Diageo Distillery Ltd
Cameronbridge Distillery
Windygates, Leven, Fife, KY8 5RL
PPC/A/1000157/CON01

Derogation Assessment for Chemical Oxygen Demand (COD), Total Suspended Solids (TSS), Total Nitrogen (TN) & Total Phosphorous (TP) in effluent discharge from Diageo Cameronbridge Distillery.

Final outcome of Derogation Assessment	SEPA Approves Derogation

1. Non-Technical Summary of Determination

Introduction

Diageo Distillery Limited, the owner of the grain distillery Cameronbridge, Windygates, Leven, have requested a time limited derogation from the emission levels for discharge to the water environment for the best available techniques associated emission limits (BAT-AEL) for chemical oxygen demand (COD), total suspended solids (TSS), total nitrogen (TN) and total phosphorous (TP).

This request relates to one of the BAT Conclusions (BATc) for the Food, Drink and Milk sector, published on 4 December 2019, which form part of the BAT Reference Document (BREF) for this industry sector. This decision document sets out the steps that SEPA have followed in assessing the request for derogation. Details of SEPA's consideration of the wider BAT conclusions will be detailed in the BREF decision document and variation notice.

Derogation Application

An additional period has been requested to progress modifications in processes to allow recovery of extra resource value from the effluent and reduce emissions to BATc standards.

The approach of recovering resource value from the effluent discharge is innovative and, where successful, will support delivery of Net Zero carbon emission ambitions not only at a site level but also company level.

SEPA Assessment

SEPA have carried out a rigorous assessment to firstly establish whether the site is eligible for derogation and then to complete a thorough assessment, including a Qualitative and Quantitative Cost Benefit Assessment (CBA) element.

SEPA have concluded no Environmental Quality Standards will be breached and no significant pollution of the environment will be caused. Emissions are expected to fall during the derogation period as different interim step changes are implemented.

A high level of protection of the environment as a whole will not only be maintained but enhanced during the derogation period and beyond, particularly in relation to effluent discharge, a reduction in carbon dioxide emissions to atmosphere and the circular economy.

Conclusion

SEPA are minded to approve a derogation until 4 December 2031 as justified by the available information assessed and the reasons presented.

2. Basic Information

Co-ordinating officer	[redacted]
BREF	The Best Available Techniques (BAT) Reference document for the Food, Drink & Milk Industries was published in 2019 (link below) Best Available Techniques (BAT) Reference Document for the Food, Drink and Milk Industries (europa.eu)
BAT Conclusions reference number and date of publication	The Food, Drink & Milk Industries BAT Conclusions document was adopted on 12 December 2019 & published on 4 December 2019 (link below) EUR-Lex - 32019D2031 - EN - EUR-Lex (europa.eu) C/2019/7989/EU, 4 December 2019
BAT Conclusions compliance date	4 December 2023
Associated derogations at Installation	No

BAT Review Process

The BREF document sets out the techniques and technologies that are considered to be the most effective at reducing emissions for a specific industry. BAT Conclusions, which are the reference for setting permit conditions and therefore include the emission levels associated with the best available techniques (BAT-AEL) are published on roughly an eight to ten-year cycle, with sites having four years to comply with the requirements, following publication.

Following the publication of BAT Conclusions, SEPA reviews the site's Pollution Prevention and Control permit to determine the Best Available Techniques (BAT) for the site and any necessary changes to deliver the updated requirements. The review process involves detailed examination of current and proposed operations and the drafting of changes to the conditions of the permit.

In the event that achievement of the BAT-AELs would lead to disproportionately higher costs compared to the environmental benefits due to the geographical location, local environmental conditions or technical characteristics of the site, derogation from the BAT-AELs can be requested. This requires significant discussion and agreement from SEPA that it is an acceptable route. There are strict legal tests that must be passed for a derogation to be acceptable. These are all detailed below, with the primary tests being that no Environmental Quality Standards (EQS) are being breached and that the environment is protected.

To demonstrate disproportionate cost, a hybrid quantitative and qualitative Cost Benefit Analysis (CBA) is completed. The quantitative element is completed using a spreadsheet tool developed by the UK Environmental Regulators. This is freely available on the Gov.UK website.

The qualitative element assesses other factors, including climate change, circular economy, biodiversity and technical factors. This approach is used for assessing impacts on the water environment as there are no formal damage costs available for these pollutants (UK damage costs are published annually for air pollutants).

SEPA assesses the request for derogation at a Technical Oversight Panel to ensure that a consistent and rigorous assessment process is applied. The draft decision document and relevant section of the proposed permit is then placed on SEPA's website for 28 days for public comment. These comments are then reviewed and taken into account before a decision is taken on the permit variation.

Diageo Distillery Ltd Permit Review

SEPA have been reviewing the entire Pollution Prevention and Control permit for the installation against the BAT Conclusions. A derogation has been requested from the requirements of one of the applicable BAT Conclusions.

Diageo Distillery Ltd have invested significant sums in the site to innovate and recover resource value from the effluent stream via the installation of an integrated Bioenergy Plant (BEP). This complex system extracts biogas and solid mass to provide heat to the plant. This work has been ongoing for some time and has improved the efficiency of the process and reduced pollutant loadings and use of natural gas considerably. This work is ongoing, with the aim of achieving full resource utilisation and meeting the BAT-AEL emission limits. This process is complex with a number of interconnected processes. The details of the BEP are described in more detail in other parts of this document.

The permit review will include upgrade conditions, first time emission limit values for certain water emissions, reduced emission limit values (ELVs) for other water emissions together with improved data gathering and reporting measures.

Details of SEPA's consideration of the wider BAT Conclusions will be detailed in the BREF decision document and variation notice VAR04.

