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# Consultation overview document

## The Hinkley Point C (Nuclear Generating Station) Order 2013

Consultation on proposed application by NNB Generation Company (HPC) Limited to remove the requirement to install an acoustic fish deterrent at Hinkley Point C


Cooling water pipes ready to be installed at Hinkley Point C

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# FOREWORD

In 2013 NNB Generation Company (HPC) Limited (NNB) was granted a development consent order (DCO) authorising the construction of a new nuclear power station at Hinkley Point in Somerset, to be known as Hinkley Point C (HPC) (HPC DCO). The power station is currently under construction. Consents for a number of refinements to the design have been sought and approved since construction began. NNB is now proposing to apply for consent for a further design change – the removal of the requirement to install an acoustic fish deterrent (AFD) system as part of HPC.

The operation of HPC requires water from the Bristol Channel to be drawn into the power station and used to cool the steam condensers and heat exchangers which form part of the electricity generation process. This process of abstracting water from the Bristol Channel, using it for cooling, and discharging it back into the Bristol Channel is known as the cooling water system. The design, approved by the HPC DCO in 2013, includes three measures to protect fish and other marine organisms from the impact of abstraction by the cooling water system. One of these measures is an AFD system, which uses underwater sound to deter sound-sensitive fish from approaching the water intake system.

Since 2013, further detailed environmental studies undertaken by the Centre for Environment, Fisheries and Aquaculture Science (Cefas), the Government's main adviser on fisheries science, have shown that with the other fish protection measures in place the operation of the cooling water system at HPC will have a negligible effect on fish populations in the Bristol Channel even without an AFD system. Recent engineering assessments have also identified that the challenging marine environment in the location where an AFD system would be installed (3.3km offshore in the Bristol Channel) would give rise to significant safety risks for workers involved in constructing and maintaining it.

For these reasons, NNB considers that an AFD system should not be installed as part of the cooling water system for HPC. However, before submitting an application to the Secretary of State seeking authorisation for this change, we are seeking the views of the local community and relevant stakeholders through this consultation which will run from **2 April 2019 to 4 June 2019.**

This document provides more information on the consultation, and we look forward to receiving your views.

Chris Fayers
Head of Environment
NNB Generation Company (HPC) Limited

# 1. INTRODUCTION

## 1.1 Purpose of this consultation

1.1.1 NNB Generation Company (HPC) Limited (NNB) is constructing a new nuclear power station, known as Hinkley Point C (HPC) in Somerset. A fundamental part of the design of HPC is the installation of a cooling water system, through which seawater is drawn from the Bristol Channel and used to cool the steam condensers and other heat exchangers within the power station as part of the electricity generation process, before then being returned to the Bristol Channel.

1.1.2 To protect fish during the process of water abstraction, the HPC DCO requires three fish protection measures to be installed.

1.1.3 One of these three measures is the installation of an acoustic fish deterrent (AFD) system. Further environmental and technical assessments carried out since consent for the project was granted in 2013 have suggested that an AFD system is unnecessary and that HPC, with the other two fish protection measures that NNB is committed to delivering, would have a negligible effect on fish populations in the Bristol Channel.

1.1.4 Our assessments have also confirmed that there would be safety risks to HPC's employees and contractors installing and maintaining an AFD system in the challenging marine environment 3.3km offshore in the Bristol Channel, where visibility in the muddy waters is near zero and tidal flows are very fast.

1.1.5 NNB therefore intends to apply to the Secretary of State for a variation to the HPC DCO, removing the requirement to install an AFD system. This application (DCO Change Application) will be applied for as a 'material change' under the process prescribed by the Infrastructure Planning (Changes to, and Revocation of, Development Consent Orders) Regulations 2011 (Change Regulations).

1.1.6 This consultation is being carried out by NNB to seek the views of stakeholders and statutory consultees, as required by the Change Regulations, prior to submission of the DCO Change Application.

1.1.7 Following this consultation, we will finalise the DCO Change Application and supporting documents, taking account of views received throughout the consultation period. We propose to submit the DCO Change Application to the Secretary of State in the latter half of 2019. Chapter 5 of this document explains the application process and Chapter 6 gives details of how to respond to this consultation.

## 1.2 Structure of this document

1.2.1 This document provides information to support the pre-application consultation process in relation to NNB's proposed DCO Change Application:

- **Chapter 1:** explains the structure of this Consultation Overview Document, identifies where further information can be found, and describes the related applications that NNB is making;
- **Chapter 2:** explains the nature and purpose of cooling water infrastructure for nuclear power stations;
- **Chapter 3:** describes the three fish protection measures that were consented as part of the HPC DCO (including an AFD system);
- **Chapter 4:** explains the justification for NNB not installing an AFD system, on the basis of environmental considerations and safety risks;
- **Chapter 5:** explains the application and decision-making process for a material change to a DCO; and
- **Chapter 6:** gives details of where consultation documents can be viewed and how to respond to this consultation.

1.2.2 A number of technical terms and abbreviations are used throughout this document. For ease of reference, a Glossary is provided at the back of this document.

## 1.3 Additional consultation documents

1.3.1 The eight documents identified in Table 1.1 provide more detailed environmental and technical information to support this consultation.

1.3.2 The documents are available to view, together with this Consultation Overview Document, online and in print at the deposit locations listed in Chapter 6. Versions of documents 1-4, updated where necessary to take into

account responses to this consultation and the related environmental permit process, will be submitted with the DCO Change Application. Documents 5-8 will also be submitted with the DCO Change Application. The documents in Table 1.1 are referred to where relevant throughout this Consultation Overview Document.

Table 1.1 Additional Consultation Documents

| | Abbreviated Title | Document title | Purpose of the document | Document No |
|---|---|---|---|---|
| 1 | Updated Environmental Statement | Updated Environmental Statement | This document provides an assessment of the likely significant effects arising from the proposed change (not installing an AFD system). It updates the assessment submitted with the DCO application. It confirms that no significant environmental effects will be caused. It is prepared in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations). | NNB-308-REP-000723 |
| 2 | Updated HRA Report | Updated Report to Inform the Habitats Regulations Assessment | This document provides an update to the Habitats Regulations Assessment Report submitted with the DCO application. It includes updated information, which confirms that the proposed change (not installing an AFD system) will not have an adverse effect on the integrity of sites protected by the Conservation of Habitats and Species Regulations 2017 (Habitats Regulations). It is prepared in accordance with the Habitats Regulations. | NNB-308-REP-000722 |
| 3 | Updated WFD Report | Updated Water Framework Directive Compliance Assessment | This document assesses the proposed fish protection measures (without an AFD system) and confirms that the design will continue to comply with the requirements of the Water Framework Directive (WFD). | NNB-308-REP-000725 |
| 4 | Eels Report | Implications for Compliance with the Eels Regulations | This document assesses the suitability of the proposed fish protection measures (without an AFD system) on the basis of compliance with the Eels (England and Wales) Regulations 2009 and Eel Management Plans. | NNB-308-REP-000746 |
| 5 | Cefas TR456 Report | Revised Predictions of Impingement Effects at Hinkley Point C – 2018 Edition 2 (Cefas) | This report underpins the above assessments and reports. It provides revised predictions of impingement arising from fish being entrapped in the cooling water system. This includes an updated baseline, taking into consideration newly available data, information and analysis techniques. | HPC-DEV024-XXX-000-RET-100031 |
| 6 | AFD Optioneering Report | Summary of Engineering Optioneering Process 2019 | This report provides details of the engineering and design process undertaken by NNB to identify a suitable AFD system. It includes an appendix containing an independent review of the health and safety studies and risk analysis undertaken to support the optioneering and design processes for an AFD system: Bureau Veritas (2018) Acoustic Fish Deterrent Health and Safety Review. | NNB-301-REP-000710 |

| | | | | |
|---|---|---|---|---|
| 7 | CW1 Report | Hinkley Point C Cooling Water Infrastructure Fish Protection Measures: Report to Discharge DCO Requirement CW1 (Paragraph 1) and Marine Licence Condition 5.2.31 | This report provides details of the cooling water system design as approved by the MMO, particularly the mitigation measures of the fish recovery and return (FRR) system and intake head design which have been assessed in the Updated Environmental Statement. | NNB-209-REP-0001030 |
| 8 | Original DCO ES Marine Ecology Chapter | Chapter 19 Environmental Statement – Volume 2 (October 2011) Hinkley Point C Development Site: Marine Ecology | This chapter is an excerpt from the DCO application which explains the assessments of impacts to the marine environment that were undertaken at the time NNB submitted the original DCO application. It summarises the conclusions on significance which were drawn from those assessments. | 100195927 |

## 1.4 Related applications

1.4.1 The fish protection measures currently required by the HPC DCO are also required by the following consents and permissions:

- Environmental permit for Water Discharge Activity (WDA) EPR/HP3228XT (WDA Permit); and
- Marine Licence L/2013/00178, which has been varied. The most recent variation to this licence is L/2013/178/4 (Marine Licence).

