

# NNB GENERATION COMPANY (HPC) LIMITED

## HINKLEY POINT C PROJECT

### CASE FOR REMOVAL OF THE REQUIREMENT TO INSTALL AN ACOUSTIC FISH DETERRENT

Water Discharge Activity Environmental Permit  
Variation Application or Acoustic Fish Deterrent  
Removal

Environmental Permit EPR/HP3228XT

**APPROVAL SIGN-OFF: WATER DISCHARGE ACTIVITY PERMIT VARIATION APPLICATION FOR ACOUSTIC FISH DETERRENT REMOVAL**

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## ACRONYMS

The following acronyms will be used in the report.

Acronym	Meaning
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. NNB-301-REP-000710.
BAT	Best Available Techniques
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CW1 report	Report by NNB GenCo (2017) entitled Hinkley Point C Cooling Water Infrastructure Fish Protection Measures: Report to Discharge DCO Requirement CW1 (Paragraph 1) and Marine Licence Condition 5.2.31 (Document ref: NNB-209-REP-0001030)
CWS	Cooling Water System
Defra Family	Collective term to describe the Environment Agency, Marine Management Organisation, Natural England, Natural Resources Wales and the Devon and Severn Inshore Fisheries Conservation Agency when these bodies are providing a coordinated response following the review of technical documents.
DCO	Development Consent Order
EA	Environment Agency
EDF	Électricité de France
EPR16	Environmental Permitting Regulations 2016
FRR	Fish Recovery and Return
Habitats Directive	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora
Habitats Regulations	The Conservation of Habitats and Species Regulations 2017
HPC	Hinkley Point C Power Station
HPC DCO	The Hinkley Point C (Nuclear Station Generating Order) 2013 as amended
HRA	Habitats Regulations Assessment
IED	Industrial Emissions Directive
LAT	Lowest Astronomical Tide

Marine Licence	Marine Licence L/2013/00178 (variation issue :/2013/178/4) in relation to HPC
MHWS	Mean High Water Spring
MMO	Marine Management Organisation
NNB GenCo	NNB Generation Company (HPC) Limited
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
SAC	Special Area of Conservation
PINS	The Planning Inspectorate
cSAC	Candidate Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
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
Updated HRA report	Updated Assessment to inform HRA submitted with the WDA Permit Variation Application and proposed DCO Change Application (Document ref: NNB-308-REP-000722)
WDA	Water Discharge Activity
WDA Permit	The permit granted by the Environment Agency on 13 March 2013 EPR/HP/3228XT for which an application to vary has been made
WDA Permit Variation Application	The application submitted to the Environment Agency on 15/02/19 to vary the WDA Permit to remove reference to an AFD system at HPC
WFD	Water Framework Directive
WFD report	Report by NNB GenCo (2018) entitled Water Framework Directive Compliance Assessment (Document ref: NNB-308-REP-000725)

## 1 INTRODUCTION

### 1.1 Purpose of this application

- 1.1.1 This technical report comprises the application to vary several conditions specified in Environmental Permit EPR/HP3228XT. This permit was determined on 13th March 2013 and regulates the standalone Water Discharge Activity (WDA) associated with the operational phase of Hinkley Point C (HPC) new build nuclear power station and is referred to hereafter in this report as the 'WDA Permit'.
- 1.1.2 Applications will also be submitted in parallel for an amendment to the Development Consent Order (DCO) made by the Secretary of State (The Hinkley Point C (Nuclear Generating Station) Order 2013: S.I. 2013:248 (as amended)), authorising construction of HPC, and for a variation of the marine licence covering construction of components of the CWS lying below Mean High Water Springs (MHWS) (licence number L201300178/4).
- 1.1.3 Since the Environment Agency (EA) determined the WDA Permit, NNB Generation Company (NNB GenCo) has continued to progress studies and assessments to support the design of the various components of the cooling water systems that give rise to water discharge activities regulated by the WDA Permit. Optioneering processes have been completed and the design of the cooling water system and its various components has advanced, including provision of reliable and effective arrangements for protection of fish and other marine organisms.
- 1.1.4 The design of the intake arrangements, the Acoustic Fish Deterrent (AFD) system and the Fish Recovery and Return (FRR) system outlined in the WDA Permit application and in the additional information submitted whilst this was being determined have also been updated.
- 1.1.5 Engineering and health and safety assessments also prepared to support the optioneering and detailed design of the intake arrangements have informed the decision that an effective acoustic fish deterrent technology is not available for application in the offshore environment at HPC. Although an AFD system may deter specific fish species from entering the intake heads and have been applied to intakes in some inland and estuarine locations, acoustic deterrent technologies are not available for offshore marine intakes, given the challenging environmental conditions that affect the integrity, operational performance and maintenance requirements of these systems. Therefore, NNB GenCo are submitting this application for a variation in the WDA Permit to remove conditions relating to requirements to install an AFD system.
- 1.1.6 Since the original application NNB GenCo has continued to develop and refine the design criteria and specification for all elements of the cooling water system, to reflect updated and new information. Since the submission of the application in 2011, the baseline environmental and ecology data has been updated to enable refinement of assumptions, particularly in relation to the behaviour of ecology in the Bristol Channel. The engineering design for the cooling water system has also evolved. In relation to fish protection

measures, this has resulted in an improved understanding of environmental and health and safety constraints, more accurate characterisation of marine receptors and environmental effects and the performance of the arrangements for fish protection.

1.1.7 Following the review of new and updated information derived from environmental and ecological studies to confirm the reliability of the conservative assumptions made in the initial WDA Permit application and the revision of compliance assessments for the purposes of the Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations) and the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the Water Framework Regulations) 2017. NNB GenCo has concluded that abstraction of sea water in the absence of an AFD system at HPC will not give rise to significant effects associated with the impingement and entrainment of fish, as the adopted design of the intake arrangements will provide suitable mitigation. On the basis of the new and revised information available, NNB GenCo has reached the following conclusions.

- The detailed designs for the seawater intake heads and the fish recovery and return system associated with the seawater cooling system have been successfully incorporated into the latest design (NNB GenCo, 2017).
- The revised predictions of impingement effects at HPC confirm that the current detailed design of the intake heads, exclusion system and the fish recovery and return system will result in negligible effects on ecologically or socio-economically important species. The methodologies and results of the revised impingement effects are summarised in Appendix A and found in full in the TR456 report (Cefas, 2019a).
- Fauna being entrained (i.e. fauna penetrating the CWS screens and passing via the pumps, heat exchangers and other components of the CWS and back to the receiving water) was not predicted to be mitigated by AFD system, so there will be no change through the CWS beyond the screens.
- Removal of the AFD system will not impair the efficiency of the FRR system (as detailed in the TR493 report, Cefas 2019b).
- The revised Water Framework Regulations Compliance Assessment and the Habitats Regulations Compliance Assessment undertaken to consider the effects of the proposed intake and fish recovery and return system demonstrate that these arrangements provide the necessary protection for fish and marine organisms.
- The detailed designs for the seawater intake and fish recovery and return system broadly comply with best practice, as specified in publications issued by the Environment Agency.
- An AFD system is not currently available for use in the offshore marine environment. This type of system has not been trialled for an offshore seabed intake and there is no operational experience of the system anywhere in the world in a marine environment similar to the harsh conditions experienced in the Bristol Channel.
- The development of an effective and suitably robust AFD system suitable for use in the marine environment is not currently envisaged by any providers and



the design of this type of system would require extensive research and development.

- The review of the technical, operational and health and safety concerns of operating this type of system in the harsh marine environment within the location of the intake heads, has confirmed that the system would be extremely difficult to construct and to maintain.
- Maintenance by divers would be required every 12 months for the lifetime of the station. These activities will be restricted to narrow tidal windows and subject to lengthy periods of weather downtime. An assessment of the risks involved with such an operational system has concluded that the risks to maintenance staff would not be consistent with the principles outlined in the Health and Safety at Work Act 1972.

