Project Title	Seagreen Wind Energy Ltd
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Boulder Removal Marine Licence Application – Supporting Information

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1. Introduction

Seagreen Wind Energy Ltd (SWL, hereafter Seagreen) is developing the Seagreen Alpha and Seagreen Bravo offshore wind farms off the east coast of Scotland in the outer Firth of Forth and Firth of Tay area (Figure 1). The projects received consent under Section 36 of the Electricity Act 1989 from the Scottish Ministers in 2014 (the S.36 Consents) (subsequently varied to remove capacity limits, August 2018). The S36 consent applicable to the Bravo Offshore Wind Farm was assigned to Seagreen Alpha Wind Energy Ltd (SAWEL) on 22nd November 2019. Marine Licences were also awarded by the Scottish Ministers in 2014, one for Seagreen Alpha, one for Seagreen Bravo, and one for the Offshore Transmission Asset (OTA). Together the wind farms Seagreen Alpha and Seagreen Bravo and the OTA collectively comprise 'the Seagreen Project'.

In 2018, following application by Seagreen, the Alpha Marine Licence and Bravo Marine Licence were varied by Scottish Ministers. Subsequently, in 2019, the OTA Marine Licence was also varied by Scottish Ministers. In addition, an additional Marine Licence was granted in 2019, and subsequently varied on 24 February 2020, providing an alternative landfall cable installation method. On 12 December 2019, the Bravo Marine Licence was transferred from the name of Seagreen Bravo Wind Energy Limited (SBWEL) into the name of Seagreen Alpha Wind Energy Limited (SAWEL).

The Onshore Transmission Asset (the onshore export cable from landfall at Carnoustie to a new substation at Tealing) was subject to a separate planning application under the Town and Country Planning (Scotland) Act 1997 and was granted Planning Permission in principle by Angus Council in January 2013. This was extended by Angus Council in December 2016, following re-application by Seagreen.

The existing OWF Marine Licence permits the installation of up to 150 wind turbine generators (WTGs) with associated foundations, inter-array cables, offshore substation platforms (OSPs) and meteorological masts. Offshore installation is due to commence in September 2021 at the first Offshore Substation Platform (OSP) location, with installation of the WTGs also starting at that time. In advance of these works, Seagreen is undertaking seabed clearance works given the potential for unexploded ordnance (UXOs), boulders or other debris to be present within the Seagreen OWF site which may cause a safety issue to the construction phase of the project.

Seagreen submitted a Marine Licence application in March 2021 for these clearance works within the Seagreen OWF site, which included pre-commencement works to remove approximately 1,900 boulders, based on 2018 site survey data, from around the WTG and OSP locations, from jack-up vessel footprints and from the inter-array cables using an orange-peel grab from a Utility Remotely Controlled Vehicle (UTROV). The Marine Licence was granted by Scottish Ministers on 30th July 2021. The application was for a works duration of four months and was based on information derived from a pre-construction geophysical survey completed in 2018. A marine licence was granted on 30/07/2021 with a duration of 2 months. This was subsequently extended to 30/11/2021 at Seagreen's request.

Further detailed seabed survey of the construction locations has taken place during summer 2021 for the identification of boulders and unexploded ordnance, UXOs. The survey data has identified a larger number of boulders for removal than was derived from the 2018 survey data. Seagreen has requested a variation of the existing licence. This document supports a further application for a Marine Licence in respect of

clearance of boulders form the construction locations for a greater number of boulders than previously licensed.

2. Supporting Survey information

In 2018 a full site survey was completed providing bathymetry and shallow sub-surface data to inform initial wind farm engineering and layout site design and layout. Further analysis of the survey data indicated there were approximately 1900 boulders withing the construction footprint areas that would be required to be moved ahead of construction start. This information formed the basis of the March 2021 Marine Licence application.

During 2021 a further high resolution geophysical survey was undertaken. This was specifically designed to identify potential UXO targets, for subsequent clearance if required, and to quantify boulder numbers and locations for removal within the wind farm site. This survey specifically focussed on the construction areas. Subsequent data processing identified a greater number of boulders, with dense patches in some areas, than had previously been understood to be present. The outcome of this survey and the implications of the increased boulder numbers were discussed with Marine Scotland at a meeting on 27th July 2021. Considerable effort has been made to compare and validate the two datasets and Seagreen is confident in the accuracy of the latter survey.

