Intended for
Angus Fire Limited

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Bentham Fire Fighting Chemicals

APPLICATION TO VARY AN ENVIRONMENTAL PERMIT

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Bentham Fire Fighting Chemicals
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1. NON-TECHNICAL SUMMARY

This application is submitted by Angus Fire Limited Ltd (referred to hereafter as "Angus Fire" or "the Client") to vary the Environmental Permit EPR/XP3832NV for the Angus Fire site located at Station Road, Bentham, Nr Lancaster, LA2 7NA (the "Site").

The current activities and directly associated activities subject to regulation under Schedule 1 of the Environmental Permitting (England and Wales) Regulations 2016 (as amended) (the 'EPR') are:

- **Activities Listed in Section 4.1 A(1)(b) of Schedule 1 of the EPR** - manufacture of chemicals which may result in the release of ammonia into the air other than an activity in which ammonia is only used as a refrigerant (Section 4.7 A(1)(b));
- **Directly Associated Activities** – Storage of raw materials, finished products and wastes and operation of two oil fired boilers.

Due to historic manufacturing activities surface water run-off from the Site has the potential to contain Per- and polyfluoroalkyl substance (PFAS). PFAS is not currently controlled by an emission limit in the EPR, and there is potential for the release of PFAS through transference from surfaces at the site into the surface water discharge (not as part of a process activity release). It is noted that manufacturing, testing and storage of fluorinated firefighting foams has ceased.

This application proposes to update the existing permit to include a waste operation to allow for treatment of contained stormwater collected on the Site and post-treatment discharge through a new discharge point (W2). The new discharge point is located at the sampling point for the discharge.

Treatment of contained stormwater is to be via a Surface Active Foam Fractionation (SAFF) treatment system (with additional treatment using Powdered Activated Carbon (PAC) where appropriate) with a maximum treatment capacity of less than 50 tonnes per day.

Angus Fire has taken additional measures to avoid rainwater becoming contaminated. This includes the installation of a roof over the existing lagoons to segregate uncontaminated rainwater from this area.

An assessment against the Appropriate Measures associated with a non-hazardous waste treatment operation has been undertaken and concluded that the new surface water treatment system will be operated in accordance with the relevant Appropriate Measures.

The variation also proposes the removal of emission points A1, A3, A4, A5 and A6 and the associated monitoring requirements. These emission points are associated with the manufacture of fire fighting foams which has now ceased and will no longer take place at the facility; plus the decommissioning of boiler 1 (emission point A6).

Management Techniques

The Site operates to an environment management system (EMS) that is accredited to ISO14001. The management system will be updated to include the operation of the new process. The EMS will ensure that:

- The risks that surface water emissions pose to the environment are identified;

- The measures that are required to minimise contamination of surface water risks are identified;
- The activities are managed in accordance with the emissions management system;
- Performance against the emissions management system is audited at regular intervals; and
- Compliance with the conditions of the environmental permit.

Raw Materials

Limited raw materials are required to facilitate the treatment process proposed on-site, these include powdered activated carbon and foaming agent (when required).

Emissions to Controlled Waters

The proposed treatment process will result in a discharge of up to 48 m^3/day to the River Wenning via emission point W2.

For the purposes of assessing impact using the Environment Agency's H1 methodology, the freshwater Environment Quality Standard (EQS) for PFOS has been considered, and an emission limit value of 10ng/l is proposed for PFOS. However, Angus Fire's approach to the management of PFAS within the contained stormwater is designed to minimise the discharge of PFAS identified at the site.

Emissions to Sewer

There will be no additional emissions to sewer resulting from the proposed changes.

Containment Strategy

The SAFF treatment process is containerised, which provides containment for the process. Pre-treatment storage tanks are located within the existing tank farm bund, which provides containment for >25% of the pre-treatment stormwater capacity, in line with CIRIA 736 requirements. Raw materials for the treatment process are stored within the adjacent building.

A post treatment storage capacity that allows for a 10-day testing cycle time is included as part of the treatment process. Where monitoring of the discharge or the treatment process shows that emissions exceed the agreed limit, the discharge will be halted and surface water will be diverted for collection and containment within IBCs. The retained surface water will either be removed from site for treatment/disposal, or, where possible, it will be fed back into the treatment system once the issue is resolved. Post-treatment storage capacity will also be available.

Emissions to Soil and Groundwater

There are no releases to soil or groundwater from Site operations.

Waste Generation

The process can include the use of powdered activated carbon (PAC) as a polishing agent if required. Where this is applied, this will result in the generation of PAC sludge as a waste stream. The waste will be collected for offsite disposal.

The quantity of PAC required is calculated for each batch for treatment which minimises the generation of waste for disposal.

The SAFF process generates a foam concentrate (containing the removed PFAS compounds) which is separated and sent offsite for disposal by high temperature incineration.

Energy Efficiency

The new treatment process is not energy intensive. Energy is required for pumping of materials and for the operation of the SAFF unit. Where possible, energy efficient equipment has been purchased.

The site operates to an EMS that is ISO14001 certified and the use of energy will be monitored and targeted in line with the sites energy reduction commitments.

Noise and Vibration

The new treatment system is to be located alongside the external tank far on the south west corner of the site and operated during normal Site operating hours which minimises the potential for noise nuisance to off-site receptors. In addition, the treatment processes involved in the surface water treatment system are not considered to be excessively noisy and insignificant compared to the background noise of the Site during standard operating hours. Finally, the EMS includes monitoring of environmental noise and will incorporate consideration of the treatment system within the monitoring process.

Odour

There are no additional odour emissions from the proposed activity

Dust

There are no additional dust emissions from the proposed activity

Site Condition Report

The proposed activity is to be undertaken within the existing permit boundary. As such, no changes to the current Site Condition Report are required.

Environmental Risk Assessment

A qualitative assessment of the potential risks to the environment has been undertaken as part of this permit variation. The environmental risk assessment concluded that the current mitigation measures are sufficient to minimise the risks to low levels.

A quantitative assessment of the discharge to the River Wenning has been completed using the Environment Agency's H1 methodology. The assessment considered the potential impacts from PFOS and other potential contaminants identified for the treated stormwater discharge where Environmental Assessment Levels (EALs) are in place. The assessment screens out all identified contaminants at Test 2, demonstrating that the proposed discharge will have no significant effect on the receiving watercourse.

2. Introduction

Angus Fire Limited operate under the Environmental Permit EPR/XP3832NV for the Angus Fire site located at Station Road, Bentham, Nr Lancaster, LA2 7NA (the "Site").

The current activities and directly associated activities subject to regulation under Schedule 1 of the Environmental Permitting (England and Wales) Regulations 2016 (as amended) (the 'EPR') are:

- **Activities Listed in Section 4.7 A(1)(b) of Schedule 1 of the EPR** - manufacture of chemicals which may result in the release of ammonia into the air other than an activity in which ammonia is only used as a refrigerant (Section 4.7 A(1)(b));
- **Directly Associated Activities** – Storage of raw materials, finished products and wastes and operation of two oil fired boilers.

The main authorised activity at the installation at the time of permit issue was the manufacture and testing of a range of firefighting foams. However, activities associated with manufacturing and testing of fluorinated firefighting foams ceased by the following dates:

- Manufacture and sale by end of March 2024;
- Testing by the end of April 2022; and
- Storage of fluorosurfactant raw materials ceased by the end of May 2024.

The Environmental Permit was originally issued by the Environment Agency in April 2007 and last varied in December 2015. The most recent variation to the permit related to annual process efficiency reporting.

Tables S3.2 and S3.3 of the Environmental Permit outline the current allowable water discharge points associated with the permitted activities. The Site is currently permitted to discharge uncontaminated surface water through emission point W1 to controlled waters, located along the eastern boundary of the Site, and process water and surface water run-off through emission point S1 to sewer, located along the western boundary of the Site near the retention lagoons.

Due to historic manufacturing activities surface water run-off from the western part of the Site has the potential to contain Per- and polyfluoroalkyl substance (PFAS). PFAS is not currently controlled by an emission limit in the EPR, and the release of PFAS has the potential to occur through transference from surfaces into the surface water discharge (not as part of a process activity release). It is noted that manufacturing, testing and storage of fluorinated firefighting foams has ceased.

Whilst Angus Fire is permitted to discharge process water through discharge point S1 under the provisions of the Environmental Permit, the sewerage undertaker (United Utilities) responsible for receiving the process water has advised that they are not equipped to treat PFAS contaminated water, irrespective of the level of pre-treatment prior to discharge. Therefore, Angus Fire cannot discharge treated stormwater through this emission point.

As a precautionary approach Angus Fire has ceased the discharge of surface water run-off from the western part of the Site and is retaining stormwater within intermediate bulk containers (IBC) and a new tank farm. The volume of stormwater currently stored on-site (15th April 2025) is over 3,974 m^3 and the bunded area available to store more IBCs has been exhausted, with IBC's now being stored in un-bunded areas e.g. car park.

To manage both the retained stormwater and future stormwater from the western part of the site, Angus Fire undertook the installation of a new mobile treatment system based on the composition of the surface water collected on-site.

This application proposes to update the existing permit to include the treatment of contained stormwater collected on the Site and post-treatment discharge through a new discharge point (W2) located at the sampling point for the discharge.

Treatment of contained stormwater is to be via a Surface Active Foam Fractionation (SAFF) treatment system (with additional treatment using Powdered Activated Carbon (PAC) where appropriate) with a maximum treatment capacity of 48m^3/day.

The variation application also incorporates the removal of emission points associated with the manufacture of firefighting foams, associated references to firefighting foams, and the decommissioned boiler 1.

3. Installation Details

3.1 Applicant Details

Company Name	Angus Fire Limited
Installation Name	Bentham Fire Fighting Chemicals
Installation Address	Station Road, High Bentham, North Yorkshire LA2 7NA
Installation Contact	Paul Williams
Registered Office	Station Road, High Bentham, North Yorkshire LA2 7NA
Company Registration Number	08441992
Permit Reference	EPR/XP3832NV

3.2 Scheduled Activities

Activity Listed in Schedule 1 of the EP Regulations	**Description of Specified Activity**	**Details**
Section 4.7 A(1) (a)Any activity for the manufacture of a chemical which may result in the release of ammonia into the air, other than an activity in which ammonia is only used as a refrigerant.	An activity for the manufacture of chemicals (fire fighting foams) which may result in the release of ammonia into the air other than an activity in which ammonia is only used as a refrigerant.	From the receipt of raw materials to storage of finished product including thermal oxidiser treatment and intermediate storage.
Directly Associated Activities		
Materials Storage	Storage of raw materials, finished products and collection and storage of wastes	From receipt of materials to the transfer of materials to dedicated storage areas and lagoons
Boiler system	1 x 6MW and 1 x 5MW oil fired boilers	Includes oil receipt and storage, transfer of steam to process and condensate handling

As part of this variation, it is requested that the phrase (fire fighting foams) is removed from the description of specified activity as they are no longer manufactured at the site. The installation remains under Section 4.7A(1)(a) due to the continuation of the Allophanate process.

The 1x6MW boiler can also be removed as this has been decommissioned.

3.3 Site Setting and Permit Boundary

It should be recognised that the installation permit boundary for EPR/XP3832NV is limited to the areas identified below, however the surface water management proposed under this permit variation reflects management of surface water from western part of the site. For clarity, the existing installation boundary is shown in green in Figure 3-1.

