Sound of Islay Tidal Array

Environmental Report

Supplementary

Environmental Information

Project: Sound of Islay Demonstration Tidal Array

Date: April 2014

SCOTTISHPOWER RENEWABLES

Contents

1. Introduction

1.1. Overview

This document has been produced to support changes to the licences and consents in place for the Sound of Islay Demonstration Tidal Array (the Development). The Development includes a demonstration array of up to10 tidal turbines (the generating station) located on the seabed within the Sound of Islay, export cables from the generating station to onshore, transition pit, transition pit to substation underground cables, and an onshore substation, with associated infrastructure and access upgrades. The location, key components and layout of the Development are detailed in Figure 1.1.

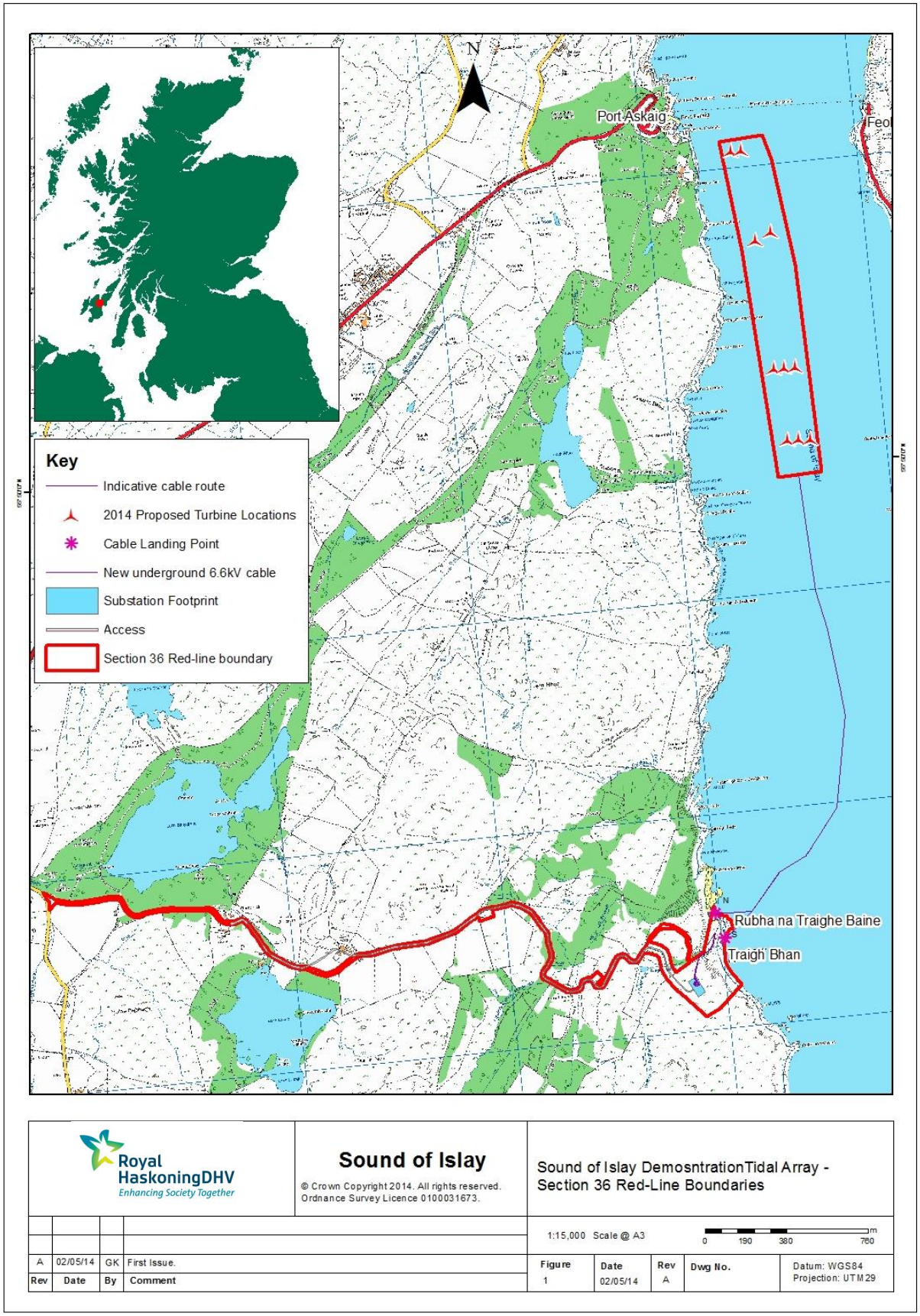


Figure 1.1 Project overview

Variations are proposed to the Marine Licence issued to Scottish Power Renewables (SPR) in March 2011, for the installation and operation of the generating station.

An application is made under Section 36 of the Electricity Act 1989 for the installation and operation of the generating station, and as part of this application Scottish Power Renewables seeks deemed planning permission for an onshore substation, transition pit, and associated infrastructure at a revised location.

A series of variations to the Sound of Islay Demonstration Tidal Array, from the currently consented project, are proposed. These variations include:

- Changes to the device dimensions;
- Altered device locations, with movement of between 41m and 117m from the consented locations, but still located within the original redline boundary (Figure 2.1);
- Inclusion of additional installation vessel options;
- Increased operational life of the project; and
- Revised onshore substation, transition pit and underground cable location, with associated infrastructure
- Change in landfall and export cable route due to the associated revised onshore substation location. The export cable route has been consented separately.

This document provides an analysis of the potential for any changes to the outcome of the Environmental Impact Assessment (EIA) that was previously produced (SPR 2010) to support the original application that may result as a consequence of the proposed variations.

1.1.1. Supplementary Environmental Information (SEI) and this Environmental Report (ER)

This Environmental Report (ER) should be read in conjunction with the 2010 Environmental Statement (ES) (SPR, 2010). The Environmental Report's main purpose is to provide Supplementary Environmental Information (SEI) to update the 2010 ES and support consent and licence applications for the Sound of Islay Demonstration Tidal Array. The Environmental Report should not be viewed as a standalone document, and has been designed and written to support consent and licensing applications for the generating station and the onshore substation with associated infrastructure.

A Marine Licence for a new export cable route between the generating station and the new substation was granted in February 2014. No other consents are required for that element of the project, however, an assessment of the potential impacts of the export cable route, and landfall point are also provided (but are not part of the current application) to allow reviewers to consider The Development in full.

This ER provides SEI through the following background and technical chapters:

- *Chapter 2: Changes to Project Description* presents the changes to the project details associated with this variation application compared with the consented details that were outlined in the original ES.
- *Chapter 3: Screening* provides a review of the impacts assessed in the original ES and the need to provide supplementary information in relation to the changes to the project description outlined in Chapter 2.
- *Chapter 4: Consultation* outlines the stakeholder consultation and public engagement which has been undertaken in relation to the revised applications
- *Chapter 5: Assessment Methodology* outlines the approach used to impact assessment in this SEI, following the approach of the original EIA.
- *Chapter 6: Benthic ecology* provides a summary of the original site characterisation and outlines the revised impact assessment associated with the variation.
- *Chapter 7: Marine Mammals and Basking Shark* presents an updated baseline characterisation using newly available information and the updated site specific monitoring following a second year of survey (Appendix 7.1) and impact assessment for the project variations.
- *Chapter 8: Ornithology* presents an updated baseline characterisation using newly available information and the updated site specific monitoring following a second year of survey (Appendix 8.1) and impact assessment for the project variations
- Chapter 9: *Terrestrial ecology* presents an updated baseline characterisation using newly available information and the updated site specific monitoring following new survey results (Appendix 9.1) and impact assessment for the project variations
- Chapter 10: *Navigation* presents a summary of the Navigation Risk Assessment (Appendix 10.1) completed by Anatec to support this SEI.
- Chapter 11: *Landscape and visual impact assessment* provides a review of the visual impacts of the substation in the revised location, using information from the technical report (Appendix 11.1)

This ER updates the 2010 ES, highlighting and assessing potential impacts from the changes outlined in *Chapter 2: Project Description.*

This ER also provides information to support an updated Appropriate Assessment under the Habitats Regulations in relation to harbour (common) seal from the South East Islay Skerries Special Area of Conservation (SAC). (See *Chapter 7: Marine mammals and basking shark*).

1.2. Background

ScottishPower Renewable Energy Limited, the parent company of ScottishPower Renewables (UK) Limited (hereafter referred to as SPR), is a wholly owned subsidiary of ScottishPower UK plc and has a renewable energy portfolio of over 1,420MW.

SPR aims to continue to expand its renewables capacity in the UK in order to help the Scottish and UK Governments meet their 2020 targets for electricity generation from renewable sources. This includes the development of some of the newer renewable technologies including wave and tidal renewables.

In July 2010, SPR submitted an application under Section 36 of the Electricity Act 1989 to construct and operate a demonstration tidal array in the Sound of Islay, Argyll and Bute. The application comprised a ten turbine development with an installed capacity of 10MW, which will be owned and operated by SPR.

The Development was the first tidal array consented in UK waters and, when built, it will deliver power directly into the National Grid. This will assist both the Scottish and UK Governments in meeting their future energy targets and their reduction of greenhouse gas emissions. The Development capacity of 10MW equates to an average production of 26.3GWh p.a., which is enough power to supply approximately 6621 average domestic households based on the average domestic electricity consumption for Scotland in 2012 (DECC, 2013).

SPR currently holds consent to construct, install and operate a demonstration tidal power array for 14 years within the Sound of Islay. The Development will utilise the tidal flow running through the Sound to power tidal turbines during the flood and ebb tidal flows and generate electricity throughout these flow periods. This ER supports an application for revisions to the consented Development including an application for an additional 11 year period of operation for the Sound of Islay demonstration tidal array, giving the project a total operational life of 25 years.

SPR also has a lease option for a substantial tidal project at Ness of Duncansby in the Pentland Firth. At 95MW this is a major project which, in itself, could be a precursor to even larger developments in that area. Although this is out with the scope of this SEI, the Sound Of Islay Development will provide technical, environmental and commercial learning which will be essential to facilitating the deployment of projects in the Pentland Firth, and in particular the Ness of Duncansby Development.

The SEI provided in this report supplements the 2010 ES (SPR, 2010) and is integral to ensuring that investigation undertaken of the environmental impacts of the proposed revised project is robust and comprehensive. The SEI provided is specific to the proposed changes to the Development (outlined in *Chapter 2: Changes to Project Description*), providing additional information and assessment beyond that in the original 2010 ES.

Outside the issues assessed in this ER, it is believed that the assessments within the original 2010 ES remain sufficiently robust and relevant to cover the revised Development and the additional 11 years of operation requested.

This report will assist Scottish Ministers in reaching a decision as to whether permission should be granted for the revised Development over the proposed increased operational life for the project.

1.2.1. Brief description of the development site and its location

The Development will be located within the Sound of Islay, a narrow channel that separates the Isles of Islay and Jura within the administrative area of Argyll & Bute Council on the west coast of Scotland. The tidal resource of this channel is recognised as one of the best on the west coast of Scotland, with local topography of the area providing an optimised working environment due to its shelter from the westerly storms that are prevalent elsewhere along the coast, making the Sound of Islay a preferred location for the world's first tidal array.

The generating station boundary remains as described in the original 2010 ES. There is no change to the red-line boundary for the generating station.

The onshore substation will be located on the eastern side of Islay, at Traigh Bhan, south of Rubha na Traighe Baine (see Figure 2.2). The proposed site is a flat area sheltered by a tree line to the north and gently sloping elevated landform to the west. An access road to the site already exists as well as overhead 33kV lines and poles owned by Scottish and Southern Electricity (SSE).

1.2.2. Site selection

The site selection process for the tidal array is outlined in the original ES (SPR, 2010).

The consented substation location is on Jura, to the east of the Sound of Islay (see SPR, 2010), however, since consent, subsequent changes to land ownership on the island has resulted in this option no longer being available to the project. As a result, a thorough review of new prospective locations was undertaken, resulting in the shortlisting of three prospective candidate sites on Islay.

One site, north of the Port Askaig ferry terminal was considered uneconomic due to the considerable shore side cable connection required to connect to the existing grid. The available site area was also restrictive and afforded little prospect of supporting the scale of site necessary to support the Development.

A review of a further two sites, both within the Dunlossit estate, established that one site, inland of the cable landfall location, was problematic, due to considerable technical difficulties with onshore cable routing, and because of its location in a natural hollow supporting established wetland / bog of ecological value. Finally the substation development would be starkly visible from a number of estate properties.

The selected substation site is considered to be the optimal site, providing both acceptable technical conditions for the construction of the substation and subsequent connection to the grid network. Access to this site has been refined to minimise potential disturbance to a nearby Golden Eagle eyrie.

Throughout this site selection process meetings have been conducted with the Argyll and Bute Council, Scottish Natural Heritage (SNH), the Royal Society for the Protection of Birds (RSPB), Marine Scotland,

and Scottish Environmental Protection Agency (SEPA) to identify and mitigate any potential environmental impact identified as a result of the Development (see *Chapter 4: Consultation*).

1.3. References

DECC (2013). Sub-national electricity consumption statistics. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/267585/Sub-national_electricity_consumption_factsheet_2012.pdf

2. Changes to Project Description

This chapter of the ER presents the design changes to the Development since submission of the original Sound of Islay Demonstration Tidal Array ES in 2010 (SPR, 2010) and forms the basis of the SEI provided and assessments undertaken in technical chapters 6 to 11.

All design elements not detailed in this report are as detailed in *Chapter 5: Project Description* of the 2010 ES (SPR, 2010) and are not repeated here.

2.1. Site Design and Layout

The Development will continue to comprise up to ten 1MW devices, installed in deep water (>51.5m depth), on an area of the seabed within the Sound of Islay, just south of Port Askaig. These will then be linked individually by cable to a substation on Islay.

The ten turbines will be arranged in four rows. The arrangement set out in the 2010 ES, of 2 then 2 then 3 then 3, from north to south, remains the proposed layout (see Figure 2.1).

2.2. Overview of the Design Changes

As discussed in Section 1.1 the proposed changes to the design of the Development are as follows:

- Slight changes to the device dimensions (detailed in Table 2.1);
- Altered locations for each device by between 41m and 117m from their currently consented locations (Figure 2.1);
- Inclusion of further installation vessel options to allow flexibility during construction;
- Increased operational life of the project from 14 years to 25 years; and
- Revised onshore substation, transition pit and underground cable location, with associated infrastructure
- Change in landfall and export cable route due to the associated revised onshore substation location. The export cable route has been consented separately.

2.3. Details of the Design Changes

2.3.1. Tidal Turbine Changes

The ANDRITZ HYDRO Hammerfest HS1000, a megawatt-scale demonstration tidal stream turbine, remains the preferred technology for deployment at the Sound of Islay development site. A single unit of this device was deployed at the EMEC tidal test facility on Orkney in December 2011 and went through a 13-month test programme, prior to being removed for routine maintenance in January 2013. Further testing has been carried out in 2013 and into early 2014.

After further assessing the tidal flow data from the Sound of Islay and marrying this with the results of testing at EMEC, it has become necessary to change the parameters of the tidal turbine, from the consented design, in order to maximise resource capture. The physical nature of the turbine has been altered in two specific ways – these are an increase of the hub height up to 26m to incorporate a yaw mechanism and an increase in the rotor diameter to 26m. These parameters now give a maximum tip height of 39m and resultant distance to water surface of at least 13.6m (bcd). These proposed changes to the devices have been assessed further in an update to the original Navigational Safety Risk Assessment (NSRA), which supported the 2010 ES (SPR, 2010). The updated assessment of the navigational risks and the NSRA addendum can be seen in Chapter 10 and Appendix 10.1.

The revised device will also have a yaw mechanism to allow the nacelle to turn around 180 degrees. This will allow the turbine to orientate itself to face the prevailing flow in order to maximise its capture of the available resource and minimise any turbulence created by the flow passing along the supporting substructure.

The proposed changes to the device parameters have resulted in an alteration to the revolutions per minute (RPM) at which the device operates, with this reduced to 8.5rpm. However, the tip speed remains at 12m/s due to the increased rotor diameter.

A comparison of the previous and the current proposed tidal turbine can be seen in Table 2.1.

Table 2.1: Summary of device changes

	Original ES	Revised Design
Substructure	Gravity	Gravity
Hub Height	22m	26m
Rotor diameter	23m	26m
Tip height	33.5m	39m
Deployment depth	50m	52.6m (min)
Under keel clearance	16.5m	13.6m (min)
Yaw mechanism	None	180°
Rotational Speed	10.2rpm	8.5rpm
Tip Speed	12ms^{-1}	12ms^{-1}

2.3.2. Proposed alternative deployment locations

Flow modelling work has continued since the original consent, allowing the spacing and locations for the turbines to be further refined and developed. The ten turbines will remain arranged so that they are spread out in four rows with the split being in a 2/2/3/3 formation from north to south of the Sound; thereby remaining unchanged from the 2010 ES (SPR, 2010).

The optimisation of the location of the turbines has benefited from additional assessment of the resource data within the Sound and the incorporating of production data from the tests at EMEC. The revised turbine locations provide an improved capacity factor for all 10 devices and, therefore, an improved energy production capability. The revised locations differ from the consented locations by between 41m and 117m (see Figure 2.1) but critically all of the new locations fall within the original red line ES boundary (as described in the 2010 ES) and the lease area agreed with the Crown Estate. Table 2.2 provides the National Grid positions for the revised device locations.

Table 2.2: Device positions

Easting	Northing
681515.2	6192785.2
681565.0	6192789.5
681634.1	6192365.4
681705.4	6192408.2
681717.6	6191766.5
681767.4	6191770.6
681817.2	6191774.8
681784.2	6191434.2
681834.1	6191436.7
681889.6	6191439.5

Consultation with Marine Scotland has confirmed that, in the context of the Sound of Islay, the range which can be considered within micro-siting provision is 50m.

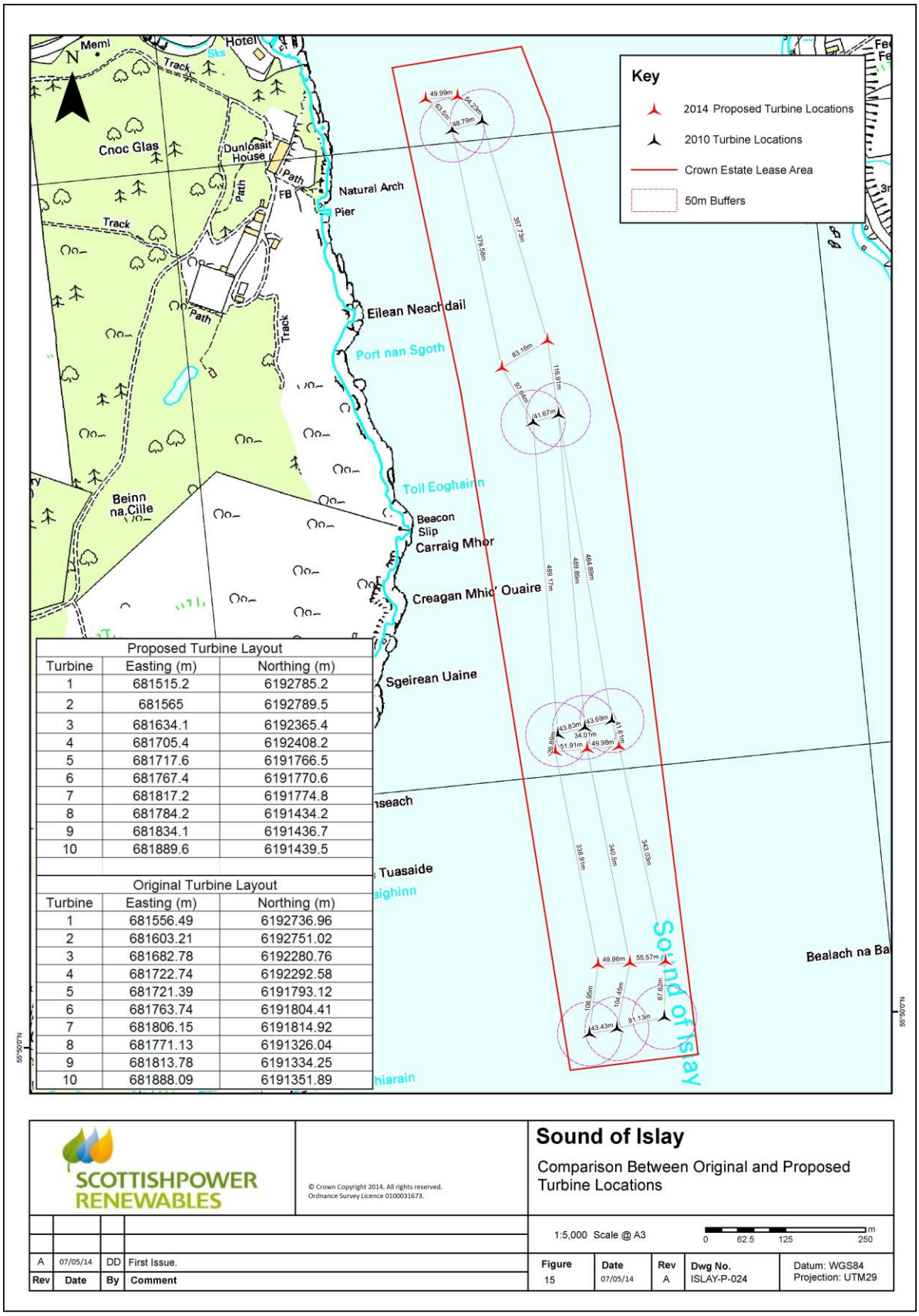


Figure 2.1 Distances between the proposed 2014 turbine locations and those locations originally proposed in the 2010 ES (SPR, 2010).

2.3.3. Proposed alternative installation methodology

The installation of the HS1000 device at EMEC has led to a review of the installation methodologies that might be appropriate for the Sound of Islay Demonstration Tidal Array. This has expanded beyond the originally proposed use of a large dynamic positioning (DP) vessel to include the possible use of a partially moored barge and tug system.

Use of a moored barge, positioned on site with a traditional spread mooring system, was initially discarded due to, amongst other things, navigational safety issues involved with the mooring and the associated buoyage, as well as difficulties involved in moving the barge and mooring between device deployments, resulting in the barge being on site for lengthy periods of time. The safety issues identified resulted in the risk for a moored barge option being assessed as "Tolerable with Additional Controls".
As the additional controls proposed required the closure of the channel for the duration of the barge's time on task it was deemed appropriate, at that time, that a DP vessel should be used in order to reduce risk. However, more recent experience at EMEC has now demonstrated that utilising a simplified mooring arrangement and tugs can offer the same advantage as that provided by a DP vessel.

While wishing to maintain use of a DP vessel as an option, the current principal installation methodology being considered by SPR for placement of the support structures and fitting of the nacelles, is a system involving an unpowered barge, stationed using a simple two point mooring, a tug and a workboat.

The mooring system proposed is different from a standard spread mooring and, combined with the methodologies proposed, aims to achieve the same short time on task as a DP vessel, with the same or similar navigational risks and considerations. The mooring arrangement differs from a spread mooring in that, instead of four or more moorings, two chain clump weights with an individual weight of 30-50t will be positioned 200-250m south of each device (the rows of which will be spaced approximately 500m apart), with each pair of clumps approximately 20-40m apart (10m-20m east or west of the structure). This equates to 3 to 9 degrees from the vessel centre-line, significantly different from a standard spread mooring. These parameters have been used to estimate the approximate anchor positions shown in Table 2.3. The two clumps are effectively acting as one, with the redundancy of two. Chain clumps as opposed to anchors have been selected because they offer an increased seabed coefficient of friction compared with a concrete clump and clumps offer a more reliable solution to anchors in predominantly rocky and gravel seabed conditions.

Table 2.3: Estimated approximate anchor positions

Anchors	Easting	Northing
for turbine 1	681558	6192564
for turbine 1	681586	6192572
for turbine 2	681654	6192581
for turbine 2	681625	6192573

Table 2.3: Estimated approximate anchor positions		
Anchors	Easting	Northing
for turbine 3	681646	6192140
for turbine 3	681675	6192150
for turbine 4	681741	6192186
for turbine 4	681774	6192197
for turbine 5	681728	6191538
for turbine 5	681756	6191541
for turbine 6	681820	6191551
for turbine 6	681790	6191549
for turbine 7	681850	6191554
for turbine 7	681879	6191558
for turbine 8	681789	6191208
for turbine 8	681817	6191210
for turbine 9	681851	6191212
for turbine 9	681879	6191218
for turbine 10	681934	6191219
for turbine 10	681906	6191215

2.3.4. Extension of operational period

The operational period for the Sound of Islay Demonstration Tidal Array was originally set at 14 years, SPR is now seeking an extension to 25 years – an additional 11 years of operation which is in line with the period of the seabed lease agreed with the Crown Estate. This extension will relate solely to the operation of the array and will not affect the proposed installation or decommissioning processes.

