Determination of an application for variation to an Environmental Permit under the Environmental Permitting (England & Wales) Regulations 2016

Decision document recording our decision-making process

The Permit number is: EPR/BJ7379IZ
The Operator is: Kimberly-Clark Limited
The Installation is: Northfleet Paper Mill
This Variation Notice number is: EPR/BJ7379IZ/V007

Consultation commenced on: 06/10/2020
Consultation ends/ended on: 03/11/2020

What this document is about

This application for a variation has been made to request a derogation for a time-limited delay in meeting the new Industrial Emissions Directive (IED) BAT Associated Emission Levels (BAT-AELs) for a direct discharge to water of total nitrogen.

In this decision document, we set out the reasoning for the consolidated variation notice that we have issued.

EPR/BJ7379IZ/V006 – the paper and pulp sector permit review
The sector review variation was issued on 16/06/2016 following a review of conditions in the permit to deliver compliance with BAT conclusions.

Article 21(3) of the IED requires the Environment Agency to review conditions in permits that it has issued and to ensure that the permit delivers compliance with relevant standards, within four years of the publication of updated decisions on BAT conclusions.

We reviewed the permit for this installation by comparing the information received in response to a Regulation 60 notice with the revised BAT conclusions for the production of pulp, paper and board (2014/687/EU). These were published on 30/09/2014.

We issued the variation to deliver compliance with the BAT standards and the BAT AELs by 30/09/2018, with an accompanying decision document explaining the reasoning for the consolidated variation notice that we issued.

Variation EPR/BJ7379IZ/V007 – purpose of this application for a derogation

This variation application (EPR/BJ7379IZ/V007) has been made to make changes to the variation issued under the sector review (EPR/BJ7379IZ/V006), to include a derogation supporting a time-limited delay to 31/12/2021 in meeting the IED BAT-AEL total nitrogen emission levels for the direct waste water discharge to receiving waters from a non-integrated paper mill.

This decision document explains how we have reviewed and considered the application and why we have included the specific conditions in the permit we are issuing. It is our record of our decision-making process and shows how we have taken into account all relevant factors in reaching our position.

Throughout this document we will use a number of expressions. These are as referred to in the glossary and have the same meaning as described in "Schedule 6 Interpretation" of the permit.

How this document is structured

Glossary of acronyms used in this document

(Not all of these acronyms are necessarily used in this document.)

BAT	Best Available Technique(s)
BAT-AEL	BAT Associated Emission Level
BATc	BAT conclusion
BREF	Best available techniques reference document
CBA	Cost Benefit Analysis
CHP	Combined heat and power
COD	Chemical oxygen demand
DAA	Directly associated activity – Additional activities necessary to be carried out to allow the principal activity to be carried out
DD	Decision document
Derogation	from BAT AELs stated in BAT Conclusions under specific circumstances as detailed under Article 15(4) of IED where an assessment shows that the achievement of emission levels associated with the best available techniques as described in BAT conclusions would lead to disproportionately higher costs
EAL	Environmental assessment level
ELV	Emission limit value derived under BAT or an emission limit value set out in IED
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 2016 (SI 2010 No. 1154)
EQS	Environmental quality standard
ETP	Effluent treatment plant
EU-EQS	European Union Environmental Quality Standard
IED	Industrial Emissions Directive (2010/75/EU)
NPV	Net Present Value
N	Nitrogen
PC	Process Contribution
PEC	Predicted Environmental Concentration
SAC	Special Area of Conservation
SGN	Sector guidance note
SHPI(s)	Site(s) of High Public Interest
SSSI(s)	Site(s) of Special Scientific Interest
TGN	Technical guidance note
WFD	Water Framework Directive (2000/60/EC)

1 Our decision

We have decided to issue the variation notice to the operator. This will allow them to continue to operate the installation, subject to the conditions in the consolidated variation notice.

As part of our decision we have decided to grant the operator's request for a derogation from the requirements of BAT Conclusion 50, Table 20 as identified in the Production of Pulp, Paper and Board BAT Conclusions document. The way we assessed the operator's request for a derogation and how we subsequently arrived at our conclusion is recorded in Annex 1 of this document.

We consider that, in reaching our decision, we have taken into account all relevant considerations and legal requirements and that the varied permit will ensure that a high level of protection is provided for the environment and human health.

The consolidated variation notice contains many conditions taken from our standard Environmental Permit template including the relevant Annexes. We developed these conditions in consultation with industry, having regard to the legal requirements of the Environmental Permitting Regulations and other relevant legislation. This document does not therefore include an explanation for these standard conditions. Where they are included in the notice, we have considered the techniques identified by the operator for the operation of their installation, and have accepted that the details are sufficient and satisfactory to make those standard conditions appropriate.

2 How we reached our decision

2.1 Receipt of application

The application was submitted on 23/08/2019 and duly made on 01/11/2019. This means we considered it was in the correct form and contained sufficient information for us to begin our determination but not that it necessarily contained all the information we would need to complete that determination; see section 2.2.