3. Derogation Description

Derogation Request from BAT 12 AELs for COD, TSS, TN, TP

BAT 12 specifies four BAT-AELs to water for effluent discharges. The BAT-AELs are described in the table below along with a comparison of current effluent discharge performance against these standards.

Table 1 – Current Effluent Performance vs BAT 12 AELs

Parameter	BAT AELs (daily average) in mg/l	95%ile (daily average in mg/l)	99%ile (daily average in mg/l)
COD	25-100	39,500	44,000
TSS	4-50	10,000	15,000
TN	2-20	1600	2300
TP	0.2-2	500	750

Short Description

Operator Proposals

The Operator has requested a six-year derogation from two of the BAT 12 AELs until 4 December 2029 for TSS and TP. They have further requested an eight-year derogation for the remaining two BAT-AELs for COD and TN until 4 December 2031. The request has been made to allow sufficient time to complete the development & implementation of solutions for recovery of resource value from the effluent together with any necessary effluent treatment to meet the BAT-AEL standards.

Key milestones within the eight-year derogation period will be delivered via four phases as described below.

Phase 1: 2024 to 2025

- Existing boiler houses (EBH) one and two have been successfully modified to operate on biogas (Feb and July 2024). Two Anaerobic Digestion (AD) reactors can now continue to produce biogas when the bio-boiler is off-line. These changes are expected to result in a reduction in COD, TN and TP concentrations.
- Commissioning of all 4 Ultra Filtration (UF) units due 2025. These changes are expected to deliver further reduction in TSS.
- Optimisation of Bioenergy Plant (BEP) aqueous treatment by 2025 (60% spent wash effluent to BEP / 40% to wet handling). These changes are expected to reduce COD and TP.
- Two AD reactors have become fully operational in early 2024, with expected ramp up to 100% capacity by 2025 when all UF units are online. These changes are expected to reduce COD.
- Two Haus centrifuges have been built and are due to be installed and operational by 2025. Expected reduction in TSS.

It is notable that the final effluent quality for TSS associated with operating the full BEP will initially lead to a deterioration in final effluent quality. This is due to the reverse osmosis (RO) system giving a reduced volume of higher contaminated effluent, while recycling water on site will result in reusing 80% and discharging 20%. This reflects the complex decision making required for development of a circular economy.

Phase 2: 2026 to 2029

- Citric Acid Sodium Hypochlorite dosing due 2026.
- Hydrochloric Acid dosing due 2026.
- Dissolved Air Floatation (DAF) plant optimisation due 2026 to reduce TSS and COD.
- Commissioning of the Reverse Osmosis (RO) units. RO1 has been fitted with a new UF membrane and is fully operational. RO2 and RO3 are operational but require new membrane replacement, completion due 2026.
- Centrate from Wet Handling Plant (WHP) to BEP - Feed Study and Hydraulic modelling due 2027.
- Centrate from WHP to BEP - CapEx Planning and approval due 2028.
- Divert all spent wash to BEP due 2029.

100% spent wash will be directed to the BEP once the above is complete. This will result in a significant reduction of all four pollutants COD, TSS, TN, TP, resulting in TSS and TP compliance with BAT-AELs. To complete Phase 2, the following projects will need to be completed:

Currently there is no dedicated route to deliver centrate from the wet handling plant (WHP) to the AD reactor treatment process at the BEP. To approach this, the following steps will be required:

Step 1: A full hydraulic assessment to determine the viability of redirecting centrate to BEP-2027.

Step 2: Once determined viable, CapEx projects can be planned and costed-2028. These would include:

- At least 650m of new pipeline.
- New duty/standby/assist centrate pumping stations.
- Dedicated centrate chemical treatment and filtration plant (e.g., gravity belt filter and polymer/coagulant dosing rig). The current Animal Feed (SuperGrain) Process cannot use polymer to ensure animal feed quality, so post-centrifuge solids removal will be required, including chemical and mechanical removal processes to ensure the centrate quality meets the required standard for Anaerobic Treatment.

Step 3: Delivery of the above chosen solutions. Any additional plant will require additional extensive groundworks as space on site is becoming limited. This will increase project complexity and the time taken to deliver.

Diverting all spent waste to the BEP will incur significant financial and environmental costs, namely:

- It would remove a source of revenue in the region of [redacted] through sales of solids to animal feed currently produced by the Wet Handling Plant. Solids removed at the BEP have been treated and will not be suitable.

- Producing animal feed at the site offsets animal production elsewhere and hence a carbon reduction.

Phase 3: Targeted Nitrogen Removal - Year 2031

Target nitrogen removal is being considered through nitrification-denitrification. This is considered a potential technically viable solution; however further trials will be needed. This can only be determined when Phases 1 and 2 above are complete and further monitoring and data is available.

Phase 4: Chemical Dosing and Nutrient Refinement - Year 2031

Tertiary treatment by chemical dosing and nutrient refinement to reduce COD may be required. This can only be determined when Phases 1 and 2 above are complete and further monitoring and data is available.

Periods of monitoring will be vital between Phases 2 and 4 as, at present, predicted performance is taken primarily from a system design document.

Strategy for Controlling Discharge of the 4 BAT-AEL Pollutants during the Derogation Period

COD

There is no current limit in the permit for COD.

- SEPA have undertaken statistical analysis of COD monitoring data gathered by the operator to generate 95 & 99%ile values that reflect current performance capabilities. The output of this analysis has been used to inform interim 95%ile lower 39,500mg/l & 99%ile upper 44,000mg/l tier daily average concentration limits for COD. SEPA will review these on an annual basis during the derogation period. After this, the BAT-AEL concentration limit of 100mg/l will apply.