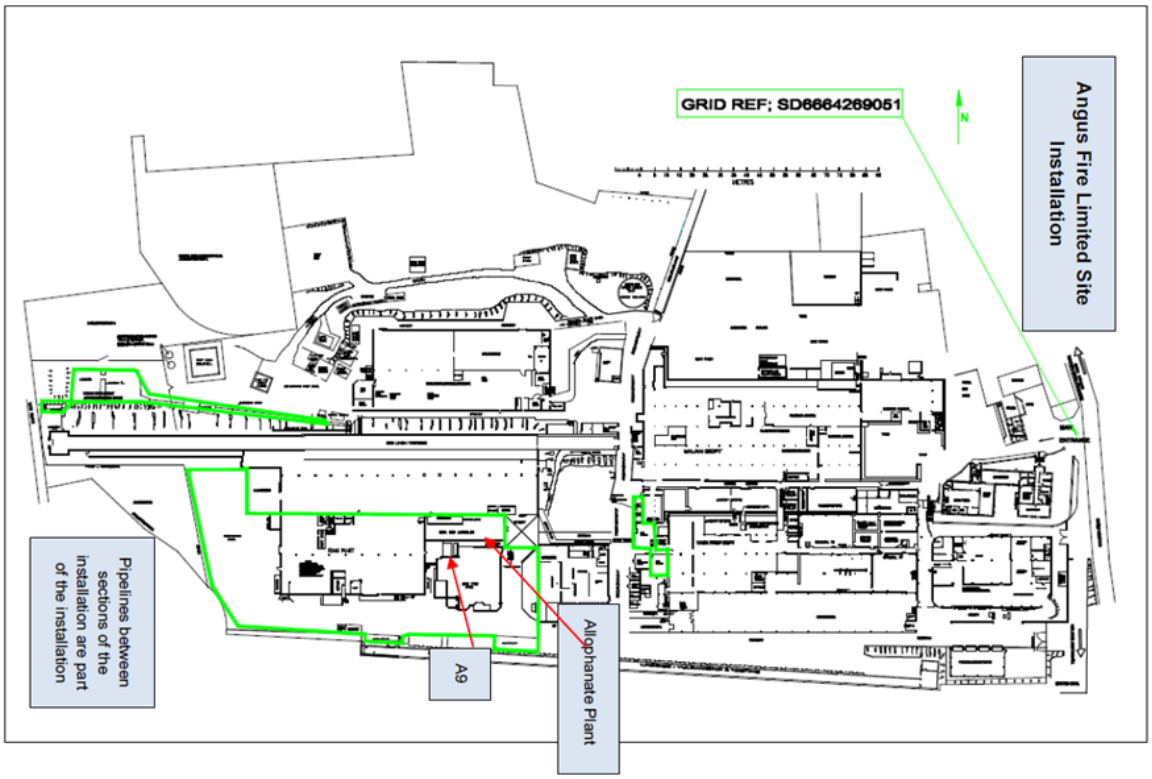


Figure 3-1 – Existing Installation Boundary

3.4 Summary of proposed changes

This variation introduces the treatment of contained water using SAFF for the removal of PFAS compounds (including PFOS). The plant is limited to treat and discharge up to 48m^3/day, and is therefore considered to be a Waste Operation under Waste Treatment reference 1.16.14 for physical and chemical treatment of waste[1]. The variation proposes to add this Waste Operation as an activity to the existing permit. A new emission point to water (W2) is proposed for the discharge of the treated stormwater to the River Wenning.

As the collection of surface water is not considered a DAA and the collection of surface water from outside the installation boundary is being undertaken on a precautionary basis there is no proposed change to the installation boundary. The indicative extent of the site area directed to the water treatment facility is shown in Figure 4-1. The water treatment facility and the discharge point are located within the installation boundary.

The variation also requests the removal of the following, as a consequence of the cessation of the manufacture of fire fighting foams, and the decommissioning of boiler 1:

[1] The Environment Agency (Environmental Permitting and Abstraction Licensing) (England) Charging Scheme 2022 Amendments up to 1 October 2024 Version: 1.4

a) Removal of the reference to 'firefighting foams' in Table S1.1
b) Removal of the statement 'including thermal oxidiser treatment' from Table S1.1
c) Removal of emissions points A1, A3, A4, A5 and A6 from Table S3.1
d) Amendment of the source wording for W1 in Table S3.2 to state 'Uncontaminated roof drainage and uncontaminated run-off'
e) Removal of Table S3.4 Process Monitoring Requirements
f) Removal of emission points A1, A3, A4 and A5 from Table S4.1
g) Removal of Table S4.2

Emission point W1 has also been relocated to be representative of the discharge point from the relevant area (boiler house).

4. Process Description

4.1 Overview

Angus Fire will undertake treatment of contained stormwater from areas at the installation where there is potential for PFAS compounds (including PFOS) to be present. Stormwater will be collected from the western part of the Site and drain towards a sump located at M-S27 as shown in the drainage layout. The contained stormwater will then be pumped to the pre-treatment storage tanks located in the external tank farm. For clarity, the drainage infrastructure and the treatment system are shown in Figure 4-1 below. The area draining to the treatment plant is shown in blue; the treatment plant itself is located adjacent to the tank farm (hatched area).

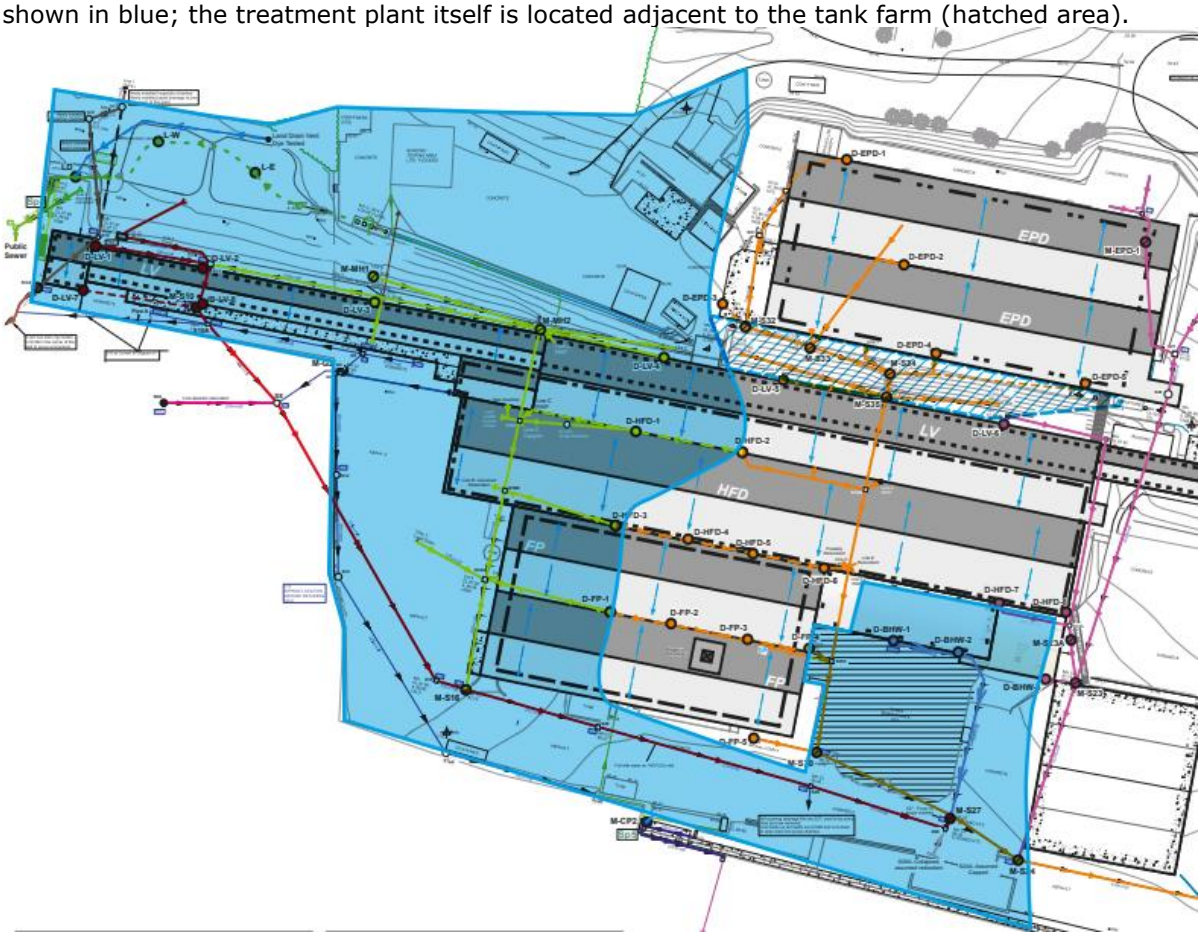


Figure 4-1. Drainage infrastructure and extent of stormwater collection for treatment

4.2 Stormwater Separation

Stormwater collection across the western part of the site has been assessed to determine the potential for PFAS and PFOS presence within the flow, and monitoring has been undertaken to confirm this.

Low risk areas have been separated through the construction of stormwater collection infrastructure that isolates stormwater in these portions of the Site from areas that have the potential to contain PFAS and PFOS. These areas are isolated from the collection point to the discharge location via W1 (under this permit) and SP2 (under discharge consent 017290164). The remainder of the site is considered to be 'high risk' and is directed to the treatment plant. Refer to Figure 4-1 showing the location of the 'high risk areas' and associated drainage infrastructure.

As a precautionary approach, Angus Fire have retained stormwater collected on the western part of the site in designated storage tanks and Intermediate Bulk Containers (IBCs) whilst the proposed treatment process is installed and permitted. It is intended that this water will also be treated via the proposed treatment plant.

As stockpiling of IBCs presents an ongoing health and safety risk for Site operations, the immediate priority once operation of the treatment system commences is the clearing of the backlog of contained stormwater.

4.3 Treatment Process

4.3.1 Options Appraisal

A high-level BAT appraisal of the potential treatment options for contained stormwater has been undertaken, as set out in Table 4-1:

Table 4-1: Options Appraisal of treatment options

Technology	Advantages	Disadvantages	Outcome
Offsite incineration	Most robust treatment approach No permitting variation requirement Fast to deploy Likely to regulatory satisfaction	Extremely expensive and not a viable long-term option Treatment facilities are reactive and disposal routes are not always open Storage container supply limitations Incinerators are far away and unsustainable long term	Whilst this is a robust approach it is not cost or environmentally sustainable in the long term.
Surface Activation Foam Fractionation (SAFF)	Excellent removal rates (<99%) – proven by onsite bench scale study; potential to achieve 10ng/l PFOS No chemical reagents Low waste generation Low energy demand Ability to deal with variation in influent concentration	High cost (£1.5m-£2m CAPEX) Longer lead time (12 weeks) Will be governed as a Waste Operation included as an activity to the installation permit	If approach can get a prompt regulatory approval and mobilisation SAFF is proven on a site basis to achieve the proposed PFOS discharge concentration of 10ng/l.
PAC	Cheap to implement Quick mobilisation Better sorption activity compared to GAC.	Is less effective compared to SAFF at influent concentration rates estimated potential to achieve Waste generation (removal and destruction of	PAC is considered a viable secondary stage (polishing) treatment post SAFF to add resilience into meeting the defined PFOS discharge criteria whilst also reducing

		saturated PAC as sludge)	concentrations of other non-regulated PFAS.
Direct discharge to sewer	Low cost Easy to implement	Receiving works not designed for PFAS removal Non-treated effluent likely to pose an impact on the River Wenning.	Not Selected

Based on the above Surface Active Foam Fractionation (SAFF) will be utilised as the primary treatment step. This will be supported by further treatment using Powdered Activated Carbon (PAC) as a final polishing process for short-chain PFAS.

The treatment plant will discharge up to 48m^3/day of captured stormwater flow.

