



## DREHID MECHANICAL BIOLOGICAL TREATMENT FACILITY

### Engineering Services Report

Date: June 2012

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TOBIN CONSULTING ENGINEERS





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# ENGINEERING SERVICES REPORT

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**PROJECT:**

**Drehid MBT Facility**

**CLIENT:**

**Bord na Móna**

**COMPANY:**

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<b>Project:</b>	Drehid MBT Facility
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## 1 INTRODUCTION

Bord Na Móna proposes to develop a Mechanical Biological Treatment (MBT) Facility within its landholding located within the townlands of Coolcarrigan, Drummond and Kilkeaskin, Carbury, Co. Kildare. No modifications to already permitted facilities, including the entrance from the R403 regional road, are envisaged.

The proposed Drehid MBT Facility will primarily accept and process municipal solid waste and will provide for an overall capacity of 250,000 tonnes per annum (TPA).

This Report together with its Appendices addresses the proposed infrastructural requirements of the development and will support the Planning Application and Waste Licence Application for the development of the proposed MBT Facility.

### 1.1 SITE LOCATION

The Bord na Móna property, outlined in blue on Drawing No. 6301-2600, is located within the County Kildare townlands of Drehid, Ballynamullagh, Kilmurry, Mulgeeth, Mucklon, Timahoe East, Timahoe West, Coolcarrigan, Corduff, Coolearagh West, Allenwood North, Killinagh Upper, Killinagh Lower, Ballynakill Upper, Ballynakill Lower, Drummond, Kilkeaskin, Loughnacush, and Parsonstown.

The site boundary or the activity boundary, outlined by the red line on Drawing No. 6301-2600, which is defined as the area in which all activities associated with the Drehid MBT Facility will occur, is confined to the townlands of Coolcarrigan, Drummond and Kilkeaskin. It should be noted that the activities associated with the Drehid MBT Facility will be confined to a landbank of 29ha.

Access has been provided into the previously permitted Drehid Waste Management Facility from the R403 via a dedicated site entrance and a 4.8km access road. This road will also provide access from the R403 to the MBT Facility.

The village of Derrinturn is located approximately 3km north west of the closest edge of the site activity boundary and Timahoe crossroads is located approximately 2.5km east of the closest edge of the site activity boundary.

The MBT Facility site boundary is located within a segment of land within the Bord na Móna landholding, which is located to the east of the existing access road and approximately 1km south of the existing Drehid Waste Management Facility. The topographic landform within the site boundary consists of flat lying to gently undulating topography of cutover peatland.

Drawing No. 6301-2600, an extract from the *Discovery Series Map No 49*, shows the site location relative to a number of adjacent villages including Derrinturn, Timahoe, Coill Dubh and Allenwood at a scale of 1:100,000. The location of the site boundary relative to the regional roads R402 and R403 is also shown on Drawing No. 6301-2600.

### 1.2 TOPOGRAPHY

A detailed topographical survey was carried out at the site in February 2012 by ORS Ltd. The final output of this survey for the proposed site is presented as a topographic contour map on Drawing No. 6301-2603.

The proposed site is situated in low-lying cutaway bogland with levels ranging from 83m to 86mOD, while the topography throughout the overall landholding is relatively flat at 80 to 90mOD.

## 2 DETAIL OF THE PROPOSED DEVELOPMENT

Bord na Móna proposes to develop the Mechanical Biological Treatment (MBT) Facility within its landholding located within the townlands of Coolcarrigan, Drummond and Kilkeaskin, Carbury, Co. Kildare. No modifications to already permitted facilities, including the entrance from the R403 regional road, are envisaged.

The proposed Drehid MBT Facility will primarily accept and process municipal solid waste and will be designed for an overall capacity of 250,000 tonnes per annum (TPA).

Mechanical Biological Treatment through a combination of mechanical processing and biological treatment reduces the volume of waste which requires treatment by disposal in landfill or incineration. By virtue of the biological process in an MBT facility, biodegradable municipal waste can be biostabilised thereby eliminating its potential to generate methane (a harmful greenhouse gas) and leachate, thus contributing to the fulfilment of Ireland's targets under the Landfill Directive (1999/31/EC). It should be noted that biostabilised waste is not considered biodegradable municipal waste if it meets the AT<sub>4</sub> requirements of the EPA.<sup>1</sup>

In deciding on the configuration of the biological process, and in particular the inclusion of Anaerobic Digestion, consideration was had to the fiscal incentives for the development of Anaerobic Digestion – namely the Renewable Energy Feed In Tariff (REFIT). Regrettably, the current fiscal incentives in the Republic of Ireland make it difficult to create a compelling or indeed viable, economic argument for the development of Anaerobic Digestion. The REFIT for Anaerobic Digestion in the Republic of Ireland is significantly inferior to its equivalents in Northern Ireland and Italy (for example).

Therefore, Bord na Móna proposes the preparation of the Planning Application and Waste Licence Application for the proposed Drehid MBT Facility such that it provides for the development of an optional Dry Anaerobic Digestion step as part of the biological treatment stage. This approach has been subject to detailed pre-application discussions with An Bord Pleanála and the EPA.

The biological treatment stage will include a composting step in any event. The Planning Application and Waste Licence Application includes for both scenarios (Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting)) The potential impacts and mitigation measures for both options are also considered within the EIS.

The design of the MBT Facility is such that there are no significant external differences between Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting). It is proposed that the AD plant and ancillary plant will be located within the enclosure of the biological treatment buildings. The main physical difference between the two Configurations will be that Configuration B will have a standby gas flare compound and a stack associated with the CHP plant. In addition, Configuration B will require physical infrastructure (i.e. overhead power line) to facilitate the export of electricity to the electricity network. Any required planning consents to facilitate this infrastructure will be arranged in due course by ESB Networks. Bord na Móna owned switch gear and transformers associated with the export of electricity will be located in the Electrical Room.

In the case of a decision to develop Configuration B (MBT with Dry Anaerobic Digestion and Composting), Bord na Móna will progress an application to ESB Networks for the export of electricity following the grant of regulatory approvals for the proposed development and prior to construction.

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<sup>1</sup> The AT<sub>4</sub> is a static respiration index (SRI) test used to calculate the oxygen consumption of a sample over a period of time. The index determines the biological stability of compost or other organic materials.

## 2.1 PROPOSED SITE INFRASTRUCTURE

This section details the site infrastructure that is proposed for the MBT Facility. The proposed site layout is outlined on Drawing Nos. 6301-2601 to 6301-2618 in Appendix 5 of this Report and the detail of the development is further described elsewhere in this Report, and in the EIS.

The following is a schedule of the main infrastructure elements which shall form the proposed Drehid MBT Facility:

- Access roads, parking areas and hardstanding areas
- Security Infrastructure
- Administration and Welfare Building
- Mechanical Treatment Building
- Solid Recovered Fuel (SRF) Building
- Biological Treatment Building No. 1
- Biological Treatment Building No. 2
- Refining Building
- Biofilter/Odour Abatement Buildings No. 1 – 3
- Maintenance Building
- Truck Wash
- Truck Park and Skip Storage Area
- Weighbridge and Weighbridge control building
- Wheelwash
- Gas flare compound (only for Configuration B)
- Combined Heat and Power (CHP) Plants (only for Configuration B)
- Electrical Power Supply Infrastructure
- Outdoor storage area for SRF
- Surface Water Pumping Stations
- Surface Water Attenuation Ponds
- Bunded Fuel Storage Area
- Heat Transfer System (between the existing Drehid Waste Management Facility and proposed Drehid MBT Facility)
- Potable Water Supply
- Landscaping Features

### Site Access

Access to the MBT Facility will be via the permitted and existing site entrance, located on the R403 regional road. A permitted 4.8km access road links this entrance to the permitted Bord na Móna operated Drehid Waste Management Facility. This entrance and access road will also be used by vehicles travelling to and from the Drehid MBT Facility. A dedicated access junction and site road is proposed from the existing access road to the Drehid MBT Facility as shown on Drawing No. 6301-2601 & 6301-2602. Appropriate signage will direct employees and visitors to the designated car parking areas and waste vehicles to the incoming weighbridge.

### Site Security

Site security arrangements to prevent unauthorised access at the Drehid MBT Facility include the following:

- The existing main entrance from the R403 has secure fencing, stonewalls and pillars and this security will also be in place for the MBT Facility due to the common site entrance (2.4m high fencing by 7m wide with an electric drive, cantilever security gate that is closed outside normal operating times). This gate is located as shown on Drawing No. 6301-2602.
- Fencing around the entire boundary of the Drehid MBT Facility footprint, with the exception of



the site entrance, will comprise of post and chain link fencing. The fencing layout is shown on Drawing No. 6301-2602, with fencing details presented on Drawing No. 6301-2624.

- Palisade type anti-intruder security fencing, 2.4m in height, will be erected at the MBT Facility site entrance gate area.
- A CCTV system monitors the existing access from the R403 and the infrastructure associated with the existing Drehid Waste Management Facility. A CCTV system will also monitor the entrance to the Drehid MBT Facility.
- Anti-intruder alarms will be located in all lockable MBT Facility buildings.

#### Administration and Welfare Building

An Administration and Welfare Building is proposed for this Facility and will be comprised of two stories. The building will provide all necessary welfare facilities for the personnel required for the operation and maintenance of the MBT Facility. It is envisaged that this will be a steel framed building, incorporating precast concrete floors and an insulated cladding system including a high quality insulated window system.

It is envisaged that the MBT Administration and Welfare Building will comprise of a ground floor and a first floor, and will include the following areas as shown in Drawing No. 6301-2190 of the Planning Drawings and 6301-2422 of the EIS Drawings:

- Canteen (Operational and maintenance personnel)
- Canteen (Supervisory and office personnel)
- Changing room
- Washing/Drying Room (washing and drying of clothing)
- Toilets and showers (Operational and maintenance personnel)
- Toilets and showers (Supervisory and office personnel)
- 2 No. Meeting Rooms (to accommodate the seating of 8 personnel)
- Plant Manager's office
- 2 No. Plant Supervisor offices
- 2 No. offices (to facilitate a person and the storage of files)
- Open plan office (to accommodate 10 No. people)
- Server Room
- SCADA Room
- Records Room
- Laboratory
- Educational/training room

The design of the MBT Administration and Welfare Building includes all necessary provisions required for the operation and maintenance of the MBT Facility in accordance with safety, health and welfare at work legislation and other legal requirements.

Air conditioning will be provided in all areas of this building. Fire and intruder alarm systems will also be installed in this building.

The design of this building has sustainability at its core. To this end, the building is designed to include rain water harvesting from roofed areas as well as the use of solar panels and geothermal heating.

The building will comply with the latest version of the Building Regulations (including access for disabled people).

It is the intention of Bord na Móna to utilise the educational room in the Administration and Welfare Building for environmental education needs. Poster presentations and literature on waste management and on the workings of the Drehid MBT Facility will be available in this room. Provision will also be made for the inspection of the EPA waste licence and Annual Environmental Reports (AERs) in this room.

#### Mechanical Treatment Building

The Mechanical Treatment Building will be constructed as steel portal framed structures with piled foundations and reinforced concrete floor slabs with a proprietary cladding. Details of the structure and dimensions of the Mechanical Treatment Building are included in Drawing No. 6301-2110 to 6301-2115 of the Planning Drawings and 6301-2425 of the EIS Drawings. The building will be supplied with 3-phase power and will include both security and fire alarm systems. Doors at the waste reception area will be rapid closing doors, with an opening or closing time of approximately 20 seconds. Doors for the acceptance of waste will be fitted with air curtains to minimise the escape of potentially odourous emissions when a door is opened.

#### Biological Treatment Buildings

The Biological Treatment Buildings (including Biological Treatment Building No. 1 and Biological Treatment Building No. 2) will be constructed as steel portal framed structures with piled foundations and reinforced concrete floor slabs with a proprietary cladding and with roller shutter doors. Details of the structure and dimensions of the Biological Treatment Buildings are included in Drawing No. 6301-2120 to 6301-2159 of the Planning Drawings and 6301-2428 of the EIS Drawings. The buildings will be supplied by 3-phase power and will include both security and fire alarm systems.

#### Refining Building

The Refining Building will be constructed as steel portal framed structures with piled foundations and reinforced concrete floor slabs with a proprietary cladding and with roller shutter doors. Details of the structure and dimensions of the Refining Building are included in Drawing No. 6301-2170 to 6301-2173 of the Planning Drawings and 6301-2426 of the EIS Drawings. The building will be supplied with 3-phase power and will include both security and fire alarm systems.