- COD emissions will be mainly controlled through operation and optimisation of existing AD reactors and membrane bioreactor (MBR).

- COD compliance due Phase 4, 2031.

Total Suspended Solids (TSS)

- SEPA have undertaken statistical analysis of TSS monitoring data gathered by the operator to generate 95 & 99%ile values that reflect current performance capabilities. The output of this analysis has been used to inform interim 95%ile lower 10,000mg/l & 99%ile upper 15,000mg/l tier daily average concentration limits. These will act as interim effluent concentration limits and will be reviewed on an annual basis until 4 December 2029. After this, the BAT-AEL of 50mg/l will apply.

- SEPA will be retaining the existing permit loading value limit for TSS/tonnes over any 24-hour period of CL 25 and CU 50.

- Currently TSS emissions in the effluent are mainly controlled through the operation of existing anaerobic digestion reactors & the wet handling plant.

- During the derogation period TSS emissions are anticipated to reduce as proposed phases are implemented such as chemical dosing (2025), UF filtration optimisation (2025) and diverting all spent wash to the BEP (2029).

- TSS compliance due Phase 2, 2029.

Total Nitrogen (TN)

- There are currently no limits in the permit for TN.

- SEPA have undertaken statistical analysis of TN monitoring data gathered by the operator to generate 95 & 99%ile values that reflect current performance capabilities. The output of this

analysis has been used to inform interim 95%ile lower 1600mg/l & 99%ile upper 2300mg/l tier daily average concentration limits. These will apply as interim effluent limits and will be reviewed annually until the end of the derogation period. After this, the BAT-AEL concentration limit of 20mg/l will apply.

- During the derogation period implementation of the different phases will reduce emissions of TN.
- TN compliance due Phase 3, 2031.

Total Phosphorous (TP)

- There are currently no limits in the permit for TP.
- SEPA have undertaken statistical analysis of Total Phosphorous (TP) monitoring data gathered by the operator to generate 95 & 99%ile values that reflect current performance capabilities. The output of this analysis has been used to inform interim 95%ile lower 500mg/l & 99%ile upper 750mg/l tier daily average concentration limits. These standards will apply as interim effluent limits and will be reviewed annually until 4 December 2029. After this, the BAT-AEL concentration limit of 2mg/l will apply.
- During the derogation period the implementation of different phases are expected to deliver reductions in TP.
- TP compliance due Phase 2, 2029.

Ammoniacal Nitrogen (as N)

Although there is no BAT-AEL for ammoniacal nitrogen (as N) the permit does currently contain effluent loading limits for this parameter of 8t/day CL and 30t/day CU. Loading limits are being retained for this parameter as these are most appropriate for ensuring delivery of compliance with the annual average EQS for unionised ammonia.

Duration of Derogation

The operator has requested a derogation for a period of 6 years for TSS and TP until 4 December 2029 and eight years until 4 December 2031 for COD and TN, after which full compliance with the BAT-AELs for the four pollutants will be required.

4. BAT Assessment

Is the proposed derogation BAT?

SEPA have concluded that site specific BAT for the Diageo installation is:

Phase 1 is the period between now and 31 December 2025. During this period of the proposed derogation, site specific BAT is to achieve the following derogated ELVs of COD CL 39,500mg/l and CU 44,000mg/l, TSS CL 10,000mg/l and CU 15,000mg/l, TN CL 1600mg/l and CU 2300mg/l and TP CL 500mg/l and CU 750mg/l.

Phase 1 requires the completion of the following steps:

- Ultra filtration four replacement.
- Hydrochloric acid dosing of membrane bioreactor (MBR).
- AC reactors ramped up to 100%.
- Reverse osmosis coming fully online with membrane replacement on RO2/RO3.
- Chemical dosing feed study.
- Diverting 60% spent wash to the BEP, 40% to the WHP.
- Converting EBH 1 and EBH 2 to operate on biogas.

Phase 2 is the period between 1 January 2026 till 4 December 2029.

During this period site specific BAT is to achieve the derogated ELVs of COD CL 39,500mg/l and CU 44,000mg/l, TSS CL 10,000mg/l and CU 15,000mg/l, TN CL 1600mg/l and CU 2300mg/l and TP CL 500mg/l and CU 750mg/l.

Phase 2 requires the completion of the following steps:

- DAF optimisation to be achieved.
- Citric acid and sodium hypochlorite dosing to be complete.
- All spent wash to be fully treated and sent to the bioenergy plant.

After completion of Phase 2, the site will be compliant with the TSS and TP effluent BAT-AELs plus a large reduction in COD and TN.

Phase 3 and Phase 4 is the period 1 January 2030 till 4 December 2031.

During this period site specific BAT is to achieve the derogated ELVs of COD 230mg/l, TSS 50mg/l, TN 410mg/l, and TP 2mg/l.

Phase 3 and 4 requires the completion of the following steps:

- Targeted nitrogen removal.
- Additional feed studies on nitrification.
- Chemical dosing nutrient refinement.

This can only be completed once all spent wash has been directed to BEP in Phase 2 and the site can carry out modelling against the plants real and current needs. After completion of Phase 4, the site will be BAT-AEL compliant for all 4 pollutants, COD, TSS, TP, and TN.

Phases	Parameters	95%ile Interim Limits (daily average in mg/l)	99%ile Interim Limits (daily average in mg/)	BAT-AEL (daily average in mg/l)	Timeframe

Phases 1 & 2	COD TSS TN TP	39,500 10,000 1600 500	44,000 15,000 2300 750	- - - -	Status Quo until 4/12/2029
Phases 3 & 4	COD TSS TN TP	- - - -	230 - 410 -	- 4 - 50 - 0.2 - 2	From 4/12/2029 to 4/12/2031
BAT-AELs compliance	COD TSS TN TP	- - - -	- - - -	25 - 100 4 - 50 2 - 20 0.2 - 2	From 4/12/2031

- The BEP has two AD reactors which use by products from the distillery as their main feedstock. The AD reactors represent a BATc recognised technique for secondary effluent treatment & deliver COD reductions. 2 No. AD reactors are now fully operational and ramp up to 100% capacity expected by 2025.

