

# CRIBBS CAUSEWAY AEROBIC DIGESTER

**Environmental Permit Application**

**Non-Technical Summary**

Prepared for: Advetec Limited

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SLR 

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## 1.0 INTRODUCTION

SLR Consulting Limited (SLR) has been instructed by Advetec Limited (Advetec) to prepare a new bespoke environmental permit application for the proposed Cribbs Causeway Aerobic Digester. The application involves an aerobic digestion system, operated by Incentive Facilities Management Limited (Incentive FM) and located beneath the Cribbs Causeway Shopping Centre, Patchway, Bristol BS34 5DG (hereafter referred to as 'the Site').

This Non-Technical Summary (NTS) provides a summary of what is being applied for, the regulated facility and outlines the key technical standard and control measures that will be implemented at the Site as a result of the risk assessments.

### 1.1 The Site

The Site is located beneath the Cribbs Causeway Shopping Centre, Patchway, Bristol BS34 5DG, centred on National Grid Reference (NGR) ST 58779 80826. The aerobic digester is located underground beneath the shopping centre, in its waste compound, approximately situated beneath the River Island store, near to the main entrance. Bristol City Centre is located 7.8km south and the town of Patchway lies 1km to the east. The Bristol Channel is located approximately 6km to the west.

The Site is immediately surrounded in all directions by commercial and industrial units comprising the Cribbs Causeway shopping centre and additional surrounding retail areas. Beyond these commercial premises is the town of Patchway comprising large areas of residential properties, the closest of which lies 560m to the east. The M5 is situated approximately 565m to the north at the closest point, beyond this lies areas of open rural land interspersed with some residential dwellings and Bristol Golf Course.

There are no designated sites of ecological or cultural interest located within the Site's boundary or its immediate surroundings. There is one Site of Special Scientific Interest (SSSI) and one Local Nature Reserve (LNR), along with some areas of Ancient Woodland located within 2km of the Site boundary. Further information on the Site's setting can be found in the Environmental Risk Assessment in Section 4 of the application.

The Site is accessed via the South Loading Bays entrance, approximately beneath the John Lewis store at NGR ST 58565 80964. This can be accessed via an unnamed access road, which leads south off Centaurus Road.

The Site Location Plan is illustrated on Drawing EP1 and the Site Layout is illustrated in Drawing EP2, both can be found in Section 3 of this application.

### 1.2 Pre-Application Advice

Pre-application advice was provided by the Environment Agency on 16/09/2021 during an on-site meeting.

### 1.3 Aerobic Digestion

Aerobic digestion is a natural bacterial process in which micro-organisms breakdown organic material in the presence of oxygen. Aerobic bacteria digest and consume the organic material, typically only producing by-products of heat, water vapour, carbon dioxide (CO<sub>2</sub>) and a post-process flock.

Aerobic digestion has typically been used to treat sewage sludge however the process has been proved to also be an effective method of solid waste treatment, reducing volume, mass and moisture content and enabling simpler handling for the operator. The process is able to accept a range of feedstocks including food waste, green waste, selected industrial waste and food by-products.

A diagrammatic overview of an aerobic digestion process is provided as Figure 1.