#### SRF Building

The SRF Building will be constructed as steel portal framed structures with piled foundations and reinforced concrete floor slabs with a proprietary cladding and with roller shutter doors. The SRF thermal dryer will be located in this building. Details of the structure and dimensions of the SRF Building are shown on Drawing No. 6301-2180 to 6301-2182 of the Planning Drawings and 6301-2424 of the EIS Drawings. The buildings will be supplied with 3-phase power and will include both security and fire alarm systems.

#### Maintenance Building

The Maintenance Building will be constructed as steel portal framed structures with piled foundations and reinforced concrete floor slabs with a proprietary cladding and with roller shutter doors. Details of the structure and dimensions of this building are included in Drawing No. 6301-2200 to 6301-2202 of the Planning Drawings and 6301-2427 of the EIS Drawings. This building will be fitted with secure storage areas to accommodate power tools, other small plant and equipment. A proprietary bunded container to EPA requirements will be provided for the storage of hydraulic oil. The building will be supplied with 3-phase power and will include both security and fire alarm systems.

#### SRF Storage Area

It is proposed that baled and plastic wrapped SRF will be stored in an outdoor storage area as shown on Drawing No. 6301-2602. This storage area will comprise of a bunded concrete area and the SRF will be stored in wrapped bales approximately 1m<sup>3</sup> in size and four bales high.

#### Biofilter/Odour Abatement Buildings

As shown on Drawing No. 6301-2602, there will be three separate Biofilter/Odour Abatement Buildings at the MBT Facility. The Biofilter/Odour Abatement Buildings will be constructed as steel portal framed structures with piled foundations and reinforced concrete floor slabs with a proprietary cladding and with roller shutter doors. Details of the structure and dimensions of these buildings are included in Drawing No. 6301-2160 to 6301-2168 of the Planning Drawings and 6301-2423 of the EIS Drawings. An odour abatement system plant room will be located in the centre of each

Biofilter/Odour Abatement Building. Plant rooms will be supplied with 3-phase power and will include both security and fire alarm systems. A storage tank for MBT process waste water and a storage tank for clean water will be located within each plant room.

Within each Biofilter/Odour Abatement Building, a biofilter section will be located at each side of the odour abatement system plant room as shown on Drawing No. 6301-2160, 6301-2163 & 6301-2166 of the Planning Drawings and 6301-2423 of the EIS Drawings.

Each biofilter section will consist of a concrete basin. The biofilter floor will consist of perforated concrete slabs supported by walls which will allow the air to flow evenly under the complete biofilter field. The air discharged from the acid scrubbers and air humidifiers will be blown into air plenums before being forced through the biofilter material. Treated air emissions, from each biofilter section, will be vented to atmosphere by a 20m high stack.

#### Weighbridge and Weighbridge Kiosk

Two proprietary weighbridges, each capable of weighing up to 60 tonnes, will be provided at the MBT Facility entrance at the locations outlined on Drawing No. 6301-2602.

Two weighbridges will be constructed, one to weigh incoming vehicles and the second to weigh outgoing vehicles. The two weighbridges are considered necessary to allow for the free-flow of vehicular traffic and to ensure efficient turn around times at the facility.

Entry control barriers will be provided at each of these weighbridges.

A weighbridge kiosk as shown on Drawing No. 6301-2602 will be constructed between the two weighbridges and will include toilet facilities. Details of the weighbridge kiosk are presented on Drawing No. 6301-2618.

#### Wheel wash

A wheel wash will be provided on the site at the location shown on Drawing No. 6301-2602 and to the details shown on Drawing No. 6301-2617.

The wheel wash will have a self-contained water recirculation system. A tank will store water for washing purposes, a pump will re-circulate the water back into the tank during washing. Solids that settle at the base of the tank will be removed by a vacuum tanker. Water will only be discharged to the foul water system during the periodic replenishment of the used process water with fresh water.

#### Fuel Storage

Bunded fuel storage will be provided for the diesel fuel that will be required for the on site plant and equipment. Kerosene will also be stored on site for the backup heating system for the Administration and Welfare Building.

This bunded fuel storage area will be located to the south of the Mechanical Treatment Building at the location shown on Drawing No. 6301-2602. This bunded fuel store area will comprise of a proprietary 20,000 litre (20m<sup>3</sup>) diesel tank and a 5,000 litre (5m<sup>3</sup>) kerosene tank located in a bund with a total capacity of 30m<sup>3</sup>.

#### Site Roads, Parking and Hardstanding

Concrete hardstand areas will be provided at the waste reception area, fuel storage area, truck wash/parking area and skip storage area and adjacent to each of the MBT Facility Buildings. Site roads are also proposed from the existing access road to the Administration and Welfare Building and around the MBT Facility. Roads and parking areas will typically be designed as bituminous macadam pavements, or where appropriate, concrete pavements. The proposed locations of these areas at the site are shown on Drawing No. 6301-2602 and are detailed on Drawing No. 6301-2620. Drainage from these hardstanding areas will be discharged to the proposed surface water collection system, via oil interceptors/grit traps.

#### Truck Wash/ Park & Skip Storage

It is proposed to locate a truck wash, a truck parking area and skip storage area near the Maintenance Building as shown on Drawing No. 6301-2602. This area will comprise of concrete hardstand areas and surface water drainage from this area will be connected to the overall surface water drainage network for the MBT Facility via oil interceptors/grit traps. Water from the truck wash will be contained and recycled. Overflow will be treated as foul water and will be directed to an onsite holding tank, from where it will be tankered off site to a suitably licensed WWTP.

#### Potable Water Supply

Potable water supply for the site is proposed to be from an on site borehole as indicated on Drawing No. 6301 - 2010. It is proposed to pump water from the borehole to the site infrastructure, via a water treatment plant, which will treat the water to remove iron, manganese and ammonia to acceptable limits. A layout of the potable watermain is shown on Drawing No. 6301 - 2013, with details shown on Drawing No. 6301 – 2023, of Appendix 5.

#### Surface Water and Foul Water Infrastructure

The layout of the surface water drainage system proposed for the site is shown on Drawing No. 6301 – 2611.

As shown on Drawing No. 6301 – 2611 a proprietary grit interception trap and a proprietary oil interceptor will be installed through which all intercepted run-off from hard stand and parking areas within the site will be diverted. The outfall from the grit trap and oil interceptor will be discharged to surface water attenuation ponds for further treatment. These ponds are sized to provide adequate capacity for a 100-year storm event, meet facility fire-fighting water requirements and provide water to meet MBT process demands when necessary. Any overflow will be diverted to a nearby bog drainage channel.

#### Other Services

Other services that will be provided at the MBT Facility site include:

- Telephone system;
- Water from an on-site borehole;
- 400v three phase electricity;
- Standby diesel generators;
- Standby pumps;
- Gas detection systems in the site buildings; and,
- Meteorological station.

#### Building Ventilation and Odour Abatement/Odour Control

The proposed MBT Facility will include a building ventilation system and an odour abatement system.

The function of the building ventilation system will be to provide a number of air changes per hour and to maintain a negative air pressure environment within each building. The maintenance of a negative pressure environment within each building will prevent the emission of untreated air thereby minimising potentially nuisance causing odour emissions. The provision of air changes within each building will also provide appropriate working conditions for MBT plant operators.

The odour abatement system will treat the air extracted by the building ventilation system and the process air exhausted by the biological treatment process. The core components of the odour abatement system include acid scrubbers, humidifiers and biofilters. As is commonplace in modern MBT facilities, the volumes of extracted building air requiring treatment in the odour abatement system will be optimised by the integration and cascading of air flows between buildings and operational areas.

On the basis that each facility building at the proposed MBT Facility will facilitate a specific element of the MBT process, the ventilation and odour abatement system will take account of the different process activities in each facility building. This approach will ensure the efficient and focused treatment of odours generated by the MBT process.

The layout of the building ventilation system and an odour abatement system (Configuration A (MBT with Composting) and (Configuration B (MBT with Dry Anaerobic Digestion and Composting) is presented in Appendix 2.1 of the EIS.

#### Heat Transfer System

Both Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting) will use process heat. Process heat will be used, primarily, in order to permit drying of the Solid Recovered Fuel (SRF) fraction in order to improve its fuel characteristics.

Under Configuration A (MBT with Composting), process heat will be provided by a CHP system (operating on landfill gas) at the existing Drehid Waste Management Facility.

Under Configuration B (MBT with Dry Anaerobic Digestion and Composting), process heat will be provided by a CHP system (operating on biogas generated by the dry AD process) at the MBT facility. The balance of the process heat required by the MBT facility will be provided by a CHP system (operating on landfill gas) at the Drehid Waste Management Facility.

The transfer of heat from the CHP system at the Drehid Waste Management Facility to the MBT Facility will be by hot water, at approximately 180°C and approximately 20 bar pressure. The underground heat transfer pipe work will be installed adjacent to the existing access road between MBT Facility site and the Drehid Waste Management Facility, as shown on Drawing No. 6301-2601, with details shown on Drawing No. 6301-2625.

An inspection chamber will be located at each thermal expansion loop/joint, to permit ready inspection of the pipe work condition. The number of loops required will be calculated during the detailed design.

#### Gas Flare

The location for the gas flaring equipment is shown on Drawing No. 6301-2140 of the Planning Drawings and 6301-2428 of the EIS Drawings. The gas flare will be equipped with regulator valves, monitoring valves, ventilator, flame arrestor, and ignition equipment. It should be noted that this is a standby gas flare which will be used in the event that the CHP Plants are unavailable and that there is insufficient volume in the biogas storage bladders. This standby gas flare will only be a feature of Configuration B (MBT with Dry Anaerobic Digestion and Composting).

## 2.2 EXISTING SERVICES

With the exception of surface water infrastructure, there are no existing services within the proposed Drehid MBT Facility site boundary. The surface water infrastructure, within the site of the proposed Drehid MBT Facility, will be diverted to accommodate the construction of the facility.

Other existing services within the Bord na Móna landholding (such as water supply and power) service only the Drehid Waste Management Facility and separate provision shall be made to service the MBT Facility Site.

## 2.3 BUILDINGS

### 2.3.1 Structural Form

The locations of the buildings at the proposed MBT Facility are shown on Drawing Nos. 6301-2601 to 6301-2618, with details shown on Drawing Nos. 6301-2110 – 6301-2202, which form part of the Planning Application and Drawing Nos. 6301-2422 to 6301-2428, which form part of the EIS.

Typically the buildings are designed as steel portal framed structures, with a proprietary cladding, constructed on reinforced concrete floor slabs.

The exception to this is the Administration and Welfare Building, as shown on Drawing Nos. 6301-2190 to 6301-2193 of the Planning Drawings and 6301-2422 of the EIS Drawings, which will be a steel framed building, incorporating precast concrete floors and an insulated cladding system including a high quality insulated window system.

Intrusive site investigation works have been carried out in the locations of the proposed buildings and on the basis of the resulting information, it is envisaged that the buildings will be constructed on piles founded on suitable bearing strata.

The buildings shall be constructed to the levels and details provided in the Planning Application and Waste Licence Application Drawings.

### 2.3.2 Building Heights

The heights of the buildings shall be in compliance with the Planning Application and Waste Licence Application Drawings. The heights of the various structures are shown on the relevant Planning Application and Waste Licence Application Drawings. The maximum height of buildings on site is 14.69m, not including stack heights.

## 2.4 OUTDOOR STORAGE AREAS

The following outdoor storage areas are included in the design of the MBT Facility;

- **FUEL STORAGE AREA**  
It is intended that diesel fuel will be stored in a 20,000 litre tank and kerosene fuel in a 5,000 litre tank, in the location shown on Drawing No. 6301-2602. These tanks shall be contained in a reinforced concrete bund and shall be covered with a roof. Drainage from the roof shall be directed to the surface water collection system. Any spills within the bund shall be removed from the site to an appropriately EPA licensed facility.
- **SRF STORAGE AREA**  
An outdoor SRF storage area shall be constructed in the location indicated on Drawing No. 6301-2602. The SRF shall be stored in plastic wrapped bales approximately 1m<sup>3</sup> in size and these bales shall be stored 4 bales high.

The baled SRF storage area shall be independently bunded and all surface water collected within the area contained therein. As appropriate, the collected runoff shall be assessed for any signs of potential contamination by an online analysis system and shall be directed to the surface water collection system if there are no indications of contamination. If there is any indication of potential contamination this runoff shall be directed to the waste water collection system.

## 2.5 ACCOMPANYING INFORMATION

This Report is accompanied by Appendices 1 to 5, which include the information detailed hereunder.

