Environment Agency permitting decisions

Bespoke permit

We have decided to grant the permit for Wastewater Treatment Facility operated by Envirogen Water Technologies Limited

The permit number is EPR/TP3430EE

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.

Description of the main features of the Installation

This permit for the waste water treatment facility (WWTF) is part of the installation at the Citrus Grove Plant located in Kegworth, Leicestershire. The existing soft drink manufacturing plant is operated by Cott Beverages Limited under permit EPR/MP3735SN. The WWTF and the soft drink manufacturing plant will form a multi operator installation.

The process water and wash-down water from the Citrus Grove Plant will be treated using a biological treatment (Low Energy Aerobic Membrane Bioreactor) and ultra-filtration. The waste water will pass through the existing effluent collection sump before entering an aerated flow balancing tank. From the balancing tank the waste water will be pumped to the bioreactor tank and then into the ultra filtration membrane biomass separation tank prior to final discharge via a pipeline, to the River Soar.

The WWTF is designed to treat and discharge up to 750m^3/day (0.0087m^3/second) in peak production periods. However, it is anticipated that the discharge will be at a lower rate during other times, with an average volume of 600m^3/day.

Key issues of the decision

Site condition report
The applicant provided a site condition report which contains information on the previous land use and details of the geological setting of the site. We are satisfied that the site description is representative of the site.

The site is part of the installation at the Citrus Grove Plant located in Kegworth, Leicestershire at National Grid Reference SK4814227598. The waste water treatment facility (WWTF) is situated at the northern end of the Citrus Grove Plant. The existing soft drink manufacturing plant is operated by Cott Beverages and together with the WWTF forms a multi operator installation.

The bed rock underlying the site consists of Edwalton Member (Mudstone), it is classified as a Secondary B aquifer under the requirements of the Water Framework Directive. The northern boundary of the site in underlain by an Arden Sandstone Formation, this is classified as a Secondary A aquifer. Superficial deposits of Hemington Member overlay the bedrock; groundwater vulnerability maps show this is classified as a Secondary A aquifer. The installation does not lie within a groundwater source protection zone.

Historical landuse maps from the 1880s onwards show the site as undeveloped farmland. Maps from the 1990s show that a factory was constructed approximately 50 meters to the south of the site (WWTF). There are no changes shown in land use at the site until the 2006 map, which identifies a mound having been constructed alongside the northwest corner.

Flood risk maps indicate that the site is on the periphery of a flood plain, the operator has addressed the potential risks of flooding in their risk assessment.

A drainage channel is located alongside the site boundary and flows north through Kegworth and Hemington Brooks towards the Lockington Marsh, before joining the River Soar. At its closest, the River Soar is located approximately 1100 meters from the site boundary.

The site will be covered in an impermeable hardstanding and will be at a gradient that ensures any runoff falls to the drainage system sump. It will be assumed that any runoff captured is contaminated and therefore it will ultimately be transferred back to the WWTF for treatment or transferred off site for disposal where onsite treatment is not suitable. This also means that any spillages can either be contained on the site or directed to the installation wide process effluent sump on the Cott Beverages Limited site where they can be pumped back to the WWTF. Uncontaminated water from roofs will drain via an interceptor to a drainage ditch, this is in line with the current management of uncontaminated runoff from the wider installation. The treated effluent from the WWTF will be discharged, via a pipeline, into the River Soar (see key issues section for more information).

We agree that, as the site has adequate surfacing and pollution prevention measures; meaning there is a low risk of pollution to soil and groundwater.

Effluent treatment technology selection
There are many different effluent treatment systems available. These can be divided into either aerobic or anaerobic systems. The operator has confirmed that a number of treatment options were considered and assessed in order to ensure the most suitable treatment method was selected.

Anaerobic treatment was deemed not to be suitable for the site, as the strength of the influent is not sufficient to sustain an active microbiology. A submerged aerated filter (SAF) and a dissolved air floatation (DAF) system were also considered. However, it was concluded that both of these options would require a larger footprint than is feasible within the constraints of the available treatment area. Also both of these treatment options require a relatively consistent influent flow and due to the fluctuations in the manufacturing process this is not achievable at this installation even with the use of the balancing tank.

