

History of Hinkley Point C (HPC) Acoustic Fish Deterrent (AFD) timeline and engagement with the Appellant

March 2013

The Environment Agency's (EA) Environmental Permit EPR/HP3228XT was granted on 13 March 2013 with the Development Consent Order (DCO) decision following on 19 March 2013.

The permit requires a number of pre-operational conditions to be met prior to the cooling water discharge beginning. Those relating to AFD are:

Reference	Pre-operational measures
PO2	At least three months 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 Acoustic Fish Deterrent (AFD) and Fish Recovery and Return (FRR) systems.
PO8	At least three months 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 and FRR Systems. The Plan shall include, but not be restricted to the following: <ul style="list-style-type: none">• a description of how the operator intends to optimise the AFD and FRR systems to minimise impacts upon fish;• details of the monitoring proposed to facilitate optimisation and meet the above objective;• confirmation of the timetable associated with the AFD and FRR system commissioning;• proposals for demonstrating the effectiveness of the optimisation process to the Environment Agency

In order to be able to conclude that the project would not have an adverse effect on species and habitats designated under the Habitats Regulations, the EA advised that three fish protection measures should also be included within the DCO and the marine licence granted by the Marine Management Organisation (MMO).

Prior to discussions commencing on the potential removal of the AFD system lengthy engagement took place between the EA and NNB Generation Company (HPC) Limited (the Appellant) in order for the Planning Inspectorate (PINs) to discharge pre-operational condition CW1 within the DCO.

Pre-operational Condition CW1 in the Development Consent Order (DCO)

Three fish protection measures, a Low Velocity Side Entry intake heads (LVSE), Fish Return and Recovery System (FRR) and an Acoustic Fish Deterrent (AFD) were included as pre-operational conditions before HPC could operate. These measures were based on published Environment Agency Guidance (Environment Agency, 2005 and 2010) and incorporated into the DCO, marine licence and the water discharge activity (WDA) permit granted by the EA.

The need for these measures was included in pre-operational condition CW1 within the DCO, which states:

- 1) *No development shall commence until details of Work Nos. 2A to 2H have, following consultation with the Countryside Council for Wales, Natural England, English Heritage and the Environment Agency, been submitted to and approved by the Marine Management Organisation. The details shall include —
 - (a) the location and design (size and shape) of the off-shore intake and outfall heads;
 - (b) the alignment (horizontal and vertical) of the cooling water intake and outfall tunnels; and*
- 2) *the location and design of the fish recovery and return system and the low velocity side entry intakes, which shall be in accordance with the Environment Agency guidance referenced in the Environmental Statement (Volume 2, chapter 2, paragraph 2.6.21).*
- 3) *The acoustic fish deterrent 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.*
- 4) *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 acoustic fish deterrent system have been installed in accordance with the approved details referred to in paragraphs (1) and (2)."*

Similarly the marine licence Condition 5.2.31 states:

No development shall commence until the following activity details have, following consultation with Natural Resources Wales, Natural England, English Heritage and the Environment Agency, been submitted to and approved by the MMO.

The details shall include:

- (a) *the location and design (size and shape) of the offshore intake and outfall heads*
- (b) *the alignment (horizontal and vertical) of the cooling water intake and outfall tunnels, and*
- (c) *the location and design of the fish recovery and return system and the low velocity side entry intakes, which shall be in accordance with the Environment Agency guidance referenced in the Environmental Statement (Volume 2, chapter 2, paragraph 2.6.21).*

Reason: to protect the marine environment.

May 2017

After years of engagement with the EA, Natural England and the MMO, 'NNB-209-REP-0001030 Hinkley Point C Cooling Water Infrastructure Fish Protection Measures: Report to Discharge DCO requirement CW1 (Paragraph 1) and marine licence Condition 5.2.31' was published by the Appellant and accepted by the MMO and the EA. This report dealt with the cooling water infrastructure from the design and location of the LVSE intake heads through to the design and location of the FRR and cooling water outfalls. While it did not include details of the Acoustic Fish Deterrent (AFD), it was mentioned where appropriate in this work.