- Currently the BEB (bioenergy boiler) is not Diageo's preferred option for steam generation. Diageo's carbon targets require reductions in natural gas combustion, ensuring the most efficient use of natural gas. The EBH's provide a more efficient method, using natural gas in conjunction with biogas, than running the BFB with natural gas, biogas and biomass. Diageo's carbon targets are therefore, driving the use of BEB only as a standby asset. This generally happens for short periods of time when the EBH's alone are unable to produce sufficient steam to meet the distillery's steam demand or require maintenance. Under normal operation, with all three EBH boilers available, the distillery demand can be met without the use of the BEB.

- As previously discussed, where possible spent wash is currently being directed to the BEP to enable biogas generation, even if the BEB is offline as the biogas can still be utilised by the EBH's. Biomass produced by the BEP is sent offsite for treatment at an external anaerobic digestion facility. Biomass produced by WHP is presently sold as animal feed. As Diageo have previously stated, the income stream associated with animal feed sales does not have a bearing on where spent wash is directed, maximising biogas production is the driving factor while maintaining smooth system operation is the main consideration.

- The measures proposed for implementation during the derogation period should not only result in a reduction in emissions to the water environment of the 4 BATc pollutants but, through acquiring resource value from the effluent will also support delivery of decarbonisation at site and company levels. Additional circular economy benefits will also arise through the use of biogas and recovery of water to reuse on site.

- A review of effluent monitoring data supplied by the operator has resulted in the setting of interim effluent limits for TSS, COD, TN & TP to reflect current performance capabilities. These interim limits are described in Section 3 above and will be reviewed on an annual basis throughout the derogation period.

5. Legal requirements

Environmental Quality Standards (EQS)

TSS, COD, TP & TN

There are no marine EQS standards for TSS, COD, TP & TN.

Annual Average EQS for Unionised Ammonia

Although there is no BAT-AEL for unionised ammonia this parameter can be regarded as a subset of TN. Any reduction in TN will have a corresponding reduction in unionised ammonia.

There is an annual average marine EQS for unionised ammonia (as N) which is 0.021mg/l.

In 2023, Envireau Water carried out an EIA on Diageo's long sea outfall (LSO) discharge to the Firth of Forth. The survey found ammonia met the required EQS within 5m of the LSO, well within the required 100m regulatory limit set by SEPA.

Mandatory Emission Limit Values

The mandatory minimum emission limit values in Annex V, VI, VII or VIII of the IED do not apply to this release.

No Significant Pollution/High Level of Environmental Protection

Background

A long sea outfall discharges effluent from the distillery and bioenergy plant into the Firth of Forth at a distance of 825m off the coast. The receiving water body is known as the Elie to Buckhaven waterbody for Water Framework Directive (WFD) classification purposes.

The Elie to Buckhaven waterbody (ID: 200050) is in the Scottish river basin district and is 63.3 km^2 in area. As the entire water body is not impacted by the discharge the water damage costs have also been determined based on the mixing zone for the consented discharge which is approximately 3km^2.

The overall status of the Elie to Buckhaven waterbody is Good for WFD classification purposes.

The effluent discharge from the grain distillery has not been identified as a pressure to the classification of this waterbody.

The site is currently compliant with the existing daily limits on total suspended solids & ammonia in the effluent discharge.

SEPA's Marine Chemists' assessment of the most recent October 2022 Benthic Survey Report is that the current effluent discharge is not causing biological pollution of the seabed.

No Significant Pollution

SEPA's assessment of the most recent October 2022 benthic survey is that the current effluent discharge is not having a negative impact on the ecology of the seabed.

Marine chemistry monitoring established that unionised ammonia concentrations were compliant with the EQS.

Once all spent wash is diverted to the BEP by 2029, the site will be compliant with TSS and TP for BAT-AELs.

Once all current techniques available on site have been optimised, targeted nitrogen removal and chemical dosing are introduced in 2031, the site will also be compliant with COD and TN for BAT-AELs.

High Level of Protection of the Environment as a Whole

Diageo have invested heavily over a number of years in the BEP and are presently working to optimise its performance to meet the BAT-AELs and greatly reduce the external resources required to operate the installation (particularly fossil gas and towns water).

Diageo have been working to get the current aqueous treatment plant and associated combustion plant fully operational since taking over its operation from Veolia in 2018. Its successful operation is key to Diageo's Society 2030 plan, which the operator is fully committed to. Two key factors of this plan are the reduction of water usage by 30% and achieving net zero with all operations being powered by renewable energy, by 2030. Additionally, Diageo aims to achieve zero waste in direct operations and zero waste to landfill in its supply chain. At the centre of these goals is a fully functioning BEP.

The final stage of the BEP is a Reverse Osmosis (RO) unit. This will enable up to approx. 80% of the treated effluent water to be recovered to use for cleaning and as a water feed to the boiler for steam production. The RO is currently being commissioned and 2,975,000litres of recycled water has been produced since the system began coming online in September 2023.

6. Derogation Justification

Derogation Criteria: Technical characteristics

Technical Characteristics of the Installation Which Justify Derogation

The operator has identified the following 2 points which act as a justification to support a derogation request under Article 15(4) of the IED.

