

Permitting decisions

Variation

We have decided to grant the variation for Crossways Farm operated by M. Gaze & Co. Limited

The variation number is EPR/FP3332MF/V006.

We consider in reaching that decision we have taken into account all relevant considerations and legal requirements and that the permit will ensure that the appropriate level of environmental protection is provided.

Purpose of this document

This decision document provides a record of the decision making process. It summarises the decision making process in the decision checklist to show how all relevant factors have been taken in to account.

This decision document provides a record of the decision making process. It:

- highlights key issues in the determination
- summarises the decision making process in the decision checklist to show how all relevant factors have been taken into account
- shows how we have considered the consultation responses

Unless the decision document specifies otherwise we have accepted the applicant's proposals.

Read the permitting decisions in conjunction with the environmental permit and the variation notice. The introductory note summarises what the variation covers.

Description of the changes introduced by the Variation

This is a Substantial Variation.

Previous variation reference EPR/FP3332MF/V004 (Varied on the 22nd December 2010) added a discharge point for treated effluent from the Reverse Osmosis (RO) Treatment Plant (acting as a Tertiary Treatment Polishing stage) to surface water at an unnamed ditch (location reference W3, NGR TM424964). In order to ensure adequate dilution and dispersal of the discharge within the water course, the discharge point can only be used when the ditch to which it discharges is in flow, therefore it cannot be used during the summer months or during periods of dry weather which limits operations on site during these times.

This application seeks to vary the permit to allow an additional discharge point for treated effluent to surface water (emission point reference W4, at NGR TM 41429779) at the River Beck, to the north of the current permit boundary. This watercourse has been identified because it remains in flow during the summer and drier months and therefore offers greater flexibility for discharge of RO waters.

A discharge will run from the existing effluent treatment works to emission point W4, at The Beck. The pipeline will run underground and will pass northwards from Crossways Farm towards Thurlton. It will then pass under Loddon Road and Beccles Road before passing through agricultural land, diagonally across the first field and along the field boundary of the second field. The pipeline then enters an area of semi-improved grassland and woodland at its northern end, before reaching the proposed discharge point (emission point reference W4) into The Beck at Ordnance Survey National Grid Reference TM 41429779.

The RO concentrate and backwash water (as well as the Ultra-Filtration, backwash water) is removed off site via tanker (approx. 100 m³/day) for treatment by Alpheus (part of Anglian Water) under a waste service contract.

Existing discharge point W3 will be retained following the variation so that it can still be used when there is sufficient flow in the ditch.

The installation boundary has been increased to take into account the new pipeline.

Key issues of the decision

The permit authorises the reception and storage of a range of hazardous and non-hazardous wastes, including oil, the biological and physico-chemical treatment of non-hazardous wastes as activities listed under Schedule 1 of the Environmental Permitting Regulation and directly associated activities (DAA), including the existing discharge of treated effluent to surface water.

As a technology, RO is well established in wastewater treatment applications. The process exploits the natural phenomenon of osmosis where by, if two aqueous solutions, with different degree of concentration, are separated by a semi-permeable membrane, water from the weakest solution will pass through the membrane to dilute the higher concentration solution on the other side. The process will continue until solutions on both side of the membrane display the same degree of concentration. The RO plant at this facility is operating as a tertiary treatment stage prior to discharging permeate to controlled waters.

With reverse osmosis the process is reversed. Pressure is applied to a water solution, against a semi permeable membrane forcing the water molecules to pass through the membrane, thus forming the clean “permeate”. The majority of the solutes or contaminants will be left behind forming the “concentrate”. Permeate is normally suitably clean enough to be directly discharged to surface water without any further treatment. Most commercially available plants are constructed as two stage plants with contaminant removal rates better than 99.6%.

Impact on Surface Water

Audit of Data Used For Screening

The applicant has routinely monitored the chemical composition of the wastewater contained within their Effluent Treatment Plant (ETP). The data set retained at the site and used in this assessment specifically comprises data for priority hazardous substances, priority substances and sanitary determinands “other pollutants”. The data used in the modelling was for the final discharge, i.e. the RO_permeate (?), and was collected between October 2014 – December 2016.

