HINKLEY POINT C

SHELDUCK MONITORING AND MITIGATION SCHEME
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NNB GENERATION COMPANY (HPC) LTD

COMPANY DOCUMENT

SHELDUCK MONITORING AND MITIGATION SCHEME

Requests for copies of this document should be referred to Head of Business Architecture, NNB GenCo, 90 Whitfield Street, London, W1T 4EZ. The electronic copy is the current issue and printing renders this document uncontrolled.)

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EXECUTIVE SUMMARY

NNB Generation Company (HPC) Limited (Company Number 06937084), part of EDF Energy, is the Company that will lead the new nuclear programme in the United Kingdom. For the purpose of this document the company is referred to as NNB GenCo.

NNB GenCo submitted an application for Development Consent to the Infrastructure Planning Commission in October 2011 for the construction and operation of Hinkley Point C and associated developments. On 19 March 2013 the Secretary of State issued an order granting development consent for the application, which included a schedule of requirements. One of these requirements (J2) stated that a Shelduck Monitoring and Mitigation Scheme (SMMS) should be produced in accordance with Natural England's Temporary Jetty Development Principles for an Adaptive Shelduck Monitoring Strategy (ref. NE/9 - see Appendix B).

This document, which describes the SMMS, addresses the following key aspects:

- DCO requirements as expressed through NE/9;
- Methods used for monitoring shelduck population and distribution;
- Monitoring results from Phase 1;
- Ongoing monitoring for Phase 2;
- Mitigation trigger points;
- Mitigation measures;
- Review points.

1 INTRODUCTION

1.1 Background

NNB Generation Company Limited (Company Number 06937084), part of EDF Energy, is the Company that will lead the new nuclear programme in the United Kingdom. For the purpose of this document, NNB Generation Company Limited is referred to as NNB GenCo.

NNB GenCo is building a new power station comprising two UK European Pressurised Reactors at Hinkley Point C, (HPC). This Shelduck Monitoring and Mitigation Scheme (SMMS) is prepared to comply with specific conditions in the Development Consent Order (DCO) and shall be implemented for all relevant construction related work.

1.2 Purpose

The purpose of this document is to provide a Shelduck Monitoring and Mitigation Scheme (SMMS) to be implemented:

“to ensure that moulting shelduck will not be negatively affected by vessel movements to/from the temporary jetty and the refurbished Combwich Wharf when judged in combination and that, as a result, no adverse effect on the integrity of the Severn Estuary Special Protection Area (SPA) and Ramsar Site will occur” (Natural England NE/9.1 Annex A page 1).

The primary need to produce this Scheme arises from DCO Requirement J2 which states:

> ***Shelduck and Non-Breeding Birds Monitoring and Mitigation Schemes***
>
> *(1) Works Nos. TJ1, TJ2 and TJ3 shall not be brought into operation until shelduck and non-breeding birds monitoring and mitigation schemes have, following consultation with Natural England and the Marine Management Organisation, have been submitted to and approved by the relevant planning authority. Unless otherwise agreed, the monitoring and mitigation schemes shall be developed in accordance with the Temporary Jetty Development Principles for an Adaptive Shelduck Monitoring Strategy (ref: NE/9).*
>
> *(2) The shelduck and non-breeding birds monitoring and mitigation schemes shall be implemented as approved.*

1.3 Scope

Shelduck gather between mid-June and October each year in the Bridgwater Bay Site of Special Scientific Interest (SSSI), which forms part of the Severn Estuary SPA and Ramsar Site, for their annual moult. Shelduck are more vulnerable to disturbance during the moulting period when they have the energetic demand of replacing feathers, are unable to fly and the population is concentrated

spatially. Vessel movements associated with the construction and operation of the temporary jetty, which forms part of the HPC 'Main Site', and the refurbishment and subsequent use of Combwich Wharf, which is one of the HPC Associated Development sites, could cause disturbance to the shelduck population. Such disturbance could constitute a significant adverse effect on the integrity of the SPA and would constitute a breach of DCO Requirement J2 and also a breach of the Habitat and Species Regulations 2017.

As required through DCO Requirement J2, the SMMS has been prepared following the advice received from Natural England (NE) in their document 'Principles for an Adaptive Shelduck Monitoring Strategy' (Inquiry document reference NE/9.1 and contained within Appendix B of this document),here after referred to as ASMS. As such, this strategy is based on the following points:

i. Monitoring of existing shelduck population size and behaviour within Bridgwater Bay in those months when moulting shelduck are present (mid-June to October).

ii. Establish the response of shelduck to vessels associated both with the construction of the temporary jetty and existing boat traffic accessing Combwich Wharf prior to refurbishment.

iii. Review of monitoring and mitigation requirements after two years monitoring (i.e. prior to in-combination operational movements to the temporary jetty and Combwich Wharf commencing) and to continue monitoring if necessary.

iv. Finalise easy to record, quantitative trigger points for implementing mitigation measures, thereby avoiding subjectivity and differing interpretations by different observers.

v. From the onset of operational vessel traffic accessing both the temporary jetty and refurbished Combwich Wharf, objective methods of data recording will monitor the behavioural responses of shelduck to development vessel traffic and provide medium/long term population trends as necessary.

vi. Implementing mitigation should triggers be exceeded. Mitigation would only apply during the moulting period (mid-June to October).

vii. Using regular review points, maintenance of an adaptive approach to monitoring, trigger points and mitigation measures.

Phase 1 monitoring of shelduck behaviour and their baseline population and distribution across Bridgewater Bay has now been completed and the SMMS now provides:

i. the Phase 2 monitoring protocol to be employed during the operational phase of vessels movements to/from Combwich Wharf;

ii. the associated trigger points and proposed mitigation measures to reduce disturbance associated with the operational phase of vessels movements to/from Combwich Wharf (see Section 6.2 for details);

iii. additional mitigation to reduce and minimise existing disturbance to shelduck arising from pedestrian use of the coastal path on the Steart peninsula.

2 SURVEY AND MONITORING METHODOLOGY

2.1 Overview

It was originally envisaged that the HPC jetty would be constructed in 2012 and that shelduck activity would be monitored during construction to establish the response of shelduck to construction vessels, in combination with monitoring responses to existing vessel traffic along the River Parrett prior to refurbishment of Combwich Wharf. The construction of the HPC jetty was postponed until November 2017 and consequently only became operational in early 2019. This has provided an opportunity to collect baseline data in the absence of jetty construction traffic. These data were collected through surveys that were undertaken in 2012, 2014, 2015, 2016, 2017, 2018 and 2019 forming seven years of 'Phase 1 Monitoring' as requested in the NE Principles for an Adaptive Shelduck Monitoring Strategy. The seven years of baseline survey have been used, alongside disturbance assessment surveys, to inform the preparation of the SMMS. Shelduck specific surveys were not undertaken in 2013 as survey methodology was under review. Following this review of the methods and approaches trialled in 2012, surveys were fully implemented from 2014.

The results of these monitoring surveys were fully reported in the following documents:

- Draft Shelduck Distribution and Population Survey Report 2012 [1];
- Shelduck Distribution and Population Survey Report – 2014 [2];
- Shelduck Distribution, Population and Disturbance Survey Report – 2015 [3];
- Shelduck Distribution, Population and Disturbance Survey Report – 2016 [4];
- Shelduck Distribution, Population and Disturbance Survey Report – 2017 [5]
- Shelduck Distribution, Population and Disturbance Survey Report – 2018[6]
- Shelduck Distribution, Population and Disturbance Survey Report – 2019[7]

[1] EDF Energy, Hinkley Point C, Draft Shelduck Population and Distribution Survey Report 2012. December 2012. Report by AMEC Environment and Infrastructure UK Ltd.
[2] EDF Energy, Hinkley Point C, Shelduck Distribution and Population Survey Report 2014. December 2014. Report by AMEC Environment and Infrastructure UK Ltd.
[3] EDF Energy, Hinkley Point C, Shelduck Distribution, Population and Disturbance Survey Report – 2015. April 2016. Report by Amec Foster Wheeler Environment and Infrastructure UK Ltd.
[4] EDF Energy, Hinkley Point C, Shelduck Distribution, Population and Disturbance Survey Report – 2016. January 2017. Report by Amec Foster Wheeler Environment and Infrastructure UK Ltd.
[5] EDF Energy, Hinkley Point C, Shelduck Distribution, Population and Disturbance Survey Report – 2017 (Draft version). October 2017. Report by Amec Foster Wheeler Environment and Infrastructure UK Ltd.
[6] EDF Energy, Hinkley Point C, Shelduck Distribution, Population and Disturbance Survey Report – 2018 (2018). Report by Wood Environment and Infrastructure UK Ltd
[7] EDF Energy, Hinkley Point C, Shelduck Distribution, Population and Disturbance Survey Report – 2019 (2019). Report by Wood Environment and Infrastructure UK Ltd

Three types of shelduck-specific surveys were undertaken fortnightly from mid-June to mid-September in each survey year; population counts, distribution surveys and disturbance monitoring. The details of these surveys are summarised below.

2.2 Phase 1 Population Surveys

The survey area for the Phase 1 population survey covers a stretch of coastline from Berrow (north of Burnham-on-sea) south to the River Parrett Estuary and from here west to Hinkley Point.

The population survey involved coordinated counts along three survey transects (the areas of land surveyed from these transects are referred to as Count Sectors 2-4 respectively). Figure A.1 shows the location of the three transects used in 2017, 2018 and 2019.

Each count lasted up to three hours and was conducted within 1.5 hours either side of high water. Where possible, counts were undertaken in less than three hours (over as short a time period as possible) to minimise double-counting. One count of the entire survey area was completed in the second half of June, two in July, two in August and one in early September.

The area around Stert Point and Stert Island was covered simultaneously from both sides of the River (from two different transects) to maximise coverage and eliminate areas where visibility was limited due to topographic features. Surveyors remained in contact with those on neighbouring transects to minimise the risk of double counting at count sector boundaries.

2.3 Phase 1 Distribution Surveys

In order to evaluate the type and level of use by moulting shelduck of the Steart Flats and surrounding intertidal areas and inshore waters, shelduck distribution surveys were undertaken between June and September each year. These were carried out from three observation points in 2017 as described in Table 2.1 and shown in Figure A.2. The same three observation points were used in 2018 and 2019).

The entire survey area comprised 44 1x1km OS grid squares, each of which was numbered (1-44). Each 1x1km square was subdivided into 25 200x200m squares, each of which was labelled with a letter (A-N and P-Z).

On each survey day, a surveyor completed six hours of survey from a single observation point in order to observe any changes or patterns in the distribution of shelduck. Three surveyors were deployed simultaneously.

During each six-hour period, seven counts were undertaken at hourly intervals either side of high-tide. During each count, the intertidal area and inshore waters were scanned using binoculars and a high-powered telescope, and all shelduck that were present were recorded. Numbers and behaviour were noted and the 200m grid-square within which each bird was present was estimated.