**Table 2.1 Appendices**

<b>Appendix Name</b>	<b>Appendix Contents</b>
Appendix 1	Water Requirements
Appendix 2	Water Supply Design
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Appendix 5	Drawings (see below)

**Table 2.2 Appendix 5 Drawings**

<b>Drawing Number</b>	<b>Drawing Title</b>
6301-2600	Regional Site Location Map
6301-2601	Overall Site Layout Plan
6301-2602	Site Layout Plan
6301-2603	Existing Site Topography
6301-2604	Existing and Proposed Cross Sections
6301-2605	Drawing Not used
6301-2606	Drawing Not used
6301-2607	Drawing Not used
6301-2608	Drawing Not used
6301-2609	Drawing Not used
6301-2610	Services Layout Plan



6301-2611	Surface Water Layout Plan
6301-2612	Foul & Process Water Drainage Layout Plan
6301-2613	Watermain Layout Plan
6301-2614	General Arrangement Surface, Process & Fire Water Pumping Stations – Sht. 1 of 2
6301-2615	General Arrangement Surface, Process & Fire Water Pumping Stations – Sht. 2 of 2
6301-2616	Attenuation Lagoons 1 & 2 General Arrangement & Section
6301-2617	Wheelwash Standard Details
6301-2618	Weighbridge General Arrangement Plan & Sections
6301-2619	Drawing Not used
6301-2620	Typical Road & Carpark Construction Details
6301-2621	Typical Manhole Details
6301-2622	Trench Bedding Details
6301-2623	Typical Watermain Details
6301-2624	Typical Fencing Details
6301-2625	Schematic & Details of Heat Transfer Pipe
6301-2626	Drawing Not used
6301-2627	Drawing Not used
6301-2628	Drawing Not used
6301-2629	Drawing Not used
6301-2630	Landscape Plan



## 2.6 SUPPORTING INFORMATION

This Report supports the EIS and the Planning Application and is supported by the Planning Drawings and the EIS Drawings, which are detailed hereunder, and included with the Planning Application and EIS, respectively;

**Table 2.3 Building Drawings Included with the Planning Application**

<b>Drawing Number</b>	<b>Drawing Title</b>
6301-2110	Mechanical Treatment Building – Ground floor plan
6301-2111	Mechanical Treatment Building – Roof plan
6301-2112	Mechanical Treatment Building – Elevations sheet 1 of 2
6301-2113	Mechanical Treatment Building – Elevations sheet 2 of 2
6301-2114	Mechanical Treatment Building – Cross-sections sheet 1 of 2
6301-2115	Mechanical Treatment Building – Cross-sections sheet 1 of 2
6301-2120	Biological Building No. 1 (Configuration A) – Ground floor plan sheet 1 of 2
6301-2121	Biological Building No. 1 (Configuration A) – Ground floor plan sheet 2 of 2
6301-2122	Biological Building No. 1 (Configuration A) – Roof plan sheet 1 of 2
6301-2123	Biological Building No. 1 (Configuration A) – Roof plan sheet 2 of 2
6301-2124	Biological Building No. 1 (Configuration A) – Elevations sheet 1 of 3
6301-2125	Biological Building No. 1 (Configuration A) – Elevations sheet 2 of 3
6301-2126	Biological Building No. 1 (Configuration A) – Elevations sheet 3 of 3
6301-2127	Biological Building No. 1 (Configuration A) – Cross-sections sheet 1 of 3
6301-2128	Biological Building No. 1 (Configuration A) – Cross-sections sheet 2 of 3
6301-2129	Biological Building No. 1 (Configuration A) – Cross-sections sheet 3 of 3

6301-2130	Biological Building No. 2 (Configuration A) – Ground floor plan sheet 1 of 2
6301-2131	Biological Building No. 2 (Configuration A) – Ground floor plan sheet 2 of 2
6301-2132	Biological Building No. 2 (Configuration A) – Roof plan sheet 1 of 2
6301-2133	Biological Building No. 2 (Configuration A) – Roof plan sheet 2 of 2
6301-2134	Biological Building No. 2 (Configuration A) – Elevations sheet 1 of 3
6301-2135	Biological Building No. 2 (Configuration A) – Elevations sheet 2 of 3
6301-2136	Biological Building No. 2 (Configuration A) – Elevations sheet 3 of 3
6301-2137	Biological Building No. 2 (Configuration A) – Cross-sections sheet 1 of 3
6301-2138	Biological Building No. 2 (Configuration A) – Cross-sections sheet 2 of 3
6301-2139	Biological Building No. 2 (Configuration A) – Cross-sections sheet 3 of 3
6301-2140	Biological Building No. 1 (Configuration B) – Ground floor plan sheet 1 of 2
6301-2141	Biological Building No. 1 (Configuration B) – Ground floor plan sheet 2 of 2
6301-2142	Biological Building No. 1 (Configuration B) – Roof plan sheet 1 of 2
6301-2143	Biological Building No. 1 (Configuration B) – Roof plan sheet 2 of 2
6301-2144	Biological Building No. 1 (Configuration B) – Elevations sheet 1 of 3
6301-2145	Biological Building No. 1 (Configuration B) – Elevations sheet 2 of 3
6301-2146	Biological Building No. 1 (Configuration B) – Elevations sheet 3 of 3
6301-2147	Biological Building No. 1 (Configuration B) – Cross-sections sheet 1 of 3
6301-2148	Biological Building No. 1 (Configuration B) – Cross-sections sheet 2 of 3
6301-2149	Biological Building No. 1 (Configuration B) – Cross-sections sheet 3 of 3
6301-2150	Biological Building No. 2 (Configuration B) – Ground floor plan sheet 1 of 2
6301-2151	Biological Building No. 2 (Configuration B) – Ground floor plan sheet 2 of 2

6301-2152	Biological Building No. 2 (Configuration B) – Roof plan sheet 1 of 2
6301-2153	Biological Building No. 2 (Configuration B) – Roof plan sheet 2 of 2
6301-2154	Biological Building No. 2 (Configuration B) – Elevations sheet 1 of 3
6301-2155	Biological Building No. 2 (Configuration B) – Elevations sheet 2 of 3
6301-2156	Biological Building No. 2 (Configuration B) – Elevations sheet 3 of 3
6301-2157	Biological Building No. 2 (Configuration B) – Cross-sections sheet 1 of 3
6301-2158	Biological Building No. 2 (Configuration B) – Cross-sections sheet 2 of 3
6301-2159	Biological Building No. 2 (Configuration B) – Cross-sections sheet 3 of 3
6301-2160	Biofilter/Odour Abatement area No.1 – Ground Floor & Roof plan
6301-2161	Biofilter/Odour Abatement area No.1 – Elevations
6301-2162	Biofilter/Odour Abatement area No.1 – Cross-sections
6301-2163	Biofilter/Odour Abatement area No.2 – Ground Floor & Roof plan
6301-2164	Biofilter/Odour Abatement area No.2 – Cross-sections
6301-2165	Biofilter/Odour Abatement area No.2 – Elevations
6301-2166	Biofilter/Odour Abatement area No.3 – Ground Floor & Roof plan
6301-2167	Biofilter/Odour Abatement area No.3 – Elevations
6301-2168	Biofilter/Odour Abatement area No.3 – Sections
6301-2170	Refining Building – Ground floor Plan
6301-2171	Refining Building – Roof Plan
6301-2172	Refining Building – Elevations
6301-2173	Refining Building – Sections

6301-2180	SRF Building – Ground floor & Roof Plan
6301-2181	SRF Building – Elevations
6301-2182	SRF Building – Sections
6301-2190	Admin/Welfare Building – Ground Floor & First Floor plans
6301-2191	Admin/Welfare Building – Roof plan
6301-2192	Admin/Welfare Building – Elevations
6301-2193	Admin/Welfare Building – Sections
6301-2200	Maintenance Building – Ground floor & Roof Plans
6301-2201	Maintenance Building – Sections
6301-2202	Maintenance Building – Elevations

**Table 2.4 Building Drawings Included with the EIS – Volume III**

<b>Appendix Name</b>	<b>Appendix Contents</b>
6301-2422	Administration & Welfare Building – Plan & Elevations
6301-2423	Typical Biofilter/Odour Abatement Building – Plan & Elevations
6301-2424	SRF Building
6301-2425	Mechanical Treatment Building
6301-2426	Refining Building
6301-2427	Maintenance Building
6301-2428	Biological Treatment Building – Plan & Elevations

### 3 ACCESS AND INTERNAL ROADS

#### 3.1 GENERAL

Access to the Mechanical Biological Treatment Facility is from the R403 Regional Road at the southwest of the Bord na Móna landholding, via a private permitted access road, between the R403 and the Drehid Waste Management Facility, as indicated on Drawing No. 6301-2601. The adequacy of this access junction is considered by a Traffic Impact Assessment, which forms part of the Environmental Impact Statement which accompanies the Planning and Waste License Applications.

The design of the internal road layout, within the MBT Facility site, has been considered as part of this Report. Internal roads have been designed to cater for articulated truck movements and this has been confirmed by carrying out an analysis using the AutoTrack™ software package.

Road layouts, with road marking details, are shown on **Drawing No. 6301 – 2602 of Appendix 5**. Roads are typically designed as bituminous macadam pavements, or where appropriate, concrete pavements, with cross falls and longitudinal falls to promote drainage of the surfaces. Drainage of access roads is by means of french drains (or infiltration drains) which will collect surface water and assist with the discharge to groundwater.

Typical construction details are shown on **Drawing No. 6301 – 2620 to Drawing No. 6301 – 2625 of Appendix 5**. Detailed design of the pavements shall be undertaken prior to the construction stage of the proposed MBT facility.

#### 3.2 PARKING AREAS

As part of the MBT Facility development it is proposed to provide a car parking area to service the development. This car parking area will be located adjacent to the Administration and Welfare Building, as shown on Drawing No. 6301 – 2602. The parking area has been designed as bituminous macadam pavements, with cross falls and longitudinal falls to promote drainage of the surfaces. Edge restraints shall be provided by an appropriate kerbing system.

It is further intended to provide a truck park and skip storage area, as shown on Drawing No. 6301-2602. This area is also designed as bituminous macadam pavements, and where appropriate, concrete pavements, with cross falls and longitudinal falls to promote drainage of the surfaces. Edge restraints shall be provided by an appropriate kerbing system.

Surface water drainage from these parking areas shall be directed to the attenuation pond, local to the Administration and Welfare Building (Pond No. 3) via an appropriately sized petrol interceptor and grit trap. The overflow from the attenuation pond shall discharge, at Greenfield Runoff rates, to the existing surface water infrastructure, within the Bord na Móna landholding. The surface water drainage layout for the site is shown on Drawing No. 6301-2611, and further information is provided in Section 6 of this Report.

Typical construction details are shown on **Drawing No. 6301 – 2020 to Drawing No. 6301 – 2025 of Appendix 5**. Detailed design of the pavements shall be undertaken prior to the construction stage of the proposed MBT facility.

## 4 EARTH WORKS

### 4.1 GENERAL

The topography of the site is relatively flat so that significant earthworks are not required for building up the site or reducing levels, however there will be the requirement to remove some of the existing peat material and replace this with a suitable engineering fill, in areas that will be used for hardstanding and roads.

It is proposed that peat removed during the course of construction of the project will be placed in environmental berms, as shown on Drawing No. 6301-2602. These environmental berms will serve to provide screening to the MBT Facility.

An extensive site investigation programme, comprising of trial pits, boreholes and laboratory testing, was carried out across the site of the proposed MBT facility, to determine the most appropriate construction methodologies for the site. As a result of the findings of the site investigation works, it was decided that the buildings would most likely be piled to suitable bearing strata and the foundations and ground floor slabs constructed from these piles.

In the locations of roads and hardstanding areas, it is intended that the peat shall be removed, to suitable bearing strata and replaced with suitable fill material.

It is intended that the proposed ground levels will match the existing ground levels, as much as is possible, while taking into consideration, operational constraints and physical constraints for the drainage of surface water from roads and hardstanding areas.

Proposed site levels are indicated on **Drawing No. 6301 – 2602** of **Appendix 5**.

## 5 WATER SUPPLY

The proposed development will require a water supply for:

- Potable water;
- Fire fighting requirements; and
- Fresh water requirements for the MBT process.

It is proposed to have separate watermains for each of the aforementioned requirements. The sub-sections below detail the nature of the supply for each of these requirements.

A full water balance for the site is included in **Appendix 1** along with water requirement calculations in **Appendix 2**. The watermain layouts including location of valves, hydrants, etc. are shown on **Drawing No. 6301 – 2613** of **Appendix 5**.

### 5.1 POTABLE WATER SUPPLY

Potable water supply for the site is proposed to be from an on site borehole as indicated on **Drawing No. 6301 - 2613** of **Appendix 5**. It is proposed to pump water from the borehole to the site infrastructure, via a water treatment plant, which will treat the water to remove iron, manganese and ammonia to acceptable limits to make it suitable for potable use. A layout of the potable watermain is shown on **Drawing No. 6301 - 2613**, with details shown on **Drawing Nos. 6301 – 2620 to 6301 – 2625** of **Appendix 5**.