Further discussion in this section on the design and suitability of Louvre screens resulted in the conclusion that Louvre screens are not suitable for fish deterrence at the HPC intake heads. In the absence of a passive method of deterring fish, it was decided that an AFD would be required.

This section concludes with the statement that *“if the [AFD] line were to fail, the intake heads would no longer be provided with a fish deterrent, and therefore would not meet the environmental requirements. At this stage of the intake head design, a final option for an AFD has not been chosen. However, it has been acknowledged that such a system is required in order to meet the environmental requirements, and a number of preliminary options have been identified.”*

As part of the original assessment, the report “A synthesis of impingement and entrainment predictions for NNB at Hinkley Point” (Cefas, TR148, 2011) explains that *“Because of the usual high water turbidity at Hinkley Point and the consequent absence of visual clues, any mitigating effect of the low-velocity intake is only likely to be realised if it is combined with some form of artificial stimulus (e.g. an AFD) to induce fish to swim away from the intake structure. Equally however, an AFD is unlikely to be fully effective on its own if the intake velocity exceeds the swimming capabilities of the fish. For these reasons low-velocity intake and AFD need to be considered as a combined mitigation measure.”*

A complete list of the statements regarding the need for a behavioural cue such as an AFD for LVSE intake heads to provide mitigation for fish entrapment can be found in the EA document Technical Brief 006.

The Severn Estuary has among the highest tidal ranges in the world with strong tidal flows and high turbidity. The CW1 P1 paper tests the escape velocities along the intake head at tidal flows up to 1.5ms^{-1} . Given the small size of the fish impinged at HPB, and at HPC, and the strong tidal flows, these small fish would not be able to maintain sustained swimming against the tidal streams. Even if they could, it would not be energetically efficient. So, the pelagic fish being impinged at HPB are most likely following the tidal streams through the estuary and being carried wherever they are taken.

CW1 P1 report shows that at peak tidal flow, the escape velocity needed by fish to avoid entry to the intake head is generally above 0.4ms^{-1} along both sides of the intake head. The EA Best Practice Guide (2005) recommends that the velocity at intake screens be kept to at or below 0.3ms^{-1} in order to allow fish to escape given a cue to do so.

According to CW1 P1 report, the HPC LVSE intake heads are predicted to achieve this criterion 66% of the time. Although this is not entirely compliant with the 0.3m s^{-1} criterion recommended by the EA, the CW1 P1 document concludes that the HPC intake heads should still be considered acceptable as they achieve 0.4m s^{-1} for 86% of the time and 0.5m s^{-1} for 95% of the time, which are considered to be protective of fish species likely to be entrapped.

TR117 (2010), a report produced by Cefas to assess the effects of the CW intake velocities on the fish entrapment risk at Hinkley Point, reiterates the point that assuming that fish can detect and respond to the inlet structure, entrapment risk is critically dependent upon the fish species, the fish size and the water temperature. The fish population at Hinkley largely consists of juvenile, small fish with

correspondingly low sustained swimming abilities. This report looked at the swimming abilities of 6 species regularly impinged at HPB (shad, cod, whiting, sole, bass, herring) versus the intake head velocity at a number of tidal states and velocities. A later Turnpenny Horsefield Associates paper adds sprat to list of fish comparing swimming speeds relative to the HPC intake velocities (CW1 P1 Ref. 19). TR117 presents tables of potential HPB-sized fish that could escape the HPC intake head velocities at different tidal states, it also very clearly states that “*these findings should not, in the absence of other measures, be taken to imply that these proportions of fish would in practice escape, as the outcome would also depend on whether or not fish were able to detect and respond to the structure. At the high turbidities usually present at Hinkley Point, in the absence of visual cues, this would depend upon the creation of other suitable sensory cues.*”

Pre-application stage

In preparation for the submission of an application to vary an environmental permit, the Development Consent Order and marine licence, the Environment Agency (EA), Natural England, Natural Resources Wales and Marine Management Organisation (the four organisations) engaged with the Appellant via a series of Marine Technical Forums (MTF) to provide pre-application advice. The MTFs were independently chaired and hosted by Appellant. The EA led on collating comments from the four organisations on the draft documents provided by Appellant.

