Project Title	Seagreen Wind Energy Ltd
Document Reference Number	LF000009-CST-OF-PLN-0013

Design Statement

Section 36 Consent Condition 13 and Marine Licence Condition 3.2.2.7

For the approval of Scottish Ministers

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Rev	Date	Reason for Issue	Originator	Checker	ECoW	Approver
01	06/03/2020	For approval	The Landscape Partnership	[Redacted]	[Redacted]	[Redacted]

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Purpose of the Design Statement

This Design Statement is submitted by Seagreen Wind Energy Limited (SWEL) (hereinafter referred to as Seagreen) to address the specific requirements of the relevant conditions attached to

1) the Section 36 (S36) Consents granted by the Scottish Ministers to SAWEL under section 36 of the Electricity Act 1989 (in respect of the Alpha Offshore Wind Farm) and to Seagreen Bravo Wind Energy Limited (SBWEL) (in respect of the Bravo Offshore Wind Farm) on 10 October 2014, both as varied by the Scottish Ministers by decision letter issued pursuant to an application under section 36C of the Electricity Act 1989 on 28 August 2018 and, in respect of the consent applicable to the Bravo Offshore Wind Farm, as assigned to SAWEL on 22 November 2019; and

(2) 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) for the Seagreen Alpha and Seagreen Bravo Offshore Wind Farms (OWFs) and their associated Offshore Transmission Assets (OTA).

Seagreen Alpha and Seagreen Bravo OWFs and the OTA are collectively referred to as the 'Seagreen Project'. This Design Statement has been prepared to discharge condition 13 of the S36 consent and Condition 3.2.2.7 of the OTA Marine Licence for the Seagreen Project simultaneously.

Accordingly, and consistent with SNH advice (SNH Advice on Offshore Wind Design Statements, February 2016), this Design Statement:

- Identifies the final wind farm design and sets out the changes in design and layout that have occurred since the draft submitted at application stage setting out the worst case scenario (WCS).
- Sets out the key criteria that have informed the final wind farm and OTA design and the constraints and considerations that have influenced the final design and layout.
- Indicates how seascape, landscape and visual impacts have been addressed and mitigated.
- Illustrates through a set of agreed representative viewpoint locations the final wind farm and OTA design and layout.

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

Scope of the Design Statement

In line with the requirements of the consents conditions, industry standards and good practice, this Design Statement covers the following:

- A summary of the consultation undertaken in the preparation of this Design Statement.
- An explanation of the layout and design changes from the worst case scenario submitted at application stage.
- A summary of the constraints and sensitivities that have influenced the final design.
- A comparison of the application scheme with the final design, including a comparison of their respective zones of theoretical visibility (ZTV).
- A set of comparative wireline layouts for the application scheme and the final design.
- A set of eight visualisations of the final design from agreed viewpoints.
- A consideration of potential night-time effects, supported by two night-time/dusk visualisations.

Structure of the Design Statement

The Design Statement is structured as follows:

Sections 1&2	Introduction & Objectives: Provides an overview of the Project and the consent requirements that underpin the content of this Design Statement. It also sets out the purpose, objectives and scope of the Design Statement and sets out the process for making updates and amendments.
Section 3	Guidance and Consultation: Identifies relevant guidance and the consultation undertaken in the preparation of the Design Statement.
Section 4	Project Overview: Provides a succinct summary of the project and its context.
Section 5	Theoretical Visibility, Extent of Effects and Viewpoints: Provides a comparison of the ZTVs for the consented application scheme and the final design and details the viewpoints.
Section 6	Design Objectives and Principles: Sets out the objectives considered when designing the wind farm layout.
Section 7	Comparison of Visual Effects: Compares the design and appearance of the wind farm with what was described in the consented application and as assessed within the SLVIA included within the Environmental Statement (ES).
Section 8	Demonstrates compliance with the original application and commitments made.
Section 9	Lists the references made within the Design Statement .
Appendices	Appendix A – Abbreviations and Definitions
	Appendix B – Change Management Process
	Appendix C – Compliance with ES Parameters
	Appendix D – Summary Mitigation Measures

List of Figures

Authorship

This Design Statement has been prepared by William Wheeler MA(Hons) MPhilLD CMLI, Technical Director at The Landscape Partnership. William was responsible for the SLVIA undertaken for the Optimised Seagreen Wind Farm Development submitted to Marine Scotland in September 2018. He has over 20 years continuous involvement within the offshore wind energy sector and has been engaged on over 25 offshore wind farm developments within UK waters. These include the now operational Beatrice and Aberdeen Bay (EOWDC) developments for which he undertook the SLVIAs and other associated pre and post-consent activities, including for their respective onshore grid connection routes and substations.

William also has extensive experience of undertaking Landscape and Visual Impact assessments for onshore wind farm developments and other renewable energy projects. Notable Scottish projects include the LVIA for the 50 turbine South Kyle wind farm located in East Ayrshire and consented in June 2017 and the earlier Biofuel power station at Steven's Croft, Lockerbie which remains the UK's largest biomass power station.

1. Introduction

1.1 Consents and Licences

Seagreen Wind Energy Limited (SWEL, hereafter referred to as 'Seagreen') was awarded Section 36 Consents (S36 Consents) under the Electricity Act 1989 by the Scottish Ministers in October 2014 for Seagreen Alpha and Seagreen Bravo Offshore Wind Farms (OWFs). The S36 consents were varied by the Scottish Ministers pursuant to an application under s36C of the Electricity Act 1989 on 28 August 2018 and the S36 Consent applicable to the Bravo Offshore Wind Farm was assigned to SAWEL on 22 November 2019. Marine Licences for Seagreen Alpha and Bravo OWFs and the Offshore Transmission Asset (OTA) (together the 'Marine Licences') were also awarded by the Scottish Ministers in October 2014, as varied, under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009. Together the wind farms Seagreen Alpha and Seagreen Bravo and the OTA collectively comprise 'the Seagreen Project'.

In 2018, following application by 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. 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).

1.2 Project Description

The Seagreen Project is located in the North Sea, in the outer Firth of Forth and Firth of Tay region and comprises the OWFs (the WTGs, their foundations, associated array cabling and cables from the WTGs up and on to the OSPs), together with associated infrastructure of the OTA (Offshore Substation Platform (OSP), their foundations and the offshore export cable), to facilitate the export of renewable energy to the national electricity transmission grid. The location of the Seagreen Project is shown in Figure 1.0.

The Seagreen Project will consist of the following key components:

- 150 WTGs comprising;
- 114 WTGs installed on three legged steel jackets, each installed on suction bucket caissons;
- 36 WTGs installed on up to four legged steel jackets, each installed on 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 interconnector cable to connect the two OSPs
    - Inter-array cables will be buried where possible and where burial is not possible cable protection will be provided
- Three subsea export cables, totalling circa 190km in length, to transmit electricity from the 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. Export cables will be buried where possible and where burial is not possible cable protection will be provided.