The operator proposes to treat the process water and wash-down water from the Citrus Grove Plant using a biological treatment (Low Energy Aerobic Membrane Bioreactor (AMBR)) and ultra-filtration. In order to assess the suitability of the cross-flow membrane bioreactor (MBR) process, a full scale pilot test was undertaken. The operator has confirmed that the results of this test indicated that due to the dilute composition of the influent wastewater an aerated micro-process was the most suitable treatment option. The development of the AMBR technology further improves the treatment process over the results achieved in the trials. Combining the treatment capabilities of the cross-flow MBR process with reduced energy use and consistent treatment in periods of process fluctuations. Should the process require treatment using an increased flow, the MBR process allows treatment to occur at a higher energy input. Additional membrane modules and automation are already included in the system, allowing the operation of the ultra filtration process with lower cross flow velocities. The design of the process ensures that the biological aeration system is able to treat any fluctuations in organic loading that may still occur even with a balancing tank stage.

The Reference Document on Best Available Techniques in the Food, Drink and Milk Industries (BREF) August 2006, notes that aerobic processes are only applicable and cost effective when the water is readily biodegradable. The operator has confirmed that the waste water is high in readily available organic content but may be limited in nutrients. Our guidance document How to comply with your environmental permit Additional guidance for: The Food and Drink Sector (EPR 6.10) states that anaerobic treatment alone is unlikely to achieve a final effluent quality high enough for discharge to a watercourse.

The treated effluent will discharge via a pipeline, into a controlled water course (River Soar). We are satisfied that the aerobic treatment described above represents the best available technique (BAT).

Treatment process
The site will only treat waste water from the Citrus Grove Plant which forms part of the multi operator installation. Waste water will pass through the existing effluent collection sump before entering an aerated flow balancing tank. From the balancing tank the waste water will be pumped to the bioreactor tank. The waste water is treated using an intense activated sludge system; the resulting biomass is separated

from the treated effluent using a cross-flow ultra filtration membrane system. From the biomass separation tank the treated effluent is discharged, via a pipeline, to the River Soar.

Storing the waste water in an aerated balancing tank will allow a more consistent waste water to go forward for treatment. The tank is designed to ensure that any short term fluctuations in parameters, such as pH, temperature and total organic carbon (TOC), do not have a detrimental effect on the subsequent treatment process.

There will be MCERTs approved monitoring equipment on the effluent and in-process monitors as well as influent monitoring. The plant will be able to be accessed remotely to ensure optimum treatment is taking place. In the event of equipment or system failure the plant can be shut down and effluent can revert to being tankered off site as per the current practice at the installation.

