HPC COMPANY DOCUMENT

COMPANY DOCUMENT
HPC CWDA ENVIRONMENTAL PERMIT VARIATION APPLICATION EPR/JP3122GM/V009 – SUPPORTING INFORMATION

Revision	01
Date of Issue	Refer to EDRMS
Document No.	100897751
Status	D4 - FFC - FIT FOR CONSTRUCTION, MANUFACTURING, PROCUREMENT
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APPROVAL: HPC CWDA ENVIRONMENTAL PERMIT VARIATION APPLICATION – SUPPORTING INFORMATION *

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DOCUMENT CONTROL

Revision	Purpose	Amendment	By	Date
01	D4 - FFC - FIT FOR CONSTRUCTION, MANUFACTURING, PROCUREMENT	n/a	DC	30/06/2021
Revision *	Status *	*	*	Click or tap to enter a date.
Revision *	Status *	*	*	Click or tap to enter a date.
Revision *	Status *	*	*	Click or tap to enter a date.
Revision *	Status *	*	*	Click or tap to enter a date.

NON-TECHNICAL SUMMARY

This application to vary the Construction Water Discharge Activity (CWDA) Environmental Permit (EPR/JP3122GM) is made by NNB Generation Company (HPC) Limited (hereafter NNB HPC), company number 6937084. The CWDA Permit was first issued in February 2012 to support the construction of the Hinkley Point C (HPC) Nuclear Power Station.

The original CWDA permit authorised a number of discharges from the Hinkley Point C (HPC) construction site to controlled waters as detailed within Schedule 1 of the permit. This was subsequently varied as follows:

- November 2013 – Inclusion of rainfall dependant run-off from the construction of the seawall (Activity A) and updated with revised drainage proposals.
- February 2015 – Increased allowance for concrete wash water volumes and addition of waste stream G (rainfall dependent run-off and shallow excavation water passed through Water Management Zone (WMZ) 6).
- March 2017 – Requirements amended with regards to Activity E to remove the need to treat pumped groundwater (subject to agreed Operating Techniques). National Grid References (NGRs) provided for WMZs.
- March 2018 - Relocation of Activity E discharge from Outlet 1 to Outlet 12, a subtidal point near the seaward end of the HPC temporary jetty. In addition, reduction of discharge flow rate to 20 l/s. Also, inclusion of a new activity (Activity H) for the discharge of trade effluent consisting of tunnelling effluent and drainage from the tunnelling spoil storage area (muck bay).
- July 2021 (expected) - Addition of drainage from multiple sources (Fuel Farm, National Grid compound (K6NG), Crushing Yard (K28 and K16), wastewater (not containing hazardous substances) from cleaning and hydrotesting of equipment and discharge of waste potable/surface water from multiple uses across site). Also, changes to the volume and discharge point for cementitious washwater (Activity F) and minor amendment to activity description for tunnelling effluent.

This latest variation of the permit is to incorporate the following amendments:

- Addition of discharge comprising effluent from Commissioning activities (including hydrotesting) and demineralised water production via Outlet 12.

The above effluent streams will be combined prior to discharge and permitted as a single discharge activity (Activity I).

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1 INTRODUCTION

1.1 Background and purpose

This application is made by NNB Generation Company (HPC) Limited (hereafter NNB HPC), company number 6937084, to vary the CWDA Environmental Permit (EPR/JP3122GM) issued in February 2012 to support the construction of the Hinkley Point C (HPC) Nuclear Power Station.

An initial Environmental Permit Application [Ref. 1] (hereafter referred to as the 2011 Application) to authorise a number of discharges to controlled waters was submitted to the Environment Agency (EA) in September 2011 and Environmental Permit EPR/JP3122GM [Ref. 2] was issued in February 2012.

In November 2013, the EA issued a variation of the Permit EPR/JP3122GM/V002 [Ref. 3] to include wastewater (rainfall dependent run-off and water from shallow excavations) produced from the construction of the seawall and to reflect the Operator's revised drainage proposals as set out in its Pre-Operational (PO) condition submissions.

In February 2015, the EA issued a variation EPR/JP3122GM/003 [Ref. 4] to the permit to allow for increased volumes of concrete wash water to be discharged and to add an additional waste stream, waste stream G. A further variation occurred in December 2015 to accommodate a company name change (EPR/JP3122GM/V004) [Ref. 5].

In March 2017, the EA issued a variation EPR/JP3122GM/V005 [Ref. 6] to amend the requirement of the environmental permit, with regards to Activity E, to remove the need to treat pumped groundwater to meet UK Water Framework Directive (WFD) Environmental Quality Standards (EQS) prior to discharge and reduce the permitted discharge volumes listed in Table S3.1 to the Permit. This variation also updated national grid references for the locations of the outfall discharge points for Water Management Zones (WMZ) 5 and 6.

The previous permit described above also incorporated three new Operating Techniques (OT); OT9 which relates to the monitoring and reporting of the load-based permit limits, OT10 which relates to dewatering operations and OT11 which relates to the monitoring and mitigation measures to support the Habitats Regulations Assessment (HRA). PO7 was removed from the permit although relevant requirements were carried over into OT10.

In 2018 the EA issued a permit variation EPR/JP3122GM/V006 and V007 [Ref. 7] for relocation of Activity E discharge from Outlet 1 to Outlet 12, a subtidal point near the seaward end of the HPC temporary jetty. Additionally, it includes a reduction of discharge flow rate to 20 l/s. This variation also included a new activity (Activity H) for the discharge of trade effluent consisting of tunnelling effluent and drainage from the tunnelling spoil storage area (muck bay) as follows:

- Tunnelling effluent generated through the construction of HPC heatsink tunnels including groundwater and low concentrations of soil conditioning chemicals.

- Run-off from rainfall over the muck bay, including low concentrations of soil conditioning chemicals and low volumes of groundwater derived from tunnelling spoil temporarily stored in this area.

Finally, in January 2021 NNB HPC submitted a permit variation application for the addition of drainage from multiple sources (Fuel Farm, National Grid compound (K6NG), Crushing Yard (K28 and K16), wastewater (not containing hazardous substances) from cleaning and hydrotesting of equipment and discharge of waste potable/surface water from multiple uses across site). The variation also included changes to the volume and discharge point for cementitious washwater (Activity F) and minor amendment to activity description for tunnelling effluent.

It is the above latest 2021 permit (expected to be granted in July 2021) that this application seeks to vary and hereafter references to "the permit" refer to EPR/JP3122GM/V008.

This variation application (herein after referred to as 'the Variation Application') is being made to cover the proposed commissioning activities and minor amendments as shown in Section 1.2.

1.2 Scope

The scope of the Variation Application is to incorporate the additional trade effluent discharges resulting from the upcoming planned commissioning activities (Activity I) into the existing permit, EPR/JP3122GM/V008. These are:

- Addition of discharge comprising effluent from Commissioning activities (including hydrotesting) and demineralised water production via Outlet 12.

The Variation Application is only related to those permitted discharges allowed under the CWDA environmental permit; there is no reference within this application to the management / discharge of radioactive substances as authorised by the Radioactive Substances Regulations (RSR) environmental permit (EPR/ZP3690SY) [Ref. 9]. Controls on the management and discharge of these substances are detailed within the NNB HPC arrangements, as appropriate.