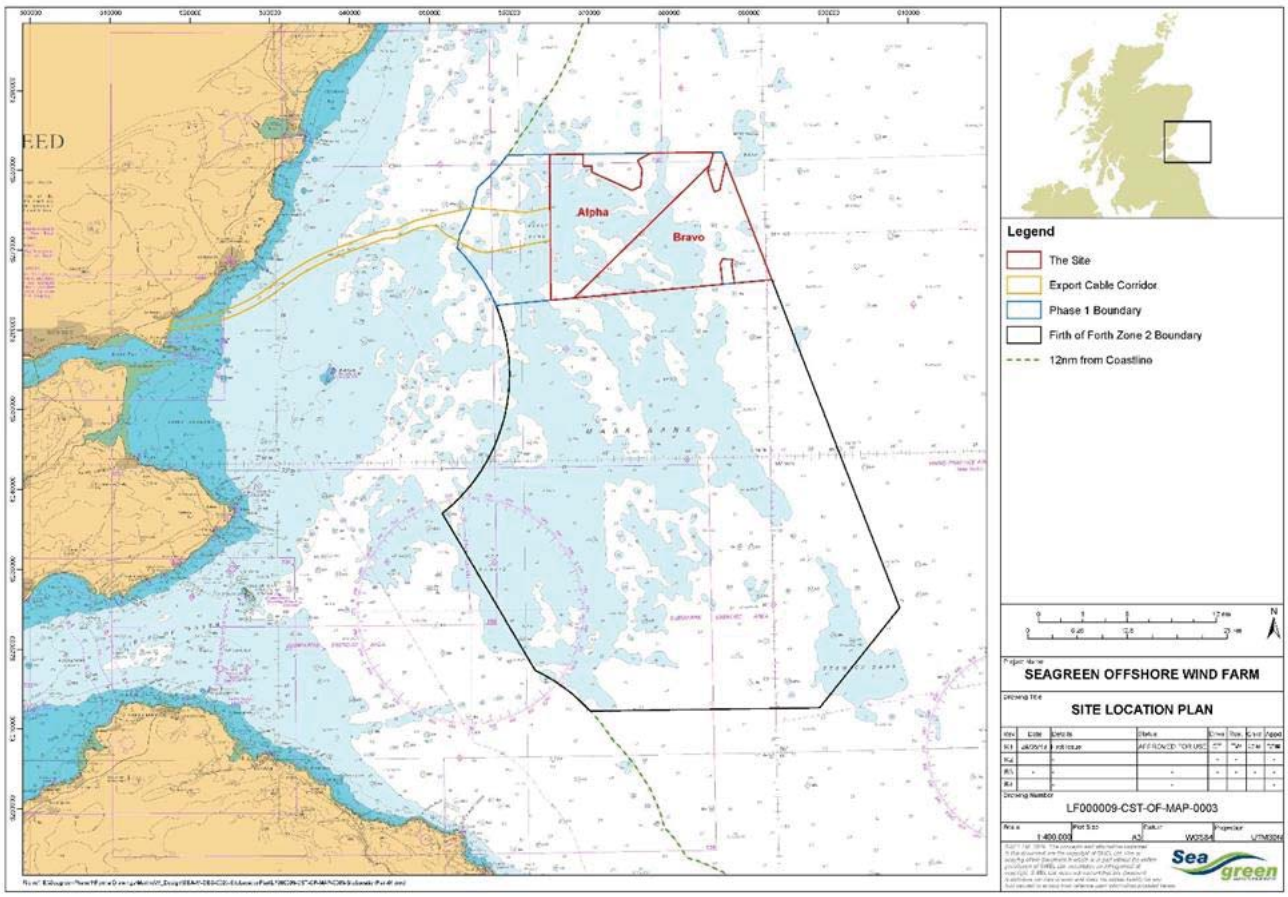


Figure 1.0 Project Location

1.3 Consent and Licence Requirements

This Design Statement has been prepared to discharge Condition 13 of the S36 Consents and Condition 3.2.2.7 of the OTA Marine Licence, as set out in Table 1.1.

Table 1.1 - Consent Conditions to be discharged by this Design Statement

Consent Document	Condition Reference	Condition Text	Reference to relevant Section of this
Section 36	Condition 13	The Company must, prior to the Commencement of the Development, submit a Design Statement ("DS"), in writing, to the Scottish Ministers	This document and the supporting visualisation figures comprise the DS to inform interested parties.
		that includes representative wind farm visualisations from key viewpoints as agreed with the Scottish Ministers, based upon the final DSLP as approved by the Scottish Ministers (as updated and amended from time to time by the Company).	See Section 3, Consultation, including agreement of viewpoints; and supporting Figures including ZTVs and Visualisations
		The DS must be provided, for information only, to the Planning Authorities, and the JNCC, SNH and any such other advisors or organisations as may be required at the discretion of the Scottish Ministers.	The DS will be provided to consultees for information only
		The DS must be prepared and signed off by at least one qualified landscape architect, instructed by the Company prior to submission to the Scottish Ministers.	See Consent Plan Overview - Authorship
		The Development must, at all times, be constructed in accordance with the approved DS (as updated and amended from time to time by the Company).	Ongoing condition This document and the supporting visualisation figures comprise the DS submitted for approval.
OTA Marine Licence	Condition 3.2.2.7	The Licensee must, prior to the Commencement of the Works, submit a DS, in writing, to the Licensing Authority, based upon the DSLP, as approved by the Licensing Authority (as updated and amended from time to time by the Licensee).	See Section 3, Consultation, including agreement of viewpoints; and supporting Figures including ZTVs and Visualisations
		The DS must be provided, for information only, to the Angus Council the JNCC, SNH and any such other advisors or organisations as may be required at the discretion of the Licensing Authority.	The DS will be provided to consultees for information only

		The DS must be prepared and signed off by at least one qualified landscape architect, instructed by the Licensee prior to submission to the Licensing Authority.	See Consent Plan Overview - Authorship

1.4 Linkages with other consent plans and Consent Conditions

The Design Statement is required to be based on the OWF DSLP (LF000009-OF-PLN-0004) under condition 13 of the S36 Consents and condition 3.2.2.7 of the OTA Marine Licence. The DSLP provides the project development information upon which the Design Statement and the comparison with the application layout is prepared. It also informs both the Design Statement and the accompanying ZTV and visualisation figures.

1.5 Construction management

Full details of the construction management procedures, including environmental compliance, monitoring and reporting and roles and responsibilities are provided in the Offshore Construction Environmental Management Plan (LF000009-CST-OF-PLN-0014 - Offshore CEMP).

1.6 Updates and Amendments

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

2. Scope and Objectives of the Design Statement

This Design Statement has been prepared to address the specific requirements of the relevant conditions attached to the S36 Consents and the OTA Marine Licence (collectively referred to as 'the consents') issued to SAWEL in respect of the S36 Consents and to SAWEL and SBWEL in respect of the OTA Marine Licence and applies to all construction as required to be undertaken before the Final Commissioning of the Works.