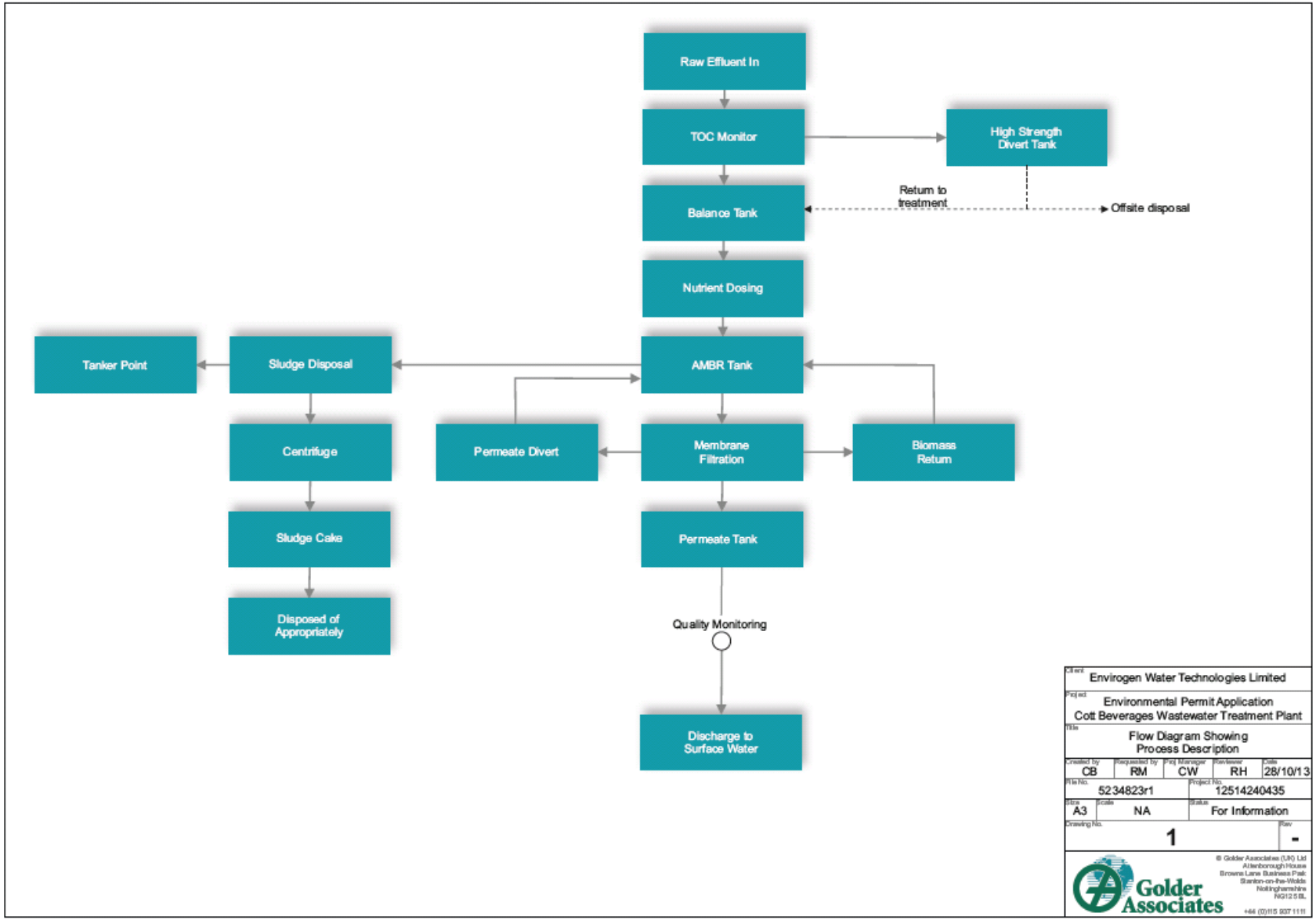
The balancing tank has been designed to provide approximately 12 hours buffer capacity should the discharge have to be stopped. The tank has a capacity of 600m^3, during operation of the waste water treatment facility the tank will be approximately 30–50% full at any one time, leaving a buffer capacity of at least 300m^3. The high strength divert tank has a capacity of 70m^3 and is connected to the overflow of the balancing tank, if required it can be used to increase available storage capacity. We are satisfied that the available storage capacity meets BAT requirements.

The high strength divert tank will allow inconsistent influent entering the site to be diverted and stored, protecting the treatment process. Once this influent is contained it can be gradually introduced back into the process or sent for off site disposal.

The waste water is treated using an intense activated sludge system, with the resulting biomass being separated from the treated effluent. The separation is achieved by the use of multi-tubular ultrafiltration membranes, in which waste water is pushed through the filters by cross-flow (the flow passes parallel to the membrane surface).The process creates a high quality effluent with low final BOD and COD values and is widely used in the food and drink sector. Aerobic biological treatment converts the organic load into bacterial cells that require disposal as sludge. A decanted centrifuge will thicken sludge produced in the treatment process and the resulting biomass will be stored in enclosed skips. The thickened sludge is a non-hazardous biodegradable waste. Conformity testing will be undertaken to identify whether this waste will be suitable for recovery or disposal. Thickening the sludge on site minimises vehicle movements. Currently there are 290 tanker movements a week to remove the liquid effluent from the beverage factory. Following the installation of the WWTF this will be reduced to approximately 1 skip load every 10 days.

The operator has confirmed that effluent will continue to be tankered off site during the initial commissioning phase, this will continue until the biology within the aeration tank has acclimatised and the treated effluent is within the permitted limits.

