Rampion 2 Wind Farm

Category 7: Other Documents

Evidence Plan (Part 3 of 11)

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Phase Three

The impact of experimental impact pile driving on oxygen uptake in black seabream and plaice

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The impact of experimental impact pile driving on oxygen uptake in black seabream and plaice

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Anthropogenic noise is a recognized global pollutant that could potentially impact many organisms, including fishes. One of the acoustic sources producing high impulsive noise and vibration is pile driving. However, the potential impacts of real pile driving on fish species has received little attention, mainly due to the logistical challenges involved. Here, we investigated the impact of pile driving on the oxygen uptake (a secondary stress response) of black seabream *Spondyliosoma cantharus* and European plaice *Pleuronectes platessa* using an experimental pile driver setup in a flooded ship-building dock. Each individual fish was tested in ambient and pile driving conditions using a counterbalanced paired design to control for potential order effects. During pile driving, black seabream increased oxygen uptake compared to the ambient control condition suggesting higher stress levels. Plaice did not show differences in oxygen consumption between the pile driving and ambient treatment. These results show the impact of pile driving on secondary stress responses in fish, highlight species-specific differences concerning acoustical impacts, and showcase the possibility of carrying out large-scale semi-field acoustic experiments.

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1. INTRODUCTION

Research concerning the impact of anthropogenic sound on aquatic species has greatly increased in the last two decades (reviewed in, e.g., Slabbekoorn *et al.*, 2010; Williams *et al.*, 2015). In fish species, experiments have been conducted using several methods of acoustic exposure including: (1) playbacks of recorded sounds (Smith *et al.*, 2004; Wysocki *et al.*, 2006; Bruintjes and Radford, 2013, 2014), (2) real boat or ship passes (Sarà *et al.*, 2007; Graham and Cooke, 2008; Jacobsen *et al.*, 2014; Simpson *et al.*, 2016), (3) seismic airguns (Engas *et al.*, 1996; Popper *et al.*, 2005; Miller and Cripps, 2013; Thompson *et al.*, 2013), and (4) impact pile driving (Debusschere *et al.*, 2014, 2016).

The dimensions of the piles that are used to reinforce offshore constructions shows large variation (see e.g. Dähne *et al*., 2013, Debusschere *et al*., 2014, Bruintjes *et al*. 2016). Moreover, many elements will influence the sound intensity, amplitude and frequency structure of the sound during pile driving including the pile's physical quantities, hammer type, pile driving method, strike rate, water depth, and the substrate of the area the pile is being installed.

The impacts of real pile driving on fishes have received little attention, mainly due to logistical difficulties. It is important to study the potential impact of pile driving in natural or semi-natural settings using *in situ* pile driving to replicate realistic sound pressure and particle motion propagation in both the water column and seabed.

Studies using juvenile European sea bass (*Dicentrarchus labrax*) and *in situ* pile driving, have shown a decrease in oxygen uptake (a secondary stress response), and no impact on mortality (Debusschere *et al.*, 2014, 2016). Other studies, using sound playbacks have reported an increase in primary and secondary stress characteristics, including increased oxygen consumption, higher ventilation rates and increased blood cortisol levels (Smith *et al.*, 2004; Wysocki *et al.*, 2006; Simpson *et al.*, 2015; Bruintjes *et al.*, 2016; Purser *et al.*, 2016). However, there is a lack of studies investigating the impacts of pile driving on the physiology of adult fish.

The current study investigated the impact of simulated impact pile driving on the oxygen uptake of black seabream (*Spondyliosoma cantharus*) and European plaice (*Pleuronectes platessa*). It was predicted that both fish species would increase their oxygen uptake during exposure to pile driver as a stress response.

2. MATERIAL AND METHODS

Experiments were conducted in a former shipbuilding dock at the Offshore Renewable Energy Catapult in Blyth, UK. The dock measured 93 x 18 m with a 3 m average water depth and a 3.5 m simulated seabed consisting of North Sea sand and small stones (Bruintjes *et al.,* in review). Simulated impact pile driving was produced by a Wrag penna post-driver with a 200 kg hammer powered by a tractor. The post-driver struck a pile made from a steel pipe (7.5 m long, 16.5 cm diameter, 0.65 cm thick) with a steel plate (1.51 x 1.64 m, 1.4 cm thick) welded at 50 cm from the bottom to ensure stable acoustic conditions during pile driving. During pile driving, the hammer struck the post 10 times per minute.

During 30 minute pile driving exposure, individuals were subjected to a cumulative Sound Exposure Level (SEL_{cum}) of 184.41 dB re 1 μPa^2. During 30 minute ambient conditions the fish were exposed to a SEL_{cum} of 159.33 dB re 1 μPa^2.

Black seabream (n=14) had an average mass of 538.4 ± 27.6 g (mean ± Standard Error [SE]) and measured 27.6 ± 0.7 cm Standard Length [SL] (mean ± SE). Plaice (n=21) had an average mass of 171.7 ± 10.5 g (mean ± SE) and an average SL of 21.3 ± 0.4 cm. All fish were wild caught in UK coastal waters.

Oxygen uptake of both fish species was measured for 30 min during exposure to pile driving and during ambient conditions in a counterbalanced paired design (i.e. each fish was tested in pile driving and in ambient conditions in a counterbalanced order to control for a potential order effect). Between both experiments (pile driving followed by ambient conditions, or vice versa) individuals had one hour to recover.

At the start of the experiment, individual fish were placed in airtight containers (for bream: radius 29.5 cm, height 20.7 cm [volume 10 L], for plaice 27.4 x 20.0 x 7.5 cm [volume 1.125 L]), a water sample was taken and the container lid was sealed underwater to prevent air bubbles. The water samples were analyzed for dissolved oxygen content with a handheld oxygen meter (HI 9164, Hanna Instruments Inc., USA). The containers with the fish inside were placed in a mesh tray, lowered 3 m below the water surface and rested on top of the seabed at 10 m from the pile driving setup. The containers rested on the seabed to expose the fish to pressure waves and particle motion via the water column as well as any potential ground roll waves via the sediment. After 30 min of exposure to pile driving or ambient conditions, the containers with the fish were raised to the dock side, a water sample was taken and the dissolved oxygen content of the water was again analysed. The difference between the initial dissolved oxygen content of the water and the content following 30 minutes of exposure, were used for analyses. The analyses were conducted on the percentage change in oxygen consumption (e.g. Simpson *et al*., 2015, 2016).

3. RESULTS

Black seabream significantly increased their oxygen consumption during exposure to pile driving (mean O_2 consumption ± Standard Error [SE]; 20.0 ± 1.8 %;) compared to ambient conditions (mean O_2 consumption ± SE; 13.2 ± 2.6 %) (Paired sample t-test: $t_{13} = -2.26$, $p = 0.042$; Figure 1a). The oxygen consumption of plaice did not differ between exposure to pile driving (mean O_2 consumption ± SE; 14.4 % ± 1.6 %) and ambient conditions (mean O_2 consumption ± SE; 15.8 ± 1.0) (Paired sample t-test: $t_{23} = -0.91$, $p = 0.374$; Figure 1b).

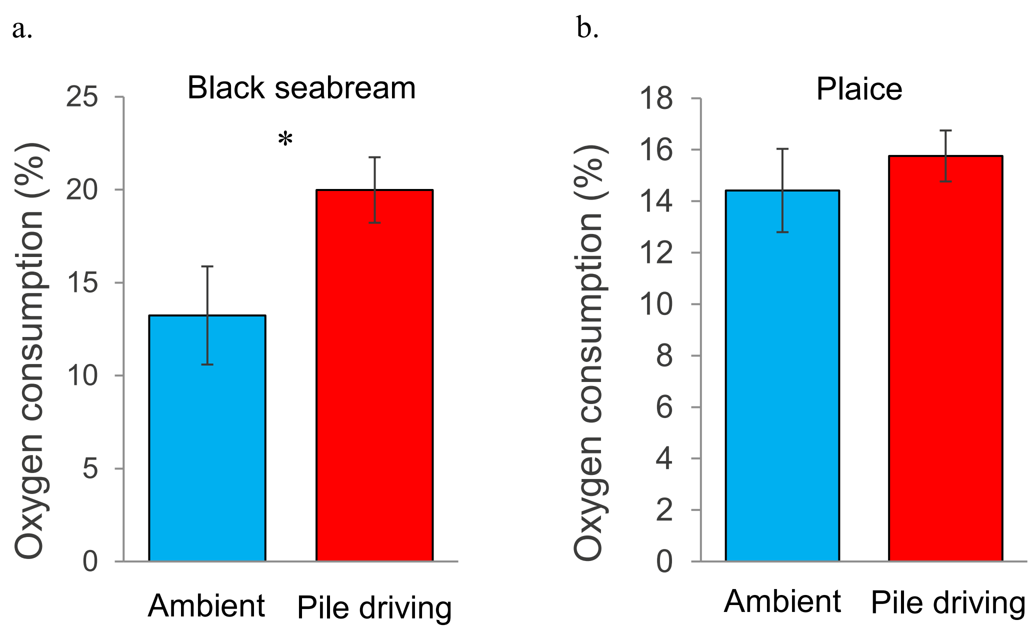

Figure 1. Oxygen consumption of black seabream (a) and plaice (b) during ambient and pile driving conditions. Shown are means ± one standard error (SE); * = p < 0.05.

4. DISCUSSION AND CONCLUSION

Impact pile driving increased oxygen uptake in black seabream, while plaice did not show differences in their oxygen consumption. The increased oxygen uptake suggests heightened stress during exposure to pile driving (Barton, 2002). Other species, such as European eels (*Anguilla anguilla*) and European sea bass also increased oxygen uptake when exposed to playback of anthropogenic sounds (Simpson *et al.*, 2015; Radford *et al.*, 2016), whereas an *in situ* pile driving study using European sea bass found a decrease in oxygen uptake (Debusschere *et al.*, 2016).

Although black seabream and plaice were tested under identical acoustic exposures, the results clearly differed, showcasing the importance of collecting species-specific data. Other studies that have tested multiple fish species using identical acoustic regimes have found both different outcomes between species (Popper *et al.*, 2005; Picciulin *et al.*, 2010; Voellmy *et al.*, 2014b), as well as similar results (Amoser and Ladich, 2003; Voellmy *et al.*, 2014a; Bruintjes *et al.*, 2016).

Although these experiments used simulated impact pile driving rather than real-word offshore operations, studies using realistic anthropogenic noise sources in large-scale semi-field conditions – such as this study – could advance current knowledge of the impacts of anthropogenic noise on marine organisms.

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20 May 2022

[redacted],

Rampion 2 Offshore Wind Farm (OWF)

MMO Response to Underwater Noise ETG Minutes, Underwater Noise Mitigation Technical Note and Additional Noise Monitoring Technical Note.

At this stage of the planning process, Rampion Extension Development Ltd (RED) are conducting environmental and technical surveys and undertaking consultation with regulatory bodies, stakeholders and communities.

The currently proposed development is sited adjacent to the southeast and west of the existing Rampion OWF, approximately 13 kilometers (km) to 25km offshore, occupying an irregular elongated area. The wind farm array Area of Search has an approximate area of 315km^2. The scoping area for the offshore export cables to connect the offshore wind farm area to the shore is approximately 74km^2.

Rampion 2 OWF is expected to comprise of no more than 116 wind turbine generators (WTGs) with a total generating capacity of 1200 Mega Watts (MW). In addition, there will be up to three offshore substations and up to 4 export cables which will carry generated power to landfall at Climping, Sussex.

The Marine Management Organisation (MMO) and relevant advisors from the Centre for Environment, Fisheries and Aquaculture Science (Cefas) attended the Noise mitigation Expert Topic Group (ETG) meeting on 24 February 2022.

This ETG meeting included a presentation of noise mitigation proposals.

On 17 March 2022 the MMO received the minutes of this meeting along with additional Rampion 2 documents. The additional underwater noise modelling was requested by the MMO at the meeting.

Consultation was undertaken with Cefas with particular focus on the following documents:

- *220224_Rampion2_EPP_Targated-Meeting_UWN_Minutes_V1*
- *Rampion 2 Technical Note_ Additional underwater noise modelling_V1*

- *Rampion 2 Underwater noise mitigation for sensitive features_V1.0 (amended)*
- *Rampion 2_Targeted-Meeting_Fish-Disturbance*

Please note the MMO is still in discussions with Natural England to ensure the advice is consistent. At this stage these comments are subject to change throughout the Evidence Plan Process.

The MMO can confirm the minutes accurately capture the discussions held. We suggest a minor amendment (in blue) to provide improved context and clarity of fisheries advisor comments;

> *LSC – Kastelein et al. (2017) paper, from a fish biology perspective, the sensitivity in the paper was close to the higher hearing sensitivity for Popper et al. (2014). We do not have an issue with using another species as proxy, and seabass as another perciform species are anatomically similar. As AA noted it is the behavioural aspect that is a concern.*

The MMO has no additional comments to make on the fish disturbance presentation as this document summarized the position of Rampion 2 regarding noise exposure thresholds. The MMO's comments on the noise exposure criteria are contained below and have been set out with topics.