The operator claimed that certain information was commercially confidential and should be withheld from the public register. We considered this request and determined that: The request is considered to be reasonable as the information is of a commercial nature and includes information that could be used by competitors to determine processing capacity, performance, timing of upgrade schedules and economic data relating to improvement costs. The application for commercial confidentiality is justified in relation to Appendix F of the application (including the Cost Benefit Analysis (CBA) tool) and should be excluded from the public register.

We are satisfied that the information on costs is not information relating to emissions, so there is not an overriding interest in making the information publicly available.

We are required to re-assess all confidentiality claims if we are minded to grant a derogation, before we go to public consultation. We decided that sufficient information on the cost benefit assessment was available for our decision to be understood by the public and that the detailed costings and the CBA tool, for which we previously granted confidentiality, should remain confidential.

Apart from the issues and information just described, we have not received any information in relation to the application that appears to be confidential in relation to any party. The application is available on our public register.

2.2 Requests for further information

Although we were able to consider the application duly made, we needed more information in order to complete our determination, and requested this on 05/08/2020.

We received the additional information by email on 11/08/2020:

- Data on the average load of total nitrogen in the discharge for January to July 2020.
- Confirmation of the ability to meet a reduction in the permitted effluent discharge volume.
- Correction of an error in the application referencing the applicable BAT conclusion.
- Confirmation of the capacity to undertake further review of the use/choice of biocide following completion of the derogation project.
- Confirmation that despite disruption caused by the coronavirus pandemic, the derogation project is still on track to deliver by 31/12/2021.

2.3 Summary of how we considered the responses from public consultation

The consultation requirements were identified in accordance with the Environmental Permitting Regulations and our public participation statement.

We have consulted on our draft decision from 06/10/2020 to 03/11/2020. A summary of the consultation responses and how we have taken into account all relevant representations is shown in Annex 3.

3 The legal framework

The consolidated variation notice will be issued under Regulation 20 of the EPR. The Environmental Permitting regime is a legal vehicle which delivers most of the relevant legal requirements for activities falling within its scope. In particular, the regulated facility is:

- an *installation* as described by the IED;
- subject to aspects of other relevant legislation which also have to be addressed.

We consider that, in issuing the variation, it will ensure that the operation of the Installation complies with all relevant legal requirements and that a high level of protection will be delivered for the environment and human health.

We explain how we have addressed specific statutory requirements more fully in the rest of this document (Annex 1).

We have set the ELVs in line with the BAT Conclusions other than for those parameters for which a derogation was sought as detailed in Annex 1 of this document. If a tighter limit was previously imposed these limits have been carried forward on the basis of no backsliding. The emission limits and monitoring tables have been incorporated into Schedule 3 of the permit.

Growth duty

We have considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 and the guidance issued under section 110 of that Act in deciding whether to grant this permit variation.

Paragraph 1.3 of the guidance says:

"The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation."

We have addressed the legislative requirements and environmental standards to be set for this operation in this decision document. The guidance is clear at paragraph 1.5 that the growth duty does not legitimise non-compliance and its purpose is not to achieve or pursue economic growth at the expense of necessary protections.

We consider the requirements and standards we have set in this permit are reasonable and necessary to avoid a risk of an unacceptable level of pollution. This also promotes growth amongst legitimate operators because the standards applied to the operator are consistent across businesses in this sector and have been set to achieve the required legislative standards.

