Department for Business, Energy & Industrial Strategy

RECORD OF THE HABITATS REGULATIONS ASSESSMENT UNDERTAKEN UNDER REGULATION 5 OF THE OFFSHORE PETROLEUM ACTIVITIES (CONSERVATION OF HABITATS) REGULATIONS 2001 (As Amended)

Project Title*: *HRA Colter 98-11 Appraisal Well

July 2018

(updated October 2018)

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1 INTRODUCTION

1.1 Council Directive 92/43/EC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) and Council Directive 2009/147/EC on the conservation of wild birds (the Birds Directive) aim to ensure the long-term survival of certain habitats and species by protecting them from the adverse effects of plans and projects.

1.2 The Habitats Directive provides for the designation of sites for the protection of habitats and species of European importance. These sites are called Special Areas of Conservation (SACs). The Birds Directive provides for the classification of sites for the protection of rare and vulnerable birds and for regularly occurring migratory species. These sites are called Special Protection Areas (SPAs). SACs and SPAs are collectively termed European sites and form part of a network of protected sites across Europe. This network is called Natura 2000. A Site of Community Importance (SCI) is a SAC in the process of receiving approval; it has received approval from the European Commission (EC) but has still to be formally designated as a SAC by the UK Government. Sites designated under the Ramsar Convention are also afforded the same level of protection as a designated site.

1.3 Any plan or project which either alone or in-combination with other plans or projects would be likely to have a significant effect on a qualifying site must be subject to an Appropriate Assessment to determine the implications for a site's integrity and conservation objectives. Such a plan or project may only be agreed after ascertaining that it will not adversely affect the integrity of a European Site unless there are imperative reasons of overriding public interest for carrying out the plan or project. Draft sites, i.e. those that have not been subject to any formal consultation, are not subject to the Appropriate Assessment process.

1.4 The Offshore Habitats Regulations transpose the Directives into UK law for offshore activities consented under the Petroleum Act 1998 and the Energy Act 2008.

1.5 Regulation 5(1) of the Offshore Habitats Regulations provides that: '*The Secretary of State shall, before granting any Petroleum Act licence, any consent, any authorisation, or any approval, where he considers that anything that might be done or any activity which might be carried on pursuant to such a licence, consent, authorisation or approval is likely to have a significant effect on a relevant site, whether individually or in-combination with any other plan or project, including but not limited to any other relevant project, make an appropriate assessment of the implications for the site in view of the site's conservation objectives*'.

1.6 Regulation 3(5) of The Energy Act 2008 (Consequential Modifications) (Offshore Environmental Protection) Order 2010 applies regulation 5 of the Offshore Habitats Regulations to an Energy Act licence that has been or is to be granted, as it applies to a Petroleum Act licence; and for the purposes of those regulations "consent" also includes a consent granted pursuant to an

Energy Act licence, including any consent required pursuant to the Offshore Petroleum Production and Pipe-lines (Assessment of Environmental Effects) Regulations 1999.

1.7 This is a record of the Appropriate Assessment undertaken by the Department for Business Energy and Industrial Strategy (BEIS) in respect of the drilling of an appraisal well at the Colter field as proposed in the Environmental Statement application [BEIS ref. no. W/4207/2017] as required under Regulation 5 of the Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001 (S.I. 2001/1754) (as amended), The Offshore Marine Conservation (Natural Habitats &c.) Regulations 2007 and in accordance with the Habitats Directive (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora).

2 SCOPE OF THE ASSESSMENT

2.1 The Environmental Statement submitted by Corallian Energy Ltd (Corallian 2017) identified 12 SACs, four SPAs and three Ramsar sites on which the the proposed appraisal well could have a likely significant effect. The sites identified were:

- Isle of Portland to Studland Cliffs SAC,
- Studland to Portland SAC,
- Dorset Heaths (Purbeck and Wareham) and Studland Dunes SAC,
- Dorset Heath SAC,
- River Avon SAC,
- St Albans Head to Durlston Head SAC,
- South Wight Maritime SAC,
- Solent Maritime SAC,
- Isle of Wight Downs SAC,
- Solent and Isle of Wight Lagoons SAC,
- Wight-Barfleur Reef SAC,
- River Itchen SAC,
- Solent and Dorset Coast pSPA,
- Poole Harbour SPA and Ramsar,
- Dorset heathlands SPA and Ramsar,
- New Forest SPA,
- Solent and Southampton Water SPA and Ramsar.

2.2 Following the completion of the Environmental Impact Assessment (EIA) the applicant identified seven designated sites for further consideration and undertook an HRA likely significant effect screening assessment. The seven sites identified as requiring an LSE screening assessment were:

- Studland to Portland SAC,
- River Avon SAC,
- Solent and Dorset Coast SPA,
- Solent and Southampton Water SPA and Ramsar,

- River Itchen SAC,
- Poole Harbour SPA and Ramsar.
- New Forrest SPA

2.3 The assessment undertaken in the application concluded that there would not be a likely significant effect on any of the qualifying features of the designated sites (Corallian 2017).

