2026

DIMLINGTON TERMINAL

EPR/PP3237CR/V008

Proposal for the Addition of Activated Carbon Adsorbers at a Surface Water Discharge Point

PERENCO

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Contents

1 Introduction

This report has been prepared to provide the Environment Agency (EA) National Permitting Service with information on the proposal for the addition of two (2) Activated Carbon Adsorber units at a Surface Water Discharge Point to further improve the quality of discharged rainwater at the Perenco (PUK) Dimlington Gas Terminal (the site) via the existing W2 emissions point.

Perenco seeks this permit variation as a proven solution to improve the overall quality of discharged rainwater from the site. There will be no change to the volume of discharge from the site in accordance with the existing permit. The water source remains unchanged and the addition of the filtration system does not alter the volume or source of the discharge/emission, it purely improves the quality of the effluent discharged by introducing a carbon filtration system. The installation trial from 18th February 2024 to 27th April 2024 and since LEP for the operation of the filters was granted on 12th June 2025 has proven that the treatment system work and improves the overall environmental outcome of the site.

2 Background

The Perenco (PUK) Dimlington Gas Terminal is located in a rural area near the village of Easington on the East coast of Yorkshire, just north of Spurn Point. The terminal receives North Sea natural gas, which is processed and exported to National Gas Transmission. The site operates under an Environmental Permit (Ref: EPR/PP3237CR).

All produced water from the processing and transmission of natural gas is unconnected with this variation and continues to be removed from the site by road tankers in accordance with the permit.

This variation is purely concerned with the improvement of the quality of overflow rainfall from the surface water drainage system via W2.

Being a major accident hazard site, in line with other industrial/aviation/firefighting sites, various Aqueous Film-Forming Foam products have been historically stored, used and tested, leading to the potential that surface water may contain traces of the component of the product. PFAS is a component of the Aqueous Film-Forming Foam (AFFF) used at site. Analysis of the site stormwater and firewater pond (which contains purely rainwater and rainwater run-off) showed the presence of short-chain PFAS in water samples collected from the ponds.

The site Environment Agency Inspector approved the trial for the use of activated carbon adsorber (a passive filter) for further improving the quality of the rainwater discharged offsite via the pond. The trial period ran from 18th February 2024 to 27th April 2024. From the laboratory results obtained following the trials, the filters successfully and significantly reduced the chemical components of AFFF.

Subsequently, the EA Site Inspector instructed the site to conclude the trial and remove the equipment and submit a permit variation application and obtain approval before a permanent carbon adsorber system could be made operational (see CAR form 0497842).

CAR Form PP3237CR/0492440 which is attached to this application contains details of the review and feasibility assessment of several proposed methods for PFAS/PFOS abatement including Reverse Osmosis, Ion Exchange Resin, Electrochemical oxidation etc, which was conducted with support from a specialist vendor. The trials and since LEP for the operation of the filters was granted on 12th June 2025 has confirmed the use of activated carbon adsorber as a suitable technology for PFAS abatement at the site.

3 Drainage System

The Open Drainage System across the Dimlington terminal consists of stormwater and oil water drains. A layout diagram illustrating the onsite drainage at Dimlington is provided in Figure 1.

3.1 Oily Water Drainage

On the Dimlington site, hard standing areas where oil spillage is a recognised possibility are drained through an oily water sewer to the Offsite Disposal Tank T-06. Contaminated water is loaded from the Offsite Disposal Tank T06 to road tankers for removal from site.

The oily water drain network ensures no contaminated water gets into the surface water drainage system and into the storm and firewater ponds.

3.2 Surface / Storm Water Drains

At Dimlington Terminal, the storm water drains perform surface water and land drainage from the open areas of the site to a stormwater pond via catch pits and oil interceptors.

Storm water from concrete paved and kerbed areas that is Consistently uncontaminated by hydrocarbons under normal operation conditions is drained by a network of concrete storm water drains. Paved areas are locally contoured to catch pits and gullies to intercept storm water run-off. Drainage from slugcatchers, the methanol loading / unloading and storage / distillation areas and the Gas Compression Trains hardstands flows to local interceptors before joining drainage from other areas. Hard standing under the gas compressor area would intercept any release from the compressor lube oil storage tanks and route it to a dedicated oil interceptor.

All storm water drainage is routed to the site oil interceptor on the inlet to the storm water pond. Water then enters the storm water pond by gravity flow over interceptor baffles. All interceptors are regularly checked for traces of hydrocarbons, which are removed by a skimming pump or vacuum tanker.

3.3 Firewater System

Effluent generated from activating foam pourers during wet testing of deluge systems are contained in bunds and transferred to IBCs for safe disposal after completion of function tests, this ensures no entry of contaminated water into the surface water drainage system at site or release into the environment via the storm and firewater ponds.

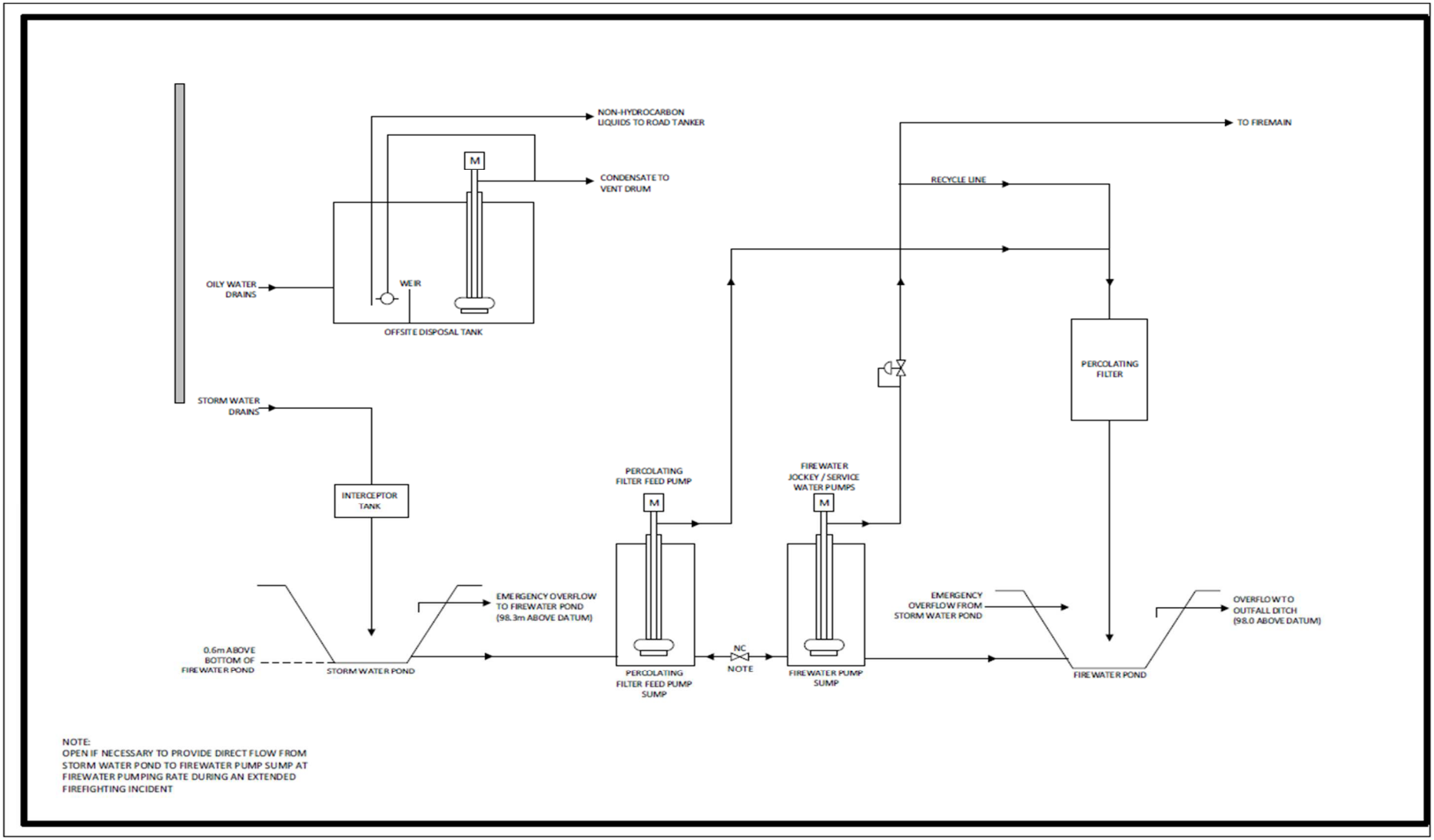

Figure 1: Drains Layout

4 PFAS / PFOS Contamination at site

The site drainage system cannot currently be segregated further than it already is, the PFAS/PFOS contamination at site is linked to the long historic use of firefighting foam like other industrial sites in the UK.

