10 m corridor. • The majority of debris encountered will be placed to the side of the cable route. Larger debris (i.e. rock outcrops) will be left insitu and the cable route diverted around it. • Any debris to be recovered and disposed of onshore in a licensed facility is anticipated to be limited to linear debris (abandoned ropes) that would impede the burial tool as it tracks along the seabed.
Step 2: Pre-lay survey	
ROV:  Source: https://www.rovco.com/services/rov/ CLV: 	• An ROV deployed from the Cable Lay Vessel (CLV) will perform a pre-lay survey immediately prior to the cable installation operation.

Equipment/Vessels	Methodology
Source: https://www.vanoord.com/activities/cable-laying-vessel	
Step 3: Cable installation	
CLV (see Step 2) ROV (see Step 2)	• The CLV is pre-loaded with the subsea cable. • Cable is surface laid between the OSPs. • The Cable Protection System (CPS) is fitted to the cable end on board the CLV. • An ROV will recover a pre-installed messenger wire within the J-Tube. The wire will be winched to deck and connected to the CPS. • The CLV will then pay out the cable, which is winched into the OSP. • On completion of the route length, the end of the cable is then cut, sealed and prepared for second end installation operations. • Cable testing will be performed at various stages during the cable lay operations.
Step 4: Cable burial/jet-trenching and cable protection	
CapJet:  Source: Nexans Consent Requirements – Construction Method Statement LF000009-NEX001-REP-K22-001-01 Jet trenching and chain cutting hybrid tool:  Source: https://www.smd.co.uk/our-products/qtrenchers/qtrencher-1400/ Fall pipe vessel:	• The OSP interconnection cable is trenched into the seabed to the target depth. • A jetting tool “CapJet” will inject water at high pressure onto the sediment surrounding the cable. • Where jet-trenching is not possible due to the presence of stiff sediments, a hybrid tool capable of both chain cutting and jet trenching will be used. • If target depth has not been reached, a second trenching pass will be completed to ensure the cable is adequately buried. • An engineered cable protection solution will further protect any areas of cable not trenched to the required depth (armouring, concrete mattressing, or rock placement). • Rock protection is usually deposited by a fall pipe vessel.

Equipment/Vessels	Methodology
 Source: Marine Traffic	

6.8.3 Mitigation and good working practices

The overarching mitigation measures and good working practices as committed to in the ES, ES Addendum and ER and which will be applied to all stages of the Seagreen OTA Project installation, are set out in Appendix D - Summary of mitigation commitments Table D.1.

6.9 Stage 6: Subtidal export cable installation

6.9.1 Introduction

Prior to subtidal export cable installation, a pre-lay grapnel run (PLGR) will clear the seabed surface of obstacles within the first half metre depth of the seabed along each cable alignment. The PLGR will commence as close to MLWS as possible (minimum 10 m water depth). The three export cables will be installed onto the seabed followed by burial (trenching) to a target depth of at least 1 m, to provide protection to the cables. It should be noted that export cable installation will be completed at three different discrete periods (see Construction Programme, LF000009-CST-OF-PRG-0002) and some of the steps for the cable installation will be repeated 3 times (one for each cable) as outlined in Table 6.11.

An overview of the subtidal export cable installation process and indicative durations is provided in Figure 6.10

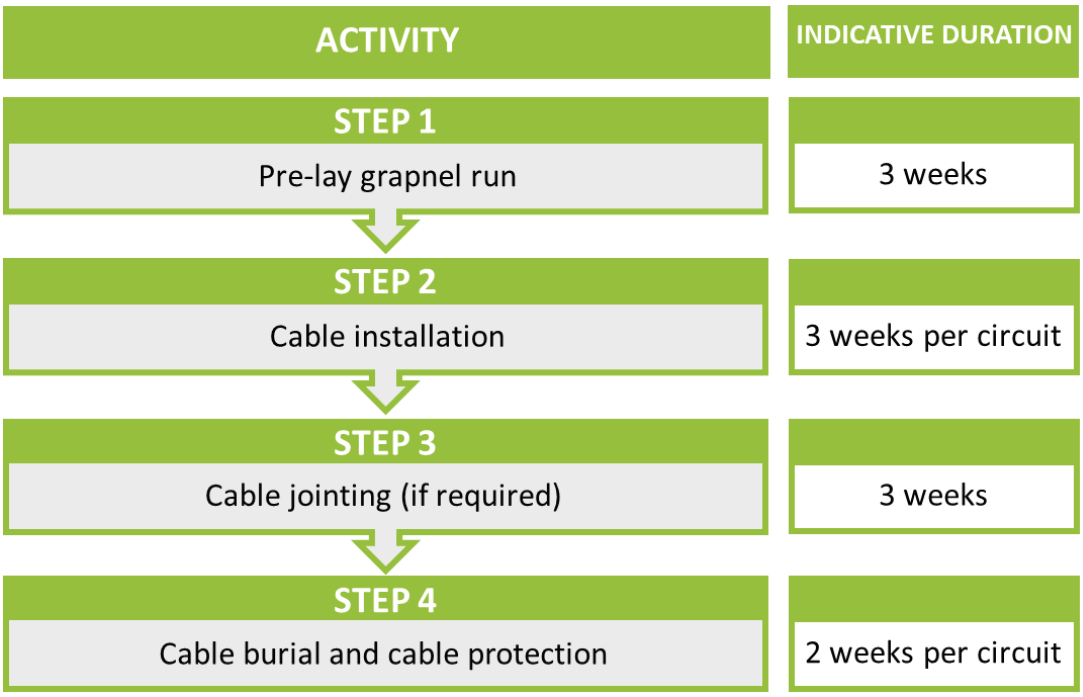


Figure 6.10: Subtidal export cable installation overview.