Fish Ecology

Behavioural threshold and proxy species for Black Bream.

1. Currently there are no noise exposure thresholds established by peer-reviewed literature that quantitively assess fish behaviour. The MMO notes that RED are seeking agreement with stakeholders and regulators to identify a threshold where an effect/no effect boundary can be determined for black seabream. Seabass; as a perciform species and being anatomically similar to black seabream (same taxonomic order), have been proposed as a proxy species to identify a suitable behavioural threshold.
2. The technical note on underwater noise mitigation appropriately highlights that there are currently no quantitative thresholds in the peer-reviewed literature to assess fish behaviour. However, quantitative thresholds are sought by stakeholders and regulators reviewing Environmental Impact Assessments (EIAs) as they provide a hard boundary of effect/no effect/ The MMO stresses that although it is generally recognized for this information that there is considerable doubt or uncertainty in such absolute designations. Behavioural reactions are also context specific.
3. The MMO notes that research on seabass noise exposure primarily by Radford *et al.*, (2016) and Kastelein *et al.* (2017) has been used by RED to suggests that 147 decibels Single strike Sound Exposure Level (dB SEL_{ss}) is an indicative and conservative threshold for disturbance to black seabream.
4. Seabass are anatomically and physiologically similar to seabream, though they are not in the same family or genus. The MMO recognises there is a low paucity of data for species that are more closely related. Given that there is peer-review scientific literature for noise exposure on seabass, it does seem an appropriate proxy species in this regard. However, the species do not have the same breeding behaviours, and this combined with any physiological and behavioural effects from exposure to piling

noise, is of **major concern**.

5. During breeding, black seabream have high energetic expenditure and the additional pressure of behavioural noise impacts during this season is a concern. Further, seabass are not an hermaphroditic species, and consequently do not sustain energetic losses through changing gender, thus these physiological differences do have a bearing on the suitability of seabass to be an effective proxy species.
6. Black seabream are protogynous hermaphroditic species attaining asymptotic length (L_{inf}) of 48 cm, smaller than seabass. They mature as female and then change gender to male around age 2-8 (Benvenuto *et al*., 2017; Neves *et al*., 2017) with smaller fish generally being female and larger male. Though they can also be protandrous with males then transition back to females (generally larger than 40cm). Because of this, populations must have a balanced age structure in order to be reproductively successful. As black bream attain reproductive maturity at 30 cm it would be more precautionary to use a lower noise threshold, again this still may not provide enough evidence to remove a seasonal restriction.
7. For previous developments, a threshold of 135 dB SELss, based on research by Hawkins et al. (2014), has been recommended by the MMO as a conservative indicator of the risk of a behavioural response, especially for clupeid fishes such as herring. The MMO appreciates RED's reservations with using this 135 dB SELss threshold (as set out in the technical note) but this is standard across all OWF projects.
8. At this stage the MMO believes a seasonal restriction is required to mitigate the impacts to black bream. The MMO does not believe RED has provided enough evidence for the threshold approach to be used. The applicability of the 147 dB SELss threshold needs to be considered further.
9. Based on research by Kastelein et al. (2017) (see para 5.2.10 of the technical note), a more conservative approach would be to consider a lower threshold of 141 dB SELss (or lower still, depending on the size of the fish). Kastelein et al. (2017) exposed seabass to percussive pile driving sounds (20 mins exposure). Initial responses (sudden, short-lived changes in swimming speed and direction) and sustained responses (changes in school cohesion, swimming depth, and speed) were quantified. The 50% initial response threshold occurred at an SELss of 131 dB re 1 mPa2 s for 31 cm fish and 141 dB re 1 mPa2 s for 44 cm fish.
10. Of relevance, RED raised at the meeting (on 24 February 2022) that the aim is to develop a threshold for a very low-level response. It is a physiological response by a species of fish, rather than fleeing or displacement. It is a measure that the fish has registered the noise, resulting in an increase in respiration rate. Using such a low benchmark for 'disturbance' means that such a threshold will be precautionary and lower than levels at which any displacement from important spawning areas at Kingmere MCZ might be anticipated. Whilst it is acknowledged at this point, this does not negate the fact that responses in seabass were still observed at a lower threshold in other studies. Therefore, if RED are pursuing an agreed threshold the lowest (most precautionary) threshold at which a response was observed should be used.
11. However, the MMO stresses that even if this information is provided, the MMO may still require further evidence and maintain the view that a seasonal restriction is required.

Additional Underwater noise modelling

12. It is not clear from the document what the noise reduction source levels are based on. This should be clarified.

13. For SELss and 141dB SELss noise contours – it is noted that both mitigated and unmitigated unweighted ranged values for the three worst-case modelling scenario parameter locations (North West (monopile), East (monopile) and South (jacket pile)) have been provided for 135 dB SELss and 141dBss, in Tables 1-5. However, unlike the 147 dB SELss the noise contours have been included within the document figures. The MMO requests that these contours associated figures are provided to aid clarity on whether these reach and/or overlap the MCZs boundaries.

14. As per Section 7 of the technical note, modelling was carried out at the same North West (NW), East (E), West (W) and South (S) noise modelling locations as presented in the Preliminary Environmental Impact Report (PEIR), as well as additional South West (SW), North East (NE) and Middle array locations, closest to the MCZ areas. Outputs are provided for various scenarios, including unmitigated piling, and when using various mitigation options. The technical note also shows modelled outputs for 'combined mitigation' in Figures 3 – 10, which leads to a 20 – 25 dB reduction in source level. It is not clear what this 'combined mitigation' consists of exactly, and this should be specified in the report.

15. The proposed zoning (see Figure 1 below, taken from the technical note) is sensitive to/reliant on modelling and the noise threshold, both of which are subject to significant uncertainties. One small change would alter the proposed zoning. Therefore, caution should be applied if suggesting part of the site does not need mitigation.

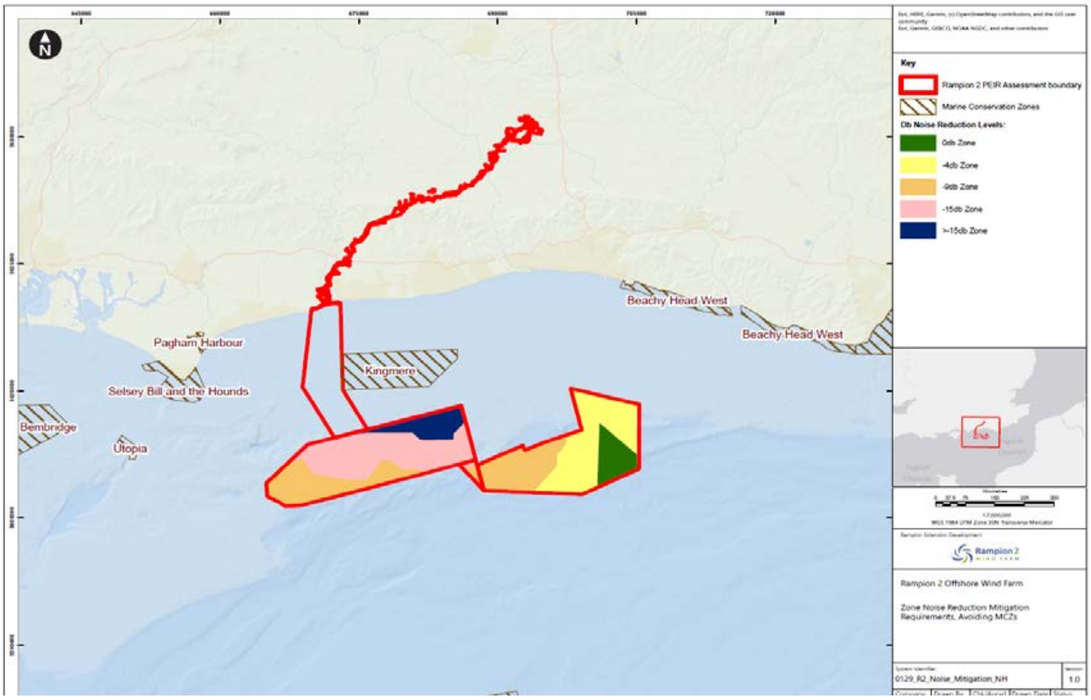

Figure 1 Contour boundaries, utilising 147 dB SELss (unweighted) model outputs with zero overlap target to the boundary of Kingmere and Beachy Head West MCZ, for worst case monopiles with various mitigations

16. It is not clear what the 25-dB reduction in source level is based on, and this should be clarified.

17. Effect ranges for all three thresholds (135 dB, 141 dB and 147 dB SELss) are provided in Tables 1 to 5 (for mitigated and unmitigated scenarios) for the three piling locations. Furthermore, noise contours are provided for the 147-dB threshold (unmitigated and mitigated), see Figures 1 to 3 in the document. These contours are overlaid onto a map showing the MCZ locations. Please provide similar figures could be produced for the 135 dB and 141 dB SELss thresholds.

18. The worst case (unmitigated) noise contours for all three thresholds are provided in Figures 4 to 6. In Figure 4 (Figure 2 below for reference), the noise contours for the NW location show a clear (and complete) overlap with the Kingmere MCZ (even based on the least precautionary threshold of 147 dB). Therefore, it is evident that appropriate mitigation (in terms of noise abatement) will be required to reduce the noise at source to acceptable levels (notwithstanding the uncertainties surrounding behaviour and what is considered to be an acceptable noise level/threshold).

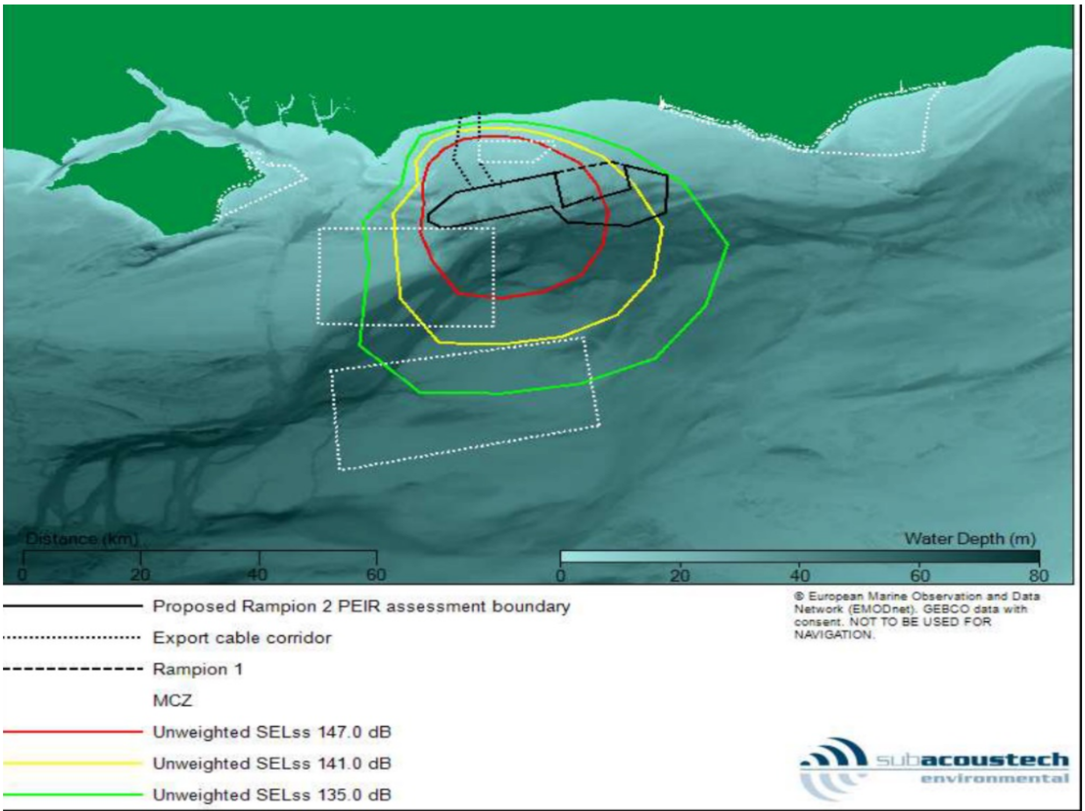

Figure 2 SELss noise modelling contours for piling at the NW location, monopile, maximum energy

Primary and secondary mitigation options

19. The MMO notes that the approach with the mitigation measures proposed is to seek a reduction in noise levels so that no significant adverse effects would be predicted. The MMO recognises that the technical note for mitigation contextualises that, for the purposes of agreeing any mitigation plan, the focus is not on specific equipment, but rather on the objective that the required level of offshore piling noise reduction is achieved. Thus, the use of example equipment that could be deployed has been detailed to provide confidence that such mitigation is practical and can be delivered at the construction stage.