There are separate routes for contaminated and uncontaminated water leaving the site which has been described in Section 3.

The site firewater and storm water ponds have been found to contain various concentration of PFAS/PFOS.

4.1 Summary of PFOS levels in the firewater pond

The PFOS levels in the water to be treated which was obtained during the trials in 2024 can be seen in Table 1 below. The surface water in the fire pond has been characterised as **non-hazardous** and can be seen in the waste characterisation report submitted as part of this variation.

(A spreadsheet of other Total PFOS results obtained after the LEP was granted has also been provided as part of this submission)

Table 1: Summary of PFOS levels detected in the firewater pond during 2024 trials

Parameter	Result 18/02/24	Result 28/02/24	Result 08/03/24	Result 18/03/24	Result 28/03/24	Result 07/04/24	Result 17/04/24	Result 27/04/24
Total PFOS	1130 ng/l	767 ng/l	743 ng/l	762 ng/l	734 ng/l	864 ng/l	764 ng/l	891 ng/l

5 Carbon Adsorber Unit Details

The proposed abatement system is a mobile activated carbon adsorber for the treatment of non-corrosive liquid streams. It is pre-loaded with activated carbon which helps in the treatment and removal of PFAS/PFOS contaminated liquid waste.

Perenco Dimlington terminal will utilise two (2) activated carbon adsorbers connected in series, the units will be replaced in lead – lag position once we have a PFAS/PFOS breakthrough in the units (remove 1st unit (lead position), move 2nd (lag position) into 1st (lead position) and bring a new unit in 2nd or lag position).

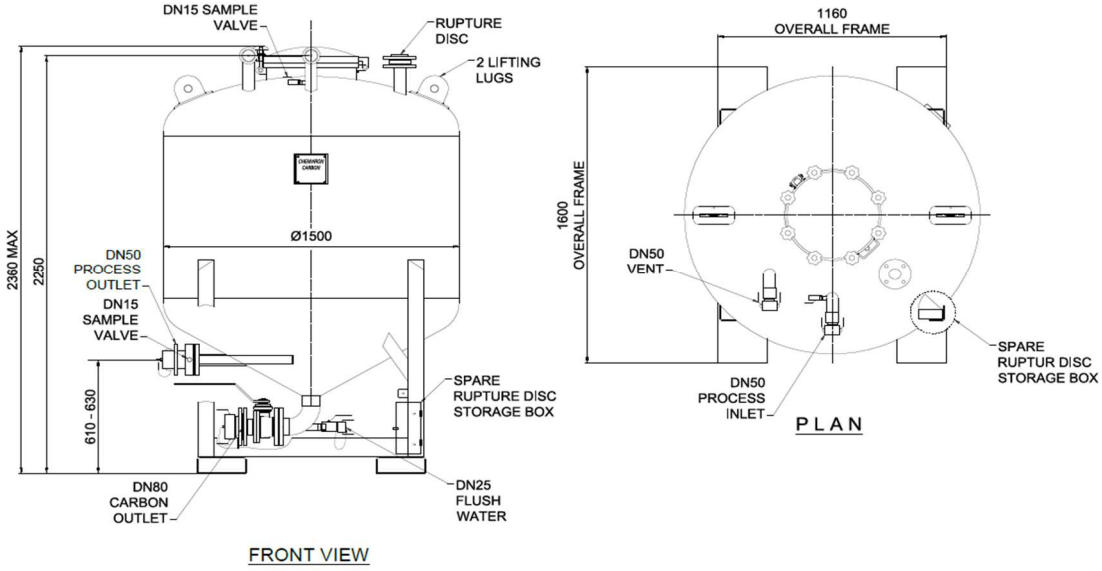

Figure 1: 14 m^3/hr Activated carbon units (Used during the trials)

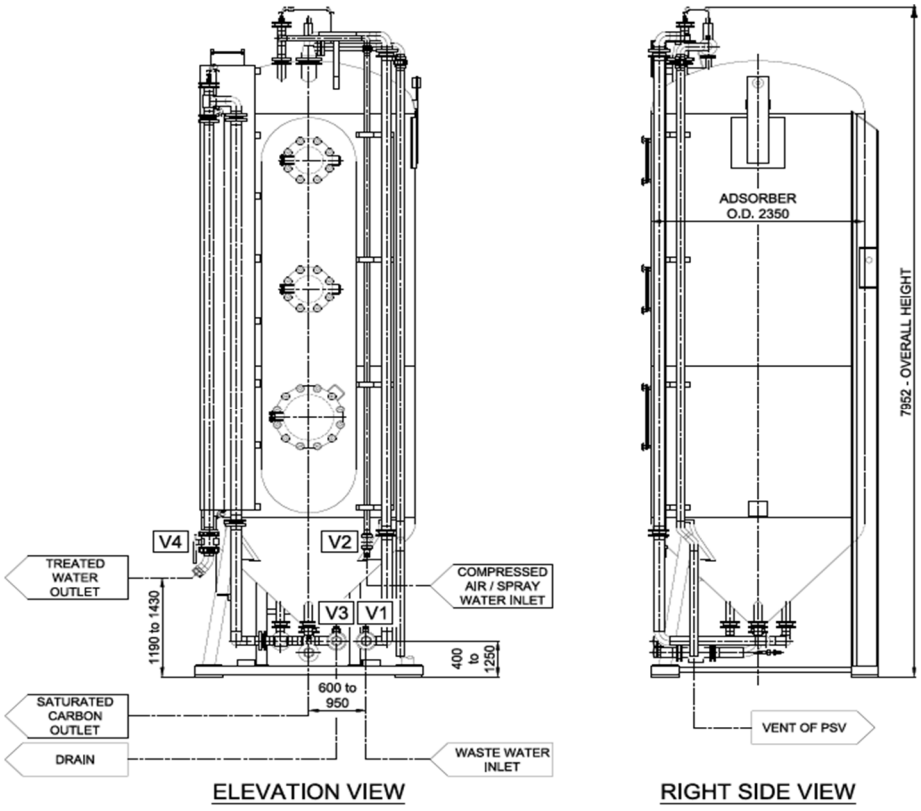

Figure 2: 80 m^3/hr Activated carbon units (To be Installed)

The proposal is capable of instantaneously filtering up to 80 m^3/hr; however, the flow through the unit will be utilised based on treatment needs (lower flow rates during periods of low rainfall and higher flow rates during periods of high and sustained rainfall).

The smaller units which operated with a flowrate of 6 – 10.5 m^3/hr were sufficient in handling rainfall events during the summer and autumn season, however, they were not sufficient in handling four (4) specific weather events that occurred in the winter (December 2025 and January 2026), a decision was made to upgrade and install a larger capacity filter capable of handling rainfall events across all seasons.

Only overflow rainwater from the storm pond will be discharged offsite when levels require and this is highly rainfall dependent. The discharge from site is intermittent (further details are in Section 5).

5.1 Expected Unit Characteristics and Setup

Units	Carbon Adsorption Unit (x2, in series)
Carbon consumption, typical	10 - 100 tonnes/y
Carbon volume per adsorber	6500 – 9000 kg; up to 21m^3
Flow rate, maximum	Up to 80 m^3/h (Peak capability) (equal to 1,920 m^3/day of discharge)
Expected typical/normal operational flow rate	10 – 20 m^3/h
Height	8.1 m
Shipping Weight (dry carbon)	25 tonnes
Weight – operating (flooded)	35 tonnes
Power consumption	Nil (passive filter unit)

DISCLAIMER: *This is the unit proposed to be used but Perenco UK Ltd may change to similar alternatives in the future.*

NOTE: The units are not switched on 24 hours/7 days a week/365 days a year.

The expected operational flow rate of 10 - 20 m^3/hr is equal to 240 - 480 m^3/day of rainwater and surface water run-off discharge whenever the units are online.

In winter months, the operational flowrate can be increased to up to 80 m^3/hr depending on high intensity rainfall and melting snow.

5.2 Environmental Risk Considerations of the Activated Carbon Units

The addition of the activated carbon adsorber is designed to **reduce potential environmental impacts** through enhanced removal of contaminants. It does not introduce any new risks or alter the hydrological flow or effluent dynamics:

- Pollution control: The activated carbon adsorber removes PFAS/PFOS.
- No infrastructure risks: The carbon adsorber does not require significant mechanical operation or modification to the current drainage system that would require additional regulatory oversight.
- There will be no release of CO2 at site linked to the use of these units or any form of air emissions including noise/vibration, odour, SOx, NOx, VOCs, dust, methane etc.