1.3 Summary Description of the Proposed Development

The site is centred on National Grid Reference (NGR) ST 211 460 and is located off Wick Moor Drove, the main access route to the HPC site (The Site) and the existing power station complex.

Further information on the site description and surrounding area is provided in the 2011 Application [Ref. 1] and includes the existing land use, nature conservation designations, geology and watercourses. There are no changes to the designations at the site and unless otherwise specified, the 2011 Application descriptions should be referenced.

1.4 Contents of the Application

The main body of the Variation Application references the 2011 Application [Ref. 1] and the existing permit [Ref. 8], the information in these documents is still valid. This Variation Application only presents the proposed changes to the permit.

Section 2 of the application describes in detail the proposals for this CWDA variation application and is the main body of this variation application.

Section 3 proposes wording to be revised within the tables in Schedule 1 of the CWDA permit.

Section 4 of the Variation Application defines how the varied activities will be managed with reference to the NNB HPC written arrangements.

Section 5 includes information relevant to specific questions within the EA application forms including costs.

Section 6 provides a summary conclusion of the application.

Appendix A contains data related to estimated discharge volumes and effluent characteristics referenced within relevant sections of this Application.

Appendix B contains the completed application forms EPA Part A1, EPC Parts C2 and C6 and EPF Part F1 necessary for an application to vary an environmental permit for a bespoke water discharge. The completed forms are provided in and are supported by the relevant sections of this Application.

Appendix C includes the anticipated costs for the CWDA permit application agreed at pre-application stage.

Appendix D includes the Cefas BEEMS Technical Report TR428; Hinkley Point C construction discharge modelling assessment at the temporary jetty location [Ref. 10].

Appendix E includes the Cefas BEEMS Technical Report TR445; Hinkley Point C modelling of hydrazine discharge plume during commissioning and operation [Ref. 11].

Appendix F includes the Cefas BEEMS Technical Report TR186, Predicted Effects of New Nuclear Build on Water Quality at Hinkley Point [Ref 12].

Appendix G includes the Cefas BEEMS Technical Report TR390 Edition 2; Laboratory studies on the decay of hydrazine in Hinkley Point Seawater and derivation of modelling terms for Hinkley Point C [Ref 13].

Appendix H includes the Cefas BEEMS Technical Report TR550; Hinkley Point C combined construction and commissioning Jetty discharge – Evidence to inform Habitats Regulations Assessment (HRA) [Ref 17].

In addition to the above the variation application should be read in conjunction with the following documents:

- Hinkley Point C Construction Water Discharge Activity Environmental Permit Application 2011 (referred to as the 2011 Application) [Ref. 1];
- Hinkley Point C Construction Water Discharge Activity Environmental Permit V008 (referred to as The Permit) [Ref. 8];

1.5 References and Definitions

Ref	Title	Location	Document No.
1	HPC Construction Water Discharge Activity Environmental Permit Application 2011	EDRMS	NNB-209-REP-000359
2	HPC Construction Water Discharge Activity Environmental Permit EPR/JP3122GM	EDRMS	NNB-209-PER-000004 (V1)
3	HPC Construction Water Discharge Activity Environmental Permit EPR/JP3122GMV002	EDRMS	NNB-209-PER-000004 (V2)
4	HPC Construction Water Discharge Activity Environmental Permit EPR/JP3122GMV003	EDRMS	NNB-209-PER-000004 (V3)
5	HPC Construction Water Discharge Activity Environmental Permit EPR/JP3122GMV004	EDRMS	n/a (admin variation)
6	HPC Construction Water Discharge Activity Environmental Permit EPR/JP3122GMV005	EDRMS	NNB-209-PER-000004 (V4)
7	HPC Construction Water Discharge Activity Environmental Permit EPR/JP3122GMV007	EDRMS	NNB-209-PER-000004 (V5)
8	HPC Construction Water Discharge Activity Environmental Permit EPR/JP3122GMV008	EDRMS	TBC
9	Radioactive Substances Regulations (RSR) environmental permit (EPR/ZP3690SY)	EDRMS	NNB-209-PER-000005
10	Cefas BEEMS Technical Report TR428; Hinkley Point C construction discharge modelling assessment at the temporary jetty location	EDRMS	100805769
11	Cefas BEEMS Technical Report TR445; Hinkley point c modelling of hydrazine discharge plume during commissioning and operation	EDRMS	HPC-DEV024-XX-000-RET-100128
12	Cefas BEEMS Technical Report TR186, Predicted Effects of New Nuclear Build on Water Quality at Hinkley Point	EDRMS	HPC-DEV024-XX-000-REP-100029
13	Cefas BEEMS Technical Report TR390 Edition 2; Laboratory studies on the decay of hydrazine in Hinkley Point Seawater and derivation of modelling terms for Hinkley Point C	EDRMS	10080557

Ref	Title	Location	Document No.
14	HPC Water and Sediment Management Plan (all contractors)	EDRMS	HPC-NNBOSL-XX-000-PLN-000030
15	HPC Environmental Management and Monitoring Plan	Teamcenter	100126704
16	HPC Environmental Incident Control Plan	EDRMS	HPC-NNBOSL-XX-000-PLN-000033
17	Cefas BEEMS Technical Report TR550, Hinkley Point C combined construction and commissioning Jetty discharge – Evidence to inform Habitats Regulations Assessment (HRA)	EDRMS	100890822 Rev 01

Term / Abbreviation	Definition
Cefas	The Centre for Environment Fisheries and Aquaculture Science
CEMP	Construction Environmental Management Plan
CETP	Commissioning Effluent Treatment Plant
CFT	Cold Functional Testing
CFTRVO	Cold Functional Testing Reactor Vessel Open
CI	Conventional Island
CWDA	Construction Water Discharge Activity Permit
EA	Environment Agency
EPR	Environmental Permitting Regulations
EQS	Environmental Quality Standard
ETA	Ethanolamine
HF	Conventional Island Electrical Building
HFT	Hot Functional Testing
HPC	Hinkley Point C
MCERTS	Environment Agency Monitoring Certification Scheme
NCC	Nuclear Circuit Cleaning
NGR	National Grid Reference
NI	Nuclear Island
NNB HPC	NNB Generation Company (HPC) Limited
OT	Operating Technique
OWDA	Operational Water Discharge Activity (permit)
RSR	Radioactive Substances Regulations

Term / Abbreviation	Definition
SAT	Service Compressed Air Distribution System
SBE	Laundry and Hot Decontamination System
SCL	Spray Concrete Lined
SCPA	Southern Construction Phase Area
SDA	Demineralised Water Production System
SDS	Safety Data Sheet (formerly knowns as material safety data sheets)
SEI	Industrial Water
SEK	Conventional Island Liquid Waste Discharge System Tanks
SEO	Plant Sewer System
SER	Demineralised Water Conditioned to pH9
WDA	Water Discharge Activity Permit
WFD	Water Framework Directive
WMZ	Water Management Zone
WSMP	Water and Sediment Management Plan

2 CWDA PERMIT VARIATION PROPOSALS

2.1 Specific additions to permit activities

2.1.1 Effluent Stream

The effluent stream will be generated through the testing of the function and performance of individual components, items of equipment, sub-systems and systems, and testing of the overall performance of the reactor including, but not limited to, its associated safety systems, waste management systems and auxiliary systems. Although the effluent stream will be discharged and permitted as a single discharge activity, the effluent stream is a combination of two effluent streams:

2.1.1.1 Demineralised Water (SDA) Effluent Stream

The demineralised water required to undertake hydrotesting and commissioning activities will initially be produced by a temporary plant and then later the permanent SDA system. The SDA provides demineralised water to be distributed by the 'Demineralised Water' System (pH7) and the 'Demineralised Water Conditioned to pH9' (SER) Systems (pH9) to the Nuclear Island (NI) and Conventional Island (CI).