Table 2.1 Survey Observation Point (OP) Locations and Details

OP	National grid reference	Details of OP location and count sector
1	ST 22674 45932	Located on the coastal path to the west of Stolford. It overlooks an area of mudflats with a relatively limited tidal range (extending 800m from the mean highwater mark). The shore comprises large rocks forming a sea defence.
4	ST 28231 46790	Located at the Tower Hide on Stert Point, which overlooks Fenning Island. The intertidal habitat comprises mainly mudflats, but also includes saltmarsh, sand dunes, the sandy beach of Stert Point, and the stony and sandy habitats on Stert Island. The mudflats extend for up to 4km north of the observation point at low tide.
5	ST 29535 46972	Located at the mouth of the River Parrett, on the coastal path. The point overlooks the lower reaches of the River Parrett, which are dominated by mudflats at low tide, together with the eastern side of Stert Island and intertidal habitats south of Burnham-on-Sea.

2.4 Phase 1 Disturbance Monitoring

Between each hourly count that was undertaken as part of the distribution survey described above, all disturbance within each sector was recorded. The number of shelduck that responded in a specified way to each stimulus was estimated.

Disturbance stimuli were categorised as follows:

- Sea/river-based vessels (sub-divided in to larger vessels, e.g. the Arco Dart; and smaller vessels, e.g. small fishing boats, jet-skis);
- Aircraft (including helicopters);
- Human (sub-divided into bait-diggers, dog walkers, walkers without dogs and cyclists);
- Predators;
- Tidal (i.e. birds disturbed by incoming tide and no other disturbance visible); and
- Unknown (flock flies/reacts without any perceived disturbance).

The level of response exhibited by shelduck was recorded as follows:

- Level 5: Movement of >500m;
- Level 4: Remaining within 200-500m of initial position;
- Level 3: Movement within 200m;
- Level 2: Behavioural change only (e.g. alarm calls, alarm posture/alert); and
- Level 1: No response.

3 PHASE 1 MONITORING RESULTS

3.1 Overview

Phase 1 monitoring surveys, consistent with the ASMS, were undertaken in 2012 (EDF 2012), 2014 (EDF 2014), 2015 (EDF 2016), 2016 (EDF 2017a), 2017 (EDF 2017b), 2018 (EDF 2018) and 2019 (EDF 2019) providing five years of baseline data in the absence of jetty construction traffic or HPC deliveries to Combwich Wharf. The results are summarised below and more comprehensive information is presented in full in each of the individual reports referenced above.

Three types of shelduck-specific surveys were undertaken fortnightly from mid-June to mid-September in each survey year; population counts, distribution surveys and disturbance monitoring. The results of these surveys are summarised below.

3.2 Population

The peak count of shelduck, 4,537, was recorded during the moult period in late August 2016 (see Figure A.5) – this translates to 79% of the most recent WeBS five-year annual peak mean of 5,768 individuals (2015/16–2019/20). Late August also contributed peak counts in 2012 (4,056) and 2015 (3,481). In 2014, the peak count was recorded in late July (3,121) whilst in 2017 it was recorded in early September (3,290). In 2018 the peak count was recorded in August (3,398) and in 2019 it was recorded in September (4,867).

The data up to 2017 indicates a general trend of numbers of moulting birds peaking in late August and early September as shown in Figure 3.1, although this pattern was not apparent in 2014 (when a 23% reduction in numbers was recorded compared to 2012) or in 2017, where numbers peaked in early September. Results from 2018 and 2019 are generally in keeping with this trend with peak counts recorded in August and September respectively.

Historical population data for SPA designation is approximately 28% lower than the peak count recorded during the shelduck surveys (4,537 shelduck survey peak in 2016) with a five year peak mean (1991/2 - 1995/6) of 3,330 individuals representing at least 1.1% of the wintering North Western Europe population.

Table 3.1 details historical counts of shelduck within the Severn Estuary (which includes the Bridgwater bay population) as recorded by the WeBS, cited in Austin et al. (2014).

Table 3.1 WeBS Counts of the Severn Estuary shelduck population: Annual Peaks 2009/10-2019/20

Site name	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	Most recent 5-year average	Peak count month
Severn Estuary	4,365	2,692	3,871	3,705	6,611	4,625	6,775	5,059	5,768	September

Ballance (2006) describes the shelduck as being an uncommon resident breeder in Somerset (rarely exceeding 20 pairs), but a common summer, autumn and winter visitor, with numbers increasing due to the arrival of moulting birds from June onwards. In 1988, the peak count of moulting shelduck within the Parrett Estuary was just under 1,900 birds in late July (Fox and Salmon, 1994), whilst in 2002 the peak number was 4,000 birds in the Parrett Estuary (Ballance, 2006).

The WeBS 2011/12–2015/16 five year peak mean shows a 10% increase compared to 1991/2 - 1995/6, indicating an overall increase recorded by both WeBS and HPC specific shelduck surveys difference since the HPC general construction and surveys commenced

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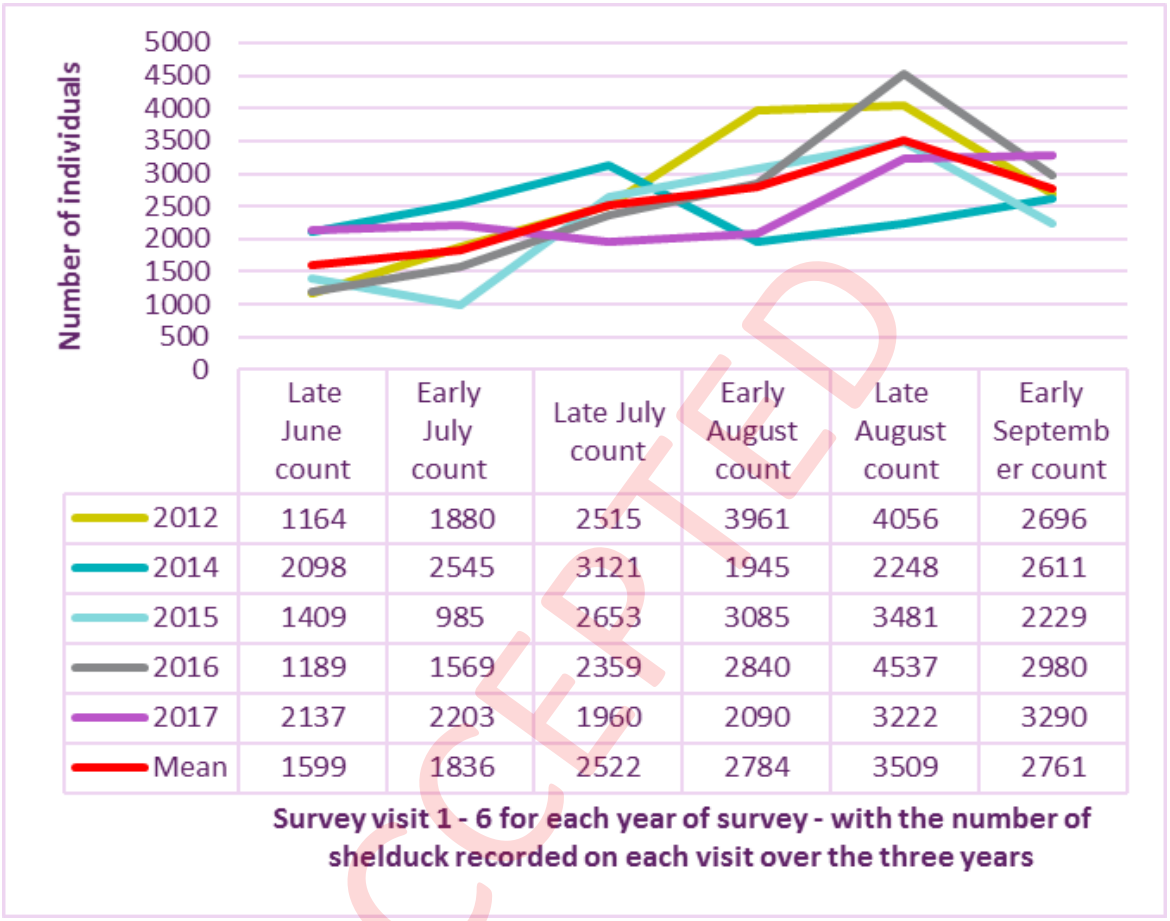

	Late June count	Early July count	Late July count	Early August count	Late August count	Early September count
2012	1164	1880	2515	3961	4056	2696
2014	2098	2545	3121	1945	2248	2611
2015	1409	985	2653	3085	3481	2229
2016	1189	1569	2359	2840	4537	2980
2017	2137	2203	1960	2090	3222	3290
Mean	1599	1836	2522	2784	3509	2761

Survey visit 1 - 6 for each year of survey - with the number of shelduck recorded on each visit over the three years

Figure 3.1: Shelduck Population Survey Results, 2012, 2014, 2015, 2016 and 2017

3.3 Distribution

The distribution of shelduck around high water remained broadly consistent throughout the survey period (See Figures A.3 to A.6, inclusive). Around slack water at low water, birds roosted on a sand bar running west from Chisel Rocks, foraging on the incoming tide, and gradually moving into an area running from Stert Island to Stert Point and out in to Bridgwater Bay. The zone between Stert Point, Stert Island and nearby in Bridgwater Bay, formed the 'core roosting area' within the study area, which regularly held between ~1,000 and 3,500 individuals. As the tide turned, birds returned to foraging on Stert Flats and north of Stert Island. The birds tended to be aggregated within the core roosting area by two hours before high tide, but started to disperse by two hours after high tide.

A secondary concentration of shelduck occurred to the east of HPC, approximately 2km from the proposed location of the temporary Jetty. Peak numbers in 2017 during the high tide period in this location ranged from 24 in June, 599 in July, 745 in August and 736 in September. Highest numbers were recorded up to two hours before and two hours after the high tide.

The feeding rates of shelduck are at their greatest on the ebb and flood tides (Olney 1963, 1964 and 1965: in Burton *et al*., 2004). The availability of a major part of their diet, the mollusc *Hydrobia ulvae*, is the main driver affecting their feeding rates. These molluscs occur near the mud surface on rising and falling tides and burrow lower down in the mud during low and high tide periods (Burton et al., 2004). This explains the pattern of shelduck movement with the tide; on a falling tide shelduck foraging at the water's edge gradually move further out across the mudflat towards the mean low water mark and then roost at low water when their food source is unavailable. They then return gradually to their high tide roost in the zone around Stert Point, Stert Island and nearby in Bridgwater Bay on the rising tide, with the majority of birds constantly feeding along the waterline of the incoming tide.

3.4 Disturbance

Natural England advised that the construction activity associated with the HPC temporary jetty needed to be monitored to assess the impact of vessels on moulting shelduck and that this information should be used to determine an appropriate mitigation strategy for operational vessel movements.

While construction of the temporary jetty only commenced in late 2017, surveys between 2012 and 2019 have shown that shelduck tend not to aggregate in the vicinity of the jetty location and are therefore unlikely to be impacted by jetty operations.

A risk does remain, however, arising from marine traffic to/from Combwich Wharf bringing abnormally indivisible loads (AILs) into the wharf by barge/tug vessels.

In the absence of regular current barge traffic into Combwich Wharf, the only regular large vessel to transit the River Parrett, is the Arco Dart (an aggregate dredging vessel). This was monitored on four passes along the river in 2015 to gain an initial understanding of shelduck responses and to enable the boat disturbance methodology within ASMS to be refined. Subsequently, three Arco Dart passes were monitored in 2016 and six passes in 2017. Table 2.1 summarises the shelduck disturbance data gained during these 13 passes in these two years of monitoring. Findings were similar in 2018 when an additional five Arco Dart passes were recorded. No Arco Dart passes were recorded in 2019.

