

SSE Peterhead

Peterhead Power Station Emissions to Water Review

Review of the Environmental Permit and the Emissions to Water to Support a Permit Variation Application

3 | 16 September 2026



This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 314992

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Contents

Non-technical Summary	1
1. Introduction	3
1.1 Purpose of Report	3
2. Summary of Site Operations	5
2.1 Environmental Setting	5
2.2 Site History	5
2.3 Current Water Use at the Installation	6
2.4 Chemical Usage at the Installation	7
2.5 Current Water Discharges from the Installation	14
2.6 Summary of the Potential for Wastewater Contamination	19
3. Existing Permit Monitoring Conditions	20
3.1 Existing Permit Conditions	20
3.2 Existing Monitoring and Sampling Arrangements	22
3.3 Compliance with the Existing Environmental Permit Conditions	27
3.4 Additional Sampling and Future Analysis Methodologies	28
4. LCP BATc Water Emissions Requirements	35
4.1 General BAT Water Requirements	35
4.2 BATc Emission Limit Values	35
5. Impact Assessment	38
5.1 Introduction	38
5.2 Water Quality Screening Assessment	38
6. Permit Variation	42

Tables

Table 2.1: Chemicals Used at the Installation	8
Table 2.2: Emission Points to Water in the Existing Permit	14
Table 2.3: Onsite Oil/ water Separator Details	16
Table 2.4: Summary of Potential Water Pollutants and Emissions	19
Table 3.1: Emissions to Water Environmental ELVs from the Existing Permit	21
Table 3.2: Monitoring Methodologies as Detailed in the Existing Permit	22
Table 3.3: Monitoring Results and Compliance – W1	27
Table 3.4: Monitoring Results and Compliance – W3	28
Table 3.5: Monitoring Results and Compliance - W4	28
Table 3.6: Monitoring Results and Compliance – W5 (SP4 and SP7)	28
Table 3.7: Sampling Results – W1 (SP1) Surface Water, Oil Separator, HRSG and Treated Sewage Effluent	30
Table 3.8: Sampling Results – W3 (SP2) - Oil Separators from Former Tank Farm	31
Table 3.9: Sampling Results – W4 (SP3a) - WTP	31
Table 3.10: Sampling Results – W4 (SP3b) - WTP	31

Table 3.11: Sampling Results – W5 (SP4) – One Through Cooling Water	32
Table 3.12: Sampling Results – W6 (SP5) – Emergency Overflow from Cooling Water Equipment	32
Table 3.13: Proposed New Analysis Methodologies	33
Table 4.1: BAT 13 Requirements	35
Table 4.2: BAT-AELs Associated with BAT 15 and Flue-gas Treatment	36
Table 5.1: W1 EQS Comparison	39
Table 5.2: W4 (SP3a) EQS Comparison	39
Table 5.3: W4 (SP3a) EQS Comparison for Annualised Emission Concentration	40
Table 5.4: W4 (SP3b) EQS Comparison	41
Table 5.5: W4 (SP3b) EQS Comparison – With Cooling Water Dilution	41
Table 6.1: Recommended Update to the Emissions to Water ELVs in Table 3.1 of the Existing Permit	44
Table 6.2: Recommended Update to the Monitoring Methodologies in Table 3.2 of the Existing Permit	44

Figures

Figure 1.1: Site Location and Installation Boundary	4
Figure 2.1: Location of Chemical Storage Areas	13
Figure 2.2: Locations of the Emission Points to Water Existing Permit	15
Figure 2.3: Site Drainage Plan	18
Figure 6.1: Updated Emission Point Figure for Inclusion in Varied Permit	43

Photographs

Photograph 1: SP1 Located at Manhole 1	24
Photograph 2: Sample Point SP3a	25
Photograph 3: Sample Point SP4	26
Photograph 4: Sample Point SP7	26
Photograph 5: Sample Point SP5	27

Appendices

Appendix A – Material Safety Data Sheets for Chemicals Used Onsite
Appendix B – WI-PEHE-SHE-003-010 Environmental Monitoring and Reporting of PPC Regulated Emissions
Appendix C – Summary of Monitoring Results and Calculations for the Impact Assessment

Non-technical Summary

SSE Thermal's (SSE) Peterhead Power Station (the "Installation") was subject to a Scottish Environmental Protection Agency (SEPA) inspection at the end of October 2025, which looked at the water discharges and monitoring carried out at the Installation. The inspection concluded that many of the conditions and monitoring methodologies included in the current Environmental Permit (PPC/A/1008802) are out of date, and therefore a review was required to ensure that the monitoring and analysis carried out on site is still applicable and appropriate for the relevant pollutants that could be present in the emissions to water. Where there are changes to water discharge arrangements e.g. discharge points, pollutants, sampling, analysis and reporting SEPA requested that a permit variation be prepared to update the permit.

The SSE Peterhead Power Station is located approximately 3km south of Peterhead town centre on the east Aberdeenshire Coast. It was originally commissioned in 1982 to provide baseload power using heavy fuel oil, or waste gas from North Sea oil fields, however it was upgraded/ repowered in the 2000s to natural gas generation, providing flexible power to the increasing renewables led electricity supply system. It is the largest power station in Scotland and provides 1,180MW of power through three Gas Turbines (GT11, GT12 and GT13) and steam raised through three Heat Recovery Steam Generators (HRSGs). The steam from the three HRSGs is routed to the original Unit 1 steam turbine.

This report has been prepared in support of an application to SEPA for a Permit variation for the operation of the Installation. It details the review carried out of existing Site operations, current water and chemical usage and summarises the potential for contamination of wastewater discharges to occur.

The existing emission points have been reviewed and a number of changes proposed to bring the Permit in line with Site operations. Additionally, a review of existing monitoring requirements and methodologies has been carried out, and where appropriate updates to the existing methodology are proposed, in order to bring the requirements in the Permit in line with current guidance.

Additional sampling and analysis of the wastewaters from the Site has been carried out, in order to facilitate an update to the Impact Assessment for this site. This has not identified any new pollutants being released from the site that would require Emission Limit Values, nor has it identified any potential exceedance of Environmental Quality Standards as a result of the emissions from the Site. The requested Permit variation covers the following aspects.

Updates to emission point arrangements to reflect current site operations:

- W2 is an overflow for W1 and is already captured by sampling at SP1, so a separate sampling location for W2 is not considered necessary.
- W4 discharges from the Water Treatment Plant into the same final outfall as W5, therefore does not need to be included as a separate emission point within the permit.
- W6 requires updating to reflect that it now relates mainly to surface water from the cooling water forebay/roadways and decommissioned ECP bund areas, with little or no normal flow.
- The removal of the electro-chlorination plant from the site means that SP7 is no longer required.

An update to monitoring and control arrangements for relevant pollutants only, namely:

- Oil analysis by visual inspection only (unless oil is detected).
- Removal of the requirement to monitor ammonia and BOD.
- Updates to monitoring requirements and methodologies to align with current practice and relevant guidance.

In addition to the above, it is considered that a review as to whether continued marine environmental monitoring under permit condition 3.5.6 is still required, given the repeated three-yearly marine surveys and the evidence that impacts from the outfall have been limited.

1. Introduction

SSE Thermal's (SSE) Peterhead Power Station (the "Installation") was subject to a Scottish Environmental Protection Agency (SEPA) inspection at the end of October 2025, which looked at the water discharges and monitoring carried out at the Installation. The inspection concluded that many of the conditions and monitoring methodologies included in the current Environmental Permit (PPC/A/1008802) are out of date, and therefore a review was required to ensure that the monitoring and analysis carried out on site is still applicable and appropriate for the relevant pollutants that could be present in the emissions to water.

As such, SEPA have requested that SSE carry out a detailed review of the current emission and monitoring arrangements and provide a report and assessment of the Installation's monitoring and associated emissions, to ensure that emissions are being controlled and measured appropriately. Where there are changes to water discharge arrangements e.g. discharge points, pollutants, sampling, analysis and reporting SEPA requested that a permit variation be prepared to update the permit. SSE have requested Ove Arup and Partners Limited's (Arup) assistance in the preparation of the review.

The SSE Peterhead Power Station is located approximately 3km south of Peterhead town centre on the east Aberdeenshire Coast. It was originally commissioned in 1982 to provide baseload power using heavy fuel oil, or waste gas from North Sea oil fields, however it was upgraded/ repowered in the 2000s to natural gas generation, providing flexible power to the increasing renewables led electricity supply system. It is the largest flexible power station in Scotland and provides 1,180MW of power through three Gas Turbines (GT11, GT12 and GT13) and steam raised through three Heat Recovery Steam Generators (HRSGs). The steam from the three HRSGs is routed to the original Unit 1 steam turbine.

The location of the Site, and the Installation Boundary are shown in Figure 1.1.

1.1 Purpose of Report

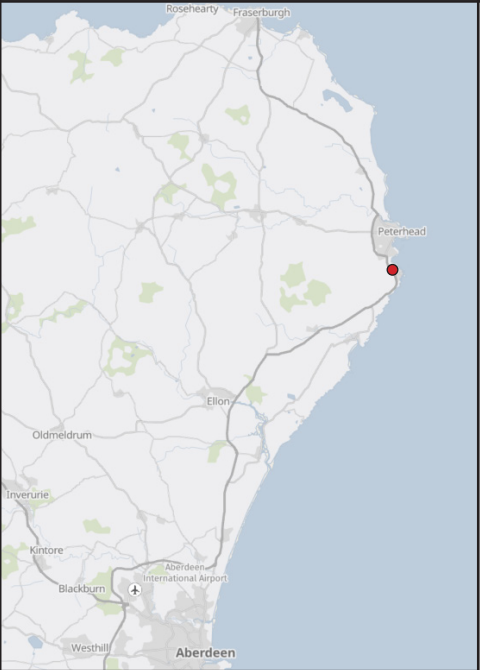
This report aims to review the current emissions to water from the Installation, to determine whether all pollutants that could be present in the emissions to water are appropriately identified, and that appropriate monitoring for these substances is being carried out. Furthermore, an assessment of the impacts of the emissions is carried out.

The report includes:

- A summary of the site operations including a review of the potential pollutants that may be emitted by the operations at Peterhead Power station through each emission point;
- A review of the existing Permit water discharge conditions;
- A review of the current sampling locations;
- A review of existing sampling and testing methodologies;
- A review of proposed future sampling, testing methodologies and certification;
- An impact assessment of the emissions from the Installation; and
- Recommendations for a Permit Variation.

As part of the review of the existing discharges, SEPA have also requested clarification as to whether there is any potential for process oil discharge from the Site and whether the emissions are treated via a recognised separator of adequate treatment capacity. This is also addressed in this report.

The report concludes by providing a list of changes required to the permit to reflect the outcome of the review and assessments.



Legend

 Installation Permit Boundary

01	21/04/2026	IC	HW	HW
Rev	Date	By	Chkd	Appd

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Project Title
**Peterhead Power Station
PPC/A/1008802**

Drawing Title
**Figure 1.1 Site Location and Installation
Boundary**

Role
Environmental Permit Support

Arup Job No.
314992

Name
ARUP-SSE-DR-314992-01

Scale
1:6,613 @ A3

2. Summary of Site Operations

2.1 Environmental Setting

The site environmental setting was originally described in the PPC Permit application Site Condition Report, prepared in 2006¹ and has more recently been summarised in the Peterhead Power Station, CIRIA C736 Compliance Assessment Report, produced by AECOM in March 2025². The AECOM report was informed by a Ground Investigation (GI) that Socotec undertook at the site in 2023, which included soil and groundwater sampling and monitoring. As the site environmental setting therefore has been extensively detailed in these reports, only a summary in the context of the potential for emissions to water, is provided here.

The site is located on raised land next to the coast, with Sandford Bay to the east and Boddam Harbour to the southeast. The area immediately to the east of the site, Buchan Ness to Collieston Coast, is classed as a Special Protection Area (SPA).

The site is at an elevation of approximately 15 to 30m above Ordnance Datum (mAOD) generally sloping towards the east/ northeast. Earth bunds approximately 5 to 7m high are located along the eastern boundary of the site.

Hardstanding areas are present in and around the process areas and buildings, which comprise of concrete/ asphalt surrounded by packed large core gravel. Parts of the site in the north, south and central areas (i.e. outside of the process and operational areas), comprise soft landscaping.

British Geological Survey (BGS) mapping³ shows the site to be generally underlain by Hatton Till Formation deposits comprising diamicton, clay, sand and gravel (referred to as glacial till) over Peterhead Pluton Granite bedrock. Made ground deposits are expected to be present within the majority of the site.

The Glacial Till deposits beneath the site are generally regarded as having a very low to low permeability and are typically classified as a “not significant” aquifer. BGS hydrogeology mapping indicates that the site is underlain by the Peterhead aquifer, which is described as a “very low productive” aquifer in which flow is through fractures. The underlying granite bedrock is considered as a Non or Weakly Permeable Aquifer.

The SEPA Flood Maps⁴ indicate that there is a medium likelihood of river flooding (each year there is a 0.5% chance of flooding) predicted to occur across the majority of the site and some areas of the site have a high likelihood of surface water flooding (each year there is a 10% chance of flooding). There is however no risk from coastal flooding at the site.

2.2 Site History

The SSE Peterhead Power Station site consists of an older heavy fuel oil/ oil field gas fired power station, which has been decommissioned, and is no longer included in the Permit but some aspects of the infrastructure remains on site. The Permitted activity covers the operation of three Combined Cycle Gas Turbines (CCGT), providing 1,180MW of electrical power.