3. Design refinement

The initial wind farm construction areas considered in the original Marine Licence application submitted in March 2021 were as follows;

- A bow-tie shaped area around each of the 114 plus 23 'spare' WTG locations (137 total), each extending up to 380 m from the WTG location and covering an area of approximately 0.26 km^2. This shape reflects the area that would need to be cleared of obstructions for WTG installation and inter-array cables (IACs) to be laid from the WTG in any direction; therefore, given refinement of the IAC configuration, these areas represent a conservative maximum around each WTG location;
- An area of approximately 300 m radius around the OSP location; and
- A 50 m wide corridor centred on each of the inter-array cables. The total length of array cable is 278km

The total area for clearance was therefore 134km^2. This area was surveyed between May and September 2021 to establish boulder numbers for clearance. Following this detailed survey of the construction areas described above and the identification of a greater number of boulders for removal than previously estimated, Seagreen has completed further design refinement. This has achieved a reduction in the construction footprints as follows;

- WTG foundation clearance footprint reduced by 90% to 0.024km^2. The total WTG footprint for clearance is 3.3km^2.

- Inter array cable corridor clearance footprint reduced by 78% to 11m width. The total area for clearance for the inter-array cables is 2.93km^2.
- The OSP clearance is unchanged at 0.28km^2

The areas where boulder removal activities will be focussed are shown in Figure 1 below. The total area is now reduced to 6.51km^2. The total number of boulders identified for removal from this area is estimated to be approximately 15,000. The total area of the wind farm site is approximately 396km^2.

A total of 1.61km^2 of this area lies within the Firth of Forth Banks MPA boundaries (see Figure 1). It is estimated that approximately 3,700 boulders will be cleared from this area within the MPA boundaries.