Survey data showed that on three of the 13 Arco Dart passes in 2015, 2016 and 2017, the provisional behavioural trigger point (BTP) (see Section 4.1) was exceeded. On many of these occasions, there was a rising tide and the vessel was incoming up river at a time when shelduck tend to be pushed towards the mouth of the river by the tide and have greater difficulty moving away from this area. One occasion was around the high water period with the Arco Dart heading down river with a particularly high tide when again birds were pushed towards the mouth of the river.

There were several instances in which shelduck only showed Level 3 and 4 responses (i.e. movements of less than 500m) when higher level disturbance responses were expected (further detail of Levels of Response are provided in Sections 2.4 and 4.2 below). However, this could have resulted from birds having been flightless at the time due to the stage of moult and therefore being

unable to move greater distances. This suggests that distance moved in response to the vessel, on its own, is unlikely to be a reliable indicator of the level of impact.

As the tide ebbs the shelduck gradually disperse out into Bridgwater Bay to feed and it was noted that often the passing of the vessel appeared to act as an initial trigger to initiate this movement, although the actual impact on the birds would likely have been minimal. Birds on land appeared to be less vulnerable to disturbance, such as those roosting on Fenning Island.

As the Arco Dart movements occurred so infrequently, the shelduck were unlikely to have become habituated to the vessel and it is therefore unclear how birds may habituate to regular barge traffic. Additional limitations associated with further analysis of the Arco Dart effects on shelduck include the small number of vessel transits that were monitored and that they were all on very high spring tides (due to river access limitations for the vessel), when the terrestrial roost sites become inundated and the tidal influence is strongest.

4 PHASE 2 MONITORING REQUIREMENTS

4.1 Background

The ASMS proposes that monitoring during the predicted 12 year operational period will include the following:

- Population monitoring – continuing this element of the Phase 1 monitoring as undertaken from 2016/17 (ongoing).
- Distribution monitoring – continuing this element of the Phase 1 monitoring as undertaken from 2016/17 (ongoing).
- Disturbance monitoring - continuing this element of the Phase 1 monitoring as undertaken from 2016/17 (ongoing).
- Additional behaviour monitoring – observing behaviour specifically in response to vessel movements at Combwich Wharf.

4.2 Ongoing Phase 2 Monitoring

Phase 2 monitoring shall continue with the population/distribution and disturbance survey methodology adopted during Phase 1. This will allow discrete evaluation of the effectiveness of mitigation measures to reduce anthropogenic disturbance activity on the roosting shelduck and evaluate their responses to these measures.

Phase 2 behavioural monitoring is considered unnecessary at the temporary jetty on the foreshore in front of HPC because the distribution surveys collected over the seven year (2012 to 2019) period have shown that shelduck do not tend to congregate within 1km of the jetty.

To effectively provide behavioural monitoring for vessel movements to and from Combwich along the River Parrett, monitoring shall be conducted from the same two observation points used previously (OP 4 and 5), located on either side of the River Parrett at the mouth of the river (Stert Point) and a revised OP3 which will be relocated to monitor disturbance do shelduck in the vicinity of the mitigation measures at Wall Common This will provide sufficient coverage of the main shelduck roosting area. Counts will be taken before and after the passing of each vessel and the following categories will be used to record behavioural responses:

- Level 1 - no response;
- Level 2 – heightened state of alert / increased vigilance;
- Level 3 – movement away from the vessel without active avoidance; and
- Level 4 – active avoidance (escape diving / scooting / flying to avoid the vessel).

In addition, the duration of the response will be recorded and notes will be made providing additional detail, such as where birds relocate to.

5 MITIGATION TRIGGER POINTS

The ASMS proposes two forms of trigger point:

- Behavioural Trigger Points
- Population Trigger Points

5.1 Behavioural Trigger Point

The ASMS proposes the following behavioural trigger point (BTP):

> *If more than 5% of the baseline population is significantly disturbed during a 24 hour period, with significant disturbance being a state of alarm/increased vigilance maintained for 5 minutes or more once the vessel has passed and/or movements of >500m.*

Monitoring suggests that shelduck in the path of an approaching vessel will escape dive, scoot along the water or attempt to fly away from the danger area. At high water the roosting shelduck are concentrated at the mouth of the River Parrett close to the navigable channel and therefore exposed to disturbance impacts from approaching vessels. This is exacerbated on incoming spring tides and during periods of strong west / north-westerly winds, with terrestrial roost sites inundated and birds pushed into the mouth of the river and less able to retreat to a safe refuge area on approach of a vessel. At other times the birds can usually relocate from the mouth of the river to alternative suitable roosting areas to the west side of Stert Island and Stert Point and on the water off Wall Common, away from the navigable channel.

Given the close proximity of the navigable channel to the roosting area at Stert Point / Stert Island, it seems likely that during the transportation periods there will be movements of birds away from the stimulus to alternative suitable habitat to the west, which in itself is unlikely to constitute a significant impact. Of greater concern would be whether the birds remain at a heightened state of alert / vigilance for more than five minutes after the boat had passed, or resorted to active avoidance measures, as would be the case if they couldn't readily relocate to alternative suitable habitat. The BTP shall also account for the period when birds are flightless and unable to move more than 500m from the approaching vessel but are likely to suffer the greatest impact from vessel disturbance.

Of the 13 Arco Dart passes monitored between 2015 and 2017, three resulted in responses where the ASMS provisional BTP would have been exceeded, indicating that further monitoring will be required.

Recommended amended behavioural trigger point:

> *If more than 5% of the baseline population is significantly disturbed during a 24 hour period, with significant disturbance being a state of alarm/increased vigilance/movement away from the vessel maintained for 5 minutes or more once the vessel has passed.*

5.2 Population Trigger Point

Natural England's ASMS proposes the following population trigger point:

A decline of 25% or more between years; and/or

A decline of 10% for running 5 year peak means.

The five years of population date collected is as follows in Table 5.1.

Table 5.1 Population Counts during Baseline Monitoring

Year	Peak Count	Numerical change	Percentage change
2012	**4056**	-	-
2014	3121	-935	-23%
2015	3481	+360	+11%
2016	4537	+1056	+30%
2017	3290	-1247	-27%
2018	3398	+108	+3%
2019	4867	+1469	+43%
2020	6174	+1307	+27%
2021	5647	-527	-8.5%
2022	6591	944	+17%
2023	5582	-1007	-15%

11 year peak mean is 4,613

5 year running mean peak is 5,772.

The population data shows that there is a large inter-annual variation in the baseline population size within Bridgwater Bay, of between 3% and 43% over the study period, indicating that a decline of 30% or greater between consecutive years would be an appropriate trigger for potential population level effects arising from NNB GenCo vessel movements coming into and out of Combwich Wharf. It should be noted that this trigger point is to act as an early warning of a potential negative trend, allowing further investigation and intervention if necessary.

With 11 years of population data five year mean peaks can be compared. The earliest five year mean peak (2014-18) was 3,565, compared to 5,772 for 2019-2023. This is encouraging as the population has clearly increased during the period that the deliveries have been running.

Natural England recommended that a 10% decline in the rolling 5 year mean peak is considered the threshold for the population trigger point and it is still considered that this is appropriate.

Recommended amended population trigger points:

- A decline of 30% or more between years; and/or
- A decline of 10% for running 5 year peak means.

Data collected during the monitoring period shows that neither of these trigger points have been breached.

6 MITIGATION MEASURES

6.1 Overview

This section addresses two forms of mitigation; those intended to address:

- potential adverse effects from vessel movements carrying abnormally large loads bound for HPC and coming into and out of Combwich Wharf, and:
- existing disturbance on the foreshore on Steart Peninusula arising from pedestrians and their dogs walking along - and straying off of the coastal path where they disturb birds using the mud flats.

Taken together, the above impacts have the potential to adversely affect the significant populations of moulting shelduck at and around the mouth of the River Parrett.

The approach to mitigation, set out below, is based on the premise that physical works can be undertaken on land to reduce current impacts, thereby reducing the potential for an increase in overall adverse effects on the shelduck.

6.2 Operational (Vessel) Mitigation Measures

Natural England's guidance, set out in the ASMS (see Appendix B of this document) proposes that mitigation measures relating to vessel movements are be implemented in the event of a trigger being reached; these measures include:

- Adjusting vessel movements; or
- Adjusting the number of vessel movements on particular days; or
- Other measures that are at least equally sufficient.

Based on the observations of shelduck distribution and behaviour within Bridgwater Bay (as explained in Section 3 above), it is considered that the following measures would be effective in minimising disturbance impacts on the shelduck population:

- Shelduck are particularly vulnerable to vessel disturbance during periods of spring tides, particularly on the rising tide and when this coincides with strong westerly / north-westerly winds (recorded during fieldwork as Beaufort force 5 and above). Under such conditions, shelduck tend to be forced into the mouth of the River Parrett, closer to the navigable channel and have greater difficulty in relocating away from the danger area associated with approaching vessels. As the tide recedes, shelduck can more readily move away from the mouth of the river into the bay and away from the navigable channel. To mitigate the effects of vessel disturbance during these periods, all vessel arrival activity through the mouth of the River Parrett would cease when westerly backed wind speed reached and exceeded 20 knots (as measured at Combwich Wharf). Twenty knots wind speed is deemed the threshold for safe barge operations. A laden barge travelling in excess of this speed will

adversely affect the barge stability, high loads will encounter a 'sail effect' resulting in the danger to the safe navigation of the barge. During transit in the River Parrett the wind speed encountered will be significantly lower as it is a sheltered river. NNB have, however, imposed this threshold as a Hold Point for departure from the Docks in Avonmouth although Vessel Masters hold the authority to reduce this threshold based on other factors such as Met Ocean.

- Disturbance during routine operations would be minimised by the implementation of a traffic management plan, with a recommendation for the Master of Vessels to adhere to a speed constraint of 5kn speed over ground (SoG). This will apply when passing sensitive pre-defined areas for tugs and barges in the Parrett and combining return movements minimising individual movements of tug support vessels (see Appendix C for supporting information on vessel activity).
- Logistics planning synergies have resulted in a significant reduction in the DCO planned vessel movements on the river with the removal of the requirement to ship containers and bring bulk cargo into Combwich Wharf. This has removed the requirement for up to six coastal vessel deliveries per calendar month with only the largest equipment now being shipped into Combwich Wharf. This represents a 50% reduction of over 144 vessel movements per year over a 5 year period. The 144 vessel movements relate to movements each way and excludes any additional movements associated with pilot support. This figure also relates to coaster vessel traffic for general cargo only and does not include Marine AIL deliveries.
- Vessel transportation operations would commence before the moulting period (mid-June to October), such that the potential disturbance associated with vessel operations is already present as the birds return to the area and therefore more likely to form part of the background activity the arriving birds would encounter before engaging in moult. Operational activity would occur over all 12 months with five, six and four deliveries occurring during the moulting period (mid-June to October) in 2021, 2022 and 2023, respectively. Each delivery represents a maximum of 10 vessel movements.
- Vessel masters will be made aware of the potential impact of passing close to shelduck while transiting the mouth of the river and that avoidance of close passage to shelduck would be preferred where possible, without compromising on navigational safety.
- Disturbance during routine operations would be minimised by the implementation of proposals for the use of Pooled or Shared Services where multiple contractors maximise the available barge capacity and upstream efficiencies in common service providers such as barge operators and tug masters through common understanding and learning.
- The original Combwich Wharf mooring dolphins will be replaced and relocated to improve both the safety and efficiency of the barge berthing operation. Improvements in berthing efficiency may reduce the probability of tug departure (and transit down river) being delayed by an overrunning/ extended berthing operation.