2.3.5. Export cable

Information on the export cable route was provided in detail in the application document for the export cable (SPR, 2013) which received consent in February 2014. Figure 1.1 shows the revised cable route.

2.3.6. Proposed alternative substation location

As discussed in Section 1.2.2 the consented substation location on Jura, to the east of the Sound of Islay (see SPR, 2010) is no longer available due to landowner changes. The revised substation location is on Islay, to the south west of the tidal array site (see Figures 1.1 and 2.1). The existing 33kV transmission line passes through the proposed substation area, allowing ease of onward transmission of power generated by The Development. Figure 2.1 provides an overview of the onshore project requirements alone.

The substation compound will include a control building, step-down transformers, auxiliary transformers, export (step-up) transformers, near shore cable transition pit and reactive compensation equipment.

The control building will house frequency convertors and associated electrical infrastructure, as well as offices and welfare facilities.

From the transition pit, power will be brought to the substation via underground onshore cables, laid in a trench, providing a depth of cover of 1m below ground level to cable sheath, where they will be pulled into switches via buried ducts. Given the very short run there will be no further jointing between the transition pit and substation connection. There will be up to ten cables in the trench, which will be 5.4m wide.

Onshore cables will terminate into the step-down transformers located opposite to the control building. The step-down transformers will reduce the voltage in the cables and subsequently connect to frequency convertors within the control building.

One of the cables entering the compound from the offshore devices will bypass the step-down transformers and connect directly into the frequency convertors within the control building. The frequency convertors are designed to modulate power generated by the offshore devices. Underground cables will connect the frequency convertors to the step-up export transformers, which will in turn connect to the capacitor bank. The purpose of the capacitor bank is to control voltage within specified levels between the substation and its grid connection at the nearby overhead 33kV distribution line.

The substation compound will also include 3 auxiliary transformers to provide power for auxiliary equipment necessary for the operation of the offshore devices and the substation and control building services.

The onshore substation will be accessed from an existing track and public road which will be upgraded where necessary. A new section of track, with a maximum running width of 5m, will be constructed to join up the existing track and the substation site, avoiding an area which is close to a golden eagle eyrie as well as an area which is too steep for the access required.

All of the onshore works described in this Section are included within the Section 36 boundary shown in Figure 1.1.

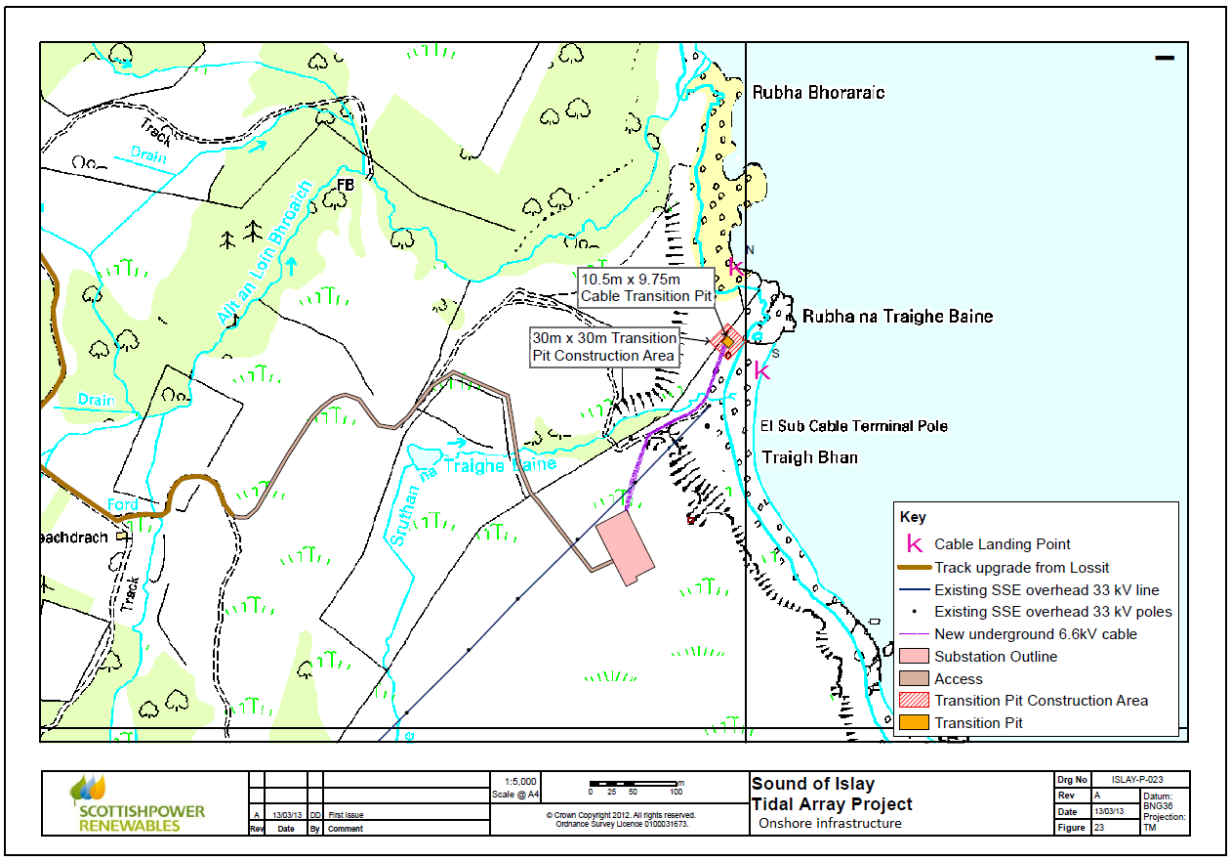


Figure 2.2 Onshore study area

2.4. Project Timescales

Indicative timescales for the Development are outlined in the bullets below:

- May 2014 – Consent and licence application;
- May 2014 to June 2014 – Statutory and public consultation;
- June 2014 – Argyll and Bute Council Planning Committee meeting;
- August 2014 – Section 36 Consent (with Deemed Planning Permission), and Marine License;
- September 2014 – anticipated Project Final Investment Decision;
- June 2015 to February 2016 – Onshore construction; and
- October 2015 to April 2017 – Offshore installation.

2.5. References

SPR (2013). Cable Route Information; Sound of Islay Demonstration Tidal Array. Available at http://www.scottishpowerrenewables.com/pages/sound_of_islay.asp

3. Screening

A detailed scoping exercise was undertaken as part of the original consent application and is detailed in the 2010 ES. Following a review of the 2010 ES (SPR, 2010) there were certain key aspects that were identified as requiring additional assessment based on the proposed changes to the development (see *Chapter 2, Changes to Project Description*) and also the proposed elongation of the operational period from 14 to 25 years.

Table 3.1 provides an overview of the impacts assessed in the original ES (SPR, 2010) and screening in relation to the need for reassessment as a result of the project changes outlined in Section 2. The following are the key aspects which are reassessed in this SEI:

- Marine mammals
    - Collision risk from updated rotor parameters
- Marine benthic habitats
    - Habitat loss at altered locations within red-line boundary
    - New installation methodology proposed
- Maritime Navigation
    - Increase in turbine size/ reduced clearance
    - Installation methodology
    - Increased operation duration
- Landscape
    - Visual impacts of substation on Islay instead of Jura
- Terrestrial Ecology
    - Potential impacts on otter in relation to the new substation location
- Birds
    - Potential impacts on golden eagle in relation to the new substation location.

SEPA has advised on mitigation and additional studies that may be required as part of this application and this advice has been incorporated into *Chapter 9: Terrestrial Ecology*.

SPR is committed to undertaking water crossings in a manner which will not impact on flood plains, storage and conveyance. To achieve this SPR will consult with SEPA during the final detailed design phase of the project to address issues and concerns regarding the design.

Table 3.1 Overview of impacts assessed in the original ES (SPR, 2010)				
Receptor	Original impact assessed	Original Residual Impact level	To be reassessed?	Key changes for re-assessment
Physical processes	Changes to hydrodynamic regime Increase in suspended sediments	Negligible	No	N/A Only minor changes to turbine parameters - will not affect the original impact assessment
Benthic ecology	Habitat loss Increased suspended sediments	Negligible	Yes	Revised benthic footprint assessment to allow for revised turbine locations and inclusion of anchor barges.
Marine mammals	Noise and vibrations during construction and operation; collision risks, barrier effects.	Minor adverse to moderate adverse	Yes	Assessment of collision risk to be reviewed. Additional data - Year 2 & tagging Increase rotor diameter - collision risk Possible use of DP for cable installation - cable route being considered in a separate application
Marine fish / Anadromous fish	Loss of spawning/ nursery grounds Noise Collision	Negligible to non-significant	No	N/A Only minor changes to turbine

Table 3.1 Overview of impacts assessed in the original ES (SPR, 2010)				
Receptor	Original impact assessed	Original Residual Impact level	To be reassessed?	Key changes for re-assessment
	EMF			parameters and increased operational life will not affect the magnitude identified in the original impact assessment,
Elasmobranchs	Smothering of spawning habitat Changes to prey Noise EMF	Negligible to minor	No	Only minor changes to turbine parameters and increased operational life will not affect the magnitude identified in the original impact assessment. Numbers of basking shark based on 2 years of survey data is lower than in the original ES due to lower sightings in year 2.
Ornithology	Disturbance	Negligible	Yes	The new substation location is in proximity to a breeding nest site for an Annex 1 species and so the potential disturbance effects are considered further. A 2nd year of vantage point survey of marine birds has been

Table 3.1 Overview of impacts assessed in the original ES (SPR, 2010)				
Receptor	Original impact assessed	Original Residual Impact level	To be reassessed?	Key changes for re-assessment
				completed since SPR (2010) and a review of this is provided.
Commercial fisheries	Loss of fishing area, navigational issues - entanglement, loss of equipment	Minor adverse to minor beneficial	No	N/A Only minor changes to turbine parameters and increased operational life will not affect the magnitude identified in the original impact assessment,
Terrestrial ecology	Impact to designated sites Terrestrial habitat loss Disturbance to otters Disturbance to reptiles, amphibians & invertebrates Spread of non-native species	Negligible to moderately adverse	Yes	Change to substation location; additional phase 1 surveys of proposed substation required to support onshore consent.
Landscape and Seascape Visual Impact Assessment (LSVIA)	Temporary impacts during construction Visual impacts of the substation during the operational phase	Moderate Negligible	Yes	Substation location on Islay is visible from the CalMac ferry, the road on Jura and the Jura NSA. An LVIA report is included within this document in Appendix 11.1.
Cultural heritage	Damage to or removal of unknown	Negligible to major all	No	N/A

Table 3.1 Overview of impacts assessed in the original ES (SPR, 2010)				
Receptor	Original impact assessed	Original Residual Impact level	To be reassessed?	Key changes for re-assessment
	onshore and onshore cultural heritage assets	impacts could be completely mitigated		A review of pastmap.org.uk identified no new constraints in terms of canmore records, sites & monuments, scheduled monuments or listed buildings. The original assessment is deemed to remain valid.
Shipping and navigation	Vessel movements in the area, DP installation methods	Tolerable with monitoring	Yes	Updated NSRA included within this document in Appendix 10.1.
Traffic and transport (onshore)	Disruption to ferry routes; road traffic disruption during construction	Minor adverse to not significant	No	N/A The installation methods for the onshore works remain consistent and mitigation measures to avoid disruption (as identified in SPR, 2010) will be used to minimise any potential impact
Tourism, recreation and socio-economics	Job creation during construction; increased spend during installation and operation/maintenance.	Minor to moderate beneficial	No	N/A Tourism and recreation is

Table 3.1 Overview of impacts assessed in the original ES (SPR, 2010)				
Receptor	Original impact assessed	Original Residual Impact level	To be reassessed?	Key changes for re-assessment
	Disturbance/displacement of tourism and recreational activity	Negligible to minor adverse		assessed on a wider scale, taking into account Islay and Jura as a whole and so the small scale changes to the Development do not alter the original assessment.
Onshore noise	Temporary vehicle noise during construction Noise from the offshore construction	Negligible to minor	No	N/A Noise impacts from the onshore substation were scoped out of the original assessment due to the small scale of these works. SPR (2010) included noise impacts on Islay in relation to onshore traffic which remain valid.
Water and sediment quality	Accidental spillages of materials during construction, operation (including maintenance) and decommissioning	Minor	No	N/A Changes to the installation method will not affect the original assessment given the limited potential for contamination in

Table 3.1 Overview of impacts assessed in the original ES (SPR, 2010)				
Receptor	Original impact assessed	Original Residual Impact level	To be reassessed?	Key changes for re-assessment
				this area, as identified in the original assessment.
Munitions and military	Minor disruption during construction to military vessels operating in adjacent PEXAs	Negligible	No	N/A The slight changes to the turbine locations and device parameters will not affect the military operations in the area beyond shipping affects which are dealt with under *Chapter 10: Navigation*, including suggested mitigation
Air quality	Construction/decommissioning of onshore works, increased road traffic and dust emissions	Negligible	No	N/A The proposed changes to the project are on the same magnitude as the original assessment (SPR, 2010) and so will not alter the impact assessment.

4. Consultation

Table 4.1 outlines the consultation undertaken regarding the provision of SEI and consent application process for the Development.

Table 4.1 SEI consultation undertaken		
Consultee	Consultation date(s)	Main issues identified / discussed
Marine Scotland (MS)	17/2/14 2/4/14 22/4/14 25/4/14	Consenting route for application; Marine Mammals; Benthic Ecology; Shipping and navigation;
Scottish Natural Heritage (SNH)	2 consultation meetings during 2013 to review onshore assessment and a following meeting (9/4/14) to discuss planning route and mitigation.	Marine Mammals; Benthic Ecology; Terrestrial Ecology; Landscape; Ornithology (onshore).
Royal Society for the Protection of Birds (RSPB)	2 consultation meetings during 2014 to review onshore assessment and establish planning route 16/4/14	Ornithology (onshore); Landscape.
Scottish Environmental Protection Agency (SEPA)	22/4/14	Terrestrial ecology and groundwater dependent ecosystems;
Argyll and Bute Council (ABC)	14/3/2012 17/2/14 2/4/14	Consenting route for application; Terrestrial Ecology; Ornithology (onshore); Landscape.
Local fishing interests	4 meetings over 2013 and into 2014 with 1st draft compensation agreement tabled	
Northern Lighthouse Board (NLB)	1 meeting in 2013	

5. Assessment Methodology

5.1. Introduction

This chapter provides an overview of the approach taken to revising the environmental impact assessment for the proposed changes detailed in *Chapter 2: Changes to Project Description*.

This ER follows the approach to EIA detailed within the original Sound of Islay ES (SPR, 2010) using quantitative and qualitative assessment methods based on expert knowledge. SEI is used to expand or update relevant assessments of key receptors.

Screening of the potential impacts associated with the offshore variation and the proposed approach to the SEI impact assessment was outlined to Marine Scotland in a letter dated 14 October 2013 (see Section 4).

5.2. General Approach

The 2010 ES (SPR, 2010) considered the likely environmental impacts of the Development, including long and short term effects. Where effects remained following the incorporation of mitigation measures, the 2010 ES (SPR, 2010) identified these remaining or 'residual' effects and classified them in accordance with a standard set of significance criteria.

Changes to the design of the Development are described in full in *Chapter 2*: *Changes to Project Description* of this report. As the design changes to the Development are limited, the majority of the assessment work undertaken previously still prevails. Where this is not felt to be the case additional work has been undertaken and additional SEI provided, as detailed in this report.

5.3. Structure of Technical Chapters

Where practicable the following standard approach has been taken to the structure of each of the technical chapters. However, certain chapters that do not lend themselves to this structure (e.g. Navigation) are treated individually.

- **Introduction**: Introduction to the chapter and how the assessment was undertaken;
- **Methodology**: Details the methodology used to identify the potential for significant impacts to occur;
- **Existing Environment**: Review of significant changes in the baseline condition since the 2010 ES submission;

- **Impact Assessment**: An assessment looking at the effects in relation to the design changes being proposed for construction, operation, decommissioning and cumulative impacts, including the residual effects following mitigation;
- **Proposed Monitoring/ Mitigation**: This section will make reference to the monitoring proposed; and
- **Statement of Significance**: This will summarise the likely overall impact significance of the proposed changes to the development.

5.4. Significance Criteria

The significance criteria used are the same as those presented in the 2010 ES (SPR, 2010). Each of the technical chapters within this SEI includes a description of the changes to the significance of effects due to the proposed changes to the development.

The impact assessment methodology will follow the matrix approach from ScottishPower Renewables (SPR, 2010) based on Tables 5.1 to 5.3. These may be revised to be receptor specific based on expert judgement.

Table 5.1: Magnitude definition	
Magnitude of Impact	Description
High	A fundamental change to the baseline condition of the receptor.
Medium	A detectible change resulting in the non-fundamental temporary or permanent condition of a receptor.
Low	A minor change to the baseline condition of the receptor (or a change that is temporary in nature).
Negligible	An imperceptible and/or no change to the baseline condition of the receptor.

Table 5.2: Sensitivity definition	
Receptor Sensitivity/Value/Importance	Description
High	Environment is subject to major change(s) due to impact. For example, sites contain features of international or national conservation or cultural designation, or permanent reduction of anthropogenic activity such as fish landings
Medium	Environment clearly responds to effect(s) in

Table 5.2: Sensitivity definition	
Receptor Sensitivity/Value/Importance	Description
	quantifiable and/or qualifiable manner. For example sites contain features of national or regional conservation or cultural designation, permanent modification of anthropogenic activity.
Low	Environment responds in minimal way to effects such that only minor change(s) are detectable. For example sites of local conservation or cultural value or temporary modification of anthropogenic activity.
Negligible	Environment responds in minimal way to effect such that only minor change(s) are detectable. For example sites contain features of local interest, little or no change to anthropogenic activity.

Table 5.3: Significance matrix				
Magnitude of Impact	Receptor Sensitivity/Value/Importance			
	Negligible	Low	Medium	High
High	No significant effect	Moderate	Major	Major
Medium	No significant effect	Minor	Moderate	Major
Low	No significant effect	Negligible	Minor	Moderate
Negligible	No significant effect	Negligible	Negligible	Minor

Each impact will be assessed against the device that represents the worst case scenario rather than the worst case of various parameters from each device which would provide an unrealistic worst case scenario.

5.5. Assumptions and Limitations

The principal assumption, which has been made during the preparation of this SEI, is that:

- The information provided by third parties, including publicly available information and databases, is correct at the time of publication.

6. Benthic Ecology

6.1. Introduction

This chapter reviews the potential impacts to seabed (benthic) communities in relation to the proposed changes to the Sound of Islay Development since the original ES submission in 2010 (SPR, 2010). The principal changes to be assessed in relation to benthic ecology are the altered turbine locations and inclusion of anchored barges in the options for the installation method. Any of the turbines expected to be required to move greater than 50m from their originally assessed position (50m being the micro-siting distance provided to SPR by Marine Scotland) will be assessed. The proposed increase in project duration is not thought to have materially altered the assessment made in the original ES (SPR, 2010).

The export cable route is not part of this application as a Marine Licence for this was granted in February 2014 however, a brief assessment of potential benthic ecology impacts for the cable route is included here, allowing The Development to be considered, in full.

If required, potential mitigation measures to reduce impacts are also discussed, along with any residual impact that remains post-mitigation. All other potential effects of the development were covered by the original 2010 ES.

6.2. Methodology

6.2.1. Site characterisation

The lease boundary of the Sound of Islay Demonstration Tidal Array has not altered since the original application was submitted in 2011. Therefore, the supporting surveys detailed in the original 2010 ES (SeaStar Survey Ltd, 2009; SPR, 2010) remain valid and no further surveys have been undertaken of the consented Development area. Any effects associated with the proposed changes to the Development are assessed with reference to the original site characterisation surveys.

The methodology for the original SeaStar Survey Ltd. (2009) drop-down video campaign can be found in *Chapter 8: Benthic Ecology* and Appendix 8.1 of the original ES (SPR, 2010).

Appendix 6.1 provides the methodology for the site characterisation survey of the export cable route which was consented in February 2014.

6.2.2. Assessment of significance

The significance of the impact is based on the intensity or degree of disturbance to baseline conditions and is categorised into four levels of magnitude; high, medium, low or negligible. The definitions of each of these are given in Table 6.1.

Table 6.1: Description of magnitude.	
Magnitude of Impact	Definition
High	Fundamental change to the baseline condition of the receptor. Resulting in major alteration of the habitats, species or biodiversity.
Medium	Detectable change resulting in non-fundamental temporary or permanent consequential changes. Some deterioration observed in the quality of the most sensitive receptor leading to a partial alteration of habitats, species or biodiversity.
Low	Minor change with only slight detectable changes, which do not (or only temporarily) alter the baseline condition of the receptor.
Negligible	An imperceptible change to the baseline condition of the benthic community

To consider the sensitivity of the species and biotopes present in the development area and immediate surrounding area, the protocols and advice available from the Marine Life Information Network (MarLIN, accessed March 2013) have been used. The MarLIN sensitivity assessment allows a comparative assessment to be made of the sensitivity and recoverability of marine habitats and species.

The sensitivity/value/importance of the receptor for each effect is characterised as one of four levels, high, medium, low or negligible. The definition of each level is given below in Table 6.2.

Table 6.2: Sensitivity/Value/importance of marine flora and fauna environment.		
Receptor Sensitivity/Value	Marine flora and fauna Importance	Site designations
High	International/National	Sites or species that have been designated for their internationally or nationally important biodiversity or habitat (SACs, SPAs, Ramsar, SSSIs, NNR, UK BAP Priority Habitat).
Medium	Regional	Sites or species that have been designated for their regionally important biodiversity or habitat (LBAP species).
Low	Local	Sites or species that have been designated locally for their flora or fauna (LNR) or undesignated sites of some locally important biodiversity or habitat.
Negligible	-	Other sites or species with little or no locally important biodiversity

Table 6.3 combines the definitions of magnitude with the level of sensitivity/value/importance of receptor to provide a prediction of overall significance of the effect.

Table 6.3: Significance Prediction Matrix				
Magnitude of Impact	Receptor Sensitivity/Value/Importance			
	Negligible	Low	Medium	High
High	No significant effect	Moderate	Major	Major
Medium	No significant effect	Minor	Moderate	Major
Low	No significant effect	Negligible	Minor	Moderate
Negligible	No significant effect	Negligible	Negligible	Minor

It should be noted that any residual effect (the effect after the implementation of mitigation) which remains at the level of '**Moderate**' or '**Major**' is regarded by the EIA Regulations as being significant.

6.3. Existing Environment

Surveys undertaken covering the Development area (less the cable route) showed that the site was typical of the region and characterised by patches of coarse gravel and rocky substrate with typical species and plants found within the site. No species of conservation significance were present, and those species present are considered to be well adapted to living in a dynamic, high energy environment.

Table 6.4 shows the habitat that each turbine was originally proposed to be sited within[1] from the 2010 ES (Turbines 1-10 in Table 6.4) as well as the habitat that any proposed changes outlined in this SEI will then site the turbines within (Turbines 1a-10a in Table 6.4). The table also provides the distance that each turbine is proposed to be moved (also see Figures 6.1 to 6.4).

Figures 6.5 to 6.8 show the biotope types in the vicinity of the approximate anchor locations. The closest biotopes are SS.SMX.CMx(CTub.Adig) and CR.HCR.FaT,Ctub.Adig

It should be noted that the biotopes provided in Table 6.4 relate to those described by SeaStar Survey Ltd. (2009). However, as described in the 2010 ES (SPR, 2010) and Section 6.4 of this SEI, the biotope **SS.SMx.CMx.CTub.Adig** is a combined biotope and the closest in the Connor *et al.* (2004) classification system is the biotope **CR.HCR.FaT.CTub.Adig**. Therefore, it can be assumed that the biotopes assessed in relation to benthic impacts during the original EIA process and reported in the 2010 ES (SPR, 2010) were the combined biotope **SS.SMx.CMx.CTub.Adig** and the Connor *et al.* (2004) biotopes **CR.HCR.FaT.CTub.Adig** and **SS.SCS.CCS.PomB**. Thus, all of the biotopes stated in the table have already been assessed. Definitions of the biotope codes are:

[1] Based on the nearest biotope assessment point - see Figures 6.1a-d.

- CR.HCR.FaT.CTub.Adig - *Alcyonium digitatum* with dense *Tubularia indivisa* and anemones on strongly tide-swept circalittoral rock
- SS.SCS.CCS.PomB - *Pomatoceros triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles

Although the original SeaStar survey (SeaStar Survey Ltd., 2009) did record PMF's they were not within the Development area and will not be dealt with in this chapter of this ER. Maerl was recorded approximately 264m from the nearest updated turbine location and 226m from the nearest approximate anchor location (Figure 6.9). This is not a significant change to the degree of proximity assessed in the original ES, where the nearest turbine location was 278m, as a result this is not considered further in the assessment.