For clarity, the effluent process is shown in the process-flow diagram on the following page:


Raw Effluent In
TOC Monitor
High Strength Divert Tank
Return to treatment
Offsite disposal
Balance Tank
Nutrient Dosing
Tanker Point
Sludge Disposal
AMBR Tank
Centrifuge
Permeate Divert
Membrane Filtration
Biomass Return
Sludge Cake
Permeate Tank
Disposed of Appropriately
Quality Monitoring
Discharge to Surface Water
Client
Envirogen Water Technologies Limited
Project
Environmental Permit Application
Cott Beverages Wastewater Treatment Plant
Title
Flow Diagram Showing Process Description
Created by
CB
Requested by
RM
Proj Manager
CW
Reviewer
RH
Date
28/10/13
File No.
5234823r1
Project No.
12514240435
Size
A3
Scale
NA
Status
For Information
Drawing No.
1
Rev
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Stanton-on-the-Wolds
Nottinghamshire
NG12 5BL
+44 (0)115 937 1111

Impact of discharge to controlled waters (River Soar)
The site proposes to discharge up to 750m^3/day of treated wash-waters from a soft drink factory into the River Soar.

The operator has applied for trade effluent consents from Severn Trent Water, however these were refused. It was concluded that the site is unable to discharge to foul sewer due to a lack of hydraulic and load capacity at the receiving sewage treatment works. We agree with the operators justification for not connecting to foul sewer.

As a consequence of the lack of sewerage undertaker facilities, the operator has proposed that the treated effluent is discharged into a local water course. A previous application for the waste water treatment facility, with the discharge going to the Kegworth Brook, was submitted to the Environment Agency in March 2013. Assessments undertaken at the time of this application showed that the discharge could have an adverse effect on the features of the Lockington Marshes Site of Special Scientific interest (SSSI) and we refused the application in August 2013. It is now proposed that the treated effluent will be discharged, via a pipeline, to the River Soar at a discharge point which will not impact upon of the SSSI.

We have assessed the impact of the proposed effluent discharge in accordance with our guidance. We undertook an assessment of the proposed discharge by calculating the impact in terms of what the resulting concentrations of pollutants would be in the downstream watercourse if a permit was granted. Modelling was undertaken with the Environment Agency's combined distribution modelling software called 'Monte Carlo'.

The primary criteria for acceptability is that discharges should not cause a greater than 10% deterioration to the existing background concentration of pollutants in the watercourse. But a secondary consideration is that the deterioration should not cause a breach of a Water Framework Directive (WFD) classification target. If the watercourse is already failing its target quality we can only allow a discharge if its overall impact would not prevent possible improvement measures from bringing the watercourse back into class.

Based on the Environment Agency's sample data the River Soar at Kegworth is currently classified under the WFD as being of 'High' quality for Biological Oxygen Demand (BOD) and Ammonia and of 'Moderate' quality for Phosphate. 'Moderate' is considered a failure in WFD terms as the directive requires all watercourses to be of 'Good' class by 2027 at the latest.

BOD and Ammonia
The models show that the discharge does not have the potential to cause a greater than 10% deterioration in the downstream concentrations of BOD and Ammonia. For Ammonia there is no change downstream from the upstream concentration of 0.22 mg/l. For BOD the 90 percentile figure actually improves slightly from 2.83 mg/l upstream to 2.82 mg/l downstream, however it is likely that this is an anomaly of the Monte Carlo method.

We are satisfied that the discharge poses no threat to WFD targets for these two determinants and that its potential impacts would be minimal.

Phosphate
For phosphate there is no change in the mean average figure of 0.41 mg/l from upstream to downstream.

Phosphate levels in the river are currently too high and the River Soar is failing its target. However, we do not believe that the phosphate load from the discharge would be a barrier to bringing the river back into 'Good' quality for phosphate. The discharge would be a very small contribution to phosphate levels within the river, meaning that that other inputs of phosphate would be far more significant.

We are satisfied that the impact of the discharge on current phosphate levels in the river would be minimal and that the discharge could not make any significant difference to improvement plans.