The distribution main shall be 100mm diameter pipe, fit for its intended purpose. The main shall be looped as per best practice where possible; however, where dead ends occur they will terminate in duckfoot hydrants as set out in the guidance document “Site Development Works for Housing Areas”. It is estimated that the peak potable water demand for the development is approx. 0.136 l/s (see potable water calculations in **Appendix 2** for justification of this figure).

### 5.2 FIRE WATER SUPPLY

Fire water for the proposed development shall be supplied from the surface water attenuation/storage ponds No. 1 & 2. These ponds will provide a storage volume of approximately 7,882m<sup>3</sup>, which is well in excess of the 1800m<sup>3</sup> necessary for fire fighting requirements as specified in the Guidelines on flow requirements (see **Appendix 2**). There is a provision in the design of the Facility, that the lagoons can be topped up by a float controlled valve, connected to the on site borehole, as required.

A fire water main shall be constructed as per the layout shown on **Drawing Nos. 6301 - 2613** of **Appendix 5**. This firemain shall be charged by a suitable fire main pumpset, which will be capable of servicing the firemain. Hydrants locations have been designed in accordance with Building Regulations Technical Guidance Document B – Fire Safety Clause 5.1.7.

Kildare County Fire Service was contacted during the preparation of the Planning Application and EIS and the information supplied has been taken into account in the design of the facility. Requirements of the Planning Authority in relation to fire safety and fire fighting requirements shall be fully complied with in the Fire Safety Certificate application for the site, which will be prepared during the detailed design of the MBT Facility and in advance of construction.

#### 5.2.1 Fire Water Retention

Fire water retention shall be in compliance with the requirements of the EPA Guidance on Fire Water Retention. Fire water, should it arise, would be dealt with in a number of different ways.

Fire water generated in the Mechanical Treatment Building will be directed to the waste collection area, which is effectively a bunded tank with a capacity of approximately 3,000m<sup>3</sup>.

Fire water generated in the Biological Treatment Buildings will be directed to the recessed areas, which will act as bunds with a capacity of approximately 1,800m<sup>3</sup> (in each building).

Fire water generated elsewhere in the proposed MBT Facility site will be directed to the surface water attenuation lagoons.

Any firewater would be analysed prior to a decision being made with respect to possible tankering off-site to an approved wastewater plant, or an approved alternative treatment.

### 5.3 FRESH WATER REQUIREMENTS FOR THE MBT PROCESS

The proposed MBT Facility will have a requirement for fresh water. Fresh water requirements will be met by means of surface water within attenuation ponds (No.1 & 2) and the on site borehole.

Fresh water will be required in the proposed MBT Facility for the following process activities:

- wash down and cleaning activities within the MBT facility buildings
- irrigation of the biofilter media in order to maintain appropriate humidity levels and thereby optimum odour removal efficacy
- replenishing and refreshing of water levels in the acid scrubbers
- replenishing and refreshing of water levels in the air humidifiers
- maintaining of minimum percolate levels in the fermentation tanks (in the case of Configuration B (MBT with Dry Anaerobic Digestion and Composting))

Fresh water tanks will be installed in each of the odour abatement system plant rooms in order to provide a buffer supply of fresh water to the process. A minimum level of fresh water in the aforementioned fresh water tanks will be maintained by means of pumping water from the surface water attenuation ponds or by means of an on site borehole.

Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting), will each have a different requirement for process water, as detailed in the following Table:

**Table 5.1: Process Water Requirements**

Process Configuration	Fresh Water Requirement
<b>Configuration A</b> (MBT with Composting)	31.4m <sup>3</sup> /day
<b>Configuration B</b> (MBT with Dry Anaerobic Digestion and Composting)	38.7m <sup>3</sup> /day

For the purposes of supplying the fresh water to the MBT process, surface water shall be taken from the surface water attenuation/storage ponds No. 1 & 2 and pumped directly to the fresh water storage tanks.

A layout for the process water main, indicating how fresh water is fed to the fresh water storage tanks and subsequently directed to each of the process buildings, is shown on **Drawing Nos. 6301 - 2613**.



A flow diagram has been provided in **Appendix 1**, to further facilitate an understanding of the movement of water throughout the proposed development.

## 6 SURFACE WATER

### 6.1 GENERAL

The topography of the site is relatively level and varies from approximately 83mOD to 86 mOD. There are a number of existing bog field drains running through the site of the proposed development, as shown on Drawing No. 6301-2602, and it is proposed to divert these bog drains, as indicated on Drawing No. 6301-2611. The surface water collection system has been designed in accordance with the following guidelines;

- Surface water from the parking area (adjacent to the Administration and Welfare Building) and the truck park & skip area shall be directed to Attenuation Pond No. 3 and discharged at Greenfield runoff rates;
- Surface water from the Administration and Welfare Building shall be directed to a rain water harvesting system, for reuse as “grey water”. Any excess shall be discharged to surface water Attenuation Pond No. 3 and discharged to the existing site drainage system at Greenfield runoff rates;
- As indicated in Section 2, above, drainage of the access roads shall be achieved by discharging the surface water to ground, via french drains (or infiltration trenches) constructed on either side of the roads.
- Surface water from all other areas shall be directed to Attenuation Ponds No. 1 & No. 2, for re-use, as indicated in Section 5, with excess volumes being discharged at Greenfield runoff rates;

It is proposed to collect the surface water runoff from hardstanding areas and buildings via a network of pipes as indicated on Drawings No. 6301-2611. All surface water to be discharged to the existing surface water infrastructure within the site shall pass through a petrol interceptor and shall be limited to Greenfield runoff rates.

It is proposed to re-use water in the surface water attenuation/storage ponds for a number of purposes, namely;

- Supply of fresh water to the MBT process;
- Supply of water for fire fighting requirements.

It is acknowledged that there will be a surplus of water collected on the site. It is proposed to control the discharge of this excess volume of precipitation to the existing bog drainage system, at Greenfield runoff rates.

The proposed surface water network showing attenuation structures, pumping stations, outfall locations, manhole locations, and direction of flow, is shown on **Drawing Nos. 6301 - 2611** of **Appendix 5**. **Appendix 3** contains calculations providing pipe sizes, cover levels, invert levels and gradients for the network.

A flow diagram has been provided in **Appendix 1**, to further facilitate an understanding of the movement of water throughout the proposed development.

### 6.2 SURFACE WATER DESIGN

Surface water design has been carried out in accordance with requirements of BS 752; the GDSDS (Greater Dublin Strategic Drainage Study) and the “Recommendations for Site Development Works for Housing Areas” – published by the then Department of the Environment (D.O.E.). Drainage of the site is achieved by a combination of piped and channel drainage systems. Calculations for the surface water network are included in **Appendix 3**.

### 6.3 SUSTANABLE URBAN DRAINAGE

Implementing the design standards of the GDSDS, the surface water drainage system takes into account the recommendations of the GDSDS and utilises SuDs (sustainable urban drainage) devices where appropriate. The layout of the site has been designed to collect surface water runoff from hardstanding areas and roofs within the development and discharge to surface water attenuation/storage ponds within the boundary of the proposed development. From here the water will be subsequently reused in the MBT process or will outfall to the existing site drainage system at the appropriate Greenfield run off rates.

The principal behind SuDs is to reduce the quantity of discharge from developments to predevelopment flows and also to improve the quality of run-off from proposed developments. In this case it is proposed to decrease the quantity of run-off by providing surface water attenuation/storage ponds and utilising some stored water in the MBT process.

The surface water attenuation/storage ponds will have the purpose of limiting the runoff from the proposed development to greenfield run off rates, providing a store of water for fire fighting purposes and also providing a store of water for the MBT process. The ponds will be lined with an impermeable liner - LLDPE or similar approved. Calculations for attenuation pond requirements are provided in **Appendix 3**, with pond details shown on **Drawing No. 6301 – 2616** of **Appendix 5**.

Applying the GDSDS, in conjunction with site specific rainfall data, an allowable outflow from the site of 5.22 l/s/ha was calculated. As discussed above, it is proposed to limit outflow from the site through a variety of measures, which can be classified as SuDs measures.

Bearing in mind the requirements of the GDSDS and in order to avoid flooding of the site, a storage volume for a 1 in a 100 yr storm event was decided upon. This determined a storage requirement of 7,882m<sup>3</sup>. The detailed calculations are contained in Appendix 3.

This storage is provided by means of the proposed surface water attenuation/storage ponds No. 1, 2 & 3. As previously discussed a proportion of this water will be retained for operational use - approximately 38.7 m<sup>3</sup>/day for the MBT process and an additional amount for fire fighting requirements.

Given the relatively flat levels of the site it is not possible to have a gravity inflow and overflow from attenuation ponds No. 1 & 2. As a result of the outfall levels (i.e. the existing Bord na Móna landholding drainage system) pumping of the surface water is required. The system has been designed with a pumped inflow, which will allow for a gravity overflow from the ponds. Details of the pumping station are provided on Drawing No. 6301-2615.

Given the nature of the proposed development a design risk assessment has been carried out – **see Section 11** – and a potential risk identified is that of failure of the pumps and subsequent flooding of the site. To guard against this a considerable level of redundancy has been built into the design of the surface water discharge system.

The surface water discharge system has been designed as follows:

- The surface water attenuation/storage ponds will cater for the 1:100yr storm event [and include for MBT process requirements and fire fighting requirements]
- The surface water attenuation/storage ponds will have a minimum free board of 0.5m
- Outflow shall be at Greenfield runoff rates
- The inlet pumping station shall incorporate the following back up measures;
  - Duty & standby electric pumps
  - Diesel powered back up pump, to provide for the eventuality that there is a power cut.

The quality of runoff from the proposed development is improved by the fact that the surface water attenuation/storage ponds will also act as settlement ponds and furthermore, the runoff will pass through an oil interceptor prior to discharge to the ponds. The oil interceptors, which all the collected

surface water passes through, will retain any hydrocarbons in the runoff and thereby improve the quality of the runoff.

## 7 FOUL WATER

### 7.1 GENERAL

Potential sources of foul water in the proposed development are:

- Wastewater from sanitary facilities
- Over flow water from the wheel wash
- Run off from the external SRF storage area (if contaminated)
- Run off from the Truck wash
- MBT process waste water

The foul water system has been divided into two distinct networks;

- Sanitary wastewater system, which will collect discharge from sanitary appliances within the various buildings and discharge to the onsite storage tank
- Process effluent system, which will collect leachate and runoff from the process buildings and discharge to the process water storage tanks, for reuse.

The proposed foul water network; showing pump stations, collection pipes and storage tanks are shown on **Drawing No. 6301 - 2612** of **Appendix 5**.

A flow diagram has been provided in **Appendix 1**, to further facilitate an understanding of the movement of water throughout the proposed development.

### 7.2 SANITARY WASTEWATER

Sanitary wastewater i.e., wastewater from toilets, washing facilities, kitchens etc. will be collected in each building and directed to an onsite waste water holding tank, via the foul water collection network. The majority of the foul collection network shall be a gravity system, however it is proposed that the weighbridge kiosk area be connected to the system via a pumping station and rising main, due to its distance from the network and the flat gradient of the site.

The on site storage tank will utilise a high level alarm which will notify the operators of the MBT Facility that the tank needs to be emptied and tankered to a suitably licensed WWTP.

**Appendix 4** contains calculations with respect to the foul discharge loading and network characteristics. A supplier catalogue, for a proprietary pumping station detailing the characteristics of the pumping stations is also provided.

### 7.3 MBT PROCESS WASTE WATER

Waste water will be produced at various stages in the MBT process. The MBT process has been designed in order to maximise the reuse of waste water.

A collection system is proposed to collect waste water from the various MBT processes within the proposed development. The collected process waste water shall be diverted to the process waste water storage tanks for reuse.

A flow diagram has been provided in **Appendix 1**, to further facilitate an understanding of the movement of process waste water throughout the proposed development.

#### 7.3.1 Waste Water Generation

The envisaged origins of waste water produced by the MBT process are described below.

Although not considered significant, leaching from incoming waste stored in the waste reception bunker in the Mechanical Treatment Building will result in the generation of leachate. Dished floor channels and drainage points in the waste reception bunker will facilitate the collection and piping of such leachate to a waste water tank.

The composting tunnel process in the Biological Treatment Buildings will generate waste water in the form of leachate and condensate. Leachate will be generated by the leaching of moisture from feedstock within the composting tunnels (particularly in the early stages of the process) to the floor of the tunnels. The aeration pipe work embedded in the floor of the composting tunnels will be connected via air locks to waste water tanks thereby facilitating the collection of this leachate. Condensate will be generated by the cooling of high humidity process air (exhausted from the tunnels) in aeration system ductwork. Condensate collection points featuring air locks will be provided at low points in the aeration system ductwork.