During the manufacture of demineralised water, a by-product referred to as the SDA Effluent Stream is produced. It is expected that for every $1m^3$ of demineralised water produced by the permanent plant, $0.4m^3$ of SDA Effluent Stream is produced. As the SDA Effluent Stream comprises a concentrate of the potable source water, treatment via the CETP is not expected to be required but is possible.

A second minor component to this effluent stream is from cleaning of the reverse osmosis membranes and this will require neutralisation due to the potential for pH variability from the use of acid and a base. This component will not be continuous due to cleaning only taking place a few times each year.

Estimation of the volumes of SDA Effluent Stream generated and required to be discharged is illustrated in Appendix A.

2.1.1.2 Commissioning Effluent Treatment Plant (CETP) Effluent Stream

The commissioning phase will involve the activities stated above and it is therefore expected that during this commissioning phase, significant amounts of demineralised water will be used with the addition of specific chemicals, where necessary. The commissioning activities planned are:

- Hydrostatic Pressure Testing

  Prior to handover of systems from the construction team to the commissioning team, hydrostatic pressure testing of systems will be performed. Note that while this effluent stream does not result from commissioning activities it is included here as hydrotesting may overlap in time with

commissioning activities and may also pass through the CETP (where required). This will involve filling the systems with demineralised water and increasing the pressure above normal operating pressure to demonstrate strength and leak tightness of the systems. Where appropriate the water will be re-used however, for the purpose of estimating effluent volumes, it has been assumed all systems will be filled and drained fully.

- Flushing and Partial System Testing

  Once component commissioning is sufficiently complete, flushing of systems will take place. This will allow the leak-tightness of components not subject to hydrostatic pressure testing (as defined above) to be checked but will also support systems in excluding foreign material in order to prevent damage to systems and equipment, unavailability of the plant, risk of personal injury and any other impact on nuclear safety post-handover from Construction.

  This activity is expected to generate significant volumes of effluent during this stage of commissioning. Flushing process will require the injection of chemicals such as trisodium phosphate, hydrazine, ethanolamine (ETA) and ammonia in order to meet chemical and physical criteria specified in the test procedures.

- Nuclear Circuit Cleaning (NCC)

  NCC marks the start of non-active commissioning. During this phase auxiliary systems (Safety Injection System (RIS), Chemical and Volume Control System (RCV) and Emergency Boration System (RBS) connected to the primary circuit will be flushed into the Reactor Pressure Vessel (RPV). The aim of the flushing is to clean the main nuclear systems.

- Cold Functional Testing Reactor Vessel Open (CFTRVO)

  This phase is when the primary circuit will be tested at temperatures well below those of normal operation, with the vessel head removed, and flow from safety injection systems into the primary circuit will be checked and adjusted.

- Cold Functional testing (CFT)

  This phase is when the primary circuit components and associated support systems will be tested with the reactor closure head in place. The primary hydrostatic pressure test will be performed, in which the integrity of the primary circuit will be tested by taking the pressure in the system to well above normal operating pressure.

Wastewater from these commissioning activities will be collected via dedicated drainage systems and treated by the CETP. After the appropriate treatment/conditioning has been undertaken, the effluent stream will be combined with the Demineralised Water (SDA) Effluent Stream and discharged into the Severn Estuary via Outlet 12.

Estimation on the volumes of commissioning effluent generated are illustrated in Appendix A.

Details of the proposed treatment arrangement are detailed in Section 4.4.

2.1.2 Proposed Update to Permit

The above effluent streams will be combined prior to discharge and permitted as a single discharge activity. The proposal is for Schedule 1 – Operations table to be updated for the inclusion of a new activity (Activity I) for the discharge of trade effluent from commissioning and hydrotesting activities (as per 2.1.1).

2.2 Revision to existing activity

2.2.1 Activity A1(i), A1(ii) & A1(iii) - Discharge of trade effluent consisting of site drainage via Outlet 1

There are no changes to this activity proposed within this application.

2.2.2 Activity B - Discharge of trade effluent consisting of site drainage via Outlet 3

There are no changes to this activity proposed within this application.

2.2.3 Activity C - Discharge of trade effluent consisting of site drainage via Outlet 4

There are no changes to this activity proposed within this application.

2.2.4 Activity E1 - Discharge of trade effluent consisting of pumped groundwater via Outlet 1

There are no changes to this activity proposed within this application.

2.2.5 Activity E2 - Discharge of trade effluent consisting of pumped groundwater via Outlet 12

There are no changes to this activity proposed within this application.

2.2.6 Activity F1 - Discharge of trade effluent consisting of cementitious wash water via Outlet 12

There are no changes to this activity proposed within this application.

2.2.7 Activity H - Discharge of trade effluent consisting of tunnelling effluent and muck bay drainage via Outlet 12

There are no changes to this activity proposed within this application.

2.3 Cessation of existing activities

There are no changes to Table S1.1 within this application.

3 PROPOSED CHANGE TO WORDING WITHIN PERMIT TABLES

Although recognising that it is for the EA to draft the permit NNB HPC has provided proposed revised wording within this section. It is acknowledged that further discussion and review will be needed.

3.1 Table S1.1 - Activities

3.1.1 Activity I

Description of Activity - Discharge comprising effluent from Commissioning activities (including hydrotesting) and demineralised water production via Outlet 12.

Limits of specified activity - The effluent will consist solely of wastewater generated during the activities above.

3.2 Table S1.2 – Operating Techniques

3.2.1 OT1

This Operating Technique is now superseded by OT6.

3.2.2 OT2

There are no changes to this Operating Technique proposed within this application.

3.2.3 OT3

This Operating Technique is no longer relevant due to construction being completed.

3.2.4 OT5

This Operating Technique is no longer relevant.

3.2.5 OT6

There are no changes to this Operating Technique proposed within this application.

3.2.6 OT7

There are no changes to this Operating Technique proposed within this application.

3.2.7 OT8

There are no changes to this Operating Technique proposed within this application.

3.2.8 OT10

There are no changes to this Operating Technique proposed within this application.

3.2.9 OT11

There are no changes to this Operating Technique proposed within this application.

3.2.10 OT12

There are no changes to this Operating Technique proposed within this application.

3.3 Table S1.4 – Pre-operational measures

3.3.1 PO1

Pre-operational measures PO1 is closed as now completed.

3.3.2 PO2

There are no changes to this Pre-Operational measure proposed within this application.

3.3.3 PO4

Pre-operational measures PO4 is closed as now completed.

3.3.4 PO8

Pre-operational measures PO8 is closed as now completed.

3.3.5 PO9

Pre-operational measures PO9 is closed as now completed.

3.3.6 PO10

Pre-operational measures PO10 is closed as now completed.

3.3.7 PO11

Pre-operational measures PO11 is closed as now completed.