4 Overview of the site and installation

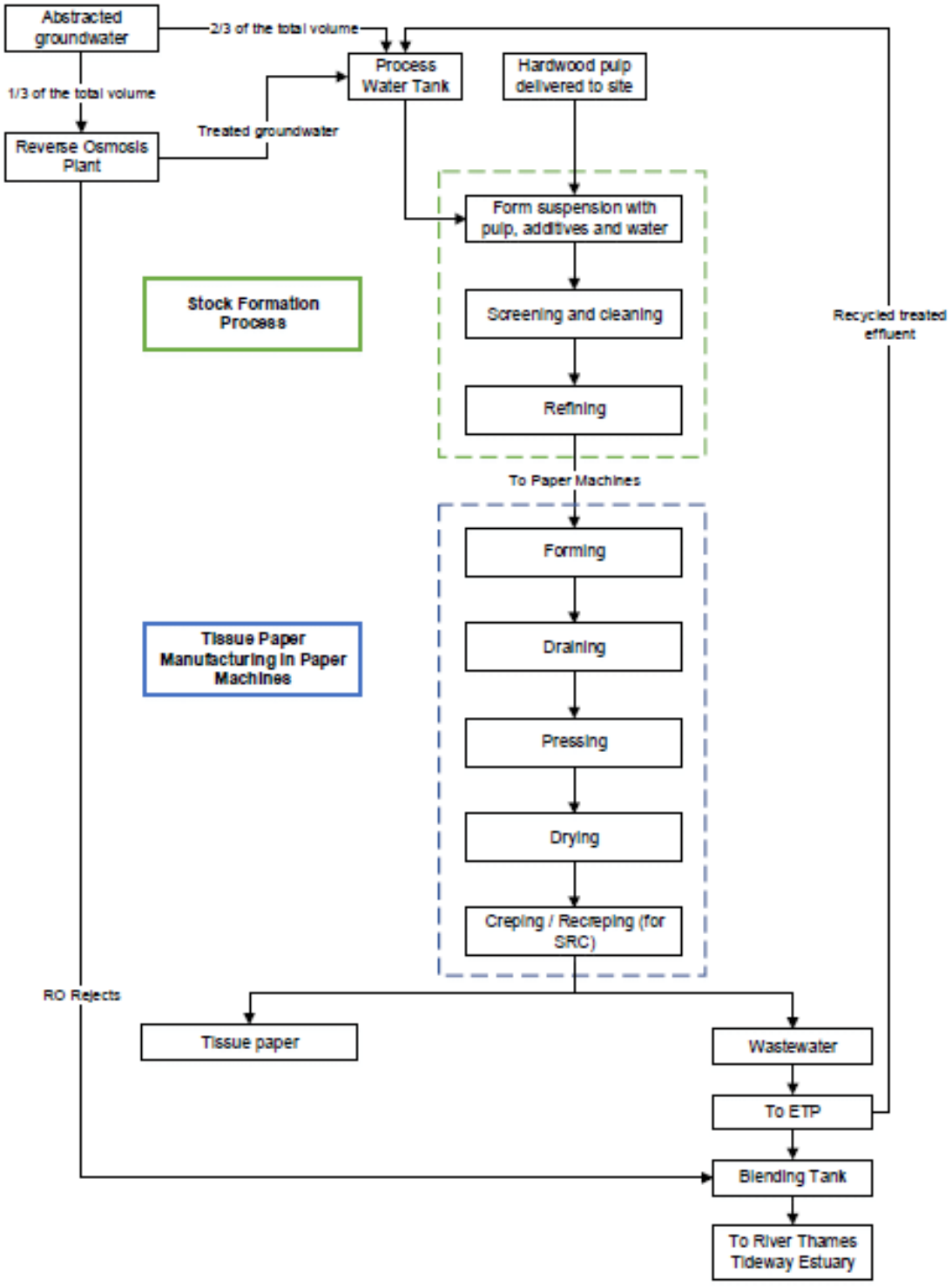
Kimberly-Clark Limited's Northfleet Paper Mill manufactures tissue products (toilet rolls) using three tissue machines. The site is defined as a non-integrated paper and board mill for the purposes of the determination of BAT. They are capable of producing up to 90,000 tonnes of tissue paper annually.

The manufacturing process currently operates across three lines: PM1, PM2 and TM3, each being a secondary re-crepe (SRC) machine. The tissue manufacturing process involves making an initial paper slurry of the virgin pulp with around 8,000 m^3/day of abstracted and recycled water and additives (primarily biocide and latex) of the required density. The slurry is then sprayed onto screens in the paper machines, and passed through machinery where it is pressed into large sheets before being wound onto rolls. The paper machines form the fibres into a web and remove most of the water to leave the tissue paper. Finally, the finished product is cut and packaged.

The site holds two groundwater abstraction licences to supply water for the manufacturing process, approximately a third of which is passed through a reverse osmosis (RO) plant to ensure the correct water quality for the process. There is an effluent treatment plant (ETP) for treating process water from the manufacturing process. Approximately a quarter of the treated effluent is recycled back into the manufacturing process, with the remainder being combined with the reject water from the RO plant prior to discharge to the River Thames.

During the paper and pulp sector review in 2016, the operator indicated that they were not fully compliant with the BAT-AELs but that they intended to be so by the compliance deadline of 30/09/2018. They intended to achieve this principally through reduction in wastewater flows, along with work on alternatives to the latex and biocide used in the process. An improvement condition was included to ensure this was kept under review with six-monthly progress reports. There was no reference to closure of paper machines at that time.

The operator now proposes closure of PM1 and PM2, and upgrade of TM3, which would enable them to reduce the amount of fresh water abstraction and effluent discharge, whilst improving recycling of the process water via removal of latex polymer use at site. This in turn would reduce the total nitrogen discharge per tonne of product manufactured, and enable them to comply with the required BAT-AEL for nitrogen. However, to ensure continued operation of the facility, whilst maintaining the site output and requisite customer requirements for quality, a staged approach to these operational changes is required. As a consequence, a time-limited derogation from the BAT-AEL for total nitrogen discharge will be required until these changes are incorporated in the site operations.