A detailed description of the proposed treatment process follows, and the pre-treatment storage, treatment process, testing and discharge process is shown in the figures provided in Appendix 2.

4.4 Pre-treatment Storage

Pre-treatment storage tanks are located within the external tank farm and close to the proposed treatment plant. Details on the tanks are provided in Table 4-2. The pre-treatment storage tanks receive stormwater from the M-S27 sump (and will also process stormwater contained in IBCs located around the Site during initial operation). It is noted that Tanks A1 and A2 are existing tanks which have been cleaned and repurposed for use as storage of contained stormwater, whilst tanks A3-A5 are new to the installation.

Table 4-2 Pre-treatment storage tanks

Tank Reference	Capacity (m^3)	Material of Construction
A1	39	Glass fibre laminate
A2	40	Stainless steel
A3	25	MDPE
A4	30	MDPE
A5	30	MDPE

Whilst there is potential for the presence of PFAS to fluctuate on a daily basis within the stormwater collected, the pre-treatment storage tanks act as a balance tank to mitigate any fluctuations that might affect the treatment process.

The PFAS concentrations observed in the pre-treatment storage tanks (ranging from 2µg/l to 7µg/l, with an average around 3.8µg/l) are well within the acceptable treatment range for the new treatment system to ensure a suitable treatment efficiency and allow for discharge of the treated surface water. The SAFF treatment process that has been installed is capable of effectively treating up to 50,000 ug/l PFAS and has demonstrated effective removal during trials. The PAC unit acts as a further polishing stage for short-chain PFAS and to ensure treatment to <10 ng/l PFOS.

4.5 Primary Treatment

SAFF will be utilised as the primary treatment step. This process is based on the principle that PFAS accumulates at the air-water interface. By bubbling gas through the water to be treated in the presence of a specialised foaming agent, PFAS accumulates at the air-water interface of the rising bubbles, which congregate at the top of the liquid column and can then be separated off. Studies on this technique, supported by a completed onsite trial, have shown >99% removal of PFOS, PFHxS, and PFOA can be achieved.

Water from the pre-treatment storage tanks is pumped into the SAFF unit at a maximum rate of $2m^3$/hr, designed to maintain a set level within the SAFF feed tank (Tank 1). The water then passes through a series of chambers (4 primary stage, 1 secondary stage and 1 tertiary stage) where air is bubbled through and the resulting 'foam' at the top of the column is separated off. This creates a concentrate (approximately 1 tonne per 2000 tonnes processed, equivalent to 0.05% of the throughput) which is collected and removed offsite for disposal by high-temperature incineration.

Following processing through the SAFF plant, the treated stormwater is directed through secondary treatment using Powdered Activated Carbon (PAC).

4.6 Secondary Treatment

The primary treatment system will be supported by further treatment using PAC as a final polishing process for short-chain PFAS (with significantly reduced waste generation). PAC treats PFAS primarily through adsorption. This process is effective as PAC has a high surface area with numerous pores, which makes it effective at adsorbing contaminants and PFAS molecules are attracted to the carbon particles due to electrostatic interactions and the non-polar nature of the carbon surface.

The non-polar chains of fluorine in PFAS molecules are pulled away from the water and onto the carbon particles removing the PFAS molecules from the surface water.

The PAC treatment process has a separate control system, using digitally controlled dosing rates (currently proposed at $<1kg/m^3$ of water based upon commissioning) to achieve optimum removal.

Recent commissioning testing (8th April 2025) which processed surface water containing 3.1µg/l of PFOS has demonstrated a 99.9% removal of PFOS through the SAFF stage, achieving the proposed limit of 10ng/l, and 99.9% removal of PFAS species following PAC treatment at just $0.5kg/m^3$.

4.7 Post-treatment Storage

Following treatment via the SAFF and PAC processes, the treated water is pumped to a series of 9 MDPE holding tanks (tanks B10-B18) prior to discharge. These tanks have a total capacity of $265m^3$.

4.8 Filling and Sampling Process

Treatment of contained water is undertaken on a batch basis. As the treatment cycle starts the PLC will open the valve on the input manifold into B10, the first tank in the cycle. At this point, a sample is taken from the feed line after the PAC and is immediately sent for external Lab testing. The tanks will only ever fill or discharge sequentially.

As the cycle continues the PLC will open the valve on the input manifold on sequential tanks until all tanks are filled. Fill level is controlled by an internal level sensor. The Stormwater Treatment Train will automatically stop processing once discharge tanks are full (or the stormwater influent feed tanks are below a pre-set level).

Once test sample results are confirmed to meet agreed discharge concentration levels the discharge cycle is started. This requires the Lab Report reference number and reported concentration of <10ng/l PFOS to be entered into the PLC control system. Without this data, the system will not allow discharge. The discharge process begins sequentially at the rate of 2m³/hr as programmed into the PLC.

The cycle will open the valves on the discharge manifold sequentially (starting at the first tank filled) until all tanks are released. The valve aperture is determined by the discharge rate and the mechanical flow restrictor on the discharge line at 2m³/hr (0.055L/S). As tanks are discharged, their empty fill level notifies the Treatment Train to recommence the next batch cycle and the filling cycle commences.

This process is designed to provide confirmation that the batch has been treated to the required standard prior to any discharge taking place. An additional compliance sampling point (W2) is identified within this permit variation to allow for spot sampling of the discharge by Angus and/or the Environment Agency.

4.9 Discharge Process and Operational Capacity

The treatment plant is expected to discharge up to 48m^3/day of captured stormwater flow. This is defined by two specific aspects which limit the treatment and discharge capacity to less than 50m^3/day.

The SAFF has 4 primary vessels, and each of these vessels will process a batch of 2.1m³ of influent water only when there is capacity in the PAC vessel to accept it. Therefore, the processing capacity of the treatment train is defined by the capacity of the PAC unit. Due to the processing times of the PAC unit, this cannot exceed 1.99 m³/hour, equivalent to 47.8m³/day.

Alongside this, the treated effluent is stored in discharge tanks prior to allow confirmatory analyses to be undertaken, with the primary discharge control maintained using the Tank Farm Discharge PLC and a mechanically restricted valve and flow meter.

A Belimo valve controller is installed in the discharge line which is limited to 2m³/hour and has no manual override or control. This provides an additional physical limitation alongside the treatment capacity limitation of the PAC unit to maintain the proposed treatment and discharge capacity of 48m³/day.

5. Waste definition

5.1 Waste Classification

The proposed treatment system allows for the treatment of less than 50 tonnes of non-hazardous waste per day. To confirm the status of the water for treatment, contained stormwater collected from the western part of the Site in areas likely to be contaminated with PFAS have been subject to testing to classify the surface water proposed for treatment, with the results presented in Table

5-1. An assessment of the contained stormwater against the 'hazardous waste' criteria has been undertaken in accordance with the EA's 'Guidance on the Classification and Assessment of Waste (WM3)'.

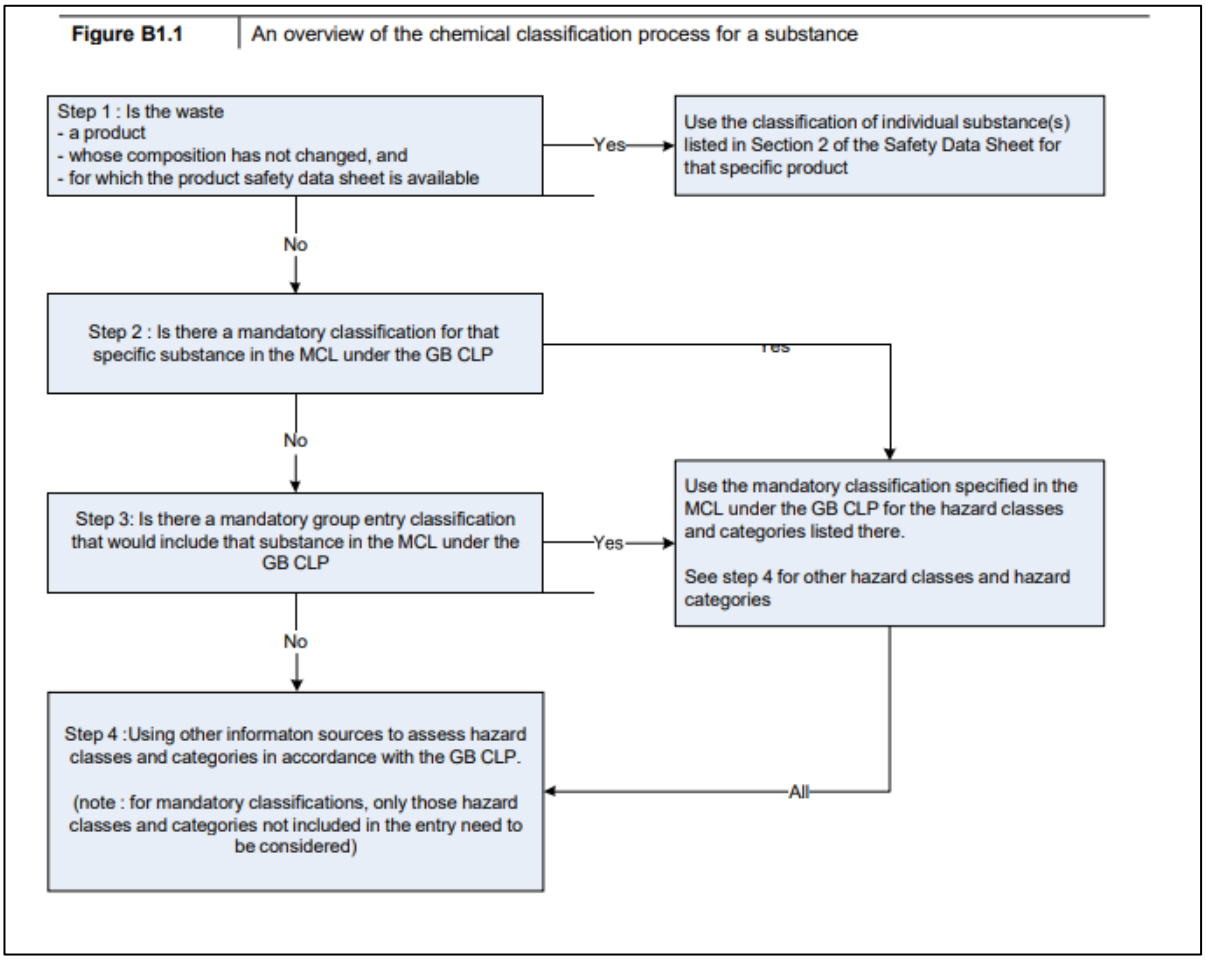
Table 5-1: Typical Substance Ranges for Surface Water Collected On-Site

Parameter	Units	Typical Range
pH		6 - 8
Arsenic	µg/l	<0.9
Cadmium	µg/l	0.04
Chromium (VI)	µg/l	0.9
Lead	µg/l	1.9
Mercury (Total)	µg/l	<0.5
Nickel	µg/l	2.2
Selenium	µg/l	<1.2
Copper	µg/l	5
Zinc	µg/l	129
TPH	µg/l	49
Total PAHs	µg/l	<0.5 to <1 depending on PAH compound and limit of detection (LOD)
Total PFAS	µg/l	2-7

It is outlined in Step 1 of the WM3 guidance that material does not need to be classified under this guidance if it is not a waste. As described above, the new treatment system is proposed for the treatment of PFAS within contained stormwater from around the Site due to the presence of PFAS attributed to historic activities and is not for purpose of treating process effluent or waste generated through on-Site activities. Notwithstanding, the assessment was undertaken at the request of the EA to determine if the presence of contaminants (including PFAS) within the contained stormwater would meet the criteria for a 'hazardous substance' in accordance the WM3 guidance.