4 MANAGEMENT OF THE ACTIVITY

4.1 Management Arrangements

NNB HPC was awarded ISO14001 certification in 2016 for its Environmental Management System including the environmental procedures operated by NNB HPC and since this time has maintained these in line with the requirements of the standard. All activities stated in this variation are being undertaken in accordance with the requirements of the NNB HPC written arrangements and management systems including the HPC Water and Sediment Management Plan [Ref. 14] and the HPC Environmental Management and Monitoring Plan [Ref. 15].

Prior to commencement of the new discharges outlined within this application, NNB processes will be followed to ensure that necessary arrangements and preparations are in place to enable safe and compliant discharge. This measure is to ensure that arrangements are in place and adequate in order for the activity to commence in a safe and compliant manner. These processes will be further discussed with the EA and regulatory involvement incorporated as required.

4.2 Emergency Events

As part of the HPC management arrangements detailed in Section 4.1 all arrangements and controls for emergency events are covered by the HPC emergency arrangements as detailed within documents such as Emergency Incident Control Plans (EICPs) [Ref. 16] and Emergency Plans.

Emergency events relevant to the permitted discharge activity could include:

- Surface flooding - This has the potential to mobilise contaminants and overwhelm the drainage systems / WMZs.
- Fires - Resultant fire-fighting waters, as well as containing chemical additives and combustion and partially combusted materials, have the potential to mobilise other contaminants and could therefore cause environmental impact if released into the environment.
- Inundations of tunnels, underground galleries and excavations with groundwater - This would likely be a life critical situation and rapid pumping / discharge is likely to be required.
- Pollution incidents - Including failure of storage vessels or spillages / leakages of fuel, oils and other contaminants present onsite.

Emergency documentation is available for information on request in advance of the commencement of any activity. Key risks and controls specific to the new permitted commissioning discharge activity are expected to be included within the relevant operating technique.

4.3 Monitoring and Reporting

The monitoring and reporting arrangements will remain the same for the majority of activities listed in this permit application. The monitoring and reporting arrangements for the new commissioning activity (Activity I) will be agreed via a new Operating Technique for this activity however, it is expected that the overall arrangements will not significantly change from those already in place under existing discharge streams.

Once the new discharges have been agreed for the commissioning activity (Activity I), CWDA permit Schedule 7 will be updated if required, together with the Operating Techniques for this activity agreed activity.

4.4 Treatment

During the commissioning activities, it is expected that significant amounts of demineralised water will be used, with the addition of specific chemicals, to support hydrotests, flushing and preservation and other station commissioning activities. The final arrangements will be agreed and confirmed in the relevant Operating Techniques. Commissioning phase activities will generate effluent from three main locations. These are the following:

1. Demineralised Water Production Plant (SDA)
    - This effluent is not expected to require treatment via the CETP based on its chemical characteristics however pH correction may be required for the minor component from cleaning of reverse osmosis membranes. It should be noted that the option is available to route this effluent through the CETP should it be required.
2. Nuclear Island Buildings
    - Systems in the NI are mostly made of stainless steel and will require minimal chemical conditioning for commissioning activities. Therefore the resulting effluent from flushing will consist of mainly demineralised water. In some instances (such as for the carbon steel closed cooling water systems), chemical contamination such as trisodium phosphate will be present in the effluent. Ammonia and ethanolamine will also be present during the station commissioning activities CFTRVO and CFT. For conservatism and volumetric considerations this stream has been included as CETP throughput however there will be the capability to bypass the CETP.
    - Trisodium phosphate is used during commissioning to treat the Closed Cooling Water (CCW) systems in order to maintain a high pH and minimise corrosion. Trisodium phosphate is harmful to humans and aquatic life. The estimated volumes of trisodium phosphate that will be used during this commissioning activity is illustrated in Appendix A, Figure 4.

3. Conventional Island Buildings

- Systems in the CI Buildings are mostly made of carbon steel and will typically require chemical conditioning during commissioning activities. Therefore, the effluent will consist mainly of demineralised water treated with ETA, ammonia and hydrazine (with trisodium phosphate in some instances).
- ETA and ammonia are conditioning agents used to produce demineralised water at pH9 and minimise corrosion. Both ETA and ammonia are harmful to humans and aquatic life. The estimated volumes of ETA and ammonia that will be used during this commissioning activity is illustrated in Appendix A, Figure 6.
- Hydrazine is a feedwater conditioning chemical required for the primary function of maintaining a reducing environment to limit corrosion in the primary and secondary circuits by eliminating dissolved oxygen. It is used at low concentrations in the primary steam circuit as an oxygen scavenger and during shutdown (wet layup) to condition the steam generators. In the secondary circuit, hydrazine maintains a non-oxidising environment, reduces the oxygen dissolved in the feedwater, and limits oxide production in the feedwater plant. The estimated volumes of hydrazine that will be used during this commissioning activity is illustrated in Appendix A, Figure 5.

In addition, it is expected that each of the new effluent streams will include suspended solids and iron oxide following the completion of hydrostatic testing and flushing activities. This is due to the removal of particulate and corrosion products from systems in order to achieve the appropriate cleanliness criteria as specified in the cleanliness codes. Trace concentrations of detergents may also be present in some commissioning effluent streams.

It is the intention that effluent streams 2 and 3 will combine during their collection and storage, and will be treated by the CETP to meet the conditions specified within the CWDA permit prior to discharge into the Severn Estuary via Outlet 12. These are identified as the CETP effluent stream in Section 2.1.

The CETP final design is yet to be confirmed however and full details will be providing in an Operating Technique, main principles applied to commissioning effluent management are shown in Figure 1.

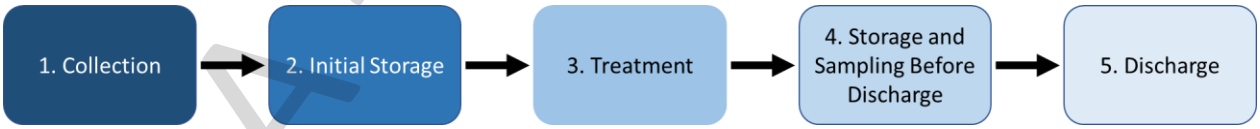

Figure 1 - Principles for Commissioning Effluent Management

1. Collection - This step involves the initial collection of effluent from the draining of the appropriate systems and routing to initial storage.
2. Initial Storage –

The NI effluent generated during commissioning activities is proposed to be transferred to a 750m^3 storage tank located within the HXA Building (further storage will be available should this be required). Once the storage tank is full, it will be circulated and sampled before being batch transferred to intermediate storage tanks located close to the CETP.

The CI Effluent generated during commissioning activities will be transferred directly to the intermediate storage tanks located next to the CETP.

The requirement of initial storage of effluents is for two main reasons:

- To sample effluent to confirm the onward routing (e.g. if the sampling confirms treatment is required, or if the effluent is clean and can be discharged without treatment); and
- To provide buffer storage prior to treatment.

3. Treatment - Treatment of chemically contaminated effluents will be undertaken to ensure that permit levels are not exceeded when the effluent is discharged. The plant will include treatment methods for the following:
    - Neutralisation;
    - Hydrazine destruction;
    - Particulate removal;
    - Oil/grease removal;
    - Heavy ion removal;
    - Ammonia removal;
    - ETA removal; and
    - Trisodium Phosphate removal.
4. Storage Before Discharge - After treatment, it is proposed that initially the treated effluent will be stored in storage tanks prior to discharge. This is proposed for two main reasons:
    - To sample the effluent to confirm that the effluent is compliant with permit levels; and
    - To provide buffer storage to control the flow rate of the discharge.