1) **Recent Investment to reduce emissions.**

   The site has significantly invested in their BEP to reduce emissions, reduce effluent quantities, increase water recovery and reduce external fuel requirements for onsite combustion plants. Total investment since 2011 is in the region of [redacted]

2) **The configuration of the plant within the site results in practical difficulties and increased costs, including lack of space for the construction of additional plant:**

   There is limited space on the installation for expansion of boiler or water treatment facilities.

Additional Factors

- Grain distilling is not a specific named sectoral activity within the BAT Conclusions but falls within scope due to being an activity that falls within the general food and drink description.

- Diageo are fully committed to their Society 2030 Plan. This will result in the site becoming net zero for GHG emissions with all operations being powered by renewable energy, reducing water consumption on site by 30%, zero waste to landfill and reducing natural gas consumption by utilising on site BEP biogas.

- Diageo Cameronbridge have been part of the River Leven Project since it began in 2018 to help restore the River Leven and improve water quality. The Alliance for Water Stewardship (AWS) also awarded the International Water Stewardship Standard Certificate to Cameronbridge Distillery in 2022 for responsible water usage and management.

7. Judgement on the balance of environmental benefits and disproportionate costs

Version of tool: CBA/QDAT – Hybrid Used

- Due to the derogation application relating to water, limited data is available for damage costs. As such SEPA have taken a hybrid approach of a qualitative assessment, with use of the CBA tool to illustrate the costs and benefits to water.

- The annual emission reductions have not been quantified as water damage costs do not exist for these substances. A damage cost was calculated using WFD classifications instead which is a conservative approach as it encompasses the entire 63.3km^2 waterbody. However, as the entire waterbody is not impacted by the discharge the water damage costs have also been determined based on the mixing zone for the consented discharge which is approximately 3km^2. Both areas have been used in the quantitative assessment to assess the proposed derogation against compliance with the BAT-AELs by the due date of December 2023.

- The latest CBA spreadsheet was downloaded from the UK.Gov Website.

- Version 6.23, as updated on 4 October 2021.

- SEPA carried out the CBA using data specifically requested from the operator.

Overview of Assessment

Three scenarios were entered into the tool:

1. Business as Usual – current situation. No actual business costs were entered for this in the CBA Tool as the aim is to show the difference between the BAT-AELs and derogation options. The existing costs are not expected to change under any of the scenarios. Damage costs as described above over an 8-year period to 2031 are included.

2. Proposed derogation – using indicative costs and timings provided by the operator for each proposed Phase until 2031. Damage costs as described above until 2031. Note the costs are then taken forward for another 20 years (i.e. only once BAT is achieved).

3. BAT-AELs – the hypothetical costs of upgrading the effluent treatment plant and operating it for 20 years to meet the BAT-AEL discharge requirements from 2023.

Data input - General

- WAC of Capital set at 7.5% (Low 5% and High 10%), based on comparable derogation assessments.
- Duration of improvements was set at industry standard of 20 years for investment decisions.
- For water damage costs, an additional line was added to the Damage Costs part of the spreadsheet for an annual cost of £9.5 million.
- This figure was derived from the cost of moving from Moderate to Good for the Buckhaven to Kinghorn waterbody (ID: 200048) (figures from SEPA published water benefit costs multiplied by the baseline area (63.3 km^2), giving £150,000 x 63.3 = £9,495,000.
- Water damage costs have also been derived for the area impacted based on the mixing zone (3.14km^2), giving £150,000 x 3.14 = annual cost of £471,000.
- The baseline waterbody (63.3km^2) costs reflect a hypothetical downgrade of the WFD Classification of the whole waterbody, and a such represents a worst-case assessment. The classification remains at Good.

Note: These figures are available in the water benefit costs spreadsheet hyperlinked in WAT-RM-41.

Data input - Options

1. Business as Usual – current situation. This incurred no additional costs in the CBA tool and so no figure is given. Run for the proposed 8 years of the derogation.
2. Proposed Derogation – Phased costs entered into spreadsheet. Damage costs unchanged until full compliance is achieved in 2031. Run for the proposed 8 years of the derogation.
3. BAT-AELs – Information was provided by the operator for the expected upgrade and running costs over 20 years.

Sensitivity Test (CBA)

The CBA Tool automatically carries out a sensitivity analysis on the key variables and underlying Net Present Value (NPV) costs and benefits.

CBA Output (Water Environment Only)

The results indicate that the costs of achieving the BAT-AELs over the proposed derogation would exceed the benefits based on the baseline waterbody costs (defined as a one step up change in Water Framework Directive classification) to the water environment by a Net Present Value of £-71 million (central estimate). Sensitivity tests also supported the central estimate which includes considering lower costs and higher benefit costs. Use of the baseline waterbody area (63.3km^2) provides a worst-case assessment.

Using the mixing zone produced a net present value of £-133 million. This is expected as the water damage cost is smaller due to the reduced area of impact (3km^2). This approach is considered appropriate as it aligns with the water quality assessment and status (Good) based on SEPA monitoring and the environmental impact assessment conducted by the operator.