It should be noted that following the design phase for the AFD system, NNB GenCo has kept the market under review to track developments that may increase the viability of the operation of a system at HPC. There have been no developments that have caused NNB GenCo to revise the position outlined above.

1.1.8 Further justification for these positions is provided at Section 2.1 of this report. More detailed commentary is included in the Justification and Supporting Evidence Report, provided at **Appendix A** and in the WFD Report (NNB GenCo, 2018b) and HRA Report (NNB GenCo, 2018c), which have been updated and accompany this application. Further detail is also provided in the reports referenced in Section 1.3.

1.1.9 As this application relates solely to proposed changes in fish protection measures and does not affect information relating to waste streams regulated by the WDA Permit, the assessment provided in this application refers specifically to those aspects of the marine environment that may be affected by proposed change in fish protection arrangements associated with the abstraction of sea water, principally fish and receptors potentially affected by changes to fish populations. As no alterations to other elements of the proposed HPC Project relevant to the WDA permit are proposed, the remainder of the WDA permit stands as originally determined.

1.1.10 On this basis, NNB GenCo requests that the conditions in the WDA Permit relating to the design and operation of the AFD system are varied or deleted as outlined in **Table 1.1**.

**Table 1.1** WDA Permit conditions to be varied

Condition reference	Condition requirements	Proposed variation of WDA Permit condition
<b>Schedule 1, Table S1.2 - Operating techniques</b>	Requires the operation of the AFD system to be undertaken in accordance with the arrangements provided in response to Question 46 of the Schedule 5 request for further information received by the EA on 29th March 2012	Delete this Operating technique.
<b>Schedule 1, Table S1.2 - Operating techniques:</b>	This requirement will be discharged when the EA has confirmed that the requirements of Pre-operational measure PO8 (in Table S1.4) have been addressed.	Delete reference to AFD in this Operating technique

Condition reference	Condition requirements	Proposed variation of WDA Permit condition
<b>Commissioning Plan for AFD and FRR Systems</b>		
<b>Schedule 1, Table S1.4 – Pre-operational Measure PO2</b>	Prior to the commencement of the Hot Functional Testing phase of commissioning the operator shall submit to the Environment Agency a report which includes a completed, as-built description of the plant and infrastructure relevant to the Water Discharge Activity. Note that the report shall take into account the cooling water system in its entirety, including the design of the AFD system and the FRR system.	Remove requirement to provide design information and an as-built description of the AFD system
<b>Schedule 1, Table S1.4 – Pre-operational Measure PO8</b>	<p>Prior to the commencement of the Hot Functional Testing phase of commissioning the operator shall submit to the Environment Agency for approval a Commissioning Plan for the AFD system and the fish recovery and return system. The Plan shall include, but not be restricted to the following:</p> <ul style="list-style-type: none"> <li>a description of how the operator intends to optimise the AFD and the FRR systems to minimise impacts upon fish;</li> <li>details of the monitoring proposed to facilitate optimisation and meet the above objective;</li> <li>confirmation of the timetable associated with the AFD and FRR system commissioning;</li> <li>proposals for demonstrating the effectiveness of the optimisation process to the Environment Agency prior to the start of Active Commissioning of Unit 1.</li> </ul>	Remove references to the AFD system from PO8

1.1.11 Table S3.1a of the WDA Permit specifies the following maximum permitted discharge rates for waste stream A, associated with the release of seawater:

- 127m<sup>3</sup>/s (tidal mean) and
- 134.6m<sup>3</sup>/s (98 percentile).

These values were incorporated into the basis of design for the seawater cooling system and derived during the early stages of the project, pending confirmation of the flow rates for the associated systems. These systems include those associated with the Ancillary Cooling Water System, the Essential Cooling Water System, the Ultimate Cooling Water System and the Fish Return System.

1.1.12 To ensure the technical assessments undertaken to characterise the performance of the proposed fish protection measures do not underestimate the effects on fish and other biota in the absence of the confirmed abstraction rate, a precautionary scenario of 132m<sup>3</sup>/s at mean sea level has been assumed and incorporated into the studies that underpin the Habitats Regulations Assessment Compliance Assessment and the Water Framework Regulations Compliance Assessment.

1.1.13 Currently work is progressing to confirm the flow rates of these and other systems. This will enable NNB GenCo to confirm the seawater abstraction rates and to assess the resultant effects of increased dilution on the thermal and physical characteristics of the

effluent streams regulated by the WDA Environmental Permit. Following confirmation these values and the preparation of a revised water balance, these values will be confirmed in the submission required to comply with Pre-operational condition P03 of the WDA Permit. This condition requires the following information to be submitted 3 months prior to the hot functional testing phase:

- a description and justification for any expected variances from the substance loadings and emissions proposed in the Permit Application; and
- any additional mitigation measures required to ensure compliance with the WDA Permit.

1.1.14 Given the conservative values assumed for these assessments, NNB GenCo considers that confirmation of these matters at this stage should not prevent or delay determination of this application.

1.1.15 This application to vary the conditions of the WDA Permit relating to the AFD system has been prepared to enable compliance with, Regulation 12(i) (b) of the Environmental Permitting Regulations 2016 (EPR16). This provides that a person must not, except under and to the extent authorised by an environmental permit, cause or knowingly permit a water discharge activity (as defined in Schedule 21, paragraph 3 of EPR16).

## 1.2 The structure of the application

1.2.1 This application is presented in a format that informs the Environment Agency of the studies and assessments undertaken in relation to the design of the fish protection arrangements to be installed at HPC that confirm the compliance status of the proposed arrangements with legal and regulatory requirements. For the purpose of this report, fish protection measures comprise engineering design features of the intake head and the fish recovery and return system, including arrangements to exclude fish, crustaceans and other marine organisms from entering the cooling water system. This technical report is therefore set out as follows.

- Introductory information (this document).
- **Appendix A** - Justification and Evidence Report. This report confirms the proposed design for the abstraction and associated fish protection measures. The report justifies the design based on the evidence provided in technical assessments and studies commissioned by NNB GenCo, with regard to legal and regulatory benchmarks and requirements. This appendix is also available as a stand-alone report NNB-308-REP-000724. Detailed supporting information is provided in the documents listed in Section 1.3 below.
- **Appendix B** - Regulatory benchmarks. This appendix confirms the statutory, regulatory and policy standards and criteria for protection of the environment relevant to this submission.
- **Appendix C** - Application forms. This appendix contains application forms A (Apply for an Environmental Permit (about you)), C6 (Application to vary a bespoke water discharge activity and groundwater (point source) environmental permit), and F1 (Charges and declarations).

## 1.3 Supporting documents

1.3.1 Documents provided to support understanding of the report are referenced throughout this report. The project specific documents relevant to this report include the following.