Following discussions with the EA concerning the proposed discharge from M Gaze at W4, the discharge into the River Beck, the EA requested that the RO discharge waters were additionally assessed using the relevant EQS for an estuarine/coastal water discharge, the methodology of the assessment to be in line with that used for a discharge to a freshwater riverine aquatic environment. This request was made as downstream of W4 the River Beck flows through a complex series of drainage ditches, with some of the water eventually flowing into the Tidal Yare within 4 km of the discharge point.

12 additional background qualitative samples were taken for analysis in 2017 on the water quality in the River Beck upstream of the proposed W4 discharge point. However where River Beck quality data is not available for substances that required to be assessed, in accordance with our guidance each substance should be assumed to be 10 percent of the EQS in “clean” watercourses or 50 percent of the EQS in more polluted watercourses. For the purposes of this assessment and in the absence of any knowledge of the relevant upstream inputs/discharges, the operator assumed that background concentrations were 50% of the relevant EQS, ensuring that the assessment remained conservative.

Limits of Detection

Where samples for a determinands were less than the LOD, the operator has adjusted the face value to half the lowest recorded LOD. For other determinands where LODs were significantly higher than other LODs, this data was removed from the dataset to avoid skewing the summary statistics. This was explained in the applicant's response to the Schedule 5 request for further information notice dated 2nd August 2017. Although this does not strictly follow our rules for screening we are comfortable with the removal of these high values from the dataset as there is sufficient data remaining in the majority of cases and/or removal does not affect the outcome of the assessment.

Removal of Outliers values

The operator also removed high values for determinands which they identified as outlier values (other than BOD and Ammonia). We don't usually agree with the removal of all these values from the dataset without further justification, but inclusion of the purported outlier values in the dataset will unlikely affect the outcome. Where I have said "unlikely to affect outcome" I have not re-run the data, but I am confident the outcome will not be affected. Where I was unsure, I have re-run the assessment.

Hardness

Several of the EQS values used in the EA modelling are dependent upon the hardness of the receiving surface water, i.e. the River Beck. Water hardness analysis was undertaken on samples from the River Beck in close proximity to the proposed discharge point, W4. The average water hardness (as CaCO₃) was found to be 608mg/L.

The following water hardness classes and EQS's were used in the H1 assessment:

- Cadmium: >200 mg CaCO₃/L= AA-EQS of 0.25 µg/L & MAC-EQS of 1.5 µg/L;
- Fluoride: >50 mg CaCO₃/L= AA-EQS of 5000 µg/L & MAC-EQS of 15000 µg/L; and
- Vanadium: >200 mg CaCO₃/L= AA-EQS of 60 µg/L.

Liabile to contain

M Gaze receive a wide range of solid and liquid wastes for treatment. They have analysed for over 90 determinands on a precautionary principle of what could be in the influent to the WWTP based on EA guidance on PHS, PS, specific pollutants and other pollutants.

- There were only 1 or 2 samples results for 29 of the organic determinands. This number of results is not enough to undertake a quantitative assessment. All results were less than the LOD which, for the majority of the determinands, was < EQS and therefore supports the conclusion that these substances were not present in the discharge at harmful concentrations. However, the LOD was significantly above the EQS for the 6 determinands listed below so no such conclusion can be drawn based on this data. However, given their large molecular size, these substances should not pass into the RO permeate unless there is a process failure.
 - Coumaphos
 - Dichlorvos
 - Flucofuron
 - Nonylphenol
 - Propetamphos
 - Triazophos
- Substances with more than 12 sample results where all results are less than an appropriate LOD did not need to be run through screening and can be assessed as not liable to be contained. There are 19 such substances. The operator has run these substances through screening anyway and all these have been screened out as insignificant by passing at test 1 except for the summated detection of cyclodiene pesticides (aldrin/dieldrin/endrin and isodrin)

1,1,1-Trichloroethane

1,2-Dichloroethane

Aldrin

Anthracene

Atrazine

Benzo(b)fluoranthene

Benzo(k)fluoranthene

Chlorothalonil

Chlorpyriphos Ethyl

Diazinon

Endrin

Fenitrothion

Hexachlorobenzene
Hexachlorobutadiene
Isodrin
Linuron
Pendimethalin
Pentachlorophenol
Trifluralin

H1 Screening Results

A H1 screening assessment and river needs modelling for ammonia and BOD (Monte Carlo Assessment) in accordance with WFD 'No deterioration principals' was submitted by the applicant regarding the effect of the proposed RO plant permeate discharge on the aquatic environment at the new proposed discharge location. The applicant concluded that the effect of the discharge was unlikely to cause significant impact on receiving waters.