Table 1.1 above identifies those aspects of the consents that the Design Statement serves to address. The content and structure of the Design Statement has been informed by a combination of existing relevant guidance and the consultation that was undertaken with Marine Scotland, SNH and the planning authorities. It also draws upon the author's experience of having prepared the Design Statement for the operational Beatrice offshore wind farm and the more recent Design Statements submitted for other offshore wind farm developments. Accordingly, its scope covers:

- Identification of relevant guidance documents.
- A summary of the consultation undertaken in the preparation of the Design Statement.
- A selection of comparative Zone of Theoretical Visibility (ZTV) figures to demonstrate compliance with the consented application stage layout.
- Turbine height comparison figures from selected viewpoint locations.
- A set of comparative wireframe views from eight agreed representative viewpoints.
- A set of visualisations of the final wind farm design, including two night-time visualisations.
- An explanation of the changes in wind farm design and layout.
- A summary of the design aims and how these have informed the final wind farm design.

Accordingly, the Design Statement has five primary functions:

i. to ensure compliance with the consent conditions;

ii. to define the final wind farm design;

iii. to demonstrate compliance with the consented application;

iv. to provide a comparison of the final wind farm design with the consented application; and

v. to communicate the final wind farm design to all interested parties;

All Seagreen personnel and Seagreen's Contractors (including their Sub-Contractors) involved in the Seagreen Project must comply, with the Design Statement through conditions of contract.

3. Guidance and Consultation

3.1 Guidance Documents

The preparation of this Design Statement has been informed by a number of guidance documents including:

- Siting and Designing Wind Farms in the Landscape - Version 3a (SNH, August 2017)
- Visual Representation of Wind Farms – Version 2.2 (SNH, February 2017)
- Advice on Offshore Wind Design Statements (SNH, February 2016)
- Offshore Renewables – guidance on assessing the impact on coastal landscape and seascape (SNH, March 2012)

All have contributed to informing the content and structure of the Design Statement and the production of all ZTVs, wireframes and visualisations.

In addition to the above guidance documents, reference is also made to a recent technical report which reviews the likely observability of different types of lighting requirements associated with offshore wind farm developments. The report was prepared following discussions with key stakeholders including SNH, Angus Council and East Lothian Council :

- The Observability of Offshore Wind Turbine Lighting (Professor Philip Best, Institute of Astronomy, University of Edinburgh, May 2018)

3.2 Consultation

Prior to the preparation of this Design Statement consultation was undertaken with key interested parties to seek agreement to a range of matters in relation to the approach and the scope of the Design Statement. Consultation with all stakeholders was predominantly by email/letter with any verbal communication being confirmed in writing. In addition, Marine Scotland and SNH were consulted via conference call with all relevant matters also being confirmed in writing. Matters covered included:

- The proposed number and location of viewpoints.
- The composition of the set of comparative wireframes and visualisations for each viewpoint.
- The number and location of night-time visualisations to be provided.
- The key guidance documents to be drawn upon to inform the Design Statement.
- Other figures to be provided, including Zone of Theoretical Visibility (ZTV) and turbine height comparison figures.

Consultation letters were issued by email on 11 September 2019 to the following consultees:

- Marine Scotland MS-LOT
- Scottish Natural Heritage

- Aberdeenshire Council
- Angus Council
- East Lothian Council
- Fife Council

Responses were received from all consultees during September and October 2019. Whilst there were subsequently some minor adjustments to the project parameters set out within the consultation letter the final project design is within the parameters identified within the letter. The table below provides a summary of the consultation undertaken and sets out how the responses received have informed the preparation of this document.

Table 3.1: Stakeholder Consultation on Approach and Scope of the Design Statement

Consultee	Date	Consultation Response	Seagreen Response
MS-LOT	01.10.19 and 09.01.20	- MS-LOT content with the scope of the DS and the approach. - MS-LOT agreed to location of two night-time visualisations, wireframe presentation of '12 no. spare turbine locations' and that there is no requirement for different foundation types to be identified.	DS produced consistent with the consultation letter and advice provided. Night-time visuals and 'spare' wireframes included within the DS as agreed.
SNH	23.09.19 and 09.01.20	- SNH content that approach is in accordance with Feb 2016 Design Statement Advice. - Agreed with 8 viewpoints and that visuals for the 2014 and final design should be in the same format. - Agreed that comparative wireframes shown on the same sheet is acceptable. - Agreed that 2 no. night-time visuals should be at dusk and informed by the Lighting and Marking Plan. - SNH agreed to location of two night-time visualisations, wireframe presentation of '12 no. spare turbine locations' and that there is no requirement for different foundation types to be identified.	DS produced consistent with the consultation letter and advice provided. Night-time visuals and 'spare' wireframes included within the DS as agreed.
Aberdeenshire Council	26.09.19	- Welcome that DS will be produced in accordance with SNH Advice. - VP1 and VP2 are appropriate for AC. VP1 to be taken as representative of other receptors within the vicinity.	DS produced consistent with the consultation letter and advice provided.

Angus Council	25.09.19	- Agree with the proposed approach. - Angus viewpoints are agreed.	DS produced consistent with the consultation letter and advice provided.
East Lothian Council	26.09.19	- Wind Farm not expected to be visible on many days. - Design not expected to have significantly different effects. - Concern over aviation lighting and request that this be as limited as possible. - Confirmed agreement to viewpoints. - Request for the DS to address different lighting scenarios.	DS produced consistent with the consultation letter and advice provided. DS will include two night-time visuals and comments on the effects of proposed aviation lighting are contained at section 4.4 of this DS.
Fife Council	11.10.19	- No comments to make.	DS produced consistent with the consultation letter.

4. Project Overview

4.1 Introduction

A summary of the Seagreen project components is set out within section 1.2 above. The 150 WTGs and two OSPs will be located due east of Arbroath and Montrose with the nearest point of landfall being the Inverbervie coastline at approximately 27km to the north west of the Seagreen project site boundary. All 150 WTGs will have a maximum hub height of 123m (above LAT) and a maximum blade tip height of 205m (above LAT) both of which are lower than the worst case parameters of 126.2m and 209.7m respectively identified within the project parameters to consultees during the Autumn 2019 consultation process and as covered under the existing consent.

Figure 01 shows the layout of the WTGs and the location of the two offshore substation platforms (OSPs) which are located within the same project site boundaries as identified within the consents. Further, more detailed information on the layout of the wind farm, including the location coordinates of each structure, is provided within the OWF DSLP (LF000009-CST-OF-PLN-0004).

4.2 Context

The Seagreen project site boundary is located within the northernmost portion of the Round 3 Firth of Forth Zone identified by The Crown Estate in 2010, with the capacity to deliver up to 3.5GW of renewable energy. The Seagreen project site is located seaward of two other wind farms within the locality, Inch Cape and Neart na Gaoithe, both of which lie between the Seagreen project site and the coastline to the west and south. As a consequence, in all views south of Arbroath, from along the Fife coastline and west of North Berwick, the Seagreen wind farm will, when visibility permits, be seen on the distant horizon line well beyond both Inch Cape and Neart na Gaoithe. Figure 01 identifies the relationship of the Seagreen site with Inch Cape, Neart na Gaoithe and the much smaller Kincardine wind farm located just south of Aberdeen.