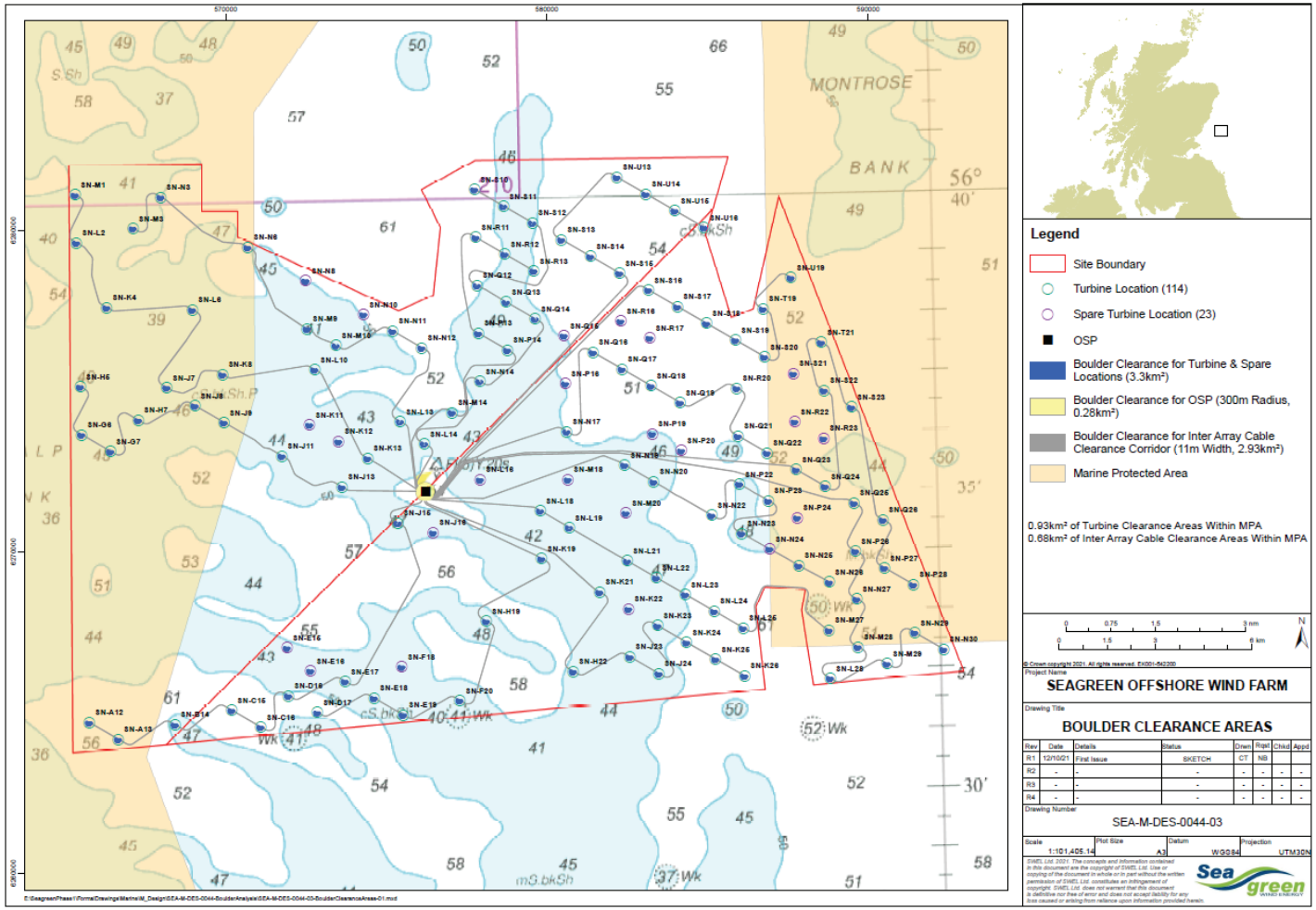

Figure 1 – Seagreen wind farm WTG layout, showing boulder clearance areas, inter-array cable routes and areas overlapping the Firth of Forth Banks Complex MPA.

4. Boulder removal methodology

The boulder size limits for removal from the construction areas are as follows;

- 400mm in WTG foundation footprints
- 500mm in installation jack up vessel footprints; and
- 300mm in inter array cable corridors.

The upper size limit for removal is constrained by the UTROV capacity and is a boulder of approximate volume 1m^3. A boulder of any greater size than this will be avoided during installation activities.

Individual boulders will be lifted from the construction areas using and “orange peel grab” attached to a UTROV, as described in the March 2021 application. Boulders will be lifted and moved the minimum distance out of the area being cleared. The boulders will be replaced on the seabed, not dropped from height, and will not be clustered in any way on removal, resulting in minimal seabed disturbance.

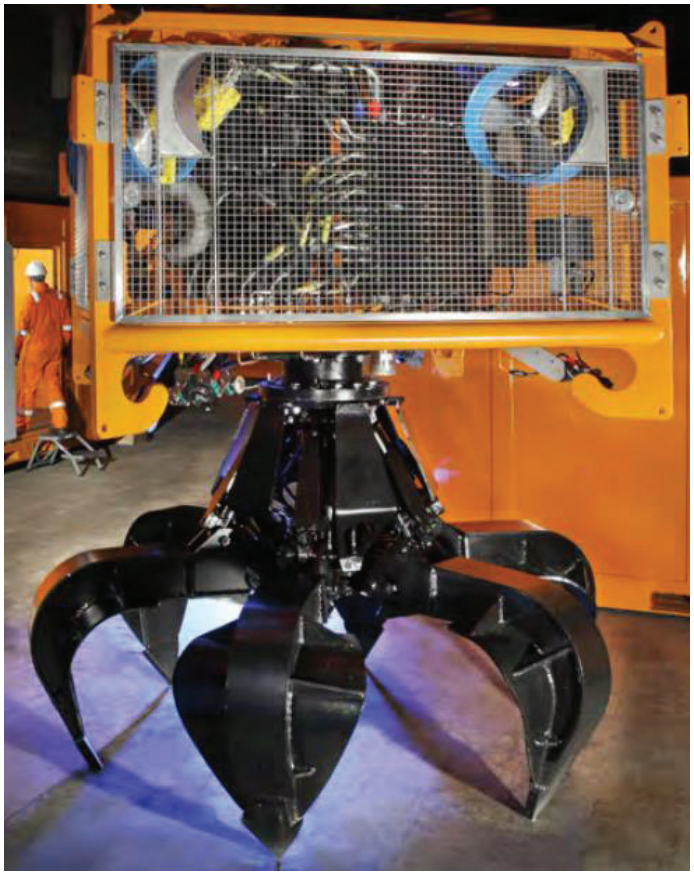

Figure 2: UTROV and Orange Peel Grab

The duration of the works is expected to extend until May 2022. The vessel utilised for the works will be the MMA Pinnacle or equivalent. In order to complete the planned works to programme a second similar vessel may also be utilised.