1.4.2 Separate variations to these permissions which require the installation of an AFD system are also required alongside the variation to the HPC DCO.

### WDA Permit Variation Application

1.4.3 An application has recently been made by NNB to the Environment Agency for a variation to the WDA Permit (WDA Permit Variation Application). This application comprises a summary report, together with a detailed technical report that sets out in more detail the rationale for the revised proposals for fish protection. Although the WDA variation process is entirely separate from this DCO Change Application consultation process, the WDA Permit Variation Application is also supported by documents 2-7 listed in Table 1.1. The Environment Agency is carrying out a public consultation on the WDA Permit Variation Application. More information on that process can be found at Citizen Space: **https://consult.environment-agency.gov.uk/psc/ta5-1ud-nnb-generation-company-hpc-limited-2.**

This portal is for comments on the WDA Permit Variation Application only.

### Marine Licence Variation Application

1.4.4 NNB intends to submit its application for a variation to the Marine Licence (Marine Licence Variation Application) at a similar time to the DCO Change Application. The MMO will consult on the application and has indicated that it will issue any decision on the Marine Licence Variation Application after any decision by the Secretary of State on the DCO Change Application.

# 2. COOLING WATER SYSTEM

## 2.1 Introduction

2.1.1 An AFD system is one of the three fish protection measures associated with the cooling water system for HPC. To understand the purpose of those measures, it is important to understand the nature of the cooling water system as a whole.

2.1.2 This Chapter explains how electricity is generated by nuclear power stations and why cooling, using water drawn from the Bristol Channel, is an essential part of the design of HPC.

2.1.3 The key elements of the cooling water system are described in this Chapter.

## 2.2 How is electricity generated from nuclear power?

2.2.1 Like coal and gas-fired power stations, nuclear power stations generate electricity by creating heat, which is used to turn water into steam. The steam then turns turbines connected to electrical generators. In the case of nuclear power stations heat is created by the process of nuclear fission.

2.2.2 HPC will be powered by two nuclear reactors of a type known as UK EPR™. Water will be used in three separate and self-contained circuits within HPC. The 'cooling water system' described in this consultation, of which an AFD system would form part, refers only to the third circuit described below. Seawater is not used in the other two circuits.

2.2.3 At the centre of each reactor is a thick-walled steel pressure vessel within which a controlled fission reaction takes place. This reaction is capable of producing 4,500MW of thermal power, which is used to heat a primary circuit of pressurised water to around 330°C (shown in red and labelled as the 'primary system' on Figure 2.1). Water in this primary circuit is circulated through four heat exchangers, known as steam generators, where water in a separate secondary system is converted to steam (shown in blue/green and labelled as the 'secondary system' on Figure 2.1).

2.2.4 The secondary circuit steam is used to power a single large turbine per reactor, rotating at around 1,500 revolutions per minute. This is housed in a turbine hall and is connected directly to a three-phase electrical generator capable of producing around 1,780MW of electrical power, of which around 1,670MW is exported to supply the UK's energy demand.

2.2.5 Steam leaving the turbine must be turned back into water to be circulated again through the secondary system. This is done by circulating the steam through a condenser (shown in grey on Figure 2.1), where cooling occurs. This cooling is achieved using seawater abstracted from the Bristol Channel, which travels around a third independent water system (the cooling water system) connected to the condenser. The cooling water system infrastructure is explained in section 2.3.

2.2.6 The steam condensate (water) is returned to the steam generators via high pressure feedwater pumps, and the cycle begins again.

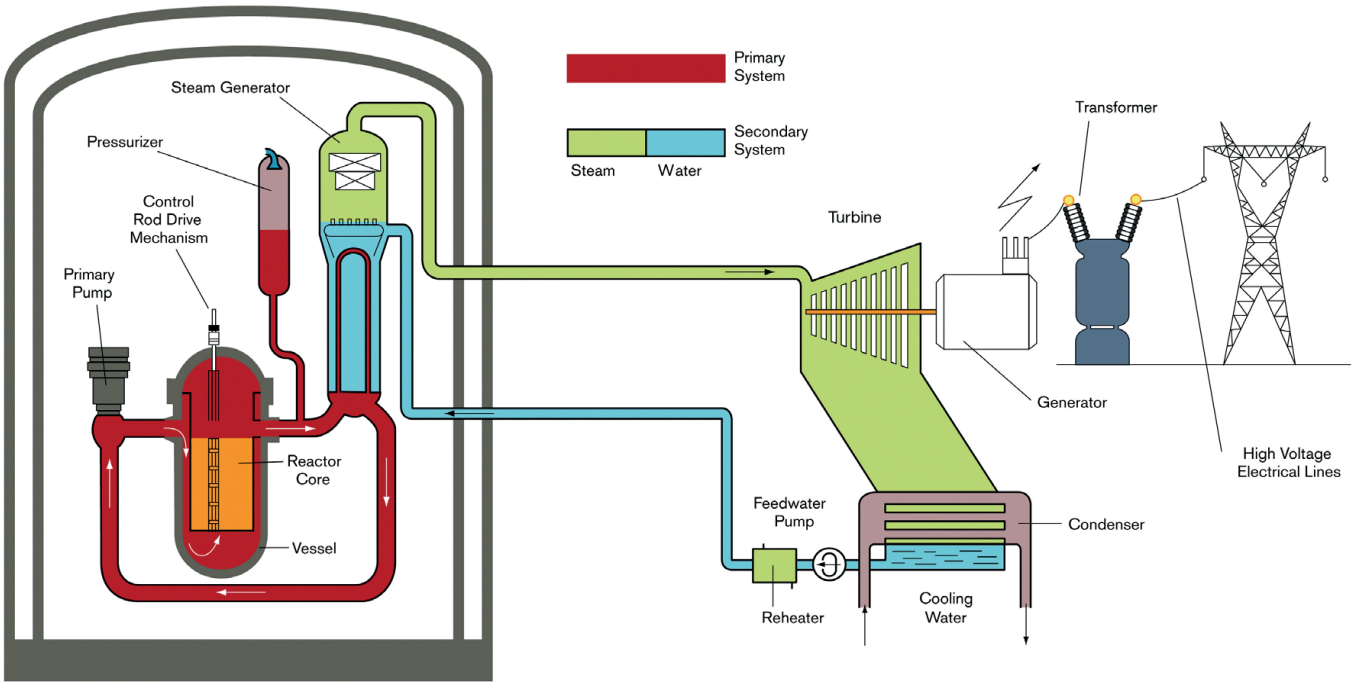


Figure 2.1: Schematic illustration of nuclear generation

## 2.3 The offshore cooling water infrastructure and related facilities

2.3.1 HPC will be cooled using water drawn from the Bristol Channel. Each of the two reactor units will have its own 'intake tunnel' through which seawater will be abstracted from the Bristol Channel and used to cool the steam condensers and other heat exchangers in the power station as part of the electricity generation process. Once the seawater has served its cooling purpose, it will be returned to the Bristol Channel via a single 'outfall tunnel', shared by both reactor units.

2.3.2 The large volume of water required for cooling (approximately 132m$^3$ per second) means that the intake and outfall tunnels must have large internal diameters: approximately 6m and 7m respectively.

2.3.3 The intake and outfall tunnels extend approximately 3.3km and 1.9km, respectively, into the Bristol Channel. Tunnels of this length are required in order to minimise the impact of water intake and discharge on the sensitive coastal marine environment.

2.3.4 Two intake heads will be installed at the seaward end of each intake tunnel. These are large rectangular structures (35.5m long, 10m wide and 2.8m deep) which the abstracted seawater must pass through before reaching the intake tunnels. As explained in the next Chapter, these intake heads have been designed to maximise fish protection. Two outfall heads will be put in place at the seaward end of the single outfall tunnel.

2.3.5 The cooling water system also encompasses a forebay and pumping station for each intake tunnel, located onshore.

2.3.6 The forebay is a large, 29m deep structure that allows the hydraulic energy from the seawater exiting the intake tunnel to dissipate before it enters the pumping station. In the pumping station, the seawater passes through a fine (5mm) mesh filter to remove debris and marine life before being pumped around the steam condensers and other heat exchangers in the cooling water system and then discharged back into the Bristol Channel. Marine life (mainly fish, crabs and shrimp) is removed from the filters by special structures ('buckets') and returned via gutters and a dedicated fish recovery and return (FRR) tunnel rather than via the outfall tunnel. The role of the intake heads and FRR tunnel are explained further in the next Chapter.