    The capacity of this storage is to be determined through the CETP design and procurement in order to accommodate identified batch treatment scenarios.
5. Discharge - Compliance sampling requirements will be specified within the varied CWDA permit. If the sampling has confirmed that the effluent is compliant, it will be discharged. Instrumentation for monitoring associated with the CWDA permit will be MCERTS certified where this is appropriate and required. It is proposed that initially batch discharge of effluent is undertaken to demonstrate that the treatment process is appropriate and reliable. When NNB HPC are able to

demonstrate confidence in the CETP performance, and with the agreement of the EA, continuous discharge with periodic sampling will be undertaken (which may negate the requirement for post treatment storage described above).

The current proposed route for transfer of collected effluent to the CETP and then to final discharge point is illustrated in Appendix A, Figure 7 (to be confirmed at a later date via an Operating Technique).

It is anticipated that the CETP will be required on site for the duration of the cold commissioning activities at HPC. It is anticipated that once Hot Functional Testing of Unit 2 starts, there will be no further requirement and the CETP will be decommissioned and removed from site.

4.5 Supporting Technical Reports

To support the design specification of the CETP and provide additional supporting evidence of this permit application, The Centre for Environment Fisheries and Aquaculture Science (Cefas) have developed and where appropriate updated a number of technical reports. These documents are summarised below, but the full reports are attached within the designated Appendix.

4.5.1 Cefas BEEMS Technical Report TR428;

The HPC Construction Discharge Modelling Assessment at the Temporary Jetty Location report (TR428) [Ref. 10] has been updated to take into account the proposed commissioning activities. The report was originally commissioned by NNB HPC to assess the priority substances and specific pollutants present in various discharges, to be made under a proposed Construction Water Discharge Activity (CWDA) permit application, at the location of the temporary jetty at HPC.

A full copy of this report is provided in Appendix D.

4.5.2 Cefas BEEMS Technical Report TR445;

The HPC hydrazine discharge modelling during commissioning and operation report [Ref. 11] has also been updated to take into account the proposed commissioning activities. For the commissioning phase, the report assesses the worst-case scenario where a simultaneous discharge of the two 750m^3 effluent tanks occurs, corresponding to a daily discharge of 1,500m^3. The release of hydrazine was modelled as a discharge of 83.3 l/s and to investigate the effect of the release concentration, three different concentrations have been considered: 10 µg/l, 15 µg/l and 30 µg/l representing a likely mean and upper bounding concentrations. The modelling has been performed using the validated GETM 3D model, applied in previous studies at HPC, with a measured hydrazine decay rate of 0.000236 s^{-1} corresponding to a half-life of 49 minutes. The report recommended that a maximum discharge concentration of hydrazine of 15 µg/l in the HPC discharge tanks during commissioning (cold flush test), before discharge through Outlet 12, should be sufficiently precautionary to prevent any adverse environmental impacts to Corallina and Sabellaria features.

A full copy of this report is attached in Appendix E.

4.5.3 Cefas BEEMS Technical Report TR186;

The HPC Predicted Effects of New Nuclear Build on Water Quality at Hinkley Point [Ref 12] has been provided in Annex G for additional reference. The report, produced by CEFAS in 2011, considers the operation of HPC and the likelihood that it will comply with current and developing water quality regulation. Whilst not specifically covering the commissioning phase of the project, it provides reference points for work undertake on the modelling of hydrazine decay and establishment of acute and chronic Predicted No Effect Concentrations (PNECs).

A full copy of this report is attached in Appendix F.

4.5.4 Cefas BEEMS Technical Report TR390;

The HPC Laboratory studies on the decay of hydrazine in Hinkley Point Seawater and derivation of modelling terms for Hinkley Point C (TR390) [Ref. 13] was produced to provide data for use in modelling hydrazine decay to predict likely concentrations near the HPC power station. The study concluded that for concentrations of hydrazine of 50 – 100µg/l the model fit data resulted in a derived half-life of 1,854 seconds (~30 minutes). The fit to data up to concentrations of 100µg/l produced a derived half-life estimate of 48.9 minutes although this longer estimate may have been contributed to by the higher method blanks for these samples.

A full copy of this report is attached in Appendix G.

4.5.5 Cefas BEEMS Technical Report TR550;

The Cefas BEEMS Technical Report TR550 [Ref. 17] builds on the previous HRA evidence report (BEEMS Technical Report TR443) to include the commissioning discharge associated with the cold commissioning phase of the Project in combination with the construction discharge and to provide an assessment of potential effects on habitats and species designated as part of the Severn Estuary marine protected areas to inform the Habitats Regulations Assessment (HRA). The assessment of effects draws upon the results of model predictions from BEEMS Technical Report TR428 and BEEMS Technical Report TR445 and relevant available evidence of the potential impacts of known chemical discharges on designated features

A full copy of this report is attached in Appendix H.

5 CONCLUSIONS

NNB HPC are applying to vary the HPC CWDA permit to incorporate the additional trade effluent discharges resulting from the planned commissioning activities into the existing permit, EPR/JP3122GM/V008. These are:

- Addition of discharge comprising effluent from Commissioning activities (including hydrotesting) and demineralised water production via Outlet 12.

NNB HPC considers that the supporting technical reports outlined in Section 4.5 provide the parameters to demonstrate that the new effluent stream (Activity I) can be discharged at concentrations that will have no significant adverse effects on the environment in which they are being discharged.

Once the CETP design and associated infrastructure has been finalised, NNB HPC will provide further details on how the discharge will be managed accordingly and within the recommendations set out in the supporting technical reports and the agreed Operating Technique for this activity.