There was a mismatch of input data for some determinands in the submitted H1 tool and the SLR report revision 4, the H1 tool appeared to be an older version than that referenced in the report. However we have checked the input data in the report (and tool as necessary) and agree, unless specifically referenced below under separate headings that:

- Input data on river and effluent flows is appropriate. (EA Q95 and mean flow estimates are 0.0023 and 0.0104 m³/s).
- Substances screened out in Test 1 can be viewed as insignificant. (There were no further substances screened out in Test 2).
- Upstream quality data is appropriate for screening Tests 3 and 4 except for those identified in section 5.4.5.
- Substances screened out in Test 3 and Test 4 can be viewed as insignificant
- Significant load conclusions are appropriate
- The use of both freshwater and marine EQS for screening ensures any substances that may impact on the tidal reaches of the downstream receiving waters due to a reduction in EQS are also flagged

Of the 22 substances identified as not screened out by test 3 & 4, ten substances have recorded values of less than the LOD where the LOD is >10% EQS. 6 of these substances have only 1 or 2 samples and are discussed above under liable to contain, the others are discussed under appropriateness of LOD. SLR observations in section 5.4.5 of their report concludes that if these substances continue to remain at <LOD there will be no environmental detriment. Any future analysis of these substances will need to match EA lab LOD or 10% or EQS

Therefore, further consideration of the data and modelling results was undertaken for the remaining substances, to determine whether any of the individual substances were likely to have a significant negative impact on the receiving River Beck.

Bioavailable Metals - Zinc, Copper, Lead and Nickel

Our screening methodology used the bioavailable EQS for these metals not the dissolved metal equivalent concentration calculated through the MBAT. We have undertaken check modelling and conclude, as the flows used in screening are conservative, given the effluent concentrations for Pb, Cu and Ni, and the use of the MBAT calculated dissolved metal equivalent concentration, to screen out these metals as insignificant is acceptable in this instance.

For Zinc, we have run MPER for the full dataset (including the results that SLR had identified as potential outliers) and can confirm that the concentration of Zn in the discharge has been assessed as not liable to cause pollution.

Boron

RQP modelling undertaken by the Agency shows that boron will deteriorate the Beck by marginally more than 10% of EQS (10.3%) but not cause a risk to EQS. If the deterioration falls below 10%, the discharge concentration is assessed as not liable to cause pollution and no emission limit is required. If we were to set emission limits to achieve no deterioration, the concentration limit we would set would be 2450 ug/l as a maximum.

SLR have proposed an ELV of 648 ug/l by reverse calculations of the screening tests. If the discharge concentration falls below this value, H1 screening tests would be passed and further assessment by modelling would not be required.

We have therefore included a limit of 2450ug/l within Table S4.2 of the Environmental Permit, this is proportionate and will ensure protection of the environment.

Cyanide

Complex cyanides can photo-degrade in the receiving water to release free cyanide but other than the first 2 results in the dataset, the concentration of total cyanide is relatively low. We agree if the waste streams have the potential for cyanide to be present that free cyanide is analysed for in the effluent to confirm presence or absence. We have set a limit of <LOD within Table S4.2 of the Environmental Permit, we are happy that the LOD in the dataset is of a similar magnitude to that achievable by the Environment Agency laboratory. This is proportionate and will ensure protection of the environment.

Chromium

RQP modelling shows that chromium will not deteriorate The Beck by more than 10% of EQS (2.9%) and will not cause a risk to EQS. The discharge concentration is assessed as not liable to cause pollution and no emission limit is required.