To determine whether the contained stormwater is a 'hazardous substance', a hazardous waste classification assessment in relation to PFAS family compounds was undertaken in accordance with the process shown in Figure B1.1 of the WM3 guidance[2], as shown below.

[2] Figure derived from EA guidance WM3 from https://assets.publishing.service.gov.uk/media/6152d0b78fa8f5610b9c222b/Waste_classification_technical_guidance_WM3.pdf [accessed 26 March 2025]



Using the steps in process flow, the following assessment was made with respect to the hazard classification of PFAS family compounds:

- The contained stormwater is not considered to be a product with a safety data sheet; and
- There are no mandatory classifications for individual PFAS substances or mandatory group classification for PFAS family compounds in the Mandatory Classification List (MCL) under the GB CLP Regulation.

Therefore, an assessment of PFAS family compounds (as the primary contaminant) using other information sources against all hazard classes and categories was undertaken. The assessment was undertaken for the typical PFAS concentrations shown in Table 5-1 against the hazard categories and classes criteria in Appendix C of the WM3. The outcome of the assessment is shown in Table 5-2.

Table 5-2: Hazard Classification of PFAS family compounds

Hazard Class	Relevant[1]	Hazard Substance Assessment
HP1: Explosive	No	N/A
HP2: Oxidising	No	N/A
HP 3: Flammable	No	N/A
HP 4: Irritant – skin irritation and eye damage	Potentially	PFAS concentration ($7x10^{-7}$ %w/w) does not exceed the

		minimum concentration limit for this hazard class (1%).
HP5: Specific Target Organ Toxicity (STOT) / Aspiration Toxicity	Potentially	PFAS concentration ($7x10^{-7}$ %w/w) does not exceed the minimum concentration limit for this hazard class (1%).
HP 6: Acute Toxicity	Potentially	PFAS concentration ($7x10^{-7}$ %w/w) does not exceed the minimum concentration limit for this hazard class (0.1%).
HP 7: Carcinogenic	Potentially	PFAS concentration ($7x10^{-7}$ %w/w) does not exceed the minimum concentration limit for this hazard class (0.1%).
HP 8: Corrosive	No	N/A
HP 9: Infectious	No	N/A
HP 10: Toxic for reproduction	Potentially	PFAS concentration ($7x10^{-7}$ %w/w) does not exceed the minimum concentration limit for this hazard class (0.3%).
HP 11: Mutagenic	Potentially	PFAS concentration ($7x10^{-7}$ %w/w) does not exceed the minimum concentration limit for this hazard class (0.1%).
HP 12: Release of an acute toxic gas	No	N/A
HP 13: Sensitising	Potentially	PFAS concentration ($7x10^{-7}$ %w/w) does not exceed the minimum concentration limit for this hazard class (10%).
HP 14: Ecotoxic	Potentially	PFAS concentration ($7x10^{-7}$ %w/w) does not exceed the minimum concentration limit for this hazard class (0.1%).
Hazard HP 15: Waste capable of exhibiting a hazardous property listed above not directly displayed by the original waste	No	N/A
Assessment of Persistent Organic Pollutants	No	Not listed in Table 16.1

Notes:

1. As described above, PFAS is not classified under the hazard statement codes described in the associated regulations described in WM3. However, to ensure completeness as part of this assessment, relevant hazard descriptions that are potentially applicable to PFAS have been listed here.

For all other contaminants identified, concentrations are less than 0.1% of the total volume and would therefore be considered non-hazardous.

Based on the assessment, the contained stormwater at the Site is considered to be non-hazardous.

5.2 Off-site Disposal

Surface waters collected from high-risk areas will be directed to the new treatment plant for PFAS removal and subsequent discharge. However, where there is a known failure of the SAFF plant or where sampling of the discharge shows emissions exceeding the proposed limit, Angus will cease discharge from the high-risk areas and retain the surface water treated on site within the post-treatment storage tanks and in IBCs or similar storage.

A verified remediation process will be developed and validated within the overall management system that ensures the discharge tanks do not contribute to further elevated levels from ongoing processing. Where feasible, retained water will be returned to the treatment plant once the issue is resolved; should this not be possible, Angus will arrange for the retained treated stormwater to be removed off site for treatment at a licenced facility.

Angus recognises that this approach does not represent a sustainable solution for management of the site's surface water, so this route will only be applied in the event of long-term failure of the treatment plant.

6. Operational Control

The stormwater treatment facility is managed through a dedicated control system providing oversight of the SAFF and PAC processes and monitoring the post-treatment storage tanks. The system has inbuilt alarms to identify low flow issues for both water and air, and faults within the system are presented through the fault screen for management by the process engineer.

The batch processing is designed to operate to a pre-programmed configuration which has been identified through the commissioning process. Sampling of the discharge as it passes through to the first post-treatment storage tank is undertaken to provide verification of the effectiveness of the treatment process. Discharge from the post-treatment storage tanks to the emission point W2 is interlocked, requiring input from the engineer to confirm the final PFOS concentrations (including laboratory results reference) and a release only occurs if the final concentrations are at or below the agreed discharge limit. Flow rate of discharge is limited to $2m^3$/hr in line with the proposed daily limit.

The SAFF unit is also monitored by a remote team of specialist engineers using remote telemetry. This ensures technical oversight of the plant and provides assistance to site-based operators during working hours to help with trouble shooting, set up and fault finding etc. The remote team also monitors the plant during the out of hours periods.

A process flows control diagram is provided in Appendix 2.

7. Management Techniques

7.1 Overview

The High Bentham Site Director or Environmental Health and Safety (EH&S) Manager will be responsible for overseeing all surface water management procedures. An emissions management plan has been developed to provide an overarching approach to environmental control of the proposed treatment plant. The emissions management plan will be reviewed at least once every six months or in response to significant changes to the activities, accidents or non-compliance.

7.2 Environmental Management System

Angus Fire operates to an environmental management system accredited to the ISO 14001 standard which will ensure that:

- The risks that surface water emissions pose to the environment are identified;
- The measures that are required to minimise contamination of surface water risks are identified;
- The activities are managed in accordance with this permit variation application and standard operating procedures (SOPs);
- Performance against the requirements of the permit variation and SOPs is audited at regular intervals; and
- Compliance with the conditions of the environmental permit.

Angus Fire has updated their environment management system to incorporate the new treatment process. An overview of the new treatment process management system, including an outline of the management system related to the new treatment facility, is provided in Appendix 3. The appended diagram presents a high-level overview including references to procedures, risk assessments, system controls, training, inspections, emergency preparedness and response, permits and consents, calibration and maintenance requirements that have been prepared as part of the integration of the new treatment process into the EMS.

The updates are aligned with the clauses of ISO 14001, shown in bold below, ensuring adherence to international standards for environmental management systems.

Objectives

- Integration of New Treatment Process into the EMS (**Clause 4.4**).
- Ensure the new process aligns with environmental policies and objectives (**Clauses 5.2 and 6.2**).
- Update EMS documentation to reflect changes and ensure compliance with local, regional, and national environmental regulations (**Clauses 6.1.3 and 9.1.2**).
- Obtain necessary permits and approvals for the new treatment process (**Clauses 6.1.3**).
- Assess the environmental impacts of the new treatment process and update environmental aspects and impacts register (**Clause 6.1.2**).
- Update and implement control measures to minimise negative impacts and enhance positive outcomes also including emergency preparedness and response (**Clauses 8.1 and 8.2**).

Key Updates

- Update EMS documentation on EH&S SharePoint to include new process flow diagrams, operating procedures (i.e. calibration process flow, stormwater capture and influent tank, treatment plant overview, site inspection and monitoring, emergency response team, emergency response site plan) (**Clause 7.5, 8.1, 8.2 and 9.1**).

- Detailed document mapping of the new treatment process and its integration into existing operations (**Clause 7.5**).
- Conduct training and awareness sessions for relevant personnel to ensure competency and understanding of the new treatment process (**Clauses 7.3 and 7.4**).
- Update monitoring and measurement by establishing new metrics and KPIs to monitor the performance of the new treatment process (**Clauses 9.1.1 and 9.1.2**).
- Integrate monitoring data into the EMS to track compliance and identify improvement opportunities (**Clauses 9.1.1, 9.1.2 and 10.3**).
- Identify potential environmental risks and opportunities associated with the new treatment process. Update risk and opportunities register (**Clause 6.1.1**).
- Develop and implement control measures to manage these risks effectively (**Clause 8.1 and 8.2**).

The integration of the new treatment process into the existing EMS at Angus Fire underscores the commitment to continuous improvement in environmental performance. This update not only ensures regulatory compliance but also promotes sustainability and operational efficiency. The updates are conducted in accordance with ISO 14001, ensuring the highest standards of environmental management are met. The site will continue to monitor and refine the process to achieve the environmental objectives and maintain high standards of performance.

7.3 Technical Competence

The facility will be supervised by an appropriately experienced manager with Certificate of Technical Competence (COTC) Level 4 in Medium Risk Operator Competence for Contaminated Land Remediation. The main risks to the environment from the operation of the new treatment system, as assessed in the ERA in Section 18 of this Report, are associated with:

- Loss of containment;
- Treatment failure;
- Discharge of PFOS; and
- Management of waste.

The qualification held by the appropriately experienced manager provides a demonstration of competence in the following areas:

- Maintain health and safety in the waste and resource management industry (OCS01);
- Manage the environmental impact of work activities (OCS02);
- Manage the movement, sorting and storage of waste (OCS05);
- Control work activities on a waste management facility (OCS06);
- Manage site operations for the remediation of contaminated land (OCS49); and
- Manage the transfer of outputs and disposal of residues from remediation of contaminated land (OCS50)

In view of the potential environmental risks from the operation of the new treatment system and the demonstrated competence of the qualification held by the appropriately experienced manager, a Level 4 in Medium Risk Operator Competence for Contaminated Land Remediation is considered appropriate for the management of the treatment system. A copy of the COTC has been provided in support of this application.

7.4 Waste Pre-Acceptance and Acceptance

The effluent treatment plant has been specifically designed to treat potentially contaminated water from the Angus installation. The site does not accept waste from third parties and therefore many of the waste pre-acceptance and acceptance criteria are not relevant to this operation.

The plant has been specifically designed to treat PFAS impacted surface waters from the site. Extensive research and development has gone into designing the ETP for this specific purpose. A significant number of samples have been collected since the containment of rainwater commenced in June 2024 (i.e. ~12 months of samples). This has allowed the concentration of PFOS and multiple PFAS chemicals to be established for a range of locations across the site, with concentrations of up to 8 µg/l PFOS identified (see Figure 3).

The SAFF unit has been demonstrated to treat from 0.005 to 50,000 µg/l of all PFAS species in a variety of industrial applications. In addition to SAFF, the treatment train at the site includes a powdered activated carbon polishing stage to ensure that the treatment target of 10 ng/l can be achieved. However, the SAFF unit alone has demonstrated treatment to <10 ng/l prior to the PAC process.