APPENDIX A ESTIMATED DISCHARGE VOLUMES AND EFFLUENT CHARACTERISTICS

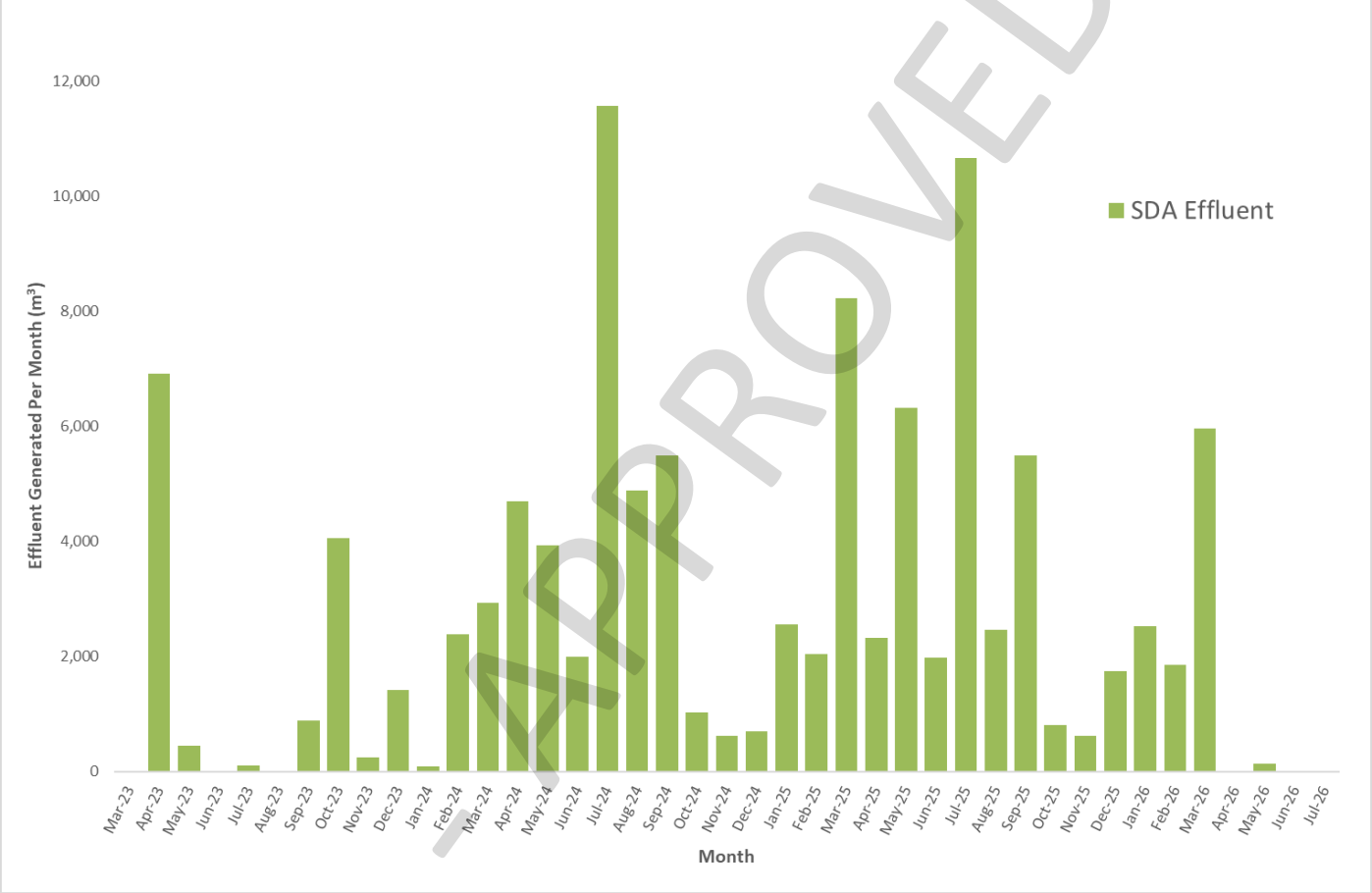

Figure 2 - Load Curve Representing the Estimated Volumes of Demineralised Water (SDA) Effluent discharge

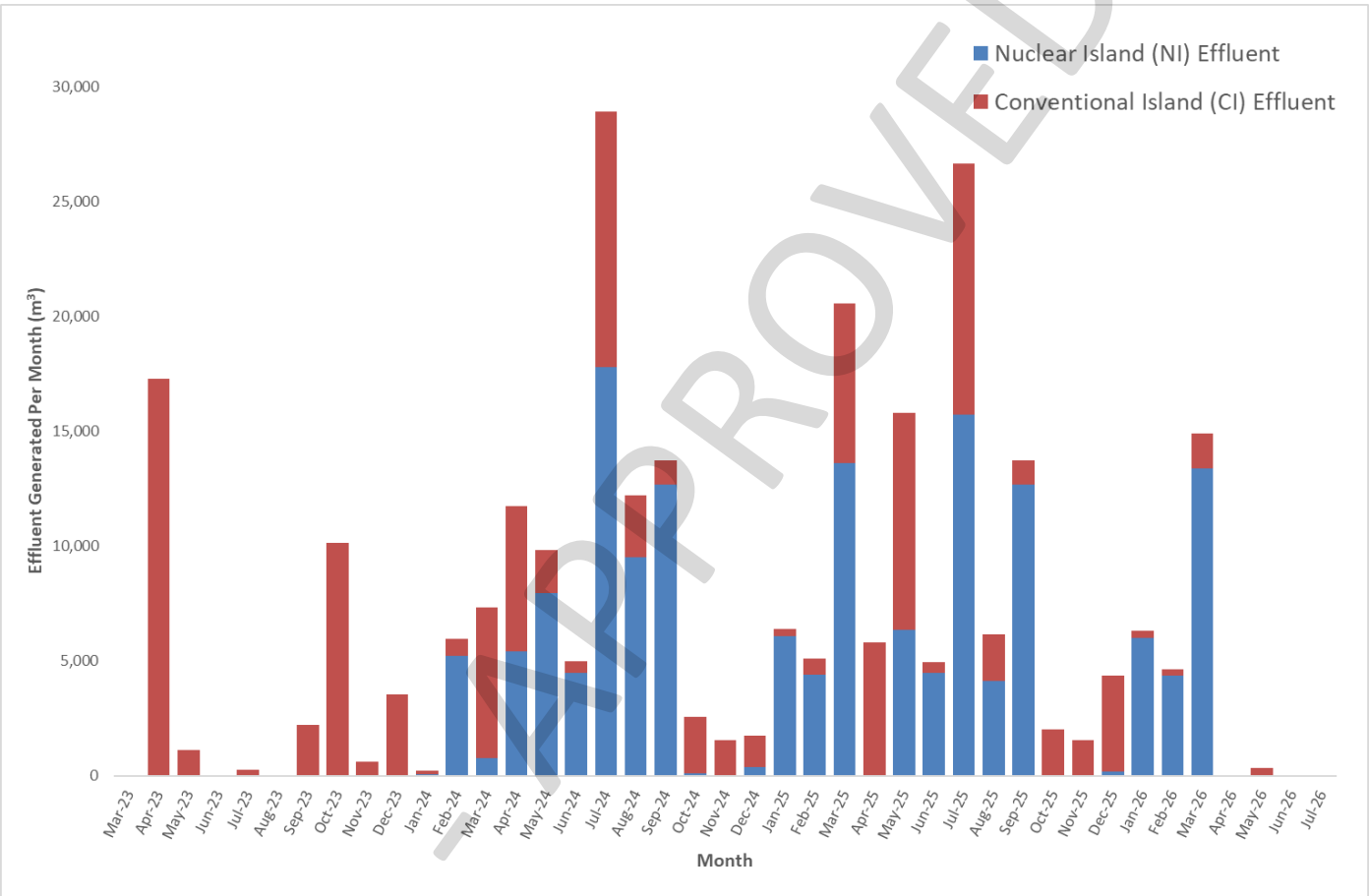

Figure 3 - Load Curve Representing the Estimated Volumes of Discharges to CETP from Commissioning Activities