Balancing Test (Qualitative)

Environmental Benefits	Costs of achieving BAT-AELs
Summary of the benefits the proposed derogation would provide	Summary of the costs of the proposed derogation
Effects on health and safety **(emission to water only)** None identified.	The applicant will invest in the treatment plant to deliver: Phase 1: Reinstatement of Full Aqueous Treatment Plant as designed Phase 2: Direct All Effluent Through Treatment Phase 3: Targeted Nitrogen Removal Phase 4: Chemical Dosing and Nutrient Refinement These measures will allow the resource value in terms of fuels and recovered water to be gained from the effluent and improve the final effluent quality to meet the BAT-AELs. However, the change in CO_2 emissions from meeting the BAT-AELs in 2023 compared to the proposed derogation is small (around 7000t/year) and is not considered to outweigh the costs. This is also supported in a quantified assessment of CO_2 emissions in the CBA. The qualitative balancing test included consideration of the environmental benefits (including effects on climate change) of the proposed derogation. SEPA have considered the positive reductions in towns water required and the displaced use of fossil gas with biogas generated and used on site, which will allow the resource value in terms of fuels and recovered water to be gained from the effluent. We support businesses in exploring new techniques that will contribute to Scotland's Net Zero goals, whilst also ensuring that the environment is protected and improved. In exercising our permitting functions under the PPC Regulations, in particular to ensure that the derogation meets the requirements of Regulation 25(14) taking account of the general principles under Regulation 21, and in deciding to grant the derogation, we have acted in the best way calculated to mitigate, and to adapt to, climate change in accordance with our climate change duties under Part 4 of the Climate Change (Scotland) Act 2009.
Effects on recreation **(emission to water only).** None identified.	
Effects on visual amenity and landscapes **(emission to water only)** None identified.	
Effects on climate change Positive – Reduction in towns water required through use of RO system on effluent for plant supply is positive and reduces water, chemical and energy demands. Positive - Displace use of fossil gas with biogas generated and used on the installation. Negative - Increase in energy and chemicals for completion of Phase 3 and 4.	
Effects on biodiversity Neutral in the interim for the water environment as current WFD water quality is Good status. Impacts on biodiversity in the water environment have been assessed as very low importance and the scale of the impact on the receiving water is negligible. In terms of environmental improvement, the discharge is not currently having an impact on the classification of the receiving water.	
Effects on Health **(emission to air only)** N/A	

Senior Policy Officer (Water Resources) Report on CBA

The CBA identified the costs of achieving the BAT-AELs would exceed the benefits based on the baseline waterbody area and the mixing zone. The former provides consistency within the sector to date. However, using the mixing zone is considered more appropriate from a water quality perspective. Consequently, I would support this approach in future for PPC derogations when assessing potential water quality impacts.

Overall Judgement

The CBA indicates the cost of meeting the BAT-AELs by December 2023 is disproportionate compared to the environmental benefits.

8. Derogation Assessment

Permitting officers minded to position

I am minded to accept the derogation request (as submitted by the operator) for the reasons set out below.

- The environmental impact of the derogated limits have been thoroughly assessed and are considered to be acceptable.
- An overall high level of protection of the environment is in place.
- The derogation request meets the technical characteristic criterion namely: - the history of recent investment and limited availability of space on site.
- An appropriate range of options were reviewed and those identified as technically viable were considered further.
- Viable options were taken forward for CBA/QDAT, were adequately described in the CBA and the cost of complying with the BAT-AELs by 4 December 23 by the upgraded BEP was assessed. The outcome of the CBA is that there is disproportionate cost.
- The measures proposed under the derogation will allow additional resources to be gained from the effluent which will contribute to a reduction in carbon dioxide emissions and towns water use.
- Upgrade conditions will be inserted in the permit to require delivery of the various projects described above. An annual progress report will also be required to track their strategy to reduce emissions to the water environment of the 4 pollutants to BAT-AEL standards.

Overview of site and installation

Diageo Cameronbridge is one of the largest grain distilleries in Europe and is located in Fife. It mainly produces grain whiskey, Smirnoff and gin. Once the site's BEP is fully operational, the majority of co-products from the distillation processes will be used as fuel on site and feedstock for anaerobic digestion processes.

Permitting Officers assessment of the derogation request

Validity of the derogation request

- The operator has addressed all reasonable options for achieving the BAT-AELs.
- The operator has referred to the BAT Conclusions and addressed all reasonable options for achieving the BAT-AELs.
- See section 7 for full details on CBA.

Option name	Short description of the option	Emission limit that would be achieved	Timescales for completion	Option taken forward to the CBA
Business as Usual-current situation	No change	Current permit limits	Already in place	Yes
Phase 1	Variety of measures to optimise BEP	New limits based on phased approach	2025	Yes
Phase 2	All spent waste to BEP	New limits based on phased approach	2029	Yes
Phase 3	Targeted nitrogen removal	New limits based on phased approach	2031	Yes
Phase 4	Chemical dosing and nutrient refinement	BAT-AELs	2031	Yes
Effluent tankering to Scottish Water	127 tankers per day	BAT-AELs	2023	Yes – but not considered in detail as NPV was significantly showing the costs outweigh benefits £-460m
Non phased approach to upgrade to meet BAT-AELs now	Single step upgrade	BAT-AELs	2023	Yes

- The Operator provided SEPA with the necessary cost data which allowed SEPA to undertake the cost / benefit analysis.

Effluent Tankering

An alternative approach to consider is tankering effluent off site, an option that would allow immediate compliance with BAT-AELs. This however, appears to be neither technically or economically feasible and does not represent BAT.

- The sites average daily discharge is 3800m^3. Assuming a 12-hour working day, this equates to 127 tankers a day or 11 tankers an hour to remove effluent. This would cause insurmountable logistical problems at the site in terms of access, increase in traffic, noise etc. There is also insufficient storage capacity on site for these volumes.
- Finding a site to dispose of this effluent within a reasonable distance from the distillery is highly unlikely.
- Diageo's consultants estimated the cost of tankering off site to be in the region of £25/m^3. This would result in an additional cost of approx. £34 million per annum. The CBA Net Present Value is £-460 indicating the cost is significantly disproportionate to the benefit.
- Tankering would also significantly increase the sites carbon footprint. Diageo's consultants estimate an increase of approx. 8,023tonnes CO_2 per annum.
- For these reasons, tankering effluent off site is not considered an option.