2.4 Advice received during consultation identified no specific concerns for the following sites subject to suitable management of proposed activities that could impact on the qualifying features of the sites (Natural England 2018):

- Solent and Dorset Coast pSPA,
- Solent and Southampton Water SPA and Ramsar,
- New Forest SPA and Ramsar.

2.5 Further clarification was requested by Natural England before it could be concluded that that the proposed project would not have a likely significant effect on the following designated sites:

- Studland to Portland SAC.

The following protected sites were identified as being at risk of a likely significant effect but additional information was required:

- River Avon SAC,
- River Itchen SAC.

2.6 BEIS agrees with the advice received relating to the sites on which the proposed project, alone and in-combination, could cause a likely significant effect.

2.7 Based on the advice received and the information presented within the application BEIS is of the opinion that there could be a likely significant effect on three designated sites and these have been considered in the Appropriate Assessment:

- Solent and Dorset Coast pSPA,
- River Avon SAC,
- River Itchen SAC.

Information sources

2.8 The Appropriate Assessment draws on a number of information sources relating to the proposed project and site designations and should be read in conjunction with this report.

- Colter (98/11-E) Appraisal Well: Environmental statement. (Corallian 2017).
- Colter (98/11-E) Appraisal Well: Supplementary Noise Report. (Corallian 2018).

2.9 References to technical papers and other documents are given in the text as necessary.

3 PROPOSED PROJECT

3.1 This section summarises the activities relating to the proposed project relevant to this assessment. Further information on the proposed project can be found in the Environmental Statement (Corallian 2017).

3.2 The proposed appraisal well, Colter 98-11-E, is a single well to be drilled using a mobile offshore drilling unit, most likely a jack-up drill rig. The well is located at 59° 39' 14.3N, 01° 49' 55.6W (ED50 UTM Zone 30N) and located approximately 6 km from the nearest coast, in water depths of 16 m (Figure 1).

3.3 It is planned to undertake drilling during 2018, depending on regulatory consent and rig availability. The overall duration the rig will be on location is estimated to be between 30 and 45 days.

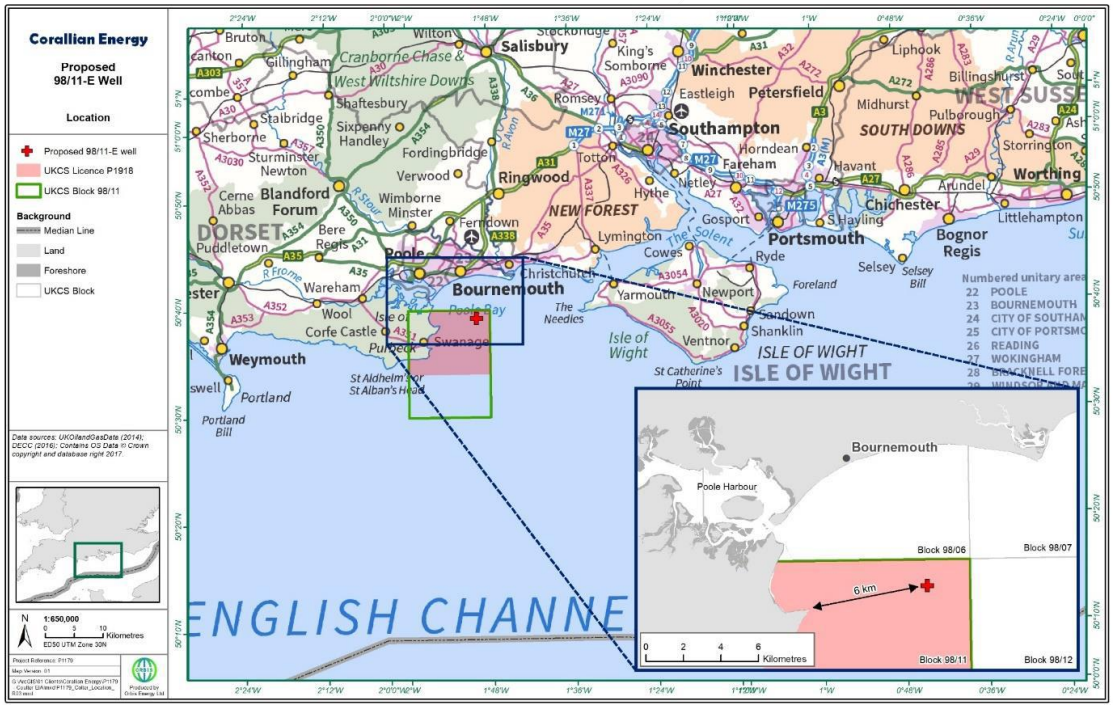

Figure 1: Proposed location of appraisal well 98/11-E (source Corallian 2017).