Due to the previous use of heavy fuel oil, the Installation had included three oil storage tanks in the northwest of the site, however these have now been removed, and the associated area has been remediated. The only oil now onsite is that associated with maintenance activities, and that held within equipment, such as transformers.

The 2023 Socotec GI investigation carried out at the site concluded that:

¹ URS. (2026). PPC Initial Site Condition Report, Scottish and Southern Energy, Peterhead Power Station.

² AECOM. (2025). Peterhead Power Station CIRIA C736 Compliance Assessment Report.

³ [GeoIndex \(onshore\) - British Geological Survey](#)

⁴ [Flood Maps | SEPA - Flood Maps | SEPA](#)

- *“There appear to be no releases of Relevant Hazardous Substances (RHS) to soil and groundwater related to current site activities;*
- *RHS in the form of total petroleum hydrocarbons (TPH) detected in the soil and groundwater are related to historical site activities/ incidents;*
- *The localised TPH detects recorded in the soil do not pose a human health risk to site operatives;*
- *The localised TPH detects recorded in the soil and groundwater do not pose a significant risk to the Water Environment in terms of the groundwater as a potential resource or a pathway to the nearby coastal waters;*
- *No other organic or inorganic RHS were recorded at elevated concentrations in the soil and groundwater, deemed to pose a human health risk or a significant risk to the Water Environment in terms of the groundwater, as a potential resource or a pathway to the nearby coastal waters; and*
- *Current soil and groundwater results indicate no negative deterioration in soil and groundwater quality, hence no significant pollution at the Peterhead Power Station Site resulting from current activities.”*

2.3 Current Water Use at the Installation

In order to understand what contaminants may be present in the emissions to water from the Installation, it is first necessary to understand where water is used on site and what chemicals are added to the water used on site prior to its subsequent discharge.

2.3.1 Cooling Water

The main water use for the Installation is the once-through cooling water comprising abstracted seawater from Boddam Harbour. The water is used for cooling on the main Unit 1 steam turbine and the ancillary cooling water systems of the CCGT units.

The abstracted seawater is treated with sodium hypochlorite to reduce microbial growth within the cooling water system before being discharged back to Sandford Bay. The injection of hypochlorite solution is intermittent during the winter months (dosing applied for one hour in six) and continuous between April and November, in order to maintain a total residual oxidant level of 0.2 mg/l at the outfall points.

Previously, hypochlorite was generated on site in the electro-chlorination plant (ECP) which used electrolysis of seawater to produce a chlorinated solution which was then dosed at a rate of 0.2ppm into the once-through cooling water system. This plant has now been decommissioned and removed from the Site, and the intent is to provide storage of hypochlorite in replacement of the ECP. The new storage and dosing arrangements will be notified to SEPA separately once the final design is completed.

2.3.2 Towns Water

Towns water is supplied to the Installation from Newfield Reservoir. It is used in domestic and firefighting systems without further treatment on site. Additionally, towns water is used for flushing the oxigest plant, and compressors and cooling water gland seals.

In addition, demineralised water is produced from towns water in the Installation's Water Treatment Plant (WTP), which comprises ion exchange resins to produce demineralised water for the Site's needs. Demineralised water is used for make-up water for losses of steam and water from the steam/ water cycle of the steam turbines and two auxiliary boilers. The WTP also includes facilities to regenerate the ion exchange resins and also condensate polishing resins.

Treatment chemicals used in the WTP are for pH control and ion exchange resin regeneration and include sodium hydroxide, sodium bisulphite and sulphuric acid.

2.4 Chemical Usage at the Installation

As well as the addition of chemicals to the water used on site being a source of contaminants in the discharge, as described in Section 2.3, there is also potential for contaminants to be present in the surface water collected on site, if chemicals are inappropriately stored or spilled on site. Raw materials and fuels used at the Installation include:

- Chemicals used for water treatment;
- Utility/ boiler chemicals;
- Oils (lubricating, hydraulic, transformer and seal);
- Diesel; and
- Others, such as firefighting foam.

A comprehensive Containment Review was carried out for the Installation in March 2025², which concluded that *“While containment at the site was generally compliant with C736 requirements, there were isolated cases where there was inadequate or no secondary or tertiary containment. Areas where inadequate secondary containment was present included the Fire Resistant Fluid storage tanks in Unit 1 Turbine House, the clean and used lube oil tanks in the Lube Oil Transfer Pumphouse, the generator oil tanks in GT11, 12 and 13 and the Turbo K storage IBCs in GT12.*

The report included a Bund Inspection summary, which identified where bund defects were present, providing a red/ amber/ green rating for bund inspection and repair. It also identified that there was a lack of information and consideration of tanker unloading facilities.

SSE have produced an Action Plan to address the issues that were raised in the Containment Review. The Action Plan has been shared with SEPA and a timetable for the completion of the required repairs to bunding, has been provided, with all works to be completed by 31st March 2028.

With regards to the containment provision of tanker unloading facilities, SSE engaged Fairhurst to carry out a risk assessment and design review of all applicable areas. A report detailing remedial requirements was provided to SEPA on 31st March 2026.

Table 2.1 provides a summary of the chemicals used at the Installation, their storage arrangements and the associated environmental hazards. Material Safety Data Sheets (MSDS) for the chemicals used on site are provided in Appendix A.

In addition to the raw material storage detailed below, there is also large quantities of transformer oil within the transformers on site. All the transformers are located within bunding that is either compliant with the requirements of CIRIA C736 already or will be upgraded as part of the Action Plan for bunding repairs/ upgrades.

The location of chemical storage facilities at the Installation is shown in Figure 2.1.

Table 2.1: Chemicals Used at the Installation

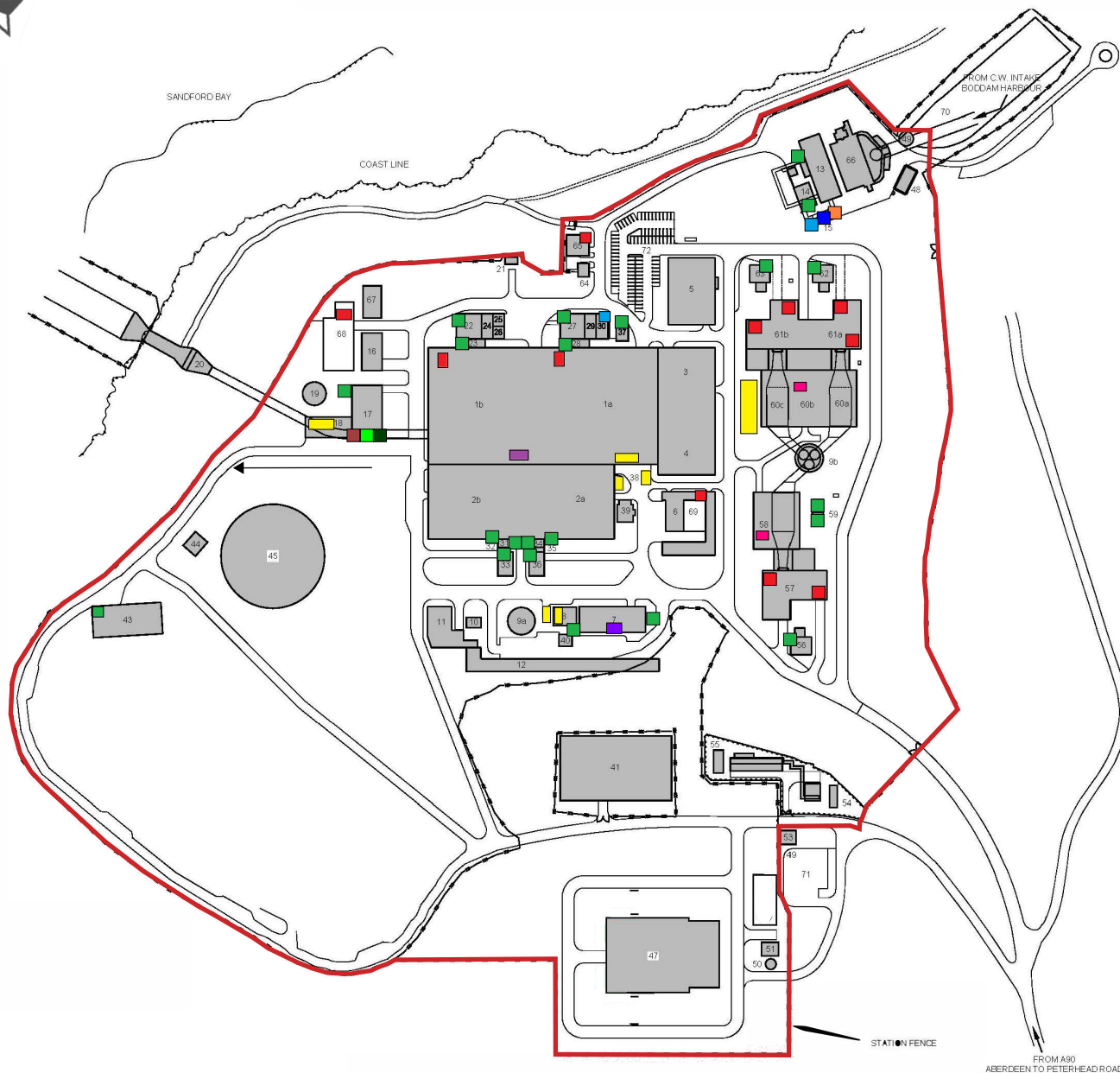
Chemical	Usage	Location and Bunding Arrangements	Storage Capacity	Typical Annual Consumption*	Environmental Risk
Sodium hypochlorite	Cooling water treatment	New storage/ dosing facility to be notified to SEPA under a separate submission following detailed design.	TBC	TBC	Very toxic to aquatic organisms. Does not bioaccumulate.
Sodium hydroxide 47%	Towns water treatment	WTP. Sodium hydroxide and sulphuric acid tanks are within individual bunds sized in accordance with CIRIA C736. Sodium bisulphite containers stored on a pallet – within the WTP building.	65 tonne tank	136 tonnes	Large quantities would affect pH and potentially harm aquatic organisms. Does not bioaccumulate.
Sulphuric acid 96%			35 tonne tank	78 tonnes	Large quantities would affect pH and potentially harm aquatic organisms. Bioaccumulation is not expected.
Sodium chloride			12 tonne tank	8.4 tonnes	None detailed.
Sodium bisulphite 38%			20 x 25 litres plastic containers	750 litres	None detailed.
Ammonia 34%	Boiler steam/ water cycle chemistry	Unit 1 Turbine Hall. Ammonia stored in double skinned tank, with outer tank in accordance with CIRIA C736.	3,070 litre tank	4,000 litres	Very toxic to aquatic organisms. Low potential for bioaccumulation.
Tri-sodium phosphate		Aux Boiler House. Kept as a solid and made up to 70 litres and then dosed to the boiler. No storage.	<70 litres in plastic vessel	70kg	None detailed.
Sodium hydroxide 0.1%		HRSB Basement. Within HRSB basement, with drains to interceptor.	1,000l tanks x 3	0	Large quantities would affect pH and potentially harm aquatic organisms. Does not bioaccumulate.

Chemical	Usage	Location and Bunding Arrangements	Storage Capacity	Typical Annual Consumption*	Environmental Risk
Nitrate based inhibitor (Nalco 8539)	Closed-circuit cooling water system	Oil store. Drums stored on bunded pallet with 110% capacity of the stored volume.	10 x 25 litre drums	0	Toxic to aquatic organisms.
Molybdate based inhibitor (Nalco 73361)			6 x 25 litre drums	0	No ecological data.
Carbohydrazide (Nalco 72100)			4 x 25 litre drums	12.5kg	None but some LC50 data for fish.
Diesel	Fuel	Unit 1 Turbine Hall. Tanks stored within a bund sized in accordance with CIRIA C736. This arrangement is subject to change based on the permit variation submitted in August 2026.	2 x 2.73m ³ tanks	3.7 tonnes	Toxic to aquatic organisms. High potential to bioaccumulate.
		Emergency Diesel Generator Tanks. Tanks stored with a bund sized in accordance with CIRIA C736.	2 x 24m ³ tanks		
		Agrekko Emergency Diesel Generator Tank. Tank stored with a bund sized in accordance with CIRIA C736. This arrangement is subject to change based on the permit variation submitted in August 2026.	1 x 9m ³ tank		
		Fire-fighting pump house. No bund, but pump house basement would provide secondary containment in the event of a leak.	4 x 0.6m ³ tanks		
		External vehicle fuel storage. Double skinned tank sized in accordance with CIRIA C736. Tank also alarmed.	1 x 5.3m ³ tank		
Lube oil	Equipment lubrication	GT Buildings. Lube oil held within each GT	14,500 litres per GT	7,000 litres	Toxic to aquatic life. Potential to bioaccumulate.