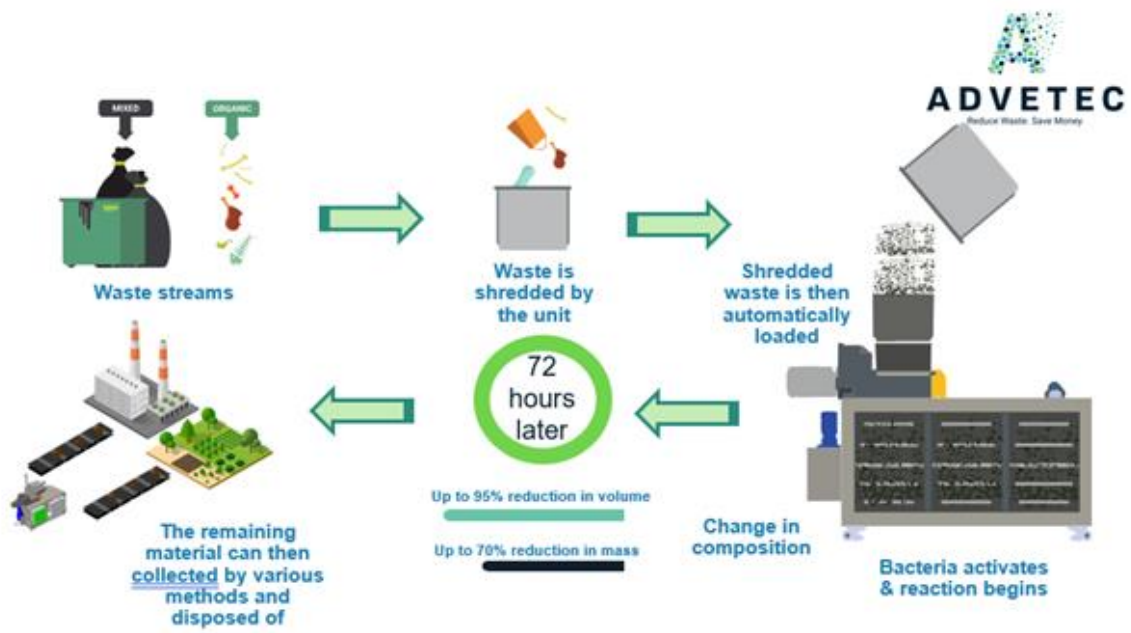


Figure 1 - Aerobic Digestion Process Overview

## 2.0 OVERVIEW OF PROPOSED DEVELOPMENT

The proposed Cribbs Causeway aerobic digester will only accept waste generated within the Cribbs Causeway Shopping Centre, namely mixed general waste and food waste from the shopping centre food court.

The Site will be located below the main shopping centre, in its waste compound, which is accessed externally via the South Loading Bays entrance of the shopping centre, or internally via a staircase or elevator. The waste, following disposal in the shopping centre, is transported down to the Site area in standard 240 litre bins via a large industrial-size elevator which opens up into the compound.

Advetec have produced a range of aerobic digester systems, one of which will be in operation at the Site (XO3).

The Site proposes to accept only up to 2 tonnes of waste (approximately 1.2 tonnes mixed general, 0.8 tonnes food) from the shopping centre per day, approximately 730 tonnes per annum. Following digestion, an approximate mass reduction of 62.5% and volume reduction of 70% is expected, resulting in an approximate output of 0.75 tonnes of flock per day.

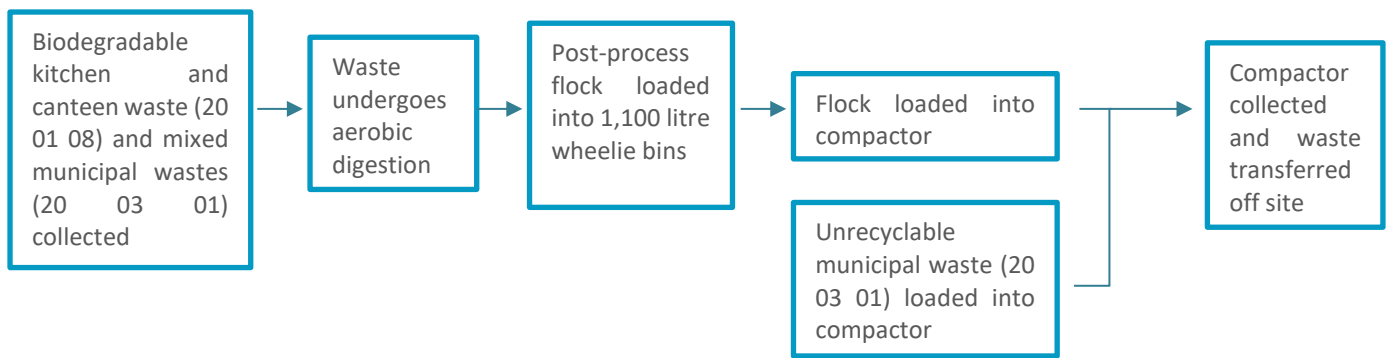
Once the bins have descended into the operational area, they are loaded into a bin-lifter which raises and diverts the waste into an internal shredder which shreds waste into 50mm<sup>2</sup> particle size. The shredded waste is then augered into a chamber, where bacteria and bio-stimulants are automatically dosed into the waste.