3.4 The jack-up rig to be used has not been finalised. However, a typical jack up rig is approximately 90 m x 100m in size and has either three or four legs supported on the sea floor by spud cans that are typically around 14 m in diameter. Depending on the seabed conditions there may be a requirement for rig stabilisation in order to minimise the risk of scour around the legs of the rig. If so, then an estimated 1,000 tonnes of rock will be placed around each leg. Of

the three previous drilling activities undertaken in the vicinity of the proposed well, it is reported that one has required rig stabilisation.

3.5 The appraisal well will target two hydrocarbon prospects at 1,100 and 1,640 m below the seabed. The expected reservoir fluid is a light crude oil 41.9° API (American Petroleum Institute). Drilling will be undertaken using seawater and water based muds. All chemical usage will be subject to the offshore chemical regulations (Offshore Chemical regulations 2002 (as amended)) and require consent prior to any usage and/or discharge.

3.6 It is estimated that 4.03 m^3 of drill cuttings and muds from the lower well sections may be contaminated with up to 278 kg of hydrocarbons. The assessment states that the contaminated cuttings and muds will be passed through a cuttings cleaning system to remove hydrocarbons before being discharged to the sea. However, no information is presented on the system to be used to remove hydrocarbons nor is the estimated volume of residual hydrocarbons that could be discharged following treatment. It is stated that 278 kg of hydrocarbons could be discharged. Subsequent to the application, Corallian have confirmed that all cuttings and muds contaminated with hydrocarbons will be contained and shipped to shore for treatment and disposal.

3.7 An estimated four vessels per week will visit the rig in order to provide supplies and one safety vessel will be present for the duration of the activities. The supply vessel will either be located at Portland harbour, Poole harbour or Southampton. An estimated six helicopter flights per week are expected to be required in order to transfer personnel. Flights will be from either Southampton or Bournemouth.

3.8 Following completion of the well there will be no flow tests and therefore no oil will be flowed to the surface. Following completion of the well it will be permanently plugged and abandoned.

3.9 A check-shot survey may be undertaken to determine the sub surface geology. The survey requires the use of 2 x 250 cubic inch airguns, placed on the seabed and operated over a period of less than 14 hrs, during which time five successive shots are fired every 30 minutes. The airguns will be placed on the seabed and the Sound Pressure Level from them will be 241 re 1µPa @ 1 m across a frequency range of 0.005 to 20 kHz.

3.10 It is estimated that the drill rig will be present on location for up to 45 days, during which time drilling is estimated to be undertaken over a period of 20 days. The anticipated earliest spud date was 15 April 2018. However, it is now envisaged that activities will commence in Q3 or Q4 2018.

4 QUALIFYING FEATURES OF THE RELEVANT SITES.

Solent and Dorset Coast pSPA

4.1 The proposed appraisal well is located within the Solent and Dorset Coast pSPA.

4.2 The Solent and Dorset Coast pSPA is a marine SPA extending from the Isle of Purbeck to the West of Bognor Regis and covers an area of approximately 890.7 km^2. The site is designated as an important area for three species of breeding Tern, namely: Sandwich tern (*Sterna sandvicensis*), common tern (*Sterna hirundo*) and little tern (*Sterna albifrons*), all of which breed in coastal SPA colonies adjacent to the pSPA and use the area for feeding (Natural England 2016a). The area of the pSPA is based on the area within which breeding Terns forage from between April and September. The boundary is defined by the recorded distributions of breeding Terns, particularly little terns, from coastal observations and generic model predictions for Sandwich and common tern.

4.3 The site holds 4.1% of the GB breeding population of Sandwich tern, 4.8% of the common tern population and 3.3% of the little tern population (Natural England 2016a).

Site	Distance from Appraisal well (km)	Qualifying features
Solent and and Dorset pSPA	0	Species Sandwich tern *Sterna sandvicensis* (441 prs) Common tern *Sterna hirundo* (492 prs) Little tern *Sterna albifrons* (63 prs)
River Avon SAC	8.4	Habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (Rivers with floating vegetation often dominated by water crowfoot) Species Bullhead *Cottus gobio* Brook lamprey *Lampetra planeri* Sea lamprey *Petromyzon marinus* Atlantic salmon *Salmo salar* Desmoulin's whorl snail *Salmo salar*
River Itchen SAC	44	Habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (Rivers with floating vegetation often dominated by water crowfoot)

		Species Bullhead *Cottus gobio* Brook lamprey *Lampetra planeri*, Atlantic salmon *Salmo salar,* Otter *Lutra lutra*, Southern damselfly *Coenagrion mercurial* white-clawed crayfish *Austropotamobius pallipes*

River Avon SAC

4.4 The River Avon SAC is, at its closest point, located 8.4 km to the north-east of the proposed appraisal well.

4.5 The site is designated for a qualifying habitat of water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (Rivers with floating vegetation often dominated by water-crowfoot). There are four qualifying species of fish: Bullhead (*Cottus gobio*), Brook lamprey (*Lampetra planeri)*, Sea lamprey (*Petromyzon marinus)* and Atlantic salmon (*Salmo salar)* and one species of mollusc: Desmoulin's whorl snail (*Salmo salar)*.