- NNB GenCo (2018a) Summary of engineering optioneering process followed for the Hinkley Point C Acoustic Fish Deterrent (AFD) System, NNB-308-REP-000710 (the 'AFD Optioneering report'). This document summarises the decision making processes for the selection, design and optimisation of components of the cooling water system, including the location of the intake structures, the design of the intake heads and the AFD system (including the findings of PrISM modelling to determine the most appropriate design and sound projector location for acoustic field generation, power supply, communications and maintenance requirements taking into account environmental constraints). The report also considers lessons learned from other sites that have installed AFD system.
- NNB GenCo (2017) Hinkley Point C Cooling Water Infrastructure Fish Protection Measures: Report to Discharge DCO Requirement CW1 (Paragraph 1) and Marine Licence Condition 5.2.31, NNB-209-REP-0001030 (the 'CW1 report'). This report is specific to DCO requirement CW1 (paragraph 1) and marine licence condition 5.2.31 and has been approved by the MMO in consultation with the EA. Other DCO requirements and licence conditions remain to be discharged.
- Cefas (2019a) Revised Predictions of Impingement Effects at Hinkley Point C 2019, HPC-DEV024-XXX-000-RET-100031 BEEMS Technical Report TR456 Revision 8 (the 'TR456 report'). This document summarises updated information relating to the advancement of science and knowledge relating to the fish community of the Bristol Channel, collected following the determination of the WDA Permit. The report also provides a revised assessment of impingement effects of fish and crustaceans for HPC, to determine the effects of relying on fish protection measures not including an AFD system. This report has been subject to earlier consultation with the Defra family and incorporates responses received up to the date of its preparation.
- Bureau Veritas (2018) Acoustic Fish Deterrent Health and Safety Review, OH2231-HPC-NNBGEN-XX-000-REP-100000 (the 'AFD Safety report'). This document provides an independent review of the health and safety studies and risk analysis undertaken following grant of the WDA Permit. These studies have supported the optioneering and design processes for the AFD system to enable NNB GenCo to make informed decisions about the works associated with the AFD system.
- NNB GenCo (2018b) Water Framework Directive Compliance Assessment, NNB-308-REP-000725 (the 'WFD report'). This document considers whether the proposed revised arrangements for seawater abstraction will adversely affect compliance with the Water Framework Directive. Of the metrics used in status assessment, the changes proposed could only affect those set for fish, which apply to transitional water bodies and river water bodies. This document provides an assessment of the proposed abstraction arrangements with regard to fish metrics in the River Parrett water body (a transitional water), as

well as screening for effects in upstream transitional and river water bodies relating to migratory fish.

- NNB GenCo (2018c), Report to Inform the Habitats Regulations Assessment, NNB-308-REP-000722 (the updated 'HRA report'). This document considers whether the proposed revised arrangements for seawater abstraction will adversely affect the integrity of European designated sites or Ramsar sites, either alone or in combination with other relevant permissions, plans or projects.
- NNB GenCo (2017) Hinkley Point C Cooling Water Infrastructure Fish Protection Measures: Report to Discharge DCO requirement CW1 (Paragraph 1) and Marine Licence Condition 5.2.31 (the 'CW1 report'). This document provides a summary of the measures implemented to address the requirements of Condition 5.2.31 of the Marine License and Condition CW1, Part 1 of the Development Consent Order.

1.3.2 The DCO CW1 requirement is reproduced In **Table 3.1**.

1.3.3 The following regulatory guidance and evidence reports are also relevant to this report:

- Environment Agency (2010a) Cooling Water Options for the New Generation of Nuclear Power Stations in the UK. This states that direct cooling can be BAT for estuarine and coastal sites, provided that (a) best practice in planning, design, mitigation and compensation is followed and (b) any residual impacts are not deemed to be unacceptable in respect of determining best practice.
- Environment Agency (2005) Screening for Intakes and Outfalls: A Best Practice Guide. This report describes best practice for screening systems.
- Environment Agency (2010b) Screening at Intakes and Outfalls: Measures to Protect Eels (The Eels Manual). This report describes best practice for screening systems and fish recovery and return systems, with specific reference to eels.
- European Commission (2001) Integrated Pollution Prevention and Control (IPPC). Reference Document on the Application of Best Available Techniques to Industrial Cooling Systems. Known as a BAT Reference or BRef note.

1.3.4 Although the activities associated with this application are not regulated by the Industrial Emissions Directive, so the BRef note is not formally applicable, it nevertheless contains useful factual information on cooling systems.

1.3.5 Consideration has also been given to the information provided in the Regulatory Position on Best Available Techniques (2018) provided in correspondence from the Environment Agency to NNB GenCo.

1.3.6 Further justification for these positions is provided at Section 2.1 of this report. More detailed commentary is included in the Justification and Supporting Evidence Report, provided at **Appendix A** and in the WFD Report (NNB GenCo, 2018b) and HRA Report (NNB GenCo, 2018c), which have been updated and accompany this application.

## 2 BACKGROUND AND CONTEXT TO THIS APPLICATION

### 2.1 Environmental context

- 2.1.1 NNB GenCo, which is a subsidiary of EDF Energy, is currently constructing a new-build nuclear power station at Hinkley Point, Somerset. The power station (HPC) comprises two pressurised water reactors and associated infrastructure. HPC is located at Bridgwater Bay in the Bristol Channel, 25 km east of Minehead and 12 km to the north-west of Bridgwater.
- 2.1.2 There are a number of international and national environmental designated sites close to Hinkley Point. Those that are relevant to this application include
- Severn Estuary Special Area of Conservation (SAC);
  - Severn Estuary Ramsar site.
- 2.1.3 Other sites that could be affected by changes to the fish protection measures through effects on mobile interest features (migratory fish and marine mammals or birds that prey on fish) include:
- River Wye/Afon Gwy SAC
  - River Usk/Afon Wysg SAC
  - Afon Tywi SAC
  - Severn Estuary SPA
  - Grassholm SPA
  - Skomer, Skokholm and Seas off Pembrokeshire SPA
  - Aberdaron Coast and Bardsey Island SPA
  - Saltee Islands SPA
  - Lambay Island SPA
  - Copeland Islands SPA
  - Cliffs of Moher SPA
  - Beara Peninsula SPA
  - Kerry Head SPA
  - Deenish Island and Scariff Island SPA
  - Puffin Island SPA
  - Iveragh Peninsula SPA
  - Skelligs SPA
  - Dingle Peninsula SPA
  - West Donegal Coast SPA
  - High Island, Inishshark and Davillaun SPA

- Tory Island SPA
- Duvillaun Islands SPA
- Clare Island SPA
- Blasket Islands SPA
- Horn Head to Fanad Head SPA
- Bristol Channel Approaches / Dynesfeydd Môr Hafren SCI
- Lundy SAC
- West Wales Marine / Gorllewin Cymru Forol SCI
- Cardigan Bay SAC
- North Anglesey Marine / Gogledd Môn Forol SCI
- Isles of Scilly Complex SAC
- Pen Llyn a'r Sarnau / Llyn Peninsula and the Sarnau SAC
- North Channel SCI
- Rockabill to Dalkey Island SAC
- Roaring Bay and Islands SAC
- Blasket Islands SAC
- Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd and
- Pembrokeshire Marine/Sir Benfro Forol SAC.

2.1.4 HPC will be 'direct-cooled' (sometimes referred to as 'open-cycle cooling'). Seawater will therefore be abstracted from the Bristol Channel to cool the dedicated steam condensers (and other heat exchangers) that service each of the generating units. The seawater will be combined with treated sewage, surface water run-off and process effluents, before being released into the Bristol Channel via a common outfall tunnel serving both generating units.

## 2.2 The Water Discharge Activity Permit

2.2.1 The EA considers that the abstraction of seawater is closely linked to the discharge of the spent cooling water (see Environment Agency, 2013a, Section 4.8.4). On this basis, the conditions relating to the AFD system specified at Table 1.1 have been included in the WDA Permit. The WDA Permit was granted on the basis of the conceptual design information for the Cooling Water System (CWS) provided in the following submissions that supported the application for the WDA Permit:

- the technical report that supported the application for a standalone WDA Permit for the operational phase of HPC (NNB GenCo, 2011a); this was submitted to the EA in September 2011; and
- further information provided in response to question no 46 in the Request for Further Information from the EA dated 13th December 2011, served under paragraph 4 of Schedule 5 of EPR16 (see NNB GenCo, 2011b).

2.2.2 The information provided in these documents outlined the fish protection measures to be incorporated into the cooling water system for HPC. At that time, it was envisaged these arrangements would include the following.