Table 6.4: Biotopes closest to proposed turbine locations within the Development boundary.

Turbine	Distance Between Turbines (m)[2]	Outside 50m Micrositing Buffer? (Y/N)	Biotope Present	Additional Assessment Required? (Y/N)	Reasoning
1	63.50	Y	SS.SMx.CMx.CTub.Adig	N	Outwith buffer, however, the biotope has been previously assessed.
1a			SS.SMx.CMx.CTub.Adig		
2	54.23	Y	SS.SMx.CMx.CTub.Adig	N	Outwith buffer, however, the biotope has been previously assessed.
2a			SS.SMx.CMx.CTub.Adig		
3	97.64	Y	SS.SMx.CMx.CTub.Adig & SS.SCS.CCS.PomB	N	Outwith buffer, however, the biotope has been previously assessed.
3a			SS.SMx.CMx.CTub.Adig		
4	116.91	Y	SS.SCS.CCS.PomB	N	Outwith buffer, however, the biotope has been previously assessed.
4a			SS.SMx.CMx.CTub.Adig		

[2] See Figure 6.2.

Table 6.4: Biotopes closest to proposed turbine locations within the Development boundary.					
Turbine	Distance Between Turbines (m)[2]	Outside 50m Micrositing Buffer? (Y/N)	Biotope Present	Additional Assessment Required? (Y/N)	Reasoning
5	26.89	N	SS.SMx.CMx.CTub.Adig	N	Within buffer & biotope previously assessed.
5a			SS.SMx.CMx.CTub.Adig		
6	34.01	N	SS.SCS.CCS.PomB	N	Within buffer & biotope previously assessed.
6a			SS.SCS.CCS.PomB		
7	41.61	N	SS.SCS.CCS.PomB	N	Within buffer & biotope previously assessed.
7a			CR.HCR.FaT.CTub.Adig		
8	108.95	Y	SS.SMx.CMx.CTub.Adig	N	Outwith buffer, however, the biotope has been previously assessed.
8a			SS.SCS.CCS.PomB		
9	104.45	Y	SS.SMx.CMx.CTub.Adig	N	Outwith buffer, however, the biotope has been previously assessed.
9a			SS.SCS.CCS.PomB		
10	87.62	Y	SS.SMx.CMx.CTub.Adig	N	Outwith buffer, however, the biotope has been previously assessed.
10a			SS.SCS.CCS.PomB		

Figure 6.10 shows the seabed habitat map along the export cable route, based on the video survey completed in 2012 (Appendix 6.1). The map shows that the cable route and buffer passes through the following habitats, which are discussed in more detail in both Appendix 6.1 and as part of the recent licence application for the cable route (SPR, 2013),consented in 2014:

- *Phymatolithon calcareum* maerl beds in infralittoral clean gravel or coarse sand SS.SMp.Mrl.Pcal
- *Alcyonium digitatum* with dense *Tubularia indivisa* and anemones on strongly tide-swept circalittoral rock CR.HCR.FaT.CTub.Adig

- *Flustra foliacea* on slightly scoured circalittoral rock CR.MCR.EcCr.FaAlCrFlu
- Kelp biotopes:
    - *Laminaria hyperborea* forest and foliose red seaweeds on moderately exposed upper infralittoral rock IR.MIR.KR.Lhyp.Ft
    - Scattered foliose algae and lug worms *Arenicola marina* SS.SMp.KSwSS.LsacR.Sa
    - *Laminaria hyperborea* park and foliose red seaweeds on tide-swept lower infralittoral mixed substrata IR.MIR.KR.LhypTX.Pk
    - *Laminaria hyperborea* park with hydroids, bryozoans and sponges on tide-swept lower infralittoral rock IR.MIR.KR.LhypT.Pk

The intertidal survey completed in 2009 for the original EIA (SPR, 2010) included the current landfall options, with one to the north and one to the south of the rocky outcrop known as Rubha na Traighe Baine. Details of the intertidal survey findings are provided in Appendix 6.2 of this ER, however, in summary, biotopes on the outcrop of Rubha na Traighe Baine consisted of a wide lichen zone on the upper shore (biotopes LR.FLR.Lic.YG and LR.FLR.Lic.Ver.Ver). The mid shore biotopes consisted of *Pelvetia canaliculata* and barnacles on moderately exposed littoral fringe rock (LR.MLR.BF.PelB) and a narrow band of *Fucus spiralis* (LR.LLR.F.Fspi.FS). The lower shore into the subtidal zone was dominated by *Ascophyllum nodosum*, sponges and ascidians on tide-swept mid eulittoral rock (LR.HLR.FT.AscT) as well as *Laminaria digitata* on moderately exposed sublittoral fringe bedrock (IR.MIR.KR.Ldig.Ldig).

During the 2009 survey, the current SSE cable was noted to provide an artificial reef habitat currently well colonised by seaweeds, generally dominated by *Fucus serratus* biotopes (LR.LLR.F.Fserr.FS) on the artificial reef (cable) substrata and polychaetes in littoral fine sand (LS.LSa.FiSa.Po) away from the cable structure itself. At the very lowest section of the shore the dominant biotope was IR.MIR.KR.Ldig.Bo with *F. serratus* still being the predominant algae on the cable itself.

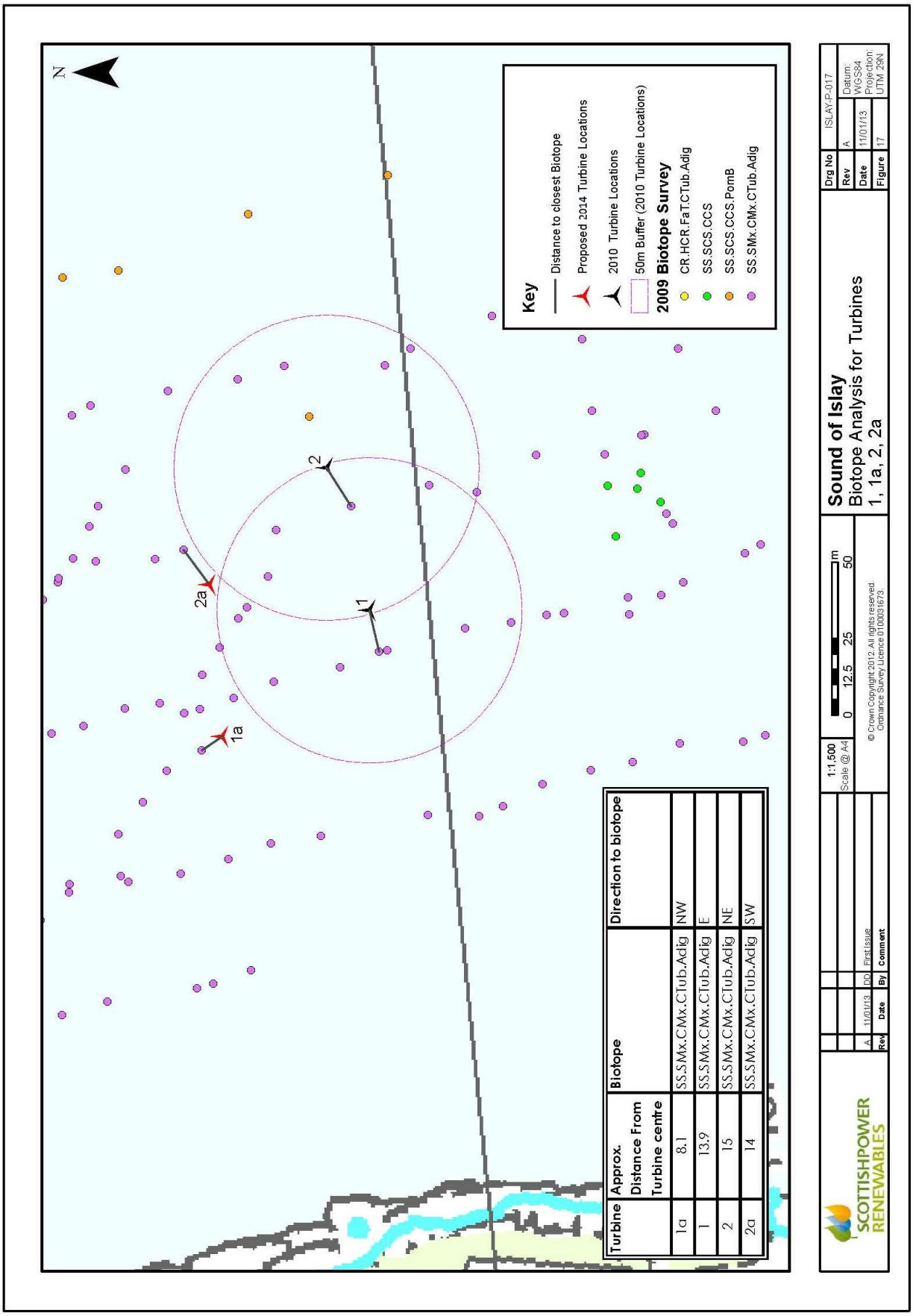


Figure 6.1: Closest biotopes in relation to the revised (2014) turbine locations and the consented locations originally proposed in the 2010 ES (SPR, 2010).

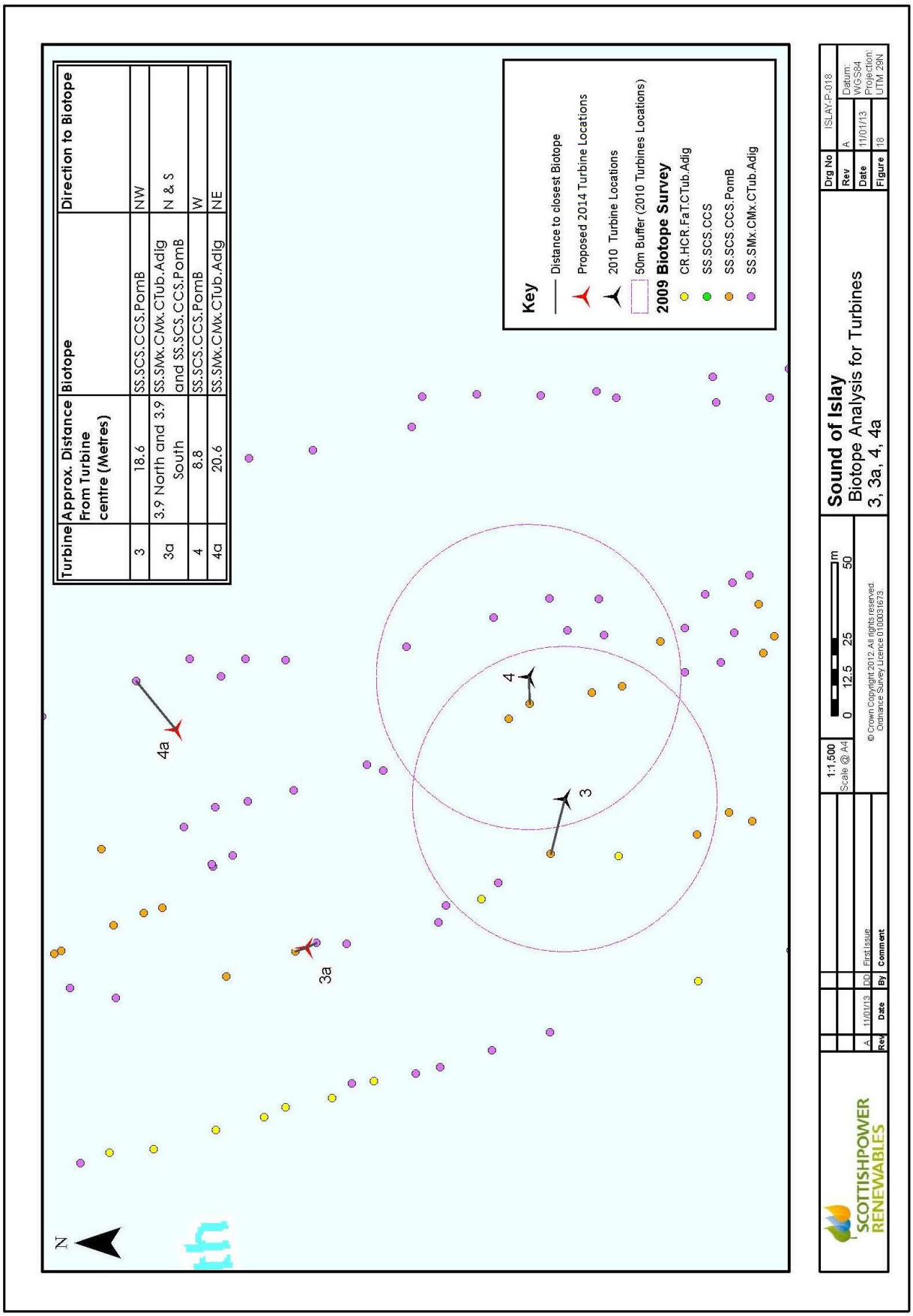
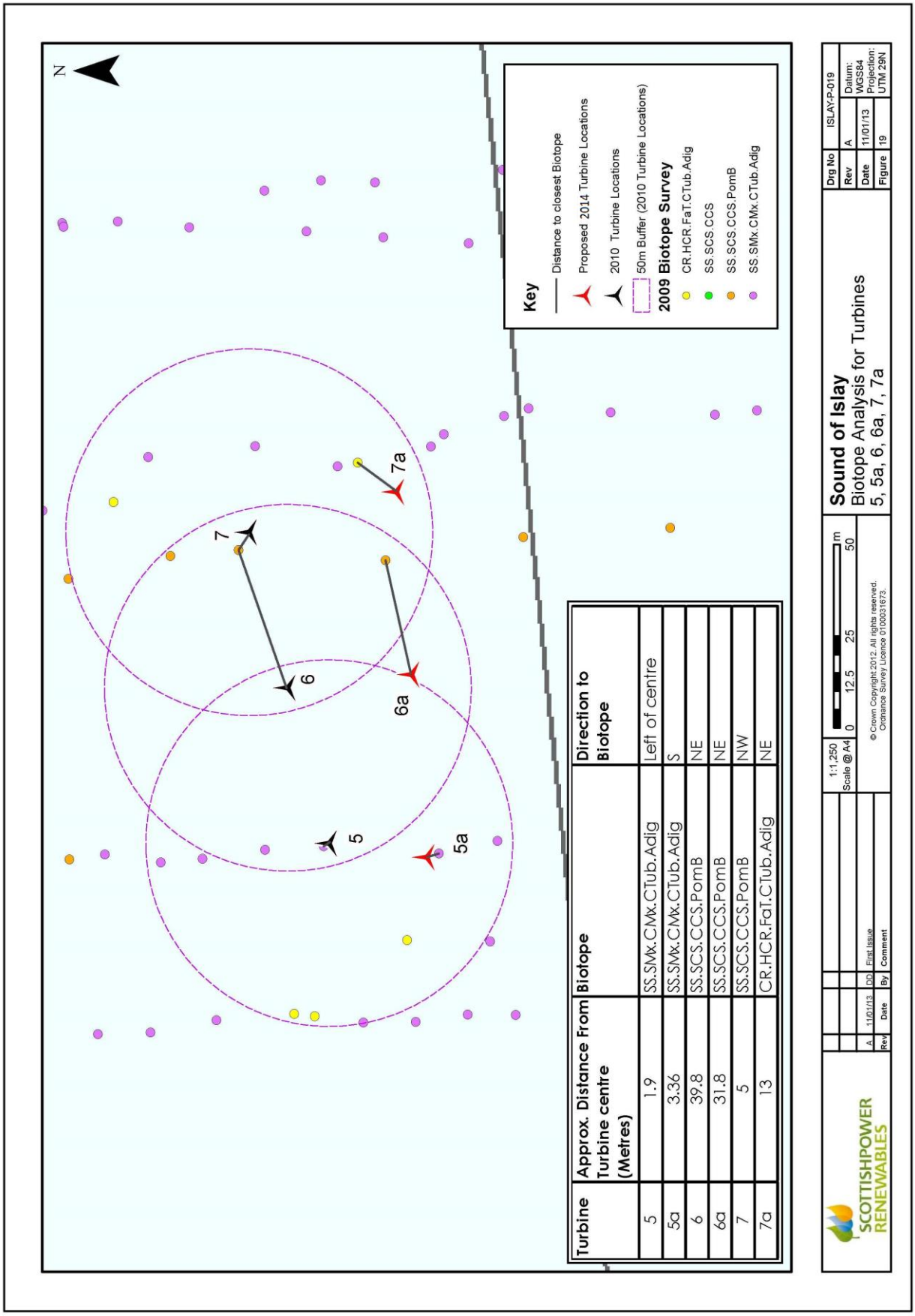


Figure 6.2: Closest biotopes in relation to the proposed 2014 turbine locations and those locations originally proposed in the 2010 ES (SPR, 2010).



Turbine	Approx. Distance From Turbine centre (Metres)	Biotope	Direction to Biotope
5	1.9	SS.SMx.CMx.CTub.Adig	Left of centre
5a	3.36	SS.SMx.CMx.CTub.Adig	S
6	39.8	SS.SCS.CCS.PomB	NE
6a	31.8	SS.SCS.CCS.PomB	NE
7	5	SS.SCS.CCS.PomB	NW
7a	13	CR.HCR.FaT.CTub.Adig	NE

Figure 6.3: Closest biotopes in relation to the proposed 2014 turbine locations and those locations originally proposed in the 2010 ES (SPR, 2010).

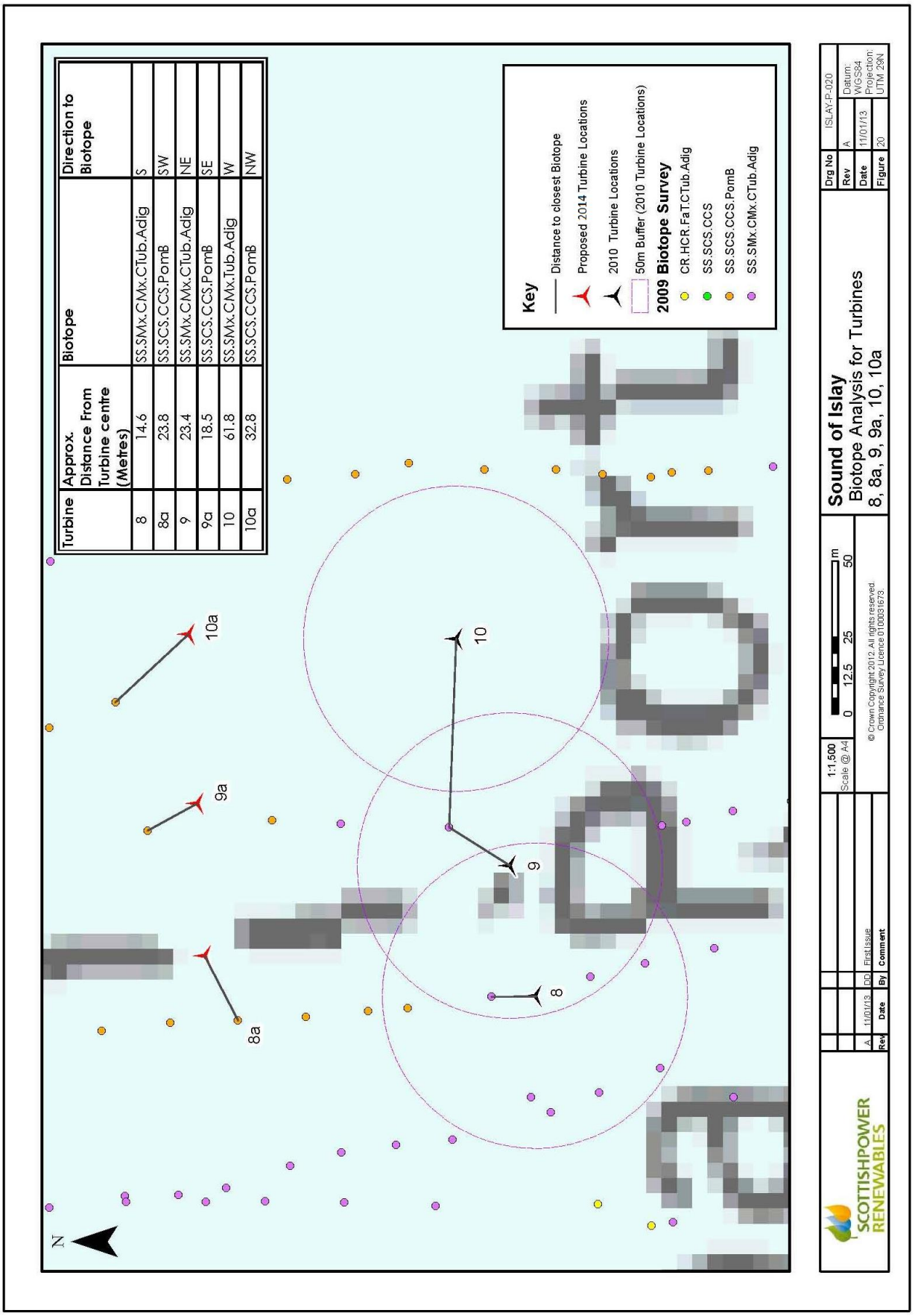


Figure 6.4: Closest biotopes in relation to the proposed 2014 turbine locations and those locations originally proposed in the 2010 ES (SPR, 2010).

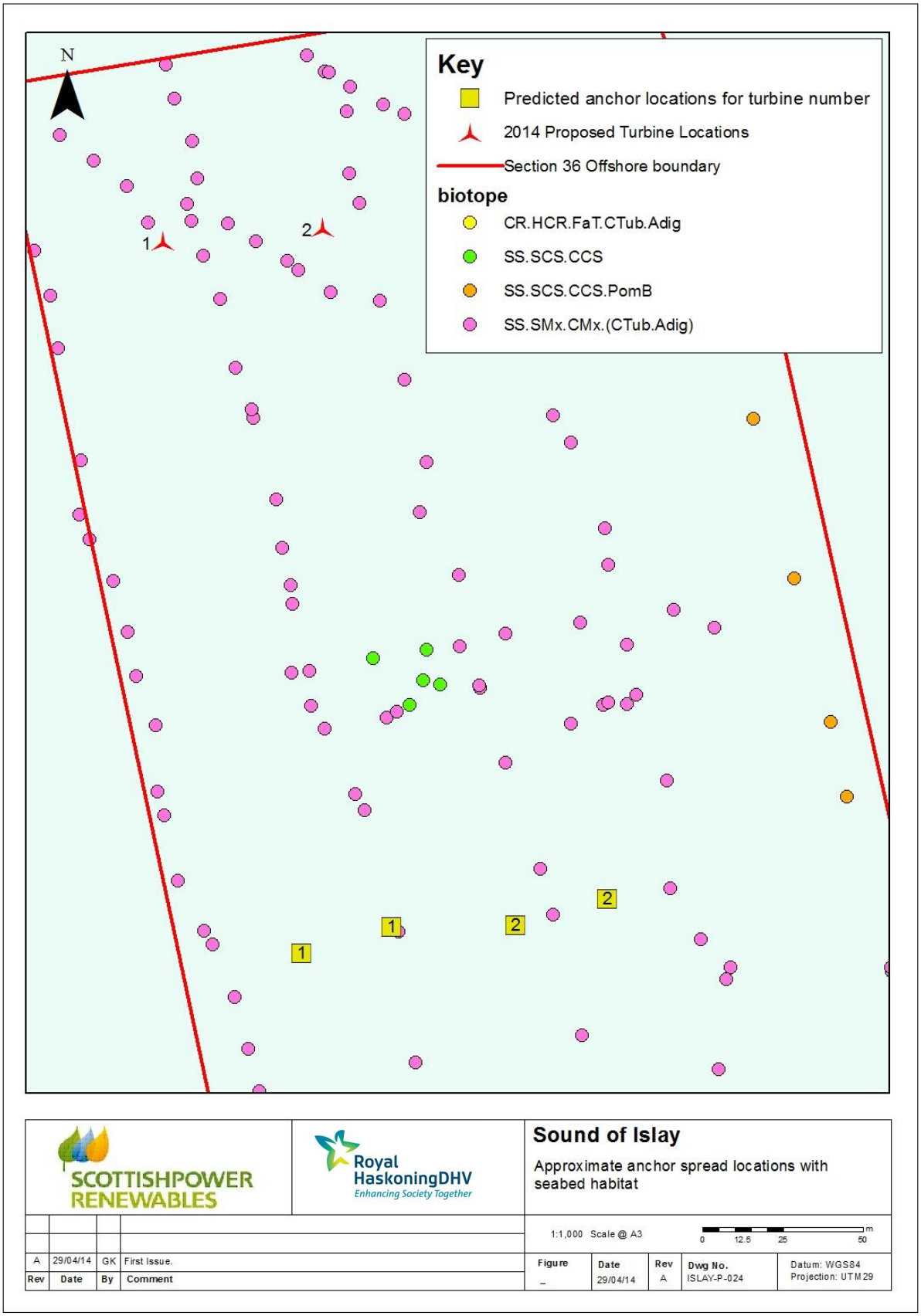


Figure 6.5: Closest biotopes in relation to the approximate anchor locations for turbines 1 and 2.