6.9.2 Key Parameters and methodology

Key parameters for the export cables are set out in Table 6.12 with the installation methodology and equipment set out in Table 6.13 The OTA Cable Plan (CaP) provides full details on the location and installation techniques for the export cables, technical specification of the cables, a burial risk assessment, and methodologies for monitoring the cables during the operational phase (OTA CaP - LF000009-CST-OF-PLN-0009).

Table 6.12: Key parameters – subtidal export cables.

Parameter	Indicative Value
Subtidal export cables	
Length	Approximately 190 km (63.2 km + 63.2 km + 63.4 km)
Diameter	Diameter 260 mm at landfall, 244 mm offshore
Burial depth	1 m (minimum)
Width of trench	N/A - Jetting fluidises the seabed locally and does not produce a defined trench
Cable voltage	225 kV
Cable protection	
Primary cable protection method	Cable burial by jetting
Contingency Cable protection	Rock 5” to 8”
Cable protection length x width x height	19 km x 7 m x 1 m

Table 6.13: Installation methodology – subtidal export cables.

Equipment/Vessels	Methodology
Step 1: Pre-lay grapnel run	
Grapnel assembly:  Source: http://eta-ltd.com/img/grapnels/tiger.jpg Pre-lay Grapnel Vessel (PLGV)	• The PLGR will commence as close to MLWS as possible (minimum 10 m water depth). • The PLGR will clear the seabed surface of obstacles within the first half metre depth of the sea bed. • The grapnel is lowered over the vessel to the seabed. The vessel moves slowly over the export cable route • The majority of debris encountered will be placed to the side of the cable route. Larger debris (i.e. rock outcrops) will be left insitu and the cable route diverted around it. • Any debris to be recovered and disposed of onshore in a licensed facility is anticipated to be limited to linear debris (abandoned ropes) that would impede the burial tool as it tracks along the seabed.
Step 2: Cable installation (step to be repeated for each of the three cables)	
 Source: Nexans Consent Requirements – Construction Method Statement LF000009-NEX001-REP-K22-001-01  Source: Nexans Offshore Export Cable – Installation Report LF000009-NEX001-REP-N14-001-01 Note – specific vessel is still TBC	**Connection of subtidal export cable to HDPE pipe exit** • CLV is loaded with cable at the manufacturing facility and sails to site. • A dive team will be mobilised to prepare the HDPE pipe exit (see Stage 2). • The subsea cable is floated out from the vessel to the HDPE pipe exit. • The onshore winch wire will be connected to the cable through the HDPE pipe. The cable will be guided into the HDPE pipe. • The cable will be winched through the HPDE pipe. **Cable lay** • The cable is surface laid between the HDPE pipe exit and the OSP. **Cable pull-in at OSP** • The Cable Protection System (CPS) is fitted to the cable end on board. (specific mechanical protection applied to protect the cable as it enters the OSP J tube bellmouth). • An ROV will recover a pre-installed messenger wire within the J-Tube. The wire will be winched to deck and connected to the sealed cable end. • The cable will be winched into the OSP. Cable testing will be performed at various stages during the cable lay operations.
Step 3: Cable jointing if required (step to be repeated for each of the three cables	

Equipment/Vessels	Methodology
C/S Nexans Skagerrack (see Step 2)	• 1st cable end is retrieved from the seabed to the C/S Nexans Skagerrak. • Cable jointing takes place on the vessel. • The jointed cable will then be lowered to the seabed.
Step 4: Cable burial and cable protection (step to be repeated for each of the three cables)	
Jet trenching Fall pipe vessel for installation of any rock protection	• The export cable is trenched into the seabed to the target depth. • A jetting tool will inject water at high pressure onto the sediment surrounding the cable to temporarily fluidise it allowing the cable to sink to the required burial depth. • If target depth has not been reached, a second trenching pass will be completed to improve the first pass. • An engineered contingency cable protection solution - rock placement will be used where burial by jetting is not achieved with up to 2 passes of the jetting tool. Rock will be deposited by a fall pipe vessel.

Figure 6.11: Cable floating operation (source: Nexans Consent Requirements – Construction Method Statement LF000009-NEX001-REP-K22-001-01).

6.9.3 Mitigation and good working practices

The overarching mitigation measures and good working practices as committed to in the ES, ES Addendum and ER and which will be applied to all stages of the Seagreen OTA Project installation, are set out in Appendix D - Summary of mitigation commitments Table D.1.

6.10 Stage 7: Commissioning

6.10.1 Introduction

Following construction of the Seagreen OTA Project, the project will undergo commissioning and testing. These steps complete the commissioning phase of the Seagreen OTA Project which is the handover of the project from the construction phase to the operation phase.

6.10.2 Mitigation and good working practices

The following mitigation and good working practice measures as identified in the ES and ES Addendum, or as subsequently identified by Seagreen, will be implemented during commissioning:

- All commissioning activities will be subject to an approved safe system of work; and
- The commissioning of Project Alpha and Project Bravo and the Transmission Asset will be in accordance with approved commissioning procedures. This will be managed by the principal contractor(s) for construction of each project to the requirements of Seagreen and the OFTO, where applicable. Commissioning activities will include the WTGs performance and reliability testing and compliance with the Grid code standard.