Chemical	Usage	Location and Bunding Arrangements	Storage Capacity	Typical Annual Consumption*	Environmental Risk
(including Fire Resistant Fluid)		Unit 1 Turbine Hall. Tank stored with a bund sized in accordance with CIRIA C736.	2 x 45.5m ³ tanks (one has been emptied and no plans to reuse)		
		Lube oil Transfer Pumphouse. Tank stored with a bund, which is not sized in accordance with CIRIA 736.	1 x 20m ³ tank		
			1 x 88m ³ tank		
		Oil Store. Hardstanding with channels to two containment sumps with 1.8m ³ capacity each.	56 x 208l drums 8.5 x 20l drums 5 x IBC		
		Castrol Store. Drums banded.	11 x 208l drums (part)		
Transformer oil	Transformers	Aux Boiler House. Tank stored within a bund which is not compliant with CIRIA C736, however with consideration of additional containment available in oil traps and sumps, compliance is achieved	2 x 6m ³ tanks	4,180 litres	Harmful to aquatic life. Potential to bioaccumulate
		Cooling water pumphouse. Bund which is sized in accordance with CIRIA C736.	2 x 1m ³ tanks		
		Electro-chlorination Plant. Bund which is sized in accordance with CIRIA C736.	3 x 1m ³ tanks		
		Water Treatment Plant. Stored within a bund sized in accordance with CIRIA736.	2 x 690 litre tanks		
		Generator Transformers. Stored within a 43m ³ bund and 407.5m ³ collection/ holding tank sized in accordance with CIRIA736.	2 x 117m ³ tanks		

Chemical	Usage	Location and Bunding Arrangements	Storage Capacity	Typical Annual Consumption*	Environmental Risk
		Unit Transformers. Stored within a 16.2m ³ bund and 407.5m ³ collection/ holding tank sized in accordance with CIRIA736	2 x 11.3m ³ tanks		
		Spare Gen Tx. Stored within a 86.7m ³ bund and 407.5m ³ collection/ holding tank sized in accordance with CIRIA736.	1 x 135m ³ tank		
		Station Transformers. Stored within a bund sized in accordance with CIRIA736.	2 x 38.5m ³ tanks		
		Station Auxiliary Tx. Stored within a bund sized in accordance with CIRIA736.	2 x 6m ³ tanks		
		Unit Auxiliary Tx. Stored within a bund sized in accordance with CIRIA736	2 x 6m ³ tanks		
		Station Txs. Stored within a bund sized in accordance with CIRIA736	1 x 33m ³ tanks		
		FOTF Transformers. Stored within a bund sized in accordance with CIRIA736	2 x 1.143m ³ tanks		
		GT's Generator Tx. Likely not compliant based on combination of bund, separator and underground pipework in accordance with CIRIA736. Site to investigate.	3 x 69m ³ tanks		
		GTs Unit Tx. Stored within a bund sized in accordance with CIRIA736.	3 x 3.8m ³ tanks		
		Oil Store.	22 x 208l darrels		

Chemical	Usage	Location and Bunding Arrangements	Storage Capacity	Typical Annual Consumption*	Environmental Risk
		Hardstanding with channels to two containment sumps with 1.8m³ capacity each.			
Expandol	Firefighting foam concentrate	Unit 1 Turbine Hall. Drums stored on sumps sized in accordance with CIRIA C736.	20 x 25 litre in drums	0 No use unless in the event of a fire. Replaced on expiration, with waste material being disposed of via a third party waste contractor.	Harmful to aquatic life. Unlikely to bioaccumulate.
Turbo K	Gas turbine cleaner	Oil store. IBCs stored on plastic/ metal containment pallets sized in accordance with CIRIA C736.	6 x 1m³ IBCs	3,000 litres	Low toxicity. No data on bioaccumulation potential available.
Hydraulic Oil	Equipment Lubrication	Oil Store. Concrete floor with channels to containment sumps.	17 x 208l barrels 5 x 20l drums 2 x IBCs	2,600 litres	Toxic to aquatic life. Potential to bioaccumulate.
		Castrol Store. Drums banded.	5 x 208l drums (part)		
*Taken from Financial 2024 – 2025 Raw Material Utilisation Data Reported to SEPA					



Legend

- Lubrication oil / Seal oil / Hydraulic oil
- Diesel
- Transformer oil
- Sodium hydroxide (20%)
- Sodium hypochlorite
- Hydrochloric acid (25%)
- Sulphuric acid (96%)
- Sodium hydroxide (47%)
- Sodium hydroxide (0.1%)
- Sodium bi sulphite
- Trisodium phosphate
- Ammonia (34%)
- Installation Boundary

01	21/04/2026	IC	HW	HW
Rev	Date	By	Chkd	Appd

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Project Title

Peterhead Power Station

PPC/A/1008802

Drawing Title

Figure 2.1 Location of Chemical Storage

Role

Environmental Permit Support

Arup Job No.

314992

Name

ARUP-SSE-DR-314992-02

Scale

1:6,613 @ A3

2.5 Current Water Discharges from the Installation

2.5.1 Permitted Discharge Points

The current Environmental Permit includes six Emission Points to water from the Installation, which all release surface water/ wastewaters into the North Sea at either Sandford Bay or the Den of Boddam Burn (a culverted stream beneath the Site which flows into Sandford Bay). The compliance sample locations for a number of the Emission Points are not at the same location as the discharge location. The Emission Points, the sampling locations and the source of the emissions are detailed in Table 2.2. The locations of the existing Emission Points (denoted by “W”) and associated sample points (denoted by “SP”) where these are different to the discharge location, as they are detailed in the existing Permit are provided in Figure 2.2.

Table 2.2: Emission Points to Water in the Existing Permit

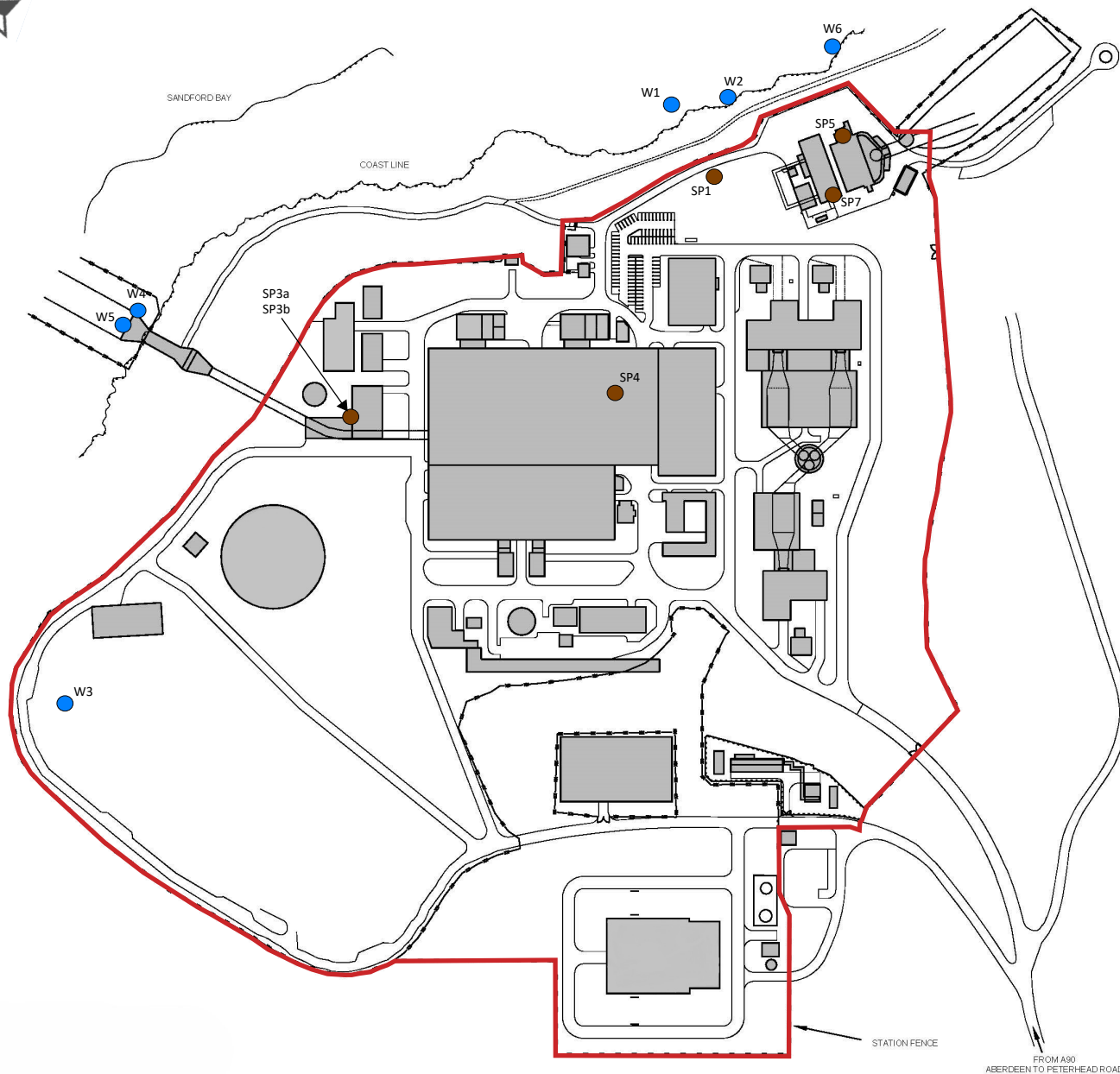
Emission Point	Sample Location and Reference	Source of Emission	Point of Discharge
W1	Manhole No. 1 SP 1	Surface water, oil separator discharges, HRSG cooling water, transformer cooling water and treated sewage effluent	Sandford Bay
W2	SP at Emission Point	Overflow for W1	Sandford Bay
W3	Fuel oil tank farm anti-pollution valve pit manhole SP 2	Oil separators within former tank farm area	Den of Boddam Burn
W4	Effluent sumps a & b recirculation lines SP 3a and SP 3b	Water treatment plant	Sandford Bay
W5	Steam Turbine 1 condenser inlet - SP 4 ElectroChlorination Plant Bund - SP 7	Cooling water equipment electro-chlorination plant effluent	Sandford Bay
W6	SP 5	Emergency overflow from cooling water equipment.	Sandford Bay

Emission point W2 is an overflow for W1. Drainage plans for the site show that W2 branches off after the Manhole 1 sample point (SP 1) for W1, and therefore any emission going to W2 would be sampled at SP 1. It is therefore considered that there does not need to be a separate sample location detailed in the Permit for W2.

Although the oil tanks have been removed from the fuel oil tank farm at W3, there remain two transformers within the former Fuel Oil pumphouse. Although the area drains via interceptor 4, due to the presence of the transformers, there remains a low potential for oil to be present in the discharge from W3.

The sumps at SP3a and SP3b discharge via a single dedicated drainage channel from the WTP which is presently identified as Emission Point W4 in the permit. The WTP drainage channel from the sumps at SP3a and SP3b interfaces and discharges into Emission Point W5 (the main cooling water outlet) as the final discharge point from the Site. It is therefore considered that there does not need to be a separate Emission Point W4 within the Permit.

W6 is located at the overflow bay for the cooling water forebay inlet to the cooling water pumps. Water from the forebay and from local surface water drains flow into this bay and exits out to W6 via an overflow pipe. In addition, clean water from the ECP bund ECP transformer bund and ECP transformer rectifier bund which remain in place following the removal of the ECP plant and transformer (note, the ECP transformer rectifiers remain in place) would be drained to W6, and therefore SP 7 is incorrectly identified as being linked to W5, whereas it is actually related to W6. The description of the source of the emissions to W5 in the Permit should be updated to reflect the surface water component of the discharge, however, there is normally little to no flow or level from this discharge point. In addition, following the removal of the ECP plant, SP 7 is no longer in place.



Legend

- Installation boundary
- Water Discharge Points
- Sample Location Points

Q1	31/04/2026	IC	HW	HW
Rev	Date	By	Chkd	Appd

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Client

SSE Thermal Generation (Scotland) Ltd

Project Title

**Peterhead Power Station
PPC/A/1008802**

Drawing Title

**Figure 2.2 Water Emissions Discharge
Points**

Arup Job No.

314992

Name

ARUP-SSE-DR-314992-03

Scale

1:6,613 @ A3

Scale

1:6,613 @ A3

2.5.2 Surface Water Drainage

The Installation has a clean surface water drainage system and an oily water drainage system. Both drainage systems discharge through Emission Point W1.

Surface water from the clean surface water system is discharged straight to drain, whereas the oily water drainage system serves areas where there is potential for oil contamination (tank bunds, the transformer compounds, internal areas and the WTP) and therefore the surface waters are first routed through oil/ water separators prior to being combined with the clean surface water for discharge.

On site manhole covers associated with clean surface waters are painted green. Drains with potential for oil to be present have manhole covers painted red. Brown drains are foul wastewater to the package treatment system.

Details of the oil/ water separators on site are provided in Table 2.3 and a site drainage plan showing the clean, oily and foul drainage system and the location of oil/ water separators is provided in Figure 2.3.

Table 2.3: Onsite Oil/ water Separator Details

Separator Reference	Type of Interceptor	Location on Site and associated Drainage	Interceptor Capacity
Separator A	Tilted plate pack separators.	Oily water drains from the auxiliary boiler house and the distillate fuel tank.	No throughput capacity listed but separator was sized for four auxiliary boilers and there are now only two in service.
Separator B	Tilted plate pack separators.	Oily water drains from the transformers next to Unit 1 and Unit 2 boiler houses.	No throughput capacity listed
Separator C	Tilted plate pack separators.	Boiler 1 and 2 basement drains, oily water drains from the ancillary services building and the contractors' workshop.	No throughput capacity listed but originally sized for 2 boilers and associated equipment, now only associated equipment from 1 boiler in service.
Separator D	Tilted plate pack separators.	Oily water drains from the WTP and Unit 1 and 2 Turbine Hall.	No throughput capacity listed but sized for two steam turbines and associated equipment, now only 1 steam turbine and associated equipment in service.
Separator 1	No longer in service	Old oil tank farm area.	N/A
Separator 2	No longer in service		
Separator 3	No longer in service		
Separator 4	Tilted plate pack separators.	Tank farm behind former fuel oil pump house – oil pump house transformers.	2 transformers by fuel oil pump house.
10UBH01	Full retention class 1	Station transformer 3 and 4 – sump drainage	22 litres/ second
10UBH02	Full retention class 1	Generator transformer 11 & 12 – sump drainage	10 litres/ second.
10UBH03	Full retention class 1	Car park – oily drains	40 litres/ second.