- **An AFD system.** The AFD system was proposed to be sited near the seawater intakes. Such systems rely on the repulsion of fish by amplified sound signals. Although these types of systems are less effective for sinuous fish such as lampreys and eels, references suggested that the application of these systems in estuarine and inland waters have proven effective in diverting salmon, trout, cyprinid and percid species from cooling water intakes.
- **Low velocity side entry intake heads.** These would be located and designed to enable the safe and efficient operation of the reactors whilst also avoiding fish migratory routes, spawning grounds, nursery grounds and the intertidal and saltmarsh areas. The application also confirmed that the intake heads would be designed to:
  - minimise the intake velocity of the abstracted seawater to 0.3 metres/second to enable fish to avoid entrapment;
  - incorporate entrance bars to exclude entry of larger organisms and to reduce abrasion of fish and crustaceans that would enter the cooling water system;
  - minimise entrainment of epibenthic species by elevating the intake heads from the seabed.
- **A fish recovery and return (FRR) system.** This system would be located upstream of the seawater cooling water system pumping station, to prevent entry to the cooling water system of certain fish, crustaceans and marine organisms by screening these from the seawater, and the recovery and return of these organisms to the Bristol Channel. The application provided that the system would be designed with reference to studies undertaken to investigate and assess the impact of fish and crustacean deaths by impingement and entrainment of marine organisms at the Hinkley Point B power station. The return system would also be designed to ensure the sensitive handling of fish, crustaceans and other organisms to minimise the potential for injury during recovery and passage through the fish return system.

2.2.3 The information provided in these WDA Permit application submissions reflected the most accurate and reliable information available to the project at the time the documents were submitted in September and December 2011. The information provided was prepared with reference to the following:

- the best practice recommendations outlined in the following EA publications:
  - EA Science Paper, Screening for Intakes and Outfalls: A best Practice Guide (Environment Agency, 2005);
  - EA Evidence Report Cooling water options for the new generation of nuclear power stations in the UK (Environment Agency, 2010a);
- the design concepts for the HPC cooling water system developed at this early stage in the design of the cooling water system;



- 
- historic baseline environmental information and survey data collected prior to the WDA Permit application being submitted (2011). It should be noted that these data may be influenced by the operation of Hinkley Point B Power Station, which is expected to continue until at least 2023;
  - a study to assess the entrainment effects on organisms at HPC; it should be noted that this assessment was based on conservative assumptions, reflecting the maturity of the design information available; and
  - the Water Framework Directive Compliance Assessment and Habitats Directive Assessment, prepared on the basis of conservative assumptions, reflecting the maturity of the design information available. These assessments demonstrated the proposed arrangements would provide the necessary protection for fish and marine organisms.

### 3 REGULATORY CONTEXT FOR THE ABSTRACTION OF SEAWATER AND FISH DETERRENT SYSTEM

#### 3.1 Regulatory position set out in the Water Discharge Activity Permit Decision Document

- 3.1.1 The requirement to install fish deterrent systems and the technical standards for these are not directly specified in legislation or regulations. In relation to HPC, conditions relating to AFD systems are included in the following approvals.
- The Development Consent Order (DCO). This Order (S.I. 2013:648), granted on 18th March 2013 and amended in 2015, 2017 and 2018, authorises the development of the power station. Schedule 2 of the DCO specifies conditions relating to the AFD system as set out below.
  - The Marine Licence (L/2013/00178/4) covering construction of the marine components of the CWS, granted on 7th June 2013 and varied with effect from 17 October 2016. The licenced activities are specified at Section 4. The conditions of the Licence are specified at Section 5.
  - The Water Discharge Activity Permit (EPR/HP3228XT) to which this application relates.
- 3.1.2 To enable understanding of the interfaces between the DCO, the marine licence and the WDA Permit, the conditions included in the Order and the Licence which relate specifically to the AFD system are summarised at **Table 3.1**.
- 3.1.3 As a statutory consultee, the EA had influenced the requirements included in the DCO as made and the conditions in the marine licence as issued. In parallel with this application to vary the WDA Permit, applications for a material change to the DCO and to vary the marine licence will be submitted to the Secretary of State and the Marine Management Organisation respectively. The EA will also be statutory consultee for the purposes of these applications.

**Table 3.1** DCO requirements and Marine Licence conditions relevant to the AFD system

Reference	Requirements
<b>The Hinkley Point C (Nuclear Generating Station) Order 2013</b>	
<b>Requirement CW1 (2)</b>	(2) The AFD system shall not be installed until details of the location and design have, following consultation with the Countryside Council for Wales, Natural England and the Environment Agency, been submitted to and approved by the Marine Management Organisation.
<b>Requirement CW1 (3)</b>	(3) No water abstraction shall commence until the off-shore intake and outfall heads, cooling water intake and outfall tunnels, the fish recovery and return system, the low velocity side entry intakes and the AFD system have been installed in accordance with the approved details referred to in paragraphs (1) and (2).
<b>Requirement CW2 (1)</b>	(1) No water abstraction shall commence until a monitoring and adaptive measures plan for Work Nos. 2A to 2H has, after consultation with the Countryside Council for Wales, Natural England and the Environment Agency, been submitted to and approved by the Marine Management Organisation. The purpose of the plan shall be to ensure that the AFD system minimises the impacts of water abstraction on the relevant fish populations, having regard to the conservation objectives of the Severn Estuary SAC and other relevant ecological considerations. The plan shall set out— <ul style="list-style-type: none"> <li>(a) the performance level to be maintained by the AFD system associated with the cooling water intakes to be confirmed through trials and the fish recovery and return system, during the operation of Unit 1 and Unit 2;</li> <li>(b) the monitoring arrangements for the trialling of the AFD system and the fish recovery and return system during commissioning of Unit 1 and Unit 2, in respect of the performance levels set in (a);</li> <li>(c) the monitoring arrangements for the AFD system and the fish recovery and return system during operation of Unit 1 and Unit 2, in respect of the performance levels set in (a);</li> <li>(d) the additional adaptive measures arising from (a), (b) and (c) and reflecting the contents of Appendix 5: Adaptive Management and Contingency Measures, section 1.3.9 (submitted 6th August 2012 as part of EDF Energy – Response to Issues Raised at the Second Issues Specific Hearing), that the Marine Management Organisation may require to be adopted during operation of Unit 1 and Unit 2 to meet or improve on the performance levels agreed under (a); the conditions where such measures would apply; and the process for their implementation; and</li> <li>(e) the monitoring methodology, frequency of monitoring and format of monitoring reports.</li> </ul>
<b>Marine Management Organisation Marine Licence L/2013/00178/4</b>	
<b>Condition 5.2.34</b>	No water abstraction shall commence until the offshore intake and outfall heads, cooling water intake and outfall tunnels, the fish recovery and return system, the low velocity side entry intakes and the AFD system have been installed in accordance with the approved details referred to in conditions 5.2.31 and 5.2.39.

Reference	Requirements
<b>Condition 5.2.35</b>	<p>No water abstraction shall commence until a monitoring and adaptive measures plan has, after consultation with the Natural Resources Wales, Natural England and the Environment Agency, been submitted to and approved by the MMO.</p> <p>The plan will set out:</p> <ul style="list-style-type: none"> <li>(a) the performance level to be maintained by the AFD system associated with the cooling water intakes to be confirmed through trials and the fish recovery and return system, during the operation of Unit 1 and Unit 2</li> <li>(b) the monitoring arrangements for the trialling of the AFD system and the fish recovery and return system during commissioning of Unit 1 and Unit 2, in respect of the performance levels set in (a) above</li> <li>(c) the monitoring arrangements for the AFD system and the fish recovery and return system during operation of Unit 1 and Unit 2, in respect of the performance levels set in (a) above</li> <li>(d) the additional adaptive measures arising from (a), (b) and (c) that may be required during operation of Unit 1 and Unit 2, the conditions where such measures would apply and the process for their implementation, and</li> <li>(e) the monitoring methodology, frequency of monitoring and format of monitoring reports.</li> </ul>
<b>Condition 5.2.39</b>	<p>The AFD system shall not be installed until details of the location and design have, following consultation with the Natural Resources Wales, Natural England and the Environment Agency, been submitted to and approved by the MMO.</p>
<b>Condition 5.2.40</b>	<p>The installation of the AFD system shall be carried on only in accordance with the approved details referred to in condition 5.2.39.</p>