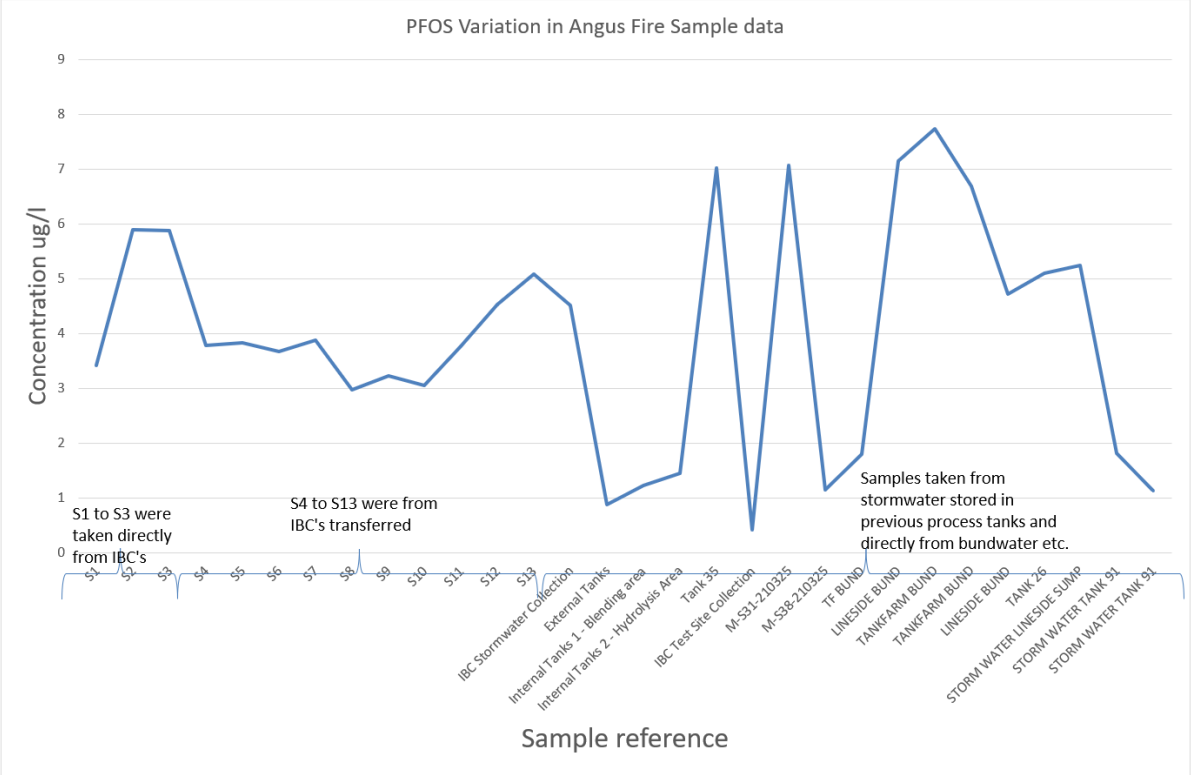
The influent is considered to be stable and the influent tanks provide significant storage capacity (165 m^3 in total with the largest tank being 40m^3) that provide buffering prior to treatment. Any peaks in concentration would be smoothed in the holding tanks.

The anticipated concentrations for the influent are therefore well within the range of treatment capability for the treatment plant.

Additionally, the discharge tanks cannot be released until the treated water has been tested at a UKAS accredited laboratory to demonstrate that the treatment target of <10 ng/l of PFOS has been achieved. Should a problem occur in the treatment train resulting in inadequately treated effluent, then it would be diverted back to the influent tanks for further treatment and the reason investigated.

For these reasons, the site does not intend to test the influent tanks prior to treatment. Testing both the influent and discharge tanks would result in significant delays in treating and discharging the tanks as both sets of samples would require testing at the laboratory with several days turnaround time. The key analysis is considered to be the discharge tank, ensuring that nothing is discharged above the proposed 10 ng/l limit.

Figure 2 – Concentrations of PFOS from Storage and Drainage at the Angus Site



7.5 Emergency Response

During the development of the new treatment system and equipment, 'other than normal operating conditions' (OTNOC) scenarios have been considered to ensure that potential pollution events resulting from abnormal and emergency conditions have been considered.

Extensive procedures have been developed for potential emergency scenarios for the existing and for the new process operations. Any incidents or near misses identified on site are recorded and investigated; and where necessary, corrective actions are implemented.

Operation of the SAFF plant is monitored remotely on a 24/7 basis by a team of specialist engineers. The team will communicate faults and errors via email with the site team and can also intervene in the event of an emergency, including the remote shutdown of the plant until a team member can get to site to investigate.

An Environmental Risk Assessment has been developed in support of the Permit application. The findings are presented in Section 19.

7.6 Incidents and Non-Conformances

Angus Fire has established procedures to record and investigate incidents and non-conformances which may affect the environmental performance of the facility.

Angus Fire's management system requires that nonconformances are reported, investigated and rectified, and actions are implemented to prevent reoccurrence.

7.7 Reporting of Complaints

Angus Fire has established procedures for dealing with complaints, as set out within their Environmental Management System.

Angus Fire will also maintain a site diary which will track the performance of the treatment plant, note any abnormal weather conditions, any incidences of spills or discharges or any malfunction with regards to the treatment plant and associated surface water infrastructure. The daily log will also record all housekeeping activities.

7.8 Maintenance

A planned preventative maintenance programme (PPM) will be established. Plant and equipment will be inspected and serviced in line with manufacturers recommendations. Critical spares will be maintained on site for water treatment equipment.

Details of faults, breakdowns and repairs will be documented and records will be maintained. Faults and breakdowns will be investigated and the service schedule revised if necessary.

7.9 Records

Angus Fire will keep records of a number of performance indicators and environmental indicators (e.g. weather conditions, surface water discharge flow etc.). Records will be legible and easily retrievable on request. Records will be kept in line with the conditions of the Environmental Permit.

For example, the following records will be kept:

- Records of potentially polluting events will be kept at the facility during the life of the permit;
- Monitoring results for discharges to surface water.

The above list is not exhaustive. Records will be kept to satisfy the requirements of the Environmental Permit and in accordance with the site EMS.

7.10 Low Flows in Receiving Water Course

The H1 assessment demonstrates no impact where flows are at the Q95 level or above. It is expected that in periods of prolonged low flow, discharges may still take place as the proposed discharge rate of 1.5 l/s is approximately 0.5% of the Q95 flow.

8. Raw Materials and Storage

8.1 Pre-treatment Storage Tanks

Angus Fire proposes to use the existing tank farm that is located in the southwest portion of the Site for the storage of contained stormwater. To maximise the storage capacity on-site to retain the back log of contained stormwater all existing tanks are currently being used for the storage of contained stormwater. Following the operation of the new treatment system to clear the back log of contained stormwater on site, the Operator proposes to maintain some of the existing tanks for the storage of contained stormwater prior to treatment (i.e., pre-treatment storage tanks).

Two existing tanks are to be retained for the storage of contained stormwater (39m^3 glass fibre laminate and 40m^3 stainless steel); these have been flushed several times to remove any remnant contaminants that may have been present from historical activities and subject to testing. In addition to the existing tanks, three new MDPE tanks have also been installed. Table 9-1 provides details on the pre-treatment storage tanks.

Table 9-1. Pre-treatment Storage Tanks

Tank	Material of construction	Capacity (m^3)	Existing/New
Tank A1	Glass fibre laminate	39	Existing
Tank A2	Stainless steel	40	Existing
Tank A3	MDPE	25	New
Tank A4	MDPE	30	New
Tank A5	MDPE	30	New

All pre-treatment storage tanks are located within an existing concrete bund that provides secondary containment. A containment assessment was completed by Ramboll in May 2024[3], the containment assessment identified that the secondary containment provides a capacity of 106 m^3. Where multiple tanks are contained with a single bund. the bund should be able to contain 110% of the largest tank or 25% of the total volume. The containment capacity of 106m^3 is 265% of the largest tank and 63% of the total volume.

It was also identified during this assessment that the secondary containment infrastructure was constructed prior to the CIRIA guidance on containment systems being developed. Therefore, the suitability of the secondary containment system for the pre-treatment storage tanks was assessed as part of this permit variation. Based on the capacity, condition of the concrete bund and tertiary containment system present on Site the pre-treatment storage tanks are considered to have suitable containment/preventative measures to prevent an uncontrolled release of contained stormwater to the environment.

In addition, all tanks are routinely inspected and maintained as part of the site's Planned Preventative Maintenance system. Further, Site management undertakes weekly site walkover inspections that includes the checking of secondary containment and emergency equipment.

A bund emptying procedure is in place, all stormwater collected in the bund is transferred to the pre-treatment storage tanks for treatment.

8.1.1 Temporary Storage of Surface Water

To prevent the release of contained stormwater to the environment the Operator has been stockpiling contained stormwater in IBCs that are located throughout the Site. It has been

[3] Ramboll 2024, Environmental Risk Assessment and Containment Assessment, Angus Fire, Bentham, prepared by Ramboll UK Ltd for Angus International Safety Group, Ref.: 1620016373, 31 May 2024

necessary to store contained stormwater in the IBCs as capacity within the existing tanks located on-site has reached capacity.

The IBCs are currently located across the Site in temporary storage locations. Whilst there is no secondary containment infrastructure surrounding the IBCs, where feasible the IBCs are located in areas of the Site where surface water is collected for treatment as contained stormwater. That is, if a spill was to occur from the IBCs in several areas it would not be captured within existing surface water collection infrastructure and retained on-site, there would be a release of contained stormwater to the environment as a consequence of a spill from an IBC stored in several areas on-site. The surface water collection infrastructure and contained stormwater retention procedures on-site do not have sufficient capacity to handle the volume of water that may be released in the event of a spill from the temporary storage areas.

Once operation of the treatment system commences, the Operator has committed to removing the backlog of contained stormwater that is stored on-site in the temporary storage areas as a priority.

In addition, all temporary storage areas are routinely inspected and maintained as part of the site's Planned Preventative Maintenance system. Further, Site management undertakes weekly site walkover inspections that includes the checking of tertiary containment and emergency equipment.

8.2 Treatment System

The treatment system is located within a container adjacent to the existing tank farm.

Containment surrounding the treatment system is routinely inspected and maintained as part of the site's Planned Preventative Maintenance system. Further, Site management undertakes weekly site walkover inspections that includes the checking of tertiary containment and emergency equipment.

An assessment of the secondary containment system against the CIRIA guidance will be completed once the backlog of contained stormwater is cleared.

The risk to the environment from a loss of containment in this portion of the Site has been assessed as part of the ERA, please refer to Section 19 for further information.

8.2.1 SAFF Treatment Process

The SAFF treatment process has a capacity of 15m^3 and is located in a containerised unit. The unit includes an internal waste collection tank that is segregated from the treatment tank. The volume of liquid effluent generated from the SAFF process is expected to be approximately 1 tonne per 2000 tonne of contained stormwater treated or a maximum of 24 kg per day when operating at maximum treatment capacity. Effluent generated from the SAFF treatment process will be collected by a licenced waste contractor for off-site disposal.

The SAFF treatment process is routinely inspected and maintained as part of the site's Planned Preventative Maintenance system, in addition to daily checks during the operation of the system.

8.2.2 PAC Treatment Process

The PAC treatment process takes place within a 3.2 m^3 Mild Steel tank with an internal epoxy coating. The tank is located within the building adjacent to the SAFF treatment plant. Waste generated from the process is stored in an IBC located within the building. The volume of PAC

sludge generated from the treatment process is expected to be <1 kg per tonne of contained water treated or a maximum of 48 kg per day when operating at maximum treatment capacity. Effluent generated from the PAC treatment process will be collected by a licenced waste contractor for off-site disposal.

The PAC treatment process is routinely inspected and maintained as part of the site's Planned Preventative Maintenance system, in addition to daily checks during the operation of the system.

8.2.3 Treated Discharge Storage Tanks

Nine (9) treated discharge storage tanks of MDPE construction are located within the tank farm bund. The tanks store post treatment discharge prior to release following compliance testing. Each tank has been newly acquired for the Site.