- The units containing spent carbon will be managed in line with Article 18 of the retained Waste Shipments Regulations (Green List controls). The Annex VII form will be completed in full and retained for 3 years, a contract that meets the requirements of article 18 of the retained Waste Shipments Regulation is already in place.
- The units are sat in a secondary containment from where they will be physically transferred on a truck to the vendor reactivation facility and as such no handling, segregation or storage of spent carbon will be undertaken at site. The spent activated carbon will be moved from site under a green list waste status for recovery without the need for prior written notification / consent (analysis of the spent carbon when the trials were completed showed that it is non-hazardous, see **CAR 2024-2457** submitted as part of the application).
- The units are placed in a secondary containment that drains back into the pond (CIRIA C736 Secondary containment requirements are not applicable).
- The spent carbon, where appropriate, will be either reactivated or regenerated by the supplier of the activated carbon skid, following trials conducted and units sent back to the supplier and the generation of a carbon acceptance request (CAR) form, the spent carbon to be generated after operations are suitable for reactivation, see **CAR 2024-2457**.
- Maintenance of the units will not be undertaken at site as this is the sole responsibility of the supplier in their facility. However, inspection of hoses, pumps and any other ancillary equipment will be undertaken by Perenco.
- There is no risk of fouling within the unit, if the unit is to be left idle for long periods (more than 2 or 3 days), to prevent anaerobic conditions developing, a brief backwash using clean or mains water will be conducted and the water drained from the unit. As some water may remain after this, water can be passed upflow from time to time to refresh and avoid anaerobic conditions. Alternatively, the units can be collected by the suppliers and replaced when stopped.

5.3 Performance of the Activated Carbon Units

The smaller units have been proven via trial to significantly remove PFOS in the rainwater discharged from site to below the threshold of detection effectively abating the risk of any PFAS substances in the W2 discharge (see Section 6). The larger units to be deployed are expected to perform at the same treatment efficiency as the smaller ones as it is an identical technology.

6 Water Treatment Description (Proposed Set-Up)

Surface water from site including rainfall and bund rainwater draining (after testing), is collected independently via the dedicated site stormwater drain system. It is then routed via the storm water interceptor pit to the storm water pond.

The storm water pond is used as a ‘buffer’ to manage fluctuations in volumes of surface run-off coming from site.

The storm pond will serve as an influent into the carbon adsorbers, after treatment they will be discharged via the pipe located in the firewater pond.

As per current design in the event of any excess water in the fire pond there is an overflow offsite via W2 emissions point.

The purpose of this variation is to filter rainwater that is discharged via W2 through these carbon adsorbers that are connected in series.

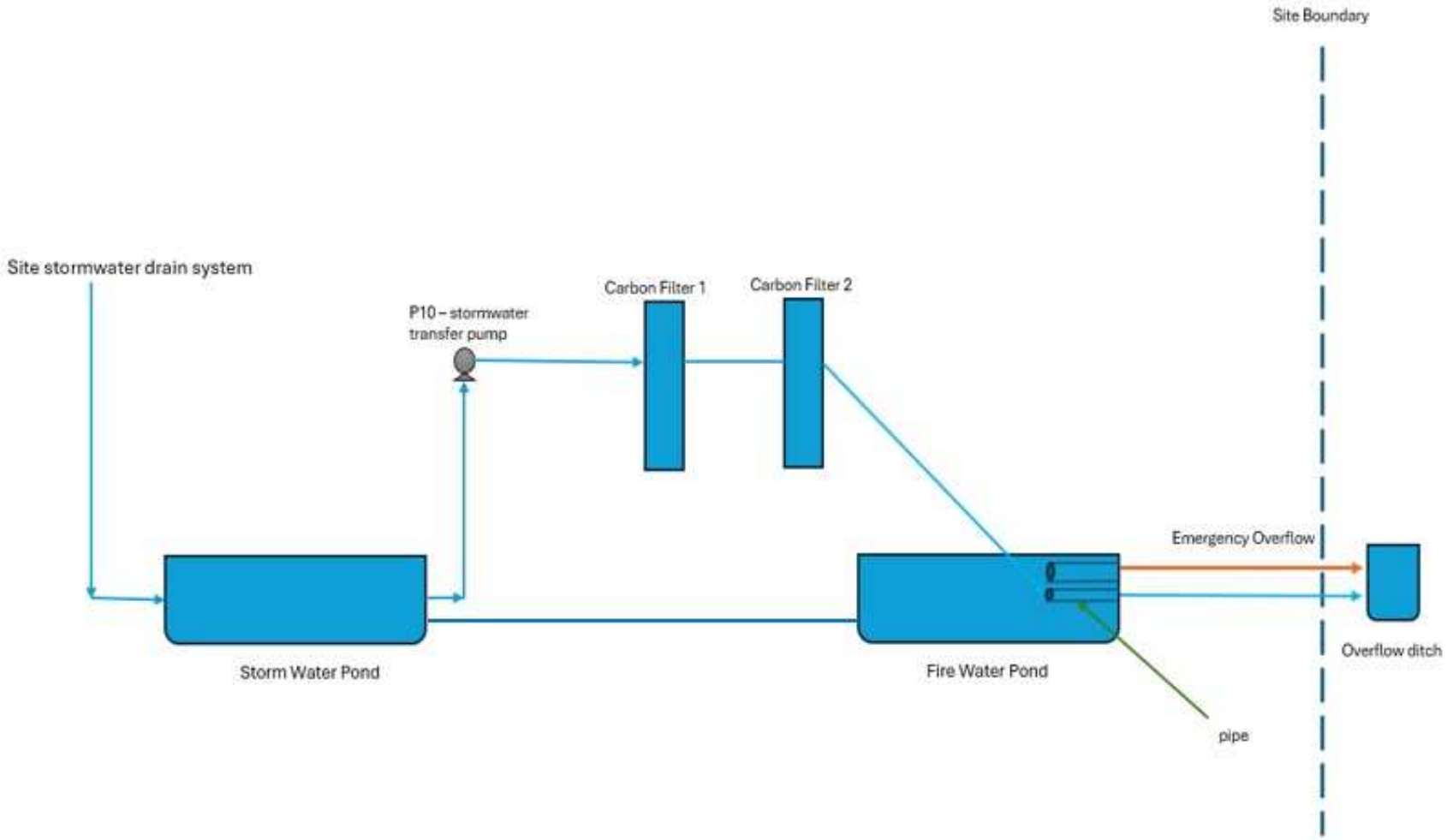

Figure 3: Water Treatment Basic PFD

The emergency overflow in Figure 3 is not used during normal operations as the water in the fire pond will be maintained to a low level, the water levels in both the storm water and firewater ponds are monitored daily as part of routine inspections.

The emergency overflow is an integral part of the terminal's original design. It is provided to manage extreme rainfall events by enabling the rapid removal of surface water from the site in circumstances where both the stormwater and firewater ponds are at capacity and have no remaining ullage to receive additional inflows. The overflow therefore provides a safeguard against site flooding, which is a critical consideration for the safe operation of a COMAH-regulated installation.

The potential use of the emergency overflow will be minimised by managing the levels in both ponds as is already being done through routine inspections and the use of the larger units (80 m^3/hr flowrate) is to ensure that there is maximum throughput during the treatment process, enhance the ability to better manage peak flows during winter / heavy rainfall periods (based upon last 5 years of Met rainfall data) and significantly lower the risk of untreated water being discharged via the emergency overflow pipe.

Figure 4: Site Plot Plan

7 Treatment Results from 2024 Trials

The carbon adsorbers were trialled within a closed loop system to:

a. Verify the extent of filtration that can be achieved with activated carbon under actual, dynamic conditions,
b. Confirm the number of bed volumes of water that could be treated with a given linear velocity before breakthrough and/or saturation and
c. Determine the minimum contact time required for successful operation.

7.1 Analysis of Results from Trials

The maximum results obtained during the 2024 trials showed that the carbon adsorber reduced:

- Total PFOS concentration from **1130 ng/l** to **< 1 ng/l.**

Further results received following the LEP granted by the EA on 12th June 2025 and amended on 8th August and 28th October 2025 showed that the Total PFOS concentrations in the final discharge after treatment was **< 0.65 ng/l** which is potentially lower than the EQS for PFOS in freshwater.

Generally, results have remained consistently below the LEP limit of < 10 ng/l asides three exceedances which occurred due to an increase in the operational flowrate during the winter.

Note: '<' means below the limit of detection.

8 Operating Techniques / Emissions Monitoring

To ensure system effectiveness, samples will be taken of the post-treated surface water (outlet of the 1st and 2nd carbon adsorber), this will enable the site to detect PFAS 'breakthrough' into the second adsorber and to ensure treatment in the 1st adsorber is still effective.