6.3 Anthropogenic (Terrestrial) Disturbance Reduction Mitigation Measures

In addition to mitigating vessel movements on the River Parrett, additional mitigation has been provided via measures to discourage visitors from venturing onto the foreshore within the National Nature Reserve at Stert Point, where they also currently disturb the roosting shelduck. This mitigation is further detailed in Appendix D and shall be delivered through additional fencing/screening with observation areas and signage in targeted locations, seeking to minimise anthropogenic disturbance effects on the shelduck population as a result of wider disturbance stimuli. The key elements of these mitigation measures are:

- Strengthening the fenceline at Wall Common to prevent access to the high tide roost areas, along with increased signage and clearance of vegetation and provision of a boardwalk(s) to allow easier access to the coastal path **(now implemented but fenceline has failed and is to be replaced in 2025)**;
- Provision of a new bird hide near to the Wall Common fenceline and southern boundary of the National Nature Reserve **(now implemented)**;
- Provision of seasonal targeted wardening at key sensitive high tide periods (e.g. to minimise disturbance and educate and provide information on the roosts formed at the sensitive high tide periods in June-September) **(now implemented)**;
- Provision of new and enhanced roost observation hide with screens/blinds, signage and information boards at Stert Point **(now implemented)**.
- It is anticipated that the regular movement of large waterborne Marine Abnormal loads may attract additional visitors along the banks of the River Parrett to view the passage of the barges. Additional mitigation measures will reduce and minimise disturbance arising from any increase in pedestrian use associated with construction tourism

6.4 Detailed Design and Delivery of Terrestrial Measures – J2 – Shelduck monitoring and mitigation Delivery Advice Note (DAN)

NNB GenCo have had very constructive discussions with Natural England over the form of terrestrial measures required (as outlined above) and are committed to their delivery. Discussion included detailed design and specifications for the bird hides and board walk, the exact location (micro-siting) of proposed measures and the materials to be used.

These mitigation measures have now been implemented as detailed in the 2021 C2 and J2 mitigation audit[8] report.

[8]

7 REVIEW POINTS

7.1 Past and Future Review Points

During Phase 2 Monitoring reviews will be conducted annually as part of in the annual monitoring reports. Recorded disturbance responses relative to the agreed population and behavioural trigger points will be considered to determine whether survey methods or effort should be altered. Should monitoring continue then further reviews would be scheduled for years 6 and 9 of operations.

8 REFERENCES

Burton, N., Musgrove, A. and Rehfisch, M. 2004. Tidal variation in numbers of waterbirds: how frequently should birds be counted to detect change and do low tide counts provide a realistic average? Bird Study, 51(1), pp. 48-57.

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Natural England, Principles for an Adaptive Shelduck Monitoring Strategy, Inquiry document reference NE/9.1