Similarly, the maturation process in the Biological Treatment Buildings will result in the generation of condensate. Condensate will be generated by the cooling of process air (extracted by negative aeration) in negative aeration ductwork. Condensate collection points featuring air locks will be provided at low points in the aeration system ductwork.

General house keeping activities involving cleaning and washing in the Biological Treatment Buildings and in the Refining Building will generate waste water. Cleaning and washing at the MBT facility will be a requirement of the Department of Agriculture, Food and the Marine in order to comply with Animal By-Products Regulations. The floors of the Biological Treatment Buildings and the Refining Building will be laid to falls thereby facilitating the collection of waste water in dished floor channels and drainage points for piping to process water tanks.

The odour abatement systems will also be a source of waste water generation. The condensation of the high humidity odourous air streams within ductwork will generate waste water. The irrigation of the biofilters will result in the collection of waste water from biofilter bases. The refreshing of water levels in the acid scrubbers and air humidifiers will also result in the generation of waste water.

The exhausted air stream from the SRF dryer in the SRF Building at an envisaged temperature of 50°C and of high humidity will cool to approximately 35°C -40°C when it combines with other building ventilation air prior to humidification and biofiltration. The cooling of this air stream will generate a volume of condensate which will be collected and piped to a process water tank.

### 7.3.2 Reuse of Process Waste Water

The envisaged reuses of waste water produced by the MBT process are described below.

In order to optimise the composting tunnel process and the maturation process, it will be necessary to maintain material moisture levels within an acceptable range. This will necessitate the addition of moisture in the form of waste water or fresh water (the latter in the case where there is a deficit of waste water).

The composting tunnels will be equipped with a sprinkling system which will facilitate re-circulation of wastewater from the waste water tanks. The sprinkling system will maintain optimum moisture levels within the composting mass thereby optimising the stabilisation process.

A means of recirculation of waste water will also be provided in the maturation buildings thereby facilitating re-use of process water in the maturation process.

In the case of Configuration B (MBT with Dry Anaerobic Digestion and Composting), waste water will be used to maintain minimum percolate levels in the fermentation tanks. However, in order to maintain the concentration of certain parameters in the percolate below a level that would have an adverse effect on the performance of the dry AD process, the addition of fresh water may be required on occasion.

### 7.3.3 Process Waste Water Storage Tanks

To mitigate any risk of a leak from process waste water tanks it is proposed that they are located within the odour abatement system plant rooms. Thus, on the basis that there will be 3 No. odour abatement systems, there will be 3 No. waste water tanks. Each tank will have an envisaged capacity of 400 cubic metres. All pipe work used for the transport of process waste water shall be specified as fusion welded polyethylene, or similar approved.

In the case of Configuration B (MBT with Dry Anaerobic Digestion and Composting), a fermentation tank will be constructed adjacent to the dry AD tunnels (between the dry AD tunnels and the composting tunnels) in Biological Treatment Building No.1 and in Biological Treatment Building No.2. Each fermentation tank will have an envisaged capacity of 900 cubic metres.

Configuration A (MBT with Composting) and Configuration B (MBT with Dry Anaerobic Digestion and Composting), will each produce different volumes of waste water. The envisaged quantities of excess process waste water which shall be produced are detailed in the following table:

**Table 7.1: Excess Process Water**

Process Configuration	Excess Process Waste Water
<b>Configuration A</b> (MBT with Composting)	0 m <sup>3</sup> /day
<b>Configuration B</b> (MBT with Dry Anaerobic Digestion and Composting)	9m <sup>3</sup> /day

The excess process waste water is the envisaged quantity of waste water that will not be re-used in the MBT process and as such, it shall be required to remove this excess process waste water to a suitably licensed waste water treatment facility.

## 8 SUSTAINABILITY

Sustainability has been to the fore in the design and planning of the proposed MBT facility. The following elements have been included in the design of the facility.

### 8.1 SUSTAINABLE URBAN DRAINAGE (SUDS)

The principals of Sustainable Urban Drainage (Suds), as set down by the Greater Dublin Strategic Drainage Study, have been implemented in the design of this facility and specific reference should be made to Section 6 of this Report. The following specific measures have been incorporated into the design which will reduce the quantity of runoff produced and improve the quality of the runoff;

- Access roads shall be drained by infiltration;
- Attenuation of storm water run-off (1;100yr event) and discharge at Greenfield runoff rates [controlled by an actuated valve];
- Reuse of storm water for;
  - Fire fighting requirements;
  - MBT process water requirements.
- Capture of rainwater from the Administration and Welfare Building and reuse as “Grey Water”;
- Surface water collection systems to pass through oil interceptors and grit traps.

### 8.2 ENERGY EFFICIENCY MEASURES

A critical element of the design of the facility has been to address the energy requirements of the facility. While the detailed design of the facility will address specific design issues, such as insulation, lighting fixtures, pump controls, pump selection etc. a number of specific measures have been incorporated into the preliminary design of the facility to reduce the amount of energy that the facility will require over its operational lifespan. Some of these measures relate to the buildings while the majority relate to the energy uses of the process.

#### *8.2.1 Solar Power and Geothermal Heating use in the Administration and Welfare Building*

It is intended to utilise a combination of sustainable energy sources for the heating of the Administration and Welfare Building. To this end, solar panels and geothermal heating have been included in the planning design of this building. The exact details of the systems will be determined during the detailed design of the MBT Facility.

#### *8.2.2 Energy Efficiency in the MBT Process*

##### **8.2.2.1 Use of heat from the Drehid Waste Management Facility**

Heat will be provided to the MBT Facility by a hot water system receiving waste heat from the CHP plants at the adjacent Bord na Móna Drehid Waste Management Facility. The hot water system will comprise of a set of pipes (supply and return) which will follow the existing access road between the Drehid Waste Management Facility and the MBT Facility. The route of this pipeline and specific details are shown on Drawing No. 6301-2601 and 6301-2625.



**8.2.2.2 Renewable Energy Production**

In the case of Configuration B (MBT with Dry Anaerobic Digestion and Composting), the proposed development would produce biogas thereby facilitating the export of renewable energy onto the electricity network.

## 9 CONSTRUCTION QUALITY ASSURANCE

In order to provide assurance that the MBT Facility is constructed in accordance with intended design and technical specifications, a comprehensive Construction Quality Assurance (CQA) plan will be implemented during the construction stage. The CQA plan will include Construction Quality Control (CQC) procedures to ensure that materials and workmanship meet defined specifications.

Construction quality control procedures will include the integrity testing of all surface water, foul water, process water pipe work and underground structures in accordance with industry accepted standards and procedures.

All integrity testing will be inspected and witnessed by an appropriately qualified person acting on behalf of Bord na Móna. Integrity test certificates will be signed by both the contractor's engineer and the engineer representing Bord na Móna.

Following the completion of construction and testing of the MBT Facility and prior to the acceptance of waste, it is proposed that a Construction Quality Assurance (CQA) Report will be prepared by a third party in compliance with good industry practice.

## 10 ANCILLARY SERVICES

### 10.1 GENERAL

Further engagement with electricity and telecoms service providers will take place following the grant of regulatory approvals for the proposed development.

The proposed MBT Facility will require a supply of three phase electricity. To this end, the MBT Facility will require an electricity supply connection with an envisaged MIC (Maximum Import Capacity) of approximately 5MVA. It is envisaged that the distribution of electricity to the electrical rooms in the Mechanical Treatment Building and the Biological Treatment Buildings will be by means of a 10kV/20kV medium voltage network. Hermetically sealed oil cooled transformers within the aforementioned electrical rooms will transform the electricity to 400V for distribution in a low voltage network to electrical panels for the powering of plant and equipment at the facility.

In the case of Configuration B (MBT with Dry Anaerobic Digestion and Composting), the proposed development would export renewable energy onto the electricity network. In the case of a decision to develop Configuration B (MBT with Dry Anaerobic Digestion and Composting), Bord na Móna will progress an application to ESB Networks for the export of electricity following the grant of regulatory approvals for the proposed development and prior to construction.

## 11 HEALTH & SAFETY

### 11.1 GENERAL

TOBIN Consulting Engineers have complied with the obligations as set out in the Safety, Health, and Welfare at Work Construction Regulations 2006. Principles of prevention have been considered and a design risk assessment for the site development elements of the works has been carried out. Hazards have been identified and where possible they have been engineered out. Where this has not been possible, mitigation measures have been included. A record shall be kept of any residual risks arising and these will be passed on to the contractor in the preliminary health and safety plan, prior to the construction stage.



# APPENDIX 1

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## **Water Requirements**

Water Balance Sheet

Water Flow Diagram

## Process Water Balance - Configuration A (MBT with Composting)

	Water Requirement	Leachate/Condensate/Wash Water Produced	Units
<b>Waste Reception Area</b>			
Leachate from waste in Waste Reception Area	-	104	Cubic Metres
Cleaning of delivery vehicles	563	563	Cubic Metres
<b>Composting Tunnel Process</b>			
Leachate from Composting Tunnels	-	1352	Cubic Metres
Irrigation water	16695	-	Cubic Metres
Condensate from Tunnel Units and Ductwork to Biofilters		7862	Cubic Metres
<b>Maturation Process</b>			
Irrigation Water	4341	-	Cubic Metres
Leachate	-	0	Cubic Metres
Condensate from Ductwork		2386	Cubic Metres
<b>General Wash Down (Composting Tunnels and Maturation)</b>			
Cleaning activities	780	780	Cubic Metres
<b>Odour Abatement Process</b>			
Biofilter Irrigation fresh water	8663	-	Cubic Metres
Condensate from Biofilters	-	2380	Cubic Metres
Condensate from Scrubbers/Humidifiers	-	1456	Cubic Metres
Scrubber/Humidifiers fresh water	1456		Cubic Metres
Condensate from Ductwork	-	1456	Cubic Metres
<b>SRF Thermal Dryer</b>			
Condensate from Exhaust Air Stream		2503	
<b>TOTAL</b>	<b>32497</b>	<b>20842</b>	Cubic Metres
<b>Total Fresh Water Requirement (Note 1)</b>	<b>11462</b>		<b>Cubic Metres Per Annum</b>
<b>Excess Waste Water</b>		<b>0</b>	<b>Cubic Metres Per Annum</b>

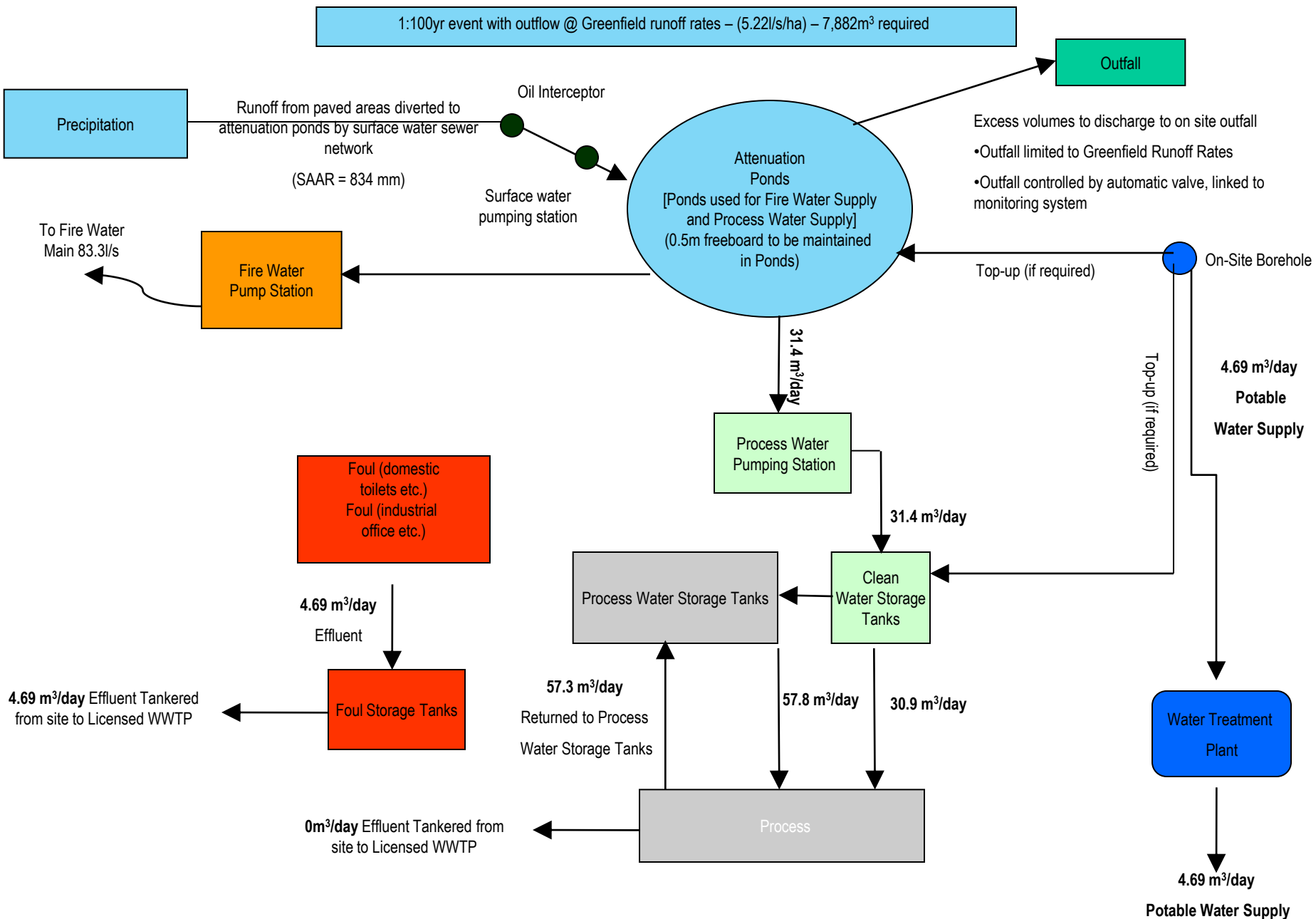
Note 1: Fresh water for Process (excludes fresh water required elsewhere - e.g. Administration and Welfare Building)