The XO3 has two chambers, with an internal mass of 3m<sup>3</sup> at any given point, through which the waste is moved for digestion. Movement is by a centralized shaft with engineered paddles that rotate according to pre-programmed algorithms. The paddles allow the system to stay aerobic while ensuring residence, and index mass throughout the process.

The only by-products of the aerobic digestion system are water vapour, carbon dioxide, condensate and a post-process residue (flock). The process uses exothermic aerobic respiration; therefore, it generates its own heat which is channelled internally back into the process, using a closed-loop heating system. The process does not use water and does not discharge to a drain or sewer. Condensate will be collected in a contained for disposal to a suitably licensed facility.

The entire aerobic digestion process takes approximately 72 hours to complete, after completion the post-process flock exits the unit via a chute and is conveyed to an 1,100 litre bin with a capacity of approximately 200kg-275kg. Following this, the bins containing the flock are transferred to a compactor where the flock is disposed of. The flock is loaded into the compactor along with unrecyclable residual wastes which cannot be fed into the digester. Waste is stored within the compactor bin before being collected, transferred off-Site and replaced with an empty compactor bin. Up to 5 tonnes of waste will be stored in the compactor bin at any one time. The compactor is collected and emptied a minimum of once a week but as and when required if more frequent collections are needed.

A basic process flow diagram of this process is provided as Figure 2.



**Figure 2 – Process Flow Diagram of Site Treatment and Storage**

The XO3 is accessible via a regulated cloud-based portal. Data points are collected, logged and stored at programmable intervals, including temperature, humidity, rotational speeds, emissions monitoring, power consumption, maintenance schedules. Alert and alarm levels are programmed into the system to notify in the event of system errors or parameters moving out of range. There is also an in-line gas monitoring system which continuously monitors levels of methane (CH<sub>4</sub>), carbon monoxide (CO), volatile organic compound (VOCs) and sulphur dioxide (SO<sub>2</sub>), which in the event of detection of any of these parameters, an alarm is raised. To mitigate against any possible odours from the AD process, an odour abatement system is fitted within the XO3 whereby the by-products of water vapour and carbon dioxide are vented to the atmosphere through a passive drum scrubber.

The Site Layout Plan, and Environmental Permit Boundary are provided on Drawing EP2. A picture of the installation can be seen in Figure 3.



**Figure 3 - Advetec Installation at Cribbs Causeway**

## 3.0 PERMITTED WASTE OPERATIONS

The activities at the Site will be regulated as a bespoke waste operation as per the Environmental Permitting (England and Wales) Regulations 2016 (as amended).

### 3.1 Specified Waste Management Activities

A number of waste management activities as described in the Waste Framework Directive 2008 will be undertaken at the Site. These include:

- R3 - Recycling or reclamation of organic substances that are not used as solvents;
- R5 - Recycling/reclamation of other inorganic materials; and
- R12 - Exchange of wastes for submission to any of the operations numbered R1 to R 11.

### 3.2 Waste Types and Quantities

The maximum quantity of waste proposed for acceptance at the Site is up to 2 tonnes per day, 730 tonnes per annum. Waste accepted to the Site will only consist of waste produced at Cribbs Causeway shopping centre. Table 1 lists the wastes which are proposed for acceptance.

**Table 1**  
**List of Wastes Proposed for Acceptance**

List of Waste Code	Description
20	MUNICIPAL WASTES AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES INCLUDING SEPARATELY COLLECTED FRACTIONS
20 01 08	Biodegradable kitchen and canteen waste
20 03 01	Mixed municipal waste

### 3.3 Waste Storage

Unrecyclable residual waste along with post-process flock will be stored within the on-Site compactor bin unit, prior to transfer off-Site. The compactor has a 28 cubic yard capacity and up to 5 tonnes of waste will be stored within the compactor bin at any one time.



## 4.0 APPLICATION OVERVIEW

This environmental permit application describes how the Site has been designed and will be operated in accordance with the relevant technical standards. In addition to this Non-Technical Summary, the application comprises the following elements, each of which are described below:

- Section 2 - Application forms (Parts A, B2, B4 and F1);
- Section 3 – Drawings;
- Section 4 - Environmental Risk Assessment;
- Section 5 – Site Condition Report; and
- Section 6 – Operations and Environmental Management Plan.