River Itchen SAC

4.6 The River Itchen SAC is, at its closest point, located 44 km to the north-east of the proposed appraisal well.

4.7 The site is designated for a qualifying habitat of: water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (Rivers with floating vegetation often dominated by water-crowfoot). The qualifying species for the site are: Bullhead (*Cottus gobio*), Brook lamprey (*Lampetra planeri)*, Atlantic salmon (*Salmo salar)*, Otter (*Lutra lutra*), Southern damselfly (*Coenagrion mercuriale*) and white-clawed crayfish (*Austropotamobius pallipes)*.

5 CONSERVATION OBJECTIVES

5.1 Conservation Objectives constitute a necessary reference for identifying site-based conservation measures and for carrying out Habitat Regulations Assessments of the implications of plans or projects. They outline the desired state for any European site, in terms of the features for which it has been designated. If these features are being managed in a way which maintains their nature conservation value, they are assessed as being in a 'favourable condition'. An adverse effect on the integrity of a site is likely to be one which prevents the site from making the same contribution to favourable conservation status for the relevant feature as it did at the time of its designation.

5.2 The purpose of an Appropriate Assessment is to determine whether a plan or project adversely affects a site's integrity. The critical consideration in relation to site integrity is whether the plan or project affecting a site, either individually or in combination, affects the site's ability to achieve its conservation objectives and favourable conservation status.

5.3 The Conservation Objectives for the Solent and Dorset Coast pSPA are :

> *Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;*
>
> - *The extent and distribution of the habitats of the qualifying features*
> - *The structure and function of the habitats of the qualifying features*
> - *The supporting processes on which the habitats of the qualifying features rely*
> - *The population of each of the qualifying features, and,*
> - *The distribution of the qualifying features within the site.*

(Natural England 2016b)

5.4 The conservation objectives for the River Avon SAC and River Itchen SAC are:

> *Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;*
>
> - *The extent and distribution of qualifying natural habitats and habitats of qualifying species*
> - *The structure and function (including typical species) of qualifying natural habitats*
> - *The structure and function of the habitats of qualifying species*
> - *The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely*
> - *The populations of qualifying species, and,*

- *The distribution of qualifying species within the site.*

(Natural England 2014a, b)

5.5 The '*integrity of the site*' is defined as ''*the coherence of the site's ecological structure and function, across its whole area which enable it to sustain the habitats, complex of habitats and/or population levels of the species for which it was classified (or designated)* (Natural England 2017). Therefore, the integrity of the site applies to the whole of the site and it is the potential impacts across the whole of the site that are required to be appropriately assessed.

5.6 The HRA has been carried out in light of best scientific knowledge with reference to the Conservation Objectives of the qualifying sites and the potential impacts on the integrity of the site (EC 2010).

6 IN-COMBINATION IMPACTS

6.1 Under the Habitats Regulations, it is necessary to consider the in-combination effects of development proposals on European Sites. These refer to effects, which may or may not interact with each other, but which could affect the same receptor or interest feature (i.e. a habitat or species for which a European site is designated).

6.2 The in-combination assessment must include known developments that are:

- Under construction,
- Permitted, but not yet implemented,
- Submitted application(s) not yet determined,
- Projects identified in the relevant Development Plan (and emerging Development Plans),
- Projects identified in other policy documents, as reasonably likely to come forward.

6.3 It is recognised that the potential on-going impacts on qualifying features from current activities that have had a long historical presence within or adjacent to the relevant designated sites are captured within the baseline. For some on-going activities, e.g. shipping, it is not possible to determine what the baseline conditions would be without the impacts that these activities have on the current populations or their prey.

7 LIKELY SIGNIFICANT EFFECTS TEST

7.1 Regulation 5 of the Offshore Habitats Regulations (2001) requires the Secretary of State to consider whether a development will have a likely significant effect on a European site, either alone or in-combination with other plans or projects. A likely significant effect is, in this context, any effect that may be reasonably predicted as a consequence of a plan or project to affect the

Conservation Objectives of the features for which the site was designated, but excluding trivial or inconsequential effects.

7.2 There are no recognised criteria as to what can be considered to be trivial or inconsequential impacts. Where predicted impacts are relatively very small compared to either the population of the management unit or the area of the site or the duration of the impact, it was determined that the impact would not cause a likely significant effect.

7.3 An Appropriate Assessment is required if a plan or project is likely to have a significant effect on a European site, either alone or in-combination with other plans or projects. A judgement of likely significant effect in no way pre-supposes a judgement of adverse effect on site integrity.

7.4 Table 1 addresses the first step of the HRA and considers the potential impacts, both alone and in-combination with other plans and projects, on the qualifying features of the designated sites to determine whether there will be a likely significant effect. The potential impacts are those that have been identified by the applicant as likely to occur. The assessment is high level and features have been screened out on the basis of either there being no direct impact or the impact is trivial and inconsequential. Unplanned events are not likely to occur and are therefore not included in the HRA, the purpose of which is to assess likely significant effects.

Table 1: Screening for likely significant effects.