Conclusion
We have included limits for this discharge to the River Soar as follows:

Parameter	Value	Units
pH range	6 – 9	pH units
Suspended solids	≤ 10	mg/l
BOD	≤ 8	mg/l
Phosphate concentration (as P)	≤ 2.5 spot 0.43 as annual average	mg/l
Ammoniacal nitrogen	≤ 3	mg/l

Limits for suspended solids and pH reflect the BAT for the sector.

We can conclude that proposed emissions for the waste water treatment facility will not cause a significant threat to the current water quality of the River Soar or the future quality if 'Good' is achieved for phosphate.

Containment
The operator has confirmed that the site is designed to ensure the containment of spillages and to prevent any potential releases to land. The site will be covered in an impermeable hardstanding and will be designed at a gradient to ensure that any run-off falls to the drainage system sump prior to being directed to the larger installation sump. The integrity of the site surface will be regularly inspected and maintained as part of the preventative maintenance programme for the site. Records of inspections and any repairs will be recorded in the site diary.

The main secondary containment will be provided by the site drainage system. This is a closed system which will assume that any runoff captured is contaminated. Should a spill occur it would be directed, via drains, to the effluent sump prior to being pumped to the WWTF. Depending on the nature of the spill, it may be diverted to the high strength divert tank and either introduced gradually to the effluent treatment stream or tankered off site for disposal.

Only small quantities of chemicals will be stored on site at any one time. They will only be stored on areas covered by impermeable concrete hardstanding and will be stored in intermediate bulk containers (IBCs) within bunded trays. The operator has confirmed that these bunds will be capable of holding 110% of the contents of the IBCs, or if they are in shared containment it will be 25% of the total tank volume which meets our minimum bunding requirements.

All storage containers and pipework will be situated within the contained area. They will be inspected at least once per week to identify any evidence of damage or leakage and to check the level of any liquid accumulating in the IBC bunds.

Storage tanks will be fitted with level monitors and alarms which will prevent overfilling and overtopping. The final effluent discharge will be continuously monitored; the data will be logged and placed onto the remote web link system. This data will be used by the operator for process control checks. The plant will have online monitoring equipment set to maintain the required performance parameters. If the effluent goes out of specification the equipment will alarm. If the alarm is directly linked to discharge quality, the discharge will be automatically stopped and the outflow diverted back to the emergency holding tank or balancing tank, this will prevent the ongoing release of an unsuitable discharge to the environment.

Accident Management Plan (AMP)
The operator has submitted an AMP and environmental risk assessment with the permit application. These documents consider events or failures which could harm the environment, assessing how they are likely to happen, the potential environmental consequences and the actions required to both minimise the potential causes and consequences of an accident. We consider the identified risk and preventative measures/controls suitable for the activities taking place at the site.

Odour
The operator has identified nearby sensitive receptors which could potentially be impacted by odour from the site. Consideration was given to the location these receptors when selecting the location of the WWTF. The plant has be specifically designed to be located away from the new housing development, it is also worth noting that these houses are located closer to the nearby sewage treatment works at Kegworth than they are to the new WWTF. The boundary of the wider installation is much larger than the treatment plant, the main factory is located between the WWTF and the closest residential receptor; providing a level of screening and blocking the direct line of sight. It is also expected that the prevailing wind direction will disperse any odours away from residential receptors.

The installation and operation of an onsite WWTF is seen as an environmental improvement over the current method of collecting and tankering of effluent off site for disposal. The operator has not submitted an odour management plan (OMP) with this application. However, the wastes to be treated at the site are not expected to be particularly malodorous and they have also committed to operating the WWTF in a way which will minimise fugitive emissions to air (including odour).

The operator has detailed measures which are aimed at reducing the potential for odour from the site:

- Waste water will be transferred to the site via a dedicated pipeline.
- Storage tanks are enclosed.
- The treatment method to be used is an aerobic process, this is considered to be less likely to generate odours compared to alternative anaerobic treatment processes.
- Prior to treatment waste water will be temporarily stored in an enclosed aerated balancing tank.
- The membrane system is modular, allowing separation to create a more efficient cleaning regime.
- Thickened sludge will be stored in enclosed skips prior to removal from site.
- The plant incorporates duty assist air blowers ensuring that the process will remain aerated should a main blower fail – preventing process from becoming anaerobic.
- To reduce the possibility of the bioreactor becoming anaerobic all critical assets are duplex – providing backup treatment capacity if required.
- A planned preventative maintenance schedule will be in place.
- Spill kits will be available on site and staff will be trained in their use.
- An environmental complaint procedure is in place and available to the public.