## Process Water Balance - Configuration B (MBT with Dry Anaerobic Digestion and Composting)

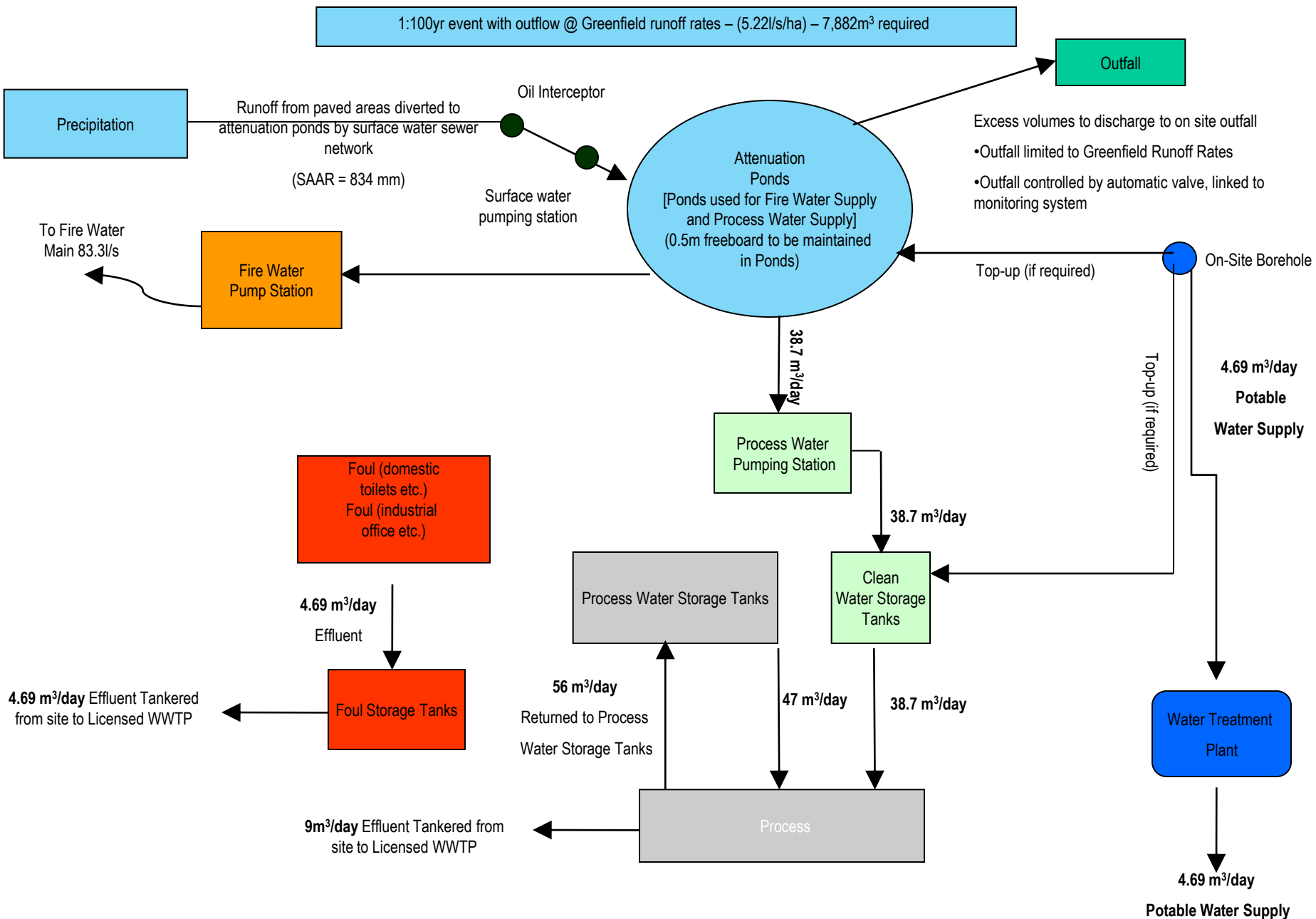
	Water Requirement	Leachate/Percolate/Condensate/Wash Water Produced	Units
<b>Waste Reception Area</b>			
Leachate from waste in Waste Reception Area	-	104	Cubic Metres
Cleaning of delivery vehicles	563	563	Cubic Metres
<b>Dry Anaerobic Digestion Process</b>			
Fresh water requirement	2636		
Re-circulated water requirement	14935		
<b>Composting Tunnel Process</b>			
Leachate from Composting Tunnels	-	1144	Cubic Metres
Irrigation water	-	-	Cubic Metres
Condensate from Tunnel Units and Ductwork to Biofilters		8806	Cubic Metres
<b>Maturation Process</b>			
Irrigation Water	2170	-	Cubic Metres
Leachate	-	0	Cubic Metres
Condensate from Ductwork		1198	Cubic Metres
<b>General Wash Down (Composting Tunnels and Maturation)</b>			
Cleaning activities	780	780	Cubic Metres
<b>Odour Abatement Process</b>			
Biofilter Irrigation fresh water	8663	-	Cubic Metres
Condensate from Biofilters	-	2380	Cubic Metres
Condensate from Scrubbers/Humidifiers	-	1456	Cubic Metres
Scrubber/Humidifiers fresh water	1456		Cubic Metres
Condensate from Ductwork	-	1456	Cubic Metres
<b>SRF Thermal Dryer</b>			
Condensate from Exhaust Air Stream		2503	
<b>TOTAL</b>	<b>31202</b>	<b>20389</b>	Cubic Metres
<b>Total Fresh Water Requirement (Note 1)</b>	<b>14097</b>		<b>Cubic Metres Per Annum</b>
<b>Excess Waste Water</b>		<b>3285</b>	<b>Cubic Metres Per Annum</b>

Note 1: Fresh water for Process (excludes fresh water required elsewhere - e.g. Administration and Welfare Building)





**Indicative Water Flow Diagram**  
**Configuration A (MBT with Composting)**



**Indicative Water Flow Diagram**  
**Configuration B (MBT with Dry Anaerobic Digestion and Composting)**

## APPENDIX 2

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### **Water Supply Design**

Potable Water Calculations

Fire Water Calculations

Rainwater Harvesting System Supplier Catalogue

# CALCULATION SHEET

Ref No: 6301

PROJECT: Drehid Mechanical Biological Treatment Facility

Sheet No: 1

Designer: DC

ELEMENT: Potable Water Demand

Date: 28/02/2012

**File Location:** W:\Projects\6301 - Drehid MBT Facility\05-Design\01-Calculations\Engineering Services  
**This Element:** Potable Water Demand

## Overall Supply

### Design Population

Site	Max. No. Visitors	Max. No. Employees	Total
Drehid MBT	25.0 persons	74.0 persons	99.0 persons

Staff Water Usage Rate	60.0 l/day/person	(See Note 2)
Visitor Water Usage Rate	10.0 l/day/person	(See Note 2)

## Demand

	EPA Design Guidelines
Avg. Daily Demand	0.054 l/sec
Peak Demand	0.136 l/sec
Min. $\varnothing$	12.00 mm

## Pipe Sizing

Therefore, use 100 mm diameter watermain.

## Notes:

1. Pipe sizing uses an average velocity of  $v = 1.2$  m/s
2. The Flow rates are obtained from Table 3 Wastewater Treatment Manuals (pg.8).

## CALCULATION SHEET

Ref No: 6301

Sheet No: 1

PROJECT: Drehid Mechanical Biological Treatment Facility

Designer: DC

ELEMENT: Firemain Supply

Date: 28/02/2012

**File Location:** W:\Projects\6301 - Drehid MBT Facility\05-Design\01-Calculations\Engineering Services

**This Element:** Firemain Supply

### Overall Demand

Quantity 83.3 L/s (See Note 1)

### Pipe Sizing

Ø	velocity
100	10.61 m/s
150	4.71 m/s
200	2.65 m/s

Therefore, use 150 mm diameter firemain. (See Note 2)

### Tank Sizing

Duration 6.0 hours (See Note 1)

Storage Volume  
Required 1799.3 m3

### Notes:

- Guidelines on flow requirements for developments served by Dublin Fire Brigade - Class II
- Wavin Polyethylene Water Systems Technical Guide - max. velocity = 5.0 m/s



# RainSava

Rainwater Harvesting  
System for the  
Commercial Market



## Technology That Serves Customers and the Environment

Anua means 'to renew'. It describes our renewed contract with nature and our renewed focus on the development of innovative environmental solutions. We continue to develop and produce the sustainable technologies that our customers demand. Anua is part of Bord na Móna, a highly successful organisation and Ireland's leading resources company for over 75 years, which has a unique heritage and understanding of the natural environment. Bord na Móna has used its expert insights into natural processes, allied to its excellent in-house research facilities, to develop sustainable solutions across a wide range of environmental challenges – wastewater treatment, odour abatement, land reclamation, power generation, resource recovery and renewable energy. This is both Anua's history and our mission for the future. Our customers range from homeowners to major commercial, municipal and utility clients, united in seeking cost-effective solutions based on environmentally sound principles. Anua exists to serve both our customers and the natural environment. Across a broad range of sectors in countries around the world, our customers trust us to deliver the best sustainable solutions, backed by superior customer service. That is why we work with our clients throughout every project to achieve the best possible result, one that will build both our reputations. Anua enjoys the benefit of the support of a highly respected parent company with over 20 years experience in developing sustainable clean air and clean water solutions. As part of this wider organisation, we adhere to their world-class standards and values for both the technology we provide and the service we give our customers.

## Complete Solutions

We don't just sell technologies. With our extensive laboratories and Innovation Centres located in Europe and the USA, we understand new challenges, pioneer research and create new processes. We work with you to create the systems you require, ensure correct installation and offer the full services of our nationwide network of support agents and technicians. From pre-planning to installation, service and maintenance, as well as the offer of monitoring and laboratory services, Anua stands by its technology and its customers.

## Customised for Customers

Customers need a partner – and products – they can trust. Like nature itself, Anua must be adaptable and responsive to change. That means developing the solutions that best suit each individual project. For Anua staff, understanding their customers' world is their business. That depth of understanding is matched by the depth of our customer support and focus. We work with clients to design solutions that are technically superior and cost-effective. We're with you every step of the way.