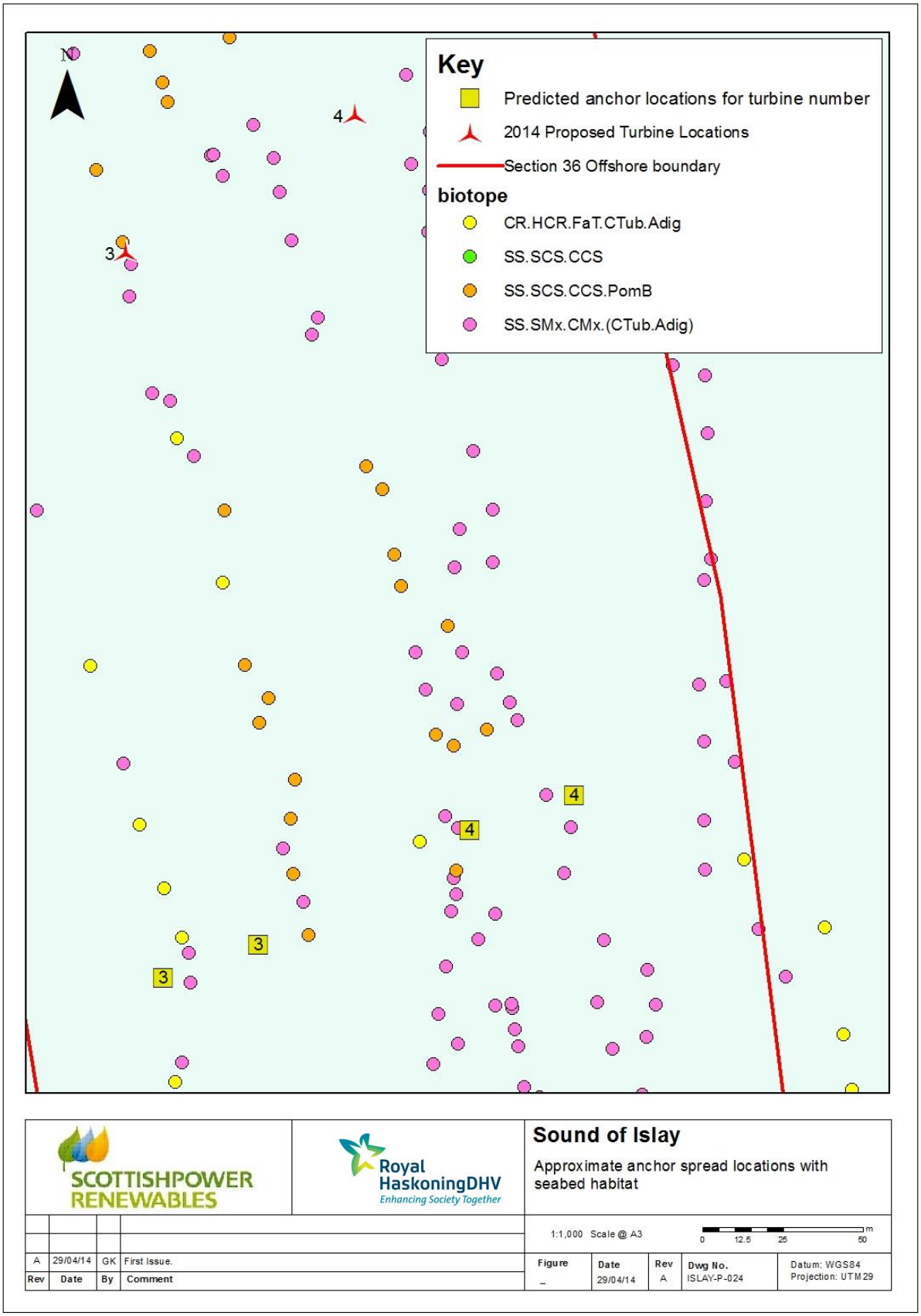


Figure 6.6: Closest biotopes in relation to the approximate anchor locations for turbines 3 and 4.

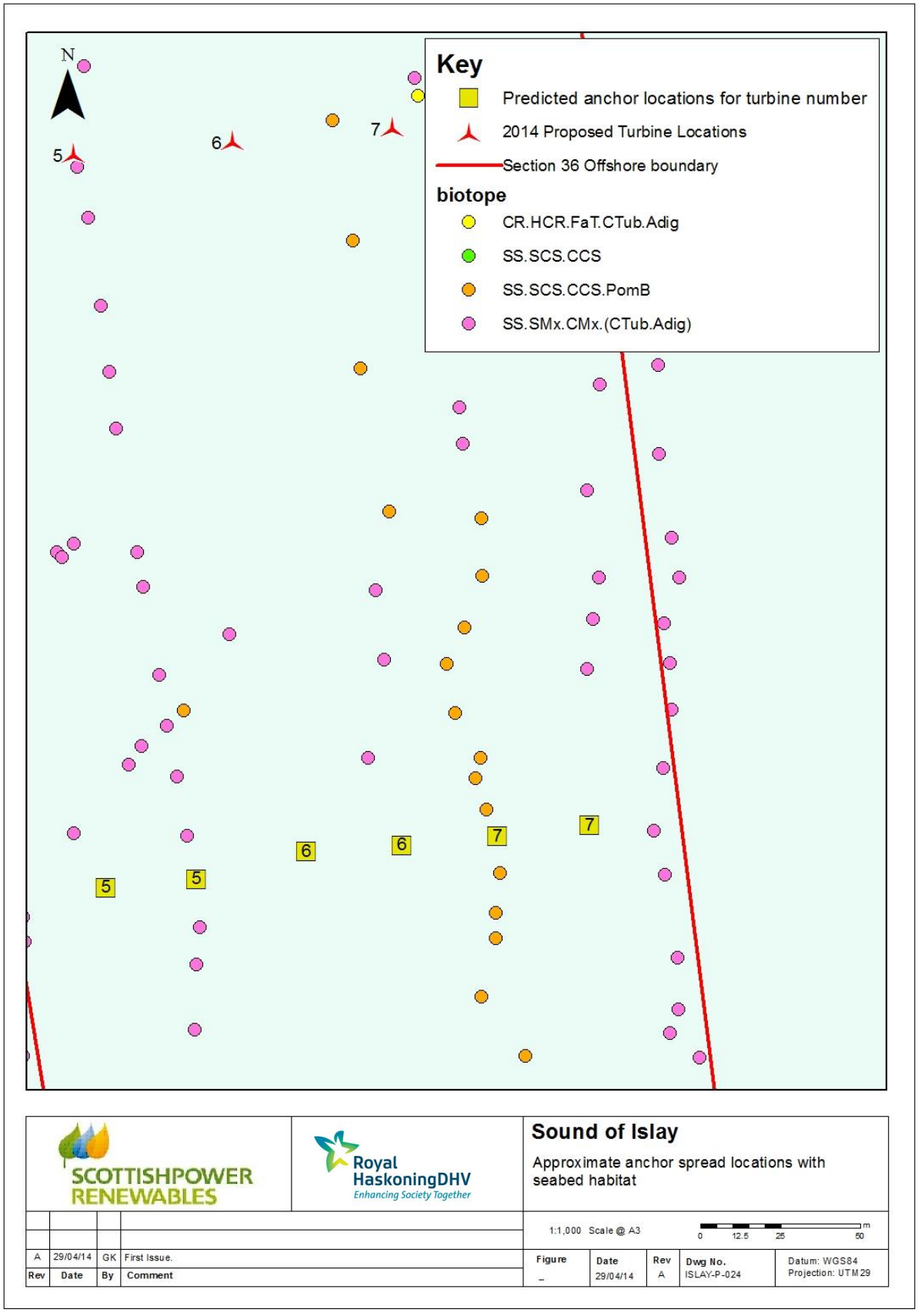


Figure 6.7: Closest biotopes in relation to the approximate anchor locations for turbines 5, 6 and 7.

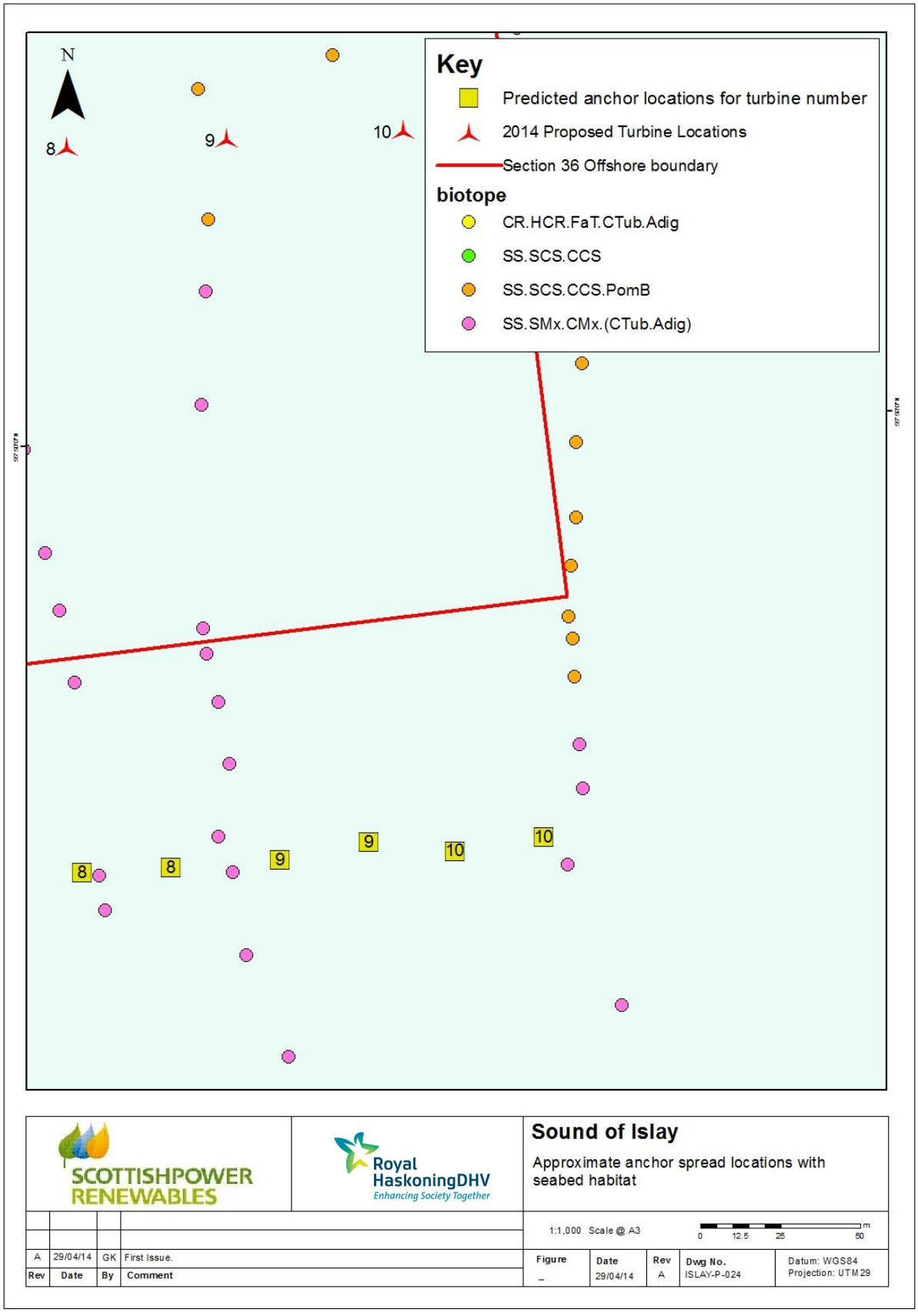


Figure 6.8: Closest biotopes in relation to the approximate anchor locations for turbines 8, 9 and 10

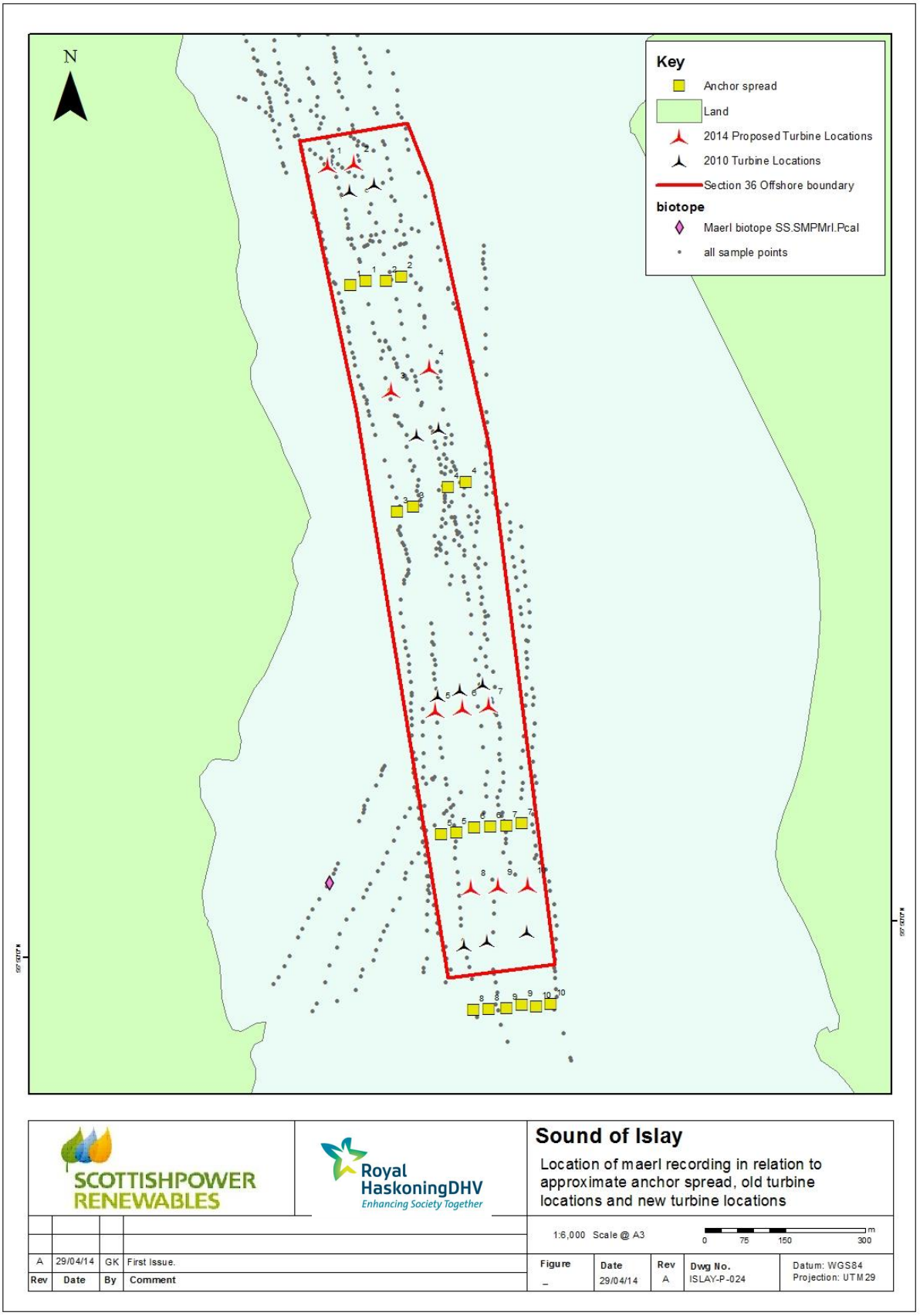


Figure 6.9: Location of maerl recorded during the 2009 survey in relation to the new and old turbine locations, and approximate anchor spreads.

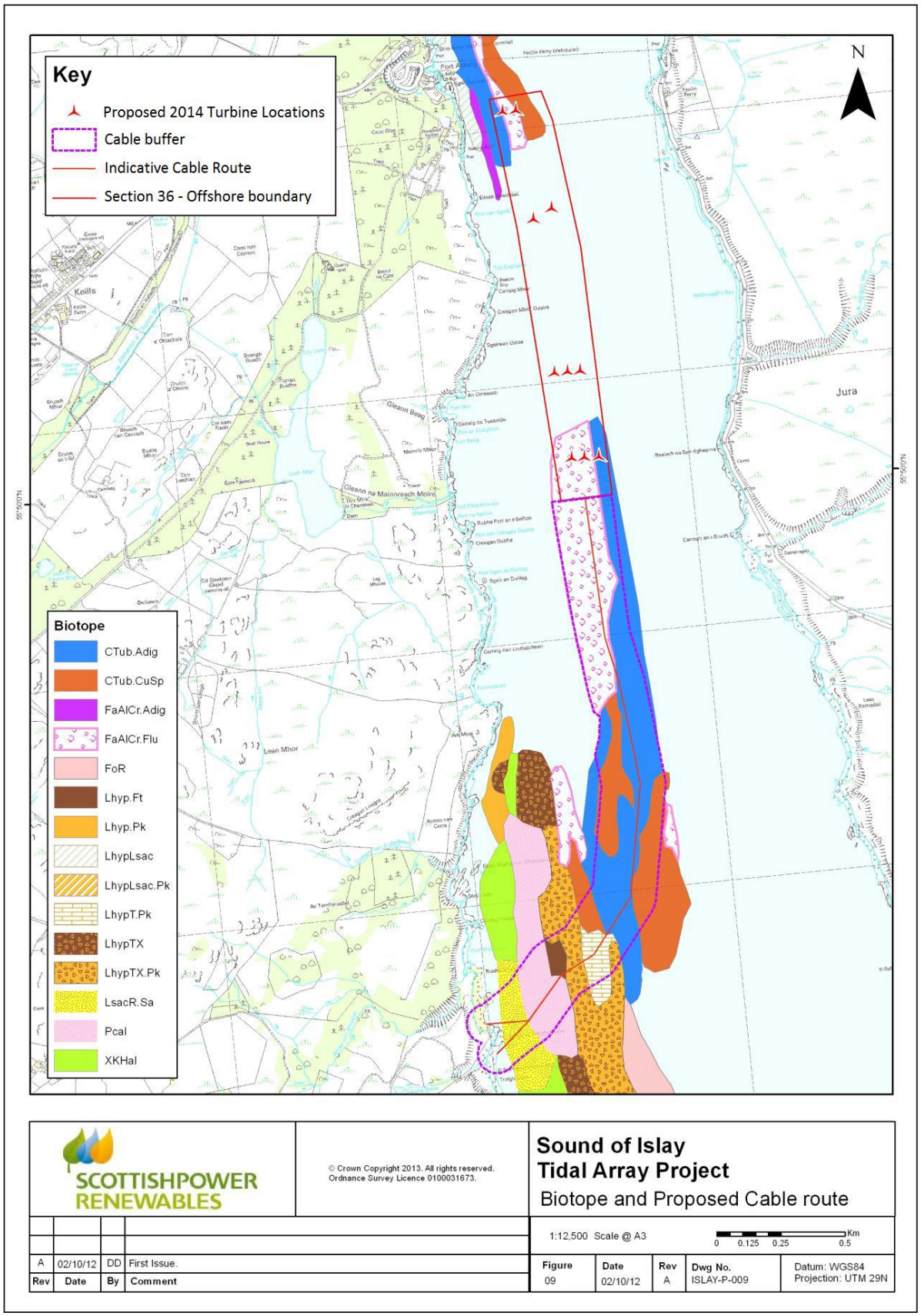


Figure 6.10: Biotopes in relation to export cable (source: SPR, 2013)

6.4. Impact Assessment

6.4.1. Potential Impacts during Installation Phase

Construction activities were considered to be of negligible significance in the original assessment; as species found within the Sound of Islay are common to this part of Scotland and tolerant of high energy environments.

As discussed in Section 6.3 there are no biotopes associated with the new turbine locations or the anchor spreads, which have not been previously assessed in the 2010 ES. The direct impact on habitats and species through the installation of foundation structures, subsea cables and associated infrastructure were considered to be of short term duration and **negligible** significance. Therefore, no further assessment is proposed in relation to the change in location of the tidal turbines and reference should be made to the 2010 ES (SPR, 2010), as the conclusions therein are not thought to have altered.

The change to the installation methodology now includes the use of an anchor barge with a 2 point anchor spread (see Section 2.3). Each anchor will have a footprint of approximately $4m^2$ and an assumption is made that they may drag by up to 2m giving an overall footprint of $8m^2$ for each anchor. The overall footprint for 2 anchors at each of the 10 turbine positions is therefore (8 x 2 x 10) $160m^2$. This is in addition to the consented footprint within the development site for the turbines ($288.6m^2$) and the inter-array cable ($3506m^2$). As stated in SPR (2010) the biotopes potentially impacted are present across the SeaStar Survey Ltd (2009) survey area which covered approximately $577,501m^2$ within the Sound of Islay. The footprint within the development site is 0.68% of the surveyed area, 0.03% of which is the estimated installation vessel footprint and 0.65% is the estimated footprint of the turbines and inter-array cabling which is already consented. The small increase in footprint as a result of the use of anchor barges does not increase the potential seabed footprint significantly (an increase of 0.03% of the surveyed area, beyond the consented footprint) in the context of the surveyed area and no change is proposed of the impact significance from **negligible** (SPR, 2010).

SPR (2013) provides the impact assessment for the export cable route, consented in February 2014. In summary, the cable route will predominantly impact the biotope CR.HCR.FaT.CTub.Adig, which is the most abundant biotope in the centre of the channel. The combined footprint of the turbine foundations, vessel anchors and export cable are of negligible magnitude within this biotope which is extensive across the site.

The route passes through two Priority Marine Features (PMFs): the first is an area of maerl (SS.SMp.Mrl.Pcal) and the second is *Laminaria saccharina* and filamentous red algae on infralittoral sand (SS.SMp.KSwSS.LsacR.Sa), both of which cannot be avoided for the required landfall either side of Rubha na Traighe Baine. The area of PMF habitat that the cables will occupy will be in the region of $7100m_2$ ($0.0071km^2$) based on ten cables and their associated horizontal spacing occupying a width of seabed in the order of 20m and the 355m wide extent of these biotopes. It should be noted that this

includes cable spacing and therefore this cable width area is very much a conservative, worst-case scenario. The sensitivity of the receptor to cable laying is high, however, the footprint of habitat loss will be relatively small compared to the total extent of these particular habitats and the available resource of similar habitats within the Sound, and in addition, the effect will be temporary giving a medium impact magnitude. The effects of habitat loss for the export cable which was consented in February 2014 are expected to be of **major** significance. Mitigation measures outlined in the Marine Licence for the export cables are included in Section 6.5.

6.4.2. Potential Impacts during O&M Phase

The original ES showed the operational phase to have a negligible impact on benthic ecology. The operational phase of the array is being proposed to be extended by 11-years to a total operational period of 25-years. However, this is not likely to have any additional effect on the benthic habitats already present. A mature biofouling community would be expected to have formed in 25-years and an additional 11 years of operation is unlikely to have any significant impact in this regard.

Therefore, no further assessment is proposed in relation to the change in project duration of the tidal array and reference should be made to the 2010 ES (SPR, 2010), as the conclusions therein are not thought to have altered in relation to the O&M Phase.

6.4.3. Potential Impacts during the Decommissioning Phase

The potential impacts during decommissioning are expected to be of the same type and magnitude to those predicted during the original ES as there are no changes to the decommissioning strategy.

The loss of habitat during installation will transpose to a loss of artificial habitat during decommissioning and a return to the original situation (as described in Section 8.4, *Chapter 8: Benthic Ecology* of the 2010 ES (SPR, 2010)). Returning to the natural state has not been considered as an impact and due to the dynamic and changeable nature of this high energy environment, it is expected that recoverability will be quick.

6.4.4. Cumulative Impacts

Cumulative impacts in relation to benthic ecology are not thought to have altered since the original assessment made in the 2010 ES and are not expected to have altered with regards the proposed changes to the turbine locations.

6.5. Proposed Mitigation and Monitoring

The 2010 ES (SPR, 2010) did not recommend any mitigation due to the negligible significance of the potential impacts.

No further mitigation is proposed as part of this revised assessment.