Abstracted groundwater
2/3 of the total volume
1/3 of the total volume
Process Water Tank
Hardwood pulp delivered to site
Reverse Osmosis Plant
Treated groundwater
Form suspension with pulp, additives and water
Screening and cleaning
Refining
Stock Formation Process
Recycled treated effluent
To Paper Machines
Forming
Draining
Pressing
Drying
Creping / Recreping (for SRC)
Tissue Paper Manufacturing in Paper Machines
RO Rejects
Tissue paper
Wastewater
To ETP
Blending Tank
To River Thames Tideway Estuary

5 Key Issues

The key issues for the determination of this application are set out in Annex 1 under the following sections:

6) Options
7) Costs and benefits consideration
8) Environmental consequences of allowing a derogation and other considerations
9) Summary of the predicted impact of derogating from the BAT-AEL on any long term or short term Environmental Quality Standards / Environmental Assessment Levels.
10) Other potential environmental impacts.
11) Permit conditions

Annex 1: Review and assessment of derogation request made by the operator in relation to BAT Conclusions which include an associated emission level (AEL) value.

1) Article 15(4)

The IED enables a competent authority to allow derogations from BAT AELs stated in BAT Conclusions under specific circumstances as detailed under Article 15(4):

By way of derogation from paragraph 3, and without prejudice to Article 18, the competent authority may, in specific cases, set less strict emission limit values. Such a derogation may apply only where an assessment shows that the achievement of emission levels associated with the best available techniques as described in BAT conclusions would lead to disproportionately higher costs compared to the environmental benefits due to:
(a) the geographical location or the local environmental conditions of the installation concerned; or
(b) the technical characteristics of the installation concerned.

Where a derogation is to be granted, the decision and the reasons for granting a derogation and justification for the conditions imposed must be clearly stated. This information must also be included in an Annex to the permit itself, as required by IED Article 15(4).

2) Cost Benefit Analysis

If a derogation is applicable under Article 15(4) of the IED, then Cost Benefit Analysis (CBA) is undertaken. The CBA allows calculation to indicate whether the costs of compliance are greater or less than the environmental benefits.

It essentially groups all the costs on one side, with all the benefits, as far as possible, on the other side. It then includes the effect of time on the value of those costs and benefits in order to produce a Net Present Value (NPV).

This gives an indication of whether those costs are disproportionate or not, but there are many sensitivities in the analysis and many aspects of the environment that cannot yet be monetised so the actual decision on disproportionality rests with the Environment Agency.

Where the NPV is positive, this indicates that the cost of compliance with the BAT AEL(s) does not outweigh the environmental benefits.

Where the NPV is negative, this indicates that the costs of compliance with the BAT AEL(s) outweigh the environmental benefits.

3) Derogation request

The operator has requested a derogation from compliance with the AEL value included in BAT Conclusion 50, Table 20 as detailed below.

Table 20

BAT-associated emission levels for the direct waste water discharge to receiving waters from a non-integrated paper and board mill (excluding speciality paper)

Parameter	Yearly average kg/t
Chemical oxygen demand (COD)	0,15 – 1,5 (1)
Total suspended solids (TSS)	0,02 – 0,35
Total nitrogen	0,01 – 0,1 0,01 – 0,15 for tissue paper
Total phosphorus	0,003 – 0,012
Adsorbable organically bound halogens (AOX)	0,05 for decor and wet strength paper

(1) For graphic paper mills, the upper end of the range refers to mills manufacturing paper that use starch for the coating process.

The operator has proposed the following mass emission limit until 31/12/2021, based upon their existing emissions:

- Total nitrogen 0.23 kg/t

The basis for the request is due to the technical characteristics of the installation.

On review and assessment of this information we have decided to grant the derogation requested by the operator in respect to the AEL value described in BAT Conclusion 50, Table 20, but have included another ELV in the variation that will ensure suitable protection of the environment.

The way in which we have considered, assessed and determined the derogation request is detailed in the sections below.

4) Description of BAT

The BAT-AELs relevant to this derogation application are found in Table 20 under BAT 50. The requirement of BAT 50 is:

In order to prevent and reduce the pollution load of waste water into receiving waters from the whole mill, BAT is to use a suitable combination of the techniques specified in BAT 13, BAT 14, BAT 15, BAT 47, BAT 48 and BAT 49.

In summary, the techniques specified for the BAT listed under BAT 50 are:

- BAT 13 – reduce nutrient emissions into receiving waters by substituting chemical additives for those with low nitrogen and phosphorus contents.
- BAT 14 – reduce emissions of pollutants into receiving waters by using primary treatment and secondary treatment.

- BAT 15 - when further removal of organic substances, nitrogen or phosphorus is needed, BAT is to use tertiary treatment.
- BAT 47 – reduce the generation of waste water using a combination of suitable techniques.
- BAT 48 - reduce fresh water use and emissions to water using a combination of suitable techniques.
- BAT 49 - reduce emission loads which can disturb the biological waste water treatment plant using suitable techniques.

The 2016 permit review variation was issued on the basis that all BAT conclusions and BAT-AELs would be met by 30/09/2018 and improvement conditions were included to ensure this. In working through these, the operator has established that they cannot make the required reduction to total nitrogen through simple changes to wastewater flows or alternatives to the latex or biocide used. The operator now proposes closure of lines PM1 and PM2, and upgrade of TM3, which would enable them to reduce the amount of fresh water abstracted and effluent discharged, whilst improving recycling of the process water via removal of latex polymer use at site. They need more time to carry this out, so have requested a time-limited derogation until 31/12/2021.