Throughout this process the four organisations raised numerous issues, concerns and points needing clarity in Appellant’s (and their Marine Environmental Contractor, commercial arm of Cefas) methodologies and documentation.

During the pre-application process the Environment Agency provided advice and recommendations, in relation to its duties and expertise, on the data and information which was furnished to it at that time. The objective in providing this advice was to aid the Appellant in ensuring its applications were as complete and informed as reasonably possible. However the EA could not make any decisions or form any opinions about whether the potential proposals were acceptable until receiving and fully assessing the final application and relevant data.

The permit variation being proposed was a complex piece of work, involving new and evolving areas of environmental science and the review of large amounts of data, information and evidence. During the pre-application stage not all the relevant data was provided to the four organisations despite this being requested from the Appellant at the time. For example, raw data underpinning the fish impingement assessment was requested in 2017 and throughout the pre-application process and also in January 2018 and November 2018. Unfortunately, the raw data and assessment calculations to support the risk assessments were not provided until April 2019, after the final permit application was submitted.

Further to this, reduction factors applied to the impingement calculations in the application to take account of the intake design were not part of the original permit application, and were not included in the information discussed during pre-application.

As the four organisations were not supplied with all the relevant data and information requested during the pre-application stage it was impossible to specifically define the exact methodologies and evidence needed to produce an application that would fully satisfy all aspects of the permit determination.

The key pre-application dates are outlined below:

November 2017

MTF meeting: the Appellant provided an update on how the AFD design had developed since CW1 and highlighted some of the issues they had encountered.

December 2017

The EA provided detailed written feedback from the four organisations after reviewing 4 initial technical documents supplied by the Appellant:

- **TR442** 'Hinkley Point C: Acoustic Fish Deterrent Review'.
- **TR409** 'Hinkley Point C: Updated impingement predictions based upon the detailed design of the cooling water system. EDITION 5'.
- **SPP089** 'Scientific Position Paper: Estimates of the abundance and distribution of sprat in the Bristol Channel 2013-2014'.
- **TR426** 'Hinkley Point Equivalent Adult Value (EAV) metrics 2009-2010'.

This was followed in January 2018 by additional comments raised by the EA's external Marine Contractor (APEM).

January 2018

MTF meeting: Verbal feedback was provided from the Commercial arm of Cefas (acting as a consultant to the Appellant) on the Priority 1 & 2 comments raised in the four organisations' review in December 2017.

April 2018

MTF meeting: Cefas (acting as a consultant to the Appellant) provided an introduction to their revised impingement assessment methodology and the Appellant described their approach for an engineering report & Best Available Techniques (BAT) justification.

July 2018

The EA provided written feedback from the four organisations on the detail provided at the April 2018 MTF meeting. Key points raised were:

- Concern over the scale of assessment in relation to the European site level integrity
- Appropriate species selection
- Use of the most up to date data & evidence
- The need to recognise and consider the uncertainties involved with each part of the assessment
- The need to show beyond reasonable scientific doubt, that there will be no adverse effect on site integrity and therefore the importance to demonstrate the cumulative uncertainty within the methodology
- The need to demonstrate all possible alternatives have been considered
- The need to consider provisions to allow for adaptive management and the inclusion of future technology
- That all data and models used should be supplied to enable a full audit process

- The requirement to use the precautionary principle and use the best scientific knowledge
- Concerns over the use of the 1% threshold for all species.

Note that some of these points were still not addressed at the time of the formal permit variation submission to the EA in February 2019.

August 2018

The EA provided written feedback on 3 additional reports submitted by the Appellant:

- Summary of engineering optioneering process followed for the Hinkley Point C Acoustic Fish Deterrent (AFD) System
- Acoustic Fish Deterrent health and safety review
- TR456 - Revised predictions of impingement effects at Hinkley Point C.

The most significant concerns raised related to the uncertainties associated with the calculations and methodology used to predict the effect of impingement. The EA advised that these had not been adequately addressed to enable confidence in the conclusions being drawn from them.