The licence for the export cable route, issued in February 2014, identifies a series of mitigation measures including:

- Debris or waste materials arising during the course of the cabling works are to be removed from the site disposal at an approved location above Mean High Water Springs;
- Measures to be taken to minimise damage to the foreshore;
- Best method of practice to be used to minimise re-suspension of sediment during cable installation; and
- Measures to be taken to minimise potential impacts on the maerl bed.

6.6. Summary

It is anticipated that the proposed changes to the location of the turbines and the increase in the operational period of the array will have, at worst, a pre-mitigation **negligible** effect on the benthic ecology of the Sound (see Section 8.5, *Chapter 8: Benthic Ecology* of the 2010 ES (SPR, 2010)).

6.7. References

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7. Marine Mammals and Basking Sharks

7.1. Introduction

This chapter reviews the potential impacts on marine mammals associated with the changes to the proposed development since the original ES, SPR (2010). It outlines the approach to the impact assessment for marine mammals and provides a review of marine mammal information, which has become available or been updated since the existing environment characterisation outlined in the original application. A summary of the original assessment and conclusion of significance is also provided.

The changes to the Development relevant to marine mammals are the altered device parameters and the requested increase to the operational life of the array. Namely the increase in rotor diameter from 23m to 26m (and associated decrease in rotational speed) and the increase from 14 to 25 years in terms of operational life.

These changes are only considered to affect the potential impact of collision risk between the operational array and marine mammals. As such an updated assessment of collision risk is provided here using the new rotor diameter, and new information on the existing environment.

The altered installation phase includes the use of an anchor barge and tugs which pose no additional risk to marine mammals compared with the DP vessel installation method assessed in the original ES (SPR, 2010) and so this is not considered further in this report.

A Marine Licence is in place for the export cable route and landfall. These elements of the Development are assessed in detail in SPR, (2013).

7.2. Original assessment

7.2.1. Environmental statement

The original impact assessment considered the occurrence of marine mammals in the area from published existing data sources, and specifically commissioned land based visual observation surveys of the Sound of Islay. Land based visual surveys commenced in April 2009, but sufficient effort was only realised from July 2009 onwards, with data until November 2009 used in the ES (Appendix 9.1 in ES). Sightings included harbour seal, grey seal, and harbour porpoise. No other species of marine mammal were sighted in the survey area.

A qualitative assessment of collision risk was made within the ES for all three species of marine mammals. The assessment concluded the potential for moderate significance effects based on the high sensitivity of marine mammals to this impact, and a low magnitude of impact.

Commitment was made to an adaptive management programme including post installation monitoring following a 'deploy and monitor' strategy, and mitigation of any significant effects. The assessment concluded a minor, not significant impact.

7.2.2. Appropriate Assessment

Marine Scotland completed an Appropriate Assessment (AA, Marine Scotland, 2011) using the results of the first year of site specific survey data and harbour seal telemetry data that were available from a tagging deployment in the south-east Islay SAC in 2003-2004 (Cunningham, 2009 in SMRU Ltd, 2010). The telemetry data suggested no visits were made to the development area by seals tagged at the SAC. However, the Sound of Islay is well within the foraging range of harbour seals from the SAC and harbour seal were recorded within or hauled out in the Sound. As a result, connectivity between the development site and the SAC was assumed. The AA used the Marine Scotland modified Band collision model to assess collision risk in harbour seal, estimating calculated risk as 45.3%, assuming no avoidance. The device was estimated to be turning for 71.5% of the tidal cycle, and assuming a 98% avoidance rate the collision risk was predicted to be 0.58 animals per year. Impacts were put in context against the Potential Biological Removal (PBR) threshold for the West Highland Seal Management Area (which was 442).

Consideration was also given in the AA to use of dynamic positioning (DP) vessels during installation of the devices. The use of DP remains an option for the installation of the devices and export cables for the Development, although the use of an anchored barge for device installation is now included as an option as discussed in *Chapter 2: Changes to Project Description.* The use of DP is not a change to the consented project but the following information provides an update to the timing to inform the Appropriate Assessment. Cable laying is expected to require approximately two weeks of DP operation on-site. This is likely to be during the winter of 2015 / 2016, dependent on weather and vessel availability but could feasibly be undertaken from middle 2015 to early 2016. Substructures and nacelles could be installed in approximately 3-4 hours if DP is used. However, allowing for uncertainty, approximately sixteen 24hr periods for DP vessel operation should be considered with sizeable breaks in between each operation. The device installation work is planned for between early 2016 and early 2017, dependent on device readiness, vessel availability and weather.

At the time of the original assessment there were no other marine renewable energy developments in the West Highland sea area, and therefore no cumulative effects to consider. However in combination effects could arise from harbour seal shooting licences (201 of which had been issued).

Marine Scotland concluded that there would not be an adverse effect on site integrity for harbour seal from the South-east Islay SAC. SPR have agreed to an Environmental Monitoring Plan (EMP) to be signed off by the licensing authority prior to installation of the array (covering issues relating to collision risk between DP vessels and the operating array).

7.3. Methodology

7.3.1. Consultation

Consultation on how the application should be made and the issues that required addressing within this Environmental Report were agreed with Marine Scotland. This defined the issues with regard to marine mammals as being primarily concerned with collision risk in harbour seal, given the proximity of the SE Islay Skerries SAC. Information is therefore provided to inform an updated AA. Further consultation was undertaken with Marine Scotland in April 2014 to agree the approach to collision risk modelling which has been used in this assessment.

7.3.2. Data collection

The 2010 ES was completed using data from the first year of site specific survey data; however data collection continued for a second year post submission. Methods of data collection for the second year of marine mammal data were as previously reported (SMRU Ltd., 2010; SPR, 2010). Four land-based visual observation sites were utilised on both the Islay and Jura sides of the Sound (see Appendix 7.1, Figure 2). Monthly surveys commenced in July 2009, and were completed in August 2011. A summary of the results of the 2-year survey programme with regard to marine mammals and basking sharks is provided in Section 7.4 below.

Since the submission of the 2010 ES (SPR, 2010) Marine Scotland and SNH have funded a tagging deployment on harbour seal by the Sea Mammal Research Unit (SMRU) in the Sound of Islay area. The final results of this study are yet to be reported, but the preliminary results are also considered in the impact assessment. Appendix 7.1 summarises the preliminary results of the 2011/2012 seal tagging in the region.

7.3.3. Assessment of significance

The significance of the effect imposed by the newly proposed development changes is based on the intensity or degree of disturbance to baseline conditions and is categorised into four levels of magnitude; high, medium, low or negligible. The definitions of each of these are given in Table 7.1.

Table 7.1: Description of magnitude.

Magnitude of Effect	Definition
High	Affect an entire population / habitat causing a decline in abundance and / or change in distribution beyond which natural recruitment would not return that population / habitat, or any population / habitat dependent upon it, to its former level within several generations of the species being affected.

Table 7.1: Description of magnitude.	
Magnitude of Effect	Definition
Medium	Damage or disturbance to habitats or populations above those experienced under natural conditions, over one or more generation, but which does not threaten the integrity of that population or any population dependent on it.
Low	Small-scale or short-term disturbance to habitats or species, with rapid recovery rates, and no long-term noticeable effects above the levels of natural variation experienced in the area. The impacts are not sufficient to be observed at the population level.
Negligible	An imperceptible and/or no change to the baseline condition of the receptor.

Definitions of the sensitivity of the marine mammal receptor are given in Table 7.2. The sensitivity of the receptor is a function of its capacity to accommodate change and reflects its ability to recover if affected

Table 7.2: Description of sensitivity.	
Sensitivity	Definition
High	Individual receptor has very limited capacity to avoid, adapt to, accommodate or recover from the anticipated impact.
Medium	Individual receptor has limited capacity to avoid, adapt to, accommodate or recover from the anticipated impact.
Low	Individual receptor has some tolerance to avoid, adapt to, accommodate or recover from the anticipated impact.
Negligible	Individual receptor is generally tolerant to and can accommodate or recover from the anticipated impact.

Table 7.3 outlines the matrix used in assessing the significance of effect of each impact to marine mammals using both the importance of the receptor (in this case 'High' sensitivity for marine mammals to collision risk with tidal turbines) and the magnitude of effect should it occur. This provides a worst case scenario and does not take into consideration the likelihood of occurrence.

Table 7.3 combines the definitions of magnitude with the level of sensitivity/value/importance of receptor to provide a prediction of overall significance of the impact.

Table 7.3: Significance Prediction Matrix				
Magnitude of Effect	Receptor Sensitivity			
	Negligible	Low	Medium	High
High	No significant effect	Moderate	Major	Major

Table 7.3: Significance Prediction Matrix				
Magnitude of Effect	Receptor Sensitivity			
	Negligible	Low	Medium	High
Medium	No significant effect	Minor	Moderate	Major
Low	No significant effect	Negligible	Minor	Moderate
Negligible	No significant effect	Negligible	Negligible	Minor

7.4. Existing Environment

The original 2010 ES and corresponding surveys showed that the area was used by low numbers of marine mammals, suggesting that the Sound of Islay is not a highly important area for these species.

7.4.1. Seals

7.4.1.1. In water

Harbour seal *Phoca vitulina* were the most common species sighted and were recorded in all months of the year. Peak harbour seal sighting rates in 2010 occurred in July before declining over the winter months, they then rose again through April-July 2011. Sighting rates were 1.94 harbour seal per hour in Year 1 of the survey and 0.96 per hour in Year 2, giving an average sighting rate of 1.43 per hour over the two years of survey (Appendix 7.1).

A sighting rate of 1.9 harbour seal per hour was used to inform the collision risk modelling in the original AA (Marine Scotland, 2011). The two year average will be taken forward in this updated assessment.

Grey seal *Halichoerus grypus* were much less common, but were again sighted during all months of the year (Appendix 7.1). There was a peak in grey seal sighting rates in March 2010 with a subsequent decrease through April and May, with sightings increasing again in June before declining in July and August 2010. Grey seal rates remained low but variable over winter 2010 and spring 2011 rising to a peak in August 2011. The average sighting rate for grey seal in year 1 was 0.76 per hour; in year two it was slightly lower at 0.71 per hour, providing a two year average of 0.73 individuals per hour.

Since the 2010 ES Marine Scotland has commissioned analysis of seal surface density estimates by SMRU, for 5km by 5km cells around the UK (Jones *et al,* 2013). In the Sound of Islay the average at-sea usage for harbour seals is 2.252 individuals per 25km^2 (0-11.798 95% confidence interval (CI)). The average at-sea usage for grey seals is 5.899 individuals per 25km^2 (0-14.100 95% CI). These density values will be taken forward, alongside the site specific siting rates, in the updated assessment.

In a non-related study, seventeen adult harbour seals were tagged on Islay during 2011 and 2012. Seven of these were tagged at the South East Islay Skerries SAC in 2011, two at Bunnahabhain Bay in 2011 and a further eight at haul-out sites within the Sound along the Islay coastline, approximately 500m north of the proposed preferred cable landfall location (Appendix 7.1).

None of the seals tagged at the SAC entered the Sound of Islay. However, half of the seals tagged in the Sound did travel to the SAC. The seals that showed the highest use of the Sound and the area around the development site were tagged at haul-outs within the Sound. Some tagged individuals also moved to the north of Islay, as far afield as Mull, Colonsay and Tiree.

7.4.1.2. Hauled out

Seals that were hauled out accounted for 55% of total seal sightings. Peak numbers of hauled out harbour seal were during January to March 2010, July and August 2010, December 2010 and January 2011 (Appendix 7.1).

The majority of haul-out sightings were on the west side of the Sound.

For grey seals, most sightings were of animals in the water and there were relatively few sightings of hauled out grey seals.

7.4.1.3. Behaviour

Hauled out seals represented the majority of all seal sightings over the whole survey period in both years. The majority of harbour seals and grey seals sighted in the water were either resting ("bottling" or "logging") or swimming.

7.4.1.4. Reference populations

The Sound of Islay is within the West Scotland Management Area for seals. The most recent PBR values for harbour and grey seal are 446 and 386 respectively (Marine Scotland, 2013). The PBR calculations are based on the minimum counts of each species of 10,611 harbour seal, and 2,512 grey seal (from 2007/2009 survey data) within the West Scotland Management Area.

The most recent minimum count for the South-east Islay SAC population is 666 (from the 2009 survey, Duck & Morris, 2010)

7.4.2. Basking sharks

Basking shark was not frequently sighted in the Sound of Islay during Year 2, with only a single individual being recorded swimming through the Sound on 1st September 2010. Two individuals were sighted in year 1 (August 2010) in the days preceding the September sighting.

7.4.3. Bottlenose dolphins

Bottlenose dolphin *Tursiops truncatus* was recorded during September, October and November 2010 and in January, June and July 2011 (Appendix 7.1). Group sizes ranged from a single individual to a group of 13 animals. Sighting rates were generally low with only 2% of all watches recording sightings of

bottlenose dolphins. This resulted in too few sightings to make any robust conclusions about patterns. Recorded behaviours include breaching and swimming.

No bottlenose dolphin were sighted in the Sound in Year 1 of the surveys.

7.4.4. Harbour porpoise

Harbour porpoise *Phocoena phocoena* has only been sighted twice over two years of surveys. Recorded behaviours include breaching and swimming.

7.5. Impact Assessment

The proposed changes to the development are only considered to affect the potential collision risk between the operating array and marine mammals. Given the lack of a quantified collision risk assessment in the original ES for all species, and lack of robust site specific estimates of density, the updated assessment will use SMRU at sea densities (Jones *et al.* 2013) for harbour seal and grey seal in an assessment of collision risk, as well as site specific siting rates. Impacts will be put in context against the current PBR for the management area, and the most recent estimate of the SAC population in the case of harbour seal.

A quantified assessment of risk is not made for other species of marine mammal due to their low occurrence. Full consideration will be given to the potential disturbance to on European Protected Species (EPS) in the EPS licence application. However, given the low level of observed and expected occurrence there is not anticipated to be a detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

All other potential effects of the development on marine mammals not covered in this chapter are covered by the original 2010 ES (SPR, 2010) and are still applicable.

7.5.1. Potential Impacts during O&M Phase

7.5.1.1. Collision risk assessment

In the original 2010 ES collision risk was assessed as moderate following a qualitative approach, and reduced to minor with implementation of the proposed deploy and monitor strategy.

This updated impact assessment has used the encounter rate model developed by Marine Scotland Science (Davies & Thompson, 2011) for the key species in the Sound of Islay (harbour and grey seal). It was not possible to fully access the parameters used in the original collision risk modelling completed by Marine Scotland in their AA. However, in order to present modelling results in this impact assessment which are comparable with those the Regulators will use to inform a consenting decision and that which was used for the original assessment, altered parameters have been summarised in Table 7.4.

Table 7.4: Summary of parameters used in the collision risk modelling completed by Marine Scotland (2011) and those used in the updated assessment.		
Parameter	Value used in AA	Updated assessment
No. blades	3	3
Max chord	Unknown	1.25
Pitch	Unknown	8 degrees
Length	1.8m harbour seal	1.8m harbour seal; 2.2m grey seal
Swimming speed	Unknown	1.5m/s
Width	0.4m harbour seal	0.4m harbour seal; 0.8m grey seal
Rotor diameter	23m	26m
Rotation period	10.2rpm	8.5rpm (range 8-8.5rpm)
Tidal current speed	Unknown	Spring tide max 3.2m/s
Number of seals	Sighting rate of 1.9 harbour seal per hour	Sighting rate of 1.43 per harbour seal per hour, and 0.73 grey seal per hour; and SMRU at sea densities (Jones et al. 2013)
Percent of time rotors moving	71.5%	65%
Number of turbines	10	10
Dive rate	12 per hour	12 per hour
Avoidance rate	98%	98%

The results of the collision risk modelling indicate the collision probability per turbine is 27.3% for harbour seal and 32.1% for grey seal based on the 26m diameter rotor (8.5rpm; Table 7.5). The collision probability for harbour seal is lower than in the original AA (45.3%). The reduction in collision probability is a function of a smaller percent of the time that the rotors will be moving, and a lower RPM despite the increase in rotor diameter. It is also likely that changes in max chord and pitch have also affected this collision probability, although the original parameters used in the assessment are not known.

Table 7.5: Collision probability per turbine		
Device	Harbour seal	Grey seal
26m diameter rotor, 8.5 rpm	27.3%	32.1%
26m diameter rotor, 8 rpm	26%	30.6%
23m diameter rotor (Marine Scotland, 2011 AA)	45.3%	Not assessed

Following from the collision probabilities in Table 7.5, the collision risk for harbour seal and grey seal has been calculated (see Table 7.6) using the Marine Scotland modified Band model for the 26m turbine (8.5rpm). The collision risk assessment assumed 12 dives per minute in the case of both harbour and

grey seal (although grey seal dive rate may be lower), and an avoidance rate of 98% (Table 7.4). The results of the Marine Scotland AA are also provided in Table 7.6 as a comparison.

The collision risk between harbour seal and the array (of 10 devices) is estimated to be a maximum of 1.1 per year (based on the site specific sightings rates). Collision at this rate approximates 0.25% of the PBR for the region.

In the case of grey seal, the collision risk is predicted to be higher using the MS at sea densities, rather than the site specific data, at 0.9 individuals per year (or 0.23% of the PBR).

The magnitude of effect in both cases is negligible, as the change would not be detectable against the baseline for either receptor. Given the negligible potential collision risk per year, the increase in the operational life of the project from 14 years to 25 years will not affect the magnitude of the collision risk overall.

Table 7.6: Results of the collision risk modelling (predicted number of individuals that will collide with the array per year)

Device	Harbour seal		Grey seal	
	Sightings rates	SMRU densities	Sightings rates	SMRU densities
26m diameter rotor 8.5 rpm	1.1 (average sighting rates over two years)	0.27	0.7	0.9
23m diameter rotor (AA)	0.58 per year (year 1 sighting rates)	Not assessed	Not assessed	Not assessed

For other species including basking shark, bottlenose dolphin and harbour porpoise the very limited numbers in the Sound of Islay result in a predicted negligible magnitude of effect.

All marine mammals are considered to have high sensitivity to collision risk with tidal turbines. Combined with the negligible magnitude of effect, the impact is assessed as minor adverse. Using this quantitative approach to assessing collision risk which was not available for the original ES (SPR, 2010) the impact from the updated assessment is considered to be not significant, and lower than the predicted impact from the original assessment which outlined a potential impact of moderate significance.

The impacts on harbour seal have also been put in context against the most recent South-east Islay SAC population estimate (666 from 2009). Assuming all individuals came from the SAC population (which is a precautionary approach, and not supported by the telemetry data) the impact could result in loss of 1.1

harbour seal or 0.17% of the population. An effect of this magnitude should not undermine the conservation objectives for harbour (common) seals in the South-East Islay Skerries SAC.

7.5.2. Potential Impacts during the Decommissioning Phase

The potential impacts during decommissioning are expected to be of the same nature and significance as the impacts during the installation phase and are not altered by the revised plans so remain as assessed in SPR, 2010.

7.5.3. Cumulative Impacts

In addition to the Sound of Islay tidal array, cumulative impacts of collision risk need to be assessed with the Argyll Tidal Array, West Islay Tidal array and Kyle Rhea Tidal array. Table 7.7 summarises the results of the cumulative impact of collision risk. Impacts from the Sound of Islay have been rounded to the nearest whole seal (one harbour seal, and one grey seal).

Argyll Tidal array did not provide a quantified collision risk assessment for harbour or grey seal. However, given the application is for a single device it is unlikely that sufficient numbers of seals will collide with this single device to have a significant effect on seal populations (either grey seal or harbour seal) in the development area. Therefore no impact on harbour or grey seals is included in the cumulative assessment.

With regard to West Islay Tidal array, collision risk has been quantified both by Marine Scotland and within the ES. Based on the Marine Scotland modified Band model, the worst case collision risk for proposed array would 20.6 harbour seal and 42.5 grey seal per annum. The assessment completed within the ES suggests mean annual encounter rates of 11.8 for harbour seal, and 12.9 for grey seal per turbine rotor, with estimated annual collision levels (assuming 97% avoidance, as 98% was not assessed) of 14 harbour seal, and 17 grey seal. The more precautionary assessment from Marine Scotland is used in this cumulative impact assessment.

The results of the collision risk modelling presented in the Kyle Rhea ES (SeaGeneration (Kyle Rhea) Ltd, 2013) based on a 98% avoidance rate are 51 harbour seal collisions per year (assuming 12 dives per hour), and 36 grey seal collisions (assuming 6 dives per hour).

In 2014, 123 licenses were issued to shoot grey seal in the West Scotland Management Area, and 152 licences were issued to shoot harbour seal.

Table 7.7: Projects and potential impacts considered in the cumulative assessment				
Project	Harbour seal		Grey seal	
	Collision rate per annum	Percent of 2013 PBR (446)	Collision rate per annum	Percent of 2013 PBR (386)
Sound of Islay	1	0.22%	1	0.26%
Argyll tidal array	Not quantified			
West Islay tidal	12	2.7%	13	3.4%
Kyle Rhea	51	11.4%	36	9.3%
Subtotal (Tidal)	64	14.3%	50	13%
2014 shooting licences	152	34.1%	123	31.9%
TOTAL	216	48.4%	173	44.8%

In combination the projects listed in Table 7.7, include projects and shooting across the West Scotland management area. In the context of the PBR for this area the magnitude of the cumulative impact will be negligible, giving a minor significance in light of the high sensitivity of all marine mammals to collision risk with tidal turbines.

Due to the extent of this area (extending from Cape Wrath in the North to The Mull of Kintyre in the south) it is unlikely that all of the potential impacts for the projects identified in Table 7.7 will be on the South-east Islay SAC population, especially with regard to impacts from the Kyle Rhea tidal array (approximately 190 km to the north), and shooting licences. Therefore, an effect of this magnitude should not undermine the conservation objectives for harbour (common) seals in the South-East Islay Skerries SAC.

7.6. Proposed Mitigation and monitoring

Post installation mitigation and monitoring is as discussed within the 2010 ES. A 'deploy and monitor' strategy will be developed in agreement with Marine Scotland and SNH. The aim of the monitoring will be to allow the significance of collision risk to be assessed and if required, appropriate collision mitigation will then be implemented. Table 7.8 outlines the proposed mitigation measures outlined in the original ES and whether any additional mitigation has been considered as part of SEI.

Table 7.8 Original mitigation measures as outlined in the original ES (2010) and additional proposed mitigation measures	
Mitigation Measures (SPR, 2010)	Additional mitigation measures (2014)
Post installation monitoring and any mitigation considered necessary by regulators, as part of an ongoing programme of adaptive management.	Original (2010) mitigation applies. No additional mitigation

Table 7.8 Original mitigation measures as outlined in the original ES (2010) and additional proposed mitigation measures	
Mitigation Measures (SPR, 2010)	Additional mitigation measures (2014)
A deploy and monitor strategy is proposed, with ongoing monitoring, linked to management of the Development. An application for a licence to disturb EPS, to enable regulators to allow deployment while further knowledge regarding effects (or lack of effects) from the Development is obtained. As part of a wider adaptive management and environmental monitoring strategy, SPR is committed to mitigating relevant significant effects identified by ongoing monitoring. Application of a vessel management protocol based on existing 'best practice' will ensure reasonable mitigation is in place to reduce potential for collision and remove potential disturbance to haul out areas in the Sound.	The licence for the export cable route which was issued in February 2014 identifies that an exclusion zone of 500m should be maintained around seal haul out sites during the sensitive period for harbour seals (June to August).

7.7. Summary

The original 2010 ES and corresponding surveys showed that the area was used by low numbers of marine mammals, suggesting that the Sound of Islay is not a highly important area for these species. Harbour seal is the most common species in the Sound of Islay with grey seal also being present regularly but less numerous. Sighting rates for harbour and grey seal were lower in year 2 than year 1. There were infrequent sightings of cetaceans and basking shark and so these species were not taken forward in the updated impact assessment.

The collision risk for harbour and grey seal is estimated to be approximately 0.25% and 0.23% of the PBR for the region, respectively which represents a negligible magnitude for the operation of the tidal array. Using this quantitative approach to assessing collision risk which was not available for the original ES (SPR, 2010) the impact from the updated assessment is considered to be minor, and therefore lower than the predicted impact from the original assessment which outlined a potential impact of moderate significance.

In order to inform the Appropriate Assessment, the impacts on harbour seal have also been put in the context of the most recent South-east Islay SAC population estimate. Taking a highly precautionary approach, the impact could result in loss of 0.17% of the population, which should not undermine the conservation objectives for harbour (common) seals in the South-East Islay Skerries SAC.

Since the original ES (SPR, 2010) a number of other tidal projects have come into the planning process and therefore a cumulative impact assessment is now required for marine mammals. It was agreed with Marine Scotland that this would cover all tidal projects in the West Scotland Seal Management Area. As with the Sound of Islay Demonstration Tidal Array, the impact will be of minor significance in the context of the PBR for the region and the cumulative impacts should not undermine the conservation objectives for harbour (common) seals in the South-East Islay Skerries SAC.