20. The technical note provides a sufficient justification for proposing the outlined primary and secondary mitigation measures (paragraph 9iii). The approach to reduce noise impact ranges where possible is welcomed and the MMO fully supports the use of noise abatement techniques. The MMO understands RED requires a threshold to be agreed to ensure they can deliver the dB reductions proposed for noise levels at sensitive locations. The MMO believes that mitigation should be set out for the worst-case scenario and that the precautionary approach is to include a seasonal restriction if noise abatement cannot reduce the noise level to no impact.

21. The MMO strongly support the use of noise abatement technologies to reduce the risk of impact on sensitive receptors during piling operations. Section 6.2 of the technical note presents the various mitigation options for consideration (i.e. PULSE hammer, MNRU hammer, Hydro Sound Dampers and double bubble curtains) and associated decibel (dB) reduction in source level for each option. Evidence (i.e. references) should be provided to support the dB reduction for each option, including with respect to frequency.

22. The MMO has concerns on the efficacy of a noise abatement system to reduce the risk of impact depends on the frequency range at which sound energy is reduced and on the target species, as each species is sensitive to a certain frequency range. More information should be presented, particularly since fish are typically more sensitive to sound at low frequencies, where the noise reduction from noise abatement systems tends to be smaller. (Note: for example, a 15-dB reduction is for broadband SELss, not certain frequency bands).

23. Figure 1 presents contour boundaries using combined mitigation options for dB reduction modelled based on the 147 dB SELss (unweighted) model outputs to obtain no overlap with MPAs. While it is understood this is to provide context on the ‘zones’ or areas of the Rampion 2 array that would require different noise reductions or combinations of the mitigation to achieve this, it is difficult to infer the extent of the individual mitigated contours and how these boundaries alter when changes are made to the modelled inputs.

24. Though it is recognised that some of these are provided individually within the modelling technical note, they are not provided in combination, please provide this, however it is recommend this is done after a behavioural metric has been agreed so these mitigation options can be fully reviewed in depth.

25. RED could explore acquiring background noise level readings from the MCZs during the black seabream spawning and nesting season. This would aid to inform on the noise levels occurring during spawning and nesting activity. Expected received noise levels at the MCZ from piling could then be calculated and compared to the background levels. The MCZ background noise level data could be supplemented with

nesting activity monitoring data to help verify the mean, minimum and maximum background noise levels when black seabream spawning activity takes place.

Conclusion

To confidently reduce the risk of impact on black seabream, the MMO requires piling activities be avoided during the sensitive breeding season (March to July) by the inclusion of a seasonal restriction condition.

The MMO notes RED believes the requirement for seasonal (piling) restrictions are not considered necessary, based on the use of appropriate noise mitigation being predicted to result in no significant effect on sensitive receptors, particularly at designated MCZ sites, as supported by the modelled underwater noise propagation extents at either Temporary Threshold Shift (TTS) or disturbance thresholds.

The MMO considers that there are many uncertainties with assessing behaviour (and applying behavioural thresholds). Assessments should be more precautionary and sufficient evidence should be provided to support the reduction in noise (source) level from the various mitigation options proposed.

However, the MMO stresses that even if this information is provided, the MMO may still require further evidence and maintain the view that a seasonal restriction is required.

Yours sincerely

[redacted]

[redacted]
Marine Licensing Case Officer

[redacted]

[redacted]

References

Benvenuto, C., Coscia, I., Chopelet, J., Sala-Bozano, M. and Mariani, S., 2017. Ecological and evolutionary consequences of alternative sex-change pathways in fish. Scientific Reports, 7(1), pp.1-12.

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Kastelein, R.A., Jennings, N., Kommeren, A., Helder-Hoek, L. and Schop, J., 2017. Acoustic dose-behavioral response relationship in sea bass (*Dicentrarchus labrax*) exposed to playbacks of pile driving sounds. Marine environmental research, 130, pp.315-324.

Neves, A., Vieira, A.R., Sequeira, V., Paiva, R.B. and Gordo, L.S., 2017. Modelling the growth of a protogynous sparid species, Spondyliosoma cantharus (Teleostei: Sparidae). Hydrobiologia, 797(1), pp.265-275.

Radford, A.N., Lèbre, L., Lecaillon, G., Nedelec, S.L. and Simpson, S.D., 2016. Repeated exposure reduces the response to impulsive noise in European seabass. Global Change Biology, 22(10), pp.3349-3360.

Annex I – key points for reference

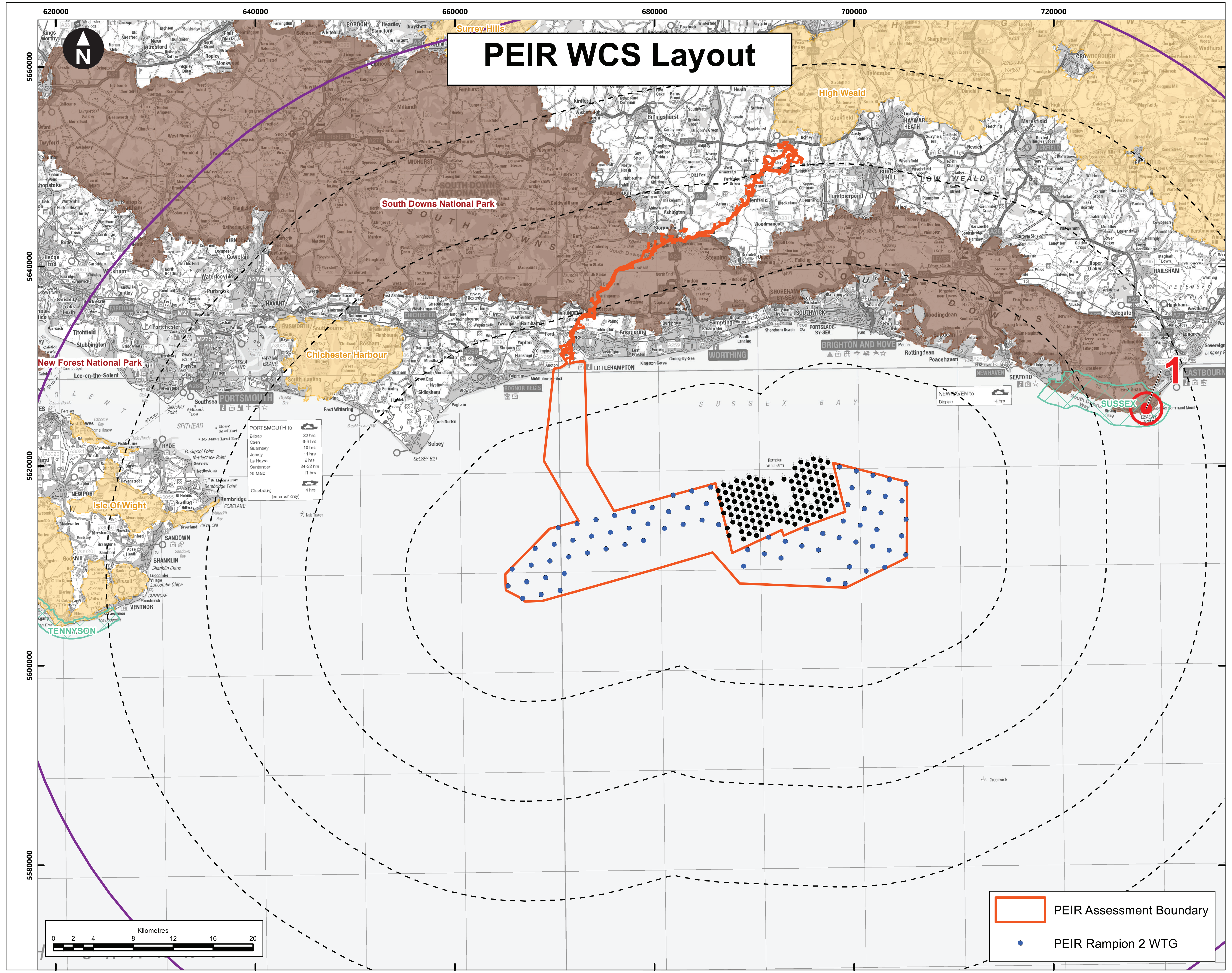
The species of concern are black seabream, herring and seahorses.

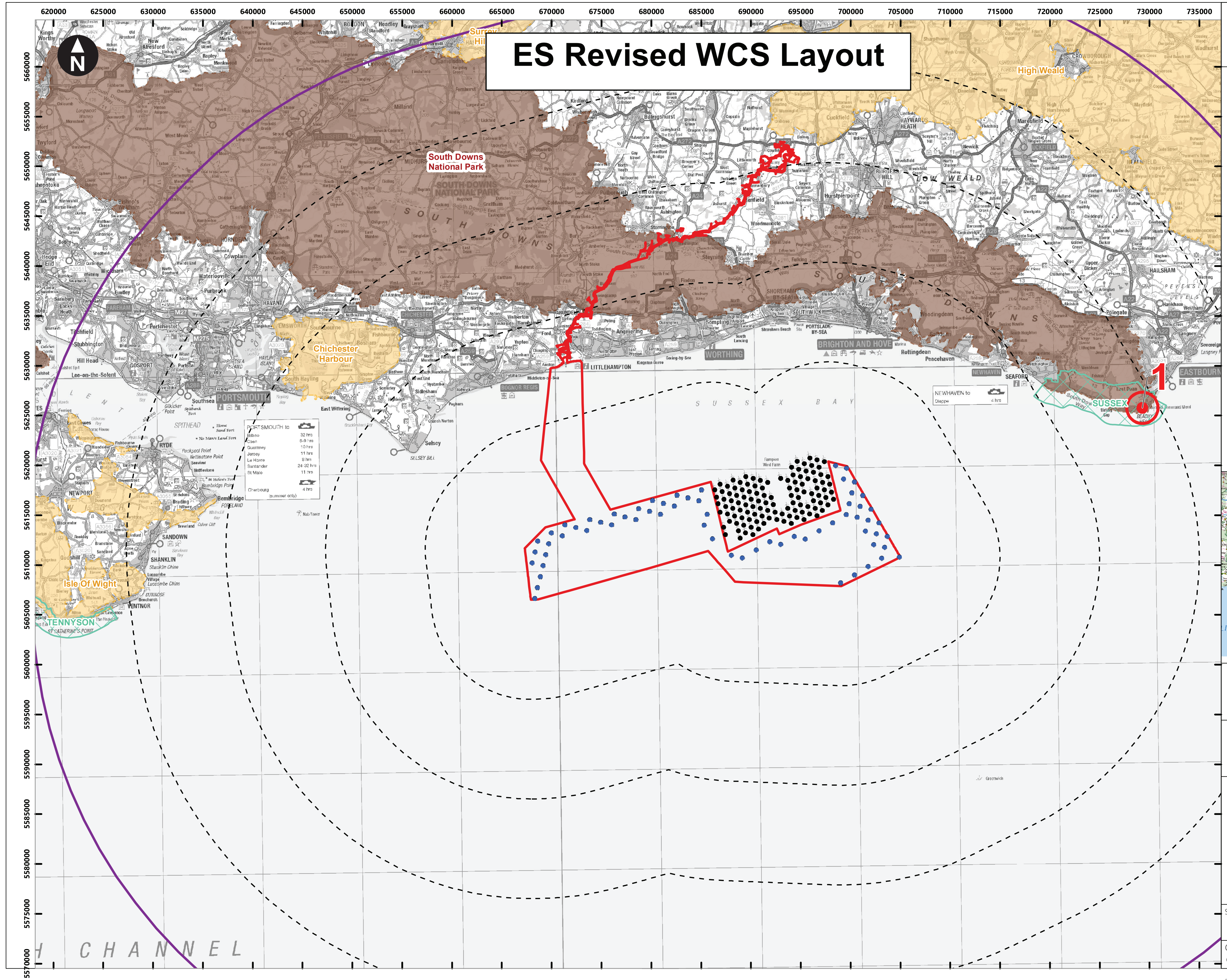
The specified breeding season for black bream is between March and July.

The Kingmere MCZ is designated for black seabream.