7. Compliance with the ES, ES Addendum and ER

The relevant conditions of the OTA Marine Licence require that the Seagreen OTA is constructed in accordance with the construction methods assessed in the ES and ES Addendum and that construction related mitigation proposed in the ES and ES Addendum (which describe the range of methods that could be applied during construction) are delivered.

Since award of development consent for Seagreen, the design of the project and the approach to installation has been substantially refined, as set out within this OTA CMS and in other relevant consent plans. To demonstrate compliance, with those methods assessed within the ES and ES Addendum, Appendix C provides a tabulated comparison of project construction parameters and methodologies as presented in the ES and ES Addendum with this OTA CMS.

The ES and ES Addendum for the Seagreen Project detailed a number of mitigation commitments specific to construction and installation activities. Appendix D - Summary of mitigation commitments presents the commitments to mitigation measures made by Seagreen in the ES and ES Addendum that are relevant to the construction methods and processes set out in this OTA CMS. The tables in Appendix D - Summary of mitigation commitments provide details of the commitments and a cross-reference to where each commitment is implemented.

8. References

Table 8.1 sets out those documents for the Seagreen OTA project in relation to either Consent Plans or other reference documents.

Table 8.1 Seagreen Document References

SWEL Document Number	Title
LF000009-CST-OF-PLN-0002	Marine Archaeological Written Scheme of Investigation & Protocol for Archaeological Discoveries
LF000009-CST-OF-PLN-0012	Marine Pollution Contingency Plan
LF000009-CST-OF-PRG-0002	Offshore Construction Programme
LF000009-CST-OF-PLN-0010	Offshore Lighting and Marking Plan
LF000009-CST-OF-PLN-0007	Offshore Navigational Safety Plan
LF000009-CST-OF-PLN-0014	Offshore Construction Environmental Management Plan
LF000009-CST-OF-PLN-0003	Offshore Transmission Assets Piling Strategy
LF000009-CST-OF-PRG-0003	Offshore OWFs Environmental Monitoring Programme
LF000009-CST-OF-PLN-0009	Offshore Transmission Assets Cable Plan
LF000009-CST-OF-MST-0002	Offshore Transmission Assets Construction Method Statement
LF000009-CST-OF-PRG-0004	Offshore Transmission Assets Operation and Maintenance Programme
LF000009-CST-OF-PLN-0008	Offshore Wind Farm Cable Plan
LF000009-CST-OF-MST-0001	Offshore Wind Farm Construction Method Statement
LF000009-CST-OF-PRG-0001	Offshore Wind Farm Operations and Maintenance Programme
LF000009-CST-OF-PLN-0006	Offshore Vessel Management Plan
LF000009-HSE-MA-STD-0001	Employer SHE Requirements
LF000009-HSE-MA-PRO-0007	Vessel Inspection
LF000009-HSE-MA-PRO-0008	Incident Reporting
LF000009-CST-OF-REP-0021	Seagreen Alpha and Bravo Offshore Wind Farms: Alternative Landfall Cable Installation Marine Licence Application – Environmental Report

The Construction (Design and Management) Regulations (2015)
http://www.hse.gov.uk/construction/cdm/2015/index.htm

The Crown Estate (2014) Construction vessel guideline for the offshore renewables industry
https://www.thecrownestate.co.uk/media/373215/construction-vessel-guideline-for-the-offshore-renewables-industry.pdf

The Crown Estate (2014) Sharing lessons learned and good practice in offshore transmission
https://www.offshorewindscotland.org.uk/media/1005/ei-sharing-lessons-learned-and-good-practice-in-offshore-transmission-summary.pdf

The G+ Global Offshore Wind Health and Safety Organisation (2018) Working at height in the offshore wind industry (2nd Ed.), The Energy Institute
https://www.gplusoffshorewind.com/__data/assets/pdf_file/0010/633556/Work-at-Height-Guidelines-2nd-Edition-B31jk-web-version.pdf

The G+ Global Offshore Wind Health and Safety Organisation (2018) The Safe Management of Small Service Vessels Used in the Offshore Wind Industry, 2nd Ed.
https://www.gplusoffshorewind.com/__data/assets/pdf_file/0011/633557/Guidelines-for-the-management-of-service-vessels.pdf

Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) / The Crown Estate (2015) FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison https://www.thecrownestate.co.uk/media/1776/floww-best-practice-guidance-disruption-settlements-and-community-funds.pdf

G+/DROPS (2018) Reliable securing booklet for offshore wind
https://www.gplusoffshorewind.com/?a=641042

RenewableUK (2015) Vessel Safety Guide
https://cdn.ymaws.com/www.renewableuk.com/resource/collection/AE19ECA8-5B2B-4AB5-96C7-ECF3F0462F75/Vessel_Safety_Guidance.pdf

RenewableUK (2014) Offshore Wind and Marine Energy H&S Guidelines
https://cdn.ymaws.com/www.renewableuk.com/resource/collection/AE19ECA8-5B2B-4AB5-96C7-ECF3F0462F75/Offshore_Marine_HealthSafety_Guidelines.pdf