With their derogation application already in progress, the operator did in fact comply with the BAT-AEL for total nitrogen in 2019, achieving 0.14 kg/t. This was due to extended periods of colder weather, which allowed more water to be recycled at a temperature suitable for the paper making process. Relatively small changes to ambient temperatures could potentially reduce the options for water re-use and cause a breach of the BAT-AEL, so a derogation is still required.

After 31/12/2021 the operator asserts that this approach will achieve compliance with the BAT-AELs. Therefore, the time-limited derogation will not extend beyond the next BREF cycle, which is preferable as the next sector review may tighten the requirements further.

5) Derogation criteria - technical characteristics

The derogation is sought in relation to technical constraints at the installation, namely:

- configuration of the plant on a given site, making it more technically difficult and costly to comply – due to the use of latex in the process, which limits the opportunity to recycle treated effluent into the process.
- the intended remaining operational lifetime of the installation as a whole or of the part of it giving rise to the emission of the pollutant(s), where the operator is prepared to commit to a timetable for closure - paper machines PM1 and PM2 are aging assets and TM3 requires upgrading.
- the effect of reducing the excess emission(s) upon other pollutant emissions, energy efficiency, water use or waste arisings from the installation as a whole – a combination of plant changes are required to

achieve the BAT-AEL through a reduction in both water usage and effluent volume.

In addition, the local environmental conditions are a valid secondary criteria due to the nitrogen concentrations in the borehole feedwater accounting for around 74% of the total nitrogen input to the facility.

We consider that the derogation criteria are met on the grounds of technical characteristics and that the configuration of the plant (requiring the use of latex) is the key criteria. The operator's current secondary re-crepe technology requires the use of latex in the process, which limits the opportunity to recycle treated effluent. The water temperature is critical to the use of latex in the process and prevents the recycling of higher temperature effluent back into the manufacturing process. This maintains the high usage of fresh borehole water with its associated total nitrogen content accounting for around 74% of the input to the facility.

The use of latex is necessary to achieve the softness of their product and there is only one other paper machine in Europe that uses this method. The operator has spent eight years investigating the replacement/reduction of latex in the process but the alternative approaches have not achieved the required results in their manufacturing process. They now propose to move away from latex chemistry completely and in doing so reduce water use significantly. This will also require closure/upgrade of the paper machines to achieve compliance with the BAT-AEL.

6) Options

The operator has presented options that combine various techniques specified in the BAT conclusions. None meet the BAT-AELs by 30/09/2018, so the timescales for completion depend on the different works proposed. To avoid shutting down the mill, the operator would have to tanker a proportion of the effluent off-site to comply with the BAT-AELs by the deadline. This is not a method mentioned in the BAT conclusions but has been considered in the assessment as a means of avoiding a derogation.

In total, the operator considered eleven options to achieve the BAT-AEL:

Review of all possible techniques to achieve BAT AEL	
Type of techniques considered	**Technique description**
Water reduction and recycling opportunities	• **Cease operating aged paper machines PM1 and PM2 and upgrade paper machine TM3 – preferred option** • Replacement of latex polymer • Cooling treated effluent for recycling
Nitrate-rich effluent off-site disposal	• Disposal of reverse osmosis reject water to sewer • Off-site disposal of reverse osmosis reject water via road tanker

Review of all possible techniques to achieve BAT AEL	
Type of techniques considered	**Technique description**
Improvement to the existing effluent treatment plant for nitrogen removal	• Use of additional organic carbon energy source to improve nitrogen removal (e.g. molasses)
Reducing total nitrogen in the site feedwater	• Alternative feed water options (e.g. use of mains water supply) • Removal of nitrate from site feedwater (e.g. by ion exchange, reverse osmosis, biological denitrification or electrodialysis) • Increase in size of existing reverse osmosis plant
Replacement of biocide	• Substitution with alternative biocide with a lower nitrogen content • UV filtration

The application reviews each option and provides justification for those not considered further. The remaining four options, which have been taken forward to the CBA in addition to 'business as usual', are:

Option name	**Short description of the option**	**Timescales for completion**	**Details**
Business As Usual (BAU)	Current Operations – the baseline	N/A	This option demonstrates the existing operation of the installation and would be applicable if the installation operations were to continue without any changes being made. It cannot meet the BAT-AEL.
Proposed derogation	Upgrade Paper Machine TM3 with subsequent closure of PM1 and PM2	01/01/2022	This would mean that the overall water use will reduce whilst at the same time more water can be recycled due to the removal of the use of latex in the process. This option also achieves other improvements in the site's environmental performance (such as meeting the waste water flow associated with BAT 5) and is considered to represent the most holistic approach to the implementation of BAT at the installation.