Demetons

There is no upstream monitoring for demetons (EQS – 0.5 ug/l) and only 2 samples of effluent in the sampling period, both recording concentrations of <LOD where the LOD was <EQS but >10%EQS. However, given the size of the molecule, we would not anticipate demetons passing into the RO permeate. The reverse calculations to obtain an ELV is not appropriate due to the limited data. RQP modelling using standard assumptions indicate

that the discharge will not deteriorate The Beck by more than 10% of EQS and not cause a risk to EQS using this limited data, however there are too few samples to be confident of this result. In the absence of other data a target maximum ELV equivalent to the EQS is acceptable to prevent significant deterioration in the receiving watercourse.

We have therefore incorporated an ELV of 0.5ug/l into Table 4.2. We consider this to be proportionate and protective of the environment.

Cyclodiene Pesticides (aldrin/dieldrin/endrin and isodrin)

Sampling shows that these summated determinands are absent from the RO permeate at <LOD the LOD in the dataset is confirmed to be of a similar magnitude to that achievable by Environment Agency laboratories. The agency has undertaken check modelling and agree with the applicants conclusion that the discharge is not liable to contain cyclodiene pesticides or liable to cause pollution. No emission limit is therefore required.

Ammoniacal Nitrogen

OI 50_12 and H1 Annex D2 provide advice on setting bespoke emission limits for sanitary parameters. Where it is feasible emission limits are set to achieve no more than a 10% deterioration of upstream water quality. Limits must not allow for a deterioration of current class. Pragmatic decisions can be made for tributaries that are not part of the WFD blue line network.

The ELV for ammonia proposed by SLR is very stringent (118 ug/l). Although there is no prescribed minimum ELV we impose, we tend not to impose limits below 1 mg/l even at large sewage works. Current WWTP performance (assuming outliers are incidents and genuine outliers) has a mean effluent quality of 0.668 mg/l and stdev of 0.892 mg/l. This equates to a 95%ile effluent quality of 2.11 mg/l. The current emission limit for the discharge W3 is 3 mg/l. The existing treatment plant is therefore capable of achieving the current maximum permitted concentration when it is performing correctly but not the limits proposed by SLR.

Although the current receiving watercourse at W3 is a different headwater to the proposed new discharge point W4, both watercourses are in the same waterbody and are expected to be of similar quality. The existing permit was set to achieve no deterioration in the watercourse at Haddiscoe which has a similar dilution to The Beck at Thurlton.

A discharge permitted at 3 mg/l maximum will cause more than a 10% deterioration of current water quality at W4 but will not cause an exceedence of good class boundary. A discharge a 3 mg/l should achieve high class boundary at Thurlton assuming no self-purification en-route. Norton Subcourse sewage works discharges to The Beck just downstream of Thurlton; it is permitted to discharge 170m³/day with an ammonia limit of 20 mg/l. There is no scheme to improve this works during AMP6 so the current impact of the works is not viewed to be unacceptable.

We conclude that the existing 3 mg/l limit is still appropriate at W4, which would allow the utilisation of both outlets. We consider this to be proportionate and protective of the environment. However the permit has been worded to ensure the maximum output of both outlets is a combined total, as this is what has been requested by the applicant and the pragmatic element of this decision has been made on this basis.

Phosphate

OI 50_12 and H1 Annex D2 provide advice on setting emission limits for phosphorus. Emission limits are set to achieve the class limit at the downstream WFD monitoring site. Consideration must also be given to any potential effects on protected areas and whether the discharge may provide a barrier on the pathway to good status.

The ELV for phosphate proposed by SLR is very stringent (73 ug/l). Although there is no prescribed minimum ELV we impose, we tend not to impose limits below 0.5 mg/l even at large sewage works although this is reducing to 0.1 mg/l. Current WWTP performance (including the one value of 0.6 mg/l that SLR had removed) has a mean effluent quality of 0.265 mg/l and stdev of 0.073 mg/l. This equates to a 95%ile effluent quality of 0.4 mg/l. The current emission limit for the discharge W3 is 1 mg/l. The existing treatment plant is therefore capable of achieving the current maximum permitted concentration when it is performing correctly.