The following sites are designated for the short-snouted seahorse:

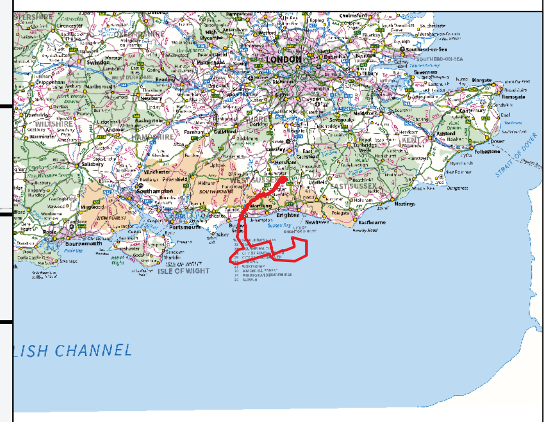
- Selsey Bill and the Hounds MCZ;
- Beachy Head West MCZ;
- Beachy Head East MCZ;
- Bembridge MCZ;





Key

- Proposed DCO Application Boundary
- 10km Radii
- 50km Study Area
- Operational Rampion 1 WTG
- Indicative Rampion 2 WTG
- Viewpoint
- National Park
- Heritage Coasts
- Area of Outstanding Natural Beauty



Kilometers

0 2 4 8 12 16 20

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WGS 1984 UTM Zone 30N Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Viewpoint 1 : Beachy Head

Consultation

System Identifier:				Version: 1.0
Company: OPEN	Drawn By: JM	Chk/Aprvd: WOOD	Drawn Date: 04/02/2022	Status: FINAL

 ISO A3 Landscape

Location grid reference: 555382 E 95992 N
Direction of view: 251°
Horizontal field of view: 53.5° (planar projection)
Distance: 25.07m

Paper size: 841mm x 297mm (half A1)
Corrected print image size: 820mm x 260mm
Principal distance: 812.5mm

Camera: Canon EOS 6D
Lens: 50mm (Canon EF 50mm f/1.4)
Camera height: 1.5m AGL
Date and time: 26/08/2020 11:08

Development Parameters:
Rampion Offshore Wind Farm: 116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm: 75 turbines at 325m blade tip height

Notes:
- Figure produced to accord with the Landscape Institute's Technical Guidance Note 6/19: Visual Representation of Development Proposals.
-
- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	25/06/2021
Drawn by:	TH	Status	FINAL
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Rampion 2 WIND FARM

Figure: 16.26d_ES
Viewpoint 1: Beachy Head
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report

PEIR WCS Layout

Wireline drawing

View flat at a comfortable arm's length

Location grid reference:	555382 E 95992 N
Direction of view:	251°
Horizontal field of view:	53.5° (planar projection)
Distance:	25.07m

Paper size:	841mm x 297mm (half A1)
Corrected print image size:	820mm x 260mm
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Camera:	Canon EOS 6D
Lens:	50mm (Canon EF 50mm f/1.4)
Camera height:	1.5m AGL
Date and time:	26/08/2020 11:08

Development Parameters:

Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm:	75 turbines at 325m blade tip height

Notes:
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- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	28/01/2022
Drawn by:	TH	Status	FOR DISCUSSION
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Rampion 2 WIND FARM

Figure: 16.26f_ES
Viewpoint 1: Beachy Head
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report

ES Revised WCS Layout

Wireline drawing

View flat at a comfortable arm's length

Location grid reference:	555382 E 95992 N
Direction of view:	251°
Horizontal field of view:	53.5° (planar projection)
Distance:	25.07m

Paper size:	841mm x 297mm (half A1)
Corrected print image size:	820mm x 260mm
Principal distance:	812.5mm

Camera:	Canon EOS 6D
Lens:	50mm (Canon EF 50mm f/1.4)
Camera height:	1.5m AGL
Date and time:	26/08/2020 11:08

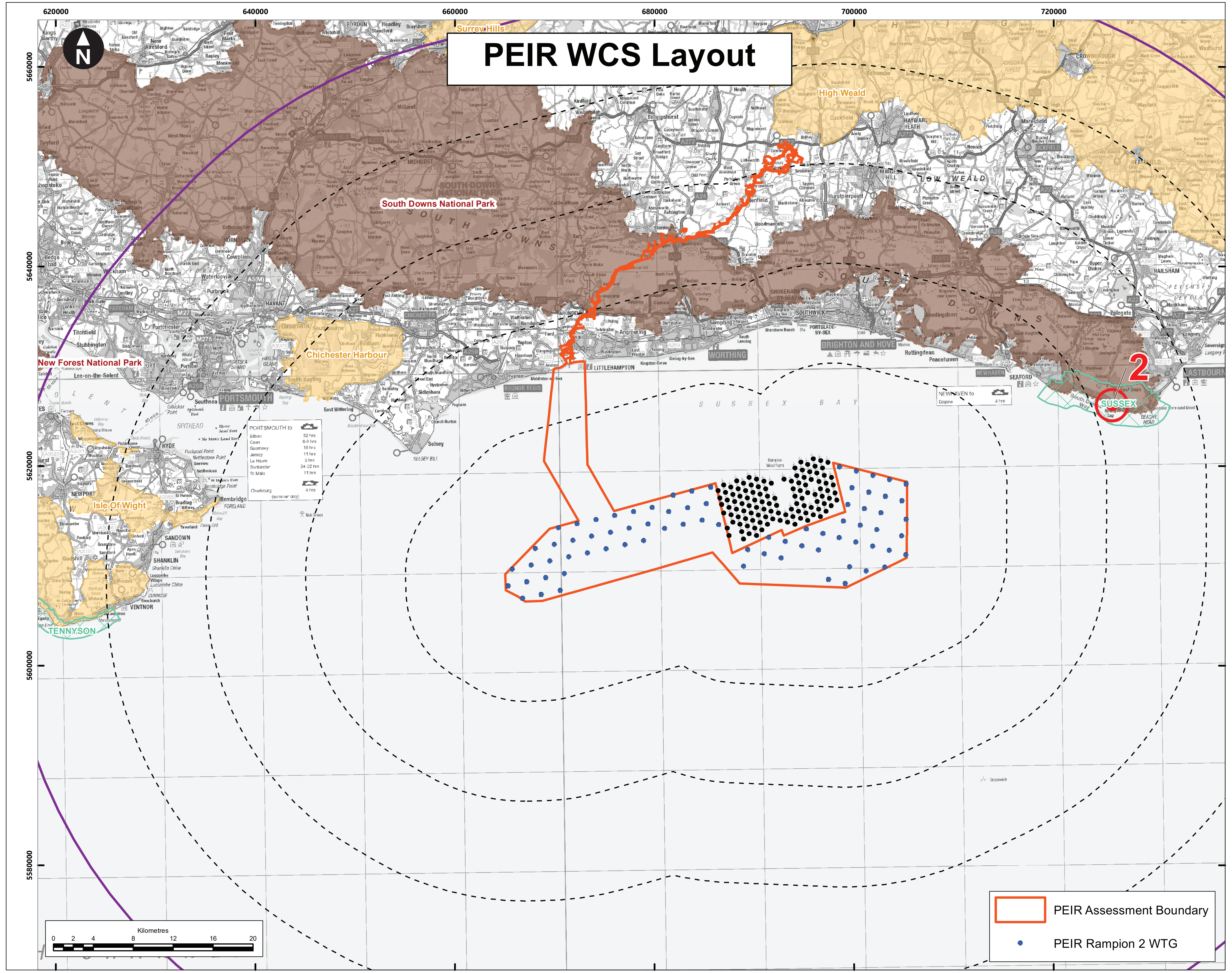
Development Parameters:

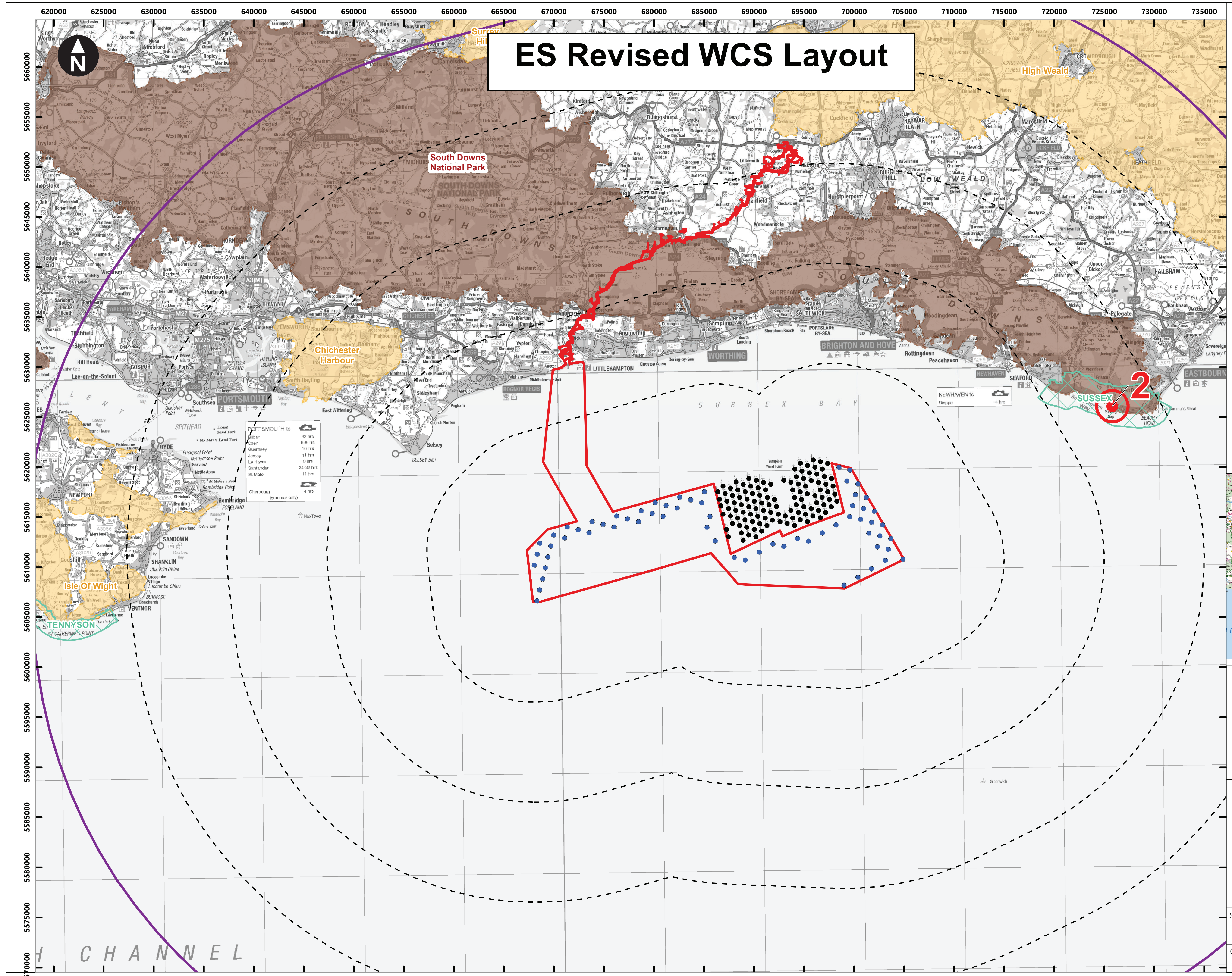
Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm:	65 turbines at 325m blade tip height

Notes:
- Figure produced to accord with the Landscape Institute's Technical Guidance Note 6/19: Visual Representation of Development Proposals.
-
- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	28/01/2022	Rampion 2 WIND FARM
Drawn by:	TH	Status	FOR DISCUSSION	
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved	

Figure: 16.26g_ES
Viewpoint 1: Beachy Head
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report





Key

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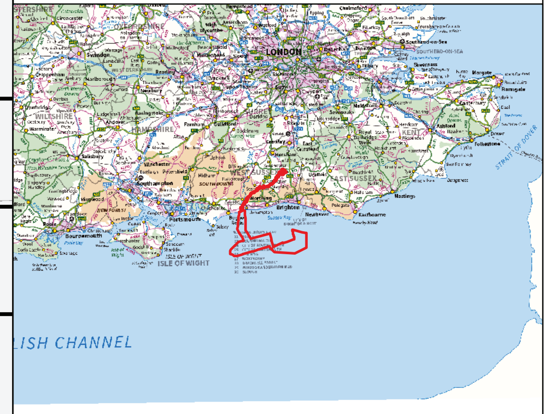
- 50km Study Area
- Operational Rampion 1 WTG
- Indicative Rampion 2 WTG
- Viewpoint
- National Park
- Heritage Coasts
- Area of Outstanding Natural Beauty



Kilometers
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WGS 1984 UTM Zone 30N Transverse Mercator

Rampion Extension Development

Rampion 2 Offshore Wind Farm

Viewpoint 2 : Birling Gap

Consultation

System Identifier:				Version: 1.0
Company: OPEN	Drawn By: JM	Chk/Aprvd: WOOD	Drawn Date: 04/02/2022	Status: FINAL

Location grid reference:	555382 E 95992 N	Paper size:	841mm x 297mm (half A1)
Direction of view:	249°	Corrected print image size:	820mm x 260mm
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Distance:	21.9km		