### The Environmental Advantages of RainSava

- Utilisation of a valuable natural resource
- Filtered rainwater can be utilised for non-potable applications
- Reduced demand on the mains water supply
- Can form part of a SUDS solution - storm water management
- Low power requirements

### The RainSava Advantages for You

- With ever-rising utility costs, it can make significant savings for your business, year after year
- The financial benefit of converting from mains to rainwater usage begins as soon as the RainSava system is operational
- Aids alignment with corporate social and sustainability responsibilities
- Many commercial premises have large roof areas and are therefore able to collect large volumes of rainwater
- The RainSava Commercial System is designed and manufactured to meet the exact requirements of your project
- Ease of installation reducing site costs through time and materials
- Designed for low maintenance
- Anua's solutions are ideally suited to commercial applications:
- Office Buildings
  - Warehouse & Factories
  - Industrial Developments
  - Schools & Public Buildings
  - Farms and Agricultural Buildings
  - Garden Centres & Nurseries
  - Housing Developments
  - Car & Truck Washes



# The RainSava Commercial System At Work

## RainSava: The Rainwater Harvesting Solution

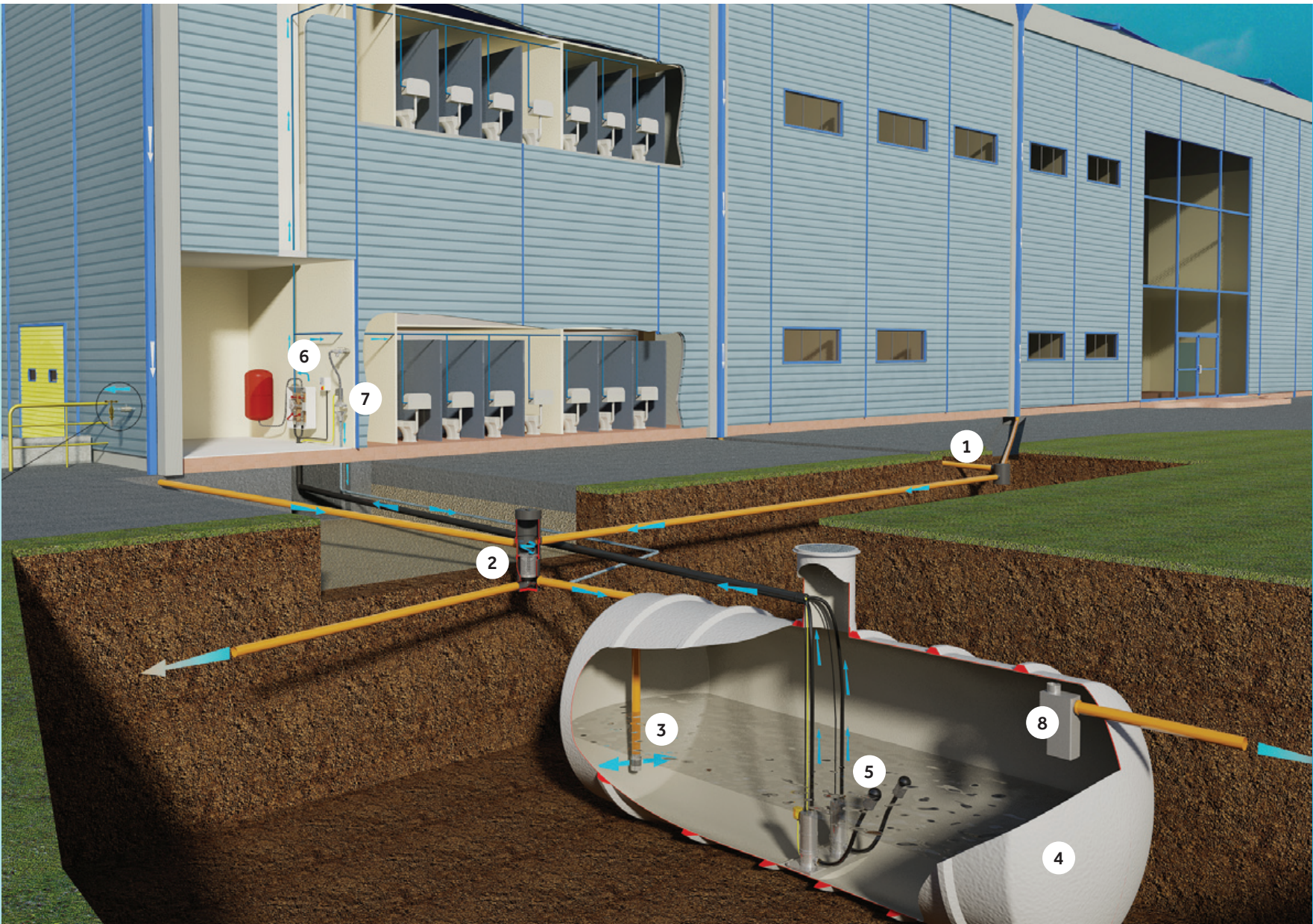
Rainwater harvesting is not a new concept. Its popularity has increased significantly in recent years with the recognition that mains tap water is becoming an increasingly precious commodity. Rainwater offers a sustainable, environmental alternative to purified drinking water for non-potable use. Collecting rain from your roof also reduces surface water from your development and may offer a storm water management solution.

Nature delivers an abundant supply of water directly to your property. The roof, gutters and down pipes act as an inbuilt collection system. The RainSava rainwater harvesting system works by taking this rain, filtering out debris such as leaves and storing the water in an underground tank. The water is then pumped into the property to be used for non-potable applications such as toilet flushing, laundry and for outside use such as sprinkler systems and vehicle cleaning.

Purified mains water is necessary for drinking, cooking, dishwashing and body care. But, typically, that accounts for less than half of commercial water usage, in certain commercial applications up to 90% of water use is categorised as non-potable. Almost a third of the water is used to flush toilets. Rainwater is the sustainable choice.

## Important Principles of Rainwater Storage in accordance with BS 8515:2009

- 1. Water must be filtered** - before entering the storage element of the system the collected rainwater should undergo filtration to prevent build up of debris in the tank.
- 2. Water that enters the tank must be ‘calmed’**- rather than openly discharge into the tank it should be directed to the bottom where it can gently percolate upwards under laminar flow, below the minimum water level preventing turbulence which would disturb settled particles at the tank base. It is important that this bottom sediment is not disturbed as in time it will form a beneficial biological layer that assists in maintaining water quality.
- 3. The tank must overflow periodically** - at least twice per year, in order that any floating debris can be removed by the skimming effect of a suitable overflow device. For this reason the volume of the tank should be carefully calculated to ensure that overflow conditions occur.
- 4. Water should be extracted from the cleanest part of the tank** - at 100 to 150mm below the surface, as achieved by the use of a fixed or floating suction filter. This ensures that the water extracted is from the cleanest zone avoiding both floating debris and sedimentation.



The illustration above is a typical Rainsava Commercial System installation

## The RainSava System At Work

- 1. Collection:** Selected surfaces collect the rainwater which then travels through standard pipework systems.
- 2. Filtration:** Before being stored the water is filtered to prevent debris and leaves entering the system. The filtration selection is dependent on the particular requirements of the project.
- 3. Calmed Flow:** The smoothing inlet calmer prevents turbulent flow in the storage unit ensuring a larger clear zone.
- 4. Storage:** The filtered water is stored for a defined design volume and period. Typically the storage units are manufactured from GRP (Glass Reinforced Plastic) configured for underground or above ground installation.
- 5. Delivery:** Water is taken from the storage tank for usage via submersible pumps with floating suction filters attached. The fine mesh micron filter intake position is just below the surface of the water – this location in conjunction with the micron filter ensures delivery of the cleanest water possible. Systems can be installed in two ways; Direct or Gravity. The Direct System pumps the water directly to the identified usage locations while the Gravity System uses an intermediate storage unit – header tanks or otherwise - to store the filtered water and deliver the water by gravity to the required location.
- 6. Controls:** The delivery pumps are controlled using combined pressure switches and flow controllers to activate the pumps according to demand, ensuring minimal energy usage. Pressure vessels are supplied for applications where pump hunting\* could be an issue.
- 7. Mainswater top-up:** When stored water is not available the system automatically switches to mains water top up, provided by a solenoid valve which is controlled by a float switch in the tank, thereby ensuring that a constant water supply is maintained without user intervention.
- 8. Overflow:** During extreme rainfall events, the overflow unit allows discharge of excessive flows . The Anua overflow unit provides a skimming facility which periodically removes pollen and other debris floating at top water level, which if retained within the storage unit can have a detrimental effect on the delivered water quality. The overflow arrangement contains an anti-backflow capability to maintain the stored water quality.

\*Applications with large demand over short periods such as toilet flushing during break-times in schools.

## Diagram Index

- 1 Collection:** Pipework systems
- 2 Filtration:** Filter
- 3 Calmed flow:** Inlet calmer
- 4 Storage:** GRP tank
- 5 Delivery:** Submersible pumps & floating suction filters
- 6 Controls:** Pressure switches and flow controllers
- 7 Mainswater top-up:** Solenoid valve controlled by a float switch in the tank
- 8 Overflow:** Overflow unit

## Detailed Design Approach

Our dedicated technical design team provides individual attention to each project to build the optimum solution around your project’s needs. We design the best solution for your property based on but not limited to the following criteria:

- Type of property** – School, Hotel, Offices.
- Age of property** – New or Existing building.
- Potential Demand** – The amount of captured water that is required for each area.
- Collection** – Calculation of potential yield utilising location metrological data, surface type – e.g. roofing material and configuration, pipe work infrastructure.
- Storage** – What space do you have and where will the tanks be sited – above or below ground?
- Installation** – Civil, Mechanical & Electrical installation requirements for your solution.
- Efficiencies & Savings** – Level of reduced water consumption & cost savings.
- Regulation / Legislation** – How your project will best fit with legislative requirements.

## RainSava Standard Storage Tank Dimensions\*

Capacity (litres)	Diameter (metres)	Length (metres)
7500	1.8	3.6
10000	1.8	4.45
12000	1.8	5.4
15000	2.64	3.7
18000	2.64	4.2
20000	2.64	4.6
25000	2.64	5.6
30000	2.64	6.6
40000	2.64	8.6
50000	2.64	10.7
60000	2.64	12.7
70000	2.64	14.7
80000	2.64	16.8
90000	2.64	18.9
100000	2.64	20.9

\*Non-standard units are available in larger diameters and greater lengths





### Meeting the Highest Standards

Anua is committed to meeting and surpassing the highest quality standards required for each of its products. That's why you will always see national and/or international standards, accreditations for all Anua products.

Free pre-planning and site reports

Free no obligation quotations

Nationwide maintenance call-out service

Expert customer support

### Simple Installation, Minimum Maintenance

While the RainSava system is made up of a number of separate components, we understand the pressures to minimise installation costs while maintaining quality. Therefore we design and manufacture the system with ease of installation and reduced maintenance in mind.

### The Anua Guarantee

Every RainSava Commercial System comes with a 12-month parts and labour warranty, but Anua's commitment to you goes far beyond this.

We have a national network of approved agents and installers, who will provide you with:

- Free Pre-Planning and Site Reports
- Free No Obligation Quotations
- Expert Customer Support
- Nationwide Maintenance Call-out Service

For further information, go to [www.anua.co.uk](http://www.anua.co.uk) or [www.anuaenv.ie](http://www.anuaenv.ie)

### Complementary Products for the RainSava Commercial System

- Educational Display Boards
- Pressure Vessel Systems
- Digital Level Monitors
- Booster Pumps Sets
- UV Filtration Systems
- Header Tank Systems

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Renew

Wastewater Treatment

Recover

Rainwater Harvesting

Re-direct

Pumps

Recycle

SUDS

Rarefy

Odour Abatement

Retain

Holding Tanks

In keeping with company policy of continuing research and development and in order to offer our clients the most advanced products, Anua reserves the right to alter specifications and drawings without prior notice.



## APPENDIX 3

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### **Surface Water Design**

Irish Suds – Evaluation of Suds Measures

Irish Suds – Initial Estimate of Suds

Oil Interceptor Supplier Catalogue

Surface Water Network Calculations

Attenuation Pond Calculations

Greenfield Runoff Calculation

# SuDS Site Evaluation

**Site Name:** Bord na Móna, Timhoe Bog

Reference: 1330517813545

Date: 29/2/2012

## 1. Introduction

This is a site specific report to provide outline guidance on drainage and the use of SuDS. Neither HR Wallingford nor any Irish Local Authority is liable for the performance of any drainage scheme which is based upon these results. It is recommended that detailed design of any scheme is carried out before construction takes place.

The following site characteristics were entered.

**Site Development Includes:** Industrial;

**Drainage Ownership:** Private;

**Site Size:** Between 3 ha and 50 ha.

**Soil Type:** 1 and 2.

**Land Use:** Greenfield Development.

**Location:** Lowlands.

**Other Characteristics:**

**Ground Water:** Less than 2m below surface.

## General

The general principle behind the use of SuDS for any site is to comply with the following:

- achieve adequate water quality treatment
- runoff volumes should be minimised
- runoff rates should be minimised
- the stormwater effluent is treated appropriately before discharge from the site bearing in mind the requirements of the receiving watercourse
- groundwater must be protected

in addition it is desirable to maximise the amenity potential and ecological benefits where there is an opportunity to provide this.

The various suds components should not be treated as individual options, but should be seen as providing a set of drainage features (a **treatment train**) which are appropriate at various scales. It is always desirable to have a mix of suds components across the site to take opportunity of their respective benefits.