Tanks B10 to B14 and B16 to B18 have a capacity of 30 m^3 and tank B15 has a capacity of 25 m^3. The specific bund provides secondary containment for any potential uncontrolled release to the environment and is considered to provide suitable capacity to a loss of containment from the tank(s) (when the volume of treated water storage is incorporated with the pre-treatment storage, the tank bund capacity of 106m^3 is 25% of the total storage). Further, the stormwater collection system on-site provides tertiary containment for this portion of the Site, should the secondary containment not be sufficient to contain a spill (this is considered highly unlikely and would require a catastrophic incident) then the tertiary containment system would isolate the spill on-site. Any spill would be collected for treatment on-site within the treatment system. It is noted that this treated water is intended to be discharged to the River Wenning, so the potential impact of any release from these tanks is considered to be very low.

In addition, all tanks are routinely inspected and maintained as part of the site's Planned Preventative Maintenance system. Further, Site management undertakes weekly site walkover inspections that includes the checking of secondary containment and emergency equipment.

The risk to the environment from a loss of containment in this portion of the Site has been assessed as part of the ERA, please refer to Section 18 for further information.

8.3 Raw Materials

Raw materials required for the operation of the new treatment system comprise powdered activated carbon for the PAC treatment process and a foaming agent for the SAFF. These materials will be stored in accordance with the recommendations made in the safety data sheets (SDS) for the products and on-site procedures.

The PAC is delivered in 500kg bags as a 'polyclay' and stored in the building adjacent to the SAFF plant, whilst the foaming agent is provided in a 205l drum which is stored on a portable bund within the building adjacent to the SAFF plant.

Raw materials storage areas are routinely inspected and maintained as part of the site's Planned Preventative Maintenance system. Further, Site management undertakes weekly site walkover inspections that includes the checking of storage areas and emergency equipment.

8.4 Waste Storage Tanks

There is no additional volume or type of effluent generated from the proposed activity other than those from the SAFF and PAC treatment process described above.

9. Emissions to Air

There are no releases to air from the new treatment system.

This variation also proposed to remove the following emission points from the permit as the processes they relate to are no longer undertaken at the site:

- A1 – Thermal Oxidiser;
- A3 – Coarse Filter Press;
- A4 – Fine Filter Press;
- A5 – Evaporator Condensate Treatment Plant Vent; and
- A6 – Boiler 1

Boiler 2 (emission point A7) is an existing combustion plant which has been rated to <5MWth. As the boiler is rated to <5MWth, it is not required to be compliant with the emission limits required for Combustion Plant as referenced in Schedule 25A of the Environmental Permitting (England and Wales) Regulations 2016 (as amended) until January 2029.

10. Emissions to Water and Sewer

10.1 Emissions to Controlled Waters

Post treatment stormwater will be discharged to the external surface water drainage system via a connection located to the west of the 'Lineside' building. A new emission point (W2) is proposed, located at the sampling point for the discharge, with PFOS emission limits proposed as described in Table 11-3.

Emission point W2 is not currently listed on the Environmental Permit (EPR/XP3832NV), it is proposed to update the permit to allow for release of the post treatment discharge through this emission point.

The emission point connects via overground pipework to site drainage running to a manhole position on the Network Rail railway line adjacent to the southern boundary of the site.

10.1.1 Point Source Release

There will be one emission point from the new treatment system. The locations of the release points are shown on the site layout plan (Figure 2) presented in Appendix 1.

The point source release point to controlled water is defined as:

- W2 – treated surface water.

This represents the compliance point for the emission of treated water, with a sampling point provided at this location.

Angus Fire also propose to amend the location of W1 to more accurately reflect the release of uncontaminated water from the boiler area of the installation to the surface water system. This is located at SD 66580 69047, and it is proposed that the source is described as uncontaminated roof drainage and uncontaminated run-off.

10.1.2 Emission Point Location

The new compliance emission point will be located at grid reference SD 66493 69053. This is adjacent to the tank farm bund where the post-treatment storage tanks are located.

10.1.3 Drainage and Containment Strategy

The new treatment system will initially be connected using hard wearing flexible hose to the surface water drainage system via the emission point; a HDPE pipe will be installed as a permanent connection point. The pipe is located primarily above ground (with underground stretches required just for areas of vehicular access), therefore, any spills associated with the transfer of post treatment discharge from the new treatment system to the discharge location will be contained on-site within the surface water collection system. Only post treatment discharge that has met the compliance requirements of the PLC system is allowed to be discharged from Site, mitigating the risk of untreated contained stormwater being release through the emission point.

In addition, this allows for regular inspection and maintenance of the transfer pipe as part of the Sites planned preventative maintenance system.

10.1.4 Receiving Waterway

The emission point connects to site drainage running to a manhole position on the Network Rail railway line adjacent to the southern boundary of the Site, which receives only surface water from the Site, and from there into a culvert. The receiving culvert also receives a consented discharge (consent reference 017290164) from emission point SP5. This consent covers the release of up to 30 m^3 per day through SP5. The combined maximum allowable discharge from these two locations into the receiving culvert would be 78 m^3 per day.

The underground culvert is understood to consist of cast iron piping under the railway, and then 225mm vitrified clay piping running for approximately 520m in a south westerly direction prior to discharging in the River Wenning at NGR SD 66324 68787 (Easting: 366324, Northing: 468787)(NGR taken from https://map.sepa.org.uk/ngrtool/.

The River Wenning is a non-tidal river that is not located in a nutrient neutral designated catchment[4]

10.1.5 River Wenning data and Impact assessment

The risk presented by emissions from the installation is determined by the condition of the receiving water, in this case the River Wenning.

A gauging station (ref. 72009) has been operating on the River Wenning at Wennington (approximately 6km downstream of the Angus site) since 1970. Data on the flow rates are available on the National River Flows Archive (NRFA) here: https://nrfa.ceh.ac.uk/data/station/info/72009 and real-time flows can be monitored here https://environment.data.gov.uk/hydrology/station/8b386e12-f3d1-4a0b-9e01-3d4367bc9bc1

The NRFA provides a mean flow for the River Wenning of 4.303m^3/s, with low flows (known as the Q95) of 0.281m^3/s.

A H1 assessment has been completed using the Environment Agency's H1 Assessment tool v2.78 (this version has been applied due to issues with the latest update and as advised by the EA). The assessment is based upon the following conditions:

[4] https://www.gov.uk/guidance/using-the-nutrient-neutrality-calculators [accessed 27 March 2025].

River Wenning flow rate: Q95 0.281m³/s
Mean flow 4.303m³/s

Emission flow rate: Mean flow 0.0002m³/s
Maximum flow 0.00055m³/s

Contained stormwater is collected from areas across the western part of the Site, therefore, there is the potential for other contaminants to be present in the post treatment discharge that may require further consideration as part of the new treatment system and proposed point source emissions monitoring. In view of this, testing of the contained stormwater (i.e., pre-treatment) was undertaken to identify if any potential contaminants are present that may require additional controls/treatment.

Any contaminants that were identified in the test results above the laboratory limit of detection (LOD) and were observed to have EQS (as recommended in the Environment Agency H1 guidance) were considered in the H1 assessment. For contaminants that were analysed to be below the LOD, the actual LOD was used as the release concentration in H1, this provides a conservative assessment of potential contaminants.

In addition, the use of raw materials that are considered to be potentially harmful to the environment were included in the H1 assessment.

The SAFF process uses a foaming agent to maximise the efficiency of the process. The product that has been chosen for use is used in cosmetics personal care products, washing and cleaning applications. However, it is considered to be harmful to the environment in its concentrated form and has therefore been assessed for the potential to cause and impact the receiving environment.

The foaming agent is supplied in a 28 – 30% solution in 205 litre drums. The foaming agent is added to the SAFF process to aid the development of a rising foam column which extracts PFAS molecules and thus improves the efficiency.

Prior to addition of the foaming agent to the treatment process, it is diluted to a 3% solution. The quantity required to achieve the treatment process is very low at 100 ml per 2.1 m³ batch (or 0.0048% by volume). It is expected that 100% of the foaming agent will be removed in the foam fraction within the SAFF unit. However, in order to provide a conservative approach to the impact assessment, it has been assumed that the removal rate is 95% which would leave 214 mg of foaming agent in the discharge from one batch or 0.102 mg/m³.

An environmental quality standard is not available for the foaming agent. Therefore, the release concentration has been compared to available toxicity data. Data provided in the safety data sheet indicates that the Predicted No Effect Concentration is 0.42 µg/l in fresh water.

The contaminant concentrations observed to be above the limit of detection that were identified to have an EQS were considered in addition to the PFOS and (assumed) foaming agent concentrations in the post treatment discharge. The concentrations of the contaminants considered in the H1 assessment are shown in the Table below:

Table 10-1: Emissions Inventory

Substance	Mean Concentration (µg/l)	Maximum Concentration (µg/l)

PFOS	0.01	0.01
Boron	19	19
Cadmium and its Compounds (<40mg/l$CaCO_3$)[1]	0.04	0.04
Chromium VI (95%ile) (dissolved)[25]	2	2
Copper	5	5
Lead and its Compounds	1.9	1.9
Nickel and its Compounds	2.2	2.2
Zinc	129	129
Sulphate	16200	16200
Dichloromethane (Methylene Chloride)	52	52
Foaming Agent[3]	0.102	0.102
Arsenic[5]	0.9	0.9
Mercury[5]	0.5	0.5
Vanadium (0 - 200 mg/l CaCO3)[45]	0.6	0.6
Benzene[5]	0.5	0.5
Toluene[5]	5	5
Naphthalene[5]	1	1

Notes:

1. $CaCO_3$ was not analysed as part of the analytical program, therefore, the most conservative EQS was used for the assessment
2. Chromium was not speciated as part of the analytical program, therefore, the total chromium test results were assessed against the most conservative EQS.
3. The foaming agent does not have an EQS, therefore the Predicted No Effect Concentration described above was used as the EQS.
4. $CaCO_3$ was not analysed as part of the analytical program, therefore, the most conservative EQS was used for the assessment
5. Concentrations associated with these compounds is equivalent to the limit of detection of the laboratory that was used to undertake the testing. These compounds were not detected above the limit of detection in the sample analysed.