Figure 01 also identifies the layout of the turbines for the Seagreen site as well as those for the other consented and operational offshore turbines within the wider locality. Whilst the turbines of the consented Neart na Gaoithe and Kincardine schemes are of broadly comparable dimensions and scale to those identified within the Seagreen final design it is noted that the consented Inch Cape layout is for substantially taller turbines (291m to blade tip height as opposed to 205m, equating to a 42% increase in height). The Inch Cape turbines are also significantly closer to the coastline and thus visual receptors along the coastline and within the hinterland. The Inch Cape development is therefore a key contextual feature providing a contrasting sense of scale against which the Seagreen turbines will be seen by all land-based visual receptors and near-shore marine-based visual receptors.

4.3 Spare Turbine Locations

The Seagreen Final Design has also identified 12 spare locations (see OWF DSLP (LF000009-CST-OF-PLN-0004)) which would be used for turbines as a contingency. These would only be utilised in the event that unsuitable ground conditions are encountered during the foundation installation operations such that an identified location cannot be utilised and an alternative location is required.

With the agreement of MS-LOT and SNH, the spare locations have been modelled into an additional wireframe for each of the agreed eight viewpoint locations, however, they have not been incorporated within the ZTVs submitted as part of this Design Statement, as if utilised, none of the locations would bring WTGs closer to the coastline.

4.4 Lighting and Marking

In accordance with the requirements of the regulatory authorities, the Seagreen Project will incorporate aviation, navigation and identification lighting. A separate Lighting and Marking Plan (LMP) (LF000009-CST-OF-PLN-0010) sets out the detailed requirements agreed with the authorities. Given the distance between the Seagreen Project and the coastline, coupled with the screening effects of Earth's curvature, neither the navigation or identification lighting is expected to be visible to onshore coastal visual receptors. Aviation lighting, even though it is more elevated, is also expected to be on the limits of potential visibility.

The Seagreen Project final design requires the following key marine and aviation lighting:

Table 4.1: Principal Lighting of Structures

	Type	**Extent and Structures**	**Colour, Distance visible**
1	Marine Lighting	17 x Significant peripheral structures	• Yellow, flashing • Visible for at least 5nm (c9.26km) • 360 degrees
2	Aviation Lighting	38 x periphery structures	• Red, flashing morse W • 2000 Candela (dimmable to 200 Candela when visibility greater than 5km) • 360 degrees
3	SAR Lighting	All structures	• Red, steady • 200 Candela • 360 degrees

Identification markers with lighting is also a standard requirement for all structures but such marking is only required to be readable at a distance of 150m with the lighting hooded and, as such, it is not considered necessary to consider it further within this Design Statement.

A recent study on 'The Observability of Offshore Wind Turbine Lighting' (Professor Philip Best, University of Edinburgh, May 2018) has appraised the distances at which different intensities of white, yellow and red lighting may be visible under different atmospheric conditions. The study concludes that the faintest visible 2000 Candela red lighting may be visible at up to distances of approximately 36km but not beyond, with 200 Candela red lighting visible up to approximately 23km (May 2018 report, Figure 4, page 7). This indicates that for shore-based receptors only the closest of the periphery structures supporting aviation lighting may be visible.

5. Theoretical Visibility, Extent of Effects and Viewpoints

5.1 Introduction

This section of the Design Statement provides a comparison of the extent of visual effects associated with the application scheme and the Seagreen final design through a comparison of Zone of Theoretical Visibility (ZTV) overlays. These have been generated to both hub and blade tip heights. The ZTVs are a useful tool which assist in identifying the extent and location of potential variations in visibility associated with the worst case scenario (WCS) consented layout and the final design.

The ZTVs also assist in identifying the extent and location of any potential variations in visual effects upon the terrestrial and marine environments and any areas of designated or protected landscapes.

5.2 Comparative ZTVs

5.2.1 Comparison of hub height visibility – bare earth

Figure 02a is a bare earth ZTV comparing the theoretical maximum extents of visibility of the hub heights for the consented layout (126m, in yellow and red) and the final design (123m, in yellow and blue). The majority of the ZTV is shown in yellow indicating that there is very little difference in the extent of visibility of the two different schemes to hub height. This is as would be expected given the small 3m variation between the hub heights with only some very minor variations evident around the periphery of the ZTV.

In terms of the marine-based variations these are broadly comparable with the final design being slightly more visible out to sea to the south east countered by the slightly greater extent of visibility of the consented layout to the north. Overall the area of red is marginally greater than that of blue indicating that the final design layout is within the parameters of the consented layout. Moreover, the marginal increased visibility of the consented layout to the north occurs closer to the coastline and thus centres of visual receptors which marginally suggests that the final design is an improved layout.

In terms of land-based visibility there is no discernible difference between the consented layout and final design layout.

5.2.2 Comparison of blade tip height visibility – bare earth

Figure 02b is a bare earth ZTV comparing the theoretical maximum extents of visibility of the blade tip heights for the consented layout (210m, in yellow and red) and the final design (205m, in yellow and blue). Again, the majority of the ZTV is shown in yellow indicating that there is very little difference in the extent of visibility of the two different schemes to blade tip height. This is also broadly as might be expected given the small 5m variation between the blade tip heights with only some very minor variations evident around the periphery of the ZTV.

In terms of the marine-based variations arising as a result of the different layouts it is noticeable that the Seagreen final design has a reduced extent of visibility to the north indicating a slight design improvement.

In terms of land-based visibility there is again no discernible difference between the consented layout and the final design layout.

5.2.3 *Comparison of hub height visibility – with woodland screening*

Figure 03a is the same ZTV as Figure 02a but with key areas of woodland modelled in as screening elements to help refine the extent of theoretical hub height visibility of the wind farm for all land-based visual receptors. The ZTV indicates that there are no new areas of the landscape from which there may be theoretical visibility of the Seagreen final design (to turbine hub height) compared to the extent of hub height visibility identified for the consented layout.5.2.4 *Comparison of blade tip height visibility – with woodland screening*

Figure 03b is the same ZTV as Figure 02b but with key areas of woodland modelled in as screening elements to help refine the extent of theoretical blade tip height visibility of the wind farm for all land-based visual receptors. The ZTV indicates that there are no new areas of the landscape from which there may be theoretical visibility of the Seagreen final design (to turbine blade tip height) compared to the extent of blade tip height visibility identified for the consented layout.

5.2.4 Summary

Collectively, the set of ZTVs confirm that the Seagreen final design is within the parameters of the consented layout. The ZTVs confirm that there are only minimal differences in the extent of potential visibility and that these only occur across the marine environment with no evident land-based differences. The Seagreen final design will be visible from marginally further away when at sea to the south and south east but this is a reflection of the slightly different layout (which places some of the final design turbines further away from the coast), rather than the difference in blade tip height of the turbines for the two layouts.