APPENDIX A SHELDUCK DISTRIBUTION FIGURES

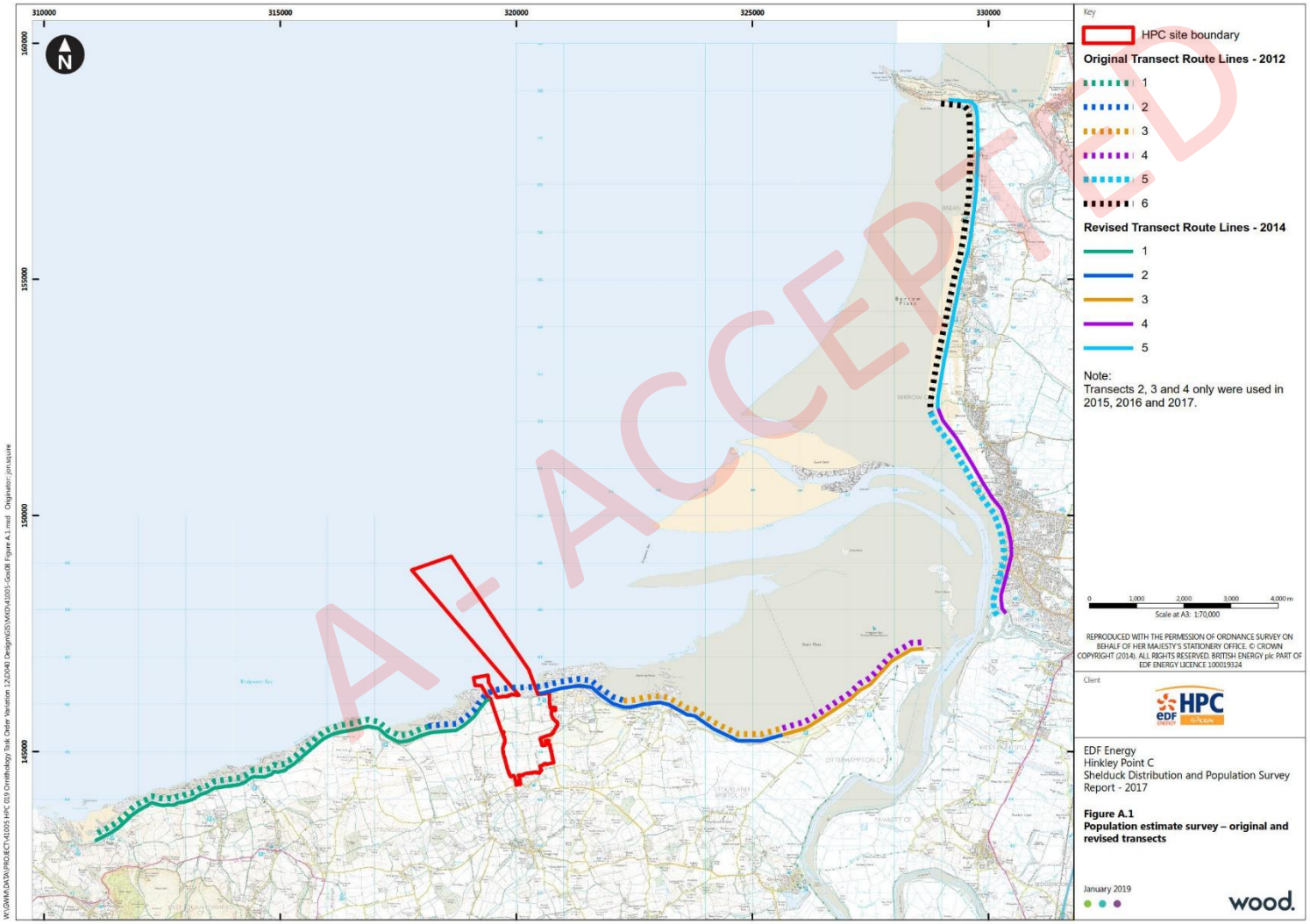

Figure A.1 Population estimate survey – original and revised transects

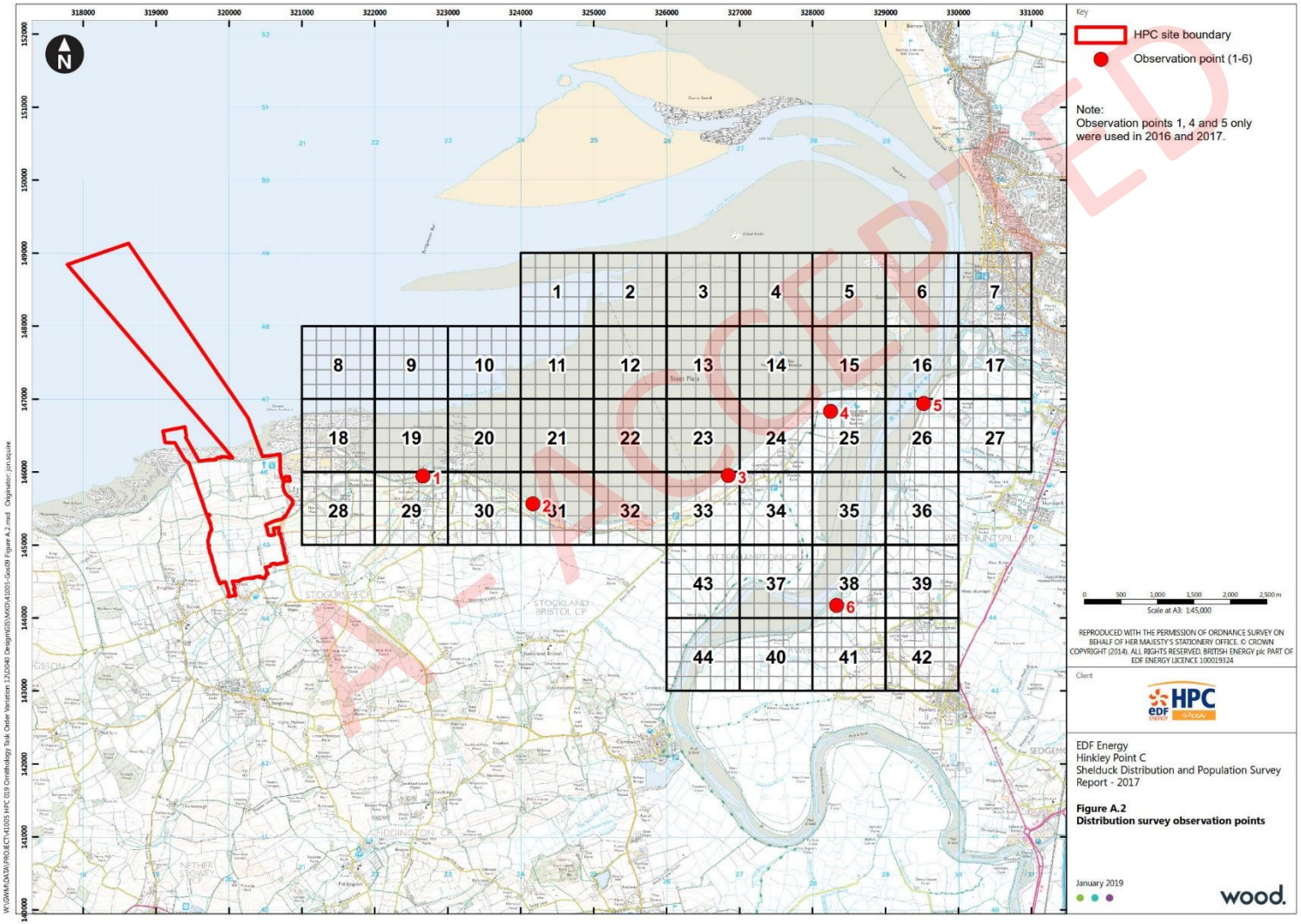

Figure A.2 Distribution survey observation points

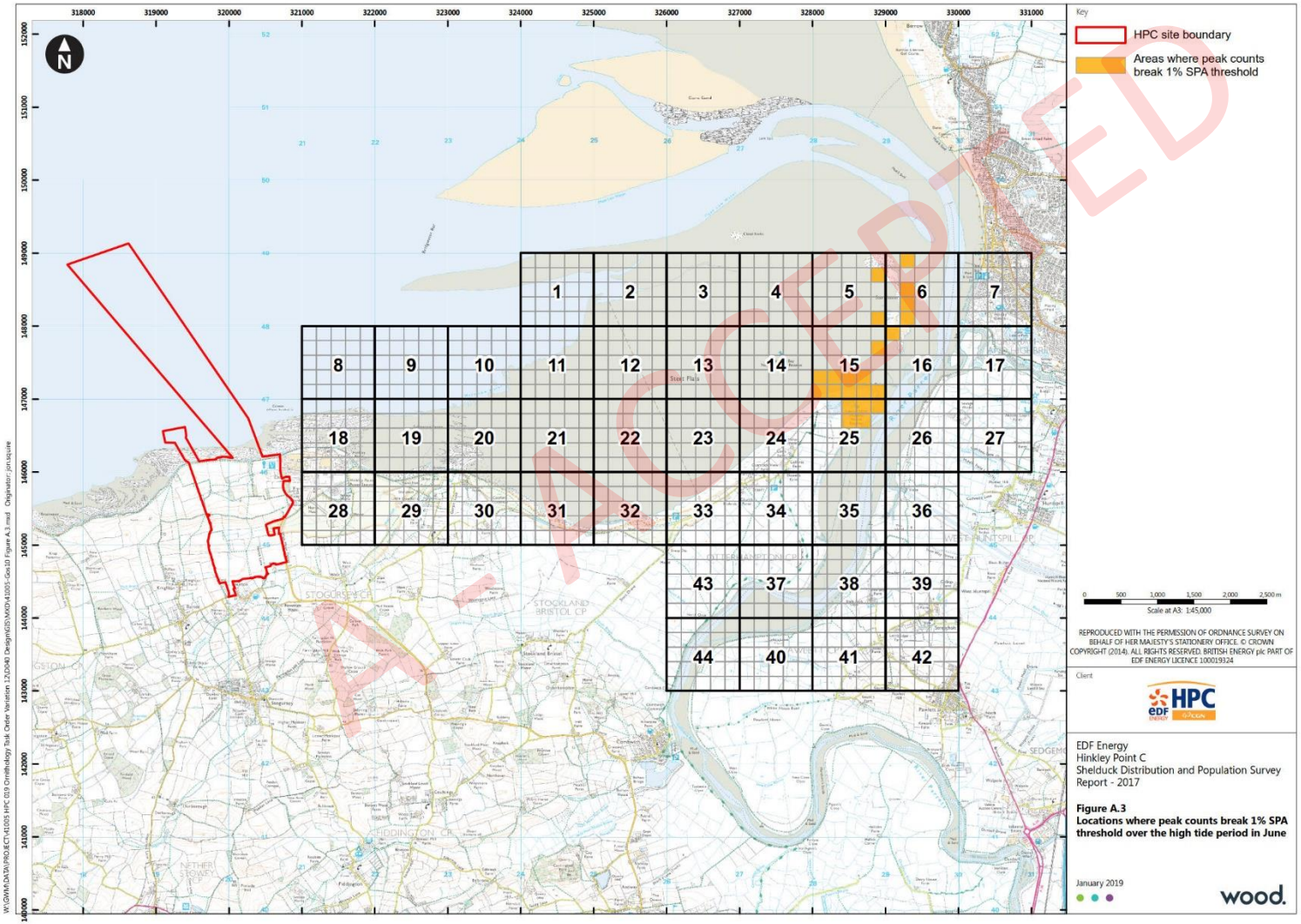

Figure A.3 Locations where peak counts break 1% SPA threshold over the high tide period in June

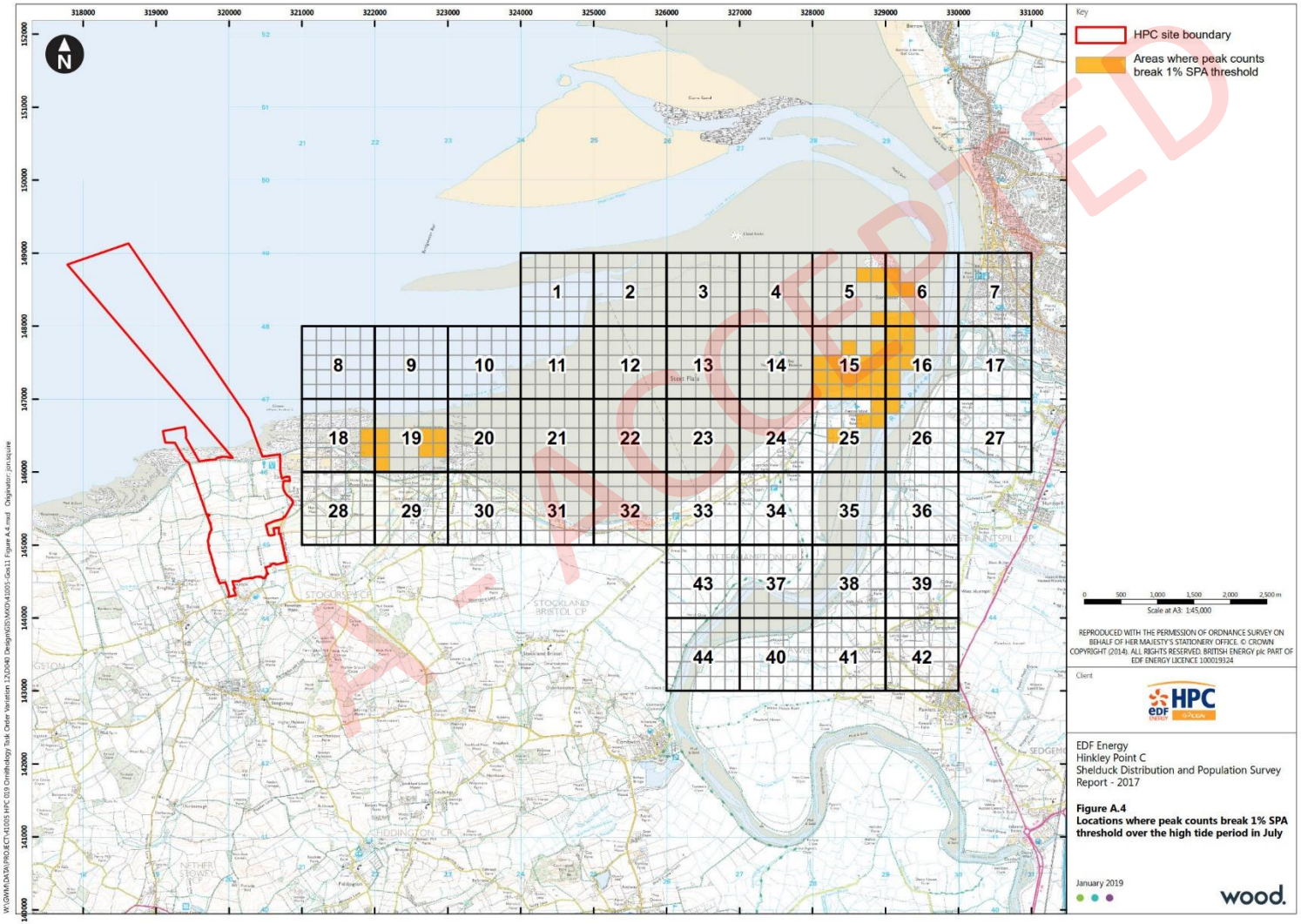

Figure A.4 Locations where peak counts break 1% SPA threshold over the high tide period in July

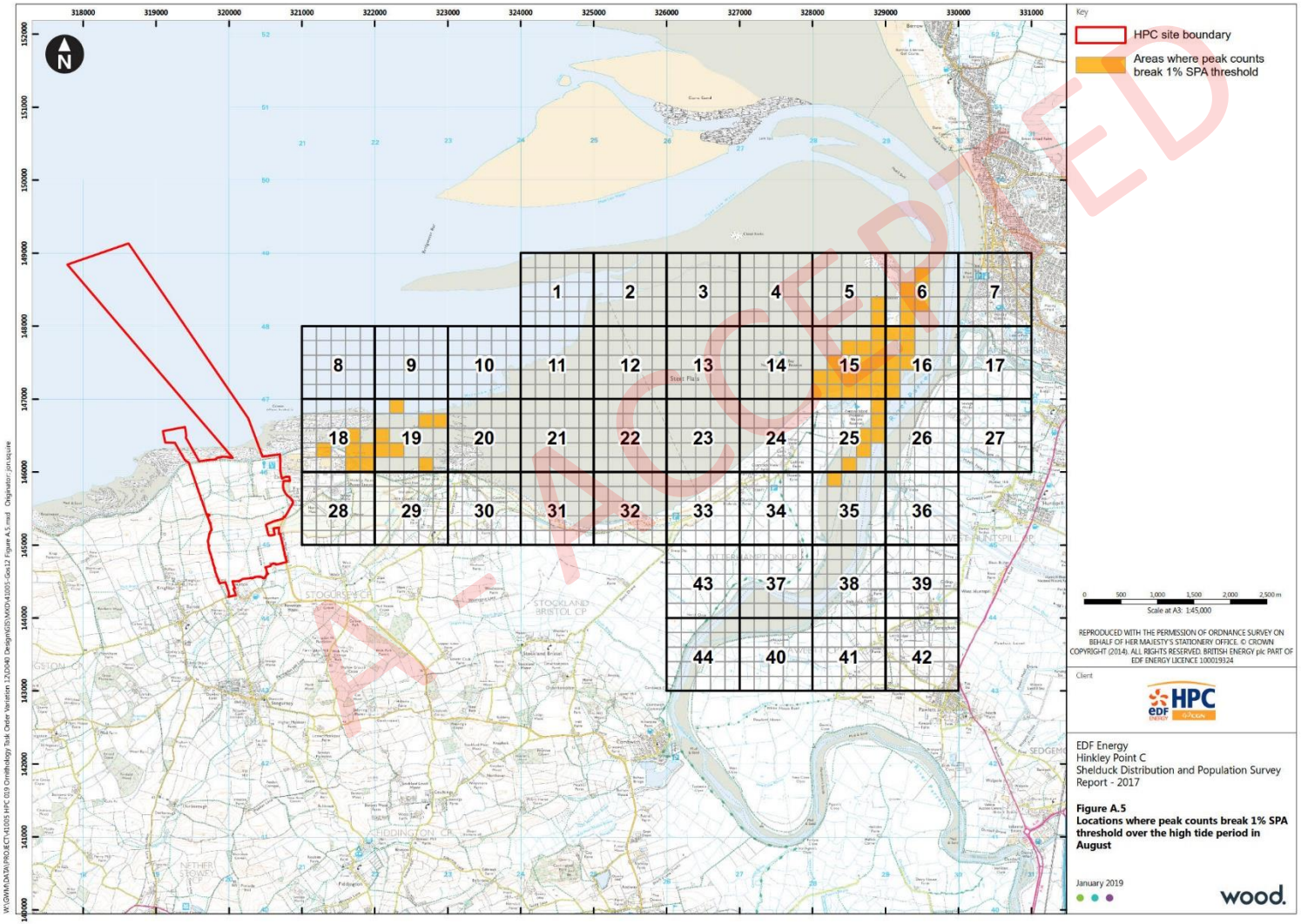

Figure A.5 Locations where peak counts break 1% SPA threshold over the high tide period in August