Potential impact	Qualifying feature											
	Sandwich tern	Common tern	Little tern	Habitats (water courses)	Bullhead	Brook Lamprey	Sea Lamprey	Atlantic salmon	Desmoulin's whorl snail	Otter	Southern damsel	white-clawed crayfish
Presence of MODU and vessels.	✓	✓	✓	×	×	×	×	×	×	×	×	×
Use of rig stabilisation material.	×	×	×	×	×	×	×	×	×	×	×	×
Discharge of cuttings, mud and cement.	✓	✓	✓	×	×	×	×	×	×	×	×	×
Discharge of domestic wastewater	×	×	×	×	×	×	×	×	×	×	×	×
Discharge of drainage water	×	×	×	×	×	×	×	×	×	×	×	×
Light emissions	✓	✓	✓	×	×	×	×	×	×	×	×	×
Underwater drilling noise from the MODU	✓	✓	✓	×	×	×	✓	✓	×	×	×	×
Noise from helicopter trips	×	×	×	×	×	×	×	×	×	×	×	×

Noise from check shot survey	✓	✓	✓	×	×	×	✓	✓	×	×	×	×
Atmospheric emissions	×	×	×	×	×	×	×	×	×	×	×	×
Generation of solid waste	×	×	×	×	×	×	×	×	×	×	×	×

7.5 The results from the screening assessment has identified potential likely significant effects on Sandwich tern, common tern and little tern from:

- Physical presence of the MODU and associated vessels,
- Discharge of cuttings, mud and cement,
- Light emissions,
- Underwater drilling noise from the MODU,
- Noise from check shot survey.

7.6 The results from the screening assessment has identified potential likely significant effects on Sea lamprey and Atlantic salmon from:

- Underwater drilling noise from the MODU,
- Noise from check shot survey.

7.7 No potential for a likely significant effect has been identified as occurring on other relevant qualifying features.

Physical presence of the MODU and associated vessels

7.8 The physical presence of the MODU and associated vessels could cause disturbance to Sandwich tern, common tern and little terns during the breeding period. The impacts of disturbance could cause birds to forage in less suitable locations and increase the energetic expenditure as bird's forage further away.

7.9 The chick rearing period for Terns in the SPA is from June to early July (Natural England 2016). The proposed activities will not commence before mid-July 2018 by which time all three species of Tern will have finished breeding with the young fledging by early July.

7.10 The physical presence of the MODU will occupy an extremely small area of the SPA, which is 890.7 km^2 and therefore affect an insignificant proportion of the SPA.

7.11 Terns are recognised have a relatively low sensitivity to vessels with much of the data collected on Tern foraging ranges obtained from vessels (Furness and Wade 2012).

7.12 It is therefore concluded that the physical presence of the MODU and associated vessels will not cause a likely significant effect on the integrity of the site.

Discharge of cuttings and cement

7.13 It is estimated that approximately 197 tonnes of cuttings and cement may be discharged on the seabed and a further 396 tonnes could be discharged at the sea surface (Corralian 2016). There is potential for the discharge of cuttings and cement to cause a plume on the sea surface, which could impact on the ability of Terns to forage in the area.

7.14 Modelling undertaken by the applicant of the Total Suspended Solid (TSS) concentrations indicates that, elevated TSS concentrations may extend out to 13 km from the discharge point. However, this will only occur during the drilling of the top-hole section of the well, which is predicted to last for less than one day. When drilling the lower hole sections, the extent of elevated TSS concentrations is lower and predicted to not extend beyond 120 m from the well location.

7.15 The duration of any potential effects is dependent on the sea conditions at the time, with relatively rapid dispersion predicted to occur in poorer weather. The greatest area of impact from drilling the top-hole section is predicted to occur for a relatively short period of time, with very localised area of impact thereafter.

7.16 Although, the presence of a plume may inhibit the ability of Terns to detect prey, the predicted short and temporary duration of any impact and the very localised area impacted is predicted to not impact on Terns, that will be able to forage over an extensive area within the SPA where there are no impacts.

7.17 It is therefore concluded that the discharge of cuttings and cement will not cause a likely significant effect on the integrity of the site.

Light emissions

7.18 Light emissions from the drilling rig and associated vessels could have the potential to attract birds to the installation and cause collisions, particularly during periods of poor weather (Van de Laar 2007). However, Terns are considered tolerant of platforms, i.e. showing no sign of being of avoidance or attraction and are not considered to be at risk of attraction to lights with no records of Terns being impacted (Barton and Pollock 2009; Bruinzeel *et al*. 2009).

7.19 It is therefore concluded that physical impacts caused by attraction to lights will not cause a likely significant effect on the integrity of the site.

Underwater noise from drilling from a mobile drilling unit (MODU)

7.20 Underwater noise from drilling from the MODU could impact on Terns and fish species, including Atlantic salmon and sea lamprey.

7.21 Drilling noise arising from the MODU is estimated to be 127 dB re 1µPa@1m and within a frequency range of between 0.01 kHz and 10 kHz (Todd and White 2010).