## 3.2 Scope of the Water Discharge Activity Permit

- 3.2.1 The EA set out conditions relating to the AFD system in the WDA Permit. The basis for these is specified in the WDA Permit Decision Document. The Decision Document confirms the EA's position relating to the scope of activities that may be regulated by the WDA Permit.
- 3.2.2 Water abstraction is regulated by the Water Resources Act 1991 (as amended by the Environment Act 1995) and the Water Act 2003, where the water abstracted is located within a 'Source of Supply'. For surface waters (except discrete water bodies with no outflow) the definition of a source of supply is synonymous with inland waters, as opposed to the open sea (Section 221 Water Resources Act 1991). As previously advised in a letter from the EA dated June 2010, the Decision Document confirms that an abstraction licence is not required for the direct cooling system at HPC, as the location and method of abstraction are not associated with inland waters.
- 3.2.3 The Decision Document (Environment Agency, 2013a, Section 4.8.4) confirms that the EA considers the cooling water abstraction to be closely linked to the water discharge activity (comprising returned cooling water and other effluents), on the basis that it is part of the same overall process stream (the abstracted seawater is released as returned cooling water). It should be noted that the discharge returning fish to the Bristol Channel via the fish recovery and return system is not classified in the WDA Permit as a waste stream. Notwithstanding the above, the EA has assessed the potential impact of

abstracting cooling water on marine life as part of its environmental risk assessment for the water discharge activity. The EA also included assessment of the effects of water abstraction in its Habitats Regulations Assessment of the WDA Permit application. The conditions relating to the AFD system specified at **Table 1.1** have been included in the WDA Permit, to reflect the findings of this assessment. The Decision Document confirms that the EA was satisfied that the arrangements proposed in the initial application were being designed according to its published best available techniques (BAT) and best practice, although, as the final design had not been confirmed:

- a pre-operational condition (PO2) was included in the WDA Permit requiring NNB GenCo to submit details of the system in advance; and
- a further pre-operational condition (PO8) was included, requiring the company to confirm how it intends to optimise the FRR system to minimise impacts on fish before any operational discharges take place.

3.2.4 It is further noted that for the purposes of Schedule 21, Regulation 3(1)(a)(i) of the Environmental Permitting Regulations 2016 a water discharge activity is defined as 'the discharge or entry to inland freshwaters, coastal waters or relevant territorial waters of any (i) poisonous, noxious or polluting matter, (ii) waste matter, or (iii) trade effluent or sewage effluent'. The definition does not include reference to water abstraction.

3.2.5 It should also be noted that the principle of inclusion of 'directly associated activities' within an environmental permit applies only to installations as defined in Schedule 1 of EPR2016, not to a stand-alone water discharge activity.

### **3.3 Application of regulatory benchmarks in determination of the Water Discharge Activity Permit**

3.3.1 The Decision Document (Environment Agency, 2013a) confirms the regulatory benchmarks that the EA has applied to determine the suitability of the cooling technology and the fish protection measures proposed in its consideration of the application for the WDA Permit. Further details of the relevant legal, regulatory and strategic policy requirements are given in Table 2.2 of **Appendix A** to this report.

3.3.2 The Decision Document confirms that, as the EA considers the cooling water abstraction to be closely linked to the water discharge, the EA has assessed the potential impacts arising from abstraction as part of the environmental risk assessment process for the water discharge activity. The Decision Document confirms that the EA has reviewed the proposed cooling water technology as a whole to assess compliance with BAT in relation to impacts on marine life. This position is broadly consistent with the approach outlined in the Regulatory Position on Best Available Techniques (2018) provided in correspondence from the Environment Agency to NNB GenCo.

3.3.3 The Decision Document also confirms that an appropriate assessment of the effects of the sea water abstraction was undertaken as part of the overall Habitats Regulations Assessment of the WDA Permit application by the EA to assess whether any potential significant effects of abstraction, either alone or in combination with other permissions, plans or projects, would be sufficient to compromise the integrity of the conservation

status of any Natura 2000 site protected by the Habitats Directive (European Commission, 1992). Ramsar sites (Ramsar Convention, 1971) were also included in the Habitats Regulations Assessment, in accordance with Government policy (see National Planning Policy Framework paragraph 118). In relation to effects of abstraction specifically, the following sites were included in the assessment:

- Severn Estuary/Môr Hafren SPA;
- Severn Estuary/ Môr Hafren SAC;
- Severn Estuary Ramsar site;
- River Usk/Afon Wysg SAC;
- River Wye/Afon Gwy SAC; and
- Afon Tywi/River Tywi SAC.

In agreement with Natural England (NE) and the Countryside Council for Wales (CCW) (now Natural Resources Wales), the River Usk/Afon Wysg SAC, River Wye/Afon Gwy SAC and Afon Tywi/River Tywi SAC were included on the basis that they would only be considered directly if effects arose in relation to the Severn Estuary/Môr Hafren migratory fish features, specifically in relation to Atlantic salmon, shad and sea lamprey.

- 3.3.4 The appropriate assessment explicitly stated that impacts arising through the abstraction of cooling water were assessed in the context of whether the system of direct cooling represented best available techniques (BAT), as set out in the EU's 2001 BAT Reference Note (BRef) on industrial cooling systems.
- 3.3.5 The factors of particular concern to the application included the entrainment and impingement of fish and planktonic organisms. The assessment concluded that based on the conservative information provided, the predicted rates of fish impingement and entrainment at HPC appear to be a level that would not adversely affect the integrity of any of the sites.
- 3.3.6 The Regulatory Position recently issued by the Environment Agency to NNB GenCo outlines the basis for using BAT as a criterion for activities upstream of the fish recovery and return system. This is particularly relevant when making comparisons to the BRef Note for Industrial Cooling Systems. It is noted that the latter document is provided to determine BAT for activities regulated by the Industrial Emissions Directive (IED). The cooling water system is not an activity regulated by the IED, as NNB GenCo does not consider that the cooling water system and more particularly the sea water abstraction and associated fish protection arrangements are directly associated with the stand-by combustion plant, which is the only part of the proposed power station regulated by the IED.
- 3.3.7 The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) is also relevant to consideration of the impacts of the cooling water system on the marine environment. The primary, though not exclusive, focus of the convention is on prevention of pollution of the marine environment. The general obligations of the Convention include taking "the necessary measures to protect the maritime area against the adverse effects of human activities so as to safeguard human

health and to conserve marine ecosystems" (Article 2(1)(a)). Implementation of these requirements requires contracting parties are required to adopt programmes and measures "which take full account of the use of the latest technological developments and practices designed to prevent and eliminate pollution fully" (Article 2(3)(a)), "taking into account" and "ensuring the application of BAT and Best Environmental Practice" (Article 2(3)(b)). These requirements are not considered to be relevant to the abstraction of seawater and associated fish protection measures, as the Convention specifically references that in relation to the prevention and elimination of pollution from land-based sources these requirements are applicable to point sources (Annex 1, Article 1(1)).

- 3.3.8 The National Policy Statement for Nuclear Power Generation (EN-6) provides the primary basis for decisions taken by the Secretary of State on applications received for nuclear power stations. The policy statement recognises the overlap with the marine policy statement and marine plans and explains how it may also be relevant to decisions of the Marine Management Organisation. EN-6 does not purport to provide specific advice to the Environment Agency on its decision making; however, it does state that discharges into water sources will be controlled in accordance with permits issued by the EA and that applicants will be *expected* to demonstrate Best Available Techniques to minimise the impacts of cooling water discharges. In the site-specific assessments in the Annexes, EN-6 does refer in the advice for one of the potential sites (not Hinkley) to best practice requirements for seawater abstraction and fish protection arrangements specified in its publications relating to cooling water options for nuclear power stations (Environment Agency, 2010a) and screening of intakes and outfalls (Environment Agency, 2005). These documents consider design considerations for the intake location, fish deterrent systems, design of intake structures, screening arrangements and FRR systems.
- 3.3.9 The Decision Document confirms that proposals for the AFD system and the FRR system have been reviewed with regard to the best practice requirements set on in these Environment Agency publications (Environment Agency, 2010a and Environment Agency, 2005). It further provides that subject to confirmation of the final design, the arrangements set out in the application are compliant with these requirements.