The units shall be kept in simultaneous operation when required until analysis results deem the beds saturated.

The units will be replaced in lead – lag position when required (i.e. remove 1st unit, move 2nd into 1st and bring a new unit on 2nd position).

Given our trial results, the smaller beds were still effective at 70 days of continuous running at 6 m^3/h.

To fully understand the treatment system, Perenco Dimlington terminal proposes one round of monitoring, within each 10-day period of operation of the equipment (A Day of operation is defined as any day in which the equipment runs – the days will be logged in the terminal daily plant readings). Whilst initial data would indicate that the treatment plant is effective at controlling PFOS levels in the discharge, there is currently limited data available, as a result of this, Perenco Dimlington terminal propose to retain the emission limit value (ELV) of 10 ng/l for Total PFOS agreed for the purpose of the Local Enforcement Position (LEP). Ongoing monitoring over a period of at least 12 months will be carried out to obtain actual data for the installed plant. In conjunction with the effluent monitoring, additional monitoring of PFOS levels in the receiving water will be carried out to confirm the background concentration. Perenco Dimlington would accept an Improvement Condition to carry out a revised H1 risk assessment informed by the additional monitoring and to review the ELV.

A flow monitoring device will be installed to take record of discharge volumes from site.

The analysis to be undertaken will be the full PFAS suite offered in an MCERTS and UKAS (ISO/IEC 17025:2017) accredited laboratory, the laboratory currently used utilises SPE with detection via Liquid Chromatography - tandem Mass Spectrometry (LC-MS/MS) analysis technique, which has been designed to meet the Drinking Water Inspectorate (DWI) requirements, known at the laboratory as TM434.

The reference method (TM434) was designed from EPA Method 1633 – Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolid, and Tissue Samples by LC-MS/MS, January 2024. EPA document EPA 821-R-24-001. It is a more selective and sensitive technique than LC-MS.

NOTE:

BS ISO 25101 currently recommended on gov.uk is from 2009 and only covers PFOS and PFOA at high detection levels (2µg/L and 10µg/L, respectively).

The monitoring frequency will be dependent on rainfall as the discharge from site will be intermittent (No rainfall = no use of the carbon adsorbers = no discharge = no monitoring).

9 Feasibility & Best Available Techniques (BAT) Analysis

Perenco Dimlington terminal conducted a feasibility assessment of various options for PFAS abatement, and the conclusions are seen below:

Technique	**Feasibility**
Pump and treat Granulated Activated Carbon (GAC)	LITHOS: Easily implemented within the drainage system (either within manhole chambers or within on-site filters). Selected as preferred remediation method, specialist vendor confirmed activated carbon is suitable for both PFAS and PFOS treatment. Development of activated carbon has come a long way in recent years with products on the market specifically aimed at typical PFAS and PFOS compounds and a single product being capable of removing both simultaneously.
Reverse Osmosis (RO) and Nanofiltration	LITHOS: Significant on-site constraints associated with the gas terminal infrastructure exists, a large-scale operation may prove difficult and be impractical. • Technology not widely used on large scale. • Availability of this technology is limited. • Not likely to be scalable for our needs.
Ion Exchange Resin (IER)	LITHOS: Potentially successful based on the PFAS identified. Likely easily implemented around the existing gas terminal infrastructure. Effectiveness can be greatly reduced by the presence of natural organic matter and may therefore not be suitable. • Technology not widely used at industrial sites. • Not considered as effective as activated carbon due to the factors mentioned above.
Flocculation/Precipitation	LITHOS: Potentially suitable for use in the on-site ponds. Unlikely to disrupt site operations. Concentrations within the

	ponds may not be high enough for the technique to be effective. • Reported levels of contamination not suited to the data available on this technology. • Activated carbon considered industry standard for PFAS/PFOS treatment.
Electrochemical Oxidation	LITHOS: Analytical data indicates the PFAS are typically short chain, therefore this treatment will likely prove unsuccessful. • Limited experience and data on this technology. Data suggest it is not effective. • Added complexity with electrical supplies and instrumentation.

Perenco Dimlington terminal has considered abatement options to reduce PFAS levels in the discharge to surface water, the abatement options considered include:

- Pump and treat Granulated Activated Carbon (GAC)
- Reverse Osmosis (RO) and Nanofiltration
- Ion Exchange Resin (IER)
- Flocculation/Precipitation
- Electrochemical Oxidation

The environmental performance of these options has been considered, alongside the feasibility of each option for implementation at the Perenco Dimlington terminal.

None of the options give rise to routine emissions to air or land. On this basis these environmental performance criteria have been excluded from consideration. The scope of the BAT assessment has therefore considered the following criteria:

- Emissions to water
- Odour
- Noise
- Raw materials consumption
- Waste generation
- Energy consumption
- Accident potential

A qualitative comparison of the environmental performance of each option is summarised in Table 2 below alongside consideration of the feasibility of implementation of the option:

Table 2: Qualitative comparison of the Environmental Performance of PFAS abatement options

Criteria	Pump and treat Granulated Activated Carbon (GAC)	Reverse Osmosis (RO) and Nanofiltration	Ion Exchange Resin (IER)	Flocculation/Precipitation	Electrochemical Oxidation
Emissions to Water	Effective at removing long chain PFAS but less effective for short chain PFAS. Potential for PFAS breakthrough if not maintained	Under environmentally relevant pH and concentration, RO and NF can effectively remove long chain PFAS from water, limited study available on effectiveness for short chain PFAS removal.	Highly effective for both long and short chain PFAS	Limited effectiveness for PFAS removal (<20%) from water.	Potentially very effective – can degrade PFAS into non-toxic compounds.
Odour	Zero to minimal odour	Minimal odour	Minimal odour	Possible due to chemical reactions	Possible due to oxidation by-products
Noise	Low noise from pumps	Moderate to high, pressure pumps can be noisy	Low to moderate	Low noise generated	Moderate noise generated
Raw Materials Consumption	Requires periodic replacement of activated carbon once PFAS breakthrough is achieved	Membranes require periodic replacement	Resin needs periodic regeneration or replacement	Requires chemical reagents	Electrodes and supporting chemical required
Waste Generation	Spent GAC can be disposed of via incineration or regenerated / reactivated.	High – generates a concentrated brine that must be managed/disposed	Spent resin is generated requiring disposal, potentially could be regenerated	High PFAS laden sludge generation	Low – minimal solid waste

Energy Consumption	Requires low energy to run, except if regeneration is conducted onsite	High energy requirement for its operation due to pressure requirements of the membrane	Moderate energy efficiency	Low to moderate energy demand depending on treatment package	Low to moderate energy depending on system design
Accident Potential	Low operational risks (e,g leaks and spills)	Risk of membrane failure or brine leakage	Standard chemical handling risks	Chemical and sludge management risks	Potential for electrical and chemical hazards
Feasibility	LITHOS: Easily implemented within the drainage system (either within manhole chambers or within on-site filters). Selected as preferred remediation method, specialist vendor confirmed activated carbon is suitable for both PFAS and PFOS treatment. Development of activated carbon has come a long way in recent years with products on the market specifically aimed at typical PFAS and PFOS compounds and a single product being capable of removing both simultaneously.	LITHOS: Significant on-site constraints associated with the gas terminal infrastructure exists, a large-scale operation may prove difficult and be impractical. • Technology not widely used on large scale. • Availability of this technology is limited. • Not likely to be scalable for our needs.	LITHOS: Potentially successful based on the PFAS identified. Likely easily implemented around the existing gas terminal infrastructure. Effectiveness can be greatly reduced by the presence of natural organic matter and may therefore not be suitable. • Technology not widely used at industrial sites. • Not considered as effective as activated carbon due to the factors mentioned above.	LITHOS: Potentially suitable for use in the on-site ponds. Unlikely to disrupt site operations. Concentrations within the ponds may not be high enough for the technique to be effective. • Reported levels of contamination not suited to the data available on this technology. • Activated carbon considered industry standard for PFAS/PFOS treatment.	LITHOS: Analytical data indicates the PFAS are typically short chain, therefore this treatment will likely prove unsuccessful. • Limited experience and data on this technology. Data suggest it is not effective. • Added complexity with electrical supplies and instrumentation.

Additionally, the proposed set up and change have been reviewed against the BAT Conclusions for the Refining of Mineral Oil and Gas.

The following BAT are considered potentially relevant.