7.22 Terns are plunge feeders, i.e. they hunt by flying over the water and undertake short, shallow dives, rarely going below the surface for more than a few seconds. The risk of any Terns being impacted by noise arising from drilling by the MODU is negligible.

7.23 Noise arising from drilling could impact on fish that are prey to Terns, causing them to relocate away from the area; the main prey items for Terns in the area are sandeels.

7.24 Noise modelling undertaken by the applicant indicates that the level of noise arising from drilling will not cause any physical injury to fish, although there is potential for fish to be displaced.

7.25 Sandeels, the main prey species for Terns, are not considered to be hearing specialists and are therefore less sensitive to noise than other species of fish, particularly those with air bladders. Studies undertaken using airguns indicate that sandeels have distinct but weak reactions to seismic airguns with initial startle responses reducing in frequency with on-going noise (Hassel *et al.* 2004). It is therefore very unlikely that noise arising from drilling at the MODU, which is considerably lower than that from a seismic airgun, will cause any displacement of fish.

7.26 There is potential for drilling noise arising from the MODU to impact on Sea lamprey and Atlantic Salmon.

7.27 Lampreys do not have any specialist hearing structures, they lack otolith organs and swim bladders and are likely to have very poor hearing sensitivity. Therefore, behavioural or physiological effects are only likely to occur when they are very close to a powerful sound source (Franco *et al*. 2011). The level of drilling noise from the MODU will not cause any displacement or physiological effects on sea lamprey.

7.28 Salmon are not considered to be hearing specialists (Nedwell *et al.* 2003, Gill and Bartlett, 2010, Harding *et al.* 2016). Salmon do not have any specific connection between the swim bladder and the auditory apparatus and therefore have a limited ability to discriminate between sounds, and as a result have a poor response to sound pressure. The species is believed to have a low overall sensitivity to sound and has a limited hearing bandwidth. Studies undertaken on captive fish indicate that there may be behavioural responses by fish to drilling noise, that could cause localised and temporary displacement effects (Spiga *et al*. 2017).

7.29 The impacts from drilling noise arising from the MODU are predicted to be very localised and not cause a likely significant effect on Atlantic salmon.

Underwater noise from check-shot survey

7.30 A check-shot survey will be undertaken over a period of between 9 – 13.5 hrs, during which time two 250 cu.in. airguns will be operated, producing estimated sound levels of 236.1 dB re 1 µPa @ 1 m (Corallian 2018). Noise modelling undertaken indicates that sound from the check-shot survey could cause physically injury to fish within 150 m from the airguns and temporary hearing impacts to 350 m.

7.31 Natural England has advised that '*it cannot be excluded, on the basis of the objective information supplied by the applicant, that the application will have significant effects on the River Avon SAC and the River Itchen SAC'* (Natural England 2018).

7.32 On the basis of the information presented within the application and subsequent information provided, supported by the advice received during consultation. It is concluded that the proposed check shot survey could have a likely significant effect on the qualifying feature: Atlantic salmon, of the River Avon SAC and River Itchen SAC.

8 APPROPRIATE ASSESSMENT

8.1 An Appropriate Assessment (AA) is triggered when the competent authority, in this case BEIS, determines that a plan or project may result in a likely significant effect on a European site.

8.2 If the AA cannot ascertain the absence of an adverse effect on the site's integrity within reasonable scientific doubt, then under Regulation 49 of the Habitats Directive alternative solutions should be sought. In the absence of an acceptable alternative, the project can proceed if there are imperative reasons of overriding public interest (IROPI). These IROPI issues are beyond the scope of this AA and are not considered here.

River Avon SAC and River Itchen SAC

8.3 The River Avon and River Itchen SACs are located approximately 8.5 km and 44 km respectively from the proposed appraisal well location. The Atlantic salmon is a qualifying feature for both SACs and could be impacted by noise from the check-shot survey during their migration to and from the SACs.

8.4 Adult Atlantic salmon migrate up the rivers from early February and during the summer months until early autumn. Smolts migrate down river to the sea during April and June. The timing of the adult migration will vary depending on the water flow and water temperature (Moore *et al*. 2012).

8.5 During the migrations both the adults and the smolts remain largely near the sea surface with adults remaining predominantly within 5 to 10 m of the sea surface and smolts remaining largely within 5 m of the sea surface. (Finstad *et al*. 2005, Holm *et al*. 2005, Thorstad *et al*. 2007). However, they have been recorded swimming to depths in excess of 100 m, which has been presumed to be related to periods of feeding (Starlaugsson 1995, Holm *et al*. 2005)

8.6 During migration adult Atlantic salmon may approach the estuary from either near the coastline or from further offshore and may delay entering the river depending on the tides and water flow (Hawkins *et al*. 1979).

8.7 Modelling undertaken by the applicant indicates that noise arising from the check-shot survey could cause the onset of a Permanent Threshold Shift (PTS) in salmon out to 150 m (unweighted SPL_{peak}) from the sound source and could cause the onset of a Temporary Threshold Shift (TTS) out to 350 m (unweighted SEL_{cum}) from the sound source (Corallian 2018). It is not possible to assess the potential range at which disturbance may occur, although this may be greater than the range predicted for TTS.