Applying these criteria, and assuming a background PFOS concentration in the River Wenning of 50% of the EQS (as recommended in the Environment Agency H1 guidance), the assessment results are:

Table 10-2: H1 Results at Q95 (low) Flows

Substance	**Test 1**		**Test 2**	
	Annual Average	**Maximum Allowable**	**Annual Average**	**Maximum Allowable**
PFOS	Fail – Concentration exceeds 10% of EQS (0.0007 ug/l)	Pass – Concentration is less than 10% of EQS (36 ug/l)	Pass – Process contribution (1.08%) is well below the screening threshold (4%)	Pass
Boron	Pass - Concentration is	N/A	N/A	N/A

	less than 10% of EQS (2000 ug/l)			
Cadmium and its Compounds (<40mg/l$CaCO_3$)[1]	Fail – Concentration exceeds 10% of EQS (0.07 ug/l)	Pass – Concentration is less than 10% of EQS (0.44 ug/l)	Pass – Process contribution (0.04%) is significantly below the screening threshold (4%)	Pass
Chromium VI (95%ile) (dissolved)[2]	Fail – Concentration exceeds 10% of EQS (3.4 ug/l)	N/A	Pass – Process contribution (0.04%) is significantly below the screening threshold (4%)	Pass
Copper	Fail – Concentration exceeds 10% of EQS (1 ug/l)	N/A	Pass – Process contribution (0.35%) is significantly below the screening threshold (4%)	Pass
Lead and its Compounds	Fail – Concentration exceeds 10% of EQS (1.2 ug/l)	Pass – Concentration is less than 10% of EQS (14 ug/l)	Pass – Process contribution (0.11%) is significantly below the screening threshold (4%)	Pass
Nickel and its Compounds	Fail – Concentration exceeds 10% of EQS (4 ug/l)	Pass – Concentration is less than 10% of EQS (34 ug/l)	Pass – Process contribution (0.04%) is significantly below the screening threshold (4%)	Pass
Zinc	Fail – Concentration exceeds 10% of EQS (10.9 ug/l)	N/A	Pass – Process contribution (0.83%) is well below the screening threshold (4%)	Pass
Sulphate	Pass - Concentration is less than 10% of EQS	N/A	N/A	N/A
Dichloromethane (Methylene Chloride)	Fail – Concentration exceeds 10% of EQS (20 ug/l)	N/A	Pass – Process contribution (0.036%) is significantly	Pass

			below the screening threshold (4%)	
Foaming Agent	Fail - Concentration exceeds 10% of EQS (0.42 ug/l)	N/A	Pass – Process contribution (0.02%) is significantly below the screening threshold (4%)	Pass
Arsenic	Pass - Concentration is less than 10% of EQS	N/A	N/A	N/A
Benzene	Pass - Concentration is less than 10% of EQS	N/A	N/A	N/A
Mercury	N/A	Fail – Concentration exceeds 10% of EQS (0.07 ug/l)	Pass	Pass – Process contribution (1.42%) is well below the screening threshold (4%)
Naphthalene	Fail - Concentration exceeds 10% of EQS (2 ug/l)	N/A	Pass – Process contribution (0.04%) is significantly below the screening threshold (4%)	Pass
Toluene	Pass - Concentration is less than 10% of EQS	N/A	N/A	N/A
Vanadium	Pass - Concentration is less than 10% of EQS	N/A	N/A	N/A

Test 3 and 4 are not required as the discharge screens out as insignificant at Test 2 for all substances.

As shown above, the process contributions for majority of substances are considered significantly below 4% of EQS at Q95 (low) flow of the River Wenning. PFOS and zinc concentrations were considered well below 4% of EQS at Q95 (low) flow. It is noted that the process concentration for all substances with the exception of PFOS was based on the pre-treatment concentration of that substance or the limit of detection for the compound used at the laboratory that analysed the compound if no concentration was detected.

It is expected that there will be some reduction in the concentration of these substances as a consequence of the treatment system. Therefore, the assessment above is considered a conservative assessment of risk to the environment from the discharge of post treatment discharge into the River Wenning.

The H1 assessments will be retained at the site and will be subject to review following the collection of test results following operation of the treatment system.

Further to the assessment completed of the assessment of the potential impact of the foaming agent, the safety data sheet states the substance contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Using the PNEC as the EQS, the release of foaming agent screened out as insignificant at Test 2. It is therefore considered that the potential worst-case release of foaming agent will not result in significant impact of the receiving water.

The H1 assessment developed for this application is presented in Appendix 4.

10.1.6 Point Source Emissions Monitoring

Angus proposed to monitor discharge point W2 for the determinands set out in Table 10.3 on a weekly basis for the first six months. It is proposed that the monitoring frequency is then reduced to monthly for the second six months of the year. Following the first year of operation and subject to compliance monitoring results, it is proposed that a review of the monitoring frequency is undertaken to determine the most suitable test/reporting frequency for the Site.

The installation will undertake the monitoring, with analyses being completed by a UKAS accredited laboratory.

Table 10-3: Point Source Emissions Monitoring – Surface Water

Monitoring point reference	Parameter	Limit	Reference period	Monitoring frequency
Release Point W2	PFOS	10ng/l	Periodic	Weekly
	pH	N/A	Periodic	Weekly
	Conductivity	N/A	Periodic	Weekly
	COD	N/A	Periodic	Weekly
	Zinc	0.6mg/l	Periodic	Weekly

Note that if the emission limits are breached within Table 10-3, then this will result in the triggering of the sites remedial actions and surface water will be retained at the site until such times as the breach has been investigated and all reasonable actions required to ensure no

further breaches have been taken. This will include notification to the appropriate regulatory authorities.

Monitoring parameters described above were determined based on substances referenced in the Environment Agency's H1 Assessment tool v2.78 and Section 7.3 of the 'Appropriate Measures for a Waste Operation. Substances that have a process contribution of >0.5% (well below the 4% of EQS insignificance threshold) were included in the proposed emissions monitoring plan, with the exception of 'Mercury' as this compound is not considered to be a relative hazardous substance for the site nor was it detected in the analytical results. Monitoring parameters for PFOS are based on the achievable concentration from the proposed treatment process, whilst the proposed limit for Zinc is designed to ensure an insignificant impact is maintained during low flow of the River Wenning.

10.2 Emissions to Sewer

There are no releases to sewer from the new treatment system.

11. Waste Minimisation and Management Techniques

Wastes generated from the new treatment system will be managed in accordance with existing waste procedures and the waste hierarchy.

Wastes from the new treatment system will be is stored in two locations. Liquid waste generated from the SAFF treatment process will be stored in an internal tank within the treatment system and PAC sludge will be stored in an IBC located adjacent to the treatment tank. The waste will be collected by a licensed contractor for off-site removal and disposal in accordance with existing site procedures and processes.

The new treatment system has been optimised for the removal of PFOS (as well as other PFAS compounds) to meet the emission limits for the Site and provide a robust treatment process. Significant waste volumes are not expected to be generated from the facility, the typical waste volumes generated per volume of surface water treated are described in Table 11.1.

Table 11.1. Waste generated by the proposed treatment process

Daily Treatment Volume	SAFF Treatment (kg/day)	PAC Treatment (kg/day)	Total (kg/day)
Mean (17 m^3)	8	17	25
Max (48 m^3)	24	48	72

12. Emissions to Soil and Groundwater

There are no emissions to soil and groundwater from the new treatment system. All treatment processes and transfer pipes are located above ground on hardstanding and the discharge point releases into a culvert of engineered brick material.

13. Noise and Vibration

The majority of the treatment system involves the storage of contained stormwater or post treatment discharge and therefore are not considered to be significant noise generating activities.

The SAFF unit is fully enclosed within a container. The doors are normally kept closed during operation. The potential sources of noise from the SAFF treatment are as a result of the pumping of water to and from the unit, and in between the internal tanks. These processes are not generally regarded as significant sources of noise.

Noise monitoring was undertaken to demonstrate that the ETP would not result in an impact to off-site receptors was undertaken.

Measurements of noise were taken inside of the SAFF container and adjacent to the SAFF primary processing vessel. The noise levels were recorded at 78.9dB(A).

Additional monitoring was undertaken external to the SAFF container, adjacent to the SAFF primary processing vessel and immediately outside the container (where it is expected that the highest noise levels would be recorded), with noise levels recorded at 55.5 dB(A).

The PAC treatment process involves mixing/agitation to provide the maximum available surface area of carbon for the removal of contaminants, the process is undertaken within a building and does not generate significant noise or vibration.

Since the closest potential noise receptors are ~65m away, and external noise levels are at 55.5 dB(A) at 1m from the noise source, the levels of noise are not considered to be significant.

It is proposed that the ETP will be operational 24 hours per day during the initial period of operation in order to process the significant backlog of water contained on site. However, following the initial period, the ETP can be operated only during normal operating hours which will further limit the potential for nuisance.

Angus will routinely undertake monitoring of the new treatment system to determine if excessive noise is generated during operation. Should excessive noise be determined to be generated, then further assessment will be completed to identify additional noise mitigation measures, including the production of a noise management plan if required.

Refer to the ERA presented in Section 18 for further information related to the assessment of the potential risk to the environment and human health from noise generated from the new treatment system.

14. Dust And Particulate Matter

There are no dust emissions from the new treatment process. The new treatment process is for the treatment of contained stormwater, therefore, the generation of dust is not expected. Although PAC has the potential to generate dust, handling and use of PAC is undertaken within a building to minimise the risk of fugitive dust emissions.

15. Odour

There are no odour emissions from the new treatment process. The new treatment system was designed for the removal of PFOS from contained stormwater; as PFOS, nor any of the treatment chemicals are not an odorous, it is not expected that odour will be generated from the new treatment system.

16. Energy Management

The site will operate to an integrated management system that is certified to ISO14001. The site will therefore identify key performance indicators and develop objectives and targets relating to energy consumption.

The treatment system has been optimised to run as efficiently as possible to reduce energy demands of the system.

It should be noted that an alternative treatment/disposal options for the contained stormwater is high temperature incineration. The use of high temperature incineration to dispose of 48 m^3 per day of contained stormwater is considered to be highly inefficient and will require a significantly higher amount of energy compared to the new treatment system.

17. Site Condition

Ramboll prepared a Site Condition Report (SCR) for the facility (Ref. 1620016167-003 High Bentham SCR _2.0 pw) based on the Environment Agency, Environmental Permitting Regulations H5 Guidance, "Site Condition Report – Guidance and Templates", Version 3.0, 2013. The SCR was prepared in February 2025.

It is considered that the SCR continues to represent the baseline condition of the Site at the time of the preparation of this Permit Variation. However, in recognition of the addition of a new relevant hazardous substance being added to the site inventory (foaming agent), the accompanying Stage 1-3 assessment has been update to reflect the change in inventory.

18. Environmental Risk Assessment

18.1 Qualitative Environmental Risk Assessment

A qualitative environmental risk assessment (ERA) has been undertaken in line with the Environment Agency guidance "Risk assessment for your environmental permit"[5].

The methodology involves:

- Hazard identification – identifying potential scenarios that could result in environmental impact.
- Receptor identification – determination of the ecological and human receptors that could be affected.
- Pathway analysis – evaluation how potential contaminants may travel through environmental media to receptors.
- Risk characterisation – quantifying the risks based on exposure and potential effects.

[5] https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit

- Risk management – mitigation of potential risks.

The assessment includes an evaluation of normal operation and emergency scenarios. The output from the ERA is presented in Table 18-1

18.2 Receptors

As discussed above a receptor is something that could be adversely affected by a pollutant. A Nature and Heritage Screening Report has been provided by the EA as part of the pre-application engagement process. The Nature and Heritage Screening Report has identified a number of Habitats within 2km of the site. Other potential receptors within 10km of the site's Environmental Permit boundary have also been identified. The receptors identified as part of the screening assessment and their hydraulic connectivity to the site are described in the Table 18-1.

Where the potential receptor has been identified to be hydraulically linked to the site (i.e., source-pathway-receptor) an assessment of the potential impact has been included. Further assessment of the environmental risk associated with the operation of the new treatment system, including the appropriate measures undertaken to mitigate the risk is provided in Appendix 5.

Table 18-1: Location of Potential Receptors to the Site

Nature and heritage conservation sites, protected species and habitats			
Special Areas of Conservation (cSAC or SAC)			
Receptor	**Distance to Receptor (approx.)**	**Hydraulically Connected**	**Potential Impact on Receptor**
Ingleborough Complex	5 km	No Receptor is located north east (upstream) of the discharge location.	N/A
Special Protection Area (pSPA or SPA)			
Bowland Fells	5 km	No Receptor is located south of the discharge location but upstream of the River Wenning and tributaries.	N/A
Local Wildlife Sites (LWS)			
Cowslip Hill	900 m	No Receptor is located east (upstream) of the discharge location.	N/A

Branstone Beck Wood	1,100 m	No Receptor is located east (upstream) of the discharge location.	N/A
Bowtham Wood and extension	1,300 m	No Receptor is located east (upstream) of the discharge location.	N/A
Eskew Lane Wood, Low Bentham	1,950 m	Yes	A H1 screening assessment was completed for relevant hazardous substances (RHS) of the site. The H1 screening assessment concluded that the process contribution of the substances assessed was not significant and therefore unlikely to have an impact on environmental receptors. The H1 assessment was completed on the assumption of the maximum discharge flow rate and pollutant loading at Q95 (low) flow of the River Wenning. In view of the conservative nature of the H1 assessment and distance to the downstream receptor the potential risk to the downstream receptor is low.
John's Bank Grasslands	2,000 m	Yes	
Ancient Woodland			
Branstone Beck Wood	1,100 m	No Receptor is located east (upstream) of the discharge location.	N/A
Bowtham Wood	1,300 m	No Receptor is located east (upstream) of the discharge location.	N/A

18.3 Migratory Fish Routes

The Nature and Heritage Screening Report provided by the EA as part of the pre-application engagement process also identified that the migratory routes for three protected species (Atlantic Salmon, European Eel and River Lamprey) were identified within 2 km of the site.