### 3.4 Application of regulatory benchmarks - application to vary the Water Discharge Activity Permit

- 3.4.1 NNB GenCo has reviewed the application of the regulatory benchmarks outlined at Section 3.3 relevant to the fish protection measures associated with this application. The applicability of the benchmarks and criteria considered at Section 3.3 and others relevant to this application are outlined at **Table 3.2**. Justification for consideration of these benchmarks is also provided. Definitions of the environmental benchmarks referenced are provided at **Appendix B**.

**Table 3.2** Environmental benchmarks and criteria relevant to the AFD system

No.	Reference	Requirement	Applicability	Justification
<b>Best available techniques (BAT)</b>				
1	National Policy Statement for Nuclear Power Generation (EN-6), Vol 1	Discharges into water sources will be controlled in accordance with permits issued by the EA. Applicants will be expected to demonstrate BAT to minimise the impacts of cooling water discharges. BAT is required to be considered (under European law) in order to avoid or reduce emissions resulting from certain installations and to reduce the impact on the environment as a whole. Use of BAT is required by the EA when licensing installations regulated by the IED. BAT takes into account the balance between the costs and environmental benefits.	Not applicable	This policy requirement relates to prevention and minimisation of impacts associated with water discharge activities.  Acknowledging the regulatory position outlined in correspondence from the Environment Agency to NNB GenCo (Ref LW/NG), as this application does seek any changes to a waste stream regulated by the WDA Permit, this requirement is not considered further in relation to mitigation measures associated with the abstraction of seawater.
2	The National Policy Statement for Nuclear Power Generation (EN-6), Vol 2	For Bradwell site assessment:  Direct cooling can still be the BAT for estuarine and coastal sites, provided that best practice in planning, design, mitigation and compensation are followed. Reference is made to the EA's evidence report Cooling water options for the new generation of nuclear power stations in the UK, Environment Agency, 2010, which is the source for this statement.	Not applicable	This statement is made in the EN-6 Annexes under the site-assessment for the Bradwell site, however the evidence report cited could be said to be applicable at all UK sites.  Acknowledging the regulatory position outlined in correspondence from the Environment Agency to NNB GenCo (Ref LW/NG), as this application does seek to make any changes to a waste stream regulated by the WDA Permit, this requirement is not considered further in relation to activities and arrangements associated with the cooling water system upstream of the entry of any polluting matter (heat or contaminants).



No.	Reference	Requirement	Applicability	Justification
3	Convention for the Protection of the Marine Environment of the North-east Atlantic (OSPAR Convention)	When adopting programmes and measures for the purpose of preventing and eliminating pollution from land-based sources, the Contracting Parties shall require, either individually or jointly, the use of BAT for point sources.	Not applicable	<p>This requirement relates to preventing and minimising water pollution. The definition of BAT in Annex 1 specifically refers to the suitability of a particular measure for limiting discharges, emissions and waste. It is acknowledged that the Convention states that the necessary measures to protect the maritime area against the adverse effects of human activities are required to be taken, by contracting parties taking the necessary measures to protect and conserve the ecosystems and biological diversity of the maritime area, rather than by requiring compliance with BAT.</p> <p>Acknowledging the regulatory position outlined in correspondence from the Environment Agency to NNB GenCo (Ref LW/NG), as this application does seek any changes to discharge of a regulated waste water stream, this requirement is not considered further in relation to mitigation measures associated with the abstraction of seawater.</p>
4	<p>Directive 2010/75/EU of the European Parliament and the Council on Industrial Emissions (Industrial Emissions Directive)</p> <p>BRef Note for Industrial Cooling Systems</p>	<p>The permit should include all the measures necessary to achieve a high level of protection of human health and the environment taken as a whole by reducing harmful industrial emissions through application of BAT.</p> <p>Transposed through the Environmental Permitting (England and Wales) Regulations 2016 (S.I. 2016:1154)</p>	Not applicable	<p>The abstraction of seawater and the discharge of seawater associated with a stand-alone water discharge activity are not processes regulated by the Industrial Emissions Directive and do not fall within the EPR16 definition of 'directly associated activities' in relation to any activities at HPC that will be regulated by the Industrial Emissions Directive.</p> <p>Acknowledging the regulatory position outlined in correspondence from the Environment Agency to NNB GenCo (Ref LW/NG), as this application does not relate activities regulated by the Industrial Emissions Directive, the requirements of the Industrial Emissions Directive are not considered further.</p>

No.	Reference	Requirement	Applicability	Justification
<b>Best practice</b>				
5	Overarching National Policy Statement for Energy (EN-1)	In relation to biodiversity and geological conservation, para. 5.3.18 requires that during construction and operation best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised.	Applicable	<p>This WDA Permit regulates arrangements that will function during the operational phase, so the policy is applicable to the matters regulated by the WDA Permit and all other aspects of the project that may affect biodiversity and geological conservation. Water abstraction has the potential to affect biota, therefore it could be argued that the policy requires abstraction arrangements to follow best practice.</p> <p>These matters are addressed in the Justification and Evidence Report provided at Appendix A, which confirms compliance with best practice for these components of the cooling water system.</p>
6	The National Policy Statement for Nuclear Power Generation (EN-6), Vol 2	<p>For Bradwell site assessment:</p> <p>Direct cooling can still be the BAT for estuarine and coastal sites, provided that best practice in planning, design, mitigation and compensation are followed. Reference is made to the EA's evidence report <i>Cooling water options for the new generation of nuclear power stations in the UK</i>, Environment Agency, 2010, which is the source for this statement.</p>	Applicable	<p>This statement is made in the EN-6 Annexes under the site-assessment for the Bradwell site but the evidence report cited could be said to be applicable at all UK sites.</p> <p>These matters are addressed in the Justification and Evidence Report provided at Appendix A, to confirm compliance with best practice for abstraction-related components of the cooling water system, to which this application for a variation to the WDA Permit is confined.</p>
<b>No significant effects on the integrity of sites protected under the Habitats Regulations</b>				
7	Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (The Habitats Directive)	<p>Assess potential impacts on the Severn Estuary SAC, SPA and Ramsar site** and other relevant sites associated with any permission, plan or project (including abstraction)</p> <p>Transposed through The Conservation of Habitats and Species Regulations 2017 (S.I. 2017:1012) (The Habitats Regulations)</p> <p>** - note UK policy is that sites listed under the Convention on Wetlands of International Importance especially as Waterfowl Habitat, Ramsar, 1971, are afforded the same level of protection as sites protected by The Habitats Regulations.</p>	Applicable	<p>As abstraction forms part of the Hinkley Point C project, its effects (such as entrainment and impingement) require assessment to demonstrate compliance with the Habitats Regulations</p> <p>These matters are addressed in the Justification and Evidence Report provided at Appendix A and in the HRA Report, which confirm that there will be no adverse effect on integrity of any Natura 2000 site as a result of the proposed variation of the WDA Permit.</p>