Separators are inspected weekly, during Operator routine inspections, and defects are raised when they require emptying to allow for works to be arranged. Drainage integrity risk-based inspection, with a rolling schedule to capture all drains is undertaken every two years.

In the event of there being oil, or any other contaminant substance, detected in the surface water drains outfall there are a number of manholes that are checked at the site in order to identify the potential source areas. The checks are based on visual observations, and in addition, grab samples are taken, which are then analysed by Laboratory Staff on site.

2.5.3 Domestic Wastewaters

Domestic wastewaters are treated onsite in an oxigest package treatment plant, which provides physico-chemical and biological treatment, with treated sewage effluent being mixed with active aerobic micro-organisms to remove organic matter, prior to discharge through W1.

In addition, there is septic tank for domestic wastewaters from the Cooling Water Pump house building and the contractors village toilet block, which are monitored with level switches and pumped up to the oxigest unit for treatment prior to discharge through the W1 discharge point.

SEPA Guidance WAT-G-057 on the Discharge of Sewage Effluent calculates whether a discharge permit is required based on the Population Equivalent (PE). To calculate the PE for a non-domestic property, the maximum number of people who could use the system in a day is multiplied by the Biochemical Oxygen Demand (BOD) load for the specific type of property and divided by 60. The relevant BOD load has been obtained for full time office staff (38 grams per person per day) and is considered to be relevant to the site's operations. There are 108 permanent staff on site and therefore the PE for the Installation has been calculated as: $108 \times 38 / 60 = 69$ (rounded up to the nearest whole number)

As the PE is greater than 50, the discharge would require a Permit in its own right, however where discharge is to coastal or transitional waters treatment with a septic tank is normally acceptable.

It is considered that the treated sanitary water from the oxigest plant is unlikely to have a noticeable impact on overall wastewater quality from the Installation, given the treatment in place and the small volume compared with other site discharges and surface water discharged from Emission Point W1.

2.5.4 Cooling Water

Once-through cooling water is discharged via Emission Point W5. Other than dosing with hypochlorite, there is no other potential contamination of these wastewaters. Continuous monitoring of total residual oxidants (at SP 4) and temperature is maintained for the cooling waters to Emission Point W5.

The auxiliary cooling circuits (i.e. the indirect once-through and closed-circuit cooling water for temperature control on oil and water systems associated with the steam turbines, generators, gas turbines, feed pumps and generator transformers) are discharged to Emission Point W1.

The potential for contamination of cooling water wastewaters is discussed further in Section 2.6.

2.5.5 Other Wastewaters

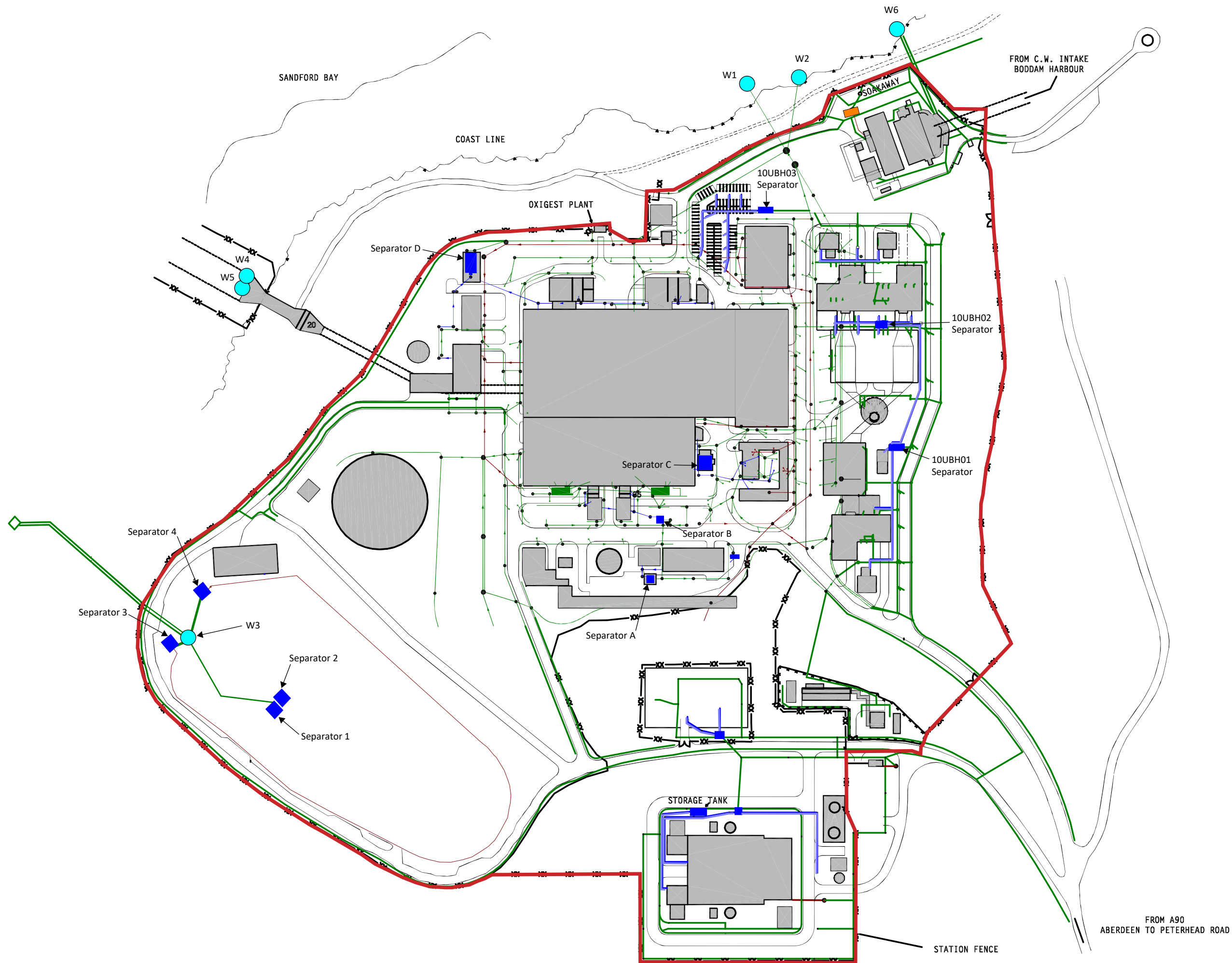
The WTP operation produces effluent containing weak acids and alkalis, common salts and suspended solids from the regeneration of the ion exchange resins. This effluent is collected in one of two effluent sumps where it is neutralised prior to being discharged to sea via Emission Point W4.

The boiler steam/ water cycle chemistry is controlled by the addition of chemicals such as ammonia, sodium hydroxide and sodium phosphate. As a result, the condensate polishing resin results in an emission of ammonia when it is regenerated, and this is also collected in one of the two effluent sumps prior to discharge to Emission Point W4. Regeneration of the condensate polishing resins only occurs approximately every four days whilst the Power Station is operational, the frequency of which is based on the volume and quality of condensate throughput.

As stated previously, Emission Point W4 is at the same final point as Emission Point W5, and therefore when the condensate polishing wastewaters are discharged, they will be discharged at the same time as the once-through cooling water, is being discharged, which will therefore result in significant dilution of the ammonia containing condensate polishing wastewater.

It is considered that the effluent produced from the WTP does not contain any other substances, other than ammonia, that require ELVs within the Environmental Permit. It should be noted that the Installation is currently assessing options for replacement of the WTP. This report considers the present design and operation.

The potential for contamination of these wastewaters is discussed further in Section 2.6.



2.6 Summary of the Potential for Wastewater Contamination

Following the review of the current water usage and wastewaters produced on site, Table 2.4 provides a summary of the potential contaminants present in the emissions from each Emission Point in the permit, based on the information provided in Sections 2.1 - 2.5.

Table 2.4: Summary of Potential Water Pollutants and Emissions

Emission Point	Source of Emission	Potential Pollutants
W1	- Surface water from areas without risk of contamination - Surface water from areas with risk of contamination from oil lubricated plant and equipment, and fuel and oil storage areas drained via oil separators - HRSB and transformer cooling water - Boiler steam condensate - Treated sewage effluent	- Hydrocarbons - Suspended solids - Sodium hypochlorite (free chlorine) - Boiler dosing chemicals (phosphate and ammonia) - Biological oxygen demand (oxygen plant) (BOD) - Temperature - pH - Potential for metals (specifically iron, copper and zinc) from corrosion of steel tubes and heat exchangers
W2	Overflow for W1 when high flow present at W1.	As W1.
W3	Surface water drainage from former oil storage tank farm.	Oil as a result of the two transformers located in the former fuel oil pump house.
W4	WTP	- Sodium hydroxide 47% and 5% - Sulphuric acid 96% and 1.5% - Sodium chloride - Sodium bisulphite - Suspended solids - pH - Ammonia - Potential for metals (specifically mercury and cadmium) from chemicals used in the WTP
W5	- Steam Turbine 1 condenser inlet - ECP process fluids (no longer produced)	- Sodium hypochlorite (free chlorine) - Temperature - pH - Suspended solids
W6	No process discharges. Surface water from roadways around the Cooling Water forebay. Decommissioned ECP bunded area and ECP transformer bunded areas flow to this point. Rectifiers have containment that runs to separators then on to W6.	Transformer oil

3. Existing Permit Monitoring Conditions

3.1 Existing Permit Conditions

The following excerpts from the Installation's Permit are the main conditions that relate to the sampling and monitoring of the emissions to water.

“3.4.1 The emissions to the water environment specified in Table 3.1, shall only be permitted from the emission points specified in that Table to the destinations specified in said Table and only after having passed through the sample points specified in that Table. The existing monitoring conditions within the Installation's Permit are shown in ”

The emission limits detailed within the Permit are shown in Table 3.1.

Table 3.1: Emissions to Water Environmental ELVs from the Existing Permit

Parameter	W1	W2	W3	W4	W5		W6
	SP1		SP2	SP 3a and SP 3b	SP4	SP7	SP5
Source	Surface water, oil separator, HRSG cooling water, treated sewage effluent	Overflow W1	Oil separators former tank farm area	Water treatment plant	Cooling water		Emergency overflow from cooling water equipment
pH	6 - 9	-	-	5 - 9	-	5 - 9	-
Oil (mg/l)	10	-	10	-	-	-	-
Temperature (°C)	25	-	-	-	32	-	-
Suspended solids (mg/l)	100	-	-	50 IL 100 IU	-	To be agreed with SEPA	-
Total residual oxidant (mg/l)	0.35	-	-	-	0.35	-	-
Biological Oxygen Demand (BOD) (mg/l)	10	-	-	-	-	-	-
Ammonia (mg/l)	-	-	-	To be agreed with SEPA	-	-	-
Oil	None visible						
Flow (m3/hr)					107,000		

3.4.2 Subject to Conditions 3.4.3 and 3.4.4, no emission specified in Table 3.1 shall exceed the limit, or be outwith the range, as appropriate, for the parameters specified in said Table.

3.4.3 The concentration release limits for Total Residual Oxidant from discharge point W1 and W5 as specified in Table 3.1 shall be complied with if the following criteria are met, namely that 95% of half hourly average Total Residual Oxidant values as determined in accordance with Conditions 3.4.11 to 3.4.13, in any month, do not exceed the limit specified in that Table and the maximum half hourly average value does not exceed 1.5 times the limit specified in that Table.

- 3.4.4 Where the limit for any parameter in Table 3.1 is prefixed with IL or IU the following Conditions shall apply in respect of that parameter:
- 3.4.4.1 Subject to Condition 3.4.4.2 and 3.4.4.3, no sample of any emission shall exceed the instantaneous lower limit (IL);
- 3.4.4.2 The limit in Condition 3.4.3.1 may be exceeded where, in any series of samples of any emission taken by SEPA at regular but randomised intervals over a year (as listed in column 1 (and 3) of Table 3.3), no more than the number of samples (as listed in column 2 (and 4) of Table 3.3) exceed the IL;
- 3.4.4.3 The limit in Condition 3.4.2 may be exceeded where, in any series of samples of any emission taken in accordance with the sampling plan required under Condition 3.4.7 over any year (as listed in column 1 (and 3) of Table 3.3), no more than the number of samples (as listed in column 2 (and 4) of Table 3.3) exceed the IL, as appropriate;
- 3.4.4.4 Notwithstanding Condition 3.4.3.2 and 3.4.3.3, no sample of any emission shall exceed the instantaneous upper limit (IU).
- 3.4.5 Measurement and/or sampling of the emissions in Table 3.1 shall be carried out by the Operator at the sampling locations specified in that Table subject to the requirements for monitoring specified in Table 3.2.
- 3.4.6 The date, time and results of all samples and spot measurements carried out in compliance with Condition 3.4.5 shall be recorded by the Operator and reported.
- 3.4.7 A sampling plan shall be agreed in writing with SEPA and shall be maintained and reviewed annually. The reviewed sampling plan shall be reported each year for the forthcoming calendar year."

The emission limits detailed within the Permit are shown in Table 3.1.