### 4.1 Application Forms

Parts A, B2, B4 and F1 of the EA's application forms have been completed in support of the application and are enclosed as Section 2 of the application.

### 4.2 Drawings

Section 3 contains drawings for the Site, these include.;

- Drawing EP1 Site Location Plan
- Drawing EP2 Site Layout Plan
- Drawing EP3 Environmental Site Setting
- Drawing EP4 Cultural and Natural Heritage

### 4.3 Environmental Risk Assessment

The Environmental Risk Assessment has considered odour, fugitive emissions, dust, releases to water, litter, mud, birds, vermin and insects, and potential for accidents and incidents. The assessment concludes that with the implementation of the risk management measures described, potential hazards from the proposed development are not likely to be significant.

The Environmental Risk Assessment is enclosed in Section 4 of this application.

### 4.4 Site Condition Report

The Site Condition Report details the condition of soil and groundwater at the Site. It contains the information necessary to determine the current state of soil and groundwater conditions at the Site, so that a comparison can be undertaken upon the eventual cessation of activities.

A copy of the Site Condition Report is provided in Section 5 of this application.

### 4.5 Operations and Environmental Management Plan

The OEMP describes how the Site has been designed and will be operated in accordance with relevant technical standards and guidance. The document includes an overview of the technology, operational processes, emissions monitoring and reporting implemented at the Site.

The OEMP is enclosed in Section 6 of this application.

## 4.6 Ambient Bioaerosols Monitoring

A round of bioaerosols monitoring was conducted at the site. The objective of the study was to first quantify the bioaerosol emissions from the digestion process, followed by investigation of the likely on and offsite impact of the operations. The document includes a description of sampling and monitoring methodology for bioaerosols, presentation of results, comparison of results against COSHH WELs, and observations and conclusions. The report concludes that Total Viable Count (TVC) and *Aspergillus Fumigatus* did not exceed the Internal Control Levels or the relevant ambient air bioaerosol concentration limits at any of the monitored locations.

The Bioaerosols Monitoring is enclosed in Section 7 of this application.

## 5.0 KEY TECHNICAL STANDARDS

Key technical standards laid out in the following documents have governed the design and proposed operation of the Site:

- Develop a management system: environmental permits, August 2021;
- Control and monitor emissions for your environmental permit, May 2021;
- Environmental Permitting Regulations - Site Condition Reports Guidance and Templates' (version 3 April 2013);
- Risk assessments for your environmental permit, March 2021; and
- Guidance Note S5.06: Recovery and Disposal of Hazardous and Non-Hazardous Waste (Version 5, May 2013).

Due to the small scale of the aerobic digester (less than 2 tonnes per day), and the location of the Site being underground in a sealed compound, the risk to sensitive receptors is considered low. However, the following control measures that are necessary to ensure the Site does not give rise to significant environmental impact have been determined through the risk assessment process and are summarised below:

- Activities are managed in accordance with an environmental management system;
- Performance against the management system is audited at regular intervals;
- Odour management measures will be employed to ensure odour emissions are minimised from the Site;
  - A carbon filter is fitted to the aerobic digester to abate against odours; and
  - Waste is stored within lidded bins prior to collection and transfer off-Site.
- Noise management measures will be employed to minimise emissions of noise including;
  - Machinery is operated so as to minimise noise;
  - Vehicles adhere to a speed limit when accessing the Site and within the wider Cribbs Causeway shopping centre.
- Strict waste acceptance procedures, detailed in the OEMP, will be adhered to prevent odour and contamination.

Daily observational monitoring is undertaken at the Site boundary, for odour, noise and dust emissions.

## 6.0 CONCLUSION

The overall conclusion from the studies undertaken as part of the application is that there is unlikely to be a significant environmental impact as a result of the proposed operation of the Cribbs Causeway Aerobic Digester.

Incentive FM is fully committed to ensuring the highest standards are met and will undertake its activities in a manner consistent with best industrial practices and in accordance with the company's environmental policy and management system.

It is therefore considered that the permit should be issued as detailed above.

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