In reviewing the AFD engineering optioneering report and AFD health and safety review the EA advised of significant uncertainties and unsubstantiated assertions in the evidence provided such that there is no justification to halt the development of the AFD system at this stage.

November 2018

The EA provided written feedback on the Appellant's draft application submission which consisted of reports covering:

- Water discharge activity permit variation application for acoustic fish deterrent removal
- Information to support Habitats Regulations Assessment
- Revised Water Framework Directive compliance assessment report
- Implications for compliance with the Eels Regulations.

Substantial comments were raised by the EA.

The EA defined comments into:

- Priority 1 issues that would need to be resolved for the application to be regarded complete (duly made).
- Priority 2 issues that would need to be improved in order to complete the determination (if not provided a potential Schedule 5 request could follow).
- Priority 3 issues defined as 'other matters that would improve the application further but were not essential'.

November 2018 – January 2019

Natural England, Natural Resources Wales and the Marine Management Organisation also provided the Appellant with comments on the report: Information to support Habitats Regulations Assessment.

The EA also engaged with the Appellant on a number of occasions by letter (10 December 2018) and meeting (7 January 2019) to discuss their assertion that Best Available Techniques (BAT) did not apply to the permit variation, and that their application would not be justified as BAT on the basis of potential pollution to the marine environment from dead biota.

Permit Application Determination

During the determination of an application the EA updated the Appellant on the progress of the determination, and discuss any required further information, but the EA did not engage in discussions that could result in premature judgements or influence prior to full consideration and consultation with the public. The Appellant has made assertions that this limited its ability to understand the EA's assessment, however such caution enables a robust and fair decision to be made for each and every applicant for an environmental permit. The EA always fully explained the reason for any information requested and ensured the applicant was given a reasonable timeline to provide this. In a high public interest application, such as this one, the EA consults on a draft decision publicly and takes account of any consultation responses received ahead of any final decision.

During this application the EA engaged with the Appellant regularly (generally on fortnightly teleconferences) to inform it of the assessment progress and on projected timescales for the determination. These timescales were advised as reasonably fluid due to the complexity and ever-evolving information relevant to the case. It was clear that determination would not be within the 4 month period as specified in Schedule 5, Part 1, paragraph 15(3)(c) of the Environmental Permitting Regulations 2016, rather that determination would be within "a longer period ... if it is agreed by the regulator and the applicant" as specified in paragraph 15(3). However, the EA does not dispute the validity of the notice of deemed refusal.

Throughout the permit determination the EA engaged with the Appellant via correspondence and held several meetings with objectives to:

- Provide clarity on the additional information required by the EA to conclude the permit determination (including outstanding requests)
- Demonstrate the approach the EA was taking to assess any potential impacts on fish at the SAC scale
- Demonstrate the re-assessments the EA made to determine the likely fish biomass entrapped and discharged.

The key interactions are outlined below:

February 2019

The Appellant submitted an application to vary the existing permit to amend or remove conditions relating to the design and operation of the AFD system and submitted the following reports alongside its application:

- A justification report
- A Habitats Regulations Assessment (HRA) report
- A Water Framework Directive (WFD) Compliance Assessment
- An Eels Regulations Assessment
- An Impingement Assessment (TR456)
- An Engineering Report (NNB-308-REP-000710)
- A Safety Report

The Environment Agency wrote to the Appellant to inform them that the application had been duly made as of 15 February 2019.

March 2019

After further review of the data supplied to support the permit application, the EA wrote to the Appellant to request further information that was required to audit the risk assessments provided in the permit application.

On 15 March 2019 the EA requested 40 spreadsheets of raw data underpinning the fish impingement assessment for EA to audit. This was originally asked for in 2017 and throughout the pre-application process. Only a summary (transposition) was provided with the application.

The EA sent a formal letter of justification stating that it was standard practice for original/raw data to be provided for water discharge assessments. The data was received on 10 April 2019 and the audit commenced immediately.

A number of other minor requests were made for reports referenced but not provided; clarification to queries and additional data. These were responded to between 3 - 9 April 2019 except for Shad data (received in May 2019) and RIMP data confirmed as not obtainable in September as it was held by a third party.