2.3.7 Figure 2.2 shows the location of the intake and outfall tunnels, the FRR tunnel and the intake and outfall heads for HPC as approved by the HPC DCO.

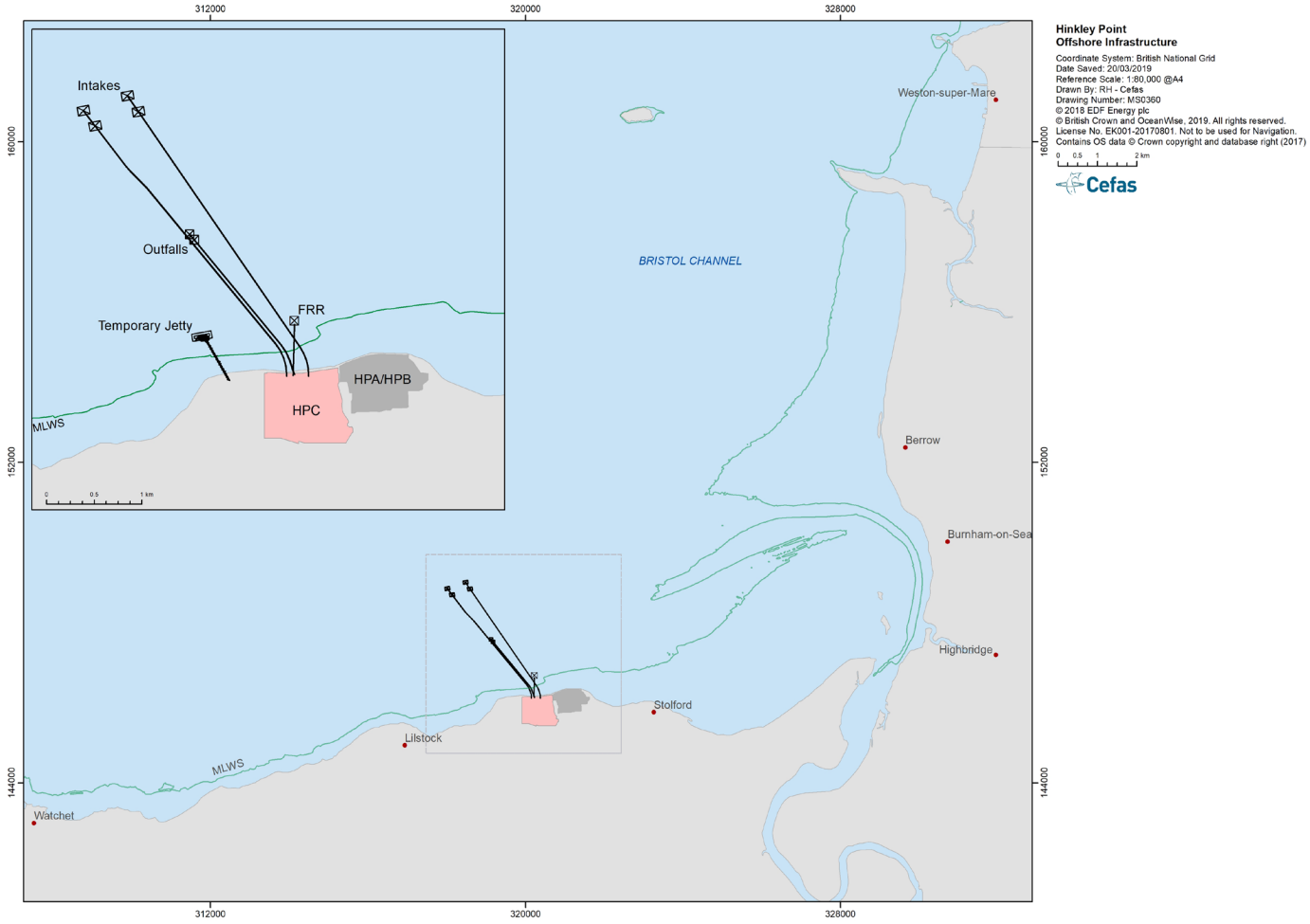


Figure 2.2: Location of intake and outfall infrastructure

# 3. FISH PROTECTION MEASURES

## 3.1 Introduction

3.1.1 This Chapter describes the three fish protection measures incorporated into the design of the cooling water system for HPC, as consented by the HPC DCO: (1) low velocity side entry (LVSE) intake heads; (2) a fish recovery and return (FRR) system; and (3) an acoustic fish deterrent (AFD) system. The nature of these measures and their role in protecting fish is described in this Chapter.

3.1.2 A number of important technical terms are used in this Chapter and in Chapter 4. These are defined below:

| Term | Meaning |
|---|---|
| Entrapment | The drawing-in of fish and other organisms into the LVSE intake heads, which then cannot swim out due to the high speed of the water flow within the cooling water system. |
| Impingement | The retention of fish or other marine organisms on the surface of filtration screens by the water current (typically includes juvenile-adult fish, shrimp and crabs). |
| Entrainment | The passage of small entrapped organisms (including fish eggs, larvae and other plankton) that penetrate the filtration screens and pass through the whole cooling water system and are discharged back into the Bristol Channel. |
| Sound projectors | The part of an AFD system which generates sound waves which deter sound-sensitive fish. |
| Turbidity | The cloudiness that arises as a result of high concentrations of particles being present in water. High turbidity levels reduce visibility in water. |

## 3.2 Three fish protection measures consented for HPC

3.2.1 Three measures to protect fish were incorporated into the design of the cooling water system for HPC, as consented by the HPC DCO:

- LVSE intake heads;
- FRR system; and
- AFD system.

3.2.2 An AFD system was intended to be the first fish protection measure that fish would encounter in the HPC cooling water system design. Where an AFD system is situated in a suitable location to operate effectively it can deter up to 95% of certain species of fish from entering the cooling water intake tunnels.

3.2.3 The LVSE intake heads have been designed to minimise the potential for entry to the intake tunnels by any fish not deterred by an AFD system. For those fish that do nevertheless enter the intake tunnels, the FRR system is designed to recover and return them to the Bristol Channel quickly and with as little damage as possible.

3.2.4 NNB is still committed to installing the LSVE intake heads and FRR system at HPC, thereby providing two layers of protection to fish. However, section 3.5 of this Chapter explains why an efficient AFD system is difficult to design, construct and maintain in the Bristol Channel. Without an AFD system in place, an increased number of fish will enter the HPC cooling water system and there will be greater fish mortality. However, Chapter 4 explains why this increase does not lead to a significant effect on populations of any species of fish in the Bristol Channel. For this reason, NNB considers it acceptable not to install an AFD system at HPC, as this will not compromise NNB's commitment to the protection of the marine environment of the Bristol Channel.

3.2.5 Figure 3.1 illustrates the fish protection measures schematically as part of the cooling water system. Each measure is described further below.