RenewableUK (2013) Safety Circular: Notices to Mariners. Guidance for Offshore Wind & Marine Projects
https://cdn.ymaws.com/www.renewableuk.com/resource/collection/AE19ECA8-5B2B-4AB5-96C7-ECF3F0462F75/Offshore_Marine_HealthSafety_Guidelines.pdf

RenewableUK (2013) H&S First Aid Needs Assessment
https://cdn.ymaws.com/www.renewableuk.com/resource/resmgr/publications/reports/H&S_First_Aid_Needs.pdf

RenewableUK (2013) Guidelines for Selection and Operation of Jack-ups in Marine Renewable Energy Industry Guidelines for Selection and Operation of Jack-ups in Marine Renewable Energy Industry

https://cdn.ymaws.com/www.renewableuk.com/resource/resmgr/publications/reports/H&S_Jackup_Barges.pdf

Seagreen (2012) Environmental Statement (ES) for the Seagreen Alpha and Bravo Offshore Wind Farms. *September 2012*.

Seagreen (2013) Addendum to the Environmental Statement for the Seagreen Phase 1 Offshore Project: Alpha and Bravo Offshore Wind Farms *October 2013.*

Appendix A – List of abbreviations and definitions

Term	Description
AIS	Automatic Identification System
Alternative Landfall Cable Installation Methodology Marine Licence	Marine Licence granted by the Scottish Ministers under the Marine (Scotland) Act 2010 on 21 November 2019 (reference 07050/19/0) in respect of the Alternative Landfall Cable Installation Methodology
Audit	Inspection to confirm, compliance and identify and correct non-conformances
CaP	Cable Plan as required under the Offshore Transmission Asset Marine Licence Condition 3.2.2.10
CDM Regulations	Construction (Design and Management) Regulations 2015
CCTV	Closed Circuit Television
Offshore CEMP	Construction Environmental Management Plan as required under the Offshore Transmission Asset Marine Licence Condition 3.2.1.2
CLV	Cable Lay Vessel
CM	Compliance Manager
CMS	Construction Method Statement as required under the Offshore Transmission Asset Marine Licence Condition 3.2.2.4
commitments register	A register that sets out all commitments to manage and mitigate potential environmental impacts made by SWEL
(the) consents	Collective term used to describe the Section 36 consents and Marine Licences issued to SAWEL, SBWEL and SWEL
CEA	SWEL's Contractor are required to appoint a Construction Environmental Advisor (CEA). The Construction Environmental Advisor will be a full-time resource for the duration of the Contractor's construction works and will be dedicated to delivering the requirements of the SWEL consent conditions and wider environmental matters
Contractor	The CONTRACTOR as defined by the CONDITIONS OF CONTRACT
Contractor Construction	SWEL's Contractors are required to produce a Contractor Offshore CEMP detailing how the Contractor will, as a minimum, implement and deliver the commitments set-out in this. The Contractor offshore CEMP should detail measures specific to the Contractor's deliverables.
CoP	Construction Programme as required the Offshore Transmission Asset Marine Licence Condition 3.2.2.3
CPS	Cable Protection System
CTV	Crew Transfer Vessel

Term	Description
DS	Design Statement as required under the Offshore Transmission Asset Marine Licence Condition 3.2.2.7
DSLP	Design Specification and Layout Plan as required under the Offshore Transmission Asset Marine Licence Condition 3.2.2.6
Diadromous fish	Fish species that migrate between fresh and salt water
ECoW	Ecological Clerk of Works as required under the Marine Licence Condition 3.2.2.12.
EMP	Environmental Management Plan as required under the Offshore Transmission Asset Marine Licence Condition 3.2.1.2 (see offshore CEMP above)
ER	Environmental Report
ERCoP	Emergency Response Co-operation Plan
ES	Environmental Statement
FLO	Fisheries Liaison Officer (SWEL) as required under the Offshore Transmission Asset Marine Licence Condition 3.2.2.13
HDD	Horizontal Directional Drilling
IALA	International Association of Lighthouse Authorities
HDPE	High density polyethylene
HLV	Heavy Lift Vessel
HTV	Heavy Transport Vessel
JNCC	Joint Nature Conservation Committee
KISCA	Kingfisher Information Services Cable Awareness
Landfall site	The point above MHWS where the OTA export cables connects to the OnTW
LAT	Lowest Astronomical Tide
Licencing Authority	Marine Scotland acting on behalf of the Scottish Ministers
Licensee	Seagreen Wind Energy Ltd (Seagreen), a company with number 06873902 and having its registered office at No1 Forbury Place, 43 Forbury Road, Reading, United Kingdom RG1 3JH, on behalf of SAWEL and SBWEL in respect of the OTA Marine Licence and Seagreen Wind Energy Ltd a company with number 06873902 and having its registered office at No1 Forbury Place, 43 Forbury Road, Reading, United Kingdom RG1 3JH in respect of the Alternative Landfall Cable Installation Methodology Marine Licence
LMP	Lighting and Marking Plan, required under Condition 3.2.2.14 of the Marine Licence
Marine Coordination	The management and surveillance of people, vessels and Offshore structures to ensure the safe preparation and execution of Offshore activities, in order to minimise the probability of an incident, and to provide effective response if an incident does occur