Table 3:BAT assessment

BAT Conclusion Number	Summary of BAT Conclusion Requirement	BAT Assessment Comments/Applicability	Compliance Status NA/CC/NC
BAT 1	In order to improve the overall environmental performance of plants for the refining of mineral oil and gas, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features: (i) commitment of the management, including senior management; (ii) definition of an environmental policy that includes the continuous improvement for the installation by the management; (iii) planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment; (iv) implementation of the procedures paying particular attention to: (a) structure and responsibility (b) training, awareness and competence (c) communication (d) employee involvement (e) documentation (f) efficient process control (g) maintenance programmes (h) emergency preparedness and response (i) safeguarding compliance with environmental legislation. (v) checking performance and taking corrective action, paying particular attention to: (a) monitoring and measurement (see	*There are changes to the Integrated Management System (IMS) because of the application to vary the permit: EPR/PP3237CR/V008* The Perenco IMS has ISO 14001 and 45001 Certification and uses all techniques (i) – (ix). Following the LEP granted on 12 June 2025, the site Environmental aspect register has been updated to include the carbon adsorber / treatment operations. Training and awareness have been conducted for relevant personnel to ensure competency and understanding of the new treatment operations. Monitoring and measurement metrics have been updated to track compliance and identify improvement opportunities.	CC

BAT Conclusion Number	Summary of BAT Conclusion Requirement	BAT Assessment Comments/Applicability	Compliance Status NA/CC/NC
	also the reference document on the General Principles of Monitoring) (b) corrective and preventive action (c) maintenance of records (d) independent (where practicable) internal and external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained; (vi) review of the EMS and its continuing suitability, adequacy and effectiveness by senior management; (vii) following the development of cleaner technologies; (viii) consideration for the environmental impacts from the eventual decommissioning of the installation at the stage of designing a new plant, and throughout its operating life; (ix) application of sectoral benchmarking on a regular basis.		
BAT 3	In order to prevent or, where that is not practicable, to reduce dust emissions from the storage and handling of dusty materials, BAT is to use one or a combination of the techniques given below: (i) store bulk powder materials in enclosed silos equipped with a dust abatement system (e.g. fabric filter); (ii) store fine materials in enclosed containers or sealed bags; (iii) keep stockpiles of coarse dusty material wetted, stabilise the surface with crusting agents, or store under cover in stockpiles; (iv) use road cleaning vehicles	*No fine dust/bulk powder materials are used in the process. The activated carbon is not handled loose and is fully contained within the abatement system. When replaced, whole unit is changed.*	NA

<table>
<tr><th>BAT Conclusion Number</th><th>Summary of BAT Conclusion Requirement</th><th>BAT Assessment Comments/Applicability</th><th>Compliance Status NA/CC/NC</th></tr>
<tr><td>BAT 4</td><td>BAT is to monitor emissions to air by using the monitoring techniques with at least the minimum frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.</td><td>There are no changes to monitoring of emissions to air because of the application to vary the permit EPR/PP3237CR/V008

The carbon adsorbers do not produce any air emissions</td><td>NA</td></tr>
<tr><td>BAT 10</td><td>BAT is to monitor emissions to water in accordance with EN standards with at least the minimum frequency given below. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.
<table>
<tr><th>Parameter</th><th>Unit</th><th>BAT-AEL (yearly average)</th><th>Monitoring frequency and analytical method (standard)</th></tr>
<tr><td>Hydrocarbon oil index (HOI)</td><td>mg/l</td><td>0.1 – 2.5</td><td>Daily EN 9377- 2</td></tr>
<tr><td>Total suspended solids (TSS)</td><td>mg/l</td><td>5 – 25</td><td>Daily</td></tr>
<tr><td>Chemical oxygen demand (COD)</td><td>mg/l</td><td>30 – 125</td><td>Daily</td></tr>
</table></td><td>This doesn’t fully apply to the situation as the discharge is rainwater runoff, with no process emissions. Treatment is restricted to removal of PFAS/PFOS from the pond and therefore monitoring of releases will be restricted to monitoring of PFAS. The proposed monitoring frequency is dependent on rainfall; the laboratory monitoring standard has been developed with guidance received from the Drinking Water Inspectorate (DWI). The analysis test will be conducted in a UKAS (ISO 17025) accredited laboratory to ensure monitoring standards are being met. The reference method is EPA Method 1633 – Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolid, and Tissue Samples by LC-MS/MS, January 2024. EPA document EPA 821-R-24-001 (Currently in use)</td><td>CC</td></tr>
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<table>
<tr><td>BOD5</td><td>mg/l</td><td>No BAT-AEL</td><td>Weekly</td></tr>
<tr><td>Total nitrogen, expressed as N</td><td>mg/l</td><td>1 – 25</td><td>Daily</td></tr>
<tr><td>Lead, expressed as Pb</td><td>mg/l</td><td>0.005 – 0.030</td><td>Quarterly</td></tr>
<tr><td>Cadmium, expressed as Cd</td><td>mg/l</td><td>0.002 – 0.008</td><td>Quarterly</td></tr>
<tr><td>Nickel, expressed as Ni</td><td>mg/l</td><td>0.005 – 0.100</td><td>Quarterly</td></tr>
<tr><td>Mercury expressed as Hg</td><td>mg/l</td><td>0.000 1 – 0.001</td><td>Quarterly</td></tr>
<tr><td>Vanadium</td><td>mg/l</td><td>No BAT-AEL</td><td>Quarterly</td></tr>
<tr><td>Phenol Index</td><td>mg/l</td><td>No BAT-AEL</td><td>Monthly EN 14402</td></tr>
<tr><td>Benzene, toluene, ethyl benzene,</td><td>mg/l</td><td>Benzene: 0.001 – 0.050
No BAT-AEL for T, E, X</td><td>Monthly</td></tr>
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<tr><td></td><td>
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<tr><td>xylene (BTEX)</td><td></td><td></td><td></td></tr>
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</td><td></td><td></td></tr>
<tr><td>BAT 11</td><td>
In order to reduce water consumption and the volume of contaminated water, BAT is to use all of the techniques given below.
<table>
<tr><th>Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>(i) Water stream integration</td><td>Reduction of process water produced at the unit level prior to discharge by the internal reuse of water streams from e.g. cooling, condensates, especially for use in crude desalting</td><td>Generally applicable for new units. For existing units, applicability may require a complete rebuilding of the unit or the Installation</td></tr>
<tr><td>(ii) Water and drainage system for segregation of contaminated water streams</td><td>Design of an industrial site to optimise water management, where each stream is treated as appropriate, by e.g. routing generated sour water (from distillation, cracking,</td><td>Generally applicable for new units. For existing units, applicability may require a complete rebuilding of the unit or the installation</td></tr>
</table>
</td><td>
There are no changes to the techniques applied to minimise water consumption and the volume of contaminated water, as a result of the application to vary the permit EPR/PP3237CR/V008

On the Dimlington site, storm water from concrete paved and kerbed areas that is normally uncontaminated by hydrocarbons is drained by a network of concrete storm water drains. Paved areas are locally contoured to catch pits and gullies to intercept storm water run-off. Drainage from the Amethyst and West Sole slugcatchers, the methanol loading / unloading and storage/ distillation areas and the Gas Compression Trains hardstands flows to local interceptors before joining drainage from other areas. All storm water drainage is then routed to the site oil interceptor on the inlet to the storm water pond. Water then enters the storm water pond by gravity flow over interceptor baffles. All interceptors are regularly checked for traces of hydrocarbons, which are removed by a skimming pump or vacuum tanker. Clean water from this pond is used to replenish the firewater pond.

All contaminated wastewater streams are routed to the oily water collection tank (T06) from where they are loaded and disposed of in an appropriate manner by our waste management contractor. Process areas which produce liquid hydrocarbons are connected via a closed drains system directly to Tank T06. This tank is to be used for spill collection
</td><td>CC</td></tr>
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<table>
<tr><td></td><td>coking units, etc.) to appropriate pretreatment, such as a stripping unit</td><td></td></tr>
<tr><td>(iv) Prevention of spillages and leaks</td><td>Practices that include the utilisation of special procedures and/or temporary equipment to maintain performances when necessary to manage special circumstances such as spills, loss of containment etc</td><td>Generally applicable</td></tr>
</table>
</td><td>from the methanol tanker loading and unloading area and the methanol storage and processing facility.

Spills on hardstanding and kerbed areas connecting to the storm water drains are routed to the interceptors which allow recovery of spilt material before the spill reaches the storm water detention pond.</td><td></td></tr>
<tr><td>BAT 12</td><td>In order to reduce emission load of pollutants in the wastewater discharge to the receiving water body, BAT is to remove insoluble and soluble polluting substances by using all of the techniques given below.
<table>
<tr><th>Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>i. Removal of insoluble substances by recovering oil</td><td>See Section 5.21.2</td><td>Generally applicable</td></tr>
<tr><td>ii. Removal of insoluble substances by recovering suspended solids and dispersed oil</td><td>See Section 5.21.2</td><td>Generally applicable</td></tr>
<tr><td>iii. Removal of soluble substances including biological treatment and clarification</td><td>See Section 5.21.2</td><td>Generally applicable</td></tr>
</table>
</td><td>There is a change to the technique used to remove soluble polluting substances from wastewater prior to discharge to the drainage ditch.