New on site ETP

BAT-AELs - the hypothetical costs and time spent on the BEP project of upgrading the effluent treatment plant and operating it for 20 years to meet the BAT-AEL discharge requirements from 2023 were assessed in the CBA/QDAT hybrid assessment.

Demonstrating disproportionality of costs and benefits

SEPA using cost data provided by the operator has completed the Cost Benefit Analysis model. This model concluded that the stated criterion would result in increased costs of achieving the BAT-AELs compared to the environmental benefits.

Summary - The operator has provided a credible argument that the increased costs linked to the technical characteristics are disproportionate for achieving the BAT-AELs compared to the environmental benefits.

Risks of allowing derogation

- Allowing the proposed derogation would not cause significant pollution and will promote achievement of a high level of protection of the environment as a whole.
- The operator's proposals mean that full compliance with the BAT 12 AELs will be delayed by 6 years (2029) for TSS and TP, 8 years (2031) for COD and TN with incremental reductions in emissions to the water environment being made in the interim.

- The proposed approach for delivering a reduction in emissions to water will allow resource value to be gained from the effluent that will support circular economy & net zero carbon ambitions.

Final Considerations

- Protection of local water quality during the derogation will be delivered by the setting of interim effluent limits (which will be reviewed annually), optimising the bioenergy plant and a phased reduction in emissions at source.
- Support of the derogation will enable the operator to extract additional resource value from the effluent in terms of biogas, biomass and clean water, which has the potential to deliver significant circular economy & low carbon solutions that have the capability to support net zero carbon ambitions on site and reduce water consumption by 30%.
- The operator has significant resources and commitment in place to support the successful delivery of the changes which are proposed.
- Diageo is a major employer in the area & across the Scotch whisky industry.
- Diageo is a key player in delivering low carbon distillation for the sector.

9. Text for inclusion in the permit

Permit Conditions

SEPA consenting policy for complex effluent discharges such as this is to set two-tier limits as 95% and 99%ile values. On that basis the existing Table 3.3 Emissions to Water ELVs has been modified to include interim two-tier composite daily average limits for TSS, COD, TN & TP. These two-tier limits will apply during the derogation period after which single value daily average BAT-AELs limits will come into effect which will need to be met 100% of the time. The planned changes are described in the table below.

Parameter	BAT-AEL[1] (daily average in mg/l)	Derogated ELV Lower Tier (95%ile) (daily average in mg/l)	Derogation ELV Upper Tier (99%ile) (daily average in mg/l)
Total suspended solids (TSS)	50**	10,000*	15,000*
Chemical oxygen demand (COD)	100****	39,500*	44,000* 230***
Total nitrogen (TN)	20****	1600*	2300* 410***
Total phosphorous (TP)	2**	500*	750*

[1] BAT-AEL as specified in the Food, Drink & Milk BAT Conclusions

*Until 4 December 2029

** From 4 December 2029

*** From 4 December 2029 until 04 December 2031

****From 4 December 2031

Note: The BAT Conclusions specifies a range for each parameter. The proposed limits represent the top of the range. Once compliance is achieved it may be that an ELV can be set below the top of the range.

In addition, the following new conditions have been inserted to track progress with planned changes during the derogation period to provide reassurance that the strategy will deliver compliance with the BAT-AELs.

10. In Schedule 3, Condition 3.6.18 to 3.6.20 have been inserted, as follows:

3.6.18 By 31 March 2029 and every 5 years there after the Operator shall conduct surveys of the benthic layer of the seabed along the long sea outfall to determine the scale of the impact to the benthic layer.

3.6.18.1 The protocol for conducting the benthic surveys required by Condition 3.6.18 shall be agreed in writing with SEPA prior to the first survey being conducted.

3.6.18.2 By 30 June 2029 and every 5 years there after the Operator shall submit to SEPA the benthic survey reports for the survey required by Condition 3.6.18.

3.6.19 By 31 March 2029 and every 5 years there after the Operator shall conduct marine water column sampling to determine the dispersed concentrations of ammonia and suspended solids discharging from the long sea outfall.

3.6.19.1 The protocol for conducting the water column sampling required by Condition 3.6.19 shall be agreed in writing with SEPA prior to the first survey being conducted.

3.6.19.2 By 30 June 2029 and every 5 years there after the Operator shall submit to SEPA the water column sampling reports for the surveys required by Condition 3.6.19.

3.6.20 Once every 5 years the operator shall conduct a survey of the long sea outfall and provide a report on its integrity.

11. In Schedule 3, a new Section 3.9 has been inserted, as follows:

3.9 Bioenergy Plant Progress Review

3.9.1 By 31 December 2025, the Operator shall provide a progress report on the Surplus Biosolids Centrifuge Project (Phase 1).

3.9.2 By 31 December 2025, the Operator shall provide a progress report on the Chemical Dosing Feed Study (Phase 1).

3.9.3 By 31 December 2025, the Operator shall provide a progress report on the UF Trains Replacement (Phase 1).

3.9.4 By 31 December 2025, the Operator shall provide a progress report on the implementation of the Citric Acid and Sodium Hypochlorite Dosing phase (Phase 1).

3.9.5 By 31 December 2025, the Operator shall provide a progress report on the installation of new membranes in the Reverse Osmosis process for RO2 and RO3. (Phase 1).

3.9.6 By 31 December 2025, the Operator shall provide a report on the progress of Hydrochloric Acid Dosing of the Membrane Bioreactor. (Phase 1).

3.9.7 By 31 December 2026, the Operator shall provide a report on the progress of the Dissolved Air Floatation coming fully on-line (Phase 2).

3.9.8 By 31 December 2026, the Operator shall provide a report on the progress of the centrate to Bioenergy Plant Feed Study (Phase 2).