BAT-AEL	Off-site disposal of part of the RO reject water (tankering)	2019	The reject wastewater stream from the existing RO plant is the largest contributor towards the total nitrogen discharge from the site, therefore if part of this effluent stream (around 275 m^3/day requiring 14 road tankers per day) is taken offsite for treatment and/or disposal, the total nitrogen levels in the site discharges could reduce sufficiently to comply with the BAT-AEL.
ETP upgrade	Improvements to the existing ETP for nitrogen removal from the waste water	2021	This option considers the improvement of the operation of the pre-anoxic zone of the existing ETP to provide effective denitrification of the combined process effluent and RO plant reject water so as to achieve compliance with the BAT-AEL for total nitrogen in the effluent. This option will require the addition of molasses (as an additional biodegradable carbon source) to the pre-anoxic zone of the existing ETP to provide an additional food source to the de-nitrification biomass. There would be no reduction in water usage with this option.
Cooling treated effluent	Cooling treated effluent for recycling	2021	The ability to recycle water is affected by the need to use latex in the process, which dictates the temperature of water that can be recycled (<30°C) and therefore its recyclability. This option therefore considers the feasibility of utilising existing redundant cooling towers to cool the treated effluent to allow greater water recycle within the existing tissue machines.

BAT 50 requires that a 'suitable combination' of techniques are employed in order to prevent and reduce the pollution load of waste water into receiving waters from the whole mill. We are satisfied that the operator's preferred option (proposed derogation), best meets this requirement through water use minimisation and recycling of water.

The operator has referred to the BAT Conclusions and addressed all reasonable options for achieving the BAT-AELs.

We have challenged the operator regarding their timescales for compliance with the BAT-AEL in light of any potential delays due to the impacts from the COVID-19 pandemic and they have confirmed that the project will still deliver by 01/01/2022.

7) Costs and benefits consideration

We have reviewed the Cost Benefit Analysis (CBA) and consider it to support the derogation request. Section 2 above explains the principles of CBA and the key points from the CBA results are summarised below.

The CBA considers the four options in the table above. The operator has included upfront investment costs, which are consistent with the cost breakdowns given in the supporting information for the application. These are drawn from quotations received plus in-house estimations and we are satisfied with the figures. There are also operating costs as relevant to each option.

Within the CBA, the net present value (NPV) for the proposed derogation is set as zero and the analyses look at whether the environmental benefits of meeting the BAT-AELs (or other options) are higher than the costs of doing so in comparison to the proposed derogation. If the benefits outweighed the costs for any of the other options, the NPVs would be positive values. The summary results are:

Summary of NPV analysis				
Option	**Proposed derogation**	**BAT AEL**	**ETP Upgrade**	**Cooling treated effluent**
Central (£millions)	0.00	-203.26	-178.03	-179.75
Sensitivity analysis				
Lowest NPV – high energy price **(£millions)**	0.00	-217.96	-192.70	-194.61
Highest NPV – low energy price **(£millions)**	0.00	-190.20	-165.00	-166.52
Scenario analysis				
Lowest NPV – High costs, Low benefits **(£millions)**	0.00	-188.41	-163.52	-165.01
Highest NPV – Low costs, high benefits **(£millions)**	0.00	-228.47	-202.90	-204.99

The NPV is negative for all options, including under the sensitivity and scenario analyses. This means that in comparison with the proposed derogation, the cost of compliance with the BAT-AELs (additional cost of around £203 million as NPV) is disproportionate compared to the

environmental benefit achieved, as are the costs of the other options considered.

We have explored a number of variations in the inputs to the CBA tool by running sensitivity analyses. These have looked at the costs and benefits of factors associated with each of the options, including upfront investment costs, energy, labour, maintenance, consumables, operating costs and environmental damage costs. Under all scenarios, the cost of compliance remains disproportionate compared to the environmental benefit achieved due to the extreme costs associated with tankering of the effluent and the high operational savings achievable under the proposed derogation.

The most extreme scenario considers whether the project to close lines PM1 and PM2 and upgrade TM3 would have happened anyway, without being driven by the need to meet the BAT-AELs. This would mean that the costs associated with the project would be common to any of the proposed options, so should not be included in the CBA tool as a cost for the proposed derogation. Additionally, the savings on energy, labour, maintenance and consumable/operating costs would be achieved for all options from 2022. The following table shows that all NPVs remain negative in comparison to the proposed derogation.

Summary of NPV analysis				
Option	**Proposed derogation**	**BAT AEL**	**ETP Upgrade**	**Cooling treated effluent**
Central (£millions)	0.00	-5.32	-0.56	-1.07

Although the exact figures for the NPVs may change under various different scenarios, the overall conclusion will not. The outcome of the CBA supports the choice of the proposed derogation project to upgrade TM3 and close PM1 & PM2 under the proposed time-limited derogation.