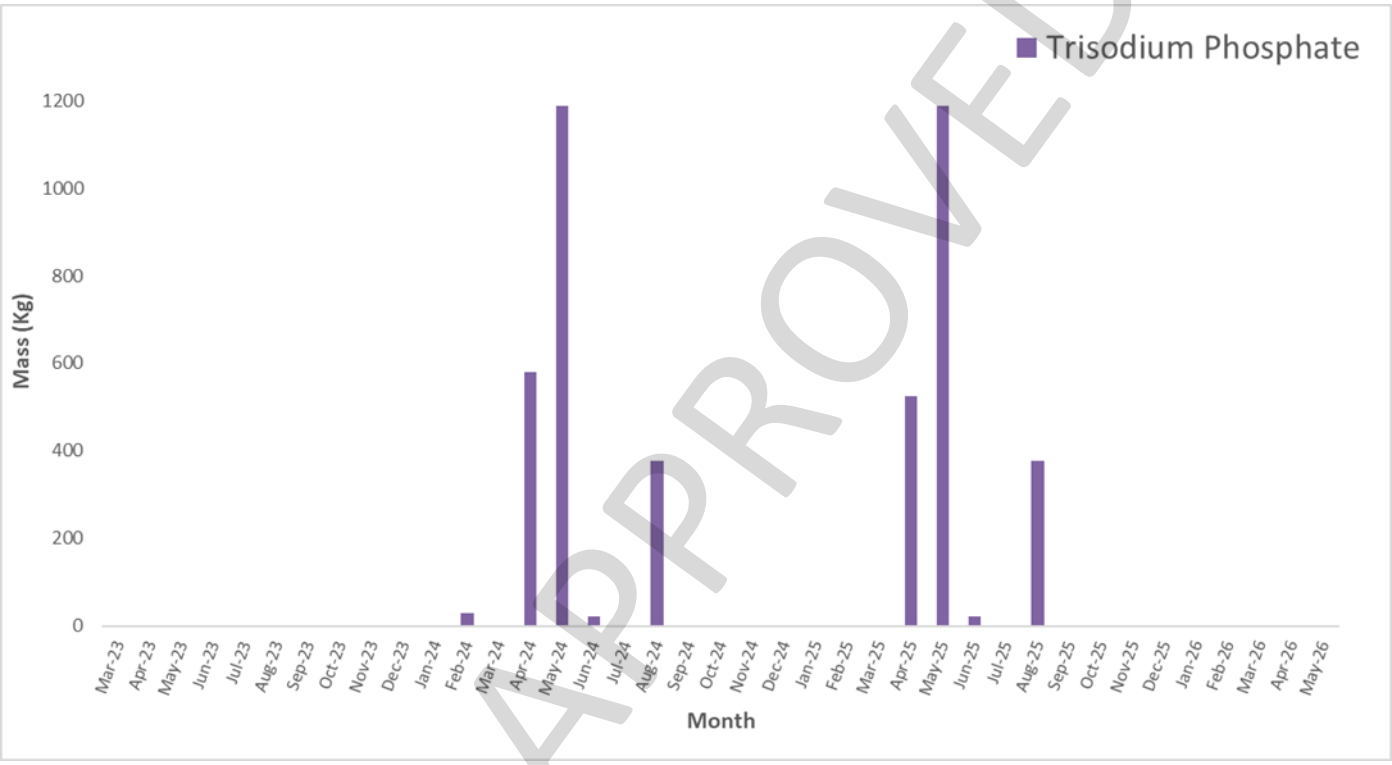

Figure 4 - Load Curve Representing the Estimated mass of Trisodium Phosphate Usage During Commissioning

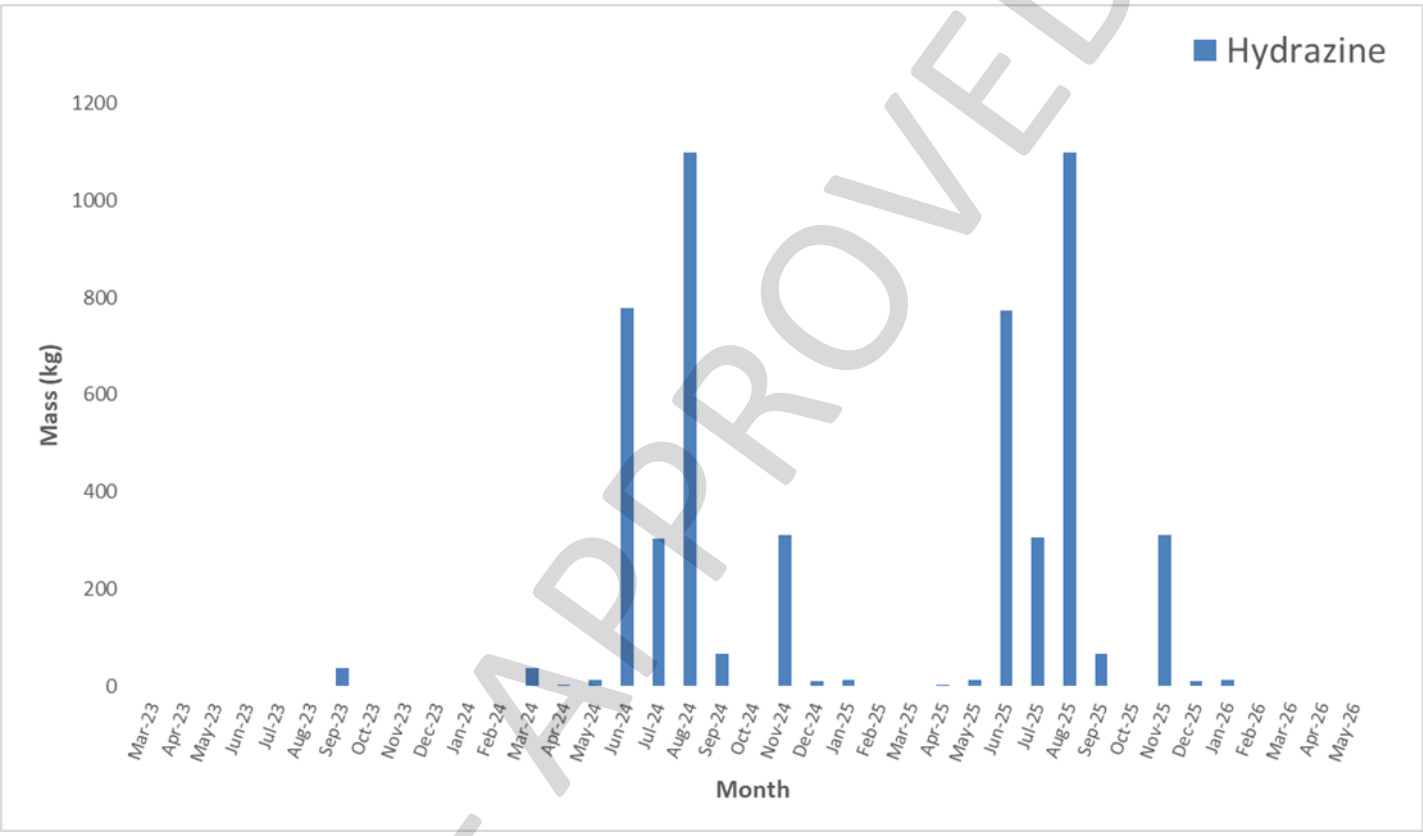

Figure 5 - Load Curve Representing the Estimated mass of Hydrazine Usage During Commissioning