Figure 3: MMA Pinnacle

Following boulder clearance a pre-lay grapnel operation will be undertaken to confirm the array cable corridors are free of other debris, for example discarded . The grapnel will be towed from the stern of the PLGR vessel to “snag” and recover any debris. 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 in-situ 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 (e.g. abandoned ropes, fishing gear) that would impede the cable burial tool as it tracks along the seabed. The grapnel will consist of a seabed riding element and a hook/share that engages with the seabed, and ultimately the item of debris. The grapnel hooks will be dragged across the seabed and are expected to penetrate <1 m into the seabed, subject to soil type (see Figure 4).

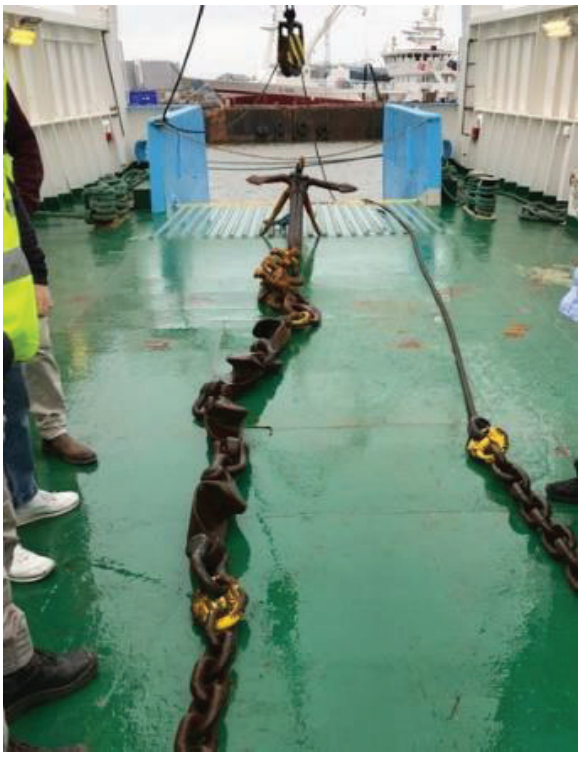

Figure 4: Grapnel assembly for PLGR

5. Assessment of potential impacts

The Supporting Environmental Information Report (document LF000009-CST-OF-LIC-REP-0005) submitted with the original site clearance Marine Licence application identified the following receptors as potentially impacted by boulder clearance and PLGR works using the above site clearance works.

- Physical environment – seabed disturbance
- Benthic ecology – seabed disturbance
- Fish and shellfish ecology – seabed disturbance
- Marine mammals – vessel activity
- Ornithology – vessel activity
- Protected sites – seabed disturbance and vessel activity
- Commercial fisheries – seabed disturbance and presence of vessels
- Shipping and navigation – presence of vessels
- Marine archaeology – seabed disturbance

5.1 Ecological receptors

In all cases the effects were predicted to be highly localised to the activities in question with negligible impact on the receptors considered. This conclusion was based on the limited extent of the works and the nature of the works. The lifting of boulders from the seabed within the works footprint and placing them on

the seabed a short distance away outside the footprint will result in minimal sediment or habitat disturbance. Any disturbance that does occur is expected to be short term, temporary and likely to recover relatively quickly, as evidenced from other wind farm sites. The consequences of any disturbance will be minimal on any benthic or fish and shellfish species present due to the limited extent and duration and will be negligible relative to the wind farm construction activities that are already consented.

The presence of any surface vessels undertaking the works could potentially result in disturbance of sensitive species. However, the works will largely be taking place over winter and some species will be present in reduced numbers than at other times of the year. Given that only one or two vessels will be involved in this activity, the effects of any disturbance will make negligible difference to the effects of routine shipping traffic in the area and will be indistinguishable relative to the wind farm construction activities.