Public consultation began on 15 March 2019 for 3 months, however it was extended in early June when additional information required by paragraph 4 of Schedule 5 to EPR information request was delayed to late June. The consultation ended on 26 July 2019.

April 2019

The full set of raw data was received as requested in March for the EA to complete the required audit of the risk assessment provided in the permit application.

A Particle Tracking Study (TR479) was submitted to support the application, which assesses the fate of dead sprat leaving the FRR outlet, in particular the numbers and distribution that may beach on the coast including designated bathing waters.

Following an initial review of all the documentation submitted to support the application, the EA wrote to the Appellant on 16 April 2019 to formally request

information it needed to fully assess the permit application under a Schedule 5 Notice (paragraph 4 of Schedule 5 to EPR 2016).

This requested the submission of a report which was referenced within the application documents: The effect of not fitting an AFD system at HPC on the operation of the HPC FRR systems (TR493), report prepared by Cefas for the Appellant, February 2019. As reference in the Water Discharge Activity Environmental Permit Variation Application for Acoustic Fish Deterrent Removal.

An agreed deadline for this to be submitted was set as: 24 May 2019.

May 2019

On 21 May 2019 the Appellant requested an extension to the deadline to submit the requested report above, to 28 June for the following reason:

"We won't have the report ready to submit to you until later in June (this is all dependent on Cefas finalising the SZC impingements studies as this has to take priority)".

The EA agreed to the extension.

June 2019

On 28 June the Appellant submitted the following report to satisfy the request for information of 16 April:

- An FRR System Efficiency Report (TR493), which looks at the effect of not fitting and AFD system at HPC on the operation of the HPC FRR systems.

July 2019

On 15 July the E A held a meeting with the Appellant to update them on the status of the permit determination. This was a discussion meeting with no formal agenda.

October 2019

Following ongoing assessment of the permit application documentation, the EA wrote to the Appellant on 7 October 2019 to formally request information required to fully assess the permit application via a Schedule 5 EPR notice.

This required the Appellant to provide a revised updated Water Framework Directive Compliance Assessment document, to include full consideration of:

- The discharge of potentially polluting matter from the Fish Recovery & Return Outlet
- The Marine Strategy Framework Directive
- A wider scope of water bodies, to include Bristol Channel Inner and upstream fresh water bodies
- Sensitive features as identified by the Water Framework Directive.

An agreed deadline for this to be submitted was set as 7 December 2019.

The Appellant wrote to the EA requesting specific information regarding the determination of the application:

Letter received 22 October 2019 requesting further information so the applicant's consultants could "understand and reproduce" the method adjustments made in the process of EA's HRA.

"The purpose of this request is to allow NNB to understand where differences arise between EA and NNB calculations, the potential magnitude of such differences and potential differences over scientific facts. This information will then allow the informed, evidence based dialogue on matters of fact; It is our belief that this would not prejudice any regulatory position or conclusion".

November 2019

The EA wrote to and shared with the Appellant information on certain aspects of the determination in order to aid them in providing a response to the EA's information request of 7 October.

This included:

- Calculation of the underlying 'HPC volume scale' annual mass starting from the previously supplied HPC CIMP data (derivation of the mean values)
- Calculations for a) intake design velocity cap and b) effective intake area
- Calculations for FRR mortality rates - upper, mean and lower estimates for the 1 species that EA considers best illustrates differences in the scientific assessment.

December 2019

On 9 December the Appellant notified the EA it would need an extension to the deadline to submit the requested report above. On 11 December the Appellant requested an extension to 17 January 2020, which the EA agreed to.

January 2020

On 17 January the Appellant submitted a document: TR515 – Hinkley Point C Water Quality Effects of the Fish Recovery and Return System in response to the EA's information request.

February 2020

On 7 February the Environment Agency provided the Appellant with feedback on the submitted report TR515 in relation to the request for information of 7 October 2019. This outlined several errors and points of clarity needed for this submission to be able to satisfy the request for information.

April 2020

On the 21 April the Appellant submitted version 2 of the report TR515 to satisfy the EA's information request of 7 October 2019 in light of the feedback provided in February.