No.	Reference	Requirement	Applicability	Justification
<b>No significant effects on the features of sites protected under the Habitats Regulations features Wildlife and Countryside Act 1981</b>				
8	Countryside and Rights of Way Act 2000 (CRoW)	Assess potential impacts on the Severn Estuary SSSI	Applicable	As abstraction forms part of the Hinkley Point C project, its effects (such as entrainment and impingement) require assessment against the SSSI citation that lists seven species of migratory fish Atlantic salmon, common eel, allis shad, twaite shad, sea trout, sea lamprey and the river lamprey). These matters are addressed in the Justification and Evidence Report provided at Appendix A and in the HRA Report, which includes an assessment on the species common to the SSSI.
<b>Water Framework Directive standards - Fish standard for Parrot Estuary and Bridgewater Bay</b>				
9	Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 Establishing a Framework for Community Action in the Field of Water Policy (The Water Framework Directive)	Requirement to prevent deterioration of the status of surface waters and protect, enhance and restore all bodies of surface water with the aim of achieving good surface water status or, for artificial and heavily modified bodies of water, good ecological potential and good surface water chemical status. Guidance is provided by PINS in their Advice Note 18: The Water Framework Directive, PINS, v1, 2017.	Applicable	Relevant water bodies are the Bridgewater Bay coastal water body and the Parrett Estuary transitional water body. Fish do not form part of the compliance metrics for coastal water bodies but are taken into account in transitional water bodies. These matters are addressed in the Justification and Evidence Report provided at Appendix A and in the WFD Report, which confirm compliance with the Water Framework Directive for the components of the cooling water system that are the subject of this application for a variation to the WDA Permit.
10	Overarching National Policy Statement for Energy (EN-1)	Policy Statement EN-1 makes it clear that the requirements of the Water Framework Directive for the protection of the water environment must be met by all nationally significant infrastructure projects. Guidance is provided by PINS in their Advice Note 18: The Water Framework Directive, PINS, v1, 2017.	Applicable	These matters are addressed in the Justification and Evidence Report provided at Appendix A and in the WFD Report, which confirm compliance with the Water Framework Directive for the components of the cooling water system that are the subject of this application for a variation to the WDA Permit.

No.	Reference	Requirement	Applicability	Justification
<b>Eels Regulations</b>				
11	Council Regulation EC/1100/2007 of 18 September 2007 Establishing Measures for the Recovery of the Stock of European Eel	To demonstrate that the proposed abstraction arrangements will comply with the requirements of the Eels Regulations, particularly in relation to screening and by-wash to return impinged eels to the waters from which they entered the diversion structure.  Implemented through the Eels (England and Wales) Regulations 2009 (S.I. 2009:3344).	Applicable	Eels entrained by the abstraction will be impinged on the screens and recovered and returned to the sea by the FRR system. These matters are addressed in the Justification and Evidence Report provided at Appendix A, which confirms compliance with the Eels Regulations for the components of the cooling water system that are the subject of this application for a variation to the WDA Permit.
12	Screening at intakes and outfalls: measures to protect eels (The Eels Manual), Environment Agency, 2010	Specifies best practice for the design of screens and fish return systems with a specific focus on eels.	Applicable	Eels entrained by the abstraction will be impinged on the screens and recovered and returned to the sea by the FRR system. Screening and fish recovery and return for eels are addressed in the Justification and Evidence Report provided at Appendix A, which confirms compliance with best practice in relation to eels for the components of the cooling water system that are the subject of this application for a variation to the WDA Permit.

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## **APPENDIX A JUSTIFICATION AND EVIDENCE REPORT**

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## **APPENDIX B REGULATORY BENCHMARKS**

### **B.1 The OSPAR Convention**

#### **B.1.1 Article 2**

3. (a) In implementing the Convention, Contracting Parties shall adopt programmes and measures which contain, where appropriate, time-limits for their completion and which take full account of the use of the latest technological developments and practices designed to prevent and eliminate pollution fully.

(b) To this end they shall:

- (i) taking into account the criteria set forth in Appendix 1, define with respect to programmes and measures the application of, inter alia,
- best available techniques
  - best environmental practice
  - including, where appropriate, clean technology;
- (ii) in carrying out such programmes and measures, ensure the application of best available techniques and best environmental practice as so defined, including, where appropriate, clean technology.

#### **B.1.2 Annex I**

### **ON THE PREVENTION AND ELIMINATION OF POLLUTION FROM LAND-BASED SOURCES**

#### **Article 1**

1. When adopting programmes and measures for the purpose of this Annex, the Contracting Parties shall require, either individually or jointly, the use of:
- best available techniques for point sources;
  - best environmental practice for point and diffuse sources;

including, where appropriate, clean technology.

(Note that ANNEX II, on the prevention and elimination of pollution by dumping or incineration, and ANNEX III, on the prevention and elimination of pollution from offshore sources, are not applicable to discharges from a pipe/tunnel connected to land, so are not applicable here.)



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## APPENDIX I

### CRITERIA FOR THE DEFINITION OF PRACTICES AND TECHNIQUES MENTIONED IN PARAGRAPH 3(b)(i) OF ARTICLE 2 OF THE CONVENTION

#### **Best Available Techniques**

1. The use of the best available techniques shall emphasise the use of non-waste technology, if available.
2. The term "best available techniques" means the latest stage of development (state of the art) of processes, of facilities or of methods of operation which indicate the practical suitability of a particular measure for limiting discharges, emissions and waste. In determining whether a set of processes, facilities and methods of operation constitute the best available techniques in general or individual cases, special consideration shall be given to:
  - (a) comparable processes, facilities or methods of operation which have recently been successfully tried out;
  - (b) technological advances and changes in scientific knowledge and understanding;
  - (c) the economic feasibility of such techniques;
  - (d) time limits for installation in both new and existing plants;
  - (e) the nature and volume of the discharges and emissions concerned.
3. It therefore follows that what is "best available techniques" for a particular process will change with time in the light of technological advances, economic and social factors, as well as changes in scientific knowledge and understanding.
4. If the reduction of discharges and emissions resulting from the use of best available techniques does not lead to environmentally acceptable results, additional measures have to be applied.
5. "Techniques" include both the technology used and the way in which the installation is designed, built, maintained, operated and dismantled.

#### **Best Environmental Practice**

1. The term "best environmental practice" means the application of the most appropriate combination of environmental control measures and strategies. In making a selection for individual cases, at least the following graduated range of measures should be considered:
  - (a) the provision of information and education to the public and to users about the environmental consequences of choice of particular activities and choice of products, their use and ultimate disposal;
  - (b) the development and application of codes of good environmental practice which covers all aspect of the activity in the product's life;
  - (c) the mandatory application of labels informing users of environmental risks related to a product, its use and ultimate disposal;

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- (d) saving resources, including energy;
  - (e) making collection and disposal systems available to the public;
  - (f) avoiding the use of hazardous substances or products and the generation of hazardous waste;
  - (g) recycling, recovery and re-use;
  - (h) the application of economic instruments to activities, products or groups of products;
  - (i) establishing a system of licensing, involving a range of restrictions or a ban.
2. In determining what combination of measures constitute best environmental practice, in general or individual cases, particular consideration should be given to:
    - (a) The environmental hazard of the product and its production, use and ultimate disposal;
    - (b) The substitution by less polluting activities or substances;
    - (c) The scale of use;
    - (d) The potential environmental benefit or penalty of substitute materials or activities;
    - (e) Advances and changes in scientific knowledge and understanding;
    - (f) Time limits for implementation;
    - (g) Social and economic implications.
  3. It therefore follows that best environmental practice for a particular source will change with time in the light of technological advances, economic and social factors, as well as changes in scientific knowledge and understanding.
  4. If the reduction of inputs resulting from the use of best environmental practice does not lead to environmentally acceptable results, additional measures have to be applied and best environmental practice redefined.