Some AFFF components are soluble in water, the proposed use of activated carbon adsorber is similar with the description in Section 5.21.2 on the use of a bed/filtration system in treatment of wastewater. The adsorbers would remove any PFAS/PFOS in the pond prior to discharge to the drainage ditch.</td><td>CC</td></tr>
</table>

BAT Conclusion Number	Summary of BAT Conclusion Requirement	BAT Assessment Comments/Applicability	Compliance Status NA/CC/NC
BAT 14	In order to prevent or, where that is not practicable, to reduce waste generation, BAT is to adopt and implement a waste management plan that, in order of priority, ensures that waste is prepared for reuse, recycling, recovery or disposal.	*There are no changes to waste management techniques for reduction of waste generation as a result of the application to vary the permit: EPR/PP3237CR/V008* There is a Dimlington-specific waste management procedure as part of the IMS, SN-DM-XX-PL-XS-000001. On saturation of the filters as a result of PFAS breakthrough, the units which contain the spent/saturated carbon will be physically transferred offsite to the supplier's facility, reactivation, regeneration or disposal options for the spent carbon will be handled by the supplier who have a licenced waste contractor. (*Analysis of the spent carbon by the vendors confirmed the spent carbon in the filters are suitable for reactivation*) There will be no processing (handling, segregation or storage) of spent carbon onsite.	CC
BAT 17	In order to prevent or reduce noise, BAT is to use one or a combination of the techniques given below: (i) make an environmental noise assessment and formulate a noise management plan as appropriate to the local environment; (ii) enclose noisy equipment/operation in a separate structure/unit; (iii) use embankments to screen the source of noise; (iv) use noise protection walls. 1.1.10.	*There are no changes to the techniques used to prevent or reduce noise as a result of the application to vary the permit EPR/PP3237CR/V008* There is no additional noise from operating the carbon adsorbers (unit is passive).	NA
	NA: Not Applicable		

BAT Conclusion Number	Summary of BAT Conclusion Requirement	BAT Assessment Comments/Applicability	Compliance Status NA/CC/NC
	CC: Currently Compliant NC: Not Compliant		

**BAT Conclusion 2, 5, 6, 7, 8, 9, 15, 16, 18, 19, 20, 21,22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57 and 58 are not applicable.*

Furthermore, the proposed set up and change have been reviewed against the BAT Conclusions for Waste Treatment.

The following BAT are considered potentially relevant.

Table 4: BAT assessment

BAT Conclusion Number	Summary of BAT Conclusion Requirement	BAT Assessment Comments/Applicability	Compliance Status NA/CC/NC
BAT 1	In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features listed in I – XV,	*There are changes to the Integrated Management System (IMS) because of the application to vary the permit: EPR/PP3237CR/V008* The Perenco IMS has ISO 14001 and 45001 Certification and uses all techniques (I) – (XV). Following the LEP granted on 12 June 2025, the site Environmental aspect register has been updated to include the carbon adsorber / treatment operations. Training and awareness have been conducted for relevant personnel to ensure competency and understanding of the new treatment operations. Monitoring and measurement metrics have been updated to track compliance and identify improvement opportunities	CC
BAT 3	In order to facilitate the reduction of emissions to water and air, BAT is to establish and to maintain an inventory of wastewater and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features: (i) information about the characteristics of the waste to be treated and the waste treatment processes, including: (a) simplified process flow sheets that show the origin of the emissions; (b) descriptions of process-integrated techniques	*The rainwater / surface water run off contained in the storm and firewater pond is known to contain PFAS/PFOS. Characteristics of Process wastewater is known as these are tankered offsite for disposal by Perenco's waste management contractor.*	CC

<table>
<tr><th>BAT Conclusion Number</th><th>Summary of BAT Conclusion Requirement</th><th>BAT Assessment Comments/Applicability</th><th>Compliance Status NA/CC/NC</th></tr>
<tr><td></td><td>and wastewater/waste gas treatment at source including their performances;

(ii) information about the characteristics of the waste water streams, such as: (a) average values and variability of flow, pH, temperature, and conductivity; (b) average concentration and load values of relevant substances and their variability (e.g. COD/TOC, nitrogen species, phosphorus, metals, priority substances / micropollutants); (c) data on bioeliminability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. inhibition of activated sludge)) (see BAT 52);

(iii) information about the characteristics of the waste gas streams, such as: (a) average values and variability of flow and temperature; (b) average concentration and load values of relevant substances and their variability (e.g. organic compounds, POPs such as PCBs); (c) flammability, lower and higher explosive limits, reactivity; (d) presence of other substances that may affect the waste gas treatment system or plant safety (e.g. oxygen, nitrogen, water vapour, dust).</td><td></td><td></td></tr>
<tr><td>BAT 4</td><td>In order to reduce the environmental risk associated with the storage of waste, BAT is to use all of the techniques given below.
<table><tr><th>Technique</th><th>Description</th><th>Applicability</th></tr><tr><td>Optimised storage location</td><td>This includes techniques such as: • the storage is located as far as technically and economically possible from</td><td>Generally applicable to new plants.</td></tr></table></td><td>There are no changes to the techniques applied to reduce the environmental risk associated with the storage of waste as a result of the application to vary the permit EPR/PP3237CR/V008

The carbon adsorption units are sat in a secondary containment from where they will be physically transferred on a truck to the vendor facility and as such no handling, segregation or storage of spent carbon will be undertaken at site.</td><td>NA</td></tr>
</table>

BAT Conclusion Number	Summary of BAT Conclusion Requirement			BAT Assessment Comments/Applicability	Compliance Status NA/CC/NC
		sensitive receptors, watercourses, etc.; • the storage is located in such a way so as to eliminate or minimise the unnecessary handling of wastes within the plant (e.g. the same wastes are handled twice or more or the transport distances on site are unnecessarily long).			
	Adequate storage capacity	Measures are taken to avoid accumulation of waste, such as: • the maximum waste storage capacity is clearly established and not exceeded taking into account the characteristics of the wastes (e.g. regarding the risk of fire) and the treatment capacity; • the quantity of waste stored is regularly monitored against the maximum allowed storage capacity; • the maximum residence time of	Generally applicable.		

BAT Conclusion Number	Summary of BAT Conclusion Requirement			BAT Assessment Comments/Applicability	Compliance Status NA/CC/NC
		waste is clearly established.			
	Safe storage operation	This includes measures such as: • equipment used for loading, unloading and storing waste is clearly documented and labelled; • wastes known to be sensitive to heat, light, air, water, etc. are protected from such ambient conditions; • containers and drums are fit for purpose and stored securely.			
	Separate area for storage and handling of packaged hazardous waste	When relevant, a dedicated area is used for storage and handling of packaged hazardous waste			
BAT 5	In order to reduce the environmental risk associated with the handling and transfer of waste, BAT is to set up and implement handling and transfer procedures.			*There are no changes to the techniques applied to reduce the environmental risk associated with the handling and transfer of waste at the site as a result of the application to vary the permit EPR/PP3237CR/V008* The activated carbon media is fully contained within the carbon adsorption unit and is not handled or stored in any loose form on the site.	NA

BAT Conclusion Number	Summary of BAT Conclusion Requirement	BAT Assessment Comments/Applicability	Compliance Status NA/CC/NC
BAT 6	For relevant emissions to water as identified by the inventory of waste water streams (see BAT 3), BAT is to monitor key process parameters (e.g. waste water flow, pH, temperature, conductivity, BOD) at key locations (e.g. at the inlet and/or outlet of the pretreatment, at the inlet to the final treatment, at the point where the emission leaves the installation)	*There is a change to the site's water emissions monitoring parameter as a result of the application to vary the permit EPR/PP3237CR/V008.* PFAS/PFOS is monitored at the outlet of the post treatment (i.e outlet of the 1st treatment stage and outlet of the 2nd / final treatment stage from where it is discharged from the site) (See section 5.1 for details). The flowrate through the carbon adsorbers will be monitored by a flowmeter.	CC
BAT 7	BAT is to monitor emissions to water with at least the frequency given below, and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.	*There is a change to the site's water emissions monitoring as a result of the application to vary the permit EPR/PP3237CR/V008* The site previously had no water monitoring requirement in the permit prior to this variation application. While the recommended monitoring for PFOS/PFOA is once every 6 months, the site currently monitors every 10 days of operation of the filters since LEP was granted. (*See section 8 for details*)	CC
BAT 8	BAT is to monitor channelled emissions to air with at least the frequency given below, and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.	*There are no changes to the techniques applied for air emissions monitoring as a result of the application to vary the permit EPR/PP3237CR/V008* There are no air emissions from the operation of the carbon adsorbers.	NA
BAT 11	BAT is to monitor the annual consumption of water, energy and raw materials as well as the annual generation of residues and wastewater, with a frequency of at least once per year.	The number of days/hours the carbon adsorbers are online is currently logged as part of daily plant readings. Estimated volume of water discharged/treated is currently recorded	CC