Engagement through the HRA process

The permit determination process required a complete reassessment of the Habitats Regulations Assessment (HRA) for the interest features of the Severn Estuary SAC and Ramsar, River Wye SAC and River Usk SAC. This is due to the removal of a key piece of mitigation (the AFD); the time that has passed since the original HRA was conducted; the availability of new evidence and data and the need to consider the current prevailing environmental conditions.

As the HRA technical assessments were completed for a number of different species during the application determination, it became apparent that the EA would be unable to conclude no adverse effect on site integrity for all of the features requiring consideration. In November 2019, and following Government guidance, the EA engaged early with the Appellant to communicate these preliminary conclusions; raise awareness; and begin discussions around the potential route to proceed to stages 3 & 4 of the HRA process.

From November 2019, the EA held more frequent meetings with the Appellant and shared detailed information on their review of the application and their subsequent assessments. The meetings were undertaken to ensure the Appellant understood the basis on which these preliminary HRA conclusions were being drawn. This was to aid discussions about a route through the HRA process and included potential compensation avenues that could be further developed through Stages 3 & 4 of the HRA process (alternative solutions and imperative reasons of overriding public interest).

The key dates are outlined below:

August 2019

Marine Intake variation Level 4 (technical level) meeting No.1: This was an information-gathering meeting as part of the permit determination, with an objective to provide to the Appellant:

- Clarity on the additional information required by the EA to conclude the permit determination (including outstanding requests)
- Demonstration of the approach the EA was taking to assess any potential impacts on fish at the SAC scale
- Demonstration of the re-assessments the EA made to determine the likely fish biomass entrapped and discharged
- Clarity on anticipated procedural approach at the MTF in relation to the DCO submission
- Clarity on topics which the EA is unable to discuss until the permit determination is concluded.

September 2019

Marine Intake variation Level 4 (technical level) meeting No.2: Several technical documents were provided to the Appellant by the EA prior to the meeting, summarising its approach to aspects of the entrapment assessment. This was a follow up meeting from the one in August with an objective to provide:

- Clarity on the additional information required by the EA to conclude the permit determination (potential Schedule 5 notices and outstanding requests)
- Demonstration of the methodologies the EA was taking to assess any potential impacts from entrapment and discharge of polluting matter
- Explanation of any additional information relevant to the application.

November 2019

In late November the EA advised the Appellant Senior Managers that its preliminary position on the Habitats Regulations Assessment for the removal of the AFD was that it was unable to conclude no adverse effect on a number of the interest features of the Severn Estuary SAC and Ramsar, River Wye SAC and River Usk SAC.

February 2020

The EA shared more of their Technical Brief documents as suitable drafts became available.

April 2020

HPC Permitting and HRA meeting with the Appellant: A teleconference was held to ensure that the EA and the Appellant had full understanding of:

- the Appellant's HRA provided in support of its application;
- the EA's assessment of that HRA; and
- the reasoning behind the EA's preliminary HRA conclusions.

April 2020

Further Technical Briefs produced by the EA were shared with the Appellant to complete the suite of documents produced during its quantitative assessment of the application.

June 2020

The full suite of updated Technical Briefs were shared with the Appellant, except for one detailing the EA's eel population estimates as this was being reconsidered at the time.

July 2020

The Appellant submitted more documents to the EA:

- Assessment of local effects of HPC on the Hinkley Point fish assemblage (SPP106)
- Worst case glass eel entrainment assessment for HPC (SPP107)
- Predicted performance of the HPC LVSE intake heads compared with the HPB intake (SPP105).

On 29 July the EA held a meeting with the Appellant as a final attempt to resolve differences; describe the EA's position; its reasoning and to discuss the potential stages 3 & 4 of the HRA process.

At this meeting the Appellant confirmed that the three previously submitted documents (SPP105, SP106 and SPP107) were not considered a formal submission under the permit variation application.

The EA was told by the Appellant that it expected to make its decision on whether to force a 'deemed refusal' at their board meeting on 30 July.

August 2020

On 4 August the Appellant served EA with a deemed refusal notice pursuant to paragraph 15(1) of Schedule 5 to the Environmental Permitting Regulations 2016.