Term	Description
Marine Licence (ML)	Either or both of the OTA Marine Licence or the Alternative Landfall Cable Installation Methodology Marine Licence
MCA	Maritime and Coastguard Agency
MCC	Marine Control Centre
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MPCP	Marine Pollution Contingency Plan, as required under Environmental Management Plan, Condition 3.2.1.2 of the OTA Marine Licence
MS-LOT	Marine Scotland Licensing and Operations Team
NLB	Northern Lighthouse Board
NSP	Navigational Safety Plan, as required for approval under Condition 3.2.2.9of the OTA Marine Licence
NtoM	Notice to Mariners
OMP	Operation and Maintenance Programme required under OTA Marine Licence condition 3.2.3.2
OnTW	Onshore Transmission Works, from landfall consisting of onshore buried export cables and new transmission substation
OSP	Offshore Substation platform
OTA	Offshore Transmission Asset, comprising the OSPs and the transmission cable required to connect the Wind Farm Assets to the OnTW from the OSPs to the MHWS at the landfall at Carnoustie
OTA Marine Licence	Marine Licence granted by the Scottish Ministers under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 on 10 October 2014, as amended by the revised marine licence granted by the Scottish Ministers on 6 March 2019 (reference 04678/19/0) in respect of the OTA
OWF	the Wind Farm Assets
PAM	Passive Acoustic Monitoring
PEMP	OWFs Environmental Monitoring Programme as required under the Offshore Transmission Assets Marine Licence Condition 3.2.1.1
PLGR	Pre-lay grapnel run
PLGV	Pre-lay Grapnel Vessel
PS	Piling Strategy, as required for approval under Condition 3.2.2.5 of the Marine Licence
PSV	Platform Supply Vessel
ROV	Remotely Operated Vehicle

Term	Description
SAWEL	Seagreen Alpha Wind Energy Ltd (SAWEL) (company number 07185533) and having its registered office at No.1 Forbury Place, 43 Forbury Road, Reading, United Kingdom, RG1 3JH
SBWEL	Seagreen Bravo Wind Energy Ltd (SBWEL) (company number 07185543) and having its registered office at No.1 Forbury Place, 43 Forbury Road, Reading, United Kingdom, RG1 3JH
Seagreen	Seagreen Wind Energy Limited (SWEL), the parent company of Seagreen Alpha Wind Energy Ltd (SAWEL) and Seagreen Bravo Wind Energy Ltd (SBWEL), (company number 06873902) and having its registered office at No.1 Forbury Place, 43 Forbury Road, Reading, United Kingdom, RG1 3JH
SEPA	Scottish Environmental Protection Authority
SHE	Safety Health and Environment
Site	The area outlined in black in the figure contained in Part 4 of the Marine Licence*
SNH	Scottish Natural Heritage
Toolbox talk	A short presentation given to the project team members on an aspect of environmental management
UKHO	United Kingdom Hydrographic Office
UXO	Unexploded Ordnance
VMP	Vessel Management Plan, required under Condition 3.2.2.8 of the Marine Licence
WAH	Working at height
Wind Farm Assets	Collective term to describe the WTGS, foundations and associated inter array cabling
WTG	Wind Turbine Generator