8.8 The results from the noise modelling indicate that, in terms of potential injury, any impacts are predicted to be within 350 m of the sound source, and there is therefore considered to be a very low risk of salmon occurring within the area at which the onset of physical injury will occur. However, there is potential for disturbance to cause displacement or behavioural effects at greater distances.

8.9 Migrating adult salmon returning to the rivers may be disturbed by the proposed surveys. There are potentially two behavioural responses that may occur. Returning salmon may be temporarily displaced and delay their entry into the river or they may ignore the sound source and enter the river without delay. Should they delay their entry into the rivers, the maximum delay is likely to be directly related to the duration of check-shot survey which, is a maximum of 14 hrs. Any disturbance would therefore be of relatively short duration.

8.10 During migration adult Atlantic salmon occur in both inshore and offshore waters and their distribution in the marine environment is not restricted. If there is any displacement, it is therefore likely that they will avoid the impacted area whilst the surveys are being undertaken, but there is no evidence that this would have a permanent effect on the migration. Atlantic salmon are known to naturally delay entry into rivers anyway, until conditions are suitable, so a delay of 14 hrs or even three days would be extremely unlikely to be significant. It is therefore concluded that any behavioural responses arising from the check shot will not have a significant adverse effect on fish returning to the rivers.

8.11 Salmon smolts and post smolts leaving the SACs do so rapidly, leaving the rivers between April and June. There is therefore a low potential for salmon leaving the relevant SACs to be located within the vicinity of the proposed survey areas at the time of the surveys. The number of salmon smolts and post smolts likely to be in the area of potential impact at any time will be low and the likely consequence to those that could be affected is that they would detour around the sound source during their offshore migration. The scale of any detour would also be very small compared to the distances travelled during the offshore migration. It is therefore concluded that any behavioural responses arising from the check-shot survey will not have an adverse effect on fish leaving the rivers.

8.12 The River Avon SAC is located approximately 8.5 km from the survey area and it is theoretically possible that salmon in the protected site could be disturbed by the surveys. However, any

disturbance would be of short duration. Although the range of any behavioural response is not known, given the relatively poor hearing capabilities of salmon it is considered unlikely that salmon could hear the noise at a range of 8.5 km. Whether or not salmon could hear the noise, it is concluded that there is a very low risk of any significant behavioural impact within the SAC.

8.13 The River Itchen SAC is located approximately 44 km from the survey area and it is highly unlikely that salmon could hear the noise at that range. It is concluded that there is an extremely low or negligible risk of any significant behavioural impact within the SAC.

8.14 The proposed survey will last no longer than 14 hours and any displacement, should it occur, will, only last during this period with fish returning to the area once the noise disturbance is stopped. Low densities of migrating Atlantic salmon may pass in the proximity of the proposed surveys and would not be expected to remain in the area, but any potential impact would be localised, of short duration and only likely to affect a small number of individuals. It is concluded that there will be no adverse effect on Atlantic salmon migrating to or from the River Avon and River Itchen SACs, or on Atlantic salmon within the SACs.

9 IN-COMBINATION ASSESSMENT

9.1 Other sources of anthropogenic impacts within the area that could affect qualifying features of the sites include fishing and shipping activities. These activities have been on-going within the area long before the sites been designated and it Is not possible to determine the level of impact, if any, these activities may be having. However, any potential impacts these activities may be having are part of the baseline.

9.2 There are no known plans or projects that could cause an in-combination impact on the qualifying features of the sites.

10 CONCLUSIONS

10.1 BEIS has undertaken a HRA in respect of relevant European sites' Conservation Objectives to determine whether there will be an adverse effect upon the integrity of the designated sites from the proposed Colter Appraisal Well 98-11, either alone or in combination with other plans and projects.

10.2 Based on the proposed work programme and predicted scale of impacts, along with evidence from existing studies on the likely potential effects on the qualifying species. It is concluded that the the proposed Colter Appraisal Well 98-11 will not cause a likely significant effect on any qualifying species or habitats of the relevant designated sites either alone or in-combination with other plans or projects. It will not have an adverse effect on the integrity of any relevant designated site.

10.3 Having concluded that there will be no likely significant effect and no adverse effect on the integrity of any site no further assessment is required.

11 REFERENCES

Barton, C. and Pollock, C. (2009). *Study to evaluate the significance of impact of UK offshore installation on migratory birds*. Cork Ecology.

Bruinzeel, L.W., van Belle, J., Davids, L. (2009). *The impact of conventional illumination of offshore platforms in the North Sea on migratory bird populations*. Final Report. Altenburg & Wymenga.

Corallian (2017). *Colter (98/11-E) Appraisal well: Environmental Statement*. Corallian Energy Limited.

Corallian (2018). *Colter (98/11-E) Appraisal well: Supplementary Noise Report*. Corallian Energy Limited.