Table 3.1: Emissions to Water Environmental ELVs from the Existing Permit

Parameter	W1	W2	W3	W4	W5		W6
	SP1		SP2	SP 3a and SP 3b	SP4	SP7	SP5
Source	Surface water, oil separator, HRSG cooling water, treated sewage effluent	Overflow W1	Oil separators former tank farm area	Water treatment plant	Cooling water		Emergency overflow from cooling water equipment
pH	6 - 9	-	-	5 - 9	-	5 - 9	-
Oil (mg/l)	10	-	10	-	-	-	-
Temperature (°C)	25	-	-	-	32	-	-
Suspended solids (mg/l)	100	-	-	50 IL 100 IU	-	To be agreed with SEPA	-
Total residual oxidant (mg/l)	0.35	-	-	-	0.35	-	-
Biological Oxygen Demand (BOD) (mg/l)	10	-	-	-	-	-	-
Ammonia (mg/l)	-	-	-	To be agreed with SEPA	-	-	-

Parameter	W1	W2	W3	W4	W5		W6
	SP1		SP2	SP 3a and SP 3b	SP4	SP7	SP5
Oil	None visible						
Flow (m³/hr)					107,000		

3.2 Existing Monitoring and Sampling Arrangements

3.2.1 Permit Monitoring Requirements

Table 3.2 of the existing Permit details the test methodologies and standards currently applied to the wastewater samples taken and is replicated in Table 3.2 of this report.

Table 3.2: Monitoring Methodologies as Detailed in the Existing Permit

Parameter	Emission Number(s)	Test Method	Monitoring Frequency
pH	W1	BS 6068-2.50:1995	Monthly grab sample
	W4	Calibrated and buffered pH probe	Continuous
Oil	W1	Visual and analysis with GC-FID or FT-IR if visible oil detected	Daily
	W3		
	W4		
	W5		
Temperature	W1	Thermocouple / PT resistance	Monthly grab sample
	W5		Continuous
Suspended solids	W1	BS 6068 2.54:1996	Monthly grab sample
	W4		Monthly
Total residual oxidant	W1	BS 6068 2.26:1998 (BS EN ISO 7393-2:1986)	Monthly
	W5	BS 6068 2.26:1998	Continuous
		BS 6068 2.26:1998 (BS EN ISO 7393-2:1986)	Monthly
Biological oxygen demand	W1	BS EN 1899-2:1998 in accordance with EN 25814	Monthly grab sample
Ammonia	W4	ISO14911:1999 or ASTM D6919-03	Monthly grab sample

In line with the permit condition 3.5.6, sampling and testing the water environment around the emission points W1, W4 and W5 is carried out every three years to identify the potential impact of emissions on the water environment including marine flora, fauna and sediments.

SSE have been carrying out this monitoring since 2008, with the last survey was carried out in 2024 by Anderson Marine Surveys Limits and Aquatic Survey and Monitoring Limited⁵ and is primarily focused on the effects the WTP effluent and potential for the elevated temperature to impact marine life. Concentrations of ammoniacal nitrogen have always been found to be low.

Previous survey reports from this monitoring programme have concluded that the power station outfall has had an effect on the intertidal and subtidal fauna and flora in Sandford Bay, though the effects were not large. The reports suggest that some changes noted within the bay are typical of natural scouring events i.e. changes

⁵ Aquatic Survey and Monitoring Ltd. (2024) Environmental Survey of Sandford Bay, Peterhead, September/ October 2024.

brought about by gross sediment movements around the bay, both intertidally and subtidally, rather than as a result of the Installation.

The marine environmental surveys conducted every three years over the last 18 years have extensively characterised the discharges from W5 (and W4) and the impact on the bay. The surveys have covered a range of operating conditions, with the results/ findings being consistent over the 18 years studies and the effects identified as not significant. As a result, it is considered that this prolonged assessment has provided sufficient understanding of the Installation's effects and continued assessment on an ongoing basis is not considered cost beneficial. It is therefore requested that SEPA review whether the continued monitoring of the marine water environment required under permit condition 3.5.6 could be ceased.

3.2.2 Current Sampling Methodologies

Best practice for sampling methodologies is that competent, experienced and appropriate persons be used and operating and calibration procedures should be fully documented and available. There also needs to be care taken to avoid cross contamination and to ensure systems are cleaned, stored and maintained appropriately.

All sampling and analysis is currently carried out onsite by trained SSE personal, however it is recognised that the Installation's laboratory is not ISO 17025 UKAS accredited.

Site Work Instruction "Environmental Monitoring and Reporting of PPC Regulated Emissions" covers the wastewater sampling and monitoring arrangements for the Installation. The Work Instruction covers:

- Requirements of the Permit;
- Organisation structure, roles and responsibilities;
- Scheduling and planning;
- Analytical method operating instructions;
- Equipment maintenance and calibration;
- Breakdown response;
- Traceability;
- Quality Assurance;
- Data control;
- Personnel competency;
- Continuous monitor maintenance and calibration schedules; and
- What to do in the event of equipment malfunction/ failure.

The samples are collected by trained staff on site and currently analysed in the onsite lab facilities according to the Individual Operating Instructions. These detail the individual sampling methods to be used, namely:

- OI-PEHE-SHE-004-POI-141-004-ENV01 - Determination of cooling water discharge total residual oxidant (TRO) using Lovibond Nessleriser 2150 comparator
- OI-PEHE-SHE-004-POI-141-004-LW02 – Determination of Cations by Ion Chromatography using Dionex ICS-1600
- OI-PEHE-SHE-004-POI-141-004-ENV03 - Determination of temperature in routine drainage discharge and effluent samples using Hanna HI 93510 digital thermometer
- OI-PEHE-SHE-004-POI-141-004-ENV04 - Determination of suspended solids in drainage and effluent discharge samples using Sartorius R200 D weighing balance
- OI-PEHE-SHE-004-POI-141-004-ENV05 - Determination of pH in routine water treatment plant effluent samples using general purpose pH meter

- OI-PEHE-SHE-004-POI-141-004-ENV06 - Determination of pH in routine drainage discharge samples using general purpose pH meter
- OI-PEHE-SHE-004-POI-141-004-ENV07 - Determination of biological demand (BOD) in drainage discharge samples
- OI-PEHE-SHE-004-POI-141-004-ENV08 - Determination of Visible Oil in routine drainage and effluent discharge samples
- OI-PEHE-SHE-004-POI-141-004-ENV010 - Determination of total residual oxidant (TRO) in main cooling water and surface drains using Hach Pocket Colorimeter II

The sampling carried out at the individual sample points is detailed in the following sections.

3.2.2.1 *Emission Point W1 (Sample Point SP1)*

The location of sample point SP1 is provided in Figure 2.2 and the sample point (Manhole 1) is shown in Photograph 1.

Photograph 1: SP1 Located at Manhole 1



Monthly grab samples are taken at SP1 for pH, temperature, suspended solids, TRO and BOD. The samples are taken by lowering a clean bucket into the manhole to take the sample. The bucket is rinsed with the sample fluid prior to filling. Once collected, the sample is taken to the onsite lab for immediate analysis. Once analysed the results are recorded within a spreadsheet.

Samples are mainly taken at times when the power station is operational (i.e. while there is HRSG cooling water discharging to this point), as unless there is rainfall there is generally no flow at this point. Samples are taken during outage periods when there is rainfall.

Daily samples for oil are taken in the same way and are analysed visually. GC-FID or FT-IR analysis is carried out if visible oil is detected, however this is very rarely the case.

3.2.2.2 *Emission Point W2*

As stated previously, discharge to W2 would be captured in sampling carried out for W1 at SP1, therefore no separate sampling is required at this point.

3.2.2.3 Emission Point W3

The location of W3 is provided in Figure 2.2. Daily grab samples are taken at W3 sampling point for oil and are analysed visually. GC-FID or FT-IR analysis is carried out if visible oil is detected, however this is very rarely the case.

The samples are taken by lowering a clean bucket into a manhole to take the sample. The bucket is rinsed with the sample fluid prior to filling. Once analysed the results are recorded within a spreadsheet.

3.2.2.4 Emission Point W4 (Sample Point SP3a and SP3b)

The location of sample point SP3a is provided in Figure 2.2 and the sample point is shown in Photograph 2.

Photograph 2: Sample Point SP3a



Sample points SP3a and SP3b relate to two sumps within the WTP. Typically, Sump 1 contains wastewaters from the WTP i.e. the rinse water from regenerating the ion exchange beds, whereas Sump 2 contains the condensate polishing resin rinse water (and therefore contains ammonia). The sumps can be swapped around, but this is the usual configuration.

Wastewaters from the WTP are continuously generated and the waters collected in the sump prior to discharge from Emission Point W4. Wastewaters from the condensate polishing plant are only generated when the resins are regenerated, and therefore sampling is only carried out at the point when these wastewaters are being generated.

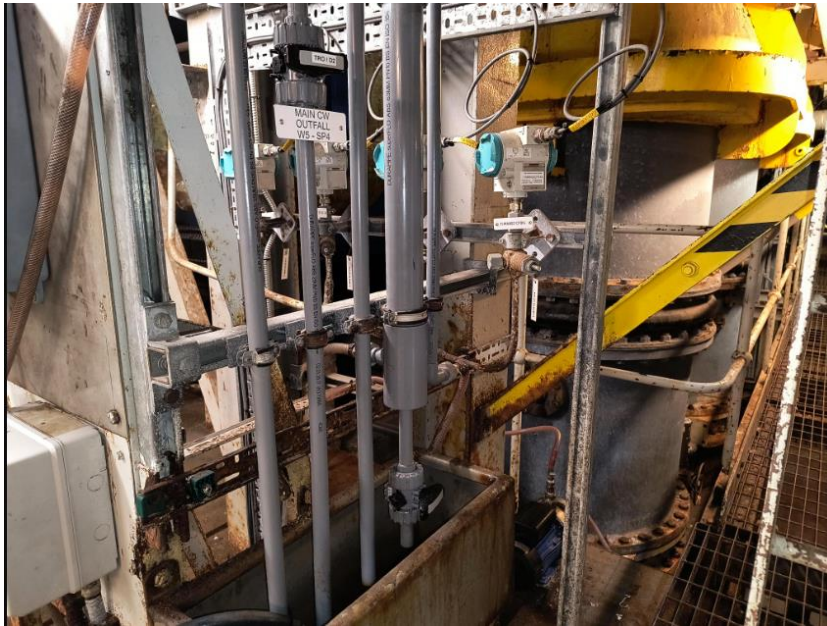
Monthly grab samples are taken for W4 at SP3a and SP3b for pH, suspended solids and ammonia. The samples are taken from a sample line, into a clean plastic bottle. The bottle is rinsed with the sample fluid prior to filling. Once collected, the sample is taken to the onsite lab for immediate analysis. Once analysed the results are recorded within a spreadsheet.

Samples for oil are taken prior to discharge from the sumps. GC-FID or FT-IR analysis is carried out if visible oil is detected, however this is very rarely the case.

3.2.2.5 Emission Point W5 (Sample Point SP4 and SP7)

The location of sample points SP4 and SP7 are provided in Figure 2.2 and the sample point (SP4) is shown in Photograph 3 and SP7 is shown in Photograph 4.

Photograph 3: Sample Point SP4



Sample point SP4 has an online analyser for the continuous monitoring of pH and TRO, in addition, monthly grab samples are also taken for TRO. The samples are taken from a sample line, into a clean plastic bottle. The bottle is rinsed with the sample fluid prior to filling. Once collected, the sample is taken to the lab for immediate analysis. Once analysed the results are recorded within a spreadsheet.

Photograph 4: Sample Point SP7



SP7 was located within the ECP bund and teed off the ECP degassing tank flow line discharge which discharged in the culvert from Boddam Harbour. As the ECP has now been removed from site, this SP is no longer required.

3.2.2.6 Emission Point W6 (Sample Point SP5)

The location of W6 is provided in Figure 2.2 and the sample point (SP5) is shown in Photograph 5.

Photograph 5: Sample Point SP5



There is currently no sampling requirement for the W6 discharge point in the Permit. Given that there is normally little to no flow, sampling at this point is also not normally possible. The only contaminant identified as being potentially present at this point is oil, as a result of the remaining presence of the transformer rectifiers in this area.

3.3 Compliance with the Existing Environmental Permit Conditions

Under the Permit the Installation is required to report water emissions monitoring results to SEPA every three months. Monitoring reports for the past five years have been provided by SSE and a review of the data available against the ELVs within the Permit is shown in Table 3.3 - Table 3.6. The values reported are the maximum of the monthly values reported to SEPA for each year and demonstrate that there has been no exceedance of the Permit limits between 2021 and 2025.

Table 3.3: Monitoring Results and Compliance – W1

Year	pH		Temperature °C	Suspended Solids mg/l	Total Residual Oxidant mg/l	BOD mg/l	Oil mg/l
	Min	Max					
Limit	6	9	25	100	0.35	10	10
2021	7.7	8.2	16.3	32.6	0.2	1.0	None visible
2022	7.6	8.1	18.0	31.2	0.2	2.0	None visible
2023	7.3	8.0	18.0	33.4	0.2	1.6	None visible
2024	7.6	8.1	14.0	28.8	0.2	1.8	None visible
2025	7.5	8.1	16.5	26.8	0.1	2.6	None visible

Table 3.4: Monitoring Results and Compliance – W3

Year	Oil mg/l
Limit	No limit
2021	None visible
2022	None visible
2023	None visible
2024	None visible
2025	None visible

Table 3.5: Monitoring Results and Compliance - W4

Year	pH		Total Suspended Solids mg/l	Ammonia mg/l	Oil mg/l
	Min	Max			
Limit	5	9	50 IL 100 IU	To be agreed	No limit
2021	6.8	8.2	28.8	630	None visible
2022	6.7	8.3	23.2	475	None visible
2023	5.8	8.0	17.8	381	None visible
2024	6.0	7.9	12.4	395	None visible
2025	5.4	7.4	11.0	501	None visible

Table 3.6: Monitoring Results and Compliance – W5 (SP4 and SP7)

Year	Temperature °C	Total Residual Oxidant mg/l	pH		Suspended Solids mg/l	Oil mg/l
			Min	Max		
Limit	32	0.35	5	9	To be agreed	No limit
SP4						
2021	No exceedances in temperature reported.	0.30	-	-	-	None visible
2022		0.32	-	-	-	None visible
2023		0.28	-	-	-	None visible
2024		0.27	-	-	-	None visible
2025		0.27	-	-	-	None visible
SP7						
2021	-	-	No flow			None visible
2022	-	-	8.73	8.73	2,573	None visible
2023	-	-	No flow			None visible
2024	-	-	No flow			None visible
2025	-	-	No flow			None visible

The high value associated with suspended solids from SP7 in 2022 is likely due to sampling being carried out during an acid tank neutralisation event, which can wash out solids from the tank. Such an event represents an infrequent maintenance activity which only occurs every few years.