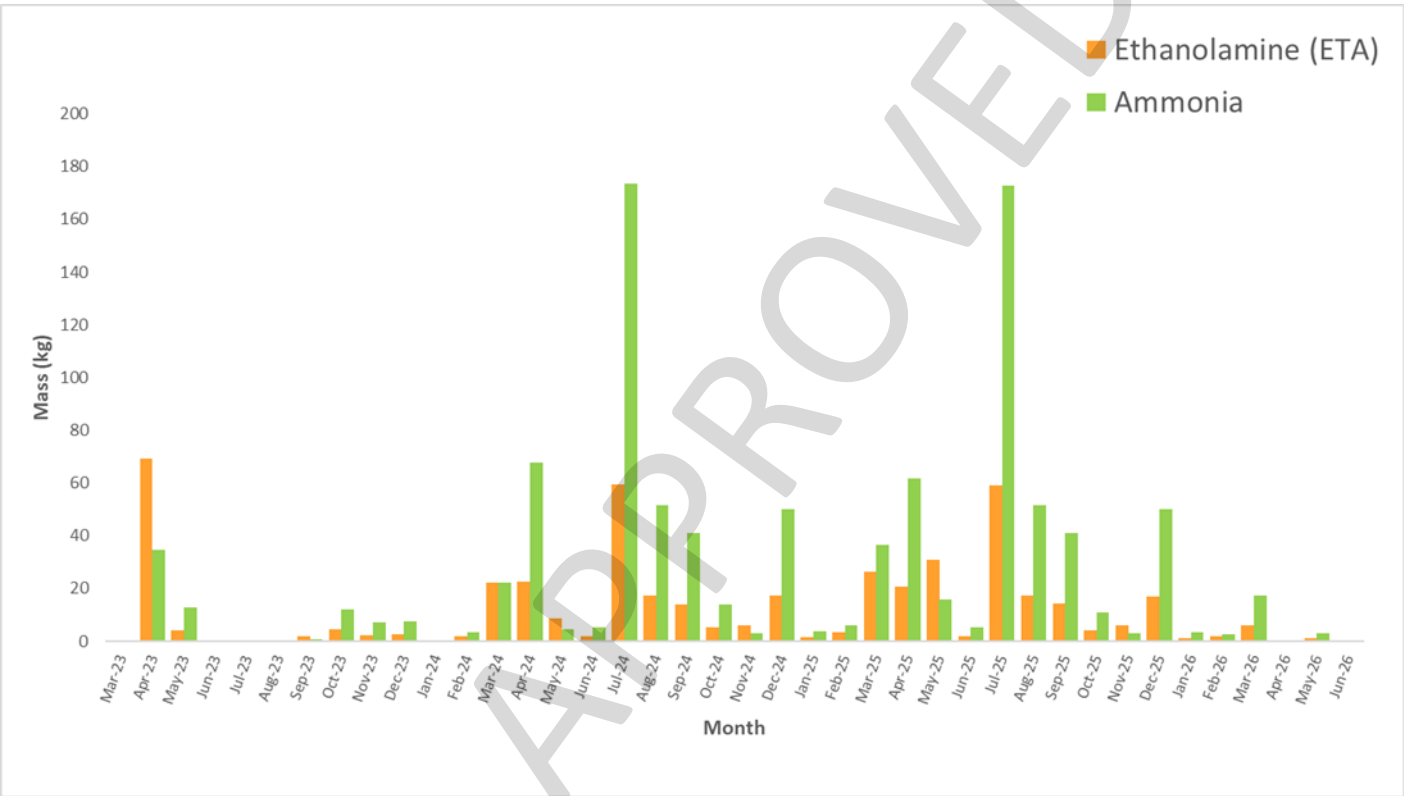

Figure 6 - Load Curve representing the estimated mass of ETA and Ammonia Usage During Commissioning.

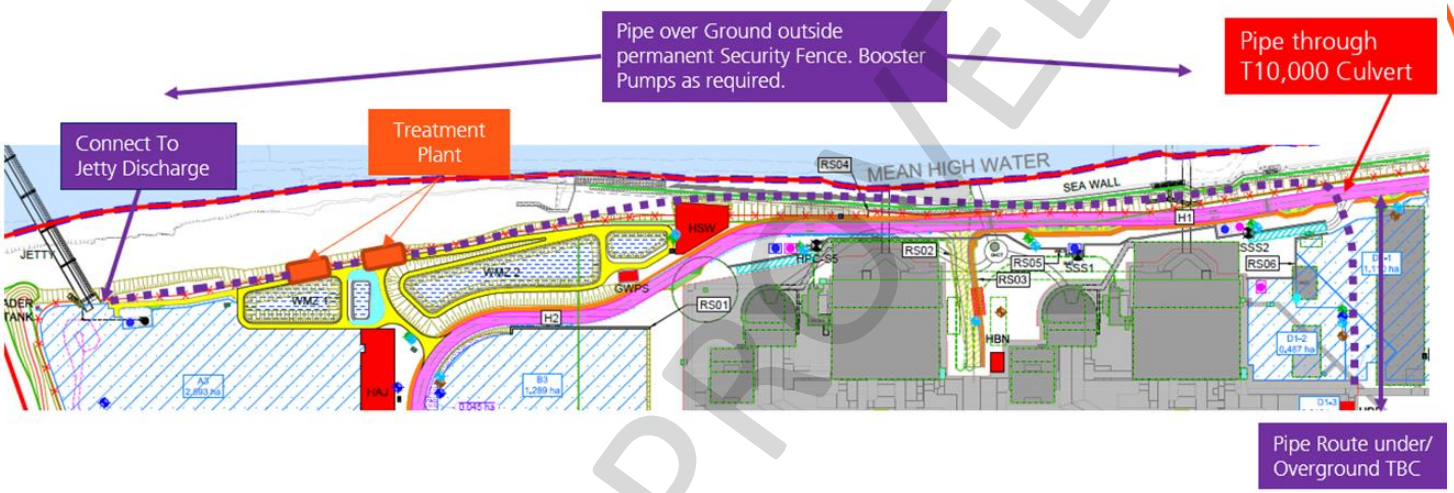

Figure 7 – Proposed Transfer Route of Effluent to Treatment and Then Final Discharge Point.

APPENDIX B ENVIRONMENTAL PERMIT APPLICATION FORMS

Application Forms A, C2 and C6

APPENDIX C ANTICIPATED COSTS FOR THE CWDA PERMIT

Application Form F1

APPENDIX D CEFAS BEEMS TECHNICAL REPORT TR428; HINKLEY POINT C CONSTRUCTION DISCHARGE MODELLING ASSESSMENT AT THE TEMPORARY JETTY LOCATION

APPENDIX E CEFAS BEEMS TECHNICAL REPORT TR445; HINKLEY POINT C MODELLING OF HYDRAZINE DISCHARGE PLUME DURING COMMISSIONING AND OPERATION

APPENDIX F CEFAS BEEMS TECHNICAL REPORT TR186, PREDICTED EFFECTS OF NEW NUCLEAR BUILD ON WATER QUALITY AT HINKLEY POINT

APPENDIX G CEFAS BEEMS TECHNICAL REPORT TR390 EDITION 2; LABORATORY STUDIES ON THE DECAY OF HYDRAZINE IN HINKLEY POINT SEAWATER AND DERIVATION OF MODELLING TERMS FOR HINKLEY POINT C

APPENDIX H CEFAS BEEMS TECHNICAL REPORT TR550, HINKLEY POINT C COMBINED CONSTRUCTION AND COMMISSIONING JETTY DISCHARGE – EVIDENCE TO INFORM HABITATS REGULATIONS ASSESSMENT (HRA)