5.3 Comparison of Effects upon Landscape Designations

Figure 04 overlays areas of landscape designation onto the ZTV shown in Figure 03b to enable a more detailed comparison of any variations that might arise in terms of potential visual effects from within areas of designated landscapes between the consented layout and the final design. The Cairngorms National Park and various areas of local landscape designation as well as gardens and designed landscapes have all been identified. The Figure confirms that none of these designated and protected landscapes will experience any additional potential visual effects that were not already identified and considered within the SLVIA submitted as part of the 2012 ES. From a design perspective the Seagreen final design is therefore considered to be consistent with the existing consent.

5.4 Representative Viewpoints

The S36 Consent includes a requirement that the Design Statement should provide:

> *"…. representative wind farm visualisations from key viewpoints as agreed with the Scottish Ministers, based upon the final DSLP as approved by the Scottish Ministers.."*

A similar requirement is identified within the Marine Licence conditions. To address this requirement a set of eight representative viewpoints were agreed through the consultation process with visualisations and

comparative wireframe views being prepared for all viewpoints. The eight agreed viewpoints are as previously considered within the 2012 ES. These are identified in the table below along with the visual receptors that they represent.

Table 5.1: Representative Viewpoints

	Viewpoint	**Primary Visual Receptors**	**Other Visual Receptors within the vicinity**	**Distance from nearest turbine**
VP1	Garron Point	Golfers	Walkers, railway travellers, motorists	37.8 Km
VP2	Beach Road Kirkton, St Cyrus	Residents, walkers	motorists	31.1 Km
VP3	White Caterthun Hill Fort	Walkers, visitors	Local road users	50.9 Km
VP4	Montrose	Residents, visitors	Motorists, cyclists	31.7 Km
VP5	Braehead of Lunan	Cyclists, residents, road users	Visitors	35.0 Km
VP6	Arbroath Signal Tower	Visitors, Walkers,	Residents	40.2 Km
VP7	Carnoustie	Residents, visitors including to the beach	Motorists, cyclists	48.1Km
VP8	Fife Ness	Coastal walkers, visitors	Residents, motorists	48.5Km

These are considered further within section 7 below which provides a comparison of the visual effects at each of the viewpoints, comparing the WCS consented application scheme with the Seagreen final design. The section also identifies the design attributes of the Seagreen final design.

6. Design Objectives and Principles

6.1 Design Objectives

The evolution of the final design for the Seagreen project has been influenced by a variety of constraints and considerations. These have included a range of environmental, engineering and economic factors which have previously been set out within the ES supporting the project consents. Most significant of the embedded mitigation measures from a design perspective was the decision to retreat the western site boundary of the array seawards by approximately 10km, to increase the distance of the nearest WTGs from the coastline. This also affords proportionally greater screening effects arising as a result of the Earth's curvature.

Following the grant of the consents, the evolution of the final design has also had regard to a number of design objectives, namely to:

- Maintain the same, or reduce, the overall horizonal spread of the WTGs along the horizon line
- Maintain the same, or reduce, the height of the WTGs
- Maintain the same, or reduce, the number of WTGs
- Maintain the same, or increase, the distance of the WTGs from the nearest stretch of coastline
- Ensure that the OSPs are sited within the array and seaward of the western site boundary
- Limit and, if possible, reduce the incidence of turbine stacking, in particular from the closest stretches of coastline and/or larger centres of visual receptors

Collectively, meeting these objectives, will ensure that the visual effects associated with the final design are at least the same as, or less than those identified within the ES supporting the project consents.

6.2 Design Attributes

Existing guidance highlights the range of aesthetic and other attributes that can have a bearing upon the appearance and design of an offshore wind farm. These attributes are considered below and have been drawn from SNH's *'Offshore Renewables – guidance on assessing the impact on coastal landscape and seascape (SNH, March 2012)*', in particular, paragraphs 5.5 and 5.6 under the sub-heading *'Characteristics of Offshore Windfarms'*. SNH's guidance on 'Siting and Designing Wind Farms in the Landscape, version 3a (August 2017) directs that (para 1.8) *"For offshore wind farms reference should be made to Offshore Renewables – guidance on assessing the impact on coastal landscape and seascape (2012)*". The earlier 2012 guidance is more appropriately focused on a marine receiving environment, rather than a terrestrial environment but the appropriate headline contents of the 2017 guidance are also referenced where relevant to a marine environment.

When considering the design attributes identified below, reference should be made to the set of comparative wireframes for each of the representative viewpoints included as Figures 6c – 13c.

6.2.1 Horizontal extent

The Seagreen final design is located within the same sector of sea as the WCS consented layout and within the same site area boundaries. Changes to the project design have taken place within these boundary constraints. As both the WCS consented layout and the final design have sought to maximise energy generation within the constraints of the site area, the design of both layouts have sought to maximise the available site area. The consequence of this is that the overall horizontal extent of the layouts are very similar, regardless of where the wind farm is viewed from.

The extent of variation in the horizontal extent between the consented application scheme and the final design is limited to approximately one degree and judged to be barely perceptible, even when the layouts are viewed in the context of coastal landform and the closer Inch Cape wind farm, as at viewpoints 6 and 7 (refer to Figures 11c and 12c).

6.2.2 WTG dimensions, form, design, size and colour

The WTGs included within the Seagreen final design layout are within, and slightly smaller than, the design parameters under the WCS existing consent. The blade tip height of the WTGs above lowest astronomical tide (LAT) has been reduced from 210m to 205m representing a 2.5% reduction in design height. There has been a similar reduction in hub height from 126m to 123m, representing an approximate 2.5% reduction in design hub height. This equates to a small, albeit difficult to perceive, design improvement.

The selected WTGs will be three-bladed and coloured consistent with industry standards. The turbines (tower sections, nacelles and blades) will be finished in the standard light grey (RAL 7035) with the substructures finished in traffic yellow (RAL 1023) consistent with maritime requirements.

6.2.3 Number of WTGs

The number of WTGs included within the Seagreen final design (150 WTGs) is the same as that included within the WCS consented layout. Whilst the number of WTGs remains the same, in order to maximise the opportunity for energy generation, and in response to a range of various constraints, the distribution of the WTGs varies between the consented layout and the final design layout. From a design perspective there is no change in WTG numbers.

6.2.4 Apparent density of the WTG layout/array

The density of WTGs across the site area varies between the WCS consented layout and the final design layout. Although in terms of WTG siting there is greater variation in the final design layout, this does not translate through to the same extent when the layouts are viewed from the representative viewpoints beyond there sometimes being a marginally slightly greater contrast in the scaling of WTGs when seen against each other within the final design layout (refer to Figures 6c and 7c).

6.2.5 Alignment of WTG rows

Both layouts adhere to a broadly south west orientation of WTG rows in response to the prevailing wind direction with the rows of the final design aligned broadly perpendicular to the Angus coastline. In contrast, the WCS consented layout rotated the WTG rows further to the west. Overall, it is judged that this makes little difference to the design merits of one layout against the other.