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<tr><td></td><td></td><td>and reported under the LEP granted by the EA. A water meter will be installed to totalise the discharge.</td><td></td></tr>
<tr><td>BAT 17</td><td>In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to set up, implement and regularly review a noise and vibration management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:
I. a protocol containing appropriate actions and timelines;
II. a protocol for conducting noise and vibration monitoring;
III. a protocol for response to identified noise and vibration events, e.g. complaints;
IV. a noise and vibration reduction programme designed to identify the source(s), to measure/estimate noise and vibration exposure, to characterise the contributions of the sources and to implement prevention and/or reduction measures.</td><td>There are no changes to the techniques used to prevent or reduce noise as a result of the application to vary the permit EPR/PP3237CR/V008

There is no noise or vibration associated with the operation of the carbon adsorbers.</td><td>NA</td></tr>
<tr><td>BAT 19</td><td>In order to optimise water consumption, to reduce the volume of waste water generated and to prevent or, where that is not practicable, to reduce emissions to soil and water, BAT is to use an appropriate combination of the techniques given in (a) – (i).
<table>
<tr><th>Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>Segregation of water streams</td><td>Each water stream (e.g. surface run-off water, process water) is collected and</td><td>Generally applicable to new plants. Generally applicable to existing plants</td></tr>
</table></td><td>There are no changes to the techniques used to reduce the volume of wastewater generated as a result of the application to vary the permit EPR/PP3237CR/V008

The techniques listed in (f), (g) and (i) are applicable. Contaminated wastewater stream is segregated at the site and sent to the offsite disposal tank T06. Process water is held in tanks from where they are loaded for offsite treatment and disposal. Surface water run-off flows to the storm pond.</td><td>CC</td></tr>
</table>

BAT Conclusion Number	Summary of BAT Conclusion Requirement			BAT Assessment Comments/Applicability	Compliance Status NA/CC/NC
		treated separately, based on the pollutant content and on the combination of treatment techniques. In particular, uncontaminated wastewater streams are segregated from wastewater streams that require treatment.	within the constraints associated with the layout of the water collection system.	There is adequate drainage infrastructure at the site and the carbon adsorbers is connected to the storm pond. The storm pond is used as a buffer to manage fluctuations in volumes of surface run-off coming from site.	
	Adequate drainage infrastructure	The waste treatment area is connected to drainage infrastructure. Rainwater falling on the treatment and storage areas is collected in the drainage infrastructure along with washing water, occasional spillages, etc. and, depending on the pollutant content, recirculated or sent for further treatment.	Generally applicable to new plants. Generally applicable to existing plants within the constraints associated with the layout of the water drainage system.		
	Appropriate buffer storage capacity	Appropriate buffer storage capacity is provided for wastewater generated during	Generally applicable to new plants. For existing plants, applicability may be limited by space		

<table>
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<tr><td>BAT 20</td><td>In order to reduce emissions to water, BAT is to treat waste water using an appropriate combination of the techniques listed in (a) – (r).</td><td>There is a change to the techniques used to reduce emissions to water as a result of the application to vary the permit EPR/PP3237CR/V008

The proposed abatement equipment works with the principle of adsorption</td><td>CC</td></tr>
<tr><td>BAT 21</td><td>In order to prevent or limit the environmental consequences of accidents and incidents, BAT is to use all of the techniques given below, as part of the accident management plan (see BAT 1).<table><tr><th>Technique</th><th>Description</th></tr><tr><td>Protection measures</td><td>These include measures such as: • protection of the plant against</td></tr></table></td><td>There are no changes to the techniques used to limit the environmental consequences of accidents and incidents as a result of the application to vary the permit EPR/PP3237CR/V008

There are adequate F & G detection systems at site, there is a procedure PUK-SMS-MOI-001 for management of incidents,</td><td>CC</td></tr>
</table>

BAT Conclusion Number	Summary of BAT Conclusion Requirement		BAT Assessment Comments/Applicability	Compliance Status NA/CC/NC
		malevolent acts; • fire and explosion protection system, containing equipment for prevention, detection, and extinction; • accessibility and operability of relevant control equipment in emergency situations.	Perenco has a portal for logging any incident at any of its operational sites.	
	Management of incidental/accidental emissions	Procedures are established and technical provisions are in place to manage (in terms of possible containment) emissions from accidents and incidents such as emissions from spillages, firefighting water, or safety valves.		
	Incident/accident registration and assessment system	This includes techniques such as: • a log/diary to record all accidents, incidents, changes to procedures and the findings of inspections; • procedures to identify, respond to and learn from such incidents and accidents.		
	NA: Not Applicable CC: Currently Compliant NC: Not Compliant			

**BAT Conclusion 2, 9, 10, 12, 13, 14, 15, 16, 18, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52 and 53 are not applicable.*

Finally, the proposed set up and change have been reviewed against the Environment Agency Chemical Waste: Appropriate measures for permitted facilities (Treatment Activities)

Table 5: Appropriate Measures Assessment

S/N	AM Requirement	AM Assessment Comments/Applicability	Compliance Status NA/CC/NC
1	General Management	The Perenco IMS has ISO 14001 and 45001 Certification. The site Environmental aspect register has been updated to include the carbon adsorber / treatment operations. Every staff has a PCAP (Perenco Competence Assurance Process) profile with Safety and Environmentally Critical Elements which are assessed annually to ensure every staff is competent in their roles and responsibilities. There are several procedures utilised for the prevention, management of incidents/accidents at site and to ensure the environment is protected in our operations (PUK-SMS-COM-006 (Operational Environmental Standards), PUK-SMS-COM-011 (Onshore Environmental Permit Compliance), PUK-SMS-MOI-001 (Incident Reporting & Investigation), Aspects and Impacts register, Emergency procedures etc).	CC
2	Waste pre-acceptance, acceptance and tracking	Perenco is not a waste installation, neither does it receive waste from external sources for treatment on our site as a result of the proposed installation of the carbon adsorbers. However, the site knows the source of the surface water requiring treatment and its properties after completing a	CC

S/N	AM Requirement	AM Assessment Comments/Applicability	Compliance Status NA/CC/NC
		characterisation assessment which has been submitted as part of this application.	
3	Waste Treatment	The treatment process is to improve the quality of discharged rainwater from site. Up to date written details of treatment procedures are available. All relevant staff trainings and monitoring systems have been put in place. There is a procedure in place utilised for Management of Change for plant or process. Records related to the proposed treatment are stored in Perenco IT systems for future reference or auditing purposes.	CC
4	Emission Control	There are no point source emissions to air, fugitive emissions to air, emissions of noise and vibration for the proposed abatement equipment. The impact of the point source emission to water has already been assessed as part of this variation and the most effective treatment technique is being utilised as evidenced in the results obtained in 2024 and 2025. The units are sat in a secondary containment which drains back to the pond in the event of any leaks or spills. Appropriate drainage system is in place; there is segregation of contaminated and uncontaminated wastewater streams at the site. The storm pond acts as a buffer for all water coming from site. Spill kits can be found at various locations at site.	CC
5	Emissions monitoring and limit	Regular PFAS/PFOS monitoring of the discharge from site is conducted, this is from the outlets of the two (2) carbon adsorbers. The current emission limit value for the discharge is 10 ng/l and the site has been largely compliant.	CC
6	Process Efficiency	The volume of water discharged from the treated process will be known as a water meter will be installed, P10 pump uses	CC

S/N	AM Requirement	AM Assessment Comments/Applicability	Compliance Status NA/CC/NC
		electricity to pump the water into the filter. There is no waste minimisation that can be implemented as the discharge from site is rainfall dependent.	

10 Conclusion

The addition of the carbon adsorber supports the Environment Agency goals by:

- Preventing pollution and reducing the potential release of harmful substances.
- Enhancing the quality of the rainwater discharge.

In line with Perenco's Environmental Policy which is to minimise the environmental impact of all operations, this proposal seeks to introduce an immediate environmental benefit by improving the rainwater discharge quality to the environment.