The standard odour condition has been included within the permit meaning that, if in future odour does become an issue and complaints are received then the operator will be required to submit an OMP for the site to the Environment Agency for approval.

Noise

It is not expected that the WWTF will generate noise at levels above the background associated with the surrounding industrial area. The closest sensitive receptor is located approximately 250m to the southeast of the site. The main factory is located between the WWTF and the closest residential receptor, providing a level of screening and blocking the direct line of sight.

The air blowers will be enclosed in acoustic enclosures and the sludge thickening plant and other operational equipment, such as pumps, will be housed inside a building for the purposes of noise mitigation.

The plant will have a planned preventative maintenance regime which will aim to maintain equipment in good working order and therefore keep potential noise caused by malfunctioning equipment to a minimum.

The number of vehicle movements at the installation will reduce as a consequence of the development of the onsite WWTF, this is likely to therefore reduce the noise generated by the installation as a whole. Currently there are 290 tanker movements a week to remove the liquid effluent from the drink factory. Following the installation of the WWTF this will be reduced to approximately 1 skip load being removed every 10 days.

In the event of the plant being taken off line, for example due to equipment failure or malfunction, the process for dealing with the effluent would revert back to the present scenario where liquid effluent is collected and tankered off site. Should the need for this arise, vehicle movements will be restricted to within normal working hours and the impact is not expected to be greater than that of the current operations.

Annex 1: decision checklist
This document should be read in conjunction with the application, supporting information and permit/notice.

Aspect considered	Justification / Detail	Criteria met Yes
Consultation		
Scope of consultation	The consultation requirements were identified and implemented. The decision was taken in accordance with our Public Participation Statement and our Working Together Agreements.	✓
Responses to consultation and web publicising	The web publicising and consultation responses (Annex 2) were taken into account in the decision. The decision was taken in accordance with our guidance.	✓
Operator		
Control of the facility	We are satisfied that the applicant (now the operator) is the person who will have control over the operation of part of the facility after the grant of the permit. The decision was taken in accordance with our guidance on what a legal operator is.	✓
European Directives		
Applicable directives	All applicable European directives have been considered in the determination of the application.	✓
The site		
Extent of the site of the facility	The operator has provided a plan which we consider is satisfactory, showing the extent of the site of the facility including discharge points and including the location of the part of the installation to which this permit applies on that site. A plan is included in the permit and the operator is required to carry on the permitted activities within the site boundary.	✓
Site condition report	The operator has provided a description of the condition of the site. We consider this description is satisfactory. The decision was taken in accordance with our guidance on site condition reports and baseline reporting under IED– guidance and templates (H5).	✓

Aspect considered	Justification / Detail	Criteria met Yes
	See key issues section for more information.	
Biodiversity, Heritage, Landscape and Nature Conservation	The application is within the relevant distance criteria of a site of heritage, landscape or nature conservation, and/or protected species or habitat. There are 5 local wildlife sites within 2 kilometres downstream of the discharge point. There is also one SSSI within 2 kilometres of the site (Lockington Marshes (SSSI)). A full assessment of the application and its potential to affect the sites has been carried out as part of the permitting process. We have not formally consulted on the application. The decision was taken in accordance with our guidance. We consider that the application will not affect the features of the sites. The point of discharge has been selected to ensure that it does not impact upon the SSSI. An Appendix 4 form was completed, concluding that the permission is not likely to damage the site. The form was saved to our Electronic Document and Records Management System in accordance with our guidance. Records show that protected species have been identified in the vicinity of the proposed discharge point into the River Soar. The operator has submitted an ecological survey and report which covers the area of the discharge. We consider that works should be undertaken accordance with the recommendations made in this report.	✓
Environmental Risk Assessment and operating techniques		
Environmental risk	We have reviewed the operator's assessment of the environmental risk from the facility. The operator's risk assessment is satisfactory.	✓
Operating techniques	We have reviewed the techniques used by the operator and compared these with the relevant guidance notes: - Sector Guidance Note S5.06: recovery and disposal of hazardous and non-hazardous waste. - How to comply with your environmental permit	✓