Although there are clear differences in the alignment of WTGs across the site, the variation in alignment only really becomes demonstrably apparent when stacking of the WTGs occurs and this varies for both schemes according to the viewpoint location.

6.2.6 Distribution of the WTGs (inc outliers and spread)

The WCS consented application layout allowed for an even distribution of WTGs across the full site area with no noticeable gaps or indentations in the array aside from those described by the red line boundary outline of the application site. The consented WCS layout is identified by the red triangles in Figure 02a with the final design overlain as blue and pink circles. Figure 01 shows the Seagreen Project final design on its own and reveals a more uneven distribution and varied density of WTGs which is a reflection of various hard constraints such as ground conditions and other sensitivities.

However, the comparative ZTV figures for the viewpoints indicate that the distribution of WTGs across the site area is broadly similar for both layouts with the final design layout showing a more even distribution at viewpoints 1 and 5 (refer to Figures 6c and 10c) and thus a more harmonious layout.

With respect to outliers, both layouts demonstrate an arrangement within which outliers appear from a number of viewpoints on both the northern and southern fringes of the array. Given the distance of the Seagreen Project from the coastline these outliers can still visually read as part of the array when viewed from the coast.

6.2.7 Stacking of WTGs

Stacking of WTGs occurs in both the WCS consented layout as well as in the Seagreen Project final design layout and is a result of the arrangement of WTG rows and their relationship to the viewpoint. As the eight comparative wireframe views show, stacking occurs at a range of locations. However, there is less frequency of stacking effects within the final design layout than for the WCS consented layout, the latter of which demonstrates stacking effects occurring in views 1 – 6 with the effects occurring within the central section of the array at four of the viewpoints. This contributes (in the WCS consented layout) to a less harmonious and more visually-interrupted consented layout which, in design terms, is less favourable.

In contrast, stacking effects occur at only three of the selected viewpoints for the final design layout and, for two of the viewpoints this characteristic occurs in the southern periphery of the array where the WTGs are seen in closest proximity to the taller and closer Inch Cape WTGs. Although generally seen as undesirable, the stacking effects can contribute to delivering a more visually-permeable wind farm with stretches of clear horizon visible between rows of WTGs. When seen in the context of neighbouring features such as the Inch Cape WTGs, this greater visibility of the horizon line assists in creating the impression of a wider separation between the two developments and, in this regard, is seen as a design benefit.

6.2.8 Contextual relationship with coast

Overall, there is no demonstrable difference in the relationship that the two different layouts have with the coastline and coastal landform.

6.2.9 Height relationship with other offshore wind farms and surroundings

Whilst there is only a small difference in the design height of the WTGs selected for the Seagreen final design as compared to the WCS consented layout, the relative proximity of the taller Inch Cape WTGs assists, from a design perspective, in visually-retreating the Seagreen WTGs (for both layouts) further offshore. This is a clear design benefit that has arisen as a consequence of the consented Inch Cape scheme.

6.2.10 Compatibility with onshore wind farms

There is no design characteristic that makes the WCS consented layout or the Seagreen final design layout less or more compatible with onshore wind farm development. This is a reflection of the site's distant marine location and the clear separation from the coastal edge.

6.2.11 Offshore substation platforms

The Seagreen Project final design sites the two OSPs broadly within the centre of the wind farm array and approximately a further 10km seaward of the western site boundary. This is a positive design move resulting in the two OSPs being an approximate minimum distance of 40km offshore, thereby further reducing any prospect of their visibility from land-based receptors. It is also noted that the number of OSPs has been reduced from the original five allowed for within the consents to two which is a clear design benefit, albeit one that will be more evident to marine based receptors rather than terrestrial receptors.

7. Comparison of Visual Effects

7.1 Introduction

This section provides a comparison of the visual effects comparing the Seagreen Project final design for the wind farm against the WCS consented application layout. The comparison has been undertaken from the eight viewpoints identified within Table 5.1 of Section 5 above and is supported by a suite of wireframe and visualisation figures for each of the viewpoints (refer to Figures 6 – 13).

7.2 Wireframes and Visualisations

Since the completion of the 2012 Offshore ES, the guidance for the production and presentation of visualisations has been updated by Scottish Natural Heritage. The photography, wireframes and photomontages for each of the viewpoints have been generated consistent with the latest SNH guidance on the *'Visual Representation of Wind Farms, Version 2.2, February 2017'.*

The presentation of visual material includes a minor variation to the SNH guidance whereby the 53.5 degree planar wireframe sheets include two wireframe images stacked one above the other and presented on the same sheet for ease of comparison.

The visualisation material for each viewpoint consists of:

- Viewpoint information sheet
- 90 degree cylindrical sheet comprising the existing view with the Final Design wireframe (including Inch Cape and Neart na Gaoithe wind farms) set below
- 53.5 degree planar sheet with two wireframes set one above each other showing the Final Design and the consents based on maximum parameters (including Inch Cape and Neart na Gaoithe wind farms)
- 53.5 degree planar sheet with two wireframes set one above each other showing the Final Design and the Final Design with the addition of the 12 'spare locations' (including Inch Cape and Neart na Gaoithe wind farms)
- 53.5 degree planar photomontage showing the Final Design
- 53.5 degree planar wireframe identifying different aviation light requirements (Viewpoints 4 and 6 only)
- 53.5 degree planar night-time photomontage showing the Final Design (Viewpoints 4 and 6 only)

7.3 Viewpoint comparison

The table below provides a summary of the differences and characteristics of the visual effects associated with the Seagreen final design layout when compared against those associated with the WCS considered within the application for consents.

Reference should be made to Figures 6 – 13 inclusive which include a set of wireframe views and visualisations for the eight agreed representative viewpoints.

Table 7.1: Summary of Differences in the Visual Effects

	Viewpoint Location	Key differences and characteristics in the visual effects of the Final Design compared to the 2014 Consented Layout	Beneficial, Adverse or No Change
VP1	Garron Point (Distance to nearest WTG – 37.8km)	• A more informal and less-rigid layout • A more even distribution of WTGs across the horizon line • Removal of the strong WTG stacking effects evident in the middle of the 2014 layout • Comparable spread of WTGs • WTG 'outliers' displaced from the northern edge of the array to the southern edge	B B B --- ---
VP2	Beach Road, Kirkton, St Cyrus (Distance to nearest WTG – 31.1km)	• A comparable layout with a mix of irregular groupings and some stacking of WTGs • Stronger stacking towards the centre of the layout • Slightly visually uncomfortable contrast in WTG groupings and heights north of the centrally stacked section • Slightly less even distribution of WTGs on the northern and southern margins of the layout • 'Outliers' evident on the southern edge partially countered by perception of reduced horizon spread	--- A A --- ---
VP3	White Caterthun Hill Fort (Distance to nearest WTG – 50.9km)	• A comparable layout and WTG spread but slightly less visually cohesive • No stacking of WTGs in the centre of the layout • Stronger stacking evident on the southern margins of the layout but balanced by perceived greater separation from Inch Cape	A B A
VP4	Montrose (Distance to nearest WTG – 31.7km)	• Broadly similar distribution of turbines • Removal of stacking effects within the centre of the array • More pronounced stacking effects within the southern section of the array with increased spacing between the rows • Broadly similar irregular arrangement of WTGs within the northern half of the array	--- B A ---
VP5	Braehead of Lunen (Distance to nearest WTG – 35.0km)	• Marginally reduced spread of WTGs to the north • More even spread of WTGs across the array • Removal of strong stacking effects along the northern edge of the layout • Removal of small area of stacking effects in the centre of the array • Similar overlap with Inch Cape WTGs along the southern edge but layout of WTGs achieves a slightly stronger definition against Inch Cape	B --- B --- ---