Appendix B – The OTA CMS Change Management Procedure

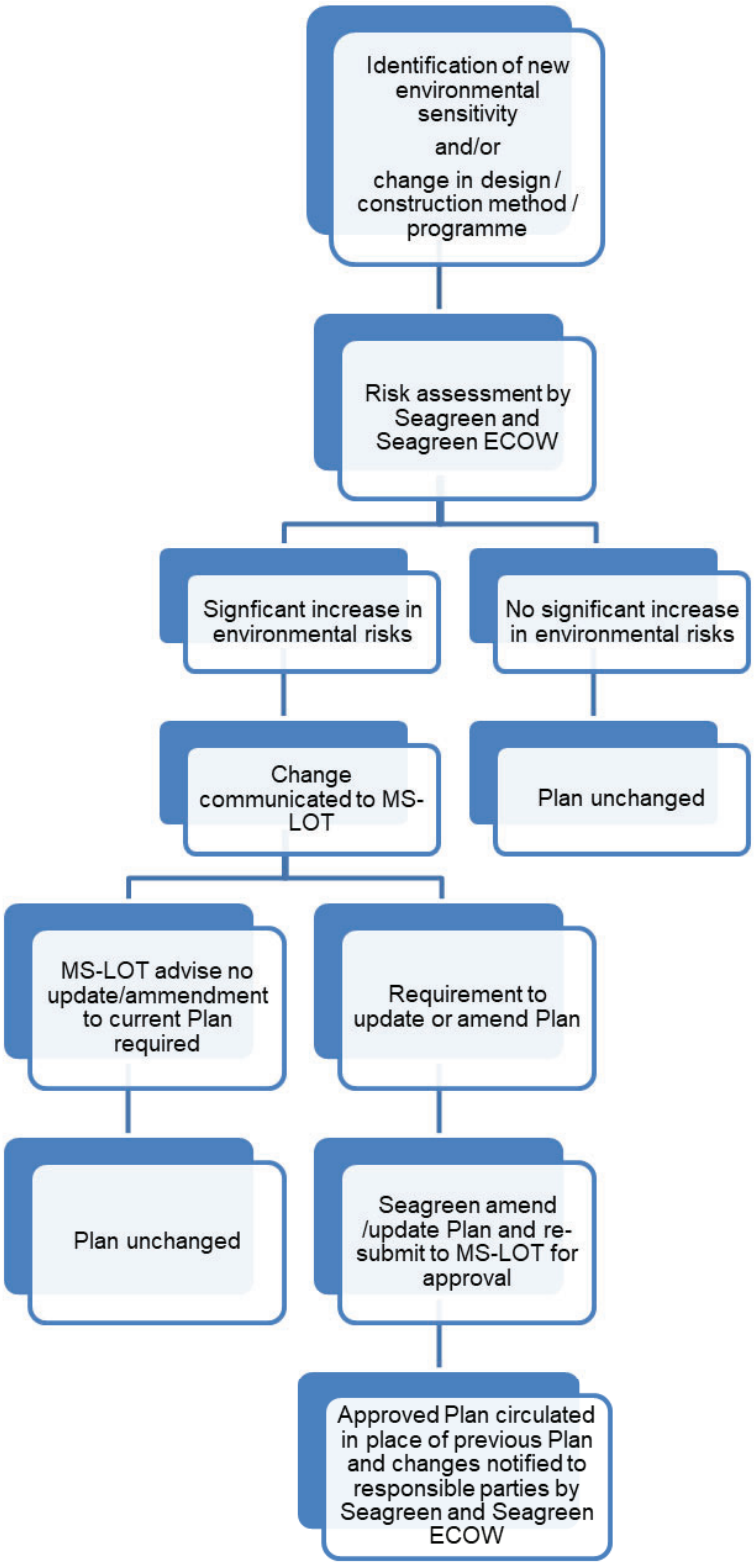


Figure B.1: OTA CMS Change Management Procedure.

Appendix C - Compliance with the ES parameters and processes

Construction parameter/process	ES/ES Addendum/ Alternative Cable Landfall ER	OTA CMS
Seabed preparation		
Boulder clearance	Scar plough and orange-peel grab	Scar plough and orange-peel grab
OSPs, substructures and foundations		
Number of OSPs	≤ 5	2
Design options	• Tubular pile • Suction pile • Gravity base foundations	Tubular pin pile
Maximum number of piles	≤ 72 (scenario 1)	24
Piling method	Driven or drilled	Vibropiling, driven and relief drilling if required
Export cables		
Export cable voltage	AC 275 kV or DC 220 kV	AC 225 kV
Number of export cable trenches	Original Application ≤ 6 Alternative cable landfall ER - 3	3
Number of export cables	Original Application ≤ 6 Alternative cable landfall - 3	3
Cable separation distance	Alternative cable landfall ER – 10 m	10 m
Maximum total length	Original application - 530 km	63.2km, 63.2km and 63.4km
Export cable corridor route width	1 – 4.5 km	1 – 4.5 km
Maximum length of cable which will require rock armoured or concrete mattress protection	26.5 km	Approximately 15 km

Construction parameter/process	ES/ES Addendum/ Alternative Cable Landfall ER	OTA CMS
Export cable installation	Original application Horizontal Directional Drilling (HDD) under coastal defence from above MHWS (ES) continued by ploughing or mechanical trenching across the intertidal area to meet the offshore works Alternative cable landfall Open cut trenching through rock revetment and through intertidal and nearshore subtidal zones	Open cut trenching or HDD through rock revetment and through intertidal and nearshore subtidal zones.
Cable burial depth	Between 0.5 - 3 m	Minimum 1 m
OSP interconnection cables		
Network of high voltage subsea power cables providing inter connection between OSPs	Circa 220 kV or above	Circa 220 kV or above
Cable installation techniques considered	• Cable plough • Jet trencher • Mechanical cutter	• Jet trenching • Mechanical cutter
OSP interconnection cable voltage	Circa 220 kV or above	Circa 220 kV or above
Cable burial depth	Between 0.5 - 3 m	Minimum 1 m

Appendix D - Summary of mitigation commitments

Table D.1: Overarching mitigation measures and good working practices as committed to in the ES and ES Addendum associated with types of infrastructure selected

Source	Reference (ES chapter)	Details of commitment	Relevant Section in this document
Environmental Statement (ES)	Project Description - 5.126	Prior to installation of foundations and substructures a pre-installation seabed survey will be required to confirm that no obstructions such as UXO, debris or large boulders are present. Obstructions will be cleared and prepared for the intended installation or the foundation may be micro-sited to avoid obstructions. In addition, there may be a need to microsite the foundations to avoid identified sensitive ecological or archaeological features.	Section 6.5
ES September 2012	Project Description – 5.153	The pre-construction geophysical survey will ascertain the level of scour protection required for each location. Scour surveys will continue beyond the construction stage of the project and may form part of the ongoing inspection regime and monitoring for the wind farm projects	Section 6.6.2
ES September 2012	Project Description – 5.154, 5.155. 5.156	If scour protection is required, this will be achieved by rock placement around the foundation and the base of the substructures after installation. Rock placement will infill any scour pit which may have developed after installation and will create a rock berm above seabed level. This will be designed to remain stable for the full lifetime of the structure under all forms of predicted environmental loading. The rock placement will be achieved using a fall pipe vessel or a vessel with a side tipping system.	Section 6.6.2.
Environmental Statement (ES)	Project Description - 5.199	The commissioning of Project Alpha and Project Bravo and the Transmission Asset Project, will be in accordance with approved commissioning procedures. This will be managed by the principal contractor(s) for construction of each project to the requirements of Seagreen and the OFTO, where applicable. All commissioning activities will be subject to an approved safe system of work, including	Section 6.10