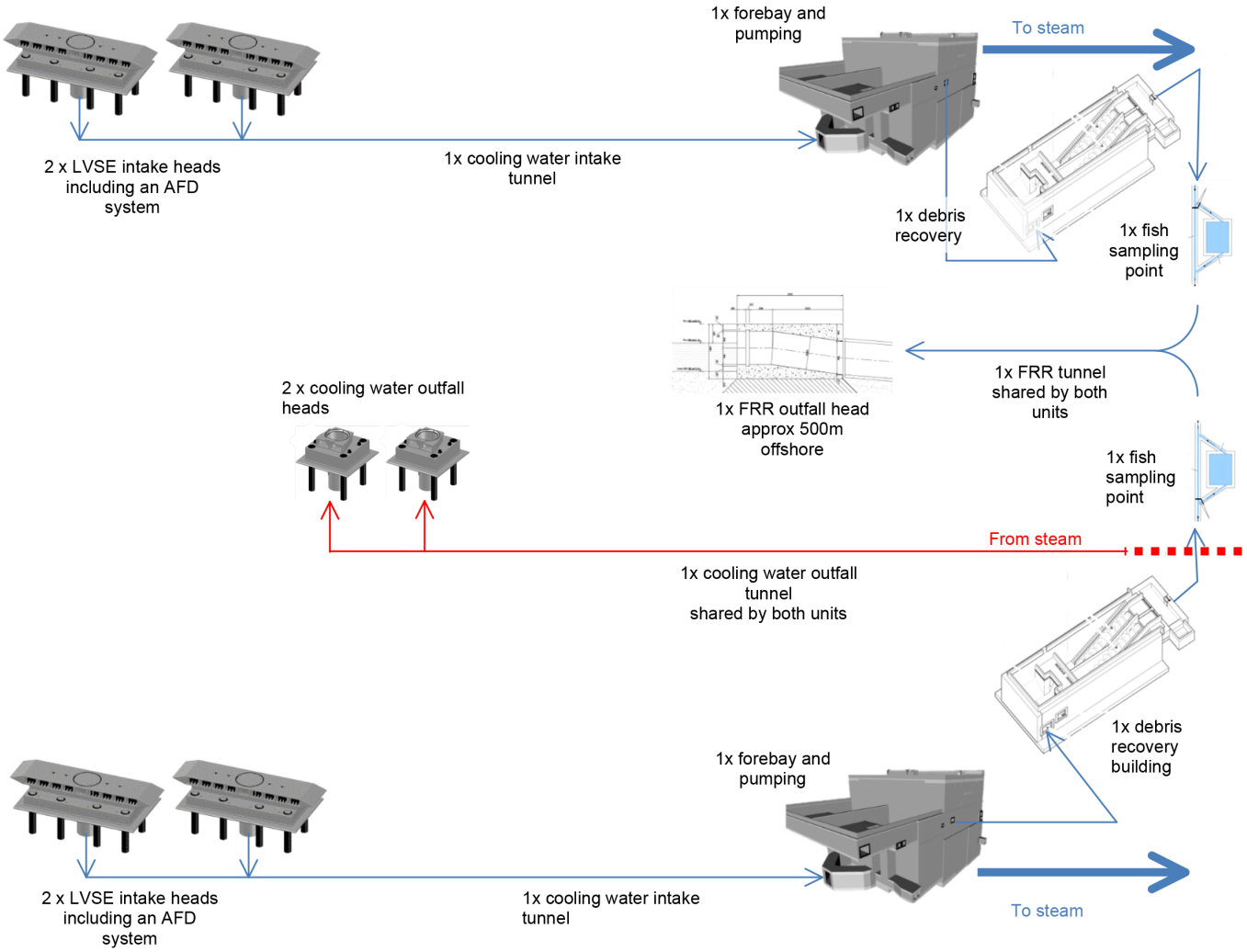


Figure 3.1: Schematic of cooling water system and fish protection measures consented by the HPC DCO

## 3.3 LVSE intake heads (measure 1)

3.3. The seawater abstracted from the Bristol Channel will pass through the LSVE intake heads into the intake tunnels. Two intake heads will be installed for each intake tunnel (see Figure 3.2 for an illustration of the design). The siting of the LVSE intake and outfall heads will be as shown on Figure 2.2 in Chapter 2. The location of the LVSE intake heads has been selected to ensure there will be a continuous and reliable supply of seawater to the cooling water system. This is necessary to ensure the safe and efficient operation of the power station, while also minimising the amount of fish and other organisms entrapped in the cooling water system.

3.3.2 The LVSE intake heads have been designed to take into account the principles of 'best practice' for fish protection, in the Environment Agency's reports (2005 and 2010). These measures are summarised at Table 3.1. Further information on the design of the LVSE intake heads is provided in the AFD Optioneering Report and the CW1 Report.

3.3.3 NNB remains fully committed to installing the LVSE intake heads, and their installation will not be affected by the proposed DCO Change Application.

Table 3.1: Fish protection measures incorporated into the LVSE intakes

| | Environment Agency Criteria | Hinkley Point C Design Information |
|---|---|---|
| **Location** | | |
| (i) | Intake heads should be located in an open area of seabed that is free from obstructions so that the abstraction does not affect the natural current flow at the intake significantly. | The HPC intake heads will be located approximately 3km offshore from the south coast of the Bristol Channel. Abstraction will not affect the natural current flow at the intake. |
| (ii) | Intake heads should not be located in intertidal or saltmarsh areas, or any other areas where fish might congregate, as this increases the risk of drawing in juvenile fish. | The HPC intake heads will be located approximately 3km from the shore and not near any intertidal or saltmarsh areas. |
| (iii) | Intake heads should not be located in narrow estuaries where migratory fish may migrate. | The HPC intake heads will be located several kilometres from the deeper, main migratory channel of the Bristol Channel. |
| (iv) | Intake heads should not be located in fish spawning or nursery areas, including those of both national and local importance. | The HPC intake heads will not be located near any fish spawning or nursery grounds. |
| **Design** | | |
| (i) | Intake heads should not create a surface vortex that might endanger craft or swimmers. | The HPC intake heads are located offshore where there are no swimmers and in deep water so that vortices will not be created. |
| (ii) | Intake heads in deep water are preferable because the bulk of fish drawn in are commonly species that favour the mid-to-upper water column. | The HPC intake heads will be located in water approximately 5m deep at low tide and 15m deep at high tide, which is deeper than the mid-to-upper water column. |
| (iii) | Intake heads should avoid abstracting water vertically because fish are less able to escape vertical currents. The problem can be overcome by fitting a velocity cap. | The HPC intake heads are of a low velocity side entry (LVSE) design. Water is only abstracted in a horizontal plane through the sides of the intake heads. |
| (iv) | Intake heads should have entrances protected by bars to prevent entry by humans, as well as marine mammals. | The HPC intake heads will have vertical bars spaced at 0.3m to prevent entry. |
| (v) | Intake heads should have sufficiently low intake velocities for fish to be able to avoid being drawn in. | The HPC intake heads are a low-velocity design and will abstract at sufficiently slow velocity to allow fish to swim away if they can detect the intake and chose to do so. |
| (vi) | Intake head entrances should be perpendicular to the main tidal stream so that tidal current velocity is not added to intake velocity. | The HPC intake heads will be perpendicular to the main tidal current and only abstract water along the two long edges. Tidal flow will serve to carry fish past the intake openings not into them. |
| (vii) | The sill of the intake should be high enough above the seabed level to prevent sediment and debris being drawn from the seabed into the intake. This also reduces the risk of drawing in epibenthic fish. | The openings of the HPC intake head will be 1m above the seabed. This will prevent sediment and debris, as well as fish and crustaceans (e.g. crabs) that inhabit the seafloor, from entering the intake. |

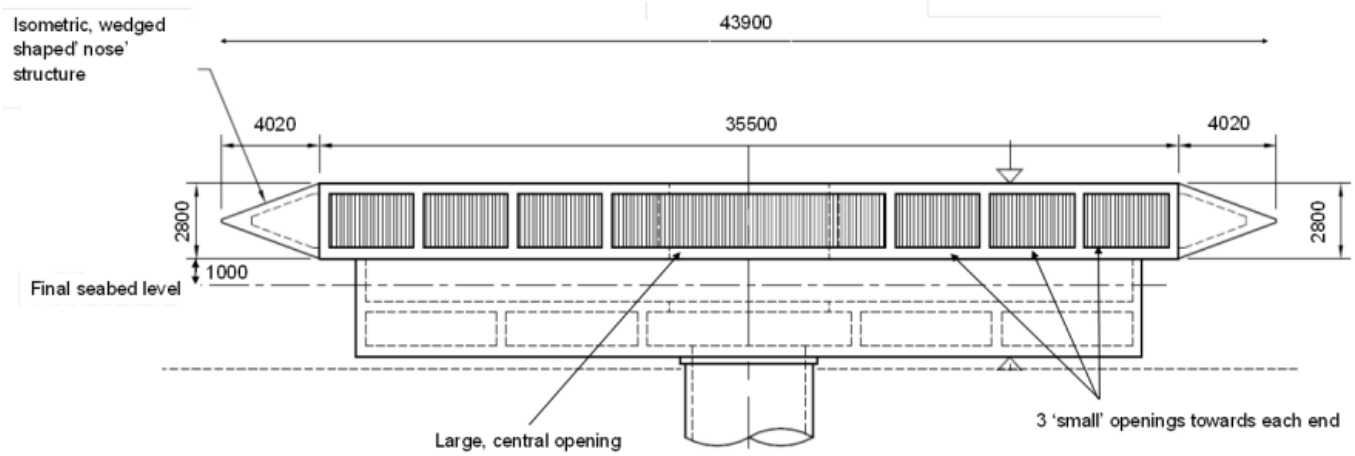


Figure 3.2 LVSE intake head design

### 3.4 Fish recovery and return system (measure 2)

3.4.1 The FRR system comprises a series of measures forming part of the cooling water system. Debris and organisms which pass through the initial widely spaced bars on the LVSE intake heads will be removed before the water enters the power station cooling water system. This occurs using fine mesh (5mm) drum screens, which protect the main cooling water supply to the steam condensers, and band screens (also 5mm) which protect the rest of the cooling water system. Each drum and band screen is fitted with buckets to recover fish and discharge them into a common gutter system for return to the sea. Anything smaller, which passes through the 5mm mesh, is entrained and passes through the power station cooling water system without causing blockages.

3.4.2 The FRR system is designed to reduce damage to fish and to optimise survival rates of fish and crustaceans handled by it. FRR systems have been reported to achieve 80 to 100% survival rates for robust epibenthic species like sole, and moderate survival rates (50 to 60%) for demersal species like cod and whiting. However, for delicate pelagic species such as herring and sprat survival rates are relatively low (<10%).