VP6	Arbroath Signal Tower (Distance to nearest WTG – 40.2km)	• Lighter density and greater spacing of WTGs along northern edge gives slightly better relationship with coastal edge • Removal of strong stacking effects in southern third of the array behind overlap with Inch Cape • Comparable spread of WTGs along the horizon • Similar overlap with Inch Cape WTGs over approximately 50% of the layout	B B --- ---
VP7	Carnoustie (Distance to nearest WTG – 48.1km)	• Very marginally more visually permeable northern edge (showing blade tips only) giving better relationship with landform • Comparable spread of WTGs along the horizon • Comparable overlap with Inch Cape turbines	--- --- ---
VP8	Fife Ness (Distance to nearest WTG – 48.5km)	• No perceptible difference with only the upper sections of WTG blades theoretically visible • Comparable spread of WTGs along the horizon • Comparable overlap with Inch Cape WTGs	--- --- ---

7.4 Summary

The comparison above demonstrates that, through the design developments that have occurred since the consenting of the WCS layout, the Seagreen Project final design has incorporated a range of design enhancements that will assist in delivering a scheme with visual effects that are in line with, and slightly reduced compared to those that were identified within the ES supporting the consented layout. These enhancements will also hold true when taking account of the micro siting parameters anticipated for within the development. Whilst some of the design enhancements have been partially counter-balanced by less desirable design changes the balance of the design changes, in broad terms, have helped to bring about a 2-1 improvement on the WCS consented layout. These visual design enhancements vary according to the location of the viewpoint and the visual receptors that it represents.

7.5 Weather Conditions and Visibility

The ES supporting the consented layout appropriately included a summary of relevant Met Office visibility data that set out the percentage incidence of visibility over a range of distances. Whilst not repeated here, it is noted that, in terms of shore-based visual receptors, the nearest WTGs will be a minimum distance of approximately 28km from visual receptors on the nearest stretch of coastline and thus the wind farm will, when visibility permits, be seen as a distant feature on the horizon line. It will also generally be seen in a broad marine context with a clear separation from the coastline.

7.6 Night-time Effects

The visualisation material accompanying this Design Statement includes two night-time photomontages from the viewpoints at Arbroath and Montrose (refer to Figures 9 and 11) supported by two wireframe views to identify the differences in aviation lighting identified within the LMP (LF000009-CST-OF-PLN-0010)

that have been modelled into the visualisations. Both of these demonstrate that the likelihood of clear visibility of the aviation lighting is considered limited, particularly when taking account of the findings of the technical report undertaken by Professor Best of the University of Edinburgh which identifies the visibility of red 2000 Candela lighting as being limited to approximately 37km. This indicates that only those WTGs that are lit to the west of the OSPs have the potential to be visible (i.e. approximately half of the lit periphery WTGs).

8. Compliance with the ES and ES Addendum

The relevant conditions of the S36 Consent and the Marine Licences require that the operational Seagreen Project be designed in accordance with the parameters assessed within the ES and ES Addendum.

The ES and ES Addendum for the Seagreen project identified and described the range of layout options that could be applied during the construction and operation of the Development. This was presented as a 'Rochdale Envelope' incorporating a variety of options in relation to the development design and the approach to installation.

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

The design benefits can be summarised as follows:

- A reduction in the maximum hub and blade tip heights of the turbines.
- A reduction in the number of OSPs from the 5 permitted within the consents to the two proposed.
- The siting of the two OSPs within the development site and away from the western site boundary such that they will be sited approximately 40km from the nearest stretch of coastline.

Other attributes of the final design remain within and consistent with the existing consents including:

- The total number of turbines and the split between the Alpha and Bravo sites.
- The horizontal spread of the turbines.
- The appearance and colour of the turbines.
- The substructure designs.

9. References

Table 9.1 sets out those documents for the Seagreen project in relation to either Consent Plans or other reference documents.

Table 9.1 Seagreen Document References

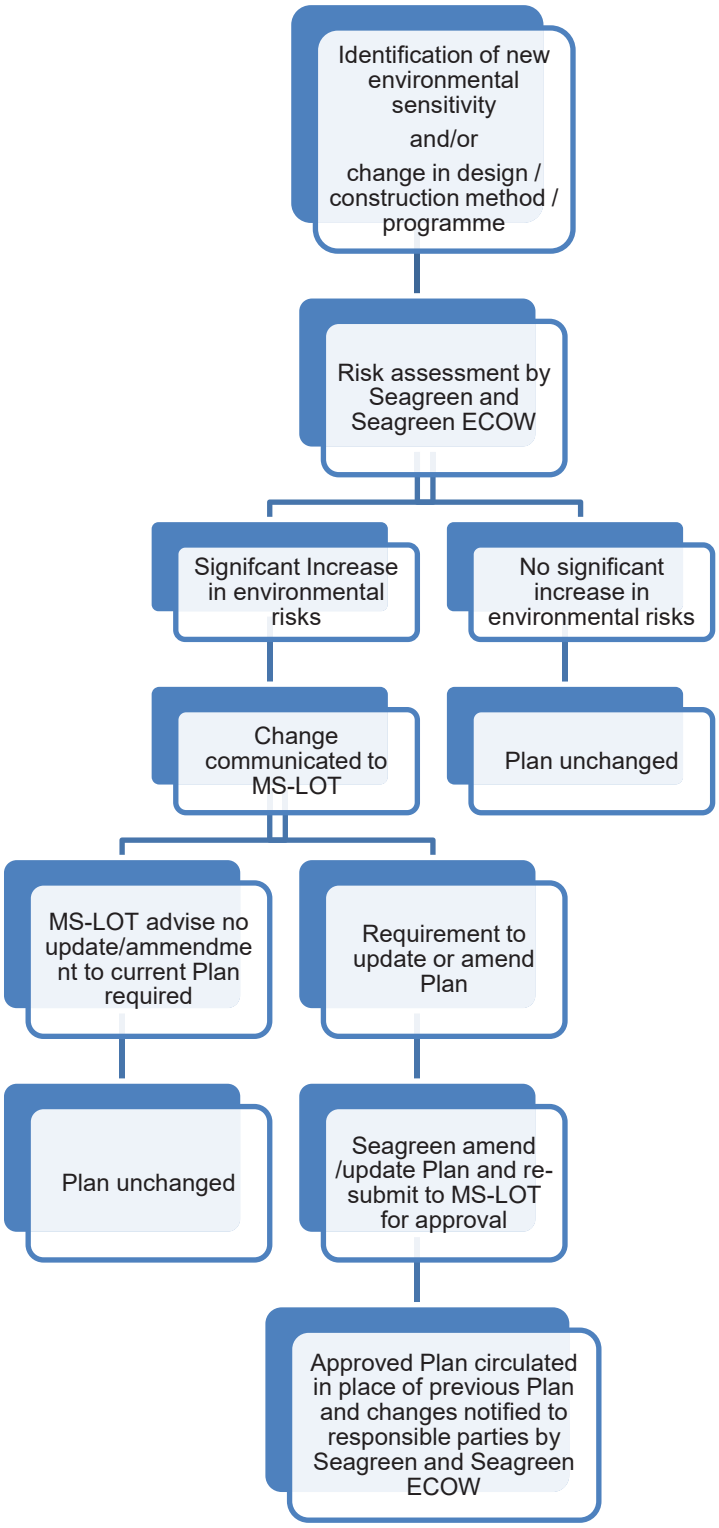
SWEL Document Number	Title
LF000009-CST-OF-PLN-0010	Offshore Lighting and Marking Plan
LF000009-CST-OF-PLN-0005	Offshore Transmission Asset Development Specification and Layout Plan
LF000009-CST-OF-PLN-0004	Offshore Wind Farm Development Specification and Layout Plan