7.8. References

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8. Ornithology

8.1. Introduction

This chapter provides a review of the following key data sources which were collected since the original ES (SPR, 2010):

- second year of vantage point survey data for seabirds; and
- terrestrial survey of the new substation location, including data for breeding birds.

The original 2010 ES concluded that the likely effects of the proposed development on all bird species were not significant. This was based on an initial one year's worth of seabird data. Section 8.3 provides a brief overview of the 2nd year of survey data in relation to the 1st year. In summary, the 2nd year of survey showed no significant changes to the baseline for marine birds used in the original assessment.

In addition, the proposed changes to the turbine locations, turbine parameters, and operational life of the array will not alter the impact significance for marine birds in relation to the original ES and therefore marine birds are not considered further in the impact assessment.

The terrestrial survey identified golden eagle in the study area for the new substation location; the impacts on this Annex 1 species are discussed further in a Confidential Appendix.

The new substation location lies adjacent the existing 33kV overhead power line and subsea cable, both of which are subject to ongoing maintenance by their operator Scottish and Southern Energy (SSE).

8.2. Methodology

8.2.1. Site characterisation

Regular observations of seabirds were made from May 2009 to November 2009 (Year 1) and from September 2010 to end of August 2011 (Year 2 – NRP, 2012) to observe the array boundary and surrounding waters from vantage points (VP) on the shore of the Sound of Islay. Full details of the VP survey method, sampling design, timing of surveys and system of calculating bird positions are given in Appendix 14.1 of the original ES (SPR, 2010) and the Year 2 Birds Technical Report provided in Appendix 8.1 of this report.

An extended Phase I survey of the onshore substation location and surrounding area included information on breeding birds (the Phase 1 survey is discussed further in *Chapter 9: Terrestrial ecology* and Appendix 9.1).

8.2.2. Impact Assessment

The impact assessment methodology for golden eagle is provided in detail in a Confidential Appendix to this report (Appendix 8.2). It follows the guidance produced by the Institute of Ecology and Environmental Management (IEEM, 2006). The IEEM guidelines set out the process for assessment through the following stages:

- describing the ecological baseline through survey and desk study;
- assigning a value to "Valued Ecological Receptors" (VERs) - these are the designated sites, habitats and species of highest ecological value affected by the development;
- identifying and characterising the potential effects (including their spatial and temporal magnitude) on these VERs based on the nature of construction, operation and decommissioning activities associated with the Development;
- describing any mitigation, compensation and/or enhancement measures associated with the development;
- determining the significance of the effects, taking into account mitigation measures where appropriate; and
- identification of any monitoring requirements.

Section 8.3 shows that there are no new seabird features in the study area which would require further assessment. The slight changes to the device parameters and layout will not change the impact on seabirds and therefore the original impact assessment and methodology from SPR (2010) still apply.

8.3. Existing Environment

Details of the findings from the two years of marine survey are provided in Appendix 8.1.

The abundance and seasonal patterns recorded in Year 2 were very similar to that found in Year 1 (NRP, 2010) for almost all seabird species. This includes those species which were identified in the original ES (SPR, 2010) as having greatest relevance to the marine turbine development namely, black guillemot, shag, great northern diver, eider and overwintering white-tailed eagle.

The abundance of some seabird species recorded was slightly different to that reported in Year 1 including gannet, Manx shearwater and passage kittiwakes which were notably less common in Year 2 than in Year 1.

There was some evidence of a small increase in the numbers of black guillemot breeding in the Inner Sound during Year 2. The numbers of this species foraging in the winter was also higher than in Year 1.

The Year 2 fieldwork did not identify any new seabird features in the study area (the Inner Sound) which would require further assessment.

Evidence of golden eagle was recorded during the terrestrial survey (Appendix 9.1). Due to the confidential nature of information on this species, details of findings regarding the golden eagle are provided in a separate Confidential Appendix 8.2.

8.4. Impact Assessment

The Confidential Appendix provides an assessment of the impacts on golden eagle and states that the species is of **High** nature conservation value due to its Annex 1 status. The impact magnitude of the construction of the substation on the Annex 1 species nest site is considered to be **High** and **Short Term** as a consequence of potential disturbance from construction works. The construction impact is therefore considered to be **Major** adverse within the context of the IEEM guidelines. However, implementation of mitigation measures to avoid disturbance during the construction period will ensure that significant effects are avoided. These measures are detailed within the Confidential Appendix to this report.

There will be a low level of activity associated with the operation of the substation and so this is considered to have a negligible impact on the Annex 1 species as detailed within the Confidential Appendix.

8.5. Mitigation and Monitoring

Mitigation measures for golden eagles were not outlined in the original ES because this species was not recorded in the original onshore study area. Mitigation measures are detailed within the Confidential Appendix to this report for golden eagle and these have been augmented based upon advice provided during consultation with SNH and RSPB. A summary is provided in Table 8.1.

Mitigation measures as outlined in the original ES for seabird species are also detailed in Table 8.1.

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
Ornithology - golden eagle	Golden eagle not considered in original ES	**Pre-construction surveys** Ongoing monitoring of the golden eagle nests is being commissioned for summer 2014 to assess breeding success pre-construction. This will allow review of the timing of construction with consultees.

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
		Construction Mitigation will be discussed and agreed with SNH and RSPB. Mitigation measures are likely to include: • Construction works limited to a minimum of 1000m from the eyrie during the breeding season (January to August), and at a greater distance if visible from the eyrie /birds in the vicinity of the eyrie. • A temporary net screening between the works and the nest; • Works involving major construction activity will be scheduled to occur out with the period January to July unless otherwise agreed with SNH and RSPB. An Ecological Clerk of Works will be in place during construction. **Commissioning & Operation** In situ temporary screening during commissioning, if appropriate. In situ temporary screening will be used during operation, if appropriate, until planting matures. Planting (proposed planting located to ensure that the building is screened as much as possible when viewed from the eagle nest), mounding (to minimise view of substation from the nest) and change to car park location (to south of

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
		substation). Potential to restrict access during breeding season to limited to high-priority / essential access only. Sympathetic working practices at all times with careful management of timing of work, noise, lighting, and movement of workers. **Decommissioning** As construction **Monitoring** An Environmental Monitoring Plan (EMP) will be discussed and agreed with SNH and RPSB. Potential to include cameras set up on site for long term monitoring
Ornithology - all other birds	Surveys to locate the nests of birds listed in Schedule 1 of the WCA will be undertaken prior to construction (and decommissioning) works during the period March-August. These surveys will be undertaken to inform measures to safeguard any breeding attempts from disturbance. Risks to seabirds of accidental release of marine contaminants will be minimised by adopting safe working practices and having contingency plans for dealing with incidents Artificial nest sites for black guillemots	Original (2010) mitigation applies. No additional mitigation.

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
	to be located away from the immediate vicinity of the proposed Development site should help reduce disturbance effects on the breeding population of this species.	

8.6. Summary

The Year 2 fieldwork did not identify any new seabird features in the study area (the Inner Sound) which would require further assessment and therefore the outcomes of the original impact assessment (SPR, 2010) have not changed.

Breeding golden eagle was recorded in the study area for the new substation location. A confidential appendix to this report (Appendix 8.2) provides the impact assessment on the Annex 1 species. The construction impact is considered to be of **major** adverse significance within the context of the IEEM guidelines. However, implementation of mitigation measures to avoid disturbance during the construction period will ensure that significant effects are avoided.

8.7. References

IEEM (2006). Institute of Ecology and Environmental Management Guidelines on EcIA. Available online at:
http://www.cieem.net/data/files/Resource_Library/Technical_Guidance_Series/EcIA_Guidelines/TGSEcIA-EcIA_Guidelines-Terestrial_Freshwater_Coastal.pdf

NRP (2010). Sound of Islay Tidal Demonstration, Year 1 Birds Technical Report.

ScottishPower Renewables (2010). Sound of Islay Demonstration Tidal Array: Volume 1 Environmental Statement. Copyright ScottishPower Renewables (UK) Ltd. 2010.

9. Terrestrial Ecology

9.1. Introduction

Appendix 9.1 provides the Ecological Survey Report and Impact Assessment for the new substation location discussed in Section 9.3. This chapter provides a summary of the technical appendix.

The 2010 ES (SPR, 2010) did not consider the terrestrial habitats on Islay as the preferred landfall location was on Jura; as such an updated ecological survey was conducted to take into consideration the new proposed substation site, associated cable works and access track on the eastern side of Islay.

9.2. Methodology

9.2.1. Site characterisation

An extended Phase 1 Habitat Survey of the new substation location was carried out on two occasions: October 2011 during changeable weather conditions and May 2012 in a period of good weather. All information associated with the surveys can be found in the survey report (Appendix 9.1).

Otter *Lutra lutra* surveys were undertaken along all burns and immediate vicinity of the bank sides on site and for a distance of approximately 250m upstream and downstream from the Site. Surveying involved a walkover of the survey area, recording signs of otter presence as described in Appendix 9.1 based on information from Bang & Dahlstrøm (2001), Sargent & Morris (2003) and Chanin (2003).

9.2.2. Impact assessment

The impact assessment methodology is provided in detail in Appendix 9.1. It follows the guidance produced by the Institute of Ecology and Environmental Management (IEEM, 2006). The IEEM guidelines set out the process for assessment through the following stages:

- describing the ecological baseline through survey and desk study;
- assigning a value to “Valued Ecological Receptors” (VERs) - these are the designated sites, habitats and species of highest ecological value affected by the development;
- identifying and characterising the potential effects (including their spatial and temporal magnitude) on these VERs based on the nature of construction, operation and decommissioning activities associated with the Development;
- describing any mitigation, compensation and/or enhancement measures associated with the development;
- determining the significance of the effects, taking into account mitigation measures where appropriate; and
- identification of any monitoring requirements.

9.3. Existing Environment

There is no overlap with the new substation site and any designated areas, with the closest being Loch Tallant SSSI situated 6km to the west. As a result this SEI does not include an assessment of terrestrial designated sites.

The Phase 1 habitat survey identified a number of habitats which are outlined fully in the survey report (Appendix 9.1). Table 9.1 below summarises the habitats found.

Table 9.1 Outline of habitats identified during the Islay Phase 1 Habitat Survey
Habitat
Arable (J1.1)
Broadleaved Woodland – Semi-natural (A1.1.1)
Continuous Bracken (C1.1)
Neutral Grassland – Unimproved (B1.2.1)
Standing Water (G1)
Mixed Woodland – Plantation (A1.3.2)
Marshy Grassland (B5)
Wet Dwarf Shrub Heath (D2)
Acid Grassland – Semi-improved (B1.2)
Improved Grassland (B4)
Dry Dwarf Shrub Heath (D1.1)
Blanket Bog (E1.6.1)
Continuous Scrub (A2.1)
Wet Heath / Acid Grassland Mosaic (D6)
Running Water (G2)
Stone Dykes

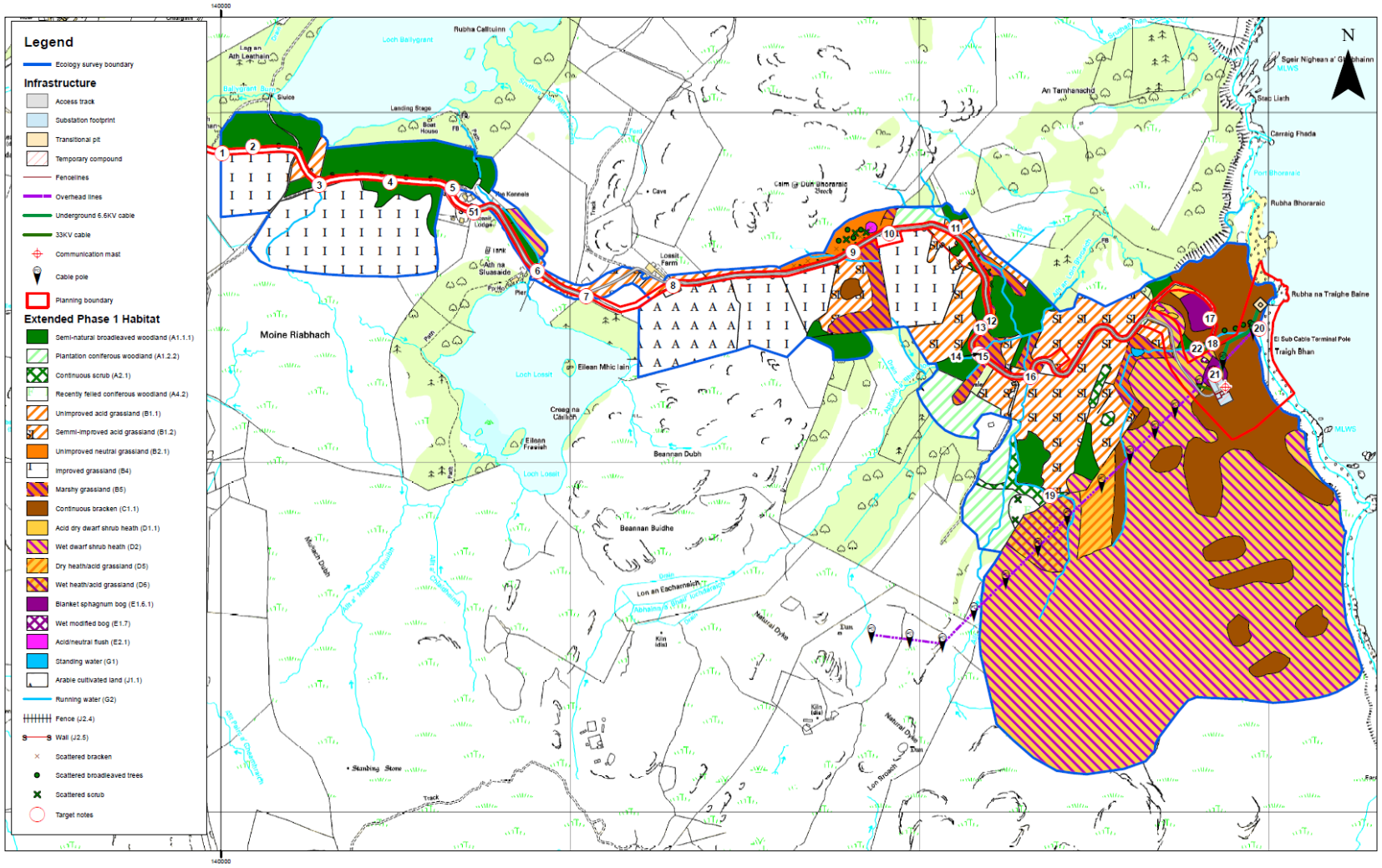
The most extensive habitat found within the survey boundary was Acid Grassland – Semi-improved. There are also a number of watercourses which drain the site and feed into lochs to the west or the sea to the east.

The desk study revealed the recent presence of otter within 50m of the Site, with more general records existing for the wider area. The habitat survey report outlines the presence of otters along watercourses with 22 spraint[3] locations identified over 5 different burns. The otter population is likely to be a transitory one and is considered of Local nature conservation importance.

Two trees were identified with roost potential for bats. Additional fauna observed during the survey include brown hare, roe deer and red deer.

Figure 9.1 shows the Phase 1 habitat map. The substation is located on areas of continuous bracken and blanket sphagnum bog. The access track follows an existing track and then drops south to the substation through wet dwarf shrub heath for approximately 300m.

[3] Otter faeces may be used to mark territories, often on in-stream boulders. They can be present within or outside the entrances of holts and couches. Spraints have a characteristic smell and often contain fish remains.



Rev	Date	By	Comment
4	26/09/13	AR	Fourth issue.
3	20/06/13	RW	Third issue.
2	12/06/13	RW	Second issue.

MacArthur Green Ltd | SCOTTISHPOWER RENEWABLES

1:10,000 Scale @ A3

0 0.075 0.15 0.3 Km

Sound of Islay
Extended Phase 1
2012

Drg No	SOI_I_001
Rev	4
Date	26/09/13
Figure	01

Datum: OSGB36
Projection: TM

Figure 9.1: Phase 1 terrestrial habitat survey mapping

9.4. Impact Assessment

The original ES considered a number of cable landfall and substation options across Islay and Jura. Impacts on terrestrial ecology related to habitat disturbance or removal, death, injury or disturbance of flora and fauna and/or their habitat, and the spread of invasive species were considered at all locations. There was also the potential for disturbance to otter *Lutra lutra* and bats which are European Protected Species (EPS) and also protected under the Conservation Regulations (1994) (as amended).

The assessments made in the original ES suggested that, with the exception of otters and terrestrial habitat loss, the significance of effect for all other terrestrial receptors can be expected to be negligible or no significant effect**.**

9.4.1. Potential impacts during installation phase

Of the habitats identified at the substation study area (Section 9.3) a number can be scoped out due to their negligible conservation value including improved grassland, arable, bracken and semi-improved grassland. Detail of habitat value and the significance criteria are described fully in Appendix 9.1.

For the remaining habitats Appendix 9.1 shows the site development, associated works and the proposed substation location are deemed to have a **minor** or **non-significant** impact within the context of IEEM guidelines and employing appropriate mitigation measures (see Section 9.5). As discussed in Section 9.3 bracken (scoped out), blanket bog blanket bog and wet dwarf shrub heath are the key habitats in the footprint of the substation and access track.

Blanket bog is an Annex 1 habitat and a UK and Argyll and Bute Priority Habitat, however, it is common across Islay and within the wider region and so is considered to be of local nature conservation value here. The proposed onshore works will potentially result in a small loss of habitat, with the location of the substation impacting upon the area of bog at the site. The impact magnitude is considered to be **minor** and the resulting impact is therefore considered to be **minor**.

The wet dwarf shrub heath is a fairly typical example of the habitat and is considered to be of local nature conservation value due to its relative abundance within the region. Impacts on this habitat are likely to be restricted to temporary disturbance during the onshore construction period. In light of this, the impact magnitude is expected to be short term and low, resulting in an overall impact that is **minor**.

Construction works are predicted to be short term and low magnitude which results in a minor and not significant impact for otters within the context of IEEM guidelines. In order to ensure the construction activities will not impact any holts or couches (otter living or resting sites) and to ensure compliance with the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended), a pre-construction survey of all

suitable areas to be affected by the works will need to be undertaken. Should any holts or couches be found within the Site it may be necessary to obtain an EPS licence to disturb for works to continue. With these recommendations implemented a negligible magnitude is considered resulting in an overall **negligible** and **not significant** impact within the context of IEEM guidelines.

9.4.2. Potential impacts during O&M phase

Operation of the substation will involve minimal human activity and so no disturbance effects are predicted for otter. No project changes covered in this SEI are likely to change the original impact assessment for terrestrial ecology during the operation phase.

9.4.3. Potential impacts during decommissioning phase

The potential impacts during decommissioning are expected to be of the same type and magnitude to those predicted during the construction phase, with the assumption that cabling will be dug up and removed from site, and that the substation will be dismantled.

9.4.4. Cumulative impacts

Cumulative impacts in relation to terrestrial ecology are not thought to have altered since the original assessment made in the 2010 ES and are not expected to have changed as a consequence of the proposed change to the substation location.

9.5. Proposed Mitigation and Monitoring

Table 9.2 outlines the mitigation measures to minimise the potential impacts on terrestrial ecology in the original ES as well as any additional mitigation proposed as part of the ER.

Table 9.2 Original mitigation measures as outlined in the original ES (2010) and additional proposed mitigation measures

Mitigation Measures (2010)	Additional mitigation measures (2014)
Otters Detailed otter surveys will take place prior to final cable landfall design to check the footprint for holts, lie-up and couches and other otter activities in consultation with SNH. This will be used to inform the application for a licence to disturb otters which may be required. Construction work will be undertaken during agreed daylight working hours (07:00-18:00), where practicable.	Original (2010) mitigation applies. Additional mitigation below. **Otters** Pre-construction surveys of all suitable areas to be affected by works; obtain EPS licence if holts/couches found within work vicinity at this stage. Ensure no potentially harmful work areas are left accessible to otters during times when work has been

Table 9.2 Original mitigation measures as outlined in the original ES (2010) and additional proposed mitigation measures

Mitigation Measures (2010)	Additional mitigation measures (2014)
Artificial light will not be used next to the coastline or rivers at night to allow otters to migrate through the area undisturbed. During summer months, construction may continue later into the evening without the need for artificial lighting. Construction areas will be left in a safe condition during periods of inactivity, with chemicals and construction materials stored safely in accordance with SEPA's Pollution Prevention and Chemical Guidelines (PPG2- Above ground oil storage tanks, and PPG5 – Works in, near or liable to affect watercourses). Key measures may include capping all pipes, covering all trenches or providing a means for otter to escape. Construction activities will maintain a strict footprint of works for the corridor of the cable trenching, and construction vehicles and equipment will not be active on or stored by the coastline for longer than is necessary. **Habitats** Impacts may be reduced further through the following measures: avoidance of tree loss altogether via micrositing or replacement planting of native trees and shrubs at an appropriate location.	ceased (e.g. uncovered pipe-workings/excavations in which otters could become trapped). **Bats** To ensure compliance with the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended), a pre-construction survey of all suitable areas to be affected by the works will need to be undertaken. If any roost sites are found within these areas at this stage, then it may be necessary to obtain an EPS disturbance licence in order for works to continue Avoid felling trees with bat roost potential. **Habitats** A peat depth survey and peat management plan to outline handling and reuse of the peat within the planning boundary. The potential for improvements to hydrology connectivity through the track as part of the track's upgrade will be explored, and agreed with SEPA as appropriate. An area of bog creation will be investigated, aiming to utilise local topography and hydrology to support translocated peat and blanket bog vegetation. The trench from landfall to the substation will be designed to prevent formation of a preferential flow path and under-draining wetland areas.

Table 9.2 Original mitigation measures as outlined in the original ES (2010) and additional proposed mitigation measures	
Mitigation Measures (2010)	Additional mitigation measures (2014)
	The following surveys are required preconstruction to identify/refine the relevant mitigation requirements: • A Functional Wetland Typology for Scotland survey (SNIFFER, 2009) • A more detailed National Vegetation Classification (NVC) survey will then be carried out on all wetland areas identified. A Controlled Activities Regulations (CAR) licence will be requested for cable crossings as appropriate Best practice working methods will be implemented to avoid pollution (e.g. implementation of SEPA's pollution prevention guidelines (PPG) and monitoring by an Ecological Clerk of Works during construction). A suitable Pollution Prevention Plan will be agreed in consultation with SEPA and SNH in advance of construction progressing.

9.6. Summary

An extended Phase 1 Habitat Survey of the new substation location identified a number of habitat types, with the majority of the proposed substation location being on bracken which is not considered to be of conservation value. Blanket bog and wet dwarf shrub heath around the substation is of local conservation importance. The ecological impact assessment outlined in Appendix 9.1 deems the impacts on these habitats to be of **minor** significance.

Appendix 9.1 outlines evidence of otters along watercourses within the survey area. The short term and low magnitude of the onshore construction works will results in an impact of **minor** significance.

9.7. References

Bang, P. and Dahlstrøm, P. (2001) Animal Tracks and Signs. Oxford University Press, Oxford.

Chanin P. (2003). Monitoring the Otter *Lutra lutra.* Conserving Natura 2000 Rivers. Monitoring Series No. 10. English Nature, Peterborough

IEEM (2006). Institute of Ecology and Environmental Management Guidelines on EcIA. Available online at: http://www.cieem.net/data/files/Resource_Library/Technical_Guidance_Series/EcIA_Guidelines/TGSEcIA-EcIA_Guidelines-Terestrial_Freshwater_Coastal.pdf

Sargent, G. and Morris, P. (2003) How to Find and Identify Mammals. The Mammal Society, London

ScottishPower Renewables (2010). Sound of Islay Demonstration Tidal Array: Volume 1 Environmental Statement. Copyright ScottishPower Renewables (UK) Ltd. 2010.

10. Navigation

10.1. Introduction

This chapter describes the potential for impacts between the revised Development and the navigational interests within the Sound of Islay. An assessment (Navigational Safety Risk Assessment – NSRA) of the potential impacts has been undertaken across all stages of the proposed tidal array from construction, operation (and maintenance) and decommissioning and, where appropriate, mitigation measures are proposed. Cumulative impacts are also considered. This chapter provides an overview of the NSRA which is provided in full in Appendix 10.1.

10.2. Methodology

10.2.1. Site characterisation

As part of the original assessment in support of the 2010 ES (SPR, 2010) an analysis of marine traffic was undertaken. It was discussed and agreed with the MCA regarding that no additional data was required for as SEI.

Data was collected in relation to the original NSRA (SPR, 2010) and revisited for the purposes of this assessment. Further, the principal data gathering occurred as part of the extensive consultation exercise described in Section 10.2.2.