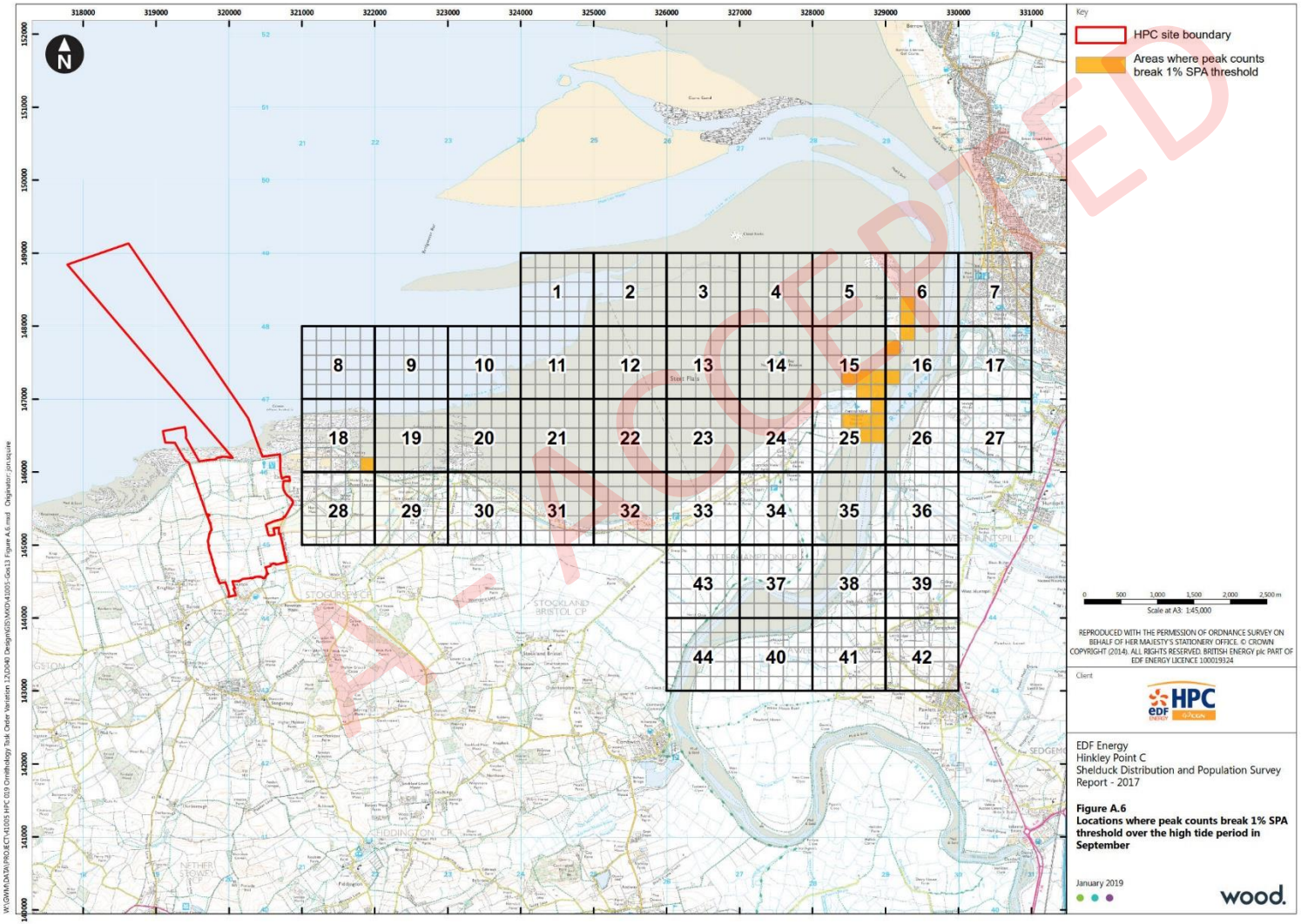

Figure A.6 Locations where peak counts break 1% SPA threshold over the high tide period in September

APPENDIX B PRINCIPLES FOR AN ADAPTIVE SHELDUCK MONITORING STRATEGY

HARBOURS ACT 1964
TRANSPORT AND WORKS ACT 1992
MARINE AND COASTAL ACCESS ACT 2010
TRANSPORT AND WORKS (INQUIRIES PROCEDURE) RULES 2004

Applications by NNB Generation Company Limited for:

1. The Hinkley Point (Temporary Jetty) Harbour Empowerment Order 201[x] under section 16 of the Harbours Act 1964 for the creation of a harbour and harbour authority comprising a jetty and terrestrial works.

2. Licence under Part 4 of the Marine and Coastal Access Act 2009 for the construction of the jetty.

3. Licence under Part 4 of the Marine and Coastal Access Act 2009 for the dredging and disposal of material from a berthing pocket alongside the jetty.

4. An application under the Transport and Works Act 1992 for the Hinkley Point (Temporary Jetty)(Land Acquisitions) Order 201[x].

Site at Hinkley Point C, Hinkley Point, Somerset, TA5 1TP

Principles for an adaptive shelduck monitoring strategy

Natural England

Marine Management Organisation ref: DC 9228

DC 9229

DC 9235

Department for Energy and Climate Change ref: TWA/10/APP/07/OBJ/02

1. At the 25 November 2011 session of the Inquiry, Natural England offered to submit its recommended version of principles for an adaptive shelduck monitoring strategy to the Inquiry to ensure that no adverse effect on the integrity of the Severn Estuary Special Protection Area and Ramsar sites would occur as a result of EDF"s proposed temporary jetty project. Natural England"s recommended version, which includes a requirement for mitigation measures to be implemented by EDF in the event that these are deemed to be necessary, is attached hereto as Annex A.

2. Natural England will, by way of its closing submissions, advise on any remaining key differences between its recommended approach and the approach set out by EDF in E52.2 or any subsequent modification of E52.2 submitted by EDF to the Inquiry.

3. Consistent with its advice in relation to necessary monitoring and mitigation measures associated with ensuring the protection of the Severn Estuary Special Area of Conservation and Ramsar site in this matter, Natural England advises that the principles set out at Annex A be incorporated into an appropriate condition or obligation (e.g., by way of a marine licence condition), to ensure that the measures identified will be capable of enforcement by the MMO. Such a condition or obligation is advised to read:

[X] *The construction of the temporary jetty shall not commence until EDF have (i) submitted to the MMO and Natural England a Shelduck Monitoring and Mitigation Scheme, which will be in accordance with the "Principles for an adaptive monitoring strategy for shelduck" as submitted by Natural England in NE/9.1, and (ii) received the MMO's written approval of said Scheme.*

[Y] *The Shelduck Monitoring and Mitigation Scheme shall be implemented as approved in paragraph [X].*

4. Proposed Condition [X] is required to be discharged prior to the commencement of construction of the temporary jetty because the adaptive monitoring principles referred to require EDF to monitor shelduck and vessel movements from at least the point in time when such construction commences.

It is Natural England's understanding that construction of the temporary jetty will commence by mid-June 2012 in the event that EDF receives permission to develop the temporary jetty, and the proposed principles are based on that understanding. If construction does not commence by mid-June of 2012, Natural England will advise the MMO in relation to the necessary detail of any Shelduck Monitoring and Mitigation Scheme submitted for approval by EDF, in consideration of that delay.

5. The MMO may, in its discretion, require that the implementation of these measures is also capable of being enforced by West Somerset District Council (e.g., by way of the proposed bilateral agreement), to the extent that the MMO is not capable of enforcing any monitoring or mitigation requirements (as set out in the principles) that may occur outside of the MMO"s area of jurisdiction (such as land-based monitoring of shelduck numbers and distribution).

Annex A: Principles for an adaptive monitoring strategy for shelduck / boat disturbance

Summary

EDF Energy and Natural England agree that an adaptive monitoring strategy should be implemented to ensure that moulting shelduck will not be negatively affected by vessel movements to/from the temporary jetty and the refurbished Combwich Wharf when judged in-combination and that, as a result, no adverse effect on the integrity of the Severn Estuary SPA and Ramsar site will occur. An adaptive monitoring strategy will enable the value of the shelduck data collected to be maximised, allow for trigger points to be identified and provide for mitigation to be implemented should those trigger points be exceeded. Natural England advises that the monitoring strategy is based on the following points:

1. Monitoring of existing shelduck population size and behaviour within Bridgwater Bay in those months when moulting shelduck are present in significant numbers (mid-June to mid-September).
2. Establish the response of shelduck to vessels associated both with the construction of the temporary jetty and existing boat traffic accessing Combwich Wharf prior to refurbishment.
3. Review of monitoring and mitigation requirements after two years' monitoring (i.e. prior to in- combination operational movements to the temporary jetty and Combwich Wharf commencing) and continue monitoring if necessary.
4. Finalise easy to record, quantitative trigger points for implementing mitigation measures, thereby avoiding subjectivity and differing interpretations by different observers.
5. From the onset of operational boat traffic accessing both the temporary jetty and refurbished Combwich Wharf, objective methods of data recording will monitor the behavioural responses of shelduck to development boat traffic and provide medium/long term population trends as necessary.

6. Implementing mitigation should triggers be exceeded. Mitigation would only apply during the moulting period (mid-June to mid-September).
7. Using regular review points, maintenance of an adaptive approach to monitoring, trigger points and mitigation measures.

1. Monitoring Phase I – Baseline Establishment and Methodology Testing

1.1) Phase I monitoring will cover two moulting periods, to start in mid-June 2012 and conclude in mid- September 2012, recommencing in mid-June 2013 and concluding in mid-September 2013[1]. The baseline situation will be established and behavioural protocols tested using the construction activity associated with the temporary jetty and existing boat traffic to Combwich Wharf (i.e, that boat traffic that exists in advance of the issuing of any Planning Act 2008 Development Consent Order in relation to the Hinkley C project) as a proxy for vessel movements. The steps to be undertaken are outlined below.

1.2) Shelduck data (from the moulting period) that has been gathered by EDF Energy through to 2011 will be collated and further surveys will be undertaken to establish a baseline population size during the 2012 and 2013 moulting periods. The estimate would be based on the number of moulting shelduck present in Bridgwater Bay between Howe Rock and Watchett. Numbers will be established in a three hour period across high tide by simultaneous observation across the area. The baseline will be established following twelve visits (two visits per month for the three month period of both years).

1.3) In tandem with population monitoring, the distribution of birds will be recorded at high tide and two hours either side between Hinkley Point and the River Parrett. This exercise will establish a baseline both for those areas of habitat occupied, as well as those areas unoccupied, potentially allowing future changes in distribution, or exclusion, to be revealed.