3.4.3 The design takes into account the recommendations for fish protection published by the Environment Agency (Environment Agency 2005 and Environment Agency 2010) and ecological and engineering studies carried out following the granting of the HPC DCO. The FRR system proposed, and the way in which it meets these purposes and requirements, is set out in Table 3.2. Further information on the design of the FRR system is provided in the AFD Optioneering Report and the CW1 Report.

3.4.4 NNB remains fully committed to installing the FRR system, and its installation will not be affected by the proposed DCO Change Application.

Table 3.2: Fish protection measures incorporated into the FRR system

| | Environment Agency Criteria | Meaning |
|---|---|---|
| (i) | The design of the fish buckets should be optimised for fish handling and be able to handle large sinuous fish (eels, lampreys). | The HPC FRR system will have buckets that are designed to retain all fish including eels and lamprey and to allow unhindered exit into the fish collection gutters. |
| (ii) | The fine filtration (band and drum) screens should rotate continuously at a speed of at least 1.5m per minute so that fish are not impinged against the screen for long periods before removal. | The HPC band and drum screens will rotate continuously. The drum screens will rotate at a speed of at least 2.5m per minute and the band screens will rotate at 0.5m per minute to prevent excessive wear and tear on these safety critical screens. |
| (iii) | Screen meshes should be smooth and fish-friendly, constructed from woven stainless steel or plastic mesh. Mesh size should be 6mm or less. | The HPC screen meshes for the band and drum screens will be woven stainless steel with a mesh size of 5mm × 5mm. |
| (iv) | Low-pressure backwash sprays should be used to remove fish from the screens. Higher pressure jets may be used at a later point in the cycle to wash off debris. | The HPC filtration screens will have backwash sprays in increasing order of pressure. The first spray will be at 1 bar to wash the fish gently from the screens. Persistent debris will be washed off afterwards by high pressure (3.5 and 6.5 bar) sprays. |
| (v) | FRR gutters should be:<br>a. smooth, with any joints properly grouted and finished so there are no snags;<br>b. at least 0.3m in diameter and the main return channel should be at least 0.5m in diameter;<br>c. covered to prevent bird predation and algal growth. | The HPC FRR gutters will be:<br>a. lined with High Density Poly Ethylene (HDPE) plastic to ensure they are smooth with smooth joins;<br>b. adhering to these dimensions;<br>c. covered. |
| (vi) | A continuous wash-water supply should be provided to ensure sufficient depth of water in the FRR gutters to keep fish immersed and moving through the FRR system. | The HPC FRR system collects wash-water in the buckets with the fish, which will be supplemented with additional water to ensure that fish are washed along the gutters safely and efficiently. |
| (vii) | A dedicated FRR tunnel should be provided to return fish to the source water body, instead of the main cooling water outfall. This is to prevent fish being exposed to high temperatures and any associated chemical discharges. | The HPC FRR system has one dedicated tunnel to return fish to the Bristol Channel. The two separate intake tunnels both return fish to the Bristol Channel using this dedicated FRR tunnel. |
| (viii) | The FRR tunnel should discharge fish at a point where they are unlikely to be returned to the intake point and should enter the water below the lowest astronomical tide (LAT) mark so that fish can be returned to sea at all states of the tide. | The HPC FRR tunnel outfall will be approximately 550m offshore and approximately 2.5km away from the intake heads. The outfall is below the LAT. |

### 3.5 Acoustic fish deterrent (measure 3)

3.5.1 The purpose of an AFD system is to deter those fish that are sensitive to sound from approaching the intake heads. The effectiveness of an AFD system is dependent upon the hearing ability of the fish species concerned. The hearing sensitivity of species varies significantly.

3.5.2 Although there are examples of AFD systems being used at power stations in the UK and around the world, there are no examples of such systems being installed in an offshore environment, or in conditions as harsh as those encountered in the Bristol Channel. AFD systems are typically installed near the shoreline within sheltered estuaries or in inland waters (rivers and lakes). AFD systems are easier to construct and maintain in such locations, as fewer sound projectors are required and the proximity of the intake to the shore means that the system can be constructed and maintained with limited disruption being caused by weather, water quality and tidal conditions.

3.5.3 At the time that NNB made its DCO application for HPC, AFD systems were regarded as emerging best practice. However, a design had not at that time been worked up by NNB or any other operator around the world in a location similar to that at HPC. It was agreed that detailed design would be carried out by NNB following the granting of the DCO. NNB therefore undertook an extensive two-year programme to develop a design for an AFD system that would work at HPC taking into account the following key considerations:

- The hearing sensitivity of fish and marine organisms present in the area;
- The isolated offshore location. The intake heads will be located in an exposed location which is subject to high wave heights and frequent winter storms. These reduce the windows of time available to construct and maintain an AFD system;
- The tidal conditions. The Bristol Channel is characterised by a very large tidal range and a short period of 'slack water', when there is no significant movement either way in the tidal stream water. The tidal range (more than 10m between high and low tide) and fast current velocities (up to 1.8m per second at the intake head locations) mean that the only time available to undertake maintenance safely is approximately 30 to 60 minutes per tide at slack water;
- The turbidity of the water within the area of the HPC intake heads is extremely high. There are high levels of suspended sediment and underwater visibility is near zero. This presents significant risks and constraints for offshore construction and maintenance activities, particularly for divers; and
- The nuclear safety classification of the intake heads. The sound modelling undertaken by NNB confirmed that the sound projectors for an AFD system would need to be mounted on or close to the intake heads in order to provide effective fish deterrence. However, as the intake heads provide a function that is safety critical for the operation of the reactors, maintenance of an AFD system must not in any way impact on the intake heads' capacity to abstract seawater.

3.5.4 Reflecting the complexity of these considerations, the optimum design identified by NNB would require a total of 288 underwater sound projectors (72 projectors per intake head), located along the sides of each intake head.

3.5.5 The installation of permanent structures with rails and/or lifting frames to raise the sound projectors out of the water for maintenance was considered but concluded not to be practical. The sound projectors would therefore need to be fixed to sea-bed mounted piled structures and installed/recovered (for maintenance) in clusters by divers.

3.5.6 Figure 3.3 illustrates the optimum design identified by NNB (AFD system infrastructure shown in yellow). The process undertaken to identify this optimum design is described in more detail in the AFD Optioneering Report.

### 3.6 The effect of the three measures

3.6.1 As explained in Chapter 4, evidence provided by Cefas suggests that a cooling water system incorporating the planned LVSE intake heads and FRR system alone would be enough to ensure a negligible effect on the fish populations in the Bristol Channel (between 0.2% and less than 0.001% of the annual size of the total commercial fish catch in the area per year dependent upon species). The addition of an AFD system would provide a further reduction in annual fish losses for some species. However, at best this reduction would only amount to

between 0.04% and 0.001% of the commercial catch for herring and of the expert stock assessment for twaite shad populations respectively. Therefore, even though an increased number of fish would enter the HPC intake tunnels without an AFD system, and there would be higher total fish mortality, this increase would not lead to a significant effect on any species within the Bristol Channel. This evidence, coupled with the known challenges of installing and maintaining the AFD system safely, has led NNB to decide to seek a variation to the HPC DCO, removing NNB's duty to install it as part of HPC.