As outlined above, and Section 10 of this Report, the H1 screening assessment completed on the process contributions for majority of substances, at the potential post-treatment discharge concentrations, are considered significantly below 4% of EQS at Q95 (low) flow of the River Wenning. Therefore, the impact of these substances is not considered to be significant.

In addition to the potential impact of substances on migratory species, the flow rate of the discharge can have an effect on the protected species migratory route if it causes a significant change in the temperature, depth or flow rate of the river.

Contained stormwater is stored on-site prior to treatment and discharge at location (W2). The treatment process is not a thermal treatment process and does not involve chemical reactions that would involve the loss or gain of heat in the post-treatment discharge. Post treatment, the water is held in the discharge tanks pending confirmatory analysis, which will provide sufficient time for the water to balance to ambient temperature.

In view of this, it is considered that the temperature of the post-treatment discharge will be at ambient temperature and will not have a significant impact on the temperature of the River Wenning.

The worst-case scenario for the release of post treatment discharge into the River Wenning would be the release of post-treatment discharge at the maximum flow rate (0.00055 m^3/s) at Q95 (low) flow of the River Wenning (0.281 m^3/s). Based on this worst-case scenario the post-treatment discharge would comprise 0.2% of the total flow rate of the River Wenning. Based on this assessment the release of the post treatment discharge to the River Wenning is not considered to have a significant impact on the flow rate of the river.

There are no proposed engineering changes to the outlet to the River Wenning, therefore, there is no change to depth of the river as a consequence of the new treatment system.

The potential impact to migratory fish is therefore considered to be insignificant.

Table 18-2: Qualitative Environmental Risk Assessment						
Hazard	**Receptor**	**Pathway**	**Risk Management**	**Probability of Exposure**	**Consequence**	**What is the Overall risk?**
Loss of containment from the influent tanks	River Wenning.	Overland flow Drainage system	There are five influent tanks with a total capacity of 164 m^3. The site policy is that any of the storage tanks on site are not filled to their maximum capacity which prevents the potential for overfilling. The tanks are located within the tank farm bund which provides secondary containment. In the very unlikely situation that the bund could not contain the contents, tertiary containment is provided in the site's drainage system and sump. Contaminated material could be pumped from the sump back to the influent storage tanks for treatment. Visual inspections of the treatment process and tank farm is undertaken daily. In addition, the area is monitored by CCTV which is accessible to authorised personnel via a remote app. Emergency response procedures & Spill team in place.	Unlikely due to control measures that are in place.	Contamination of the River Wenning	Low
Loss of containment from the discharge tanks	River Wenning.	Overland flow Drainage system	There are nine discharge tanks with a total capacity of 265 m_t^3. However, the maximum volume stored is 238 m^3 in line with the site policy of not utilising the full capacity of the tanks to prevent overfilling. The tanks are located within the tank farm bund which provides secondary containment. In the very unlikely situation that the bund could not contain the contents, tertiary containment is provided in the site's drainage system and sump. Contaminated material could be pumped from the sump back to the influent storage tanks for treatment. It is noteworthy that only treated surface waters will be contained within the discharge tanks and therefore there is minimal risk to the environment. Visual inspections of the treatment process and tank farm is undertaken daily. In addition, the area is monitored by CCTV which is accessible to authorised personnel via a remote app.	Very unlikely due to control measures that are in place and the tanks contain only treated surface water.	Contamination of the River Wenning	Very Low

Loss of containment from the treatment tanks	River Wenning.	Overland flow Drainage system	The treatment train is located within a containerised system which provides effect secondary containment for the tanks held within. The treatment system is a batch process that is under PLC control. Therefore, there is little potential for the tanks to be overfilled due to the metering of influent into the tanks. In addition, each of the tanks have level control to prevent overfilling. Visual inspections of the treatment process and tank farm is undertaken daily. In addition, the area is monitored by CCTV which is accessible to authorised personnel via a remote app. Tertiary containment is provided in the sites drainage system and sumps. Material would be contained on site and pumped back to the influent tanks for treatment.	Very unlikely due to control measures that are in place.	Contamination of the River Wenning	Very Low
Treatment failure	River Wenning.	Surface water discharge point W2	The treatment process has been optimised to ensure effective treatment of contaminated surface waters. The treated material is sampled prior to storage in the discharge tanks. The tanks are only discharged when the analytical data confirms that the treatment was effective. The treatment train is under PLC control, the tanks can only be discharged when the analytical data is entered and is less than the target value. The PLC system cannot be over ridden or bypassed by process operators.	Very unlikely due to control measures that are in place.	Contamination of the River Wenning	Very Low

Failure of treatment equipment	River Wenning.	Surface water discharge point W2	All treatment plant will be checked on a daily basis. Any issues with plant will be reported immediately to the Site Manager or deputy. As the process is controlled by a PLC system, any malfunctions or deviations are flagged on the control panel. The system includes integrated CCTV and all key components include monitoring sensors which will issue SMS text messages upon recording of a value outside their defined operational boundary. A programme of planned preventative maintenance will be implemented and all plant and equipment will be subject to regular maintenance in accordance with the manufacturer's guidance. The site may keep critical spares so that minimal disruption will be experienced in the event of plant failure or breakdown. If the treatment plant fails or is offline for any reason, surface water separated for treatment will be retained within the influent tanks and/or IBCs and either processed through the treatment plant once the issue is resolved, or transferred offsite for treatment/disposal.	Unlikely due to control measures that are in place.	Contamination of River Wenning.	Low
Insufficient capacity in the treatment system	River Wenning.	Surface water discharge point W2	There are five influent tanks with a total capacity of 164 m^3. The average volume of water collected at site was recorded at 17 m^3/day. Therefore, there is significant storage capacity provided in the tanks. Surface water will be treated as soon as possible and will not be allowed to accumulate in the storage tanks, this will ensure that ullage in the tanks is maintained. However, the site has contingency for storm events. In the unlikely event that there is insufficient capacity in the influent tanks, then surface water can be stored in IBCs. Storage will be provided in the warehouse building as far as is practicable. It is noteworthy that in the event of a significant storm event, the concentration of contaminants in the surface water to be treated will be significantly diluted and therefore impose less of a risk. In addition, the receiving water will be in high flow and provide significant dilution to any contamination.	Unlikely due to control measures that are in place.	Contamination of River Wenning.	Very Low

Presence of PFOS in surface water	River Wenning	Surface water discharge point W2	Direct discharge to the River Wenning will only occur from areas of the site where PFOS concentrations are confirmed as non-detectable (to a Limit of Detection of 10ng/l). Separation of surface water flows will be applied to retain water from areas where elevated concentrations of PFOS are confirmed. Surface water with elevated PFOS concentrations will be processed through the bespoke treatment system capable of achieving 10ng/l PFOS within the discharge. Equipment associated with the separation process (sumps, pumps and above-ground drainage pipework) will be inspected at both the start and the end of the work day to ensure that they continue to operate effectively. The Site Manager or deputy will also cease discharge to the River Wenning and retain the surface water on site in the event that monitoring returns demonstrate PFOS levels above the agreed limit. The discharge will recommence once PFOS levels are below the agreed limit.	Unlikely due to the control measures in place.	Contamination of River Wenning	Low
Over dosing treatment chemicals	River Wenning	Surface water discharge point W2	Raw materials used in the treatment process are limited to powdered activated carbon (PAC) and a foaming agent. The treatment process has been optimised to minimise the amount of raw materials used and waste generated from the process. The treatment process is under PLC control that doses the exact quantities of raw materials required. Process operators are unable to over ride the control system.	Unlikely due to the control measures in place.	Contamination of River Wenning	Low

Loss of containment of treatment chemicals.	River Wenning.	Overland flow Drainage system	Raw materials used in the treatment process are limited to powdered activated carbon (PAC) and a foaming agent. PAC will be stored in bags within the warehouse building. The material is inert and therefore no potential for environmental impact. The foaming agent is in liquid form and is stored in 205l drums inside the warehouse building on portable bunds. The foaming agent is considered to be harmful to the environment in concentrated form. However, it is diluted to 3% prior to addition to the process. The warehouse building has Aco drains to prevent spilled material exiting through the doors. Spill kits are located throughout the site and personnel are trained in their use. If a spillage occurred on the yard area then it would be contained using spill kit material and/or drain covers. If it were to enter the drainage system then it could be isolated and removed for offsite disposal.	Very unlikely due to the control measures in place and quantities of materials stored.	Contamination of River Wenning	Very low
Waste generation	Carbon emissions from incineration and transport offsite.	Offsite waste processing via incineration.	Wastes generated from the new treatment system will be managed in accordance with existing waste procedures. The SAFF process lifts PFAS molecules out of water in a rising foam column. The condensed PFAS volumes are sent for destruction via high temperature incineration. The second stage of the treatment process is the addition of PAC as a polishing agent and remove residual PFOS. Waste emanating from the second stage is also removed for high temperature incineration. The treatment process has been optimised to minimise the amount of raw materials used and waste generated from the process.	Very unlikely due to the control measures in place and quantities of materials stored.	Raw material use and carbon emissions.	Very low

Fire Water	River Wenning.	Overland Flow Site drainage system	The process is designed to treat contaminated surface waters. The raw materials to be used are not flammable and the risk of fire is very limited. However, the facility is monitored 24 hours by CCTV and the site security team. The treatment train is housed in a containerised unit. This would provide containment in the event of an equipment fire. The site has emergency preparedness and response procedures and fire extinguishers are located throughout the site. In the unlikely event of large volumes of fire water being generated, this is likely to be contained in the sites drainage system and sumps and could be removed for offsite disposal. The likelihood of treatment chemicals reaching the river in volumes to result in impact is very low.	Very unlikely due to the control measures in place.	Contamination of the River Wenning and local ground contamination.	Very low.
Noise and Vibration	Local fauna and local redents.	Air and ground vibration.	The treatment system is located in the south-west portion of the site, and centrally to the wider site area, away from off-site receptors. Majority of the treatment system involves the storage of contained stormwater or post treatment discharge. The treatment system processes (PAC and SAFF) that are potentially noise and vibration generating are containerised and/or located within a building to reduce the potential impact of noise and vibrations. Noise monitoring undertaken at the site demonstrated that noise levels external to the container immediately adjacent to the main operating unit were <60dBA. The noise levels measured on-site are significantly lower than the level of noise at which employers must assess a risk to workers health, as stated in The Control of Noise at Work Regulations (80dbA).	Very unlikely due to the control measures in place and the nature of the treatment system processes.	Disruption of local fauna and nuisance.	Very low

Appendix 1
Figures

Appendix 2
Treatment Train Process

Appendix 3
Management Systems

Appendix 4
H1 Assessment Tool

Appendix 5
Appropriate Measures

Appendix 6
Stage 1 – 3 Assessment