1.4) Monitoring of shelduck behaviour during the moulting period will take place around the temporary jetty area when under construction and in relation to the existing vessel movements associated with Combwich Wharf. This information will be used both to trial methods of recording behaviour and to gain an understanding of moulting shelduck responses to disturbance. Monitoring will take place across the tidal cycle and will be repeated within and between months; the frequency of

monitoring will be determined by the types of activity that are the most comparable with the operational activities (e.g. the arrival or movements of off-shore piling rigs).

[1] This schedule is based on the current EDF Energy plans to begin the construction of the temporary jetty in 2012 and begin in-combination vessel movements to the temporary jetty and Combwich Wharf in 2015.

2. First Review Point – Honing Provisional Behavioural and Population Trigger Points

2.1) The results obtained during Phase I monitoring will be presented as a report to be used as a basis for discussion between EDF Energy and Natural England regarding the refinement of data collection methods for subsequent moulting periods and agreeing any revisions to the behavioural and population trigger points that are provisionally described in section 3, if deemed necessary. EDF Energy and Natural England will endeavour to reach agreement on any revisions proposed by either party within 30 business days ("business days" throughout this document means a day other than a Saturday, Sunday or Bank Holiday in England) from the end of Phase I (or 21 September 2013, whichever is earlier).

2.2) If shelduck show no response to boat traffic, or only a very limited response, it may be agreed by all parties that the monitoring and mitigation strategy does not extend beyond the first review point to Monitoring Phase II.

2.3) Irrespective of whether the parties reach agreement on any revised trigger points, EDF energy will submit a Contingent Mitigation Strategy (CMS) to Natural England for its approval within a further 30 business days of the end of the period specified in 2.1. The CMS will identify any revised trigger points either agreed to by EDF Energy and Natural England in relation to paragraph 2.1, or, if no such agreement is achieved, the trigger points proposed by EDF Energy, and identify a mitigation strategy to be implemented in the event that a trigger is reached, which will involve adjusting vessel movements or the number of vessel movements on particular days, or mitigation measures that are at least equally sufficient. Natural England will either approve or reject the CMS within a further 30 business days of its receipt from EDF.

2.4) The parties expect to reach agreement on both the behavioural and population trigger points and the CMS, but in the event that agreement cannot be reached on either the trigger points, or the CMS, the parties would submit any dispute to an Expert for determination within a further 30 business days from the end of the last period referred to in paragraph 2.2.

2.5) The Expert would be appointed by the President of the Institute of Ecology and Environmental Management and must have at least 10 years of relevant experience. The Expert"s costs shall be paid by EDF Energy. The Expert would establish a process for receiving information and representations from the parties and will be required to reach his or her determination prior to the first moulting period coinciding with simultaneous operation of both the temporary jetty and refurbished Combwich Wharf in 2015. The Expert"s determination would be binding on the parties.

3. Provisional Behavioural and Population Trigger Points

3.1) Agreed trigger points cannot relate to levels of disturbance considered to constitute an adverse effect as this would allow an impact on the Severn Estuary Special Protection Area (SPA) to be realised prior to mitigation being implemented. Therefore, trigger points must be below levels of effect considered to be adverse. Two different trigger points are proposed:

3.2) The provisional Behavioural Trigger Point will be based on the number of birds disturbed and the length of time the effects of disturbance are detectable. If the Behavioural Trigger Point is exceeded, EDF Energy will implement the CMS:

> **Behavioural Trigger Point = If more than 5% of the baseline population is significantly disturbed during a 24 hour period (applies years 1-12 of combined operation).**

Significant disturbance is defined as 5% *of the baseline population being disturbed to an extent where a state of alarm/increased vigilance is maintained for more than 5 minutes once the vessel has moved away from the congregation of shelduck disturbed and/or movements in excess of 500m from the location of first disturbance[2] are made within 5 minutes.*

[2] The validity of a 500 m displacement distance for moulting / flightless birds is uncertain and subject to review.

3.3) The provisional Population Trigger Point will be based on changes in the numbers of moulting shelduck in Bridgwater Bay. Annual population data and five year peak means will both be used to determine whether a significant decline in the population level has been recorded. The percentage of moulting shelduck affected will be calculated using the peak Bridgwater Bay population size during the period mid-June to mid-September, rather than the current SPA population estimate, as this is based on peak wintering bird numbers:

- **Population Trigger Point = A decline of 25% or more between individual years (applies following population estimate established in year 1 i.e. years 2-12 of combined operation); and/or**
- **Population Trigger Point = A decline of 10% for running 5 year peak means was recognised (i.e. years 6-12 of combined operation).**

3.4) As population declines may not be attributable to the in-combination effects of the operation of the temporary jetty and Combwich Wharf, exceeding the Population Trigger Point would prompt discussions regarding the appropriateness and the necessity of mitigation. If it can be reasonably shown that the population decline is attributable to the in-combination effect of the jetty and Combwich Wharf vessels, review of the Behavioural Trigger Point (assuming it had not already been triggered) and implementation of the CMS would be appropriate.

3.5) It is acknowledged by both parties that the quantum of the measures outlined for the provisional Trigger Points (e.g. displacement, time and population change) may be either too high or too low. Therefore, as already described, trigger points will be reviewed in light of data collected during Monitoring Phase I (see section 2) and at regular intervals thereafter should the strategy continue (see Section 5).

4. Monitoring Phase II - Recording Shelduck Responses to Vessel Movements

4.1) The behaviour of moulting shelduck in response to vessel movements to the temporary jetty and the refurbished Combwich Wharf will be monitored commencing in year 1[3] of the predicted 12 year combined operational period. In addition, the population monitoring described in Monitoring Phase 1 will be repeated in order to record population trends over this same 12 year combined operational period subject to the ongoing necessity for data collected being agreed during review periods (as described in Section 5). Exact methodologies for behaviour and population monitoring will be determined following a review of Phase I. The results of behaviour and population monitoring will be compared against the Trigger Points to determine if mitigation is implemented.

4.2) The monitoring of moulting shelduck numbers and behaviour in areas where vessels are most likely to disturb individual birds will take place from two vantage points. These vantage points will be at the end of the temporary jetty (i.e. to view disturbance effects on shelduck due to boats moving to/from the jetty head) and at Steart Point (i.e. where the vessels moving to Combwich Wharf enter the River Parrett); these vantage points will be reviewed prior to implementation following the provision of detailed vessel movement plans.

4.3) Counts will also be taken prior to the arrival of the vessel and following its passing. Behavioural responses will be recorded with reference to changes in behaviour, time taken to resume pre-disturbance behaviour, distances moved using active avoidance methods and distances between vessels and shelduck when the first signs of disturbance are observed. To contextualise these figures counts on “undisturbed” high tides (e.g., when there are no vessel movements) will also be taken. Information collected during the population monitoring could then be used in conjunction with the data collected during the vantage point watches to determine whether changes in distribution or density were occurring[4].

4.4) The frequency of potentially disturbing events, i.e. the numbers of daily boat movements both to and from the temporary jetty and Combwich Wharf, will also be collated and presented for each moulting period.

[3] Currently scheduled for 2015

[4] The validity of this measure will depend on the extent to which shelduck drift with tidal currents independently of disturbance.

5. Further Review Points

5.1) The First Review Point (see Section 2) will take place after Monitoring Phase I. At this review point, provisional trigger points will be amended, if necessary, in light of information gathered during Monitoring Phase I. Alternatively, if shelduck show no response to boat traffic, or only a very limited response, it may be agreed by all parties that the monitoring and mitigation strategy does not extend beyond the first review point.

5.2) Should the monitoring and mitigation strategy extend to Monitoring Phase II, in order to maintain the adaptive nature of the strategy further review points will be scheduled after years 1, 2 and 3 of combined operation. At these review points lessons learnt regarding survey and evaluation techniques and early results will be discussed. These discussions could lead to alteration of survey methods or an increase, reduction or cessation of effort. For example, if continuing Phase II Monitoring never results in the levels set out in the Population and Behavioural Trigger Points being approached, it is likely that further monitoring will no longer be deemed necessary. If the potential for significant disturbance remains, however, further survey and comparison of results with pre-determined trigger points will continue, with further reviews scheduled for years 6 and 9.

5.3) EDF Energy and Natural England will endeavour to reach agreement in relation to the findings of these further reviews within six months of the end of the last shelduck moulting period in relation to which any review is being carried out. Should agreement not be reached, the matter will be submitted to an Expert for

determination, in accordance with Section 2.4, save that the Expert's determination will be required to be delivered prior to the next shelduck moulting period following the review that is the subject of that determination.

APPENDIX C SUPPORTING INFORMATION ON OPERATONAL (VESSEL) MITIGATION MEASURES

Vessel Types and Sizes

Barges

The standard North Sea Barges (NSB) are the largest of the proposed vessels 90m x 27M and the Muster Ports have been assessed on their ability to accommodate these vessels and this maximises flexibility. The NSB was selected by NNB GenCo following a Jacobs review of the overall requirements of the project plus mandated environmental flood prevention measures required for Combwich Wharf. Combwich Wharf facility has been redesigned to accommodate the NSB operating for Ro-Ro operations. The NSB will need to be towed from the Muster Port to Combwich Wharf by a suitable tug (s).

North Sea Barge	
Length = 90m Beam = 27m Draught = 1.5m Moulded Depth = 6.1m	

As an alternative to European Barges it may be possible to use the specialised barge 'Terra Marique' to deliver abnormal indivisible loads (AILs). The Terra Marique is unique in its ability to hydraulically alter the level of its on-board roadway to suit loading and discharge facilities, it also would require the assistance of a tug to travel between a Muster Port and Combwich.

Tugs and Support Vessels

Terra Marique	
Length = 80m Beam = 16.5m Draft = 2.0m Moulded Depth = 6.0M	

Tugs are the traditional workhorses of the sea suited to all types of marine work including towing, mooring, anchor handling and dredge support. Each barge will require to have two tugs for each transit with one tugs fixed by lines to the barge and another acting as safety, resilience and additional navigational support during the transit.

Shallow Draft Tug Boat (Typical)	
Length = 31m Beam = 9.5m Draft = 2.8m	

Shoalbuster Tug Boat (Typical)	
Length = 26m Beam = 9.5m Draft = 2.6m	

Number of Vessel Movements

The selection of a NSB by EDF significantly reduces the number of vessels transiting the River Parrett by utilising a barge with a higher deck space of 2,700m^2 compared to European Standard Barge (ESB) of 1080m^2. This is an increased capacity of 60%.

Each barge delivery will generally be supported by 2 Tugs that will depart Combwich during discharge operations.

Based on the current construction program the schedule for Marine AIL deliveries is shown in the table below that outlines the number of planned vessel movements per month. A total of ten vessel movements will be required for each delivery. Five, six and four deliveries will occur during the moulting period (mid-June to October) in 2021, 2022 and 2023, respectively.

Month	No Deliveries	Vessel Movements	Month	No Deliveries	Vessel Movements	Month	No Deliveries	Vessel Movements	Month	No Deliveries	Vessel Movements
Jan-21	2	20	Jan-22	1	10	Jan-23	1	10	Feb-24	1	10
Feb-21	1	10	Feb-22	1	10	Feb-23	1	10			
Apr-21	1	10	Apr-22	1	10	Apr-23	1	10			
May-21	1	10	May-22	2	20	May-23	1	10			
Jun-21	1	10	Jun-22	2	20	Jul-23	1	10			
Aug-21	2	20	Jul-22	1	10	Aug-23	1	10			
Sep-21	1	10	Aug-22	1	10	Sep-23	1	10			
Oct-21	1	10	Sep-22	1	10	Oct-23	1	10			
Nov-21	1	10	Oct-22	1	10	Dec-23	1	10			
Dec-21	1	10	Nov-22	1	10						
			Dec-22	1	10						

Tidal Constraints to Vessel Movements

Following extensive marine simulations conducted by HR Wallingford the recommendation for tidal constraints imposes a restriction of wave heights to a maximum of no more than 2 metres in height.