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## **B.2 Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Recast) (The Industrial Emissions Directive)**

### **B.2.1 Preamble**

- (12) The permit should include all the measures necessary to achieve a high level of protection of the environment as a whole and to ensure that the installation is operated in accordance with the general principles governing the basic obligations of the operator. The permit should also include emission limit values for polluting substances, or equivalent parameters or technical measures, appropriate requirements to protect the soil and groundwater and monitoring requirements. Permit conditions should be set on the basis of best available techniques.
- (13) In order to determine best available techniques and to limit imbalances in the Union as regards the level of emissions from industrial activities, reference documents for best available techniques (hereinafter BAT reference documents') should be drawn up, reviewed and, where necessary, updated through an exchange of information with stakeholders and the key elements of BAT reference documents (hereinafter BAT conclusions') adopted through committee procedure. In this respect, the Commission should, through committee procedure, establish guidance on the collection of data, on the elaboration of BAT reference documents and on their quality assurance. BAT conclusions should be the reference for setting permit conditions. They can be supplemented by other sources. The Commission should aim to update BAT reference documents not later than 8 years after the publication of the previous version.

Further references to BAT in the preamble relate principally to emission limits.

### **B.2.2 Article 1**

- (10) 'best available techniques' means the most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing the basis for emission limit values and other permit conditions designed to prevent and, where that is not practicable, to reduce emissions and the impact on the environment as a whole:
- (a) 'Techniques' includes both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned;
  - (b) 'Available techniques' means those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced inside the Member State in question, as long as they are reasonably accessible to the operator;

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(c) 'Best' means most effective in achieving a high general level of protection of the environment as a whole;

(13) 'emission levels associated with the best available techniques' means the range of emission levels obtained under normal operating conditions using a best available technique or a combination of best available techniques, as described in BAT conclusions, expressed as an average over a given period of time, under specified reference conditions;

## **B.3 BRef document on industrial cooling systems**

### **B.3.1 Executive summary**

The BRef note states that "Design and positioning of the intake and various devices (screens, barriers, light, sound) are applied to reduce the entrainment and impingement of aquatic organisms. The effect of the devices depends on the species."

Under a heading of "Reduction of entrainment", it also states:

"Many different techniques have been developed to prevent entrainment or to reduce the damage in case of entrainment. Success has been variable and site-specific. No clear BAT have been identified, but emphasis is put on an analysis of the biotope, as success and failure much depend on behavioural aspects of the species, and on proper design and positioning of the intake."

The main body of the BRef note includes a whole section (3.3.2) on fish entrainment and mitigation, including AFD systems.

## **B.4 Policy EN-6, the Nuclear National Policy Statement**

### **B.4.1 Para. 3.7.7**

Discharges into water sources will be controlled in accordance with permits issued by the EA. Applicants will be expected to demonstrate Best Available Techniques to minimise the impacts of cooling water discharges.

A footnote refers to Best Available Techniques, stating that "Best Available Techniques (BAT) are required to be considered (under European law) in order to avoid or reduce emissions resulting from certain installations and to reduce the impact on the environment as a whole. Use of BAT is required by the EA when licensing the major potentially polluting industries. BAT takes into account the balance between the costs and environmental benefits." However, the source of the European law is not specified.

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## **B.5 Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (The Habitats Directive)**

### **B.5.1 Preamble**

Whereas, in order to ensure the restoration or maintenance of natural habitats and species of Community interest at a favourable conservation status, it is necessary to designate special areas of conservation in order to create a coherent European ecological network according to a specified timetable;

Whereas all the areas designated, including those classified now or in the future as special protection areas pursuant to Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds (5), will have to be incorporated into the coherent European ecological network.

### **B.5.2 Article 1**

(e) Conservation status of a natural habitat means the sum of the influences acting on a natural habitat and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species within the territory referred to in Article 2.

The conservation status of a natural habitat will be taken as 'favourable' when:

- its natural range and areas it covers within that range are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable as defined in (i);

(i) conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within the territory referred to in Article 2;

The conservation status will be taken as 'favourable' when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

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**B.5.3 Article 2**

- Measures taken pursuant to this Directive shall be designed to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest.

**B.5.4 Article 3**

- A coherent European ecological network of special areas of conservation shall be set up under the title Natura 2000. This network, composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II, shall enable the natural habitat types and the species' habitats concerned to be maintained or, where appropriate, restored at a favourable conservation status in their natural range.

The Natura 2000 network shall include the special protection areas classified by the Member States pursuant to Directive 79/409/EEC (now replaced by Directive 2009/147/EC).

**B.5.5 Article 6**

- For special areas of conservation, Member States shall establish the necessary conservation measures involving , if need be, appropriate management plans specifically designed for the sites or integrated into other development plans, and appropriate statutory, administrative or contractual measures which correspond to the ecological requirements of the natural habitat types in Annex I and the species in Annex II present on the sites.
- Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4 , the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and , if appropriate, after having obtained the opinion of the general public.
- If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest , including those of a social or economic nature , the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected . It shall inform the Commission of the compensatory measures adopted .

Where the site concerned hosts a priority natural habitat type and / or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further

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to an opinion from the Commission, to other imperative reasons of overriding public interest .

## **B.6 Convention on Wetlands of International Importance especially as Waterfowl Habitat, Ramsar, 1971**

### **B.6.1 Article 3**

1. The Contracting Parties shall formulate and implement their planning so as to promote the conservation of the wetlands included in the List, and as far as possible the wise use of wetlands in their territory.

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## **B.7 Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (The Water Framework Directive)**

### **B.7.1 Article 4**

#### **Environmental objectives**

1. In making operational the programmes of measures specified in the river basin management plans:
  - (a) for surface waters
    - (i) Member States shall implement the necessary measures to prevent deterioration of the status of all bodies of surface water, subject to the application of paragraphs 6 and 7 and without prejudice to paragraph 8;
    - (ii) Member States shall protect, enhance and restore all bodies of surface water, subject to the application of subparagraph (iii) for artificial and heavily modified bodies of water, with the aim of achieving good surface water status at the latest 15 years after the date of entry into force of this Directive, in accordance with the provisions laid down in Annex V, subject to the application of extensions determined in accordance with paragraph 4 and to the application of paragraphs 5, 6 and 7 without prejudice to paragraph 8;
    - (iii) Member States shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status at the latest 15 years from the date of entry into force of this Directive, in accordance with the provisions laid down in Annex V, subject to the application of extensions determined in accordance with paragraph 4 and to the application of paragraphs 5, 6 and 7 without prejudice to paragraph 8;
    - (iv) Member States shall implement the necessary measures in accordance with Article 16(1) and (8), with the aim of progressively reducing pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances without prejudice to the relevant international agreements referred to in Article 1 for the parties concerned.

## **B.8 The Eels (England & Wales) Regulations 2009**

### **B.8.1 Eel screens**

- 17.- (1) This regulation applies to -



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- (a) any diversion structure capable of abstracting at least 20 cubic metres of water through any one point in any 24-hour period; and
  - (b) any diversion structure returning water to a channel, bed or sea.
- (4) On or after 1st January 2015, a responsible person must ensure an eel screen is placed in a diversion structure.

### **B.8.2 By-wash**

- 18.- (1) This regulation applies where an eel screen placed in accordance with regulation 17 is located at a point in the diversion structure other than at the entrance to the conduit or channel by which the water is abstracted.
- (2) A responsible person must provide a continuous by-wash immediately upstream from the eel screen which allows eels to return by as direct route as practicable to the waters from which they entered the diversion structure.
- (3) Failure to comply with paragraph (2) is an offence.

### **B.8.3 Eel screens and by-wash**

- 19.- (1) A responsible person must ensure that an eel screen or by-wash -
- (a) does not interfere with any statutory right of navigation;
  - (b) is constructed and located, so far as reasonably practicable, so that eels are not injured or damaged by it;
  - (c) is maintained in an efficient state.
- (2) A person must not damage or interfere with an eel screen or do anything that impedes the free passage of eels through a by-wash.
- (3) Failure to comply with paragraph (1) or (2) is an offence.



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## APPENDIX C ENVIRONMENTAL PERMIT VARIATION APPLICATION FORMS

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