8) Environmental consequences of allowing a derogation and other considerations

The BAT-AELs are yearly average limits for the kg of pollutant per tonne of product produced (kg/t). The annual emissions of total nitrogen from the activity are currently 0.23 kg/t and these would reduce to 0.15 kg/t if the BAT AEL was met in accordance with the timeline set by the IED. The operator's proposal will mean that the current emission rate could continue until the BAT-AEL is met from 01/01/2022. At a paper production of 57,196 tonnes per year, this amounts to an additional 4.49 tonnes per year of total nitrogen being discharged above the BAT-AEL. This did not occur in 2019 as the operator did in fact comply with the BAT-AEL for total nitrogen, achieving 0.14 kg/t. This was due to extended periods of colder weather, which allowed more water to be recycled at a temperature suitable for the paper making process. For the first six months of 2020 inclusive, the operator has achieved an

average of 0.072 kg/t. However, this had reached 0.14 kg/t for the month of June and may increase further or remain at this higher level until at least October, when the ambient air temperature tends to reduce again.

The following table summarises the flows and loads of the discharge and uses these along with production tonnages to calculate figures for the total nitrogen and waste water per tonne of product.

- The BAT-AEL for total nitrogen has a yearly average limit of 0.01 - 0.15 kg/tonne for tissue paper.
- The BAT associated waste water flow as a yearly average is 3.5 to 20 m^3/tonne of product.

Summary of predicted outputs					
Parameter	**BAU**	**Proposed derogation**	**BAT AEL**	**ETP Upgrade**	**Cooling treated effluent**
Nitrogen load of discharge (kgN/day)	35.8	16.1	23.3	23.3	23.5
Discharge flow (m^3/day)	6,288	1,976	6,013	6,288	4,112
Total N BAT-AEL (kg/t)	0.23	0.15	0.15	0.15	0.15
Waste water per tonne of product (m^3/tonne)	40.1	18.0	38.4	40.1	26.2
Total N (mg/l)	5.7	8.1	3.9	3.7	5.7

It can be seen from the table above that the proposed derogation is the only option that meets both the BAT-AEL for total nitrogen and the BAT associated waste water flow. This is due to a reduction in waste water flow resulting from an increase in water recycling. This results in an increase in the concentration of total nitrogen (mg/l) in the effluent, which has been used in the modelling to assess the environmental impacts of the discharge.

The first stage of assessment used a simple mass balance model, Monte Carlo, to review the impact of the different options under one-directional flow conditions. Due to the considerable dilution in the River Thames, the model does not predict any difference between the upstream quality and the downstream quality. None of the options are predicted to cause deterioration of the water quality, including maintaining BAU.

In order to investigate the impact in further detail, a more complex model, CORMIX, has been used to assess dispersion rates under different tidal conditions. This model estimates the distance required for the plume from a discharge at 50 mg/l nitrate to dilute to an excess concentration below 1 mg/l of nitrate in comparison to different background concentration scenarios. The plume is found to typically extend up to 30 metres from the outfall, increasing to a maximum of 100 metres from the outfall for a limited time at slack waters.

The plume is rapidly dispersed by the River Thames on the turning tide. For reference, the width of the river at the discharge location is around 500 metres.

We have reviewed both modelling exercises and are satisfied that they present conservative assessments to reach a conclusion of 'no deterioration' that we are in agreement with. Although the concentration of total nitrogen (mg/l) in the effluent will increase, this is off-set by the significant reduction in waste water flow, resulting in a reduction in the load of total nitrogen discharged.

9) Summary of the predicted impact of derogating from the BAT-AEL on any long term or short term Environmental Quality Standards / Environmental Assessment Levels.

The predicted impact of derogating from the BAT-AEL on any long term or short term Environmental Quality Standards (EQS) / Environmental Assessment Levels (EAL) is insignificant. Under the Water Framework Directive (WFD), the Thames Middle transitional water body meets moderate status, with the potential to achieve good status by 2027. The discharge is longstanding and a delay in meeting the BAT-AEL until 2022 will not hinder the achievement of this objective. Indeed, once the project to upgrade Paper Machine TM3 along with closure of PM1 and PM2 is complete, there will be a significant reduction in the load of total nitrogen in the paper mill's discharge to the River Thames.

10) Other potential environmental impacts.

The nearest Special Protection Area (SPA) and Ramsar site to the outfall is the Thames Estuary & Marshes at a distance of over 5 km downstream. This wetland comprises intertidal habitats, marshes and lagoons that provide wintering and breeding habitats for wetland bird species. Due to there being no substantial change to the emissions from Northfleet paper mill we do not consider the SPA/Ramsar to be relevant for assessment. There are no Special Areas of Conservation (SAC), Marine Conservation Zones, Sites of Special Scientific Interest (SSSI), Protected Habitats or Local Wildlife Sites within the relevant screening distances of the outfall.

The River Thames is a migratory route for a number of migratory fish (Protected Species). We are satisfied that the conclusions of the modelling assessment confirm that there is no likely significant effect from the discharge on these migratory species.

As the modelling assessments show that all options have no significant impact on the River Thames it is important to ensure the choice of option considers the overall environmental impact from the installation.

The reduction in water usage under the proposed derogation is the most significant difference between the options and is the only outcome that meets the BAT associated waste water flow limit. It is also the only option that results

in a reduction in energy use, particularly in comparison to the cooling treated effluent option, which actually increases the site's energy consumption and is unlikely to be considered BAT. The ETP upgrade option increases the use of raw materials, as molasses is required to improve the denitrification. The BAT-AEL option (tankering) significantly increases the off-site disposal of waste and associated emissions and is not a sustainable solution.