The requirement to maintain under keel clearances and the draught of the vessels will further reduce the availability of tides that support deliveries.

Further restrictions have been imposed that indicate vessel movements would not normally be undertaken when the wind speed is predicted to be in excess of 20 knots and from a westerly direction at Combwich Wharf.

It is estimated that, as a result of these restrictions, coupled with the existing DCO restrictions, 18% of all tidal windows will be available to EDF.

Proposed mitigation

Modelling and detailed logistical assessment has identified that it is not possible to reduce transit speed lower than 5 knots without compromising the safe navigation of the vessels where a minimum speed must be maintained in order to maintain steerage and to stay within the confines of a rapidly falling or rising tide.

Simulations were undertaken at the lower speed possible for a transit 2.5 knots (i.e. 1.02 m per second and equated to 3.6km in the 1 hour window) resulting in a failed transit time. Three knots transit speed (i.e. 1.5 m per second and equated to 5.4 km in the 1 hour window) also resulted in a failed transit time.

The lowest possible speed simulated for a successful transit ie 5 knots that is 2.5 m per second and equates to 9 km in the 1 hour window.

Based on these figures the slowest average speed vessels could travel at is 4.6 knots, therefore in a one hour transit speed could be reduced by 0.4 knot over the 8.5km route.

Based on the chart, the required transit time from Burnham on Sea and anticipated speed, it is estimated that transit duration through the sensitive shelduck area near Stert Point will be approximately 15 minutes.

Vessel passage can only be conducted in accordance with the Harbour Authority (Port of Bridgwater), with the vessel beginning transit up the river from the approaches to the River Parrett at minus 2.5 hours before High Tide. At minus 1 hr 30 mins pilots would board at Burnham on Sea with a transit of 1 hour to Combwich Wharf to arrive 30 mins prior to the High Water mark. This is a

critical timed passage and review of the key ecologically sensitive areas indicated that more than 50% of the transit is within scope of these areas. Simulations have a recommended passage speed of 5 knots that maintains the critical timelines whilst maintaining stability of the load barge. It may be possible, although only with the following consultation and assessment by the harbour authority, to potentially reduce speed to minimise wake effect from the vessel at the critical ecological habitats. However any further reduction below the current 5 knots fixed speed limit could be detrimental to vessel traffic and may compromise navigational safety.

It is expected that the pilot vessel will not normally enter the River Parrett as part of the HPC load delivery operations. As described above, the pilots will board the tug at Burnham on Sea and return to Burnham on Sea with the tug. Should the pilot vessel enter the river Parrett in association with the barge movements, NNB GenCo shall request that the pilot vessel attends the barge or associated vessels to and from Combwich, to combine vessel movements. NNB GenCo will also request that the pilots comply with the speed limitations set out in this document during HPC load delivery operations. NNB GenCo may engage with the pilots via an educational seminar (or similar means) to encourage compliance, if deemed to be beneficial. It should be noted NNB GenCo's commitments described in this document do not encompass the pilots' activities and that NNB GenCo have no powers of enforcement over the pilots.

The original Combwich Wharf mooring dolphins will be replaced and relocated to improve both the safety and efficiency of the barge berthing operation. Improvements in berthing efficiency will reduce the probability of tug departure (and transit down river) being delayed by an overrunning/ extended berthing operation.

A copy of this document and any subsequent revisions or amendments will be provided to the master of any vessel used to carry out any HPC activity on the River Parrett. A copy of this document will be held on board any such vessel and a notice outlining the vessel mitigation measures shall be displayed.

Nothing in this document will limit the key requirement for the safety of navigation and marine operations to be maintained, and for risks to be reduced to ALAPR. It is noted that the Master of a vessel has the overriding authority and responsibility to make decisions about carrying out those actions he/she deems necessary in order to contribute to the interests of those on board, the ship, safety, health and environment, and to prevent pollution. The Master is responsible for safe navigation; all operational decisions on board vessels are subject to the Master's discretion.

Key working assumptions

- Restriction on working hours: Daily Arrival & Departure Restrictions 2200 – 0600; Daily Operating Restrictions 0730 – 1830;

- Date when first vessels will be using the river in connection with the development: Currently expected to be mid June 2020;

- Number of vessel movements associated with each barge delivery: 1 x Barge, 2 x Support Tugs. The tugs will make a further two movements (one down and one up the river). As such there will be a total of ten movements per load delivery;

- Transit times for vessels moving up and downstream (with reference to speeds to be agreed). approaches to Combwich Wharf 2.5 hrs;

- Based on current construction schedule the number of loads predicted per year during operation of the Wharf – with break down for each month. Up to 5 delivery windows per month. Specific load breakdown per delivery unknown at this time. Total requirement 360 loads from Q3 2019 to Q1 2024.

APPENDIX D ANTHROPOGENIC (TERRESTRIAL) DISTURBANCE MITIGATION MEASURES

Mitigation to reduce the amount of human disturbance on shelduck is proposed via implementation of additional measures to discourage visitors from venturing onto Stert Point and thereby disturbing the roosting shelduck. The two key aspects of these mitigation measures are:

- Strengthening the fenceline at Wall Common to prevent access to the high tide roost area with increased signage and clearance of vegetation and provision of observation hide/ with screens/blinds and adjoining boardwalk to allow easier access to the coastal path; and

- Adoption of seasonal targeted wardening at key sensitive high tide periods, establishing a roost observation hide with screens/blinds signage at Stert Point, and active wardening to educate and provide information on the roosts formed at the sensitive high tide periods in mid-June to October.

It is anticipated that these measures will be in place by June 2020, before the next shelduck moulting season starts.

Key Disturbance-Sensitive Periods

Foraging shelduck return gradually to their high tide roost in the zone around Stert Point, Stert Island and nearby in Bridgwater Bay on the rising tide, with the majority of birds constantly feeding along the waterline of the incoming tide.

This high tide zone between Stert Point, Stert Island and nearby in Bridgwater Bay forms the 'core roosting area' which regularly holds between ~1,000 and 3,500 shelduck. As the tide turns, birds return to foraging on Stert Flats and north of Stert Island. Birds tend to be aggregated within the core roosting area by two hours before high tide and started to disperse by two hours after high tide.

Disturbance minimisation mitigation measures are therefore focussed on the core roosting area most accessible to human disturbance along the northwest facing Stert Point foreshore from the civil parish boundary fenceline at Wall Common north east c2km towards Stert Point for five hours over the hide tide period.

Wall Common – Access Points

Wall Common car park currently acts as a focal point of visitors parking and exploring the shoreline, there are visitor information boards highlighting the nature reserve and the key species to be found in the area (Figures D1 and D2). Whilst these boards are informative we would combine current signage and interpretation boards with additional focussed messaging regarding high tide roosts and their vulnerability to human disturbance and associated consequences for the

birds. The signage would encourage people to visit the proposed Wall Common and Stert Point observation platform areas (see next section) and educate on the impacts on walking along the protected foreshore.

Access along the foreshore toward Stert Point is actively discourage at the moment by a refurbished fence line following the civil parish boundary line (see figures D3 and D4). This fenceline also has information posters (figure D5) explaining the need to minimise disturbance to roosting and breeding birds. However, the refurbished fenceline currently has minimal effects on reducing foot traffic along the shoreline with many walkers just stepping over the fenceline where sand/vegetation has accrued. Whilst the signs indicate an alternative route to the coastal path this alternative route is difficult to follow through dense reeds.

The following are therefore proposed to compliment the current signage/interpretation boards and access rerouting:

- Increased signage and interpretation boards both in current and new locations near the fenceline;
- Specific roost disturbance minimisation information;
- Increasing height of fenceline to dissuade people climbing over it to access the foreshore towards Stert Point and the high tide roosts;
- Provision of a hide at Wall Common with access boardwalk and clearer paths to aid rerouting access from the foreshore to the coastal path; and
- Provision of new roost observation hide at Stert Point.

Figure D.1 NE Information Boards at Wall Common Car Parking Area

Figure D.2 Detail of NE Information Signage at Wall Common Car Park

Figure D.3 Wall Common Fenceline following Civil Parish Boundary Line (also forms southern boundary of the National Nature Reserve (NNR). (NOW REPLACED)

Figure D.4 View to Wall Common Fenceline and Costal Path – With Walkers in Distance Climbing Over Fence After Walking to the Point

Figure D.5 NE Roost Disturbance Reduction Information Signs (NOW REPLACED)

Observation/Information Platform

As previously highlighted, foraging shelduck return gradually to their high tide roost in the zone around Stert Point, Stert Island and nearby in Bridgwater Bay on the rising tide, with the majority of birds constantly feeding along the waterline of the incoming tide before roosting and loafing in the core area. Between ~1,000 and 3,500 shelduck are present in this area from two hours before and two hours after high tide.

Therefore, disturbance minimisation mitigation measures are focussed three hours before and two hours after high tide, during this five hour period it is proposed that targeted wardening would be undertaken from the proposed observation hides. An example of the nature of the potential hide/blind structure is shown in Figure D5, this blind is on the local WWT Reserve at Steart and illustrates the combination of screening, viewing slots and information boards that could be used for the shelduck observation/information platform; although the size of the proposed hide/blind would be smaller than that illustrated and potentially accessed by less intrusive pathway or boardwalks.

The observation platform/hide at Stert Point would allow direct observation of the moulting shelduck roosts, whereas the Wall Common hide/platform would allow observation of the pre-roost congregations of shelduck and be a first point in educating the public intercepting potential disturbance activity.

Figure D.5 Example of Suitable Screening/Blind/Open Hide with Seating and Information Boards Proposed for Shelduck Roost Observation Post (Example taken from WWT Steart Reserve)

It is envisaged that wardening activity would be undertaken on all high tides during daylight hours that coincide with vessel activity along the Parrett, potentially 8-12 high tides per month with additional days targeted at weekend high tides when visitor numbers and potential disturbance events are likely to be higher.

Warden focus would be on provision of an observational and educational nature, potentially targeting weekends when visitor numbers are likely to be higher, with observation optics (telescopes and tripods and viewing binoculars) and supporting information/interpretation boards and signage available for the public to use.

Anticipated monthly requirement from mid-June to October would be approximately 35 tides associated with vessel movement days and approximately 25 weekend diurnal high tides. In terms of wardening hours this would amount to around a season total of 300 hours (assuming five hours per wardening session).

The exact location of the most suitable observation point in the Wall Common area to allow controlled and disturbance reduced viewing of the roost area is yet to be confirmed but key considerations are its location to intersect walkers heading along the shoreline from Wall Common area, easy access form PROW, easy access for hide/blind construction, good positioning for viewing roosting birds and safe location in terms of high tides.

Note: The focussed wardening is now underway and will be subject to regular review.