The initial study used the following data:

- AIS Traffic Survey (total of 28 days data);
- Fishing vessel VMS data;
- RYA Cruising Routes;
- Discussions with West Highlands Anchorages and Mooring association (WHAM); and
- DECC Maritime Traffic Database.

10.2.2. Consultation

The original NSRA undertook a consultation and HIRA (Hazard Identification and Risk Assessment) exercise in support of the ES (SPR, 2010). In order to identify the impacts of the potential hazards related to the revised Development, a further round of consultation was undertaken. This included the revisiting and updating of the original hazard log through a HIRA Workshop (2nd November 2012). Those involved in the consultation process were key local stakeholders who use the Sound of Islay. Those included in the hazard identification and risk assessment workshops/discussions included representatives from:

- Caledonian MacBrayne (CalMac) Ferries;
- Clyde Fishermen' Association;
- Islay Sea Safaris;
- Local fishermen;
- Northern Lighthouse Board; and
- RNLI.

The revised Hazard and Control Log is contained within *Annex B* of the updated NSRA (Appendix 10.1).

10.2.3. Assessment of Significance

The significance of the effect imposed by the newly proposed changes to the Development is based on the intensity or degree of disturbance to baseline conditions and is categorised into four levels of magnitude; high, medium, low or negligible. The definitions of each of these are given in Table 10.2.

Table 10.2: Description of magnitude.	
Magnitude of Impact	Definition
High	A fundamental long term change to baseline navigational conditions. For example change resulting in collision or displacement of vessels resulting in limited access.
Medium	A non-fundamental but detectable temporary or permanent change in the condition of navigation. For example a long term displacement of vessels resulting in significantly increased journey times.
Low	A minor change to the baseline condition of navigation (or a change that is temporary in nature). For example a short term displacement of vessels resulting in significantly increased journey times.
Negligible	An imperceptible and/or no change to the baseline condition of navigation.

The significance of the effect is assessed on the basis of both the magnitude of a potential navigational impact (Table 10.2) and the sensitivity/importance/value of the navigational receptor (Table 10.3).

The sensitivity/value/importance of the receptor for each effect is characterised as one of four levels, high, medium, low or negligible. The definition of each level is given in Table 10.3

Table 10.3: Sensitivity/Value/Importance of receptor.	
Receptor Sensitivity/Value	Importance
High	Navigation is vital. For example, "lifeline" ferry links for which there are no alternatives.

Table 10.3: Sensitivity/Value/Importance of receptor.	
Receptor Sensitivity/Value	Importance
Medium	Navigational facilities which are important e.g. major routes for which the alternative adds significantly to journey time and cost.
Low	Navigational facilities which are in regular use e.g. routes for which the alternative will provide a slight inconvenience.
Negligible	Navigational facilities which are in low use e.g. rarely used routes or routes which are easily diverted.

Table 10.4 combines the definitions of magnitude with the level of sensitivity/value/importance of receptor to provide a prediction of overall significance of the effect.

Table 10.4: Significance Prediction Matrix				
Magnitude of Impact	Receptor Sensitivity/Value/Importance			
	Negligible	Low	Medium	High
High	No significant effect	Moderate	Major	Major
Medium	No significant effect	Minor	Moderate	Major
Low	No significant effect	Negligible	Minor	Moderate
Negligible	No significant effect	Negligible	Negligible	Minor

10.3. Existing Environment

The baseline description with regards navigational movements within and surrounding the Development site has remained generally unchanged since the production of the original ES (SPR, 2010).

10.3.1. Fishing Vessels

Fishing activities within the Sound prosecute a creel fishery. No trawling, net or line fishing is reported to occur, or has occurred in the recent past, in the Sound. Creeling in the Sound is conducted by small, locally based, day-fishing vessels. These vessels range between 6m single handed vessels, to vessels over 10m manned by 3-4 people. The number of creel boats operating out of Port Askaig harbour is approximately 10 with the majority of fishing in the Sound of Islay taking place during the winter months.

Creeling involves the placing of long lines of creels (pots) on the seabed with a buoyed clump weight at each end. These lines may consist of up to 50 creels on a line of over 1000 metres in length overall. It is normally laid parallel to the land and relatively close-in to the shoreline of the Sound in waters up to 30m in depth. However, some of the creel fishermen stated that they do lay fleets of creels across the Sound and in waters of greater than 30m charted depth. The creels are normally recovered, checked and re-laid daily.

10.3.2. Ferries

Caledonian MacBrayne (CalMac) run ferry services between Kennacraig and Port Askaig / Port Ellen and Kennacraig to Oban and Colonsay via Port Askaig. The total number of movements in and out of Port Askaig amount to, approximately, 22 per week during the period April to October and 18 per week between the end of October and the end of March.

Table 10.5 details the ferries currently used on this route.

Table 10.5: CalMac Ferry Details		
Name	Length/Beam/Draught	Capacity
MV Finlaggan	89.8m x 16.3m x 3.3m	62 cars/659 passenger
MV Hebridean Isles	85.2m x 15.8m x 3.1m	85 cars/550 passengers
Lord of the Isles	84.6m x 15.8m x 3.1m	54 cars/506 passengers

Based on available data available on the Caledonian MacBrayne website (Caledonian MacBrayne, 2013), the passenger numbers on the Kennacraig to Islay (both the Port Askaig and the Port Ellen services) have shown a general increasing trend between 2003 and 2012 (the only dip occurring between the years 2009 and 2010) from 139,859 in 2003 to 178,398 in 2012. Car numbers also increased year on year from 45,859 in 2003 to 57,274 in 2012. This represents an overall increase in both passenger numbers and car numbers by 27.5% and 24.9% respectively. The number of coaches and commercial vehicles using this service showed an overall increase of 97.2% and 175.2% respectively during the period 2003-2012. Tables 10.6a-d give a breakdown of the figures from 2003 highlighting the trends over the past decade. It should be noted that the increases and decreases shown are partly an artefact of the original three services having now been amalgamated into two.

Table 10.6a: Passengers			
Year	Route		
	Kennacraig - Islay	Kennacraig – Islay – Colonsay - Oban	Kennacraig – Islay - Colonsay
2003	139859	0	7820
2004	148047	7294	2135
2005	150890	7383	2029
2006	152526	7309	2420
2007	157408	8685	-
2008	159343	9932	-
2009	171380	10102	-
2010	169280	8110	-
2011	174183	11033	-
2012	178398	11380	-

Table 10.6a: Passengers			
Year	Route		
	Kennacraig - Islay	Kennacraig – Islay – Colonsay - Oban	Kennacraig – Islay - Colonsay
% increase from 2003	27.5%	43.6%[4]	-69%[5]

Table 10.6b: Cars			
Year	Route		
	Kennacraig - Islay	Kennacraig – Islay – Colonsay - Oban	Kennacraig – Islay - Colonsay
2003	45859	0	2171
2004	47438	1700	661
2005	48919	1864	719
2006	49332	1848	833
2007	51377	2383	-
2008	52201	2818	-
2009	56319	2807	-
2010	54239	2323	-
2011	56079	3177	-
2012	57274	3133	-
% increase from 2003	24.9%	84.3%[6]	-61.6%[7]

Table 10.6c: Coaches			
Year	Route		
	Kennacraig - Islay	Kennacraig – Islay – Colonsay - Oban	Kennacraig – Islay - Colonsay
2003	178	0	5
2004	192	16	5
2005	169	25	2
2006	255	20	5
2007	201	19	-
2008	184	10	-
2009	213	9	-
2010	287	11	-

[4] Increase from 2004 due to service not being in existence in 2003.

[5] Decrease between 2003 and 2006 only as service has ceased.

[6] Increase from 2004 due to service not being in existence in 2003.

[7] Decrease between 2003 and 2006 only as service has ceased.

Table 10.6c: Coaches			
Year	Route		
	Kennacraig - Islay	Kennacraig – Islay – Colonsay - Oban	Kennacraig – Islay - Colonsay
2011	344	6	-
2012	351	8	-
% increase from 2003	97.2%	-50%[8]	0%

Table 10.6d: Commercial Vehicles			
Year	Route		
	Kennacraig - Islay	Kennacraig – Islay – Colonsay - Oban	Kennacraig – Islay - Colonsay
2003	7334	0	406
2004	7425	226	167
2005	8151	281	187
2006	8509	263	201
2007	9340	468	-
2008	9797	442	-
2009	9459	356	-
2010	9513	427	-
2011	10519	551	-
2012	12070	622	-
% increase from 2003	64.6%	175.2%[9]	-50.5%[10]

The Kennacraig to Islay to Colonsay to Oban ferry service, which only runs in the summer, also saw a steady increase in passenger numbers (of 38%), cars (65%) and commercial vehicles (58%) between 2004 and 2009, but did not see an increase in coach numbers.

The Port Askaig to Feolin ferry is operated by ASP Ship Management on behalf of Argyll and Bute Council. It crosses the Sound up to 40 times per day in summer between 07:35 and 20:00 (and occasionally until 23:00 if pre-booked). The ferry running this route is the Eilean Dhuira which is a twin engine, twin screw and twin rudder vessel with a draught of around 1.5m and fully laden has a capacity 41t (approximately 6 cars or 1 road tanker). The direct route between Port Askaig and Feolin is approximately 200m north of the northern sub-array. However, due to the effects of the tide, the route

[8] Decrease from 2004 due to service not being in existence in 2003.

[9] Increase from 2004 due to service not being in existence in 2003.

[10] Decrease between 2003 and 2006 only as service has ceased.

over the ground can be as much as 200m north or south of the direct line. It is currently the only method of public transport to access Jura (via Islay) with a vehicle, and during the winter it is the only public transport link between Jura and Islay.

Carrying statistics for this ferry service in 2009 totalled 70,821 passengers over 5980 sailings equating to average passenger numbers per trip of 11.8 people. The average number of passengers per trip during the winter months can be as low as 7.5, whereas in the summer it is as high as 16.6. Passenger numbers are at their highest during spring and summer, with July carrying the greatest number of passengers in 2009 (a total of 8949).

A small 12 seat passenger ferry run by Jura Development Trust operates during the summer months between Craighouse on the south east coast of Jura and Tayvallich on the Kintyre peninsula. The service runs twice per day (except Wednesday) from May to September with a slightly reduced service in April.

10.3.3. Cargo Vessels

There a number of cargo lines which have vessels which use the Sound on a regular basis as part of the inshore traffic route. They include:

- Aasen Shipping and Chartering (Norway);
- Seatrans (Norway);
- Lys Line (Norway);
- Scotline Marine Holdings (UK); and
- Arklow Shipping Ltd (Ireland).

Of the vessels observed during the survey period the deepest draught was the MV Nornews Leader (since renamed MV Ohm Leader) at 6.6m. There were nine vessels with a draught in excess of 5m. The average draught was 4.53m.

The passage through the Sound of Islay is limited by the shallow waters in the north of the Sound where, even if vessels navigate with care to avoid the shallow bank with a minimum depth of 9.1m, the maximum charted depth of navigable waters is in the order of 10.2m.

10.3.4. Royal National Lifeboat Institution (RNLI)

The RNLI Islay Lifeboat is a Severn Class vessel (Helmut Schroder of Dunlossit II) berthed at Port Askaig within a few hundred metres of the proposed array.

10.3.5. Recreational Diving

There are a number of diving sites associated with the Sound of Islay. The Underwater World Publication – "*Dive West Scotland*" by Lawson Wood identifies two dive sites. The first is the "*Port Askaig Deeps*" and involves a "deep" dive within the proposed development area. The second is a drift dive undertaken at an average depth of 12 -15m in the shallower waters to the south of the proposed site in the vicinity of Glas Eilean.

The diving guide "*Dive Islay Wrecks*" by Steve Blackburn identifies the wreck of the Wyre Majestic in position 55 53.0N, 006 07.22W site as a site of interest to divers. This is some 4.3nm to the north of the proposed development.

10.3.6. Sailing and Motor Yachts.

The Sound of Islay is identified in Royal Yachting Association UK Atlas of Recreational Boating as a route classified as a "*Light Recreational Use*". There are no yacht anchorages recommended by the RYA in their routing information.

Discussions with a representative of the RYA (the Chairman of the RYA Scotland Cruising Committee who is the RYA "Coastwatcher" for the area as well as the Secretary of the West Highlands Anchorages and Moorings Association (WHAM)) indicated that the level of recreational vessel traffic was, approximately in the order of 6 – 7 craft per day during the season between April and September. It was stated that such vessels do not frequently anchor in the Sound except, on occasion, to avoid adverse tides by using the anchorages between Am Fraoch Eilean and Brosdale Island, Bunnahabhain Bay and MacDougall's Bay. Such leisure craft are usually below 15m in length and draw up to a maximum of 2.5m.

10.3.7. Military Usage

There are no military, surface Practice Exercise Areas (PEXAs) covering or immediately adjacent to the proposed area and there are no indications of the area as being a transit route for anything other than surface vessels. The Defence Estates (now Defence Infrastructure Organisation (DIO)) Safeguarding department was consulted with regard to the proposed development during the scoping comment exercise conducted by SPR in the initial phase of this project. They stated that they had no concerns regarding the development as it falls outside of a safeguarding area. However, naval vessels do transit the Sound. The largest naval vessel known to have navigated the Sound in recent years was the HMS Bulwark (Length overall (LOA) 177m x 32m beam x 7.5m draught).

10.4. Impact Assessment

The navigational risks from the original demonstration array for the installation, operational[11] and decommissioning phases were considered as "Tolerable with monitoring" (SPR, 2010). However, this consideration was based on the original project assumptions, some of which have now been amended and are reflected in this document for the revised Development. These changes include the increased dimensions of the devices, newly proposed device locations, the potential requirement for standby mooring installations[12], a newly proposed cable route and a new installation methodology which no longer includes the requirement for dynamic positioning (DP) vessels as originally proposed.

Proposed mitigation measures are outlined in Section 10.5.

10.4.1. Potential Impacts during Construction Phase

Rather than look at specific operations that may be disrupted, as was the case with the original impact assessment (SPR, 2010), this section will consider the proposed changes to the Development as set out in Section 10.2 and determine their possible effects and any related mitigation. Therefore, this section should be read in conjunction with the original Navigation chapter within the original ES (SPR, 2010).

The change to the installation methodology from a DP vessel to a purpose built unpowered installation barge, tug/workboat and mooring arrangement has, to an extent, changed the hazard scenarios present during the installation phase. These have been addressed in a recent Hazard Identification and Risk Assessment (HIRA) workshop.

The minimum available width of the navigable channel (reduced by the presence of installation vessels) was determined in SPR (2010) as being in the order of 170m. There has been no significant change to those values. (i.e. a minimum of 163m as opposed to 170m and commensurate reductions in other positions).

The on-site duration of the barge will not change significantly from that proposed for the DP vessel i.e. short duration "on-task" windows (i.e. a matter of hours), and the arrangements for the mooring remove the hazard in the intervening periods, then the risk to shipping from the installation process is considered within the NSRA as "**Tolerable with Additional Controls**" as there has been no significant change to the time at risk..

[11] The risks are not considered to have changed with the proposed increase in operational period.

[12] If required, these will be assessed and an application for consent made separately. They will not be dealt with further in this ER.

Based on existing levels of vessel activity in the Sound and the timeframe associated with installation operations, a low magnitude is predicted. However, given the medium receptor sensitivity, the significance of the effect in relation to the installation of the devices is predicted to be **minor**.

If the mitigation suggested above is implemented it is likely that the significance of the effect in relation to the installation of the devices is predicted to reduce to **negligible**. However, within the NSRA this will remain "**Tolerable with Monitoring**".

10.4.2. Potential Impacts during Operational Phase

Impact: Increased Turbine Height and Reduced UKC

The effect of the increase in overall height of the individual devices has been, to an extent, mitigated by micro-siting using the detailed bathymetric information available (see Section 6.3.1 in Appendix 10.1). Hence, the minimum worst case Under Keel Clearance (UKC) for the deepest draught vessel known to have used the area on a single occasion is now 5.1m (as opposed to 8m) and for the CalMac ferries using the area on a regular basis it is now 9.1m (as opposed to 12m). It should be noted that such clearances would only occur in a specific combination of circumstances i.e. a negative surge of -1m occurring at LAT and during the passage of an infrequent visitor to the Sound which manages to pass over the single turbine sited in the least depth.

The reduction in depth was considered to have changed the assumptions in the previous report that the potential UKC between the devices and the deepest draught vessel were such that further analysis of the theoretical possibility of contact in various sea states and swell conditions was not necessary. Therefore, the updated NSRA addressed this issue in greater detail. The additional analysis undertaken concluded that, if the new dimensions of the turbines were applied to all turbines in all the positions, even assuming a combination of extreme conditions, there is no risk of collision between even the deepest draught vessel (7.5m) and the shallowest turbine.

Given the siting and depths of the other turbines, the normal range of tidal heights and, hence the clearances which exists for the greater part of the time, the risk to shipping from the presence of the array as a whole is considered as being "**Tolerable with Monitoring**".

Based on UKC for the devices and the UKC at the northern end of the Sound, existing levels of vessel activity in the Sound and the timeframe associated with installation operations, a low magnitude is predicted. However, given the medium receptor sensitivity, the significance of the effect in relation to increased turbine height (and resultant reduction in UKC) is predicted to be **minor**.

If the mitigation measures suggested in Section 10.5 are implemented it is likely that the significance of the effect in relation to the presence of the devices and their clearance is predicted to reduce to **negligible**. However, within the NSRA this remains "**Tolerable with Monitoring**".

Impact: Turbine Locations

All of the proposed turbine locations remain within the original red-line boundary of the existing S36 consent. Therefore, as the turbines remain within this area and the UKC has been assessed for this area in the NSRA (see Impact 8.3 and Appendix 10.1) it is not deemed that the alight alteration in turbine locations constitutes an additional impact that requires further assessment than that already done.

Impact: Increase operational life

The increase in operational life is not deemed to alter the impact on shipping due to the use of mitigation measures described above to ensure the project is tolerable with monitoring.

10.4.3. Potential Impacts during Decommissioning Phase

The risks from decommissioning activities are expected to be the same as for the installation process. Therefore, similar control measures would be implemented. However, it is anticipated that the duration of decommissioning will be lower as some infrastructure will remain in place and will not require to be removed.

10.4.4. Cumulative Impacts

Cumulative impacts are not thought to have altered since the original assessment made in the 2010 ES and are not expected to have altered with regards the proposed changes as set out in this chapter.

10.5. Proposed mitigation and monitoring

Table 10.7 (below) details the mitigation measures outlined in the original ES and additional measures identified as part of the updated NRSA.

Table 10.7 Original mitigation measures as outlined in the original ES (2010) and additional proposed mitigation measures

Mitigation measures (2010)	Additional mitigation measures (2014)
Careful timing of activities (such as deliveries to the Feolin slipway) that may impact upon the ferry service to be conducted outside of peak usage where possible. All construction vessels to comply with the international regulations for preventing collision at sea1972 (COLREGS). Vessels will be marked with appropriate flags and lights in accordance with COLREGS to warn other users of any restricted	Liaise with CalMac concerning the planned activities to ensure de-confliction of CalMac ferry operations to/from Port Askaig or, where this was not possible, by establishing a procedure between the developer and CalMac for assessing the risk of allowing ferry operations to take place at the same time as installation activities Submission of adequate information to the UKHO and other authorities (e.g. MCA) in good time to enable promulgation of national and local NMs/Radio Navigational Warnings

Table 10.7 Original mitigation measures as outlined in the original ES (2010) and additional proposed mitigation measures	
Mitigation measures (2010)	Additional mitigation measures (2014)
manoeuvrability. Disruption will be monitored during deployment including through contact with ferry operator. Radio communication between DP vessel, cable laying vessel and the Kennacraig to Port Askaig to be open whenever any of these vessels are on approach or operating within the Sound. The contractor responsible for the cable lay activity will notify the UK Hydrographic Office (UKHO) of all the activity using the maritime safety information (MSI) system for promulgation to all vessels by notices to mariners (NMs) and radio navigational warnings. Notice to mariners will be transmitted by radio each day during construction operations to ensure all users are aware of construction activities.	Provision of an appropriate, dedicated Guard vessel to monitor and warn traffic of the activities being conducted Emergency Response Coordination Plan (ERCoP) in place An Environmental Management Plan (EMP) outlining constraints upon and management required of the installation process will be developed and implemented Appropriate charting of devices.

10.6. Summary

The conclusions drawn from the NSRA (Appendix 10.1) based on the updated development scenario are that the risks identified within this chapter are all '**Tolerable with Monitoring**' as long as the mitigation identified and set out is applied to the project.

10.6.1. Impact Summary Table

See *Annex B* – Hazard and Control Log within the NSRA (Appendix 10.1) for a full hazard list. Table 10.8 relates to the impacts as set out within this chapter.

Table 10.8: Impact Summary Table

Table 10.8: Impact Summary Table				
Installation				
Impact	Magnitude of Impact	Receptor Sensitivity	Significance Level	Residual Impact
Installation Methodology	Low	Medium	Minor	Negligible
Operation / Maintenance				
Impact	Magnitude of Impact	Receptor Sensitivity	Significance Level	Residual Impact
Increased Turbine Height and Reduced UKC	Low	Medium	Minor	Negligible
Turbine Locations	-	-	-	-

10.7. References

Caledonian MacBrayne, 2012. Carrying statistics. Accessed at: http://www.calmac.co.uk/corporate-calmac/carrying-statistics.htm

ScottishPower Renewables (2010). Sound of Islay Demonstration Tidal Array: Volume 1 Environmental Statement. Copyright ScottishPower Renewables (UK) Ltd. 2010.

11. Landscape

11.1. Introduction

This chapter provides a review of the original 2010 ES (SPR, 2010) and compares the potential visual impacts for the new substation location at Traigh Bhan, on the eastern coastline of Islay with the consented substation location on Jura. The chapter draws on information in the Landscape Proposals for the Sound of Islay Tidal Energy Substation (Appendix 11.1).

The original ES concluded that there would be minor / no significant landscape effects during the construction and operational phases of the development. There were predicted to be moderate significant effects on the views from the Dunlossit Estate on Islay, the Kennacraig to Port Askaig ferry and from the Jura road south of Feolin during construction. However these impacts would be temporary during construction, lasting approximately 3 months, with minor / no significant effects anticipated during the operational phase.

11.2. Methodology

11.2.1. Site characterisation

Optimised Environments Ltd (OPEN) has produced an accurate 3D computer model of the substation and this was used to consider the appearance of the substation in relation to the existing landscape. A number of visualisations are provided in Appendix 11.1.

11.2.2. Impact Assessment

The impact assessment methodology follows that of the original ES (SPR, 2010).

11.3. Existing Environment

The proposed substation site is located near the eastern coastline of Islay with landform forming part of the plateau moorland massif which extends from Port Ellen to Port Askaig. The high, rocky plateau has an undulating landform and a massive scale. Steep slopes are broken by numerous rocky outcrops and massive boulders and by upland lochs. The plateau forms a steep, rocky coastline, often with cliffs however the sheltered coastline of the Sound of Islay has a more indented character, with some narrow bays and shingle beaches amongst the cliffs.

The Moorland Plateau is distinctly different on Islay and there is greater diversity, with broadleaved woodlands colonising lower coastal cliffs. The Dunlossit mansion house sits elevated close to the shore and the village of Port Askaig and the Caol Ila distillery are tucked within small bays and contained by steep wooded slopes.

The substation site itself is located on a plateau, between 26-30m AOD, between the steeply rising landform of Beinn Dubh, which backdrops the site to west/south-west; and the steep, rocky raised beach edge, which drops steeply down to sea level in the Sound of Islay to the east. The position of the substation site is on a relatively flat area of ground, with a localised hill form evident in the northern part of the site, at around 28m, with the contours dropping gradually to the south and east, before then dropping steeply at low cliffs on the coastal edge. An incised valley, 'Sruthan na Traighe Baine', is located to the north of the site. The contours rise steeply to the west/south-west up Beinn Dubh (267m).

The proposed substation site will be visible from the Sound of Islay, in views from the Kennacraig to Port Askaig Ferry, as it is located on the coastal edge of the Sound of Islay. The proposed landform contours will provide a degree of visual screening and integration of the development in views from the Kennacraig to Port Askaig Ferry, the principal visual receptor in the Sound of Islay.

The proposed substation will be visible in the context of existing native woodland located on the coastal edge of the Sound of Islay. There are extensive areas of native woodland around the coastal areas of Port Bhoraraic and Am Tamhanach to the north of the proposed substation location, which form a characteristic element of the landscape along this stretch of the Sound of Islay between Port Askaig and Traigh Bhan. In particular, these native woodlands tend to be within small incised valleys near the coast, and along sheltered coastal cliffs of the eastern coastline of Islay. An area of native woodland is located immediately north of the substation, within the incised valley of 'Sruthan na Traighe Baine'.