3.6.2 The removal of the requirement to install an AFD system is the subject of this consultation.

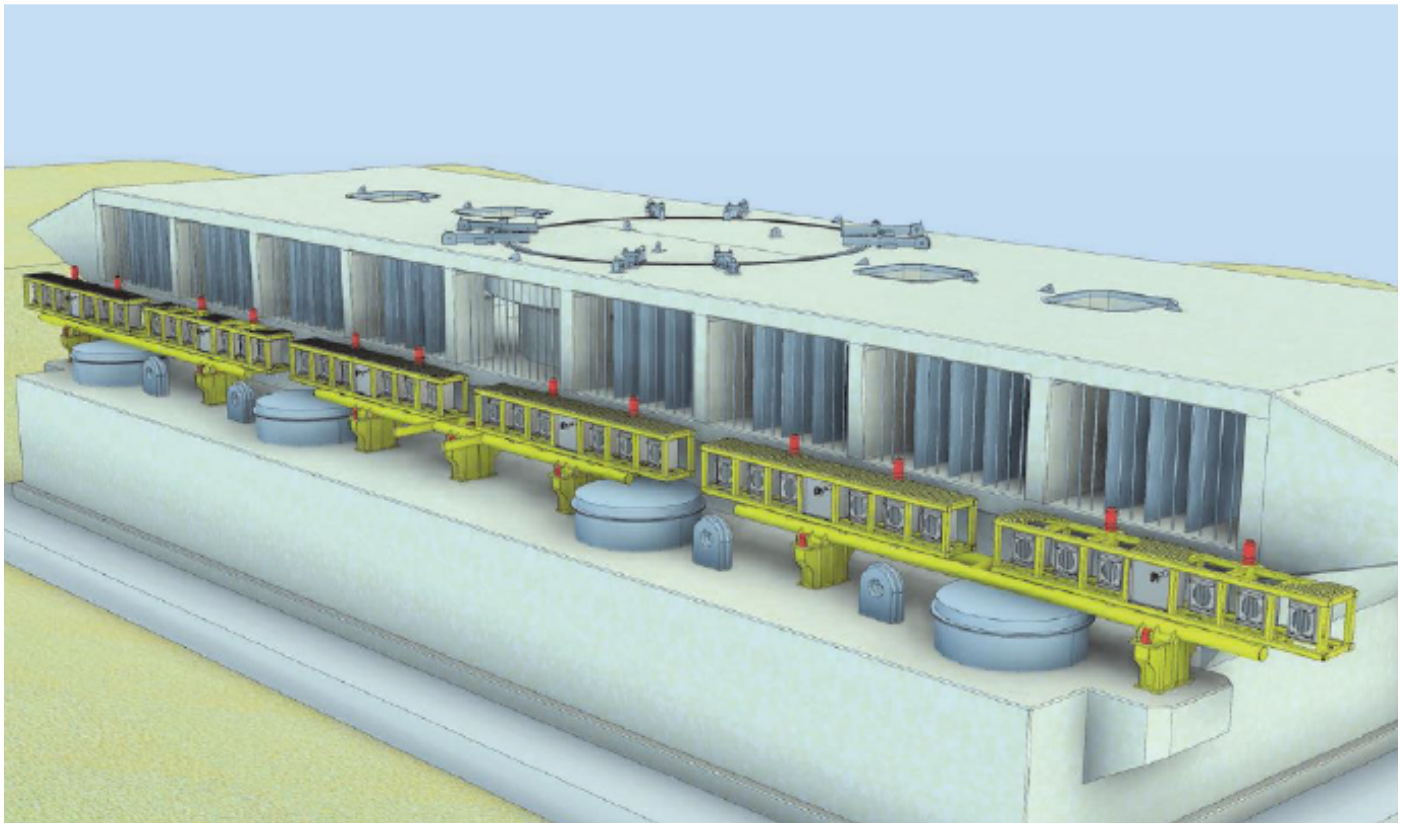

Figure 3.3: Potential siting of AFD structures as part of the LVSE intake head

# 4. JUSTIFICATION FOR NOT INSTALLING AN AFD SYSTEM

## 4.1 Introduction

4.1.1 This Chapter sets out the basis on which NNB considers that the removal of the requirement to install an AFD system is justified.

4.1.2 As explained in Chapter 3, currently NNB is required to install three fish protection measures at HPC (LVSE intake heads, a FRR system and an AFD system). In this Chapter we describe how a thorough assessment of the environmental evidence has confirmed that the installation of the LVSE intake heads and the FFR system will alone be sufficient to protect fish stocks and ensure that there is no significant effect on marine ecology.

4.1.3 In addition, the serious risks to those employees and divers who would be tasked with installing and maintaining an AFD system are explained.

## 4.2 Marine ecology of the area

4.2.1 There are several important ecological sites and species of interest located in the vicinity of HPC that are protected by national and international legislation. These sites either have fish as an interest feature or they are designated by virtue of hosting species that are reliant on fish and other marine organisms for prey. The wetland habitats of the Severn Estuary in particular are important for nature conservation and host bird populations including waders and water birds.

4.2.2 Various species are found within, or migrate through, the Bristol Channel. These include species protected by legislation, including Atlantic salmon, twaite shad, allis shad, river lamprey, sea lamprey, sea trout and eel.

4.2.3 Cetaceans (the collective name for all whales, dolphins and porpoises) have also been recorded in the Severn Estuary. Those most recorded include the harbour porpoise, Risso's dolphin, common dolphin, bottlenose dolphin and minke whale. Grey seals have also been recorded.

4.2.4 NNB recognises its responsibility to protect this sensitive marine environment, and the work conducted by the Centre for Environment, Fisheries and Aquaculture Science (Cefas), the Government's main adviser on fisheries science (summarised in this Chapter) has taken careful account of all relevant factors in assessing the effect of not installing an AFD system.

4.2.5 As part of the DCO Change Application and the related applications described in Chapter 1, assessments must be undertaken and submitted pursuant to the Conservation of Habitats and Species Regulations 2017 (Habitats Regulations), The Water Environment (WFD) (England and Wales) Regulations 2017 and The Eels (England and Wales) Regulations 2009. Draft versions of these reports, which may be updated prior to submission, are provided as part of this consultation (see Chapter 1).

## 4.3 Work conducted by Cefas

### Scope of Cefas's assessment

4.3.1 At NNB's request, Cefas has undertaken a comprehensive assessment of the effectiveness of the LVSE intake heads and the FRR system (with no AFD system) in reducing the number of fish and other organisms entrapped in the abstracted seawater and impinged in the cooling water system.

4.3.2 This assessment updates the original impingement assessment submitted with the DCO application for HPC in 2011, when development of the cooling water system was at an early stage. The 2011 assessment was based on the best available information at that time, but to counter gaps and limitations in the information available, worst case assumptions were used to ensure that the findings of the report were not unduly optimistic and did not underestimate effects.

4.3.3 Since the DCO application was made, there have been considerable advances in scientific understanding and knowledge of the Bristol Channel fish community. The Cefas TR456 Report gives a comprehensive appraisal of these matters and a detailed assessment of fish impingement at HPC. The nature, scope and findings of Cefas's assessment, as set out in the report, are summarised below.

### Species of fish assessed

4.3.4 To assess the effectiveness of the LVSE intake heads and the FRR system (with no AFD system), the Cefas assessment considers impingement effects on the species present at Hinkley Point. Three categories of fish were selected for assessment:

- socio-economically important species – these are species that are important to recreational activities and the economy of the area;
- conservation species – these are species protected by legislation; and
- ecologically important species – these are species which comprise 95% of species abundant in the area.

4.3.5 The species considered in the assessment on this basis are identified in Table 4.1. These 21 species were selected to be fully representative of the fish community found at Hinkley Point (as detailed in Cefas TR456 Report).

Table 4.1: Species assessed in the Cefas T456 Report

| | | | |
|---|---|---|---|
| Socio-economically important species | | | |
| Sole | Cod | Bass | Thornback ray |
| Conservation species | | | |
| Allis and twaite shad | Eel | Herring | Cod |
| Whiting | Blue whiting | Plaice | Sole |
| Salmon | Sea trout | River and marine lamprey | |
| Ecologically important species | | | |
| Sprat | Whiting | Sole | Thin lipped grey mullet |
| Flounder | Five bearded rockling | Sand goby | Brown shrimp |

### Criteria for significance

4.3.6 To determine whether the abstraction of seawater has a significant effect on the ecology of the area and whether it would affect the integrity of sites and species protected by the Habitats Regulations, it is necessary to demonstrate that the operation of the cooling water system incorporating the LVSE intake heads and FRR system (with no AFD) will not affect the long-term sustainability of fish populations.

4.3.7 Very large numbers of fish are eaten by other fish, marine birds and marine mammals. This natural mortality is typically 10 to 20% of the adult population per year for longer-lived species but can be 60% or more for shorter-lived shoaling species.

4.3.8 Furthermore, fishing can sustainably take at least 10 to 20% of the adult population every year without affecting the species' ability to reproduce and maintain their population levels. For many species, even higher levels of fishing are sustainable.

4.3.9 In this context, the appropriate threshold for the assessment of impacts of HPC without an AFD system was considered based on:

- the criterion used in the original impingement assessment submitted with the DCO application, which defined 'negligible effects' as below a threshold of 1% of the annual fish stock size or total commercial fish catch in the area; and
- the professional judgement of Cefas, taking into account best practice international fisheries management science and advice provided by the International Council for the Exploration of the Sea (ICES) and organisations forming part of Defra, including the Environment Agency, Marine Management Organisation, Natural England, and the Devon and Severn Inshore Fisheries Conservation Authority, as well as Natural Resources Wales from the Welsh Assembly.

4.3.10 On this basis, it was decided that the effects of HPC on fish stocks would be deemed to be negligible if the predicted effects over a one-year period were:

- less than a 1% reduction of the ICES estimated annual fish stock size of the particular species; or
- if no fish stock assessment was available, less than a 1% reduction of the total annual commercial fish catch in the area for the species.