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Lens:	50mm (Canon EF 50mm f/1.4)
Camera height:	11.5m AGL
Date and time:	26/08/2020 11:50

Development Parameters:

Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm:	75 turbines at 325m blade tip height

Notes:
- Figure produced to accord with the Landscape Institute's Technical Guidance Note 6/19: Visual Representation of Development Proposals.
-
- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	25/06/2021
Drawn by:	TH	Status	FINAL
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Rampion 2 WIND FARM

Figure: 16.27e_ES
Viewpoint 2: Birling Gap
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report

Location grid reference:	555382 E 95992 N
Direction of view:	249°
Horizontal field of view:	53.5° (planar projection)
Distance:	21.9km

Paper size:	841mm x 297mm (half A1)
Corrected print image size:	820mm x 260mm
Principal distance:	812.5mm

Camera:	Canon EOS 6D
Lens:	50mm (Canon EF 50mm f/1.4)
Camera height:	11.5m AGL
Date and time:	26/08/2020 11:50

Development Parameters:	
Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm:	75 turbines at 325m blade tip height

Notes:
- Figure produced to accord with the Landscape Institute's Technical Guidance Note 6/19: Visual Representation of Development Proposals.
-
- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	28/01/2022
Drawn by:	TH	Status	FOR DISCUSSION
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Rampion 2 WIND FARM

Figure: 16.27g_ES
Viewpoint 2: Birling Gap
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report

ES Revised WCS Layout

Wireline drawing

View flat at a comfortable arm's length

Location grid reference:	555382 E 95992 N	Paper size:	841mm x 297mm (half A1)	Camera:	Canon EOS 6D
Direction of view:	249°	Corrected print image size:	820mm x 260mm	Lens:	50mm (Canon EF 50mm f/1.4)
Horizontal field of view:	53.5° (planar projection)	Principal distance:	812.5mm	Camera height:	11.5m AGL
Distance:	21.9km			Date and time:	26/08/2020 11:50

Development Parameters:

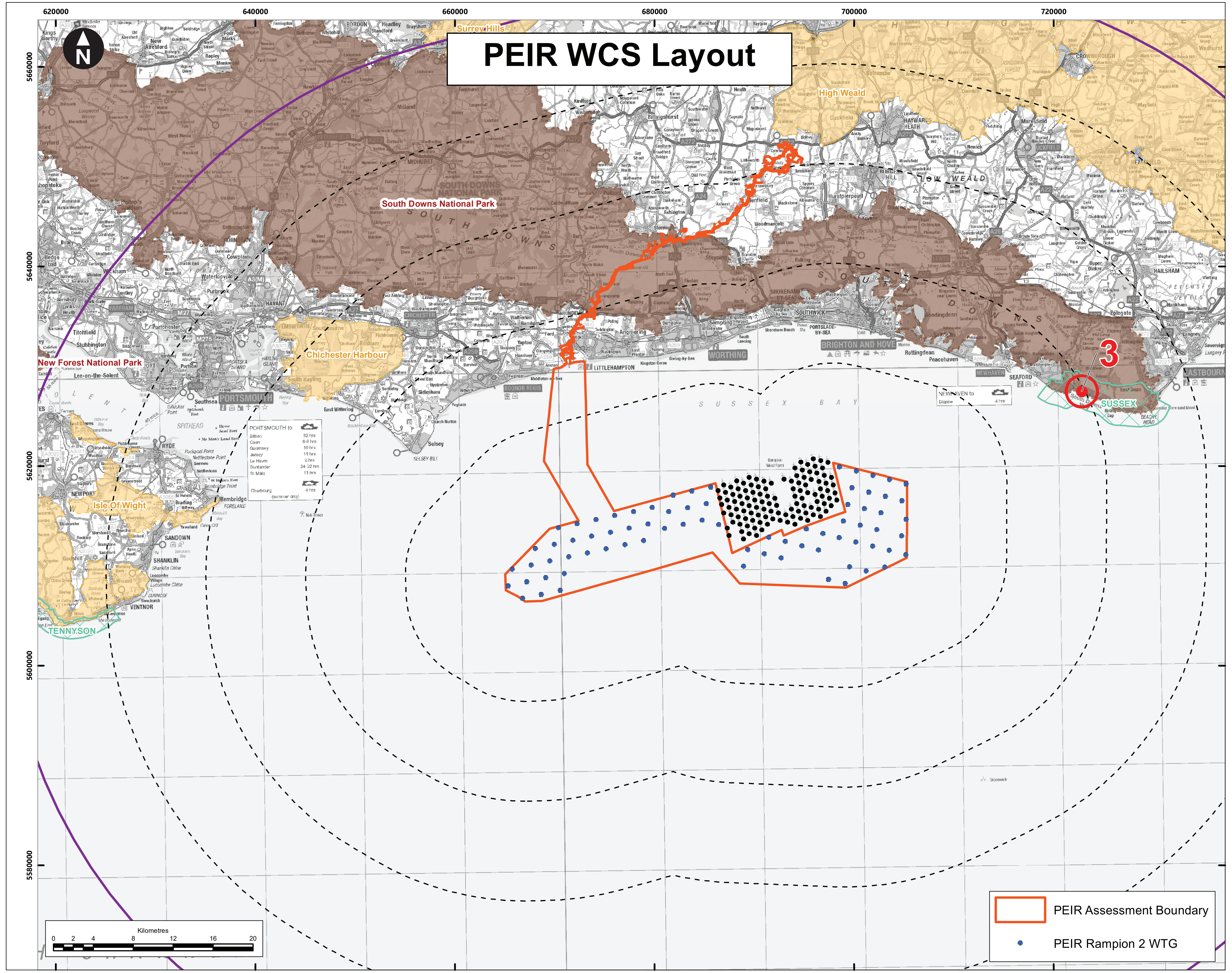
Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm:	65 turbines at 325m blade tip height

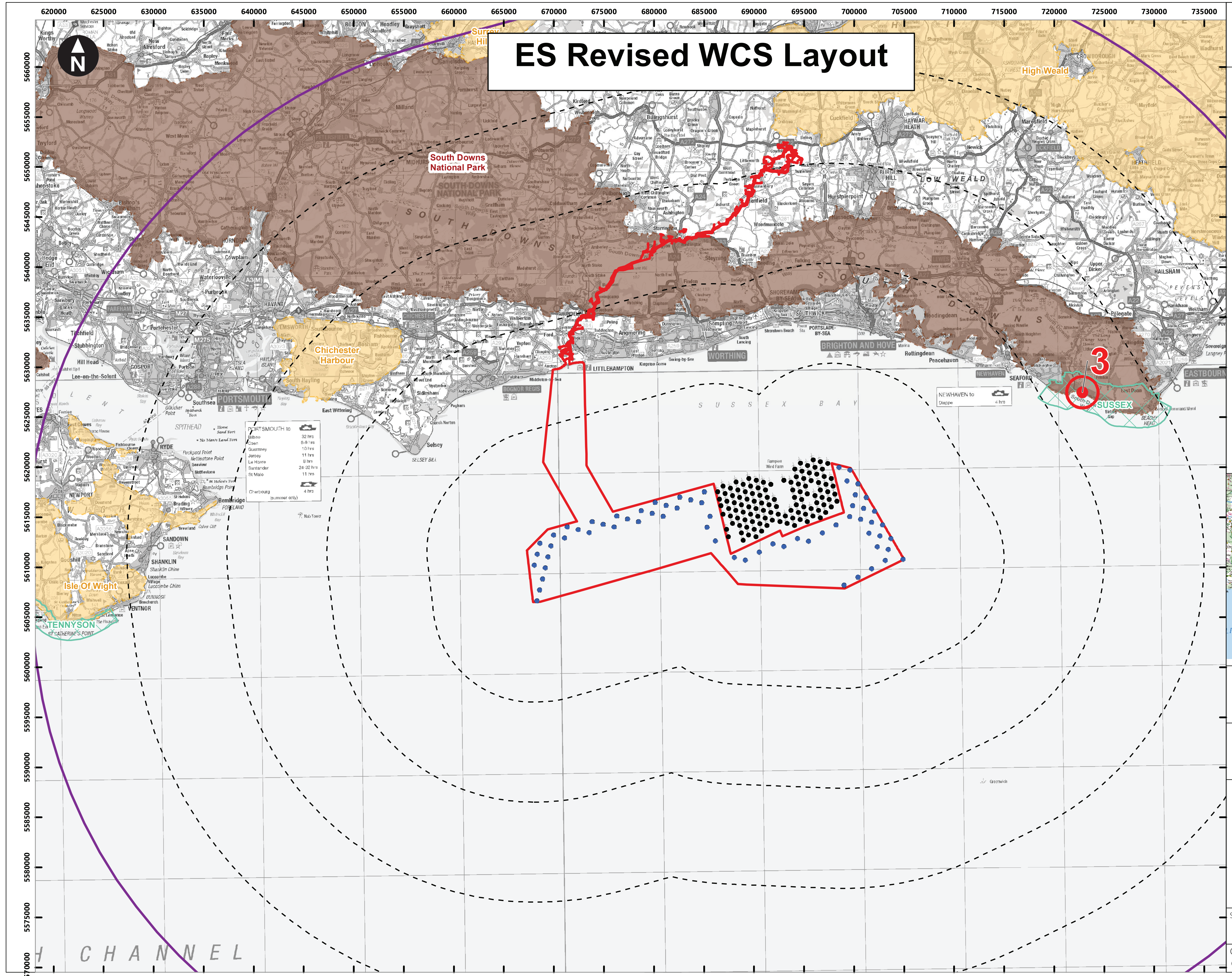
Notes:
- Figure produced to accord with the Landscape Institute's Technical Guidance Note 6/19: Visual Representation of Development Proposals.
-
- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	28/01/2022
Drawn by:	TH	Status	FOR DISCUSSION
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Rampion 2 WIND FARM

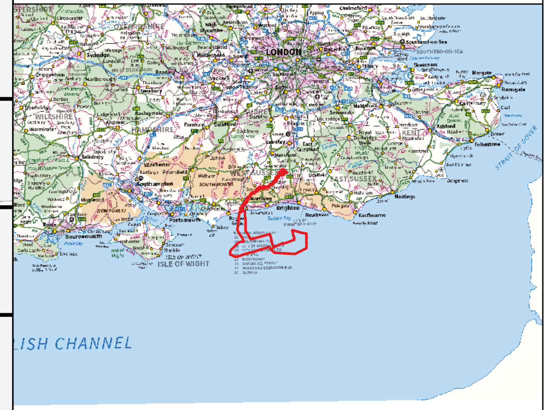
Figure: 16.27i_ES
Viewpoint 2: Birling Gap
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report





Key

- Proposed DCO Application Boundary
- 10km Radii
- 50km Study Area
- Operational Rampion 1 WTG
- Indicative Rampion 2 WTG
- Viewpoint
- National Park
- Heritage Coasts
- Area of Outstanding Natural Beauty



Kilometers

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WGS 1984 UTM Zone 30N Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Viewpoint 3 : Seven Sisters Country Park

Consultation

System Identifier:				Version: 1.0
Company: OPEN	Drawn By: JM	Chk/Aprvd: WOOD	Drawn Date: 04/02/2022	Status: FINAL

 ISO A3 Landscape

Location grid reference:	552400 E 97419 N
Direction of view:	244°
Horizontal field of view:	53.5° (planar projection)
Distance:	19.72m

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Corrected print image size:	820mm x 260mm
Principal distance:	812.5mm

Camera:	Canon EOS 6D
Lens:	50mm (Canon EF 50mm f/1.4)
Camera height:	1.5m AGL
Date and time:	06/11/2020 09:14

Development Parameters:

Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm:	75 turbines at 325m blade tip height

Notes:
- Figure produced to accord with the Landscape Institute's Technical Guidance Note 6/19: Visual Representation of Development Proposals.
-
- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	25/06/2021
Drawn by:	TH	Status	FINAL
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Rampion 2 WIND FARM

Figure: 16.28d_ES
Viewpoint 3: Seven Sisters Country Park
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report

PEIR WCS Layout

Wireline drawing

View flat at a comfortable arm's length

Location grid reference:	552400 E 97419 N
Direction of view:	244°
Horizontal field of view:	53.5° (planar projection)
Distance:	19.72m

Paper size:	841mm x 297mm (half A1)
Corrected print image size:	820mm x 260mm
Principal distance:	812.5mm

Camera:	Canon EOS 6D
Lens:	50mm (Canon EF 50mm f/1.4)
Camera height:	1.5m AGL
Date and time:	06/11/2020 09:14

Development Parameters:

Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm:	75 turbines at 325m blade tip height

Notes:
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-
- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	28/01/2022
Drawn by:	TH	Status	FOR DISCUSSION
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Rampion 2 WIND FARM

Figure: 16.28f_ES
Viewpoint 3: Seven Sisters Country Park
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report