EC (2010). *Wind Energy Developments and Natura 2000 sites.* Guidance Document. European Commission 2010.

Finstad, B. Økland, F. Thorstad, E.B. Bjørn, P.A. McKinley, R.S. (2005). Migration of hatchery-reared Atlantic salmon and wild anadromous brown trout post-smolts in a Norwegian fjord system. *Journal of Fish Biology* 66 (1) 86-96.

Franco, A., Perez-Dominguez, R. & Cutts, N. (2011). *Assessment of potential impacts of Able Marine Energy Park (AMEP) on sea and river lamprey in the Humber Estuary*. IECS report to ABLE UK Ltd.

Furness, B. and Wade, H. (2012). *Vulnerability of Scottish seabirds to offshore wind turbines.* Report commissioned by Marine Scotland. 39pp.

Gill, A. B. and Bartlett, M. (2010). *Literature Review on the Potential Effects of Electromagnetic Fields and Subsea Noise from Marine Renewable Energy Developments on Atlantic Salmon, Sea Trout and European Eel.* Scottish Natural Heritage, Commissioned Report No. 401.

Hassel, A.T., Knutsen, J., Dalen, S., Lokkeburg, K., Skaar, O. Ostensen, E.K., Haugland, M.F., Misund, O.A. (2003). *Reaction of sandeel to seismic shooting: a field experiment and fishery statistics study*. Institute of Marine Research, Bergen, Norway.

Harding, H., Bruintjes, R., Radford, A.N. and Simpson, S.D. (2016). Measurement of Hearing in the Atlantic salmon (Salmo salar) using Auditory Evoked Potentials, and effects of Pile Driving Playback on salmon Behaviour and Physiology. *Scottish Marine and Freshwater Science Report* Vol 7 No 11.

Hawkins, A.D., Urquhart, G.G. & Shearer, W.M. (1979). The coastal movements of returning Atlantic salmon, Salmo salar L.. *Scottish Fisheries Research Report 15*, 14pp.

Holm, M. Jacobsen, J.A. Sturlaugsson, J. and Holst, J.C. (2005) *Preliminary results from DST tagging of salmon in the Norwegian Sea*. ICES, WGNAS 2005: Working paper 13.

Moore, A., Bendall B., Barry, J., Waring, C. and Crooks, L. (2012). River temperature and adult anadromous Atlantic salmon, Salmo salar, and brown trout, Salmo trutta. Fisheries Management and Ecology, 2012, 19, 518–526.

Natural England (2014a). European Site Conservation Objectives for River Avon Special Area of Conservation: Site Code: UK0013016. 30 June 2014. Natural England.

Natural England (2014b). European Site Conservation Objectives for River Itchen Special Area of Conservation: Site Code: UK0012599. 30 June 2014. Natural England.

Natural England (2016a). *Solent and Dorset Coast potential Special Protection Area*. Natural England. January 2016.

Natural England (2016b). *European Site Conservation Objectives for Solent & Dorset Coast potential Special Protection Area*. 29 January 2016. Natural England.

Natural England (2016c). *Solent and Dorset Coast potential Special Protection Area (pSPA)* Departmental Brief. Natural England. January 2016.

Natural England (2017). *Natural England Standard: Habitats Regulations Assessment (HRA) Standard.* Natural England 1.12.2017. V1.1.

Natural England (2018). *Corallian Colter (98/11-E) Appraisal well*. Letter to BEIS dated 16 February 2018. Ref: 235990.

Nedwell, J., Langworthy, J., and Howell, D. (2003a). Assessment of sub-sea acoustic noise and vibration from offshore wind turbines and its impact on marine wildlife. Report No. 544 R 0424.

Spiga, I., Aldred, N. and Caldwell, G.S. (2017). Anthropogenic noise comprises the anti-predator behaviour of the European Seabass *Dicenytatchus labrax*. *Marine Pollution Bulletin* 122: 297-305.

Sturlaugsson, J. (1995). *Migration study of homing of Atlantic salmon (Salmo salar L.) in coastal waters W- Iceland: Depth movements and sea temperatures recorded at migration routes by data storage tag*s. ICES. C.M. 1995/M:17. 13 p.

Thorstad, E.B. Okland, F. Finstad, B. Silvertsgard, R. Plantalech Manel-la, N. Bjorn, P.A. and McKinley, R.S (2007). Fjord migration and survival of wild and hatchery reared Atlantic salmon and wild brown trout post-smolts. *Hydrobiologia*, 582, 99-107.

Todd V.L.G. and White P.R. (2012). *Proximate Measurements of Acoustic Emissions Associated with the Installation and Operation of an Exploration Jackup Drilling Rig in the North Sea*. In: Popper A.N., Hawkins A. (eds) The Effects of Noise on Aquatic Life. Advances in Experimental Medicine and Biology, vol 730. Springer, New York, NY.

Van de Laar, F.J.T. (2007). *Green light to birds: Investigation into te effect of bird-friendly lighting*. NAM Locatie L15-FA-1. December 2007.