4.3.11 For a few species no information was available on the fish stock size or on commercial catches, and in these cases the population trend data from fish impingement data recorded at Hinkley Point B (HPB) were used to undertake an assessment of the likely effects of HPC (as set out in the Cefas TR456 Report). HPB is an operational nuclear power station adjacent to the site of HPC, and uses a cooling water system similar to that proposed at HPC but without any fish protection measures.

4.3.12 The 1% threshold and the HPB long-term trend comparison were used by the Environment Agency in its assessments of significant effects in the DCO application.

### Conclusion of Cefas assessment

4.3.13 As set out in the Cefas TR456 Report, Cefas predicts that the expected annual losses of fish due to HPC if it is fitted with the LVSE intake heads and the FRR system are below the 1% negligible effects threshold for each of the species considered. The expected effect range is between 0.2% and less than 0.001% of annual stock size or commercial catch per year dependent upon species. Installing an AFD system would only provide a further reduction in annual fish losses for some species, and at most this reduction would amount to 0.04% of the commercial catch for herring and 0.001% of the expert stock assessment for the twaite shad population.

4.3.14 On this basis, the Cefas assessment predicts that HPC with the proposed fish protection measures of the LVSE intake heads and FRR system and without the AFD system will have a negligible effect on the species assessed. Installing an AFD system would only provide a further reduction on impacts that are already negligible.

4.3.15 Therefore, Cefas concludes that not to operate an AFD system at HPC would have no significant effects on marine ecology, no adverse effect on the integrity of any sites protected by the Habitats Regulations and no effect on compliance with the Water Framework Directive or the socio-economic interests of the area. For more detailed information on how these conclusions have been reached, please see in addition to the Cefas TR456 Report, the Updated Environmental Statement, Updated HRA Report, Updated WFD Report and Eels Report.

### Fish losses in comparison with commercial fishing catches

4.3.16 To put the fish mortality in context, the total amount of fish estimated to be killed by the operation of HPC without the AFD system has been predicted by Cefas to be around 56 tonnes in a year. An impact of this magnitude can be compared to that of one small fishing trawler. This compares with approximately 650,000 tonnes commercially fished in the UK in the same year assessed.

## 4.4 Safety risks in relation to installing and maintaining an AFD system

4.4.1 As part of the design process, consideration was given to the construction and maintenance requirements for an AFD system (see AFD Optioneering Report). The review confirmed:

- Remotely operated vehicles (ROVs) cannot currently operate at the water velocities encountered at Hinkley Point (see below), meaning that maintenance by ROVs (instead of divers) is not possible;
- The harsh marine environment at the HPC intake head locations would require that each of the AFD sound projectors be recovered for maintenance by divers every 12 months, for the 60-year lifetime of the power station;
- 72 days per year would be required to undertake maintenance. Taking into account the tidal conditions (tidal range and short periods of slack water) and weather conditions at Hinkley Point, it is unlikely that there will be 72 days in the year suitable for maintenance activities;
- The Bristol Channel has the third highest tidal range in the world, with fast-flowing water peaking at around 1.8m per second and tidal height variations of more than 10m between high and low tide;
- The turbid water conditions that give rise to near zero visibility increase the potential for the divers to become entangled in their diving equipment, the AFD system infrastructure and the intake heads thereby posing a risk to workers and to nuclear safety, given that the unimpeded operation of the cooling water system is critical to nuclear safety; and
- The risk of ship collision is also unacceptably high due to the extensive navigation in the Bristol Channel around the intake head locations.

4.4.2 In conclusion, the design process identified significant health and safety concerns relating to the construction and maintenance of an AFD system at HPC (see Bureau Veritas (2018) Acoustic Fish Deterrent and Safety Review appended to the AFD Optioneering Report). The harsh marine environment at Hinkley Point and the challenging tidal conditions encountered give rise to risks to human life. Health and safety legislation requires NNB to reduce risks to workers to a level that is as low as is reasonably practicable (ALARP). The risks to employees and contractors undertaking installation and maintenance activities, particularly divers, would not be compatible with these requirements.

4.4.3 These safety concerns reinforce NNB's view that it is appropriate to remove the requirement to install an AFD system at HPC.

# 5. APPLICATION PROCESS AND NEXT STEPS

## 5.1 Introduction

5.1.This Chapter provides a summary of the process NNB must go through in order to seek consent for the DCO Change Application and how this consultation fits into the process.

5.1.2 We also explain why we are treating this change as a 'material change' despite evidence that the effect of not installing an AFD system will not have a significant effect on the environment.

## 5.2 Previous 'non-material' change applications

5.2.1 NNB has in the past sought and obtained consent for a number of design changes to the HPC power station and associated developments. All of those changes were classed as 'non-material' under the Planning Act 2008 regime. As such, pre-application consultation was not required, and amendment orders were granted by the Secretary of State in 2015[2] , 2017[3] and 2018[4] after representations from interested parties in response to publicity notices were taken into account.

## 5.3 Why does NNB consider the non-installation of an AFD system a 'material' change?

5.3.1 As explained in Chapter 4, the technical assessments provided as part of this consultation indicate that the operation of HPC will not have a significant effect on the environment or protected habitats, even if an AFD system is not installed - provided that the other fish protection measures (the LVSE intake heads and FRR system) are installed. NNB remains fully committed to installing both of these measures as part of HPC.

5.3.2 Nevertheless, the Secretary of State in granting the HPC DCO took into account the installation of an AFD system as a mitigation measure in reaching his decision that there would not be an unacceptable effect on the environment or protected habitats. NNB therefore considers it appropriate to treat the change as a 'material' change within the meaning of the Planning Act 2008 regime. The effect of this is to ensure that the application is subject to a higher degree of scrutiny than for a 'non-material' change.

5.3.3 The Planning Act 2008 (Section 153 and Schedule 6) provides the legal basis for making a 'material' change to a DCO. The procedure is governed by the Change Regulations. The process is managed by the Planning Inspectorate. Figure 5.1 sets out the key stages, and further guidance on making changes to DCOs is provided at: **https://www.gov.uk/government/publications/changes-to-development-consent-orders.**

5.3.4 In particular, there is a duty on NNB to consult the local community, stakeholders and statutory consultees, and take into account any representations made before finalising and submitting the DCO Change Application. When the DCO Change Application is submitted, it must be accompanied by a Consultation Report which sets out the ways in which feedback from the consultation has been taken into account. This consultation is therefore an important part of the process and we welcome your views. Please refer to Chapter 6 for information on how to respond.

5.3.5 Once the DCO Change Application has been made to the Planning Inspectorate, there will be a 28 day period for representations to be made to the Secretary of State. The Secretary of State will consider the application and all representations received, and decide whether it is necessary or appropriate to hold an examination.

5.3.6 If the Secretary of State takes the decision not to hold an examination, he will consider all representations received and take them into account in reaching his decision, in the same way as for a non-material change application. He is expected to make a decision within two months of notifying all parties that an examination will not be held.

[2] The Hinkley Point C (Nuclear Generating Station) (Amendment) Order 2015
[3] The Hinkley Point C (Nuclear Generating Station) (Amendment) Order 2017
[4] The Hinkley Point C (Nuclear Generating Station) (Amendment) Order 2018


Figure 5.1: Key stages of the material change process

5.3.7 If the Secretary of State decides that an application should be subject to an examination, one or more inspectors will be appointed from the Planning Inspectorate to review all representations and identify the main issues. A preliminary meeting will be held with parties who have expressed an interest in taking part in the examination. The examination of an application for a material change should be completed within four months of the preliminary meeting. The Planning Inspectorate must make a written report and recommendation to the Secretary of State within two months of the end of the examination and the Secretary of State must then make a decision two months after that.

5.3.8 If consent is granted, this will be brought into effect by the making of an Order which amends the existing HPC DCO, removing the requirement to install an AFD system.

# 6. RESPONDING TO THIS CONSULTATION

6.1.1 The consultation will start on 2 April 2019 and finish on 4 June 2019. We are seeking your views on our proposal and are keen to hear from you during the consultation period.

6.1.2 In particular, we would like your views on the following questions:

1. Do you have any comments on the evidence provided by Cefas that the two remaining fish protection measures will be sufficient to ensure that the operation of Hinkley Point C will have a negligible effect on fish populations in the Bristol Channel?
2. Do you have any comments on the additional justification for not installing the acoustic fish deterrent, that installing and maintaining it would pose unacceptable safety risks to divers and others?
3. Are there any other issues you believe Hinkley Point C should address in relation to the proposal to remove the requirement to install an acoustic fish deterrent?