11.4. Impact Assessment

11.4.1. Designations

The original substation site was to incorporate the southern part of Jura, which is defined as a National Scenic Area (NSA) and to lie approximately 2km to the north of an Area of Panoramic Quality on part of the coast of Islay within the Sound of Islay. It was concluded that the proposal would not compromise the objectives of the NSA designation or the overall integrity of the site.

Movement of the substation location to Islay will avoid infringing upon the NSA and the Area of Panoramic Quality. It will also have no impact on local policy and guidance, in particular Policy LP ENV 9 which requires developments in NSA to demonstrate a standard level of objectives to avoid compromising the designated area.

It is likely that the original assessment of **no significant effect** on the Area of Panoramic Quality and NSA will remain for the new substation location.

11.4.2. Visibility

It was concluded that there would be no, or severely restricted, visibility of the proposed substation development on Jura during construction and operational phases. There may be some limited visibility but this would be a considerable distance from the three most popularly accessed peaks.

The key viewpoints and the significance of effect considered at construction in the original ES included:

- Sound of Islay – Kennacraig to Port Askaig Ferry - moderate;
- Dunlossit Estate, west coast of Islay - moderate;
- Public road on Jura, travelling south - moderate; and
- Public road on Jura, travelling north - moderate.

However each of these viewpoints reduced to minor, no significant or negligible visual effect during the operational phase.

Not all previous viewpoints are considered with the new proposed substation location. There will no longer be a significant visual impact to the Dunlossit estate nor the public road alongside the original development site on Jura. The new site on Islay is away from public roads and outwith the main road connecting the east of the island to the west.

Four key viewpoints have been considered on Islay in agreement with SNH:

- Kennacraig to Port Askaig Ferry (north);
- Kennacraig to Port Askaig Ferry (east);
- Kennacraig to Port Askaig Ferry (south);
- Beinn Chaolais; and
- A846, Jura

The new proposed substation site will be visible from the Sound of Islay, in views from the Kennacraig to Port Askaig Ferry as it is located on the coastal edge of the Sound of Islay. It is likely that the significance on this viewpoint will remain the same as previously assessed, **moderate significance**.

Mitigation described in Section 11.5 includes using landform contours to provide a degree of visual screening and integration of the development in views from the Kennacraig to Port Askaig Ferry, the principal visual receptor in the Sound of Islay (see Figures 7-10, Appendix 11.1). The re-profiling of the site contours will integrate the development within the coastal landform setting and provides a degree of visual screening in views from the Sound of Islay. Additional measures include extending the native woodlands around the site and proposed colour mitigation proposals (Figure 6, Appendix 11.1). These factors are likely to reduce the visual significance of effect further (see Figures 17-27, Appendix 11.1).

Additionally, the colour and native planting mitigation (see Section 11.5) will likely reduce any significant impacts associated with visibility from the A846 road on Jura and any visual impact from Beinn Chaolais to a **minor** / **non-significant** level.

11.4.1. Cumulative Impacts

Cumulative impacts are not thought to have altered since the original assessment made in the 2010 ES and are not expected to have altered with regards the proposed changes as set out in this chapter.

11.5. Mitigation and Monitoring

A re-profiling of the site contours is proposed as part of the development, levelling the ground within site footprint and grading to the east and south, creating a slightly higher landform on the coastal side of development. Proposed landforms will be constructed utilising site-won material from the construction activities. The proposed landform creates a gently sloped landform profile that helps integrate the development within the coastal landform setting and provides a degree of visual screening of the development in views from the Sound of Islay. The proposed landform avoids the creation of landscape 'bunds' with steep triangular forms, which are inappropriate in this landscape. Visual representations of the proposed mitigation are provided in Appendix 11.1.

Table 11.1 outlines the mitigation measures detailed in the original ES and any additional measures proposed as a result of the new substation location.

Table 11.1 Original mitigation measures as outlined in the original ES (2010) and additional proposed mitigation measures

Mitigation measures (2010)	Additional mitigation measures (2014)
Minimising the footprint of the proposed substation to reduce the visual impact from all viewpoints considered in the LVIA and lowering the base of the GRP units to optimise the screening provided by the lower slopes of Beinn na Doire Leithe from the public road when travelling north. Creation of an earth mound against the North-western boundary of the substation to aid screening from the public road. This mound should be vegetated with reserved heather/grass turves cut from the base of the substation.	Original (2010) mitigation revised and summarised below. Re-profiling of site contours; Native woodland planting; and Colouration of substation to merge in with surrounding landscape.

11.6. Summary

The original ES considered the visual significance associated with the Sound of Islay development as moderate significance during construction reducing to minor / no significance during operation. The new substation site is likely to offer a reduction in visual impact given that the surrounding landscape is slightly different in terms of topography and areas of existing native woodland offering a slightly more concealed location. There will also be reduced construction works associated with the new substation development given that there is already an access road to the proposed site. Additionally the Dunlossit estate will no longer be looking directly at the substation as the new location is now on the east coast, slightly south of the mansion house. The additional mitigation measures including proposed re-contouring, colour mitigation and additional tree planting will offer a further reduction in visibility of the substation. Therefore the original statement of a **minor** or **no significant effect** on landscape views during operation and construction remains.

12. Summary

12.1. Impact summary

Table 12.1 provides a summary of the impact assessment outcomes developed for the Development including those for the original impact assessment (from the original ES, SPR (2010)), and the assessment of the impact of changes to the Development assessed within this report.

Table 12.1 Summary of impacts

Receptor	Original impact assessed	Original Residual Impact levels	Revised impact assessment
Physical processes	Changes to hydrodynamic regime Increase in suspended sediments	Negligible	N/A
Benthic ecology	Habitat loss Increased suspended sediments	Negligible	Negligible
Marine mammals	Noise and vibrations during construction and operation; collision risks, barrier effects.	Minor - Moderate adverse	Minor
Marine fish / Anadromous fish	Loss of spawning/ nursery grounds Noise Collision EMF	Negligible/Non-significant	N/A
Elasmobranchs	Smothering of spawning habitat Changes to prey Noise EMF	Negligible – Minor	N/A
Ornithology	Seabird disturbance	Negligible	No change to seabird assessment Major impact on golden eagle
Commercial fisheries	Loss of fishing area, navigational issues - entanglement, loss of equipment	Range Minor adverse to Minor beneficial	N/A

Table 12.1 Summary of impacts			
Receptor	Original impact assessed	Original Residual Impact levels	Revised impact assessment
Terrestrial ecology	Impact to designated sites Terrestrial habitat loss Disturbance to otters Disturbance to reptiles, amphibians & invertebrates Spread of non-native species	Negligible - Moderately adverse	Negligible - Minor
LSVIA	Temporary impacts during construction Visual impacts of the substation during the operational phase	Negligible - Moderate	Minor-Moderate
Cultural heritage	Damage to or removal of unknown onshore and onshore cultural heritage assets	Negligible to Major but that these could be completely mitigated	N/A
Shipping and navigation	Vessel movements in the area, DP installation methods	Tolerable with Monitoring	Yes
Traffic and transport	Disruption to ferry routes; road traffic disruption during construction	Minor adverse Tolerable with Monitoring	Minor adverse Tolerable with Monitoring
Tourism, recreation and socio-economics	Job creation during construction; increased spend during installation and operation/maintenance. Disturbance/displacement of tourism and recreational activity	Minor-Moderate beneficial Negligible-Minor adverse	N/A
Onshore noise	Temporary vehicle noise during construction Noise from the offshore construction	Negligible - Minor	N/A
Water and sediment quality	Accidental spillages of materials during construction, operation (including maintenance) and decommissioning	Minor	N/A

Table 12.1 Summary of impacts			
Receptor	Original impact assessed	Original Residual Impact levels	Revised impact assessment
Munitions and military	Minor disruption during construction to military vessels operating in adjacent PEXAs	Negligible	N/A
Air quality	Construction/decommissioning of onshore works, increased road traffic and dust emissions	Negligible	N/A

12.2. Mitigation summary

Table 12.2 provides a complete overview of the mitigation proposed for the Sound of Islay Demonstration Tidal Array and onshore substation, taking into account the original mitigation outlined in SPR (2010) and any newly proposed mitigation outlined in this Environmental Report.

Table 12.2 Overview of all proposed mitigation measures

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
Ornithology - golden eagle	Golden eagle not considered in original ES	Ongoing monitoring of the golden eagle nests is being commissioned for summer 2014 to assess breeding success pre-construction. This will allow review of the timing of construction with consultees. **Construction** Mitigation will be discussed and agreed with SNH and RSPB. Mitigation measures are likely to include: • Construction works limited to a minimum of 1000m from the eyrie during the breeding season (January to August), and at a greater distance if visible from the eyrie /birds in the vicinity of the eyrie. • A temporary net screening between the works and the nest;

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
		• Works involving major construction activity will be scheduled to occur out with the period January to July unless otherwise agreed with SNH and RSPB. An Ecological Clerk of Works will be in place during construction. **Commissioning & Operation** In situ temporary screening during commissioning, if appropriate. In situ temporary screening will be used during operation, if appropriate, until planting matures. Planting (proposed planting located to ensure that the building is screened as much as possible when viewed from the eagle nest), mounding (to minimise view of substation from the nest) and change to car park location (to south of substation). Potential to restrict access during breeding season to limited to high-priority / essential access only. Sympathetic working practices at all times with careful management of timing of work, noise, lighting, and movement of workers. **Decommissioning** As construction

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
		Monitoring An Environmental Monitoring Plan (EMP) will be discussed and agreed with SNH and RPSB. Potential to include cameras set up on site for long term monitoring
Ornithology - all other birds	Surveys to locate the nests of birds listed in Schedule 1 of the WCA will be undertaken prior to construction (and decommissioning) works during the period March-August. These surveys will be undertaken to inform measures to safeguard any breeding attempts from disturbance. Risks to seabirds of accidental release of marine contaminants will be minimised by adopting safe working practices and having contingency plans for dealing with incidents Artificial nest sites for black guillemots to be located away from the immediate vicinity of the proposed Development site should help reduce disturbance effects on the breeding population of this species.	Original (2010) mitigation applies. No additional mitigation.

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
Terrestrial ecology	**Otters** Detailed otter surveys will take place prior to final cable landfall design to check the footprint for holts, lie-up and couches and other otter activities in consultation with SNH. This will be used to inform the application for a licence to disturb otters as may be required. Construction work will be undertaken during agreed daylight working hours (07:00-18:00), where practicable. Artificial light will not be used next to the coastline or rivers at night to allow otters to migrate through the area undisturbed. During summer months, construction may continue later into the evening without the need for artificial lighting. Construction areas will be left in a safe condition during periods of inactivity, with chemicals and construction materials stored safely in accordance with SEPA's Pollution Prevention and Chemical Guidelines (PPG2- Above ground oil storage tanks, and PPG5 – Works in, near or liable to affect watercourses). Key measures may include capping all pipes, covering all trenches or providing a means for otter to escape. Construction activities will maintain a	Original (2010) mitigation applies. Additional mitigation below. **Otters** Pre-construction surveys of all suitable areas to be affected by works; obtain EPS licence if holts/couches found within work vicinity at this stage. Ensure no potentially harmful work areas are left accessible to otters during times when work has been ceased (e.g. uncovered pipe-workings/excavations in which otters could become trapped). Provision of mammal/wildlife corridor within any new water crossing design. **Bats** To ensure compliance with the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended), a pre-construction survey of all suitable areas to be affected by the works will need to be undertaken. If any roost sites are found within these areas at this stage, then it may be necessary to obtain an EPS disturbance licence in order for works to continue Avoid felling trees with bat roost potential. **Habitats** A peat depth survey and peat management plan to outline handling and reuse of the peat within the planning boundary.

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
	strict footprint of works for the corridor of the cable trenching, and construction vehicles and equipment will not be active on or stored by the coastline for longer than is necessary. **Habitats** Impacts may be reduced further through the following measures: avoidance of tree loss altogether via micrositing or replacement planting of native trees and shrubs at an appropriate location.	The potential for improvements to hydrology connectivity through the track as part of the track's upgrade will be explored, and agreed with SEPA as appropriate. An area of bog creation will be investigated, aiming to utilise local topography and hydrology to support translocated peat and blanket bog vegetation. The trench from landfall to the substation will be designed to prevent formation of a preferential flow path and under-draining wetland areas. The following surveys are required preconstruction to identify/refine the relevant mitigation requirements: • A Functional Wetland Typology for Scotland survey (SNIFFER, 2009) • A more detailed National Vegetation Classification (NVC) survey will then be carried out on all wetland areas identified. A Controlled Activities Regulations (CAR) licence will be requested for cable crossings as appropriate Best practice working methods will be implemented to avoid pollution (e.g. implementation of SEPA's pollution prevention guidelines (PPG) and monitoring by an Ecological Clerk of Works during construction).

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
		A suitable Pollution Prevention Plan will be agreed in consultation with SEPA and SNH in advance of construction progressing.
Anadromous fish	No mitigation required; however, contractors will adhere to good construction practice guidance (e.g. CIRIA guidance, SEPA Pollution Prevention Guidelines).	No additional mitigation.
Marine fish and shellfish resources	Micro-siting to avoid any known sensitive habitats such as rocky reefs Use of soft start (gradual ramping up) to any operations that will emit noise and vibrations into the Sound Adherence to best practice outlined in BS5228-2 (2009) British Standards Code of practice for noise and vibration control on construction and open sites during all construction activities Adherence to best practice guidance in CIRIA C584 (2003) Coastal and Marine Environmental Site Guide during all construction activities	Original (2010) mitigation applies. No additional mitigation.

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
	Environmental Site Guide during all construction activities Carry out works at or close to slack tide when any suspended sediment will re-settle more rapidly and in the vicinity of the work site Use cable and device installation methods that minimise sediment re-suspension	
Commercial fisheries	Install turbines and cables during periods of least fishing activity within the Sound (creeling activity is at its lowest in the summer). Close consultation with local fishermen to identify methods of installation which minimise the area and the time period for any restriction. Micro-siting to avoid reef areas which may potentially be used by lobster. Consultation with fishermen to ensure that they are fully aware of the locations and timings of installation. Fishing vessels to be provided with accurate information on the position of the individual devices immediately after they are installed. All crews operating installation vessels and any shore based workers to remain vigilant at all times, and alerting such fisherman to the potential danger.	Original (2010) mitigation applies. No additional mitigation

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
	Dedicated safety boat to safely manage any unpowered vessels that come within the vicinity during installation. Consultation with fishermen to ensure that they are fully aware of the locations of the turbines. Provision of device positional data to Kingfisher Information Services and to local fishermen (so they can input into their plotters). Designate the array area a "No Fishing" (Int. Symbol N21) and "No Diving" area. An explanatory note to be included in navigational charts explaining the nature of the hazards caused by the turbines. The reporting of any accidents or near misses should occur in a clear and concise manner. A procedure for achieving this should be decided upon which should clearly outline who is responsible for reporting and how it should occur.	

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
Elasmobranchs	The use of vessel and / or shore based visual observers would allow teams undertaking installation works to be alerted to the presence of basking sharks in the Sound. On receiving such an alert, appropriate mitigation would be put in place, potentially including avoidance of areas where sharks are feeding and modification (e.g. slowing of vessels) or cessation of installation activity until the sharks have moved on from the installation area. Appropriate procedures would be agreed with Marine Scotland SPR accepts that there is some uncertainty about some potential impacts from the Development and is committed to undertaking a post installation monitoring programme in order to determine the nature of those impacts SPR is committed to working with the regulator to identify reasonable measures to mitigate against collision risk	Original (2010) mitigation applies. No additional mitigation

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
Marine mammals	Post installation monitoring and any mitigation considered necessary by regulators, as part of an ongoing programme of adaptive management. A deploy and monitor strategy is proposed, with ongoing monitoring, linked to management of the Development. An application for a licence to disturb EPS, to enable regulators to allow deployment while further knowledge regarding effects (or lack of effects) from the Development is obtained. As part of a wider adaptive management and environmental monitoring strategy, SPR is committed to mitigating relevant significant effects identified by ongoing monitoring. Application of a vessel management protocol based on existing 'best practice' will ensure reasonable mitigation is in place to reduce potential for collision and remove potential disturbance to haul out areas in the Sound.	Original (2010) mitigation applies. No additional mitigation The licence for the export cable route which was issued in February 2014 identifies that an exclusion zone of 500m should be maintained around seal haul out sites during the sensitive period for harbour seals (June to August).
Benthic ecology	No mitigation proposed	No additional mitigation in relation to this application. The licence for the export cable route which was issued in February 2014 identifies a series of mitigation measures including: • Debris or waste materials arising

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
		during the course of the cabling works are to be removed from the site disposal at an approved location above Mean High Water Springs; • Measures to be taken to minimise damage to the foreshore; • The best method of practice will be used to minimise re-suspension of sediment during cable installation; and • Measures to be taken to minimise potential impacts on the maerl bed.
Water and sediment quality	No mitigation proposed	No additional mitigation
Physical environment & Coastal processes	No mitigation proposed	No additional mitigation
Air Quality	The sulphur content of any fuel oil used on board a ship must not exceed limits outlined in the Merchant Shipping (Prevention of Air Pollution from Ships) Regulations 2008 as amended. No additional mitigation measures	Original (2010) mitigation applies. No additional mitigation

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
Cultural heritage	Direct impacts on unknown onshore undesignated cultural heritage assets during the construction phase could be mitigated through a programme of archaeological works, the scope of which would be provided in a WSI to be agreed by West of Scotland Archaeology Service (WoSAS) on behalf of the Planning Authority	Original (2010) mitigation applies. No additional mitigation
Socio-economics	Installation will be designed to minimise unnecessary noise Adherence to Traffic Management Plan and mitigation laid out in Chapter 19 (SPR, 2010): Transport and Traffic, including consideration of large public events The array will be appropriately charted as an underwater obstruction and annotated, also be charted as 'no fishing' and 'no diving' area and consultation will continue with relevant diving organisations. During construction activities the following safety procedures will be implemented: Notice of the activities would be promulgated through the UKHO Maritime Safety Information system (i.e. Notices to Mariners (NMs) and Radio Navigational Warnings (NavWarns/WZs)) and will occur just prior to and during the maintenance works Installation vessels will comply with	Original (2010) mitigation applies. No additional mitigation

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
	the COLREGS in that they would display the appropriate lights and marks for vessels engaged in such activities Presence on site of manned vessels capable of monitoring and advising the other marine traffic using the Sound of Islay The Navigational Risk Assessment has been undertaken (Appendix 19.1) and identifies management of potential conflict with ferry routes. Further mitigation is discussed in Chapter 19 (SPR 2010): Transport and Traffic. SPR will continue to work to raise the profile of the project and demonstrate the benefits of tidal energy; work with the Islay Energy Trust to develop and promote good quality interpretative materials to encourage interest and understanding of tidal energy. As a safety precaution Hammerfest Strom are fitting rope cutters on the devices to prevent entanglement of fishing gear.	

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
Landscape and seascape	Minimising the footprint of the proposed substation to reduce the visual impact from all viewpoints considered in the LVIA and lowering the base of the GRP units to optimise the screening provided by the lower slopes of Beinn na Doire Leithe from the public road when travelling north. Creation of an earth mound against the North-western boundary of the substation to aid screening from the public road. This mound should be vegetated with reserved heather/grass turves cut from the base of the substation.	Original (2010) mitigation revised and summarised below. Re-profiling of site contours; Native woodland planting; and Colouration of substation to merge in with surrounding landscape.
Military and Munitions	Through consultation with the Defence Estates it was identified that there were no concerns with regard to military activities and the tidal array development. Consultation with the Defence Estates will be continued throughout consenting and site development, allowing any future concerns to be addressed should they arise. The Defence Estates will be informed in advance of intended works dates and any potentially conflicting activities will be coordinated to minimise disturbance. The Development will adhere to the safety measures identified in the Navigational Safety Risk Assessment (Appendix 19.1, SPR (2010)), with particular reference to the following points: • Notice of the works would be promulgated through the UKHO	Original (2010) mitigation applies. No additional mitigation

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
	Maritime Safety Information system (i.e. Notices to Mariners (NMs) and Radio Navigational Warnings (NavWarns/WZs)) and will occur just prior to and during the construction works; • Installation vessels will comply with the COLREGS in that they would display the appropriate lights and marks for vessels engaged in such activities; • Presence on site of manned vessels capable of monitoring and advising the other marine traffic using the Sound of Islay; • The array will be appropriately charted as an underwater obstruction and annotated, as discussed further in the Navigational Safety Risk Assessment; and • The Principal Contractor will liaise with local organisations including the Defence Estates to ensure that suitable working channels are selected to avoid compromising authorised communications • Should suspected items of UXO be discovered during any project phase, their location will be recorded and immediate advice will be sought from the relevant authorities. If a UXO is identified during the construction phase then works will cease immediately until advice and remediative actions are implemented. • In addition munitions awareness	

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
	briefings will be given to contractors and ship staff prior to and during the construction phases. The MoD and emergency services will be consulted as appropriate. The Defence Estates will be informed in advance of intended works dates and any potentially conflicting activities will be coordinated to avoid conflict.	
Noise	Where feasible, night time operations will be avoided; The control of construction noise from marine construction operations will be most effectively achieved through the application by the Principal Contractor for a Section 61 'prior consent' in accordance with the guidance set out in the Control of Pollution Act 1974. Additional generic mitigation against marine construction noise will be relatively generic, incorporating conventional best practice in construction operations. Mitigation measures may (not exclusively) include: • Education and awareness-raising of construction operatives with regard to the prevention of local community noise disturbance. • Minimising the idling of vessels in proximity to the residential properties. • Avoiding excessive revving of vessel or marine plant equipment	Original (2010) mitigation applies. No additional mitigation

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
	engines. • Extra care taken in handling and placing materials within vessels. • Ensuring that the most modern plant equipment is used and fitted with appropriate noise attenuation. Ensuring proper maintenance and operation of plant equipment and vessels.	
Shipping (included in the traffic and transport chapter of SPR (2010))	Radio communication between DP vessel, cable laying vessel and the Kennacraig to Port Askaig to be open whenever any of these vessels are on approach or operating within the Sound. The contractor responsible for the cable lay activity will notify the UK Hydrographic Office (UKHO) of all the activity using the maritime safety information (MSI) system for promulgation to all vessels by notices to mariners (NMs) and radio navigational warnings. All construction vessels to comply with the international regulations for preventing collision at sea 1972 (COLREGS).Appropriate flags and lighting to show the manoeuvrability of the construction vessels in accordance with COLREGS. Disruption will be monitored during	Liaise with CalMac concerning the planned activities to ensure management of CalMac ferry operations to/from Port Askaig or, where this was not possible, by establishing a procedure between the developer and CalMac for assessing the risk of allowing ferry operations to take place at the same time as installation activities Submission of adequate information to the UKHO and other authorities (e.g. MCA) in good time to enable promulgation of national and local NMs/Radio Navigational Warnings Provision of an appropriate, dedicated Guard vessel to monitor and warn traffic of the activities being conducted Emergency Response Coordination Plan (ERCoP) in place Environmental limits for the installation process are developed and implemented

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
	deployment through contact with ferry operator in order to minimise impact. Notice to mariners will be transmitted by radio each day during construction operations to ensure all users are aware of construction activities.	Appropriate charting of devices.
Onshore traffic	Onshore construction works carefully sited to avoid traffic access routes to the ferry terminals on both Islay and Jura. Staff travelling on the Islay to the Jura ferry service during construction of the substation should use the minimum number of vehicles as is practical (car sharing when possible). Use of suitable methodology to ensure road disruption is minimised, such as half road closure or use of passing places whilst construction is undertaken. The contractor will provide a traffic management plan which will insure that the increase in traffic on Jura will reduce affect to the normal A846 traffic. Further mitigation measures, if required, will be determined in discussions with the relevant highway authorities (Argyll and Bute Council) Remedial works to improve road surfaces if it is deemed that the Development has caused degradation	Original (SPR, 2010) mitigation will be reviewed and, in consultation with regulators and consultees, applied to Islay, as appropriate. No additional mitigation

Receptor	Mitigation Measures (EIA 2010)	Additional mitigation measures (SEI 2014)
	of the (A846) Construction vessels, where possible, will avoid unnecessary crossing of the ferry route. Careful timing of activities (such as deliveries to the Feolin slipway) that may impact upon the ferry service to be conducted outside of peak usage where possible.	

Appendix 6.1 Video survey of the export cable route

Appendix 6.2 Intertidal survey

Appendix 7.1 Marine mammal survey and technical report

Appendix 8.1 Ornithology year 2 report

Appendix 8.2 Confidential appendix

Appendix 9.1 Terrestrial survey report

Appendix 10.1 Navigational Safety Risk Assessment

Appendix 11.1 Landscape Proposals