A discharge at current effluent quality should not cause an exceedence of good class boundary at the point of discharge. A discharge a 1 mg/l should ensure good status at Thurlton assuming no self-purification en-route.

We conclude that the existing 1 mg/l limit is still appropriate at W4 and have incorporated this ELV into Table 4.2. We consider this to be proportionate and protective of the environment.

Conclusion

The Environment Agency agrees with the operator's conclusion that the discharge from the proposed RO process are not likely to cause pollution or breach any specified EQS described in the Environmental Quality Standards Directive (EQSD) (2008/105/EC) and for those substances covered by Annex 8 of the Water Framework Directive (WFD) (2000/60/EC) will not cause a deterioration to any WFD water in accordance with the WFD no deterioration principles and our operational guidance 50_12.

Decision checklist

Aspect considered	Decision
Receipt of application	
Confidential information	A claim for commercial or industrial confidentiality has not been made.
Identifying confidential information	We have not identified information provided as part of the application that we consider to be confidential.
Consultation/Engagement	
Consultation	<p>The consultation requirements were identified in accordance with the Environmental Permitting Regulations and our public participation statement and our working together agreements:</p> <ul style="list-style-type: none"> • Director of Public Health • Health and Safety Executive • Foods Standards Agency • Local Authority • Public Health England <p>The application was publicised on the GOV.UK website.</p> <p>The comments and our responses are summarised in the consultation section.</p>
The site	
Extent of the site of the facility	The operator has provided plan which we consider is satisfactory, showing the extent of the site of the facility. The plan is included in the permit.
Site condition report	The operator has provided a description of the condition of the site, which we consider is satisfactory. The decision was taken in accordance with our guidance on site condition reports and baseline reporting under the Industrial Emissions Directive.
Biodiversity, heritage, landscape and nature conservation	<p>The application is within the relevant distance criteria of a site of heritage, landscape or nature conservation, and/or protected species or habitat.</p> <p>The Broads (SAC) ~3808m</p> <p>Broadland (Ramsar) ~3807m</p> <p>Norton Villa (LWS) 1539m</p> <p>Devils End Meadows ~1862m</p> <p>Brundish Wood (Ancient Woodland)</p>

Aspect considered	Decision
	<p>There are no emissions to air, land or Groundwater, the only emissions are RO permeate waters to the aquatic environment. There are no sites of nature conservation, and/or protected species or habitat for emissions to controlled waters within 10km downstream screen from point of discharge.</p> <p>We have assessed the application and its potential to affect all known sites of nature conservation, landscape and heritage and/or protected species or habitats identified in the nature conservation screening report as part of the permitting process.</p> <p>We consider that the application will not affect any sites of nature conservation, landscape and heritage, and/or protected species or habitats identified.</p> <p>We have not consulted Natural England on the application. The decision was taken in accordance with our guidance.</p>
Environmental risk assessment	
Environmental risk	<p>We have reviewed the operator's assessment of the environmental risk from the facility.</p> <p>The assessment shows that, applying the conservative criteria in our guidance on Environmental Risk Assessment supplied by the operator and reviewed by ourselves all emissions may be categorised as environmentally insignificant with the exception of:- Bioavailable Metals - Zinc, Copper, Lead and Nickel, Boron, Cyanide, Demetons, Ammonia and Total Phosphate.</p> <p>The operator's risk assessment is satisfactory.</p> <p>Please see key decisions section.</p>
Operating techniques	
General operating techniques	<p>We have reviewed the techniques used by the operator and compared these with the relevant guidance notes and we consider them to represent appropriate techniques for the facility.</p> <p>The operating techniques that the applicant must use are specified in table S1.2 in the environmental permit.</p>
Operating techniques for emissions that do not screen out as insignificant	<p>Emissions of pollutants: Bioavailable Metals - Zinc, Copper, Lead and Nickel, Boron, Cyanide, Demetons, Ammonia and Total Phosphate cannot be screened out as insignificant. We have assessed whether the proposed techniques are BAT. Please refer to key issues section of this document.</p> <p>The proposed RO techniques are in line with the benchmark levels contained in the IPPC SGN S5.06 'Guidance for the recovery and disposal of hazardous and non-hazardous waste' and we consider them to represent appropriate techniques for the facility. The permit conditions ensure compliance with relevant BREF.</p>