ES Revised WCS Layout

Wireline drawing

View flat at a comfortable arm's length

Location grid reference:	552400 E 97419 N
Direction of view:	244°
Horizontal field of view:	53.5° (planar projection)
Distance:	19.72m

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Principal distance:	812.5mm

Camera:	Canon EOS 6D
Lens:	50mm (Canon EF 50mm f/1.4)
Camera height:	1.5m AGL
Date and time:	06/11/2020 09:14

Development Parameters:

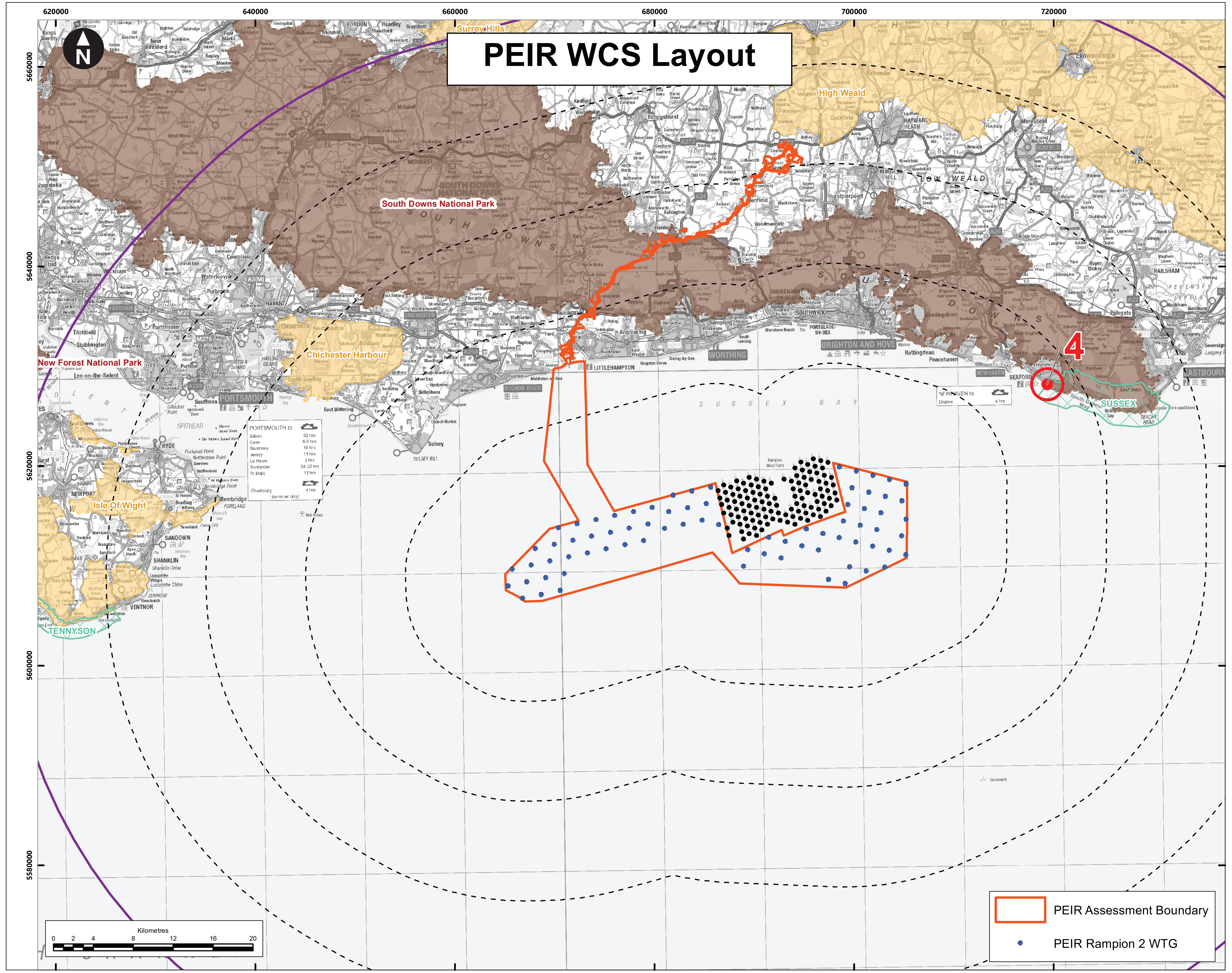
Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm:	65 turbines at 325m blade tip height

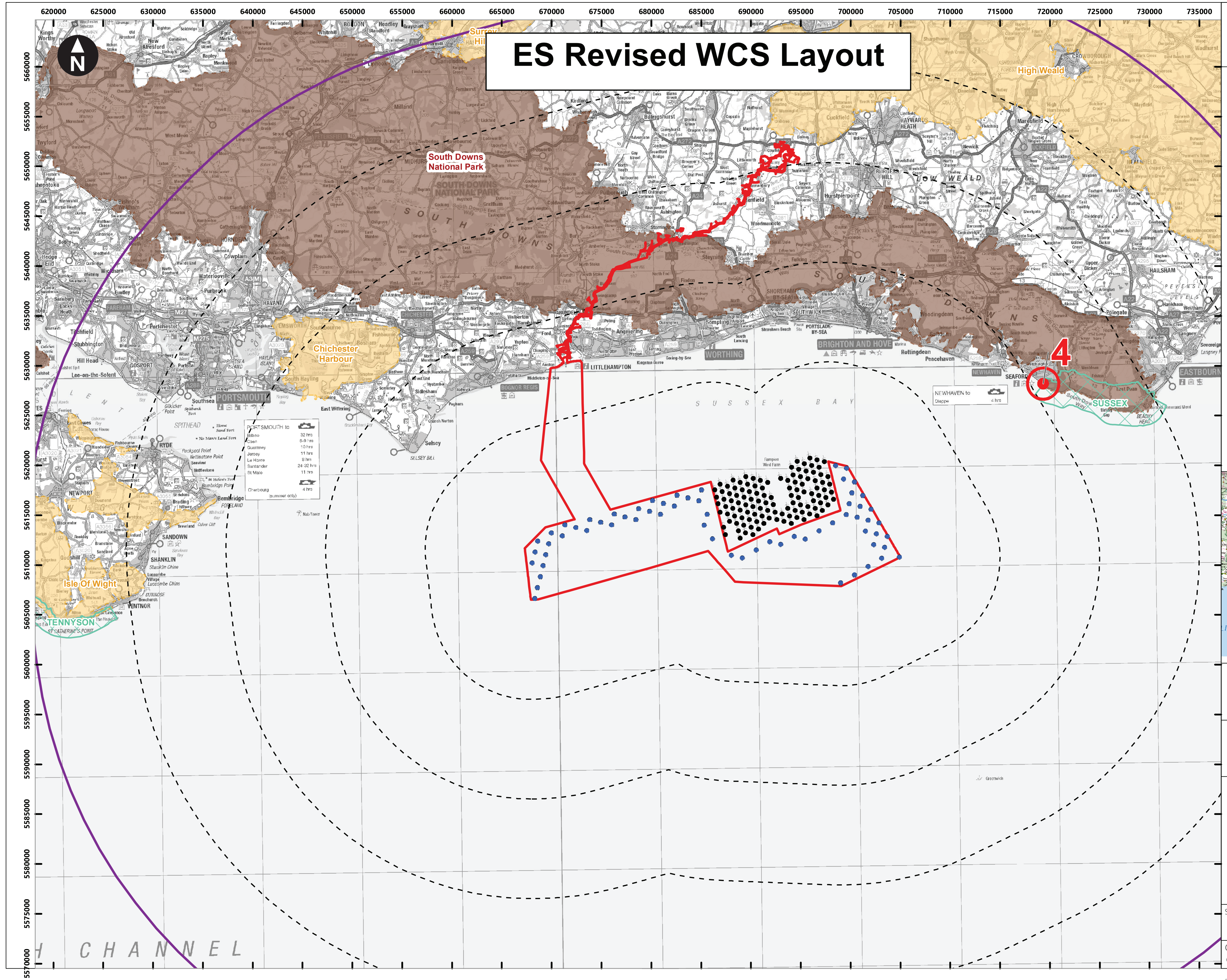
Notes:
- Figure produced to accord with the Landscape Institute's Technical Guidance Note 6/19: Visual Representation of Development Proposals.
-
- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	28/01/2022
Drawn by:	TH	Status	FOR DISCUSSION
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Rampion 2 WIND FARM

Figure: 16.28g_ES
Viewpoint 3: Seven Sisters Country Park
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report





Key

- Proposed DCO Application Boundary
- 10km Radii
- 50km Study Area
- Operational Rampion 1 WTG
- Indicative Rampion 2 WTG
- Viewpoint
- National Park
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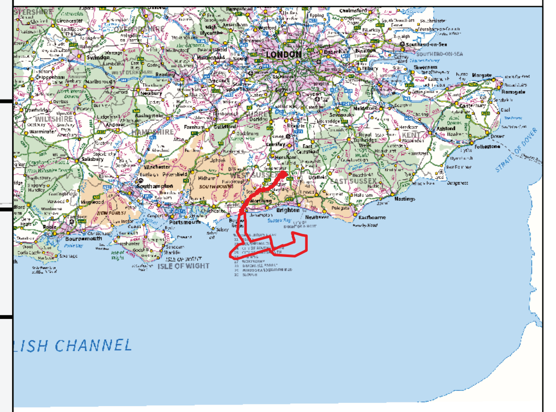

Kilometers

0 2 4 8 12 16 20

1:350,000

WGS 1984 UTM Zone 30N Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Viewpoint 4 : Seaford Head

Consultation

System Identifier:				Version: 1.0
Company: OPEN	Drawn By: JM	Chk/Aprvd: WOOD	Drawn Date: 04/02/2022	Status: FINAL

Location grid reference:	548924 E 98186 N
Direction of view:	239°
Horizontal field of view:	53.5° (planar projection)
Distance:	17.11m

Paper size:	841mm x 297mm (half A1)
Corrected print image size:	820mm x 260mm
Principal distance:	812.5mm

Camera:	Canon EOS 6D
Lens:	50mm (Canon EF 50mm f/1.4)
Camera height:	1.5m AGL
Date and time:	26/08/2020 12:59

Development Parameters:

Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm:	75 turbines at 325m blade tip height

Notes:
- Figure produced to accord with the Landscape Institute's Technical Guidance Note 6/19: Visual Representation of Development Proposals.
-
- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	25/06/2021
Drawn by:	TH	Status	FINAL
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Rampion 2 WIND FARM

Figure: 16.29d_ES
Viewpoint 4: Seaford Head
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report

PEIR WCS Layout

Wireline drawing

View flat at a comfortable arm's length

Location grid reference:	548924 E 98186 N
Direction of view:	239°
Horizontal field of view:	53.5° (planar projection)
Distance:	17.11m

Paper size:	841mm x 297mm (half A1)
Corrected print image size:	820mm x 260mm
Principal distance:	812.5mm

Camera:	Canon EOS 6D
Lens:	50mm (Canon EF 50mm f/1.4)
Camera height:	1.5m AGL
Date and time:	26/08/2020 12:59

Development Parameters:	
Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
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Notes:
- Figure produced to accord with the Landscape Institute's Technical Guidance Note 6/19: Visual Representation of Development Proposals.
- © Crown copyright and database rights 2020 Ordnance Survey 0100031673.
- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	28/01/2022
Drawn by:	TH	Status	FOR DISCUSSION
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Rampion 2 WIND FARM

Figure: 16.29f_ES
Viewpoint 4: Seaford Head
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report

ES Revised WCS Layout

Wireline drawing

View flat at a comfortable arm's length

Location grid reference:	548924 E 98186 N
Direction of view:	239°
Horizontal field of view:	53.5° (planar projection)
Distance:	17.11m

Paper size:	841mm x 297mm (half A1)
Corrected print image size:	820mm x 260mm
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Camera height:	1.5m AGL
Date and time:	26/08/2020 12:59

Development Parameters:

Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
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Notes:
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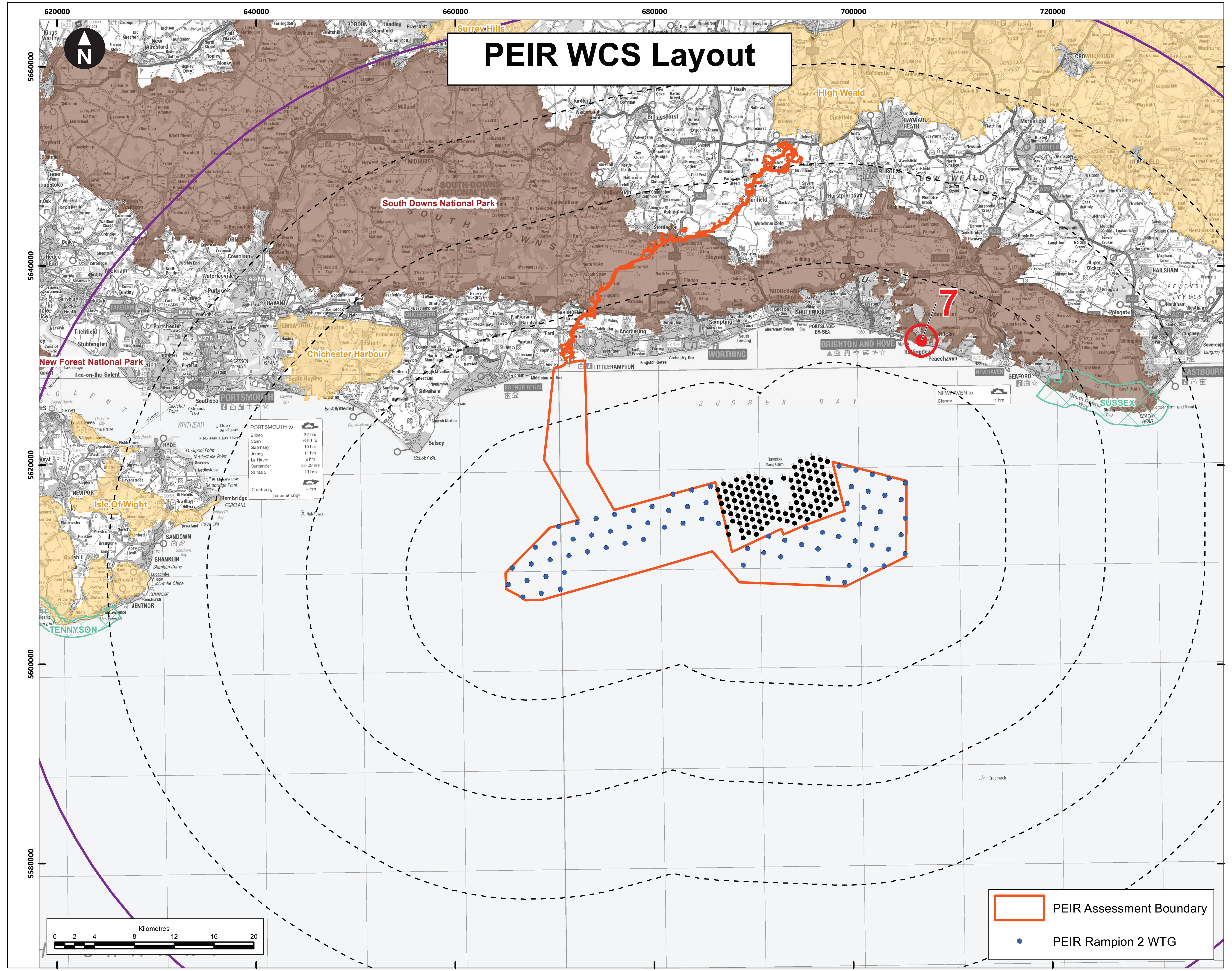
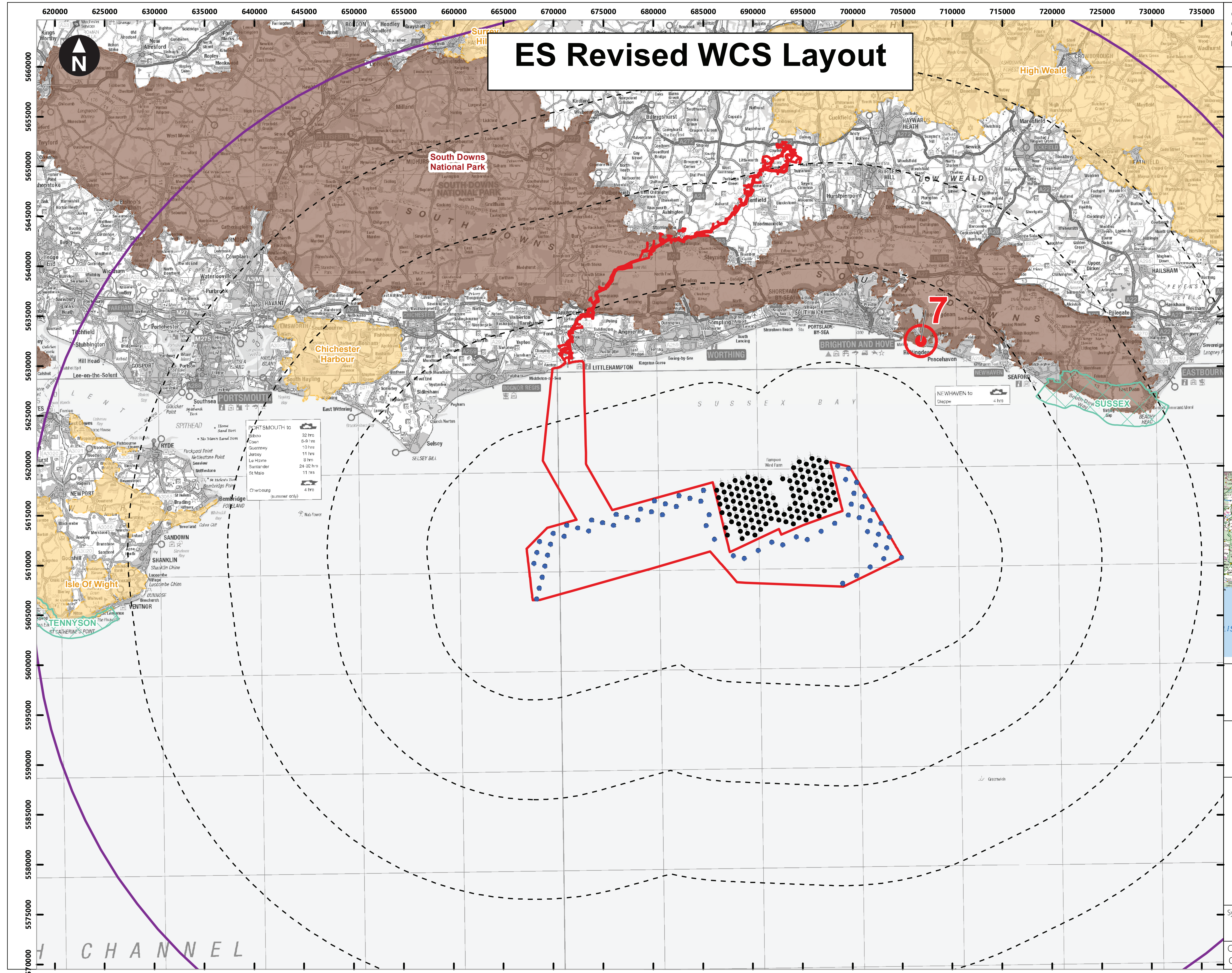
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	28/01/2022
Drawn by:	TH	Status	FOR DISCUSSION
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Rampion 2 WIND FARM

Figure: 16.29g_ES
Viewpoint 4: Seaford Head
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report





Key

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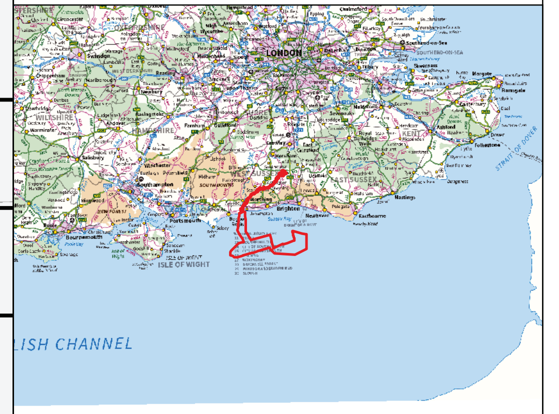
- 50km Study Area
- Operational Rampion 1 WTG
- Indicative Rampion 2 WTG
- Viewpoint
- National Park
- Heritage Coasts
- Area of Outstanding Natural Beauty



Kilometers
0 2 4 8 12 16 20
1:350,000
WGS 1984 UTM Zone 30N Transverse Mercator

Rampion Extension Development

Rampion 2 Offshore Wind Farm

Viewpoint 7 : Beacon Hill, Rottingdean

Consultation

System Identifier:				Version: 1.0
Company: OPEN	Drawn By: JM	Chk/Aprvd: WOOD	Drawn Date: 04/02/2022	Status: FINAL

Document uncontrolled when printed   ISO A3 Landscape

Location grid reference:	536465 E 102628 N
Direction of view:	214.5°
Horizontal field of view:	63.5° (planar projection)
Distance:	14km

Paper size:	1027.7 x 297mm
Corrected print image size:	1006.7 x 260mm
Principal distance:	812.5mm

Camera:	Canon EOS 6D
Lens:	50mm (Canon EF 50mm f/1.4)
Camera height:	1.5m AGL
Date and time:	26/08/2020 15:04

Development Parameters:	
Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm:	75 turbines at 325m blade tip height

Notes:
- Figure produced to accord with the Landscape Institute's Technical Guidance Note 6/19: Visual Representation of Development Proposals.
-
- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	25/06/2021
Drawn by:	TH	Status	FINAL
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Figure: 16.32d_ES
Viewpoint 7: Beacon Hill, Rottingdean
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report

PEIR WCS Layout

Wireline drawing

View flat at a comfortable arm's length

Location grid reference:	536465 E 102628 N
Direction of view:	214.5°
Horizontal field of view:	63.5° (planar projection)
Distance:	14km

Paper size:	1027.7 x 297mm
Corrected print image size:	1006.7 x 260mm
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Camera:	Canon EOS 6D
Lens:	50mm (Canon EF 50mm f/1.4)
Camera height:	1.5m AGL
Date and time:	26/08/2020 15:04

Development Parameters:

Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm:	75 turbines at 325m blade tip height

Notes:
- Figure produced to accord with the Landscape Institute's Technical Guidance Note 6/19: Visual Representation of Development Proposals.
-
- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	28/01/2022
Drawn by:	TH	Status	FOR DISCUSSION
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Figure: 16.32f_ES
Viewpoint 7: Beacon Hill, Rottingdean
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report

Location grid reference:	536465 E 102628 N
Direction of view:	214.5°
Horizontal field of view:	63.5° (planar projection)
Distance:	14km

Paper size:	1027.7 x 297mm
Corrected print image size:	1006.7 x 260mm
Principal distance:	812.5mm

Camera:	Canon EOS 6D
Lens:	50mm (Canon EF 50mm f/1.4)
Camera height:	1.5m AGL
Date and time:	26/08/2020 15:04

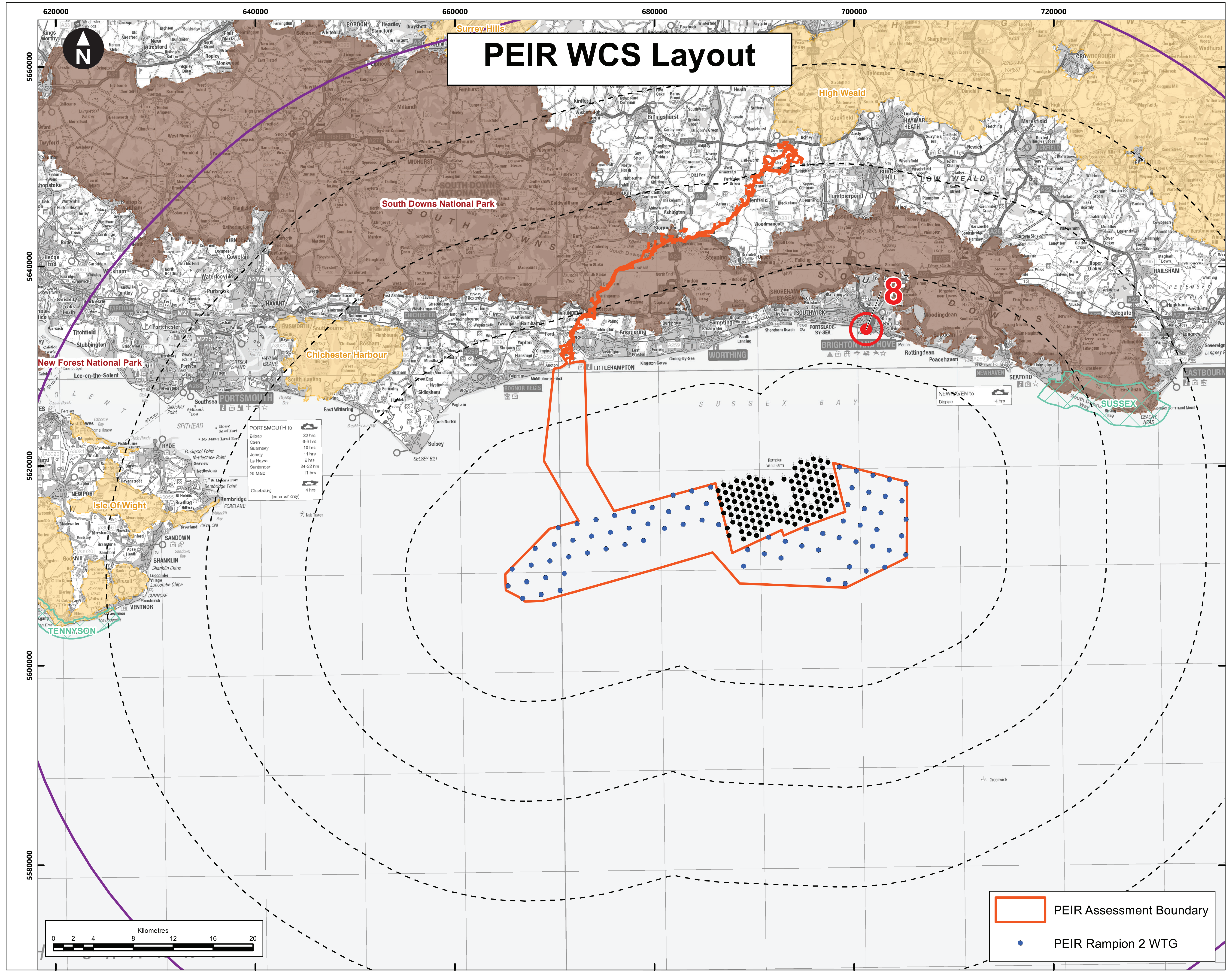
Development Parameters:

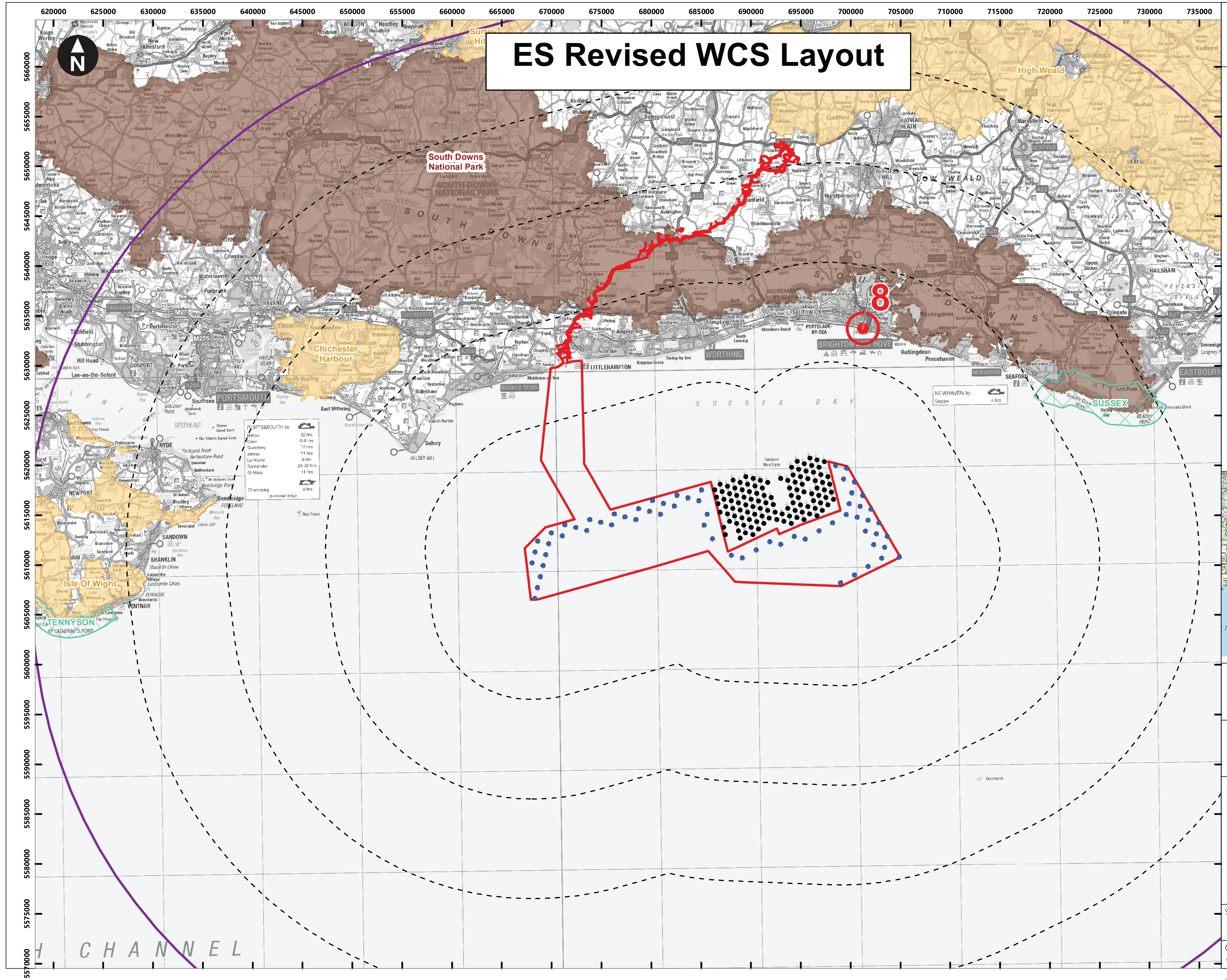
Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm:	65 turbines at 325m blade tip height

Notes:
- Figure produced to accord with the Landscape Institute's Technical Guidance Note 6/19: Visual Representation of Development Proposals.
-
- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	28/01/2022
Drawn by:	TH	Status	FOR DISCUSSION
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

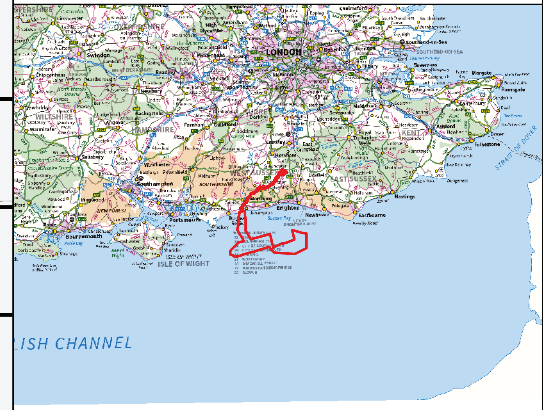
Figure: 16.32g_ES
Viewpoint 7: Beacon Hill, Rottingdean
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report





Key

- Proposed DCO Application Boundary
- 10km Radii
- 50km Study Area
- Operational Rampion 1 WTG
- Indicative Rampion 2 WTG
- Viewpoint
- National Park
- Heritage Coasts
- Area of Outstanding Natural Beauty



Kilometers
0 2 4 8 12 16 20

1:350,000
WGS 1984 UTM Zone 30N Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Viewpoint 8 : Brighton sea front promenade

Consultation

System Identifier:				Version: 1.0
Company: OPEN	Drawn By: JM	Chk/Aprvd: WOOD	Drawn Date: 04/02/2022	Status: FINAL

Location grid reference:	530887 E 103942 N
Direction of view:	172.5°
Horizontal field of view:	53.5° (planar projection)
Distance:	13.8m

Paper size:	841mm x 297mm (half A1)
Corrected print image size:	820mm x 260mm
Principal distance:	812.5mm

Camera:	Canon EOS 6D
Lens:	50mm (Canon EF 50mm f/1.4)
Camera height:	1.5m AGL
Date and time:	05/11/2020 11:17

Development Parameters:

Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm:	75 turbines at 325m blade tip height

Notes:
- Figure produced to accord with the Landscape Institute's Technical Guidance Note 6/19: Visual Representation of Development Proposals.
-
- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	25/06/2021
Drawn by:	TH	Status	FINAL
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Figure: 16.33e_ES
Viewpoint 8: Brighton sea front promenade
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report

Location grid reference:	530887 E 103942 N	Paper size:	841mm x 297mm (half A1)	Camera:	Canon EOS 6D
Direction of view:	226°	Corrected print image size:	820mm x 260mm	Lens:	50mm (Canon EF 50mm f/1.4)
Horizontal field of view:	53.5° (planar projection)	Principal distance:	812.5mm	Camera height:	1.5m AGL
Distance:	13.8m			Date and time:	05/11/2020 11:17

Development Parameters:

Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm:	75 turbines at 325m blade tip height

Notes:
- Figure produced to accord with the Landscape Institute's Technical Guidance Note 6/19: Visual Representation of Development Proposals.
-
- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	25/06/2021
Drawn by:	TH	Status	FINAL
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Rampion 2 WIND FARM

Figure: 16.33f_ES
Viewpoint 8: Brighton sea front promenade
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report

PEIR WCS Layout

Wireline drawing

View flat at a comfortable arm's length

Location grid reference:	530887 E 103942 N
Direction of view:	172.5°
Horizontal field of view:	53.5° (planar projection)
Distance:	13.8m

Paper size:	841mm x 297mm (half A1)
Corrected print image size:	820mm x 260mm
Principal distance:	812.5mm

Camera:	Canon EOS 6D
Lens:	50mm (Canon EF 50mm f/1.4)
Camera height:	1.5m AGL
Date and time:	05/11/2020 11:17

Development Parameters:

Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm:	75 turbines at 325m blade tip height

Notes:
- Figure produced to accord with the Landscape Institute's Technical Guidance Note 6/19: Visual Representation of Development Proposals.
-
- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	28/01/2022
Drawn by:	TH	Status	FOR DISCUSSION
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Rampion 2 WIND FARM

Figure: 16.33i_ES
Viewpoint 8: Brighton sea front promenade
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report

PEIR WCS Layout

Wireline drawing

View flat at a comfortable arm's length

Location grid reference:	530887 E 103942 N
Direction of view:	226°
Horizontal field of view:	53.5° (planar projection)
Distance:	13.8m

Paper size:	841mm x 297mm (half A1)
Corrected print image size:	820mm x 260mm
Principal distance:	812.5mm

Camera:	Canon EOS 6D
Lens:	50mm (Canon EF 50mm f/1.4)
Camera height:	1.5m AGL
Date and time:	05/11/2020 11:17

Development Parameters:

Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm:	75 turbines at 325m blade tip height

Notes:
- Figure produced to accord with the Landscape Institute's Technical Guidance Note 6/19: Visual Representation of Development Proposals.
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- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	28/01/2022
Drawn by:	TH	Status	FOR DISCUSSION
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Figure: 16.33j_ES
Viewpoint 8: Brighton sea front promenade
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report

ES Revised WCS Layout

Wireline drawing

View flat at a comfortable arm's length

Location grid reference:	530887 E 103942 N
Direction of view:	172.5°
Horizontal field of view:	53.5° (planar projection)
Distance:	13.8m

Paper size:	841mm x 297mm (half A1)
Corrected print image size:	820mm x 260mm
Principal distance:	812.5mm

Camera:	Canon EOS 6D
Lens:	50mm (Canon EF 50mm f/1.4)
Camera height:	1.5m AGL
Date and time:	05/11/2020 11:17

Development Parameters:

Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm:	65 turbines at 325m blade tip height

Notes:
- Figure produced to accord with the Landscape Institute's Technical Guidance Note 6/19: Visual Representation of Development Proposals.
-
- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	28/01/2022
Drawn by:	TH	Status	FOR DISCUSSION
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Rampion 2 WIND FARM

Figure: 16.33p_ES
Viewpoint 8: Brighton sea front promenade
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report

ES Revised WCS Layout

Wireline drawing

View flat at a comfortable arm's length

Location grid reference:	530887 E 103942 N	Paper size:	841mm x 297mm (half A1)	Camera:	Canon EOS 6D
Direction of view:	226°	Corrected print image size:	820mm x 260mm	Lens:	50mm (Canon EF 50mm f/1.4)
Horizontal field of view:	53.5° (planar projection)	Principal distance:	812.5mm	Camera height:	1.5m AGL
Distance:	13.8m			Date and time:	05/11/2020 11:17

Development Parameters:

Rampion Offshore Wind Farm:	116 turbines at 140m blade tip height
Rampion 2 Offshore Wind Farm:	65 turbines at 325m blade tip height

Notes:
- Figure produced to accord with the Landscape Institute's Technical Guidance Note 6/19: Visual Representation of Development Proposals.
-
- 100% Enlargement
- TYPE 4 VISUALISATION

Company:	OPEN	Drawn date:	28/01/2022
Drawn by:	TH	Status	FOR DISCUSSION
Chk/Aprvd:	SM	File:	191397_RMP2_SLVIA_ES_ETG_v3_NoRemoved

Figure: 16.33q_ES
Viewpoint 8: Brighton sea front promenade
Rampion 2 Offshore Wind Farm
Preliminary Environmental Information Report