Aspect considered	Justification / Detail	Criteria met Yes
	Additional guidance for: The Food and Drink Sector (EPR 6.10) The key measures proposed by the Operator include the following: • A planned preventative maintenance programme will be in place at the WWTF • The site will be secured to ensure no public access • Training will be provided for staff • All IBCs secondary bunded to the larger of 110% of the largest tank or 25% of the total volume • High level alarms will be located on storage tanks • Spill kits will be available on site and staff will be trained in their use • All wastes accepted for treatment will only come from the wider installation. • Level alarms will be located on storage tanks • Pre acceptance procedures are in place to assess the suitability of wastes accepted. Monitoring will take place prior to treatment, allowing inappropriate waste streams to be identified before they reach the WWTF. • Water quality monitoring on effluent discharge to controlled waters The proposed techniques/ emission levels for priorities for control are in line with the benchmark levels contained in the Technical Guidance Note (TGN) and we consider them to represent appropriate techniques for the facility. The permit conditions ensure compliance with relevant BREFs and BAT Conclusions, and ELVs deliver compliance with BAT-AELs.	
The permit conditions		
Waste types	We have not specified the permitted waste types, descriptions and quantities, which can be accepted at the regulated facility. The WWTF is only permitted for treatment of effluent produced from the Cott Beverages Limited, Citrus Grove Plant. This is specified in Table S1.1 of the permit.	✓
Incorporating the application	We have specified that the applicant must operate the permit in accordance with descriptions in the application,	✓

<table>
<tr><th>Aspect considered</th><th>Justification / Detail</th><th>Criteria met
Yes</th></tr>
<tr><td></td><td>including all additional information received as part of the determination process.

These descriptions are specified in the Operating Techniques table in the permit.</td><td></td></tr>
<tr><td>Emission limits</td><td>We have decided that emission limits should be set for the parameters listed in the permit.

It is considered that the numeric limits described below will prevent significant deterioration of receiving waters. We have imposed numeric limits because either a relevant environmental quality or operational standard requires this.

<table><tr><th>Parameter</th><th>Limit (incl. unit)</th></tr><tr><td>Total daily volume of discharge</td><td>Maximum 750 m^3/day</td></tr><tr><td>pH</td><td>6-9</td></tr><tr><td>Total suspended solids</td><td>10 mg/l</td></tr><tr><td>Ammoniacal nitrogen</td><td>3 mg/l</td></tr><tr><td rowspan="2">Phosphate (as P)</td><td>2.5 mg/l spot sample</td></tr><tr><td>0.43 mg/l as annual average</td></tr><tr><td>Biological Oxygen Demand (BOD)</td><td>8 mg/l</td></tr></table>
See the key issues section for further information</td><td>✓</td></tr>
<tr><td>Monitoring</td><td>We have decided that monitoring should be carried out for the parameters listed in the permit, using the methods detailed and to the frequencies specified.

Based on the information in the application we are satisfied that the operator’s techniques, personnel and equipment have either MCERTS certification or MCERTS accreditation as appropriate.</td><td>✓</td></tr>
<tr><td>Reporting</td><td>We have specified reporting in the permit.</td><td>✓</td></tr>
</table>

Aspect considered	Justification / Detail	Criteria met
		Yes
Considerations of foul sewer	We agree with the operators justification for not connecting to foul sewer.	✓
Operator Competence		
Environment management system	There is no known reason to consider that the operator will not have the management systems to enable it to comply with the permit conditions. The decision was taken in accordance with our guidance on what a competent operator is.	✓
Relevant convictions	The Case Management System has been checked to ensure that all relevant convictions have been declared. No relevant convictions were found.	✓
Financial provision	There is no known reason to consider that the operator will not be financially able to comply with the permit conditions. The decision was taken in accordance with our guidance on what a competent operator is.	✓

Annex 2: Consultation and web publicising

The application was advertised on the Environment Agency's website from 27/05/2016 to 27/06/2016, no comments were received in response to the publication.

We also consulted the Health and Safety Executive and the Local Authority, however no response has been received.