3.9.9 By 31 December 2028, the Operator shall provide a report on the progress of diverting all spent wash to Bioenergy Plant (Phase 2).

3.9.10 By 4 December 2030, the Operator shall provide a report detailing progress made in TN removal due in 2031 (Phase 3).

3.9.11 By 4 December 2030, the Operator shall provide a report detailing progress made in Chemical Dosing and Nutrient Refinement due in 2031 (Phase 4).

3.9.12 For the period until 04 December 2031 the Operator shall submit a report each month containing a summary of:

(a) any commissioning activities undertaken during the preceding month
(b) any tests undertaken during the previous month, and
(c) the results of any test received during the previous month

3.9.13 By 31 December each year the Operator shall provide a progress report including but not limited to: -

(a) A review of effluent monitoring data gathered for TSS, COD, TN & TP over the previous 12 months in accordance with Condition 3.6 and compare performance against the ELV's in Table 3.3 that apply**.**

(b) Overall progress made in the previous 12 months in the implementation of techniques to reduce emissions to water of TSS, COD, TN & TP to achieve compliance with the ELV's for those parameters in Table 3.3 that apply.

(c) Intended plans for reducing emissions to water of TSS, COD, TN & TP over the following 12-month period.

Although there is no BAT-AEL for ammoniacal nitrogen (as N) the permit does currently contain effluent loading limits for this parameter of 8t/day CL and 30t/day CU. Loading limits are being retained for this parameter as these are most appropriate for ensuring delivery of compliance with the annual average EQS for unionised ammonia.

Installation specific derogation annex

X.1 The Regulation

Regulation 25(6) of the Regulations provides that SEPA must include emission limit values that ensure that emissions do not exceed the levels associated with the best available techniques (BAT-AELs) laid down in the BAT Conclusions.

Regulation 25(12) of the Regulations states:

"SEPA may set a less strict emission limit value... for an installation if –
(a) an assessment shows that achievement of the emission levels associated with the best available techniques as described in any BAT Conclusions would lead to disproportionately higher costs compared to environmental benefits due to the –
i) the geographical location or local environmental conditions of the installation, or

ii) technical characteristics of the installation, ..."

Regulation 25(2)(c) provides that where a less strict value is set ("derogation"); it is a requirement that "the permit specifies the reasons for setting the value, including the result of the assessment and the justification for the conditions imposed". The purpose of this Appendix is to satisfy those requirements.

X.2 The Derogation Used

SEPA have decided to set an ELV that derogates from the BAT-AEL range in the BAT Conclusions in respect of total suspended solids (TSS), chemical oxygen demand (COD), total nitrogen (TN) and total phosphorous (TP).

Parameter	BAT-AEL[1] range in the BATc	Derogated ELV Lower Tier (95%ile) (daily average in mg/l)	Derogated ELV Upper Tier (99%ile) (daily average in mg/l)
Total suspended solids (TSS)	50**	10,000*	15,000*
Chemical oxygen demand (COD)	100****	39,500*	44,000* 230***
Total nitrogen (TN)	20****	1600*	2300* 410***
Total phosphorus (TP)	2**	500*	750*

[1] BAT-AELs as specified in Table 1 to the Food, Drink & Milk Industries BAT Conclusions
*Until 4 December 2029
** From 4 December 2029
*** From 4 December 2029 until 4 December 2031
****From 4 December 2031

X.3 Basis for the Derogation

SEPA have set this emission limit value on the grounds that achievement of emissions within the BAT-AEL range would lead to disproportionately higher costs compared to environmental benefits due to the technical characteristics of the installation:

The technical characteristics of the installation mean that achievement of total suspended solids, chemical oxygen demand, total phosphorous and total nitrogen emissions within the BAT-AEL range would lead to disproportionately higher costs due to the need to:

1) atypical cross media impacts would arise whereby reducing the emissions of one pollutant increase the emissions of another;

2) the configuration of the plant within the site results in practical difficulties and increased costs, including lack of space for the construction of additional plant; and

3) the history of recent investment in techniques designed to reduce emissions.

A Cost Benefit Analysis conducted by SEPA based on applicant data gave the result that achievement of emissions for total suspended solids, chemical oxygen demand, total phosphorous & total nitrogen within the BAT-AEL range would lead to disproportionately higher costs for the reasons given above.

X.4 Justification for the Conditions Imposed

SEPA have included two tier composite ELVs for total suspended solids (CL of 10,000mg/l & CU of 15,000mg/l), chemical oxygen demand (CL of 39,500mg/l & CU of 44,000mg/l), total nitrogen (CL of 1600mg/l & CU of 2300mg/l) & total phosphorous (CL of 500mg/l & CU of 750mg/l) on the grounds that SEPA considers it:

- Represents current BAT for the installation
- Reflects current plant operating capabilities
- Ensures no significant pollution of the environment will be caused and that a high level of protection of the environment as a whole will be achieved; and
- The derogation is time limited until 4 December 2029 for TSS and TP, and until 4 December 2031 for COD and TN.

There is projected to be a phased reduction in emissions to water during the period of the derogation.

10. Conclusions

Overall Conclusion

Limited data is available for damage costs. As such SEPA has taken a hybrid approach of a qualitative assessment, with use of the CBA tool to illustrate the costs and benefits to water. Both assessments identify the costs of meeting the BAT-AELs now outweigh the benefits compared to the proposed derogation and indicate the cost would be disproportionate.

The Scottish Environment Protection Agency has reviewed the derogation request and concluded that the derogation is justified in this case.

The Scottish Environment Protection Agency is therefore minded to allow this derogation request subject to the conditions outlined in Section 9.