Source	Reference (ES chapter)	Details of commitment	Relevant Section in this document
		the Wind Turbine Generators (WTG) performance and reliability testing and compliance with the Grid code standard.	
ES September 2012	Physical Environment – 7.165, 7.192, 7.204	Up to only two substructures/foundations will be installed simultaneously over any three-day period across all projects during the minimum 6 months annual construction period and therefore the release of this material during construction activities will be phased over time.	Section 6.6
ES September 2012	Physical Environment – 7.171, 7.174, 7.215	Substructures/foundations will be installed over a minimum 6 month annual construction period, with no more than two substructures/foundations being installed simultaneously at any one time.	Section 6.6
ES September 2012	Physical Environment – 7.259	Where scour protection is adopted, visual ROV, drop video or dive surveys or bathymetric surveys will be undertaken at selected locations	Section 6.6
ES September 2012	Physical Environment – 7.273	Efforts will be made to optimize the length of cable that will achieve target burial depth and therefore the amount of cable protection required will be minimised.	Section 6.9
ES September 2012	Sediment Quality - 8.142	Site specific assessments will be made at each foundation location to determine the preferred foundation type and seabed preparation requirements and methods.	Section 6.5
ES September 2012	Water and Sediment Quality - 8.142	If the need for seabed preparation at any location is determined, a licence will be applied for under the Marine (Scotland) Act 2010 for Dredging and Deposit of Solid Waste in the Territorial Sea and UK Controlled Waters Adjacent to Scotland.	Section 6.5
ES September 2012	Benthic Ecology and Intertidal Ecology - 11.48 and 11.214	Best practice measures will be employed by Seagreen, based on lessons learnt from equivalent cable installations across sandy shores, to ensure that the significance of potential impacts remain as negligible, these include:	Section 6.4.5

Source	Reference (ES chapter)	Details of commitment	Relevant Section in this document
		– Limiting the number of vehicle operations across the intertidal area. – Ensuring that any vehicle operations keep to designated areas of minimal practicable size – Lay down of tracking if appropriate in areas of softer sand.	
ES September 2012	Fish and Shellfish Resources – 12.78, 12.354, 12.367	Placement of scour protection should reduce the amount of re-suspended material during operation.	Section 6.6
ES September 2012	Fish and Shellfish Resources – 12.376	However, burial depths of up to 3m and cable sheaths may mitigate some of the impacts of EMF for the export cable.	Section 6.9
ES September 2012	Marine Mammals – 13.516	The export cables will be shielded to meet industry standards and will be buried to a minimum of 0.5m.	Section 6.9
ES September 2012	Commercial Fisheries - 14.222	Export cables will be buried to a target depth of between 0.5 and 3m, where it is technically practicable to do so, which will reduce the risk to fishing vessels from snagging. In instances where adequate burial cannot be achieved an appropriate cable protection will be used.	Section 6.9
ES September 2012	Commercial Fisheries - 14.203, 14.267; Shipping and Navigation - 15.113, 15.145	The majority of export cables will be buried, although approximately 5% of the export cables may be protected by other means (i.e. rock placement or concrete mattresses).	Section 6.9

Source	Reference (ES chapter)	Details of commitment	Relevant Section in this document
ES September 2012	Shipping and Navigation – 15.35, 15.277	The following section presents mitigation measures which can be implemented for the OWF development to reduce the level of impact: • Promulgation of information and warnings through Notices to Mariners, Kingfisher publications, fisheries liaison, local recreation clubs and marinas and further appropriate media on construction activities, cable installation works and other OWF matters; • the use of guard vessels where appropriate to aid emergency situations and warn vessels; • application for and use of safety zones to protect the construction/ decommissioning of the sites; • use of appropriate means to notify and provide evidence of the infringement of construction safety zones; • use of vessels that are 'fit for purpose' for the construction activities including marked in accordance with International Regulations for the Prevention of Collisions at Sea (COLREGS) and fitted with an Automatic Identification System (AIS) transponder to prevent them becoming a risk factor; • Aids to Navigation in line with International Association of Lighthouse Authorities (IALA) O-139 (IALA, 2008) and MCA/ NLB Requirements (which will include a system of routine inspection and maintenance of lights and markings); • additional buoyage if required to assist safe navigation (this would be based on guidance from NLB); • creation of an Emergency Response Co-operation Plan (ERCoP) with the relevant Maritime Rescue Co-ordination Centre (MRCC) from construction phase onwards, including MCA	6.6 and 6.9

Source	Reference (ES chapter)	Details of commitment	Relevant Section in this document
		standards and procedures for WTG shut -down in the event of a search and rescue, counter pollution or salvage incident in or around an OWF; • monitoring by radar, AIS and Closed Circuit Television (CCTV) or other agreed means; • fenders/ bumper bollards installed on structures; • clear notification of works (especially pre charting of cables); • subsea cables will be buried or trenched where possible to provide protection from dragged and dropped anchors and dropped objects; • where burial/ trenching is not possible, cables will be protected by other means such as rock dumping and concrete mattresses; • any cables installed within the cable corridor will be notified to Kingfisher Information Services and Cable Awareness (KISCA) for inclusion in cable awareness charts and plotters for the fishing industry; • consultation with fisheries stakeholders through the proposed regional Fisheries Working Group (see Chapter 14: Commercial Fisheries) to ensure that the cable protection method does not inhibit fishing activities; and • cable burial and bundling to reduce the effect of electromagnetic interference.	
ES September 2012	Seascape, landscape and visual amenity - 16.216, Mitigation and Monitoring - 22.32	Within the export cable corridor, the construction activities close to residential receptors would be restricted to daylight or normal working hours. If there is night-time lighting less than approximately 2 km to the shore, best practice measures would be applied to ensure the lighting is not directed towards the shore (e.g. using boats between the works and shore only).	Section 6.4 and 6.9