Appendix A – Design Statement List of Abbreviations and Definitions

Term	Description
Alpha Marine Licence	Marine licence granted by the Scottish Ministers under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 in respect of Seagreen Alpha Wind Farm on 10 October 2014 as amended by the revised marine licence granted by the Scottish Ministers on 28 August 2018 (reference 04676/18/0) and subsequently varied on 12 December 2019 (reference 04676/19/0).
Bravo Marine Licence	Marine licence granted by the Scottish Ministers under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 in respect of Seagreen Bravo Wind Farm on 10 October 2014 as amended by the revised marine licence granted by the Scottish Ministers on 28 August 2018 (reference 04677/18/0) and as further amended by the revised and transferred marine licence granted by the Scottish Minsters on 12 December 2019 (reference 04677/19/0)
(the) consents	Collective term used to describe the Section 36 consents and Marine Licences issued to SAWEL, SBWEL and SWEL
DS	Design Statement
DSLP	Development Specification and Layout Plan
EIA	Environmental Impact Assessment
ES	Environmental Statement
HAT	Highest 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 in respect of the OWF and on behalf of SAWEL and SBWEL in respect of the OTA.
LAT	Lowest Astronomical Tide
LMP	Lighting and Marking Plan, required under Condition 19 of the S36 consent and Condition 3.2.2.14 of the OTA Marine Licence
Marine Licences	The three marine licences for the Seagreen Project, comprising the Alpha Marine Licence, the Bravo Marine Licence and the OTA Marine Licence
MHWS	Mean High Water Springs
MS-LOT	Marine Scotland Licensing and Operations Team
OnTW	Onshore Transmission Works, from landfall consisting of onshore buried export cables and new transmission substation
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

Term	Description
OTA Marine Licence	marine licence granted by the Scottish Ministers under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 in respect of the OTA on 10 October 2014 as amended by the revised marine licence granted by the Scottish Ministers on 6 March 2019 (reference 04678/19/0)
OSP	Offshore Substation Platform means an alternating current Offshore substation platform which is a standalone modular unit that utilises the same substructure and foundation design as a wind turbine generator
OWF	Collective term used to describe the Wind Farm Assets
S36 Consents	Consent under section 36 of the Electricity Act 1989 granted by the Scottish Ministers on 10 October 2014 in respect of the Seagreen Alpha and Seagreen Bravo offshore wind farms, both as varied by the Scottish Ministers by decision letter issued pursuant to an application under section 36C of the Electricity Act 1989 on 28 August 2018
SAWEL	Seagreen Alpha Wind Energy Limited, a company with registered number 07185533 and having its registered office at No1 Forbury Place, 43 Forbury Road, Reading, United Kingdom RG1 3JH
SBWEL	Seagreen Bravo Wind Energy Limited, a company with registered number 07185543 and having its registered office at No1 Forbury Place, 43 Forbury Road, Reading, United Kingdom RG1 3JH
Site	The area outlined in red in both Figure 1 attached to the S36 consent Annex 1 and the figure contained in Part 4 of the OTA Marine Licence
SLVIA	Seascape, Landscape and Visual Impact Assessment
SNH	Scottish Natural Heritage
Seagreen (SWEL)	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
WCS	Worst Case Scenario
WFA	Wind Farm Assets, the Offshore array development as assessed in the ES including wind turbine generators, their substructures and foundations, and associated inter-array cabling
WTG	Wind Turbine Generator
ZTV	Zone of Theoretical Visibility

Appendix B – Design Statement Change Management Procedure



Appendix C Compliance with ES parameters and ES Addendum

Design-related parameter	ES and ES addendum	DS
Location	At the closest point, Project Alpha and Bravo are located approximately 27km and 38km east of the coastline respectively.	No change
WTGs		
Total number of WTGs	Up to 150	Total 150
Up to 75 WTGs and supporting structures per project	75 per site	75 per site
Substructure type	Up to 4 legged Jacket with driven piles suction piles or gravity base system	114 WTGs installed on suction bucket foundations on 3-legged (tripod) jacket constructed of steel. 36 WTGs installed on piled foundation on up to 4 legged jacket constructed of steel.
Blade clearance above LAT	26.1 – 42.7m [1]	37 – 41m
Rotor diameter	122 – 167m	164m
WTG hub height (above LAT)	87.1 – 126.2m	119 - 123m [2]
Maximum blade tip height (above LAT)	148.1 – 209.7m	201 – 205m
Nacelle dimensions	From 15m x 4m x 4m up to 24m x 12m x 12m	20.6m x 8.8m x 9.3m (including hub)
Minimum spacing between WTGs	610 – 835m [3]	1,042m (excluding micro-siting)

[1] Note this figure was revised within the S36 Consents to 29.8m (with a maximum blade tip clearance of 42.7m) above LAT.

[2] Design Statement is based on 123m hub height as worst case scenario

[3] Note this figure was revised within the S36 Consents to 1,000m.

WTG colour (tower, hub and blades)	RAL 7035 (light grey)	RAL 7035 (light grey)
Colour of substructures	RAL 1004 (yellow)	RAL 1023 (traffic yellow)[4]
OSPs, substructures and foundations		
Number of OSPs	≤ 5	2
Design options	• Tubular pin pile • Suction pile Gravity base foundations	Tubular pin pile
OSP Dimensions, per OSP	Max length: 40 – 100m Max width: 40 – 60m Max height: 45 – 60m	Length: 52m Width: 35m Height: Topside 45m above LAT

[4] RAL 1023 is considered to be the industry standard substructure paint colour and no discernible difference is anticipated from RAL 1004 specified within the ES.