Appendix A: Environmental Risk Assessment

The risk assessment covers Noise and Vibration, odour, waste management, accidents, air emissions and Fugitive releases.

What do you do that can cause harm and what could be harmed?			***Managing the risk***	***Assessing the risk***		
Hazard	***Receptor***	***Pathway***	***Risk management***	***Probability of exposure***	***Consequence***	***What is the overall risk?***
What has the potential to cause harm?	*What is at risk?*	*How can the hazard get to the receptor?*	*What measures will you take to reduce the risk?* *If it occurs – who is responsible for what?*	*How likely is this contact?*	*What is the harm that can be caused?*	*What is the risk that still remains*
Operational Phase – There is no noise anticipated from the use of the units as was evidenced during the initial trials and as observed since LEP was granted	N/A	Air	N/A	N/A	N/A	N/A

What do you do that can cause harm and what could be harmed?			*Managing the risk*	*Assessing the risk*		
Hazard	***Receptor***	***Pathway***	***Risk management***	***Probability of exposure***	***Consequence***	***What is the overall risk?***
To Water and/or Land						
What has the potential to cause harm?	*What is at risk?*	*How can the hazard get to the receptor?*	*What measures will you take to reduce the risk?* *If it occurs – who is responsible for what?*	*How likely is this contact?*	*What is the harm that can be caused?*	*What is the risk that still remains*
Operational Phase – Potential for discharge of liquids containing incompletely removed PFAS contaminants (Ineffective adsorbers)	Controlled waters (offsite drainage ditch linked to the Humber) Humber Estuary SAC, SPA, Ramsar	Subsurface processes	The units will be changed out as soon as breakthrough is identified, the lead / lag filter arrangement will provide robust operation. Using 2 units ensures that if there is a breakthrough of PFAS in the 1st unit, the 2nd unit connected in series will still ensure treatment continues and acts as a secondary barrier. Proposed monitoring frequency will be followed to ensure carbon bed is still effective.	Unlikely	Short-term contamination of marine ecosystem, potential for bioaccumulation in marine life	Not significant
Operational Phase – Release to land/ groundwater from poorly maintained adsorbers	On-site soil, Groundwater	Sub-surface processes, groundwater plume	Secondary containment will be designed according to BAT standards and regularly inspected. Routine infrastructure monitoring, secondary containment inspection and emptied as required. Corrective actions will be raised for any improvement works identified within inspections (connections only as filters are not maintained onsite or by Perenco). Proximity of unit to the pond means any spill will drain back to the pond via underlying French drains,	Unlikely	Land and Groundwater contamination (Site is not on a groundwater SPZ)	Not significant

			although bunding in place drains back into the ponds			
Operational Phase – Possible storage of spent activated carbon (On-site carbon transfer)	Groundwater - Flamborough Chalk aquifer, onsite soil	Leaching from poor containment	The spent carbon will not be segregated or stored onsite as the units will be physically transferred offsite on saturation of the filters, eliminating the need for onsite carbon transfer. The offsite carbon transfer / regeneration / reactivation will be handled by the supplier.	Highly Unlikely	Soil and groundwater contamination (Site is not on a groundwater SPZ)	Not significant
Operational Phase – Use of the emergency overflow	Controlled waters (offsite drainage ditch linked to the Humber) Humber Estuary SAC, SPA, Ramsar	Emergency overflow pipe	The emergency overflow is not expected to be used during normal operations as the water in the fire pond will be maintained to a low level, the water levels in both the storm water and firewater ponds are monitored daily as part of routine inspections The 80 m3/hr units are capable of handling all rainfall onsite.	Unlikely	Contamination of marine ecosystem, bioaccumulation in marine life	Not significant

What do you do that can cause harm and what could be harmed?			*Managing the risk*	*Assessing the risk*		
Hazard	***Receptor***	***Pathway***	***Risk management***	***Probability of exposure***	***Consequence***	***What is the overall risk?***
What has the potential to cause harm?	*What is at risk?*	*How can the hazard get to the receptor?*	*What measures will you take to reduce the risk? If it occurs – who is responsible for what?*	*How likely is this contact?*	*What is the harm that can be caused?*	*What is the risk that still remains?*
Operational Phase – Maintenance of the adsorbers	N/A	N/A	N/A	N/A- the units are to be maintained by the vendor at their facility before brought onsite.	N/A	N/A
Operational Phase – Failure of pump during period of high rainfall	On-site soil and Groundwater – Flamborough Chalk Aquifer	Failure of pump leading to overfilled firewater pond and release to drainage ditch and site soil	Back up pumps will be held onsite. Stormwater levels have adequate ullage to serve as buffer in periods of high rainfall.	Unlikely	No treatment of water in the pond	Not significant
Operational Phase – Failure of plant	Receiving waterbody (Offsite drainage ditch linked to the Humber), Humber Estuary SAC, SPA, Ramsar, On-site soil	Failure of both plants leading to inability to treat surface water and resultant rise in pond levels	The Carbon filter suppliers have a short turnaround time to deliver new units to site. Highly unlikely both units will fail at the same time.	Highly Unlikely	No treatment of water in the pond	Not significant
Operational Phase – Plant failure (damage to equipment)	Site soil and Groundwater – Flamborough Chalk Aquifer	Spill and failure to contain	Purchase order is in place should additional adsorbers be required at short notice. Unlikely for both adsorbers to be damaged at the same time.	Unlikely	Release of contaminated water on site soil	Not significant

Operational Phase – Fires from potential static electricity	Local residents, onsite staff	Atmosphere	The proposed changes are not anticipated to affect the requirements currently in place for management of fire, equipment will be located in a safe area with suitable earth installed	Highly Unlikely	Release of hazardous substances	Not significant
Operational Phase – Potential for liquids to be discharged due to failure of fitting due to incorrect hose pressure rating	Groundwater - Flamborough chalk aquifer, soil	Leaks and spills	Hoses and fittings rated at 2.5 barg will be used. Impact from flooding is considered in the site COMAH Safety report and considered a negligible risk for the site. Bunding is in place that drains back into the pond.	Highly Unlikely	Localised flooding	Not significant

Air Emissions

What do you do that can cause harm and what could be harmed?			***Managing the risk***	***Assessing the risk***		
Hazard	***Receptor***	***Pathway***	***Risk management***	***Probability of exposure***	***Consequence***	***What is the overall risk?***
What has the potential to cause harm?	*What is at risk?*	*How can the hazard get to the receptor?*	*What measures will you take to reduce the risk? If it occurs – who is responsible for what?*	*How likely is this contact?*	*What is the harm that can be caused?*	*What is the risk that still remains*
Operational Phase – There are no possible sources of air emissions for the proposed activities	N/A	Air	N/A	N/A	N/A	N/A
Operational Phase – Odour	Air	Atmospheric emissions	There is no odour generated from the use of the units	Very Unlikely	Air pollution	Not significant

Accident Scenarios

What do you do that can cause harm and what could be harmed?			***Managing the risk***	***Assessing the risk***		
Hazard	***Receptor***	***Pathway***	***Risk management***	***Probability of exposure***	***Consequence***	***What is the overall risk?***
What has the potential to cause harm?	*What is at risk?*	*How can the hazard get to the receptor?*	*What measures will you take to reduce the risk? If it occurs – who is responsible for what?*	*How likely is this contact?*	*What is the harm that can be caused?*	*What is the risk that still remains*
Operational Phase – Vandalism of carbon adsorbers	Receiving waterbody (Offsite drainage ditch linked to the Humber), Humber Estuary SAC, SPA, Ramsar, On-site soil	Inability to operate plant leading to the inability to treat surface water and resultant rise in pond levels	The site is fenced with electrical barb wire for additional protection; CCTV is installed with police patrolling the site perimeter regularly as the site is designated as Critical National Infrastructure (CNI)	Very Unlikely	No treatment of water in the pond	Not significant
Operational Phase – Operator error	Receiving waterbody (Offsite drainage ditch linked to the Humber), Humber Estuary SAC, SPA, Ramsar, On-site soil	Inability to operate plant leading to the inability to treat surface water and resultant rise in pond levels	All operators have been adequately trained on how to operate the units and there is a procedure in place	Very Unlikely	No treatment of water in the pond	Not significant
Operational Phase – Site Flooding	Receiving waterbody (Offsite drainage ditch linked to the Humber), Humber Estuary SAC, SPA, Ramsar, On-site soil	Uncontrolled release from the pond bypassing the treatment plant	The Site is not located in a flood prone area; the larger units are capable of instantaneously treating all rainwater falling on the site.	Very Unlikely	Release of hazardous substances	Not significant