Source	Reference (ES chapter)	Details of commitment	Relevant Section in this document
ES September 2012	Socio Economics, Tourism & Recreation - 19.141	. For a temporary period within the construction phase, works to the coastal zone may prevent access to the beach and sea. Access would be prevented for safety reasons for a temporary period of 3 months.	Section 6.4
ES September 2012	Socio Economics, Tourism & Recreation - 19.143	The export cables will be laid below the surface and hence will not result in any permanent change to the utilisation of the receptors as tourism or recreations resource.	Section 6.9
ES Addendum October 2012	Marine Mammals - 3.138, 3.326; Fish and Shellfish - 4.120	Seabed preparation activities may require a licence under the Marine and Coastal Access Act (2009) or Marine (Scotland) Act 2010 for Dredging and Deposit of Solid Waste in the Territorial Sea or UK Controlled Waters Adjacent to Scotland, depending on where the activity takes place.	Section 6.5

Table D.2: Mitigation and good working practices specific to landfall installation.

Source	Reference (ES Chapter)	Details of commitment	Reference (this document)
ER – alternative cable landfall	Table 4.1	Working and stockpiling areas would be kept to a minimum size during the construction phase.	Section 6.4
ER – alternative cable landfall	Table 4.1	Excavation of material along each trench would be undertaken in separate sediment layers and material of different grades would be stored separately within temporary stockpile areas where practicable. In intertidal areas, berms will be created to store the material which will be flattened to ensure that the berms do not become too high where practicable.	Section 6.4
ER – alternative cable landfall	Table 4.1	Reinstatement in the intertidal zone will be undertaken on a 'layer by layer' basis in reverse order to the excavation sequence.	Section 6.4

Source	Reference (ES Chapter)	Details of commitment	Reference (this document)
ER – alternative cable landfall	Table 4.1	Rock that is used to replace any material on the rock revetment will be either imported from Norway or from a UK quarry. The quarried material will be transported dry to reduce the potential risk of Invasive Non-Native Species.	Section 6.4
ER – alternative cable landfall	Table 4.1	During cable installation works, working areas in the intertidal zone will be marked off to prevent public access, and advisory safety distances (of up to 500 m radius) will be recommended around the cable installation works in the subtidal zone. Advisory safety distances will be notified via issue of a Notice to Mariners.	Section 6.4
ER – alternative cable landfall	Table 4.1	The rock revetment will be reinstated following completion of the works. Initial inspection has determined that some additional rock may be needed. Rock materials removed from the rock revetment will, where practicable, be reused during reinstatement if this is possible. Rock that is used to replace any material on the rock revetment will be either imported from Norway or from a UK quarry. The quarried material will be taken from onshore and will be transported dry to reduce the potential risk of Invasive Non-Native Species.	Section 6.4
ER – alternative cable landfall	Table 4.1	A localised coastal flood warning system will be implemented during construction in consultation with SEPA to mitigate for flood risk. Where possible, works will not be carried out during a coastal flood or storm event.	Section 6.4
ER – alternative cable landfall	Table 4.1	A topographic survey will be carried out to identify and map the contours of the seabed, beach and rock revetment prior to construction. Following reinstatement, a repeat topographical survey will be carried out to confirm that the original profiles and bathymetry have been restored.	Section 6.4
ER – alternative cable landfall	Table 4.1	Selection of appropriate plant will reduce the potential for over excavation and reduce delays during construction	Section 6.4

Appendix E – Pro-forma and contact details for key Seagreen personnel, contractors and sub-contractors

PRO-FORMA

This pro-forma is for the notification to Scottish Ministers of any agents, contractors or sub-contractors that will carry out any licensed marine activities (up to MHWS), as required under section 2.6 of Marine Licence 04678/19/0 and Section 3.1.3 of Marine Licence 07050/19/0.

This pro-forma should be completed prior to commencement of any licenced activity, and whenever there is a change to agents, contractors or sub-contractors.

Complete the details in the table below.

Role	Company Name	Address	Contact Name

CONTACT DETAILS FOR KEY SEAGREEN PERSONNEL, CONTRACTORS AND SUB-CONTRACTORS

Role	Organisation/Company	Telephone/Mobile	Email
Seagreen Project Manager	Seagreen	TBC	TBC
Seagreen Package Manager [1]	Seagreen	TBC	TBC
Seagreen Package Manager [2]	Seagreen	TBC	TBC
Seagreen Package Manager [3]	Seagreen	TBC	TBC
Seagreen Client Representative	Seagreen	TBC	TBC
Seagreen Marine Coordinator	Seagreen	TBC	TBC
Seagreen Compliance Manager	Seagreen	TBC	TBC
Seagreen Safety Health and Environment (SHE) Manager	Seagreen	TBC	TBC
Seagreen Ecological Clerk of Works (Offshore ECoW)	Seagreen	TBC	Derek.duckett@sse.com
Contractor	TBC	TBC	TBC
Contractor	TBC	TBC	TBC