3.4 Additional Sampling and Future Analysis Methodologies

3.4.1 Additional Sampling

SSE procured Socotec to carry out additional monitoring of the emissions to water from the Installation. Socotec are a UKAS ISO 17025 and MCERTs accredited laboratory.

Socotec have carried out a sampling campaign lasting 3 months collecting one sample per week for 12 weeks for all the discharge locations and pollutants within the existing Permit, to enable a review of emissions compliance for all Emission Points with ELVs assigned.

In addition, following the review of potential contaminant of the wastewater discharge in Section 2.6, it is considered that there is potential for metals to be present in emissions from Emission Point W1 and W4 due to corrosion of steel tubes, the use of water treatment chemicals and as a result of additives in some of the corrosion inhibitors used onsite.

Additional monitoring has therefore been carried out on the discharges from W1 and W4 to determine the concentrations of metals in the wastewaters discharged from the site. Additionally, due to the use of phosphates in the auxiliary boiler dosing, there is potential for this to also be present in the wastewater discharges from W1, and therefore this was also monitored.

The sampling campaign was carried out in such a way as to ensure that different operating conditions were captured in the samples taken, as it is recognised that site operations can vary the effluent flows throughout the week/ month and so sampling needs to account for this to ensure that a range of representative samples are gathered.

The results of the additional sampling are presented in Table 3.7 to Table 3.12.

The results show that all but one sample were compliant with ELVs within the Permit. The exception was on TSS at W4 for the sample date shown as 30th April 2026. Socotec did not actually come to site to sample on 30th April 2026, rather the sample analysed would have been a duplicate of a sample taken by the site on 27th April 2026 and held refrigerated for Socotec. It is therefore considered that this result should be taken with caution as Socotec analysis would have been >2 days from when the sample was taken, and therefore outwith the analysis time stated on British Standard BS EN 872:2005.

The sample taken by SSE on 27th April 2026 and analysed by the Lab at the Installation had a result of 1.0mg/l with a control sample analysed alongside, which proved within limits. It is therefore considered that the corresponding Socotec result is an outlier that should be disregarded.

In addition, there was an instrument error on the temperature readings noted on 22nd June 2026, and therefore these have been discounted from the results.

The results have been used to inform an impact assessment of the emissions, in Section 5.

Table 3.7: Sampling Results – W1 (SP1) Surface Water, Oil Separator, HRSG and Treated Sewage Effluent

	pH	Temp	BOD5	TSS	Ammoniacal N as NH ₃	Orthophosphate as P	Cu	Fe	Zn	Total GRO C5 - C10	Chlorine (free)
Permit Limit	6-9	25	10	100	-	-	-	-	-	10	0.35
Date		°C	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
30/04/2026	7.9	19.1	<1.0	10	0.24	<0.01	0.001	0.02	0.038	<0.1	<0.1
04/05/2026	8	20.1	<1.0	<5	0.49	<0.01	0.001	0.08	0.035	<0.1	<0.1
19/05/2026	8.1	18.6	<1.0	11	0.36	<0.01	<0.001	0.01	0.03	<0.1	<0.1
27/05/2026	7.7	21.3	<1.0	26	0.24	<0.01	0.001	0.05	0.038	<0.1	<0.1
09/06/2026	7.6	20.3	<1.1	18	0.24	<0.01	0.001	0.14	0.018	<0.1	<0.1
15/06/2026	8	18.4	<1.0	82	0.24	<0.01	<0.001	0.08	0.027	<0.1	<0.1
22/06/2026	7.8	-	<1.0	24	0.47	<0.01	<0.001	<0.01	0.012	<0.1	<0.1
29/06/2026	7.9	17.4	<1.0	37	0.49	<0.01	<0.001	0.09	0.013	<0.1	<0.1
07/07/2026	8.1	19.7	<1.0	<5	0.49	<0.01	0.002	0.01	0.014	<0.1	<0.1
Average	7.9	19.4	<1.0	30	0.36	<0.01	0.0012	0.06	0.025	<0.01	<0.1
Max	8.1	21.3	<1.0	82	0.49	<0.01	0.002	0.14	0.038	<0.01	<0.1

Table 3.8: Sampling Results – W3 (SP2) - Oil Separators from Former Tank Farm

	Total GRO C5 - C10
Permit Limit	10
Date	mg/l
30/04/2026	<0.1
04/05/2026	<0.1
11/05/2026	<0.1
27/05/2026	<0.1
09/06/2026	<0.1
15/06/2026	<0.1
22/06/2026	<0.1
29/06/2026	<0.1
13/07/2026	<0.1

Table 3.9: Sampling Results – W4 (SP3a) - WTP

	pH	TSS	Ammoniacal N as NH ₃	Cd	Hg
Permit Limit	6-9	50IL / 100IU	-	-	-
Date		mg/l	mg/l	mg/l	mg/l
30/04/2026	8.0	121*	0.05	<0.01	<0.00003
11/05/2026	8.5	33	0.06	<0.01	<0.00003
27/05/2026	6.9	21	329	<0.01	<0.00003
15/06/2026	7.0	28	0.36	<0.01	<0.00003
22/06/2026	8.0	7	0.19	<0.01	<0.00003
07/07/2026	6.9	17	0.36	<0.01	<0.00003
Average	7.6	21	55	<0.01	<0.00003
Max	8.5	33	329	<0.01	<0.00003

* Outlier result not included in the calculation of the average and maximum values.

Table 3.10: Sampling Results – W4 (SP3b) - WTP

	pH	TSS	Ammoniacal N as NH ₃	Cd	Hg
Permit Limit	6-9	50IL / 100IU	-	-	-
Date		mg/l	mg/l	mg/l	mg/l
02/05/2026	8.1	15	334	<0.01	<0.00003
09/06/2026	7.5	22	365	<0.01	<0.00003
15/06/2026	6.7	63	443	<0.01	<0.00003
22/06/2026	6.8	31	448	<0.01	<0.00003
07/07/2026	7.1	19	121	<0.01	<0.00003
Average	7.2	30	285	<0.01	<0.00003
Max	8.1	63	448	<0.01	<0.00003

Table 3.11: Sampling Results – W5 (SP4) – One Through Cooling Water

	Temp	Total GRO C5 - C10
Permit Limit	32	0.35
Date	°C	mg/l
30/04/2026	18.6	<0.1
04/05/2026	20.0	<0.1
27/05/2026	21.3	<0.1
09/06/2026	20.4	<0.1
15/06/2026	18.4	<0.1
22/06/2026	-	<0.1
29/06/2026	17.5	<0.1
13/07/2026	18.9	<0.1
Average	19.3	<0.1
Max	21.3	<0.1

Table 3.12: Sampling Results – W6 (SP5) – Emergency Overflow from Cooling Water Equipment

	pH	Temp	TSS	Total GRO C5 - C10
Date		°C	mg/l	mg/l
04/05/2026	8.1	20.0	11	<0.1
09/06/2026	7.7	21.1	9	<0.1
15/06/2026	8.1	18.2	15	<0.1
22/06/2026	7.9	1.3	13	<0.1
29/06/2026	7.5	17.1	40	<0.1
07/07/2026	7.3	19.7	55	<0.1
13/07/2026	7.3	17.7	118	<0.1
Average	7.7	16.4	37.3	<0.1
Max	8.1	21.1	118.0	<0.1

3.4.2 Future Onsite Analysis

It is noted that some of the analytic standards for sample testing detailed in Table 3.2 are out of date, as they have not been revised since the PPC Permit was issued in 2007. A review of the monitoring standards detailed in the Monitoring Reference Document for IED installations (JRC Reference Report on Monitoring of Emissions to Air and Water from IED Installation) has therefore been carried out.

A review of the existing and proposed new analytic methods is detailed in Table 3.13.

Table 3.13: Proposed New Analysis Methodologies

Parameter	Existing Method Specified	JRC Reference Report	Proposed Future Methodology	Compliance with JRC
Free chlorine	BS 6068 2.26:1998 (BS EN ISO 7393-2:1986)	EN ISO 7393-2	EN ISO 7393-2: 2018	Yes
pH	BS 6068-2.50:1995	BS ISO 10523	BS ISO 10523: 2012	Yes
Temperature	Thermocouple / PT resistance	No specific EN or ISO standard for measurements in water available	N/A	N/A
Suspended solids	BS 6068 2.54:1996	BS EN 872:2005	BS EN 872: 2005	Yes
BOD (5 day)	BS EN 1899-2:1998 in accordance with EN 25814	BS EN 1899-1:1998 BS EN 1899-2:1998 or ISO 5815-1:2019 BS EN 1899-2:1998	BS EN 1899-1: 1998	Yes
Ammonium nitrogen (NH ₄ -N)	ISO14911:1999 or ASTM D6919-03	Various dependent on analysis method, but EN14911:1999 for ion chromatography for ammonium	EN ISO 14911: 1999	Yes
Oil – hydrocarbon oil index	Visual and analysis with GC-FID or FT-IR if visible oil detected	EN ISO 9377-2:2000	Visual analysis onsite. If positive GC-FID ISO9377-2 (At offsite Lab)	Yes

The proposed changes to the sampling methodologies will mean that the monitoring carried out will be in compliance with the JRC reference report.

These onsite sampling methods have been updated to use the new methodologies, and the following Operating Instructions have been updated and can be viewed on site:

- OI-PEHE-SHE-004-POI-141-004-ENV01 - Determination of cooling water discharge total residual oxidant (TRO) using Lovibond Nessleriser 2150 comparator
- OI-PEHE-SHE-004-POI-141-004-ENV03 - Determination of temperature in routine drainage discharge and effluent samples using Hanna HI 93510 digital thermometer
- OI-PEHE-SHE-004-POI-141-004-ENV04 Determination of Suspended solids in drainage and effluent discharge samples using Sartorius R200 D weighing balance
- OI-PEHE-SHE-004-POI-141-004-ENV05 - Determination of pH in routine water treatment plant W4 effluent samples using general purpose pH meter Mettler Toledo SevenCompact Duo
- OI-PEHE-SHE-004-POI-141-004-ENV06 - Determination of pH in routine drainage discharge samples using general purpose pH meter

- OI-PEHE-SHE-004-POI-141-004-ENV07 - Determination of biological demand (BOD) in drainage discharge samples
- OI-PEHE-SHE-004-POI-141-004-ENV010 - Determination of total residual oxidant (TRO) in main cooling water and surface drains using Hach Pocket Colorimeter II
- OI-PEHE-SHE-004-POI-141-004-ENV14 Determination of Cations in Environmental Discharges – Ammonia by EN ISO14911:1999 by Thermofisher Aquion IC.

In addition, Work Instruction WI-PEHE-SHE-003-010 Environmental Monitoring and Reporting of PPC Regulated Emissions has been updated to capture the changes in water testing and to formalise laboratory training, quality assurance and quality controls and audit processes moving forward that are proposed for the site. This is provided in Appendix B.

Three new Forms have also been developed associated with the Work Instruction and updated Laboratory Quality Assurance processes as follows:

- FO-PEHE-SHE-004-POI-141-004-ENV01 Environmental Sampling Training Testing Record.
- FO-PEHE-SHE-004-POI-141-004-ENV05 PPS PPC ENV pH QC Audit Record
- FO-PEHE-SHE-004-POI-141-004ENV07 PPS PPC ENV BOD_n QC Audit Record
- FO-PEHE-SHE-004-POI-141-004ENV14 PPS PPC ENV Ammonia by QC Audit Record

4. LCP BATc Water Emissions Requirements

4.1 General BAT Water Requirements

The current LCP BAT⁶ includes a number of BAT requirements in terms of water usage and emissions to water. A review of the Installation's compliance against the LCP BAT conclusions was carried out in and provided to SEPA in October 2017. The relevant responses are provided in Sections below.

BAT 13 – In order to reduce water usage and the volume of contaminated wastewater discharged, BAT is to use one or both of the techniques given below.

Table 4.1: BAT 13 Requirements

Technique		Description	Applicability	Installation Response
a.	Water recycling	Residual aqueous streams, including run-off water, from the plant are reused for other purposes. The degree of recycling is limited by the quality requirements of the recipient water stream and the water balance of the plant.	Not applicable to wastewater from cooling systems when water treatment chemicals and/or high concentrations of salts from seawater are present.	Water usage is optimised and minimised where plant design allows. The sea water used within the once through direct cooling water system is not of suitable quality to be re-used in other processes on site. Boiler water is recycled on site.
b.	Dry bottom ash handling	Dry, hot bottom ash falls from the furnace onto a mechanical conveyor system and is cooled down by ambient air. No water is used in the process.	Only applicable to plants combusting solid fuels. There may be technical restrictions that prevent retrofitting to existing combustion plants	Not applicable for gas fired plant.

BAT 14 – In order to prevent contamination of uncontaminated wastewater and to reduce emissions to water, BAT is to segregate wastewater streams and to treat them separately, depending on the pollutant content.