Aspect considered	Decision
Permit conditions	
Conditions where the consent of another person is needed.	The relevant person(s) with interests in the land affected by the condition(s) have been notified as required by Schedule 5, Part 2 of the Environmental Permitting Regulations. They have commented upon our notifications and we have taken their comments into account. See the <u>Consultation section</u> on conditions where the consent of another person is required.
Emission limits	<p>ELVs have been added for the following substances.</p> <p>Ammonia 3 mg/l</p> <p>Total Phosphate 1 mg/l</p> <p>Boron 2450 ug/l</p> <p>Cyanide Free <LOD</p> <p>Demetons <LOD</p> <p>pH</p> <p>Oil</p> <p>It is considered that the numeric limits described above will prevent significant deterioration of receiving waters. We have imposed these limits because either a relevant environmental quality or operational standard requires this.</p> <p>Please see Key issues sections.</p>
Monitoring	<p>We have decided that monitoring should be added for the following parameters, using the methods detailed and to the frequencies specified:</p> <p>Ammonia, Total Phosphate, Boron, Cyanide Free, Demetons, pH and Oil</p> <p>These monitoring requirements have been imposed in order to ensure the aquatic environment is protected.</p> <p>We have stipulated that the effluent should be sampled at the point of discharge at least monthly where that discharge point is used in any calendar month. This is proportionate to the process and the risks involved.</p> <p>We are satisfied with the operator's proposal to use in-line water sampling equipment to automatically collect daily sub samples of the effluent from the discharge pipe. We are satisfied that the operator's techniques, personnel and equipment have either MCERTS certification or MCERTS accreditation as appropriate.</p> <p>To measure the effluent flow, the operator uses an Efcron Electromagnetic flow meter and Vacuum Wastewater Sampler to enable continuous inline monitoring and automated sampling of the discharge. The operator is required to demonstrate that this is MCERTS standard, in accordance with condition 3.6.3 of the permit, or agree with us otherwise.</p> <p>Similarly, when measuring flow in the watercourse (Discharge W3 and W4) the operator will need to demonstrate that this <u>is</u> done to MCERTS standard, in accordance with condition 3.6.3 of the permit, or agree with us otherwise.</p>

Aspect considered	Decision
	<p>Currently effluent is only permitted to be discharged at point W3 when there is a flow rate of at least 0.005m³/second in the ditch. This requirement has been additionally transposed to the new emission point W4 in the River beck. We consider this requirement to be proportionate and protective of the environment. The minimum flow requirement equates to a daily volume of 432m³ which will be sufficient to carry the effluent downstream, prevent percolation and provide suitable dilution.</p>
Reporting	<p>We have added reporting in the permit for the following parameters: Point W4 Emission point to River beck as OS grid reference TM41429779 Ammonia, Total Phosphate, Boron, Cyanide Free, Demetons, pH, Oil.</p>
Considerations of foul sewer	<p>We agree with the operator's justification for not connecting to foul sewer. The facility is in a location where it is not reasonable to connect to the foul sewer.</p>
Operator competence	
Management system	<p>There is no known reason to consider that the operator will not have the management system to enable it to comply with the permit conditions.</p>
Growth Duty	
Section 108 Deregulation Act 2015 – Growth duty	<p>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.</p> <p>Paragraph 1.3 of the guidance says:</p> <p>“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.”</p> <p>We have addressed the legislative requirements and environmental standards to be set for this operation in the body of the decision document above. 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.</p>

Aspect considered	Decision
	<p>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.</p>

Consultation

Conditions where the consent of another person is required

Summary of responses received on proposed conditions and the way in which we have been taken these into account in the determination process:

Response received from
Raveningham Estate on 23/03/17
Brief summary of issues raised
No issues raised, Landowner aware of the application
Summary of actions taken or show how this has been covered
No further action necessary