5.2 Other human activities

Static gear fishing activity and scallop dredging are the primary commercial fishing activities recorded in the wind farm site. Static fishing gear has been removed from the site under Cooperation Agreements reached with the fishermen involved. The scallop fishery generally targets the sandy gravelly sediments rather than areas where large numbers of boulders are present. Where boulders are present in areas targeted by scallop dredging the seabed and the associated habitats are not expected to be further impacted by the proposed clearance activities. The areas more favoured by the static gear fishery generally shallower and have a greater presence of boulders and cobbles more suited to the targeted crabs and lobsters. The clearance of boulders along an 11m corridor is expected to result in negligible impact on the target species or on the resumption of the activity post construction. It is therefore concluded that there will be negligible effects on commercial fishing activities as a result of the proposed boulder clearance activities.

The initial and final locations of all boulders that are moved from the construction areas will be recorded. If required, this information can be provided to fishermen in a suitable format for input to a plotter to support continued fishing activities.

The wind farm site has been marked off as a construction area since September 2021. Shipping traffic, including fishing vessels, is expected to reroute around the site as a result for the duration of construction, including these the activities considered in this document.

Potential archaeological features identified I the 2012 EIA have been protected through the introduction of Archaeological Exclusion Zones (AEZ). These are avoided by all works activities. Further potential features that have been identified during subsequent survey activities are also protected by AEZs. The boulder clearance activities and all subsequent construction activities will avoid the AEZs and the potential impact on archaeological features will be negligible. A procedure is in place for the reporting of any previously unidentified potential archaeological features and these will also be protected.

5.3 Protected sites

The Firth of Forth Banks Complex MPA is designated for;

- Ocean quahog aggregations (*Arctica islandica*)
- Offshore subtidal sands and gravels
- Shelf Banks and Mounds
- Moraines representative of the Wee Bankie Key Geodiversity Area

The proposed areas for boulder clearance overlap the MPA areas in the west of the site and the east of the site (see Figure 1). The total overlap between the MPA areas and the Seagreen wind farm site is 123.8km^2. The total construction area to be cleared within this overlap with the MPA areas is 1.61km^2. It is estimated that approximately 3,700 boulders are required to cleared within this area.

The overlap of 123.8km^2 with the wind farm site equates to approximately 5.8% of the total area of the Firth of Forth Banks Complex MPA. The proposed boulder clearance works may overlap with some of the features of the MPA, however the anticipated extent of the proposed works within the MPA is relatively small and represents approximately 1% of the overlapping area and less than 0.01% of the total MPA area. The works will also be short term in nature and temporary, with any effects being highly localised around the area of impact. As was concluded in Document Reference LF000009-CST-OF-LIC-REP-0009 the shelf bank and mound large-scale features and the Moraines key geomorphological feature are considered unlikely to be adversely affected by the proposed works due to the very small scale of the impact footprints in relation to these large-scale features. With respect to the subtidal sands and gravels and ocean quahog features, the impact will be small in extent, relative to the total area of the MPA. As already discussed, any effects on benthic receptors are likely to be small, with a rapid recovery following any disturbance. There is therefore no significant risk of the proposed boulder clearance works hindering the conservation objectives of the Firth of Forth Banks Complex MPA.

5.4 Cumulative effects

Cumulative effects were considered in the Supporting Environmental Information Report (document LF000009-CST-OF-LIC-REP-0005) submitted with the original site clearance Marine Licence application. The conclusions from this document are still considered to be valid due to the localised and temporary nature of any impacts arising from the additional boulder clearance works required. No cumulative effects with other works are anticipated. The clearance works will take place in the context of and overlapping with the overall construction works for the consented Seagreen wind farm project.

6. Conclusions

This document has been prepared to support an additional Marine Licence application for boulder removal following detailed seabed survey work that indicated a greater presence of boulders in certain areas than previously anticipated. The boulder clearance works commence during June 2021 under an existing licence. They are now expected to continue until May 2022.

Consideration has been given to the potential impacts expected during these clearance works on the associated receptors. No receptors are predicted to be significantly or cumulatively impacted given the localised and temporary nature of the clearance works.