Wastewater streams are segregated such that clean surface water goes straight to discharge, whereas potentially contaminated waste waters are routed through oil/ water separators before being combined with clean surface water and discharge via Emission Point W1.

Other wastewaters are also segregated and discharge via separate outfall, close to the location of generation. All wastewaters are tested in accordance with the Environmental Permit, to ensure compliance with Permit conditions.

It is therefore considered that the requirements of BAT 14 are met.

4.2 BATc Emission Limit Values

BAT 15 details the techniques that should be used to reduce emissions to water from flue-gas treatment and provides BAT-Associated Emission Levels (AELs) that are applicable for direct discharges to a receiving water body.

There are no water emissions from flue-gas treatment at the Installation, and therefore it is not considered that BAT 15 is applicable. The decision documents for a number of combustion sector Environmental Permits in

⁶ Publications Office

England have been reviewed and all state that none of the BAT 15 techniques or BAT-AELs are applicable as there is no flue gas treatment at the sites.

That said, due to the lack of other BAT-AELs for LCP sites, it is noted that in England, the Environment Agency have used these values in the recent Environmental Permits issued and referenced reviewing the BAT-AELs during Environmental Permit variations, in the absence of other applicable BAT-AELs.

The BAT-AELs associated with BAT 15 are provided in Table 4.2. There are a number of the BAT-AELs that have an accompanying footnote to say that they are only applicable to wastewater from the use of wet Flue Gas Desulphurisation (FGD), and therefore these have been greyed out in Table 4.2.

Table 4.2: BAT-AELs Associated with BAT 15 and Flue-gas Treatment

Substance/ Parameter		BAT-AELs (daily average)
Total organic carbon (TOC)		20 – 50 mg/l ^{1, 2, 3}
Chemical oxygen demand (COD)		60 – 150 mg/l ^{1, 2, 3}
Total suspended solids (TSS)		10 – 30 mg/l
Fluoride (F-)		10 – 25 mg/l ³
Sulphate (SO ₄ ²⁻)		1.3 – 2.0 g/l ^{3, 4, 5, 6}
Sulphide (S ²⁻), easily released		0.1 – 0.2 mg/l ³
Sulphite (SO ₃ ²⁻)		1 – 20 mg/l ³
Metals and metalloids	Arsenic	10 – 50 µg/l
	Cadmium	2 – 5 µg/l
	Chromium	10 – 50 µg/l
	Copper	10 – 50 µg/l
	Mercury	0.2 – 3 µg/l
	Nickel	10–50 µg/l
	Lead	10–20 µg/l
	Zinc	50–200 µg/l
¹ Either the BAT-AEL for TOC or the BAT-AEL for COD applies. TOC is the preferred option because its monitoring does not rely on the use of very toxic compounds. ² This BAT-AEL applies after subtraction of the intake load. ³ This BAT-AEL only applies to waste water from the use of wet FGD. ⁴ This BAT-AEL only applies to combustion plants using calcium compounds in flue-gas treatment. ⁵ The higher end of the BAT-AEL range may not apply in the case of highly saline waste water (e.g. chloride concentrations ≥ 5 g/l) due to the increased solubility of calcium sulphate. ⁶ This BAT-AEL does not apply to discharges to the sea or to brackish water bodies.		

When considering the BAT-AELs that are discounted due to their association only with FGD, only that for TSS is considered to be potentially appropriate to the Installation. The current Suspended Solids ELV for the Installation is 100mg/l for Emission Point W1, however the monitoring data reported between 2021 – 2025 indicated that the highest concentration measured at W1 33.4mg/l, which is just over the upper level of the BAT-AEL of 30mg/l. The wastewater discharged from Emission Point W1 includes surface water drainage from building roofs and yard areas and therefore there is a greater potential for fine sediments/ solids (not site process derived) to be washed into the discharge, whereas the performance criteria above is predicated on flue

gas waste water treatment plants with filtration. As such, it is considered that the LCP BAT-AEL of 30mg/l is not directly applicable, and that the current ELV (100mg/l) remains applicable to the Site.

It is not considered that the metal and metalloid limits are applicable to the site. A review of chemical use and monitoring shows there are no source of these parameters other than the concentrated raw water (following treatment) or the raw materials used in the water treatment process.

This is supported by the impact assessment presented in Section 5.

5. Impact Assessment

5.1 Introduction

There has been a number of changes to the Environmental Quality Standards (EQS) since the Peterhead Permit limits were set. The current EQSs have been reviewed against the monitoring data detailed in Section 3.4.1 to enable a revised impact assessment to be undertaken for the Installation.

SEPA EASR Guidance WAT-G-072⁷ provides the relevant EQS for receiving marine waters, with SEPA EASR Guidance WAT-G-069⁸ providing the steps to undertaking the assessment. These guidance documents have been used to inform the assessment presented in the following sections.

5.2 Water Quality Screening Assessment

The first step of the assessment requires comparison of the measured concentration of substances within the wastewater with the relevant EQS values. This has been carried out for each Emission Point (W1, W4 SP3a and W4 SP3b) where pollutants have the potential to be present as a result of site operations.

The annual average EQS for ammonia is in the un-ionised form, as this is the state in which ammonia is toxic to aquatic life. Therefore, it is necessary to convert the measured values of ammoniacal nitrogen as N to un-ionised ammonia. The percentage of total ammonia that is un-ionised is dependent on pH and temperature: as the percentage of pH and temperature increases, the proportion of toxic un-ionised ammonia also increases. The fraction of un-ionised ammonia present therefore needs to be calculated using an empirical equation:

The Calculation Method

- **Inputs needed:** Water **temperature** (in Celsius) and **pH level**. Total Ammonia Nitrogen (TAN) is optional if you only need the percentage.
- **pKa Determination:** Calculates the acid dissociation constant based on temperature (T in Kelvin) using the formula:

$$\text{pKa} = 0.09018 + \frac{2729.92}{T + 273.15}$$

- **Fraction Formula:** Finds the un-ionized fraction (f) using pH and pKa values:

$$f = \frac{1}{1 + 10^{\text{pKa} - \text{pH}}}$$

This calculation has been carried out for all the samples that were analysed for ammonia, and the average values obtained for each Emission Point have been used in the assessment.

5.2.1 Comparison with the Relevant EQSs for the W1 Wastewaters

The average (and where required, maximum) concentrations for the parameters with EQSs in the wastewaters released from Emission Point W1 are taken from the monitoring data presented in Table 3.3.

The concentrations have been compared against the relevant EQSs in Table 5.1.

⁷ [wat-g-072_eqs_for_discharges_to_surface_waters.docx](#)

⁸ https://beta.sepa.scot/media/ydma0gjq/wat-g-069_permit-guide_discharge_of_effluent_to_the_water_environment.docx

Table 5.1: W1 EQS Comparison

Parameter	EQS Values (µg/l)		Concentration in W1 Wastewater (µg/l)		Impact Assessment Screening	
	Annual Average (AA)	Maximum Allowable Concentration (MAC)	AA Concentration	MAC Concentration	AA	MAC
Ammonia (unionised) (NH ₃ -N)	21	-	17	-	Pass	-
Copper (dissolved)	3.76 ²	-	1.2	-	Pass	-
Iron (dissolved)	1,000	-	60	-	Pass	-
Zinc (dissolved)	7.9	-	25	-	Fail	-
¹ Assessed at the limit of detection as all samples were found to have Cd concentrations below the limit of detection.						
² 3.76 where dissolved organic carbon (DOC) ≤ 1 mg/l, $3.76 + (2.677 \times ((\text{DOC}/2) - 0.5))$ where DOC > 1 mg/l.						

All parameters except zinc are screened from requiring further assessment, given that the released concentration of zinc is higher than the EQS value.

Zinc cannot be screened out at this stage, however there is no identified source of zinc in the W1 wastewaters other than the potential for is to be present as a result of corrosion of steel tubes and heat exchangers. It should be noted that the average concentration of zinc in the wastewater discharged from W1 is three times lower than the average concentration of zinc that has been measured in the raw towns water that comes into Site. The average raw towns water concentration of zinc is 72µg/l, which was analysed over the same period of time that the wastewater samples were analysed. All towns water use from buildings and demineralised towns water used as boiler feedwater are all routed to W1, so the likely source of zinc in the emission is the towns water.

Based on the average concentration used in the assessment, only a 3.2-fold dilution would be required to reduce the concentration of zinc in the wastewater to the annual average zinc EQS. The W1 discharge point is 50m offshore, at a depth of 1.66m, and therefore it is envisaged that this level of dilution will occur within close proximity to the discharge point, resulting in concentrations that are below the EQS within the near field.

5.2.2 Comparison with the EQS for W4 (SP3a) Wastewaters

The concentrations for the parameters with EQSs in the wastewaters released from Emission Point W4 (SP3a) are taken from the monitoring data presented in Table 3.9. It should be noted that in

Table 3.9, there was a high value reported for ammonia (329mg/l) on the 27th May 2026. This coincided with an infrequent occurrence of the condensate polishing regeneration waters going to this sample point, where more normal operation sees these waters going to SP3b. As such, this value has been discounted from the screening assessment for SP3a, as the impacts of these waters have been included in the assessment of emissions from SP3b in Section 5.2.3.

The concentrations have been compared against the relevant EQSs in Table 5.2.

Table 5.2: W4 (SP3a) EQS Comparison

Parameter	EQS Values (µg/l)		Concentration in W4 (SP3a) Wastewater (µg/l)		Impact Assessment Screening	
	AA	MAC	AA Concentration	MAC Concentration	AA	MAC
Ammonia (unionised) (NH ₃ -N)	21	-	3.9	-	Pass	-

Parameter	EQS Values (µg/l)		Concentration in W4 (SP3a) Wastewater (µg/l)		Impact Assessment Screening	
	AA	MAC	AA Concentration	MAC Concentration	AA	MAC
Cadmium (dissolved)	0.2	-	<10 ¹	-	Fail	-
Mercury (dissolved)	-	0.07	-	0.03	-	Pass
¹ Assessed at the limit of detection as all samples were found to have Cd concentrations below the limit of detection.						

Ammonia (unionised) and mercury are screened from requiring further assessment, given that their released concentrations are lower than the relevant EQS values.

The limit of detection (LOD) of the analysis methodology for cadmium was 0.01mg/l (10µg/l), and therefore this is over the annual average EQS of 0.2µg/l. The cadmium in all samples taken was found to be below the LOD. For the screening assessment however, it was assumed that cadmium was present at the LOD, and therefore this results in cadmium not being screened out as requiring further assessment.

The discharge from W4 (SP3a) is not continuous. In the 12 months up to 28th August 2026, there have been 439 discharges from SP3a, with a total volume of 27,101m³. Each discharge therefore comprises approximately 62m³ of wastewaters that would be discharged on average 1.2 times a day, over a maximum of 2 non-consecutive hours.

Therefore, to annualise the emission concentrations to take account of the intermittent nature of the discharge, the average concentrations from Table 5.2 have been divided by a factor of 20 (i.e. 24 hours divided by 1.2 hours). The results are shown in Table 5.3.

Table 5.3: W4 (SP3a) EQS Comparison for Annualised Emission Concentration

Parameter	EQS Values (µg/l)		Concentration in W4 (SP3a) Wastewater (µg/l)		Impact Assessment Screening	
	AA	MAC	AA Concentration	MAC Concentration	AA	MAC
Cadmium (dissolved)	0.2	-	0.5 ¹	-	Fail	-
¹ Assessed at the limit of detection as all samples were found to have Cd concentrations below the limit of detection.						

Although cadmium still cannot be screened at the LOD, the initial dilution that would be needed to reduce the concentration of cadmium used in the assessment to below the EQS would only be 2.5 times. Given the small volume of the discharge, the conservative nature of assessing the cadmium concentration at the LOD, and the large volume of water available for dilution, it is considered that it is highly unlikely that the SP3b wastewaters would result in an exceedance of the EQS.

Although there is the potential for cadmium to be present at this point, due to its potential presence at low concentrations in the sodium hydroxide and sulphuric acid water treatment chemicals used, it is considered that the concentration of cadmium in the actual wastewater will be significantly lower than the LOD used in the assessment.

It is possible to calculate the quantity of cadmium in the discharge based on a mass balance calculation of cadmium present in the raw materials. Although specific data for the Peterhead Power Station site is not available, this has been carried out based on data available from the Keadby Power Station site, where cadmium concentrations in the sodium hydroxide and sulphuric acid have been determined to be 0.01mg/kg and 0.005mg/kg respectively. Based on the Installation's annual consumption of 78 tonnes and 136 tonnes of sodium hydroxide and sulphuric acid respectively in 2025 and the annual discharge from SP3a of 27,101m³, the concentration of cadmium in the wastewater has been calculated to be 0.0000001ug/l, and therefore significantly below the EQS value.

It is therefore considered that it is highly unlikely that emissions of cadmium from the Installation would result in an exceedance of the EQS in the receiving waters.

5.2.3 Comparison with the EQS for W4 (SP3b) Wastewaters

The concentrations for the parameters with EQSs in the wastewaters released from Emission Point W4 (SP3b) are taken from the monitoring data presented in

Table 3.10. As stated in Section 5.2.2, it is considered that the high values reported for ammonia on the 27th May 2026 would be more appropriately assessed as a release from SP3b, and therefore these values have been included in the concentrations included in Table 5.4.