We are satisfied that the proposed derogation option achieves the best overall environmental outcome.

11) Permit conditions

The permit includes a total nitrogen limit of 0.23 kg/t for the duration of the derogation, after which it will reduce to the BAT-AEL of 0.15 kg/t with a corresponding decrease in the maximum daily flow limit from 11,000 m^3/day to 5,000 m^3/day. We do not consider it necessary to introduce a concentration limit on total nitrogen, although the permit will continue to include the requirement for weekly monitoring of a 24-hour flow proportional sample.

The permit includes an improvement condition requiring the operator to monitor and report on progress with the works required for the proposed derogation option and achieving the BAT-AEL, as well as the BAT-associated waste water flow. The permit also includes an improvement condition for the operator to review their choice of biocide once the upgrades to TM3 are complete and it has been possible to increase the temperature of the water in use. This could potentially lead to even greater reductions in water usage and total nitrogen.

12) Conclusion

The derogation request meets the technical characteristic criteria of IED Article 15(4) with an appropriate range of options reviewed and taken forward for CBA. The operator has demonstrated that the costs of achieving the BAT-AEL by 30/09/2018 are disproportionate to the environmental benefits. This is mainly due to the high costs associated with tankering.

We are satisfied that the operator has demonstrated that the proposed derogation option achieves the best overall environmental outcome and we have no concerns regarding the ongoing BAU impact on the River Thames for the duration of the time-limited derogation. It is important that both the pollutant concentration and the discharge flow are considered in order to achieve compliance with the annual load based limit, as well as other BAT relevant to the site. The BAT-AEL for total nitrogen will be achieved, albeit at a later date than required by the BREF, with no significant impact on the environment. In addition, the waste water flow will also reduce to meet the BAT associated range. Allowing the proposed derogation would not cause any significant pollution or prevent a high level of protection of the environment as a whole to be achieved.

Annex 2: Improvement Conditions

Based on our assessment of the proposals in the derogation application, we consider that we need to set improvement conditions so that the desired outcomes are achieved by the installation. These additional improvement conditions are set out below - justification for them is provided at the relevant section of the decision document (Section 11 of Annex 1).

In addition, we have set new deadlines for IC3 and IC4 because we have not finalised the outcomes of these conditions with the operator and still consider the requirements to be of relevance.

If the consolidated permit contains existing improvement conditions that are not yet complete or the opportunity has been taken to delete completed improvement conditions then the numbering in the table below will not be consecutive as these are only the improvement conditions arising from this permit variation.

Ref	Improvement Condition	Date
IC5	<u>BAT Conclusion 50, Table 20</u> The operator shall submit, for approval by the Environment Agency, reports setting out progress to achieving the BAT Conclusion AEL where a derogation has been applied for and granted. The reports shall include, but not necessarily be limited to, the following: 1) Current performance against the BAT Conclusion AEL (including all effluent treatment plant monitoring data from the last year to date). 2) Methodology for reaching the AELs. 3) Associated targets/timelines for reaching compliance by 31/12/2021 for emissions from the effluent treatment plant. 4) Any alterations to the initial plan.	Progress reports by: 31/03/2021 30/09/2021
IC6	<u>BAT Conclusion 5</u> The operator shall submit, for approval by the Environment Agency, reports setting out progress to achieving the BAT-associated waste water flow for a non-integrated paper mill. The reports shall include, but not necessarily be limited to, the following: 1) Current performance against the BAT-associated waste water flow. 2) Methodology for reaching the BAT-associated waste water flow. 3) Associated targets/timelines for reaching compliance by 31/12/2021. 4) Any alterations to the initial plan.	Progress reports by: 31/03/2021 30/09/2021

Ref	Improvement Condition	Date
IC7	The operator shall undertake a review of total nitrogen emissions from the effluent treatment plant (ETP) against the standard set in Table S3.3 of this permit, following completion of improvements to achieve the BAT-AEL. The operator's review shall investigate measures for the further reduction of total nitrogen emissions to the River Thames (both in terms of effluent quality and volume reduction), including a reduction/substitution of the biocide used in the production process. A report on the review including timescales for any proposed changes shall be submitted to the Environment Agency for approval, along with ETP monitoring data from the last two years to date.	31/03/2024

Annex 3: Consultation on the draft decision

This section reports on the outcome of the public consultation on our draft decision carried out between 06/10/2020 and 03/11/2020.

The draft decision record and associated draft consolidated variation notice were published and made available to view on gov.uk website between the dates detailed above. We also sent the consultation to the local authority and the Health and Safety Executive.

Summary of responses to consultation and the way in which we have taken these into account in the determination process:

Response received from
Gravesham Borough Council
Brief summary of issues raised
Confirmed no comments
Summary of actions taken or show how this has been covered
None required

No other responses were received.