We encourage you to provide feedback in one of the following ways:

- Email your comments to: **Hinkley-enquiries@edf-energy.com**
- Post your written responses to **FREEPOST CONSULTATION RESPONSE**
- Call our Freephone number during normal office hours: **0800 169 6507**

6.1.3 Copies of all the consultation documents are available to view at the following locations:

Table 6:1: Deposit locations

| Location | Opening times |
|---|---|
| Sedgemoor District Council, Bridgwater House, King Square, Bridgwater, Somerset, TA6 3AR | Monday – Friday:<br>09:00 – 17:00 |
| Somerset West and Taunton Council,<br>Deane House, Belvedere Road, Taunton, Somerset, TA1 1HE | Monday, Tuesday, Thursday, Friday:<br>08:30 – 17:00<br>Wednesday:<br>09:30 – 17:00 |
| Somerset West and Taunton Council, West Somerset House, Killick Way, Williton TA4 4QA | Monday – Thursday:<br>08.30 – 17:00<br>Friday:<br>08.30 – 16:30 |
| North Somerset Council, Town Hall, Walliscote Grove Road, Weston-Super-Mare, BS23 1UJ | Monday – Friday:<br>08.30 – 17:00<br>Saturday:<br>09:00 - 14.30 |
| Somerset County Council, County Hall, Taunton Somerset, TA1 4DY | Monday – Thursday:<br>08:30 – 17:00<br>Friday:<br>08:30 - 16:30 |
| Hinkley Point Visitor Centre (EDF Energy),<br>Units 18-19, Angel Place Shopping Centre, Bridgwater, Somerset, TA6 3TQ | Monday – Friday:<br>09:00- 16:00<br>Saturday:<br>09:00 – 13:00 |
| Environment Agency Bridgwater Office,<br>Rivers House, East Quay, Bridgwater, TA6 4YS | Monday – Friday:<br>09:30 – 16:30 |

| | |
|---|---|
| Environment Agency Head Office,<br>Horizon House, Deanery Road, Bristol, BS1 5AH | Monday – Friday:<br>08:00 – 18:00 |
| Cardiff Council, County Hall, Atlantic Wharf,<br>Cardiff, CF10 4UW | Monday – Thursday:<br>08:30 – 17:00<br>Friday:<br>08:30 - 16:00 |
| Vale of Glamorgan Council, Civic Offices, Holton Rd, Barry,<br>CF63 4RU | Monday - Thursday:<br>08.30 – 17:00<br>Friday:<br>08.30 – 16:30 |
| Newport City Council,<br>Information Station, Old Station Building, Queensway,<br>Newport NP20 4AX | Monday – Friday:<br>08.30 – 17:00 |
| Cardiff Central Library, Cardiff Central Library,<br>The Hayes, Cardiff, CF10 1FL | Monday – Wednesday & Friday:<br>09:00 – 18:00<br>Thursday:<br>10:00 – 19:00<br>Saturday:<br>09:00 – 17:30 |

6.1.5 Hard copies of the consultation documents which form part of this DCO Change Application consultation can be requested by emailing **Hinkley-enquiries@edf-energy.com**. A reasonable fee for printing and posting may be required.

6.1.6 If you require the consultation documents in a different format for accessibility reasons, please call **0800 169 6507** or email **Hinkley-enquiries@edf-energy.com.**

6.1.7 If you have any questions on the proposal, whether they be in relation to the consultation itself or the supporting documents, you can contact NNB by phone **0800 169 6507**, email **Hinkley-enquiries@edf-energy.com** or post **FREEPOST CONSULTATION RESPONSE**.

6.1.8 Members of the NNB team will also be available to answer questions directly at the times and locations set out below:

6.1.9 Representations received will be logged by NNB and considered in the preparation of the final DCO Change Application. A summary of consultation responses received will be referenced in the Consultation Report to be submitted with the DCO Change Application. Please be aware that your responses may be made public as the Secretary of State may request copies of all original representations received by NNB.

Copies of NNB's related application to the Environment Agency to vary the environmental permit requirement to install an AFD system can also be found at each of the deposit locations listed in Table 6.1. See Chapter 1 for an explanation of the separate environmental permit variation process. Any responses to that consultation should be sent to the Environment Agency and not to NNB.

| Location | Address | Date | Start | Finish |
|---|---|---|---|---|
| Cannington Village Hall | Brook Street, Cannington<br>Bridgwater TA5 2HP | Tuesday 9 April 2019 | 17:00 | 19:00 |
| Angel Place Shopping Centre | EDF Energy Visitor Centre, Units 18-19, Angel Place Shopping Centre, Bridgwater, Somerset TA6 3TQ | Tuesday 23 April 2019 | 16:00 | 20:00 |
| Stogursey Victory Hall | Stogursey TA5 1PR | Wednesday 30 April 2019 | 17:00 | 19:00 |

# 7. GLOSSARY

The following acronyms and abbreviations are used in this document:

| Term / Abbreviation | Definition |
|---|---|
| AFD | Acoustic fish deterrent |
| AFD Optioneering Report | Report by NNB GenCo (2019) entitled Summary of Engineering Optioneering Process followed for Hinkley Point C AFD system. (Document ref: NNB-301-REP-000710) |
| ALARP | As Low As Reasonably Practicable |
| Cefas | Centre for Environment, Fisheries and Aquaculture Science |
| Cefas TR456 Report | Report by Cefas entitled Revised Predictions of Impingement Effects at Hinkley Point C – 2019 HPC-DEV024-XXX-000-RET-100031 BEEMS Technical Report TR456 |
| Change Regulations | The Infrastructure Planning (Changes to, and Revocation of, Development Consent Orders) Regulations 2011 |
| CW1 Report | The report prepared by NNB describing the design of the cooling water system and submitted to the MMO to fulfil DCO requirement CW1 (part 1) and Marine Licence Condition 5.2.31 |
| DCO | Development Consent Order |
| DCO application | The application submitted by NNB on 31 October 2011 to the Secretary of State under section 37 of the Planning Act 2008 for a development consent order to build and operate a new nuclear build facility at HPC |
| DCO Change Application | The proposed application for a material change to the HPC DCO to remove the requirement to design, install and monitor an AFD system at HPC |
| demersal fish | Species of fish that live and feed near to the floor of seas and lakes |
| EIA | Environmental Impact Assessment |
| EIA Regulations | The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 |
| entrainment | The passage of small entrapped organisms (including fish eggs, larvae and other plankton) that penetrate the filtration screens and pass through the whole cooling water system and are discharged back into the Bristol Channel |
| entrapment | The drawing-in of fish and other organisms into the LVSE intake heads, which then cannot swim out due to the high speed of the water flow within the cooling water system |
| Environment Agency 2005 | 'Screening for intake and outfalls: a best practice guide', Environment Agency (2005) |
| Environment Agency 2010 | 'Cooling water options for the new generation of nuclear power stations in the UK', Environment Agency (2010) |
| epibenthic fish | Species of fish that live and feed on the surface of the floor of lakes seas, lakes and rivers |
| FRR | Fish recovery and return |
| Habitats Regulations | The Conservation of Habitats and Species Regulations 2017 |
| HDPE | High density poly ethylene |
| HPB | Hinkley Point B |
| HPC | Hinkley Point C |
| HPC DCO | The Hinkley Point C (Nuclear Station Generating Order) 2013 as amended |
| HRA | Habitats Regulations Assessment |

| | |
|---|---|
| ICES | International Council for the Exploration of the Sea |
| impingement | The retention of fish or other marine organisms on the surface of filtration screens by the water current (typically includes juvenile-adult fish, shrimp and crabs) |
| LAT | Lowest astronomical tide |
| LVSE | Low velocity side entry |
| Marine Licence | Marine Licence L/2013/00178 (variation issue L/2013/178/4) in relation to HPC |
| Marine Licence Variation Application | The proposed application to vary the Marine Licence to remove reference to an AFD system at HPC |
| MMO | Marine Management Organisation |
| NNB | NNB Generation Company (HPC) Limited |
| pelagic fish | Species of fish that live in the water column (not near the surface or sea bed) and offshore, typically in the open ocean / sea (not near the shore) |
| ROV | Remotely Operated Vehicle |
| Secretary of State | The Secretary of State for Business Energy and Industrial Strategy |
| sound projectors | Sound projectors associated with an AFD system, which are responsible for generating the sound waves which deter fish |
| turbidity | The cloudiness that arises as a result of high concentrations of particles being present in water. High turbidity levels reduce visibility in water |
| Updated HRA Report | Updated assessment to inform the HRA submitted with the WDA Permit Variation Application and proposed DCO Change Application (Document ref: NNB-308-REP-000722) |
| Updated Environmental Statement | Updated environmental statement submitted to support this consultation on the proposed DCO Change Application |
| WDA | Water Discharge Activity |
| WDA Permit | The permit granted by the Environment Agency on 13 March 2013 EPR/HP/3228XT |
| WDA Permit Variation Application | The application submitted to the Environment Agency on 15 February 2019 to vary the WDA Permit to remove reference to an AFD system at HPC |
| WFD | Water Framework Directive |


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