Table 5.4: W4 (SP3b) EQS Comparison

Parameter	EQS Values (µg/l)		Concentration in W4 (SP3b) Wastewater (µg/l)		Impact Assessment Screening	
	AA	MAC	AA Concentration	MAC Concentration	AA	MAC
Ammonia (unionised) (NH ₃ -N)	21	-	4,835	-	Fail	-
Cadmium (dissolved)	0.2	-	<10 ¹	-	Fail	-
Mercury (dissolved)	-	0.07	-	0.03	-	Pass
¹ Assessed at the limit of detection as all samples were found to have Cd concentrations below the limit of detection.						

Unionised ammonia and cadmium are both higher than the EQS values when released from SP3b, however, as stated in Section 2.5.5, condensate polishing wastewaters are only released when the power station is operational, and as Emission Point W4 feeds into the once-through cooling waters prior to their release at Emission Point W5, there will be significant dilution of the condensate polishing wastewater prior to the point of release. It is therefore considered appropriate to reassess the SP3b effluent with the dilution that would be provided by the cooling water discharged from W5, which has been calculated as an average of 23,400m³/hr for operations with one cooling water pump operational as a conservative case (note that the Permitted discharge is 107,000m³/hr).

When generated, the condensate polishing wastewater is discharged at a rate of 90m³/hr, however actual discharge volumes are approximately 42m³/hr at a time. In the 12 months prior to 28th August 2026, the wastewater has only been released 71 times, with a total volume of 2,984m³.

The pollutant flux (g/h) of the pollutants in the W4 (SP3b) wastewater have been determined based on a discharge of 90m³/hr, and then the concentrations have been recalculated based on a total flow rate of 23,490m³/hr and the results are shown in comparison with the EQSs in Table 5.5.

Table 5.5: W4 (SP3b) EQS Comparison – With Cooling Water Dilution

Parameter	EQS Values (µg/l)		Concentration in W4 (SP3b) Wastewater (µg/l)		Impact Assessment Screening	
	AA	MAC	AA Concentration	MAC Concentration	AA	MAC
Ammonia (unionised) (NH ₃ -N)	21	-	18.5	-	Pass	-
Cadmium (dissolved)	0.2	-	0.04	-	Pass	-
¹ Assessed at the limit of detection as all samples were found to have Cd concentrations below the limit of detection.						

It can be seen that all pollutants from the SP3b effluent are lower than the EQS at the point of release as an annual average and therefore do not need any further assessment.

6. Permit Variation

Following the SEPA inspection at the end of October 2025, SSE have carried out a full review of their water discharge and monitoring arrangements in place at the Peterhead Power Station. In addition, additional sampling and analysis has been carried out of the discharges, to enable an updated impact assessment of the releases from the Site, from the main wastewater discharge points.

The full findings of the review are detailed within this report, however it has led to a number of identified amendments or variations required to the existing Permit, which have been summarised in this Section.

There are a number of changes to the Emission Point references required, namely:

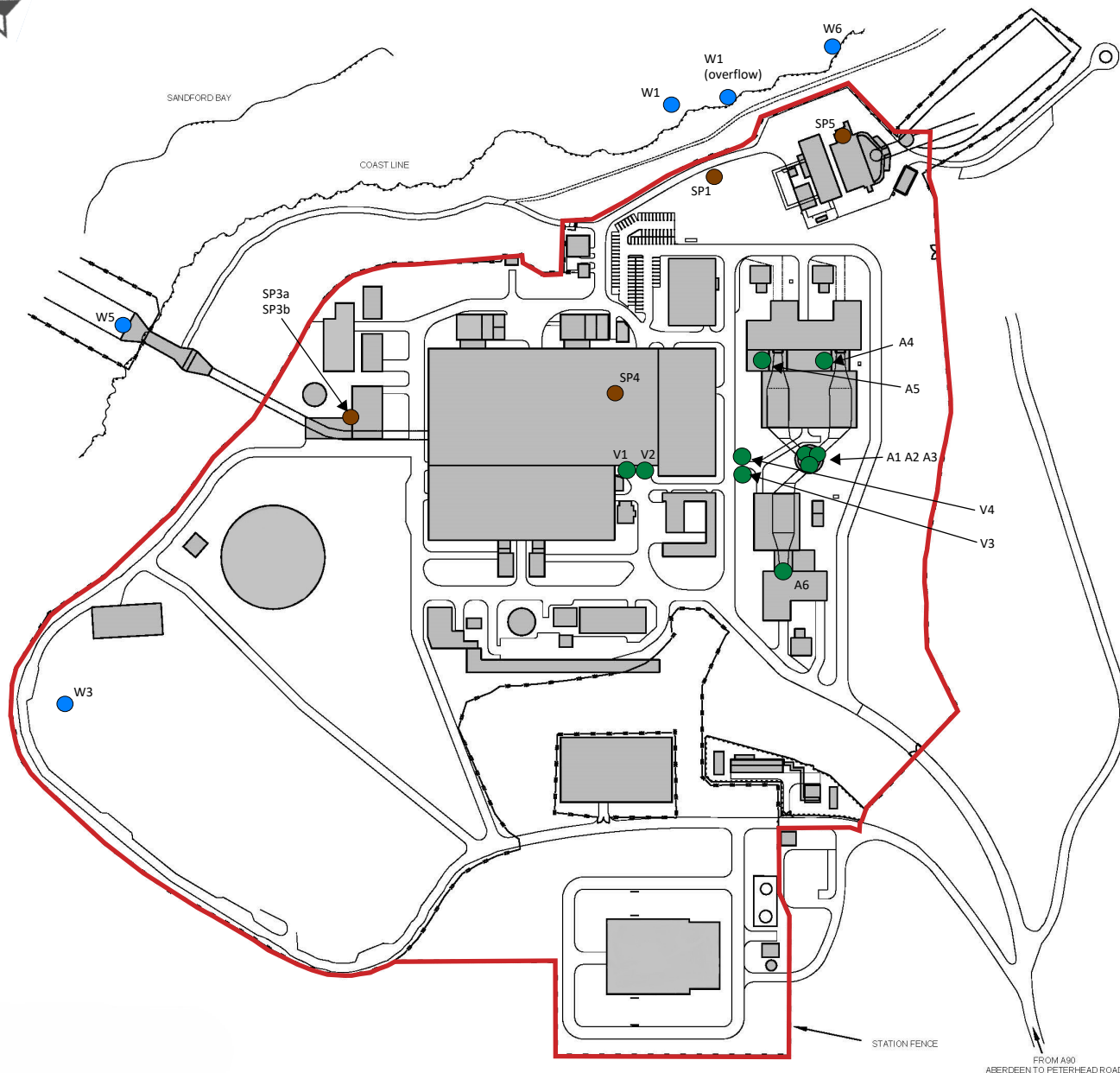
- Emission point W2 is an overflow outlet for W1. Drainage plans for the site show that W2 branches off after the Manhole 1 sample point (SP1) for W1, and therefore any emission going to W2 would be sampled at SP1. It is therefore considered that there does not need to be a separate location detailed in the Permit for the W2 emission point and this can be marked as “W1 (overflow)”.
- The sumps at SP3a and SP3b presently identified as Emission Point W4, actually interfaces and discharges into Emission Point W5 as the final discharge point from the Installation. It is therefore considered that W4 as a separate discharge point can be removed from the Permit, with the Sp3a and SP3b sample points being linked to Emission Point W5.
- Following removal of the ECP equipment, SP7 is no longer *insitu* and therefore it can be removed from the Permit.
- W6 is located at the overflow bay for the cooling water forebay for the cooling water pumps. Water from the forebay and from local surface water drains flow into this bay and exits out to W6 via an overflow pipe. In addition, clean water from the disused ECP bund, ECP transformer bund and ECP transformer rectifier bund are discharged to this point, and therefore the description of the source of this emission in the Permit should be updated to reflect the surface water component of the discharge.

An updated plan of the Emission Points from the Installation is provided in Figure 6.1.

Additionally, a number of updates to the ELVs are also required, namely:

- It is requested that the requirement to monitor BOD and the associated ELV at Emission Point W1, is removed. Monitoring results and SEPA compliance reporting, have demonstrated that there have not been any exceedances of the current limit, with wastewaters having concentrations significantly below 10mg/l. Although the PE for the Site is greater than 50, it is below 100 and therefore it is considered that septic tanks would provide sufficient treatment for this discharge. As all sanitary wastewater is treated in the oxigest plant, additional treatment is therefore provided. It is therefore considered that the treated sanitary water from the Installation is unlikely to have a noticeable impact on overall wastewater quality from the Installation, given the treatment in place and the small volume compared with other site discharges and surface water discharged from Emission Point W1.
- It is requested that the ELVs at Emission Point W1 and W3 and the requirement to monitor oil, other than by visible inspection, is removed. The majority of oil sources associated with W3 have now been removed from the Site. In the unlikely event that oil is detected, samples would be sent off site for analysis, however historic monitoring has demonstrated that visible oil is rarely present.
- It is requested that the ELVs and monitoring required for suspended solids at Emission Point W1 and W5 is removed. It is considered highly unlikely that significant suspended solids will enter the drainage system from surface run off (at W1), which has been demonstrated consistently in the monitoring results to date.

Although there is potential for suspended solids to be present in the wastewaters from SP 3a SP3b during washing out of the sumps, this is an infrequent activity and infrequent discharge. It is therefore not considered appropriate to have a limit on this activity.



Legend

- Installation boundary
- Emission Points to Water
- Sample Location Points
- Emission Points to Air

Q1	31/04/2026	IC	HW	HW
Rev	Date	By	Chkd	Appd

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Client

SSE Thermal Generation (Scotland) Ltd

Project Title

**Peterhead Power Station
PPC/A/1008802**

Drawing Title

**Figure 6.1 Updated Emission Point
Drawing**

Arup Job No.
314992

Name
ARUP-SSE-DR-314992-03

Scale
1:6,613 @ A3

Scale
1:6,613 @ A3

- It is requested that the proposed ELV on ammonia at W4 be removed from the Permit. An emission limit has not been agreed with SEPA since the Permit's issue, and the impact assessment presented in Section 5 of this report demonstrates that an exceedance of the annual unionised ammonia EQS as a result of released from the Installation is very unlikely.

Given the requested updates above, it is recommended that Table 3.1 of the existing Permit be updated to remove the requirements outline above. Those requirements to be deleted are shown in greyed out cells, additions are shown in **red** text.

Table 6.1: Recommended Update to the Emissions to Water ELVs in Table 3.1 of the Existing Permit

Parameter	W1	W2	W3	W4	W5		W6
	W1 (and W1 overflow)		W3	W5			W6
	SP1		SP2	SP 3a and SP 3b	SP4	SP7	SP5
Source	Surface water, oil separator, HRSG cooling water, treated sewage effluent	Overflow W1	Oil separators former tank farm area	Water treatment plant	Cooling water	ECP Process Waters	Emergency overflow from cooling water equipment and surface water
pH	6 - 9	-	-	5 - 9	-	5 - 9	-
Oil (mg/l)	10	-	10	-	-	-	-
Temperature (°C)	25	-	-	-	32	-	-
Suspended solids (mg/l)	100	-	-	50 IL 100 IU	-	To be agreed with SEPA	-
Total residual oxidant (mg/l)	0.35	-	-	-	0.35	-	-
Biological Oxygen Demand (BOD) (mg/l)	10	-	-	-	-	-	-
Ammonia (mg/l)	-	-	-	To be agreed with SEPA	-	-	-
Oil	None visible						
Flow (m³/hr)					107,000		

As well as the requested changes above. The review of monitoring and analysis methods applied at the Site has shown that some of the methodologies need updating to align with the most recent guidance. It is therefore recommended that Table 3.2 of the existing Permit be updated to detail the new methodologies and standards to be applied to the wastewater samples collected at the site.

Table 6.2: Recommended Update to the Monitoring Methodologies in Table 3.2 of the Existing Permit

Parameter	Emission Number(s)	Test Method	Monitoring Frequency
pH	W1 (SP 1)	BS ISO 10523: 2012	Monthly grab sample
	W5 (SP 3a and SP 3b)	Calibrated and buffered pH probe	Monthly grab samples

Parameter	Emission Number(s)	Test Method	Monitoring Frequency
Oil	W1 (SP1)	Visual check. Analysis with GC-FID or FT-IR only if visible oil detected	Daily
	W3 (SP2)		
	W4		
	W5 (SP 3a and SP 3b)		
	W6 (SP 5)		
Temperature	W1 (SP 1)	Thermocouple / PT resistance	Monthly grab sample
	W5 (SP 4)		Continuous
Suspended solids	W1	BS EN 872: 2005	Monthly grab sample
	W4		Monthly
Total residual oxidant	W1 (SP 1)	EN ISO 7393-2: 2018	Monthly
	W5 (SP 4)	EN ISO 7393-2: 2018	Continuous
		EN ISO 7393-2: 2018	Monthly
Biological oxygen demand	W1	BS EN 1899-1: 1998	Monthly grab sample
Ammonia	W4	EN ISO 14911: 1999	Monthly grab sample

The marine environmental surveys conducted every three years over the last 18 years have extensively characterised the discharges from W5 (and W4) and the impact on the bay. The surveys have covered a range of operating conditions, with the results/ findings being consistent over the 18 years studies and the effects identified as not significant. As a result, it is considered that this prolonged assessment has provided sufficient understanding of the Installation's effects and continued assessment on an ongoing basis is not considered cost beneficial. It is therefore requested that SEPA review whether the continued monitoring of the marine water environment required under permit condition 3.5.6 could be ceased.

Appendix A – Material Safety Data Sheets for Chemicals Used Onsite

See separate folder.

Appendix B – WI-PEHE-SHE-003-010 Environmental Monitoring and Reporting of PPC Regulated Emissions

See separate document.

Appendix C – Summary of Monitoring Results and Calculations for the Impact Assessment

Excel spreadsheet.