## SuDS Ownership

Due to institutional and legislative constraints it is possible that the most technically appropriate solution may not be appropriate due to ownership and maintenance issues. It is essential that any drainage proposal will receive appropriate long-term maintenance.

Private owners have no constraints on the use of any SuDS component. Careful assessment should be made of the risk of a change to the SuDS component occurring in the property and the impact this might have on the whole system performance.

The following table summarises the current position on vesting of SuDS systems in Ireland (LA = Local Authority).

--	--

Ownership/Maintenance by Drainage Organisation				
SuDS Component	LA Drainage	LA Roads	LA Parks	Private
Ponds	No	No	Yes	Yes
Basins	No	No	Yes	Yes
Pervious Pavements	No	No	No	Yes
Swales	No	Yes	No	Yes
Infiltration Trenches	No	No	No	Yes
Soakaways	No	No	No	Yes
Green Roofs	No	No	No	Yes
Rainwater Harvesting	No	No	No	Yes
Bio-retention	No	No	No	Yes

## Design of SuDS

It is important to be aware of both the opportunities and constraints of using SuDS for providing the most appropriate drainage system for a development. For more in-depth guidance the most appropriate document (other than GDS policy guidance) is the SUDS manual by CIRIA and SuDS for High Density Developments by HR Wallingford. Other SuDS reference documents and manuals are to be found in the references section of this web site.

Design of SuDS with access to temporary or permanent water should consider public health and safety as well as issues associated with construction and operational management of the structures.

Where SuDS are being used in rolling or steep terrain careful consideration of site layout planning and SuDS alignment is needed to minimise gradients of swales and construction of large embankments.

## Construction of SuDS

SuDS are a combination of civil engineering structures and landscaping practice. Due to the limited experience of building SuDS in the water industry, there are a number of key issues which need to be particularly considered as their construction requires a change in approach to some standard construction practices. Detailed guidance on the construction related issues for SuDS is available in the SUDS Manual and the associated Construction Site handbook (CIRIA, 2007).

## SuDS Components for Your Site

The following table summarises the SuDS components that might be used at your site, based on the input you have given:

SuDS Component	Applicability
Ponds	yes
Basins	no
Pervious Pavements	yes
Swales	yes
Infiltration Trenches	yes
Soakaways	no
Green Roofs	yes
Rainwater Harvesting	yes
Bio-retention	yes

The following table summarises the SuDS components that might be used at your site, based on the input you have given:

The use of infiltration in industrial areas should normally be avoided unless the risks of serious pollution are assessed as being low.

It is unlikely that most infiltration options will be viable when groundwater is less than 2m deep, though the use of permeable pavements may still be possible.

## Treatment Train

In principle, the more SuDS used in a treatment train the better. Ponds should preferably not be used as the first SuDS component for any paved runoff. Treatment will be more effective and hydraulic benefits will also be gained.

Where commercial or industrial development is proposed, greater emphasis on the treatment train will be required. It would generally be desirable to separate the systems serving these areas from systems serving residential developments.

Where sites are very large, greater emphasis on treatment trains is needed to address the increased risk of accidental pollution incidents.

## 2. Suitable SuDS Components

The following SuDS might be suitable components of the drainage system for the reasons given:

### • Ponds

Ponds are suitable for this site.

Where industrial areas are served by ponds it is important to maximise the treatment process and minimise the transmission of an accidental spillage. Ponds should therefore be designed as multiple units if possible.

Ponds built in permeable soils may require liners to ensure the existence of the permanent pool. The liner may be finished 100 or 200 mm lower than the outlet invert to encourage some infiltration to take place. Design of this perimeter zone should maximise infiltration.

Where the groundwater level is high the permanent pool of a pond should be designed to be at a higher level. This is particularly the case where a liner is to be used to avoid it being displaced. As this does not provide an unsaturated zone below the structure, the pond would be designed to minimise the risk of transmitting pollutants into the groundwater.

### • Pervious Pavements

Pervious pavements are suitable for this site.

Pervious pavements used in industrial areas need to consider the risk of pollutants. In most situations it is likely that the permeable pavement will be lined to avoid the risk of infiltrating pollutants. Experience has shown that great care is needed in making linings watertight due to the practical difficulties of working on a site. Concrete block permeable pavements have been used in industrial situations with heavy goods vehicles. However it is important to specifically address the additional forces to avoid deformation of the pavement.

### • Swales

Swales are suitable for this site.

The land take of swales is significant except for mini-swales. Although these SuDS components are very effective, their use in high density developments may be precluded due to lack of space. In spite of this issue of land take and adoption difficulties, the use of these SuDS units is very desirable due to their effectiveness in addressing both hydraulic and water quality issues. Swales built to serve industrial areas should use soils which are relatively impervious to minimise the risk of infiltrating pollutants.

### • Infiltration Trenches

Infiltration trenches are suitable for this site.

consideration of the risks to groundwater have been assessed in detail.

The use of infiltration trenches where groundwater levels are high is still possible as long as an unsaturated zone of 1 m can be provided.

- **Green Roofs**

Green roofs are suitable for this site.

The use of green roofs provides a number of benefits including reducing runoff volumes for ordinary rainfall events. However they do not have a significant impact on the sizing of main drainage components unless the rainwater is harvested and used.

- **Rainwater Harvesting**

Rainwater harvesting is suitable for this site.

Warning: Rainwater harvesting for large roof areas may have a higher yield than the demand for the collect water. In this situation stormwater management benefits assumed for extreme storm event management will be limited and require careful analysis.

Rainwater harvesting has benefits in reducing potable water demand and also can have a significant impact in reducing the size of some main drainage components if rainfall storage tanks are large enough. Where water resources are particularly scarce, rainwater harvesting should be positively considered. Depending on proposed usage and yield, guidelines suggest that the volume of storage provided should be around 350 litres per person to ensure reasonable continuity of supply. However where rainwater harvesting is used to obtain stormwater management benefits, this figure should be multiplied by around 3 (1000 l/person). Detailed evaluation of the rainwater harvesting benefits requires the use of time series rainfall data.

- **Bio-retention**

Bio-retention is suitable for this site.

Warning: The risk of pollutants affecting the groundwater may be significant if bio-retention is used in industrial areas.

Warning: The use of bio-retention in situations where the groundwater is less than 2m may not be feasible unless the percolation zone depth is kept to a minimum.

### 3. Unsuitable SuDS Components

The following SuDS have been excluded as suitable components of the drainage system for the reasons given:

- **Basins**

Basins are not suitable for this site.

As there should be at least 1 m of unsaturated soil below the base of the basin, it is unlikely that the structure can be used where groundwater levels are high.

- **Soakaways**

Soakaways are not suitable for this site.

The use of soakaways in areas where the groundwater is less than 2 m cannot ensure a minimum unsaturated zone of 1m.

## Initial estimation of SUDS volumes

Reference: 1330517465208

Date: 29/2/2012

Version 1.0

Site name: **Bord na Móna Timahoe Bog**  
 Site location: **Timahoe Bog, Allenwood, Co. Kildare**  
 Site coordinates: **-6.944300,53.359076 -6.934302,53.369075**

This is an estimation of the storage requirements needed to meet surface water drainage criteria for the site.

Site characteristics:	Default values		Corrected values
Area		26.9	ha
Proposed % of Impermeable Area (50-100%)		50	%
% of Impermeable Area Required Treatment		100	%
Soil Type (based on FSR)	2	2	
Hydrological Region	Dublin Region	Dublin Region	
Average Annual Rainfall	826	826	mm
M5-60 Rainfall Depth	17	17	mm
"r" Ratio M5-60/M5-2 day	0.3	0.3	
Climate Change Increase	1.1	1.1	%
<b>Calculated requirements:</b>			
<i>Discharge rate limits:</i>			
1:1 year	54	54	l/s
1:30 year	127	127	l/s
1:100 year	155	155	l/s
<i>Volumetric requirements</i>			
Option 1: Using Long-term Storage:			
-treatment storage	<b>1614</b>	<b>1614</b>	m <sup>3</sup>
-long term storage	<b>1641</b>	<b>1641</b>	m <sup>3</sup>
-attenuation storage	<b>5302</b>	<b>5302</b>	m <sup>3</sup>
-interception storage	<b>538</b>	<b>538</b>	m <sup>3</sup>
Option 2: Without Long-term Storage:			
-treatment storage	<b>1614</b>	<b>1614</b>	m <sup>3</sup>
-attenuation storage	<b>7948</b>	<b>7948</b>	m <sup>3</sup>
-interception storage	<b>538</b>	<b>538</b>	m <sup>3</sup>

Neither HR Wallingford nor any Irish Local Authority is liable for the performance of any drainage scheme which is based upon the figures given in the report. It is recommended that detailed design of any scheme is carried out before construction takes place.



# SUDS

For the Commercial,  
Municipal and Utility  
Markets



## Technology That Serves Customers and the Environment

Anua means 'to renew'. It describes our renewed contract with nature and our renewed focus on the development of innovative environmental solutions. We continue to develop and produce the sustainable technologies that our customers demand. Anua is part of Bord na Móna, a highly successful organisation and Ireland's leading resources company for over 75 years, which has a unique heritage and understanding of the natural environment. Bord na Móna has used its expert insights into natural processes, allied to its excellent in-house research facilities, to develop sustainable solutions across a wide range of environmental challenges – wastewater treatment, odour abatement, land reclamation, power generation, resource recovery and renewable energy. This is both Anua's history and our mission for the future. Our customers range from homeowners to major commercial, municipal and utility clients, united in seeking cost-effective solutions based on environmentally sound principles. Anua exists to serve both our customers and the natural environment. Across a broad range of sectors in countries around the world, our customers trust us to deliver the best sustainable solutions, backed by superior customer service. That is why we work with our clients throughout every project to achieve the best possible result, one that will build both our reputations. Anua enjoys the benefit of the support of a highly respected parent company with over 20 years experience in developing sustainable clean air and clean water solutions. As part of this wider organisation, we adhere to their world-class standards and values for both the technology we provide and the service we give our customers.

## Complete Solutions

We don't just sell technologies. With our extensive laboratories and Innovation Centres located in Europe and the USA, we understand new challenges, pioneer research and create new processes. We work with you to create the systems you require, ensure correct installation and offer the full services of our nationwide network of support agents and technicians. From pre-planning to installation, service and maintenance, as well as the offer of monitoring and laboratory services, Anua stands by its technology and its customers.

## Customised for Customers

Customers need a partner – and products – they can trust. Like nature itself, Anua must be adaptable and responsive to change. That means developing the solutions that best suit each individual project. For Anua staff, understanding their customers' world is their business. That depth of understanding is matched by the depth of our customer support and focus. We work with clients to design solutions that are technically superior and cost-effective. We're with you every step of the way.

## What is SUDS?

Sustainable Drainage Systems – also known as SUDS – is a range of techniques which aims to provide a sustainable approach to managing drainage from developments to protect and ensure long-term viability of our water resources. Increasing levels of run-off from impermeable surfaces areas such as roads, car parks and roofs create a pressure on the existing natural drainage systems which increases the risk of flooding and pollution.

Our integrated approach of closely replicating the natural drainage from the site and treating run-off to remove pollutants allows us to reduce flood risk, protect water quality and aid sustainability of water resources.



### The Environmental Advantages of Anua SUDS

- Protection of water quality levels in the receiving waters
- Conserves and utilises the natural resource of rainwater
- Minimises the environmental impact of surface water from developments
- Allows a holistic approach to surface water management
- Aids flood prevention
- Helps the sustainability of water resources
- Ensures the stability and durability of drainage systems

### The Anua SUDS Advantages for You

- Durable systems made from high quality components
- Flexible design and manufacturing process ensures the correct solution
- Ease of installation – Pre-fitted units
- Certified to BS EN 858 - 1
- Backed up by superior technical and legislative knowledge



# Anua SUDS At Work

Anua’s range of solutions allow the drainage designer to employ a holistic approach to achieve the optimum solution. The three main areas of focus are:

**Storm Attenuation**

Reduces the velocity rate of run-off from the development and replicates natural drainage patterns to reduce the risk of flooding.

**Separation**

Protects receiving waters by removing pollutants such as petrol, diesel and oils from the development run-off.

**Rain Harvesting**

Reduces the volume of run-off from the development and reduces potable water demand by harvesting the rainwater onsite.

**1. Anua Attenuation Systems**

When the level of surface water run-off onsite is above the permitted discharge rate, typically during storm conditions, then the excess volume needs to be retained. This is discharged afterwards at the allowed rate when conditions are suitable (i.e. when the storm subsides). There are two methods for attenuating the flow (balancing the flowrate):  
The first method utilises the Anua Flow Regulator devices, allowing a set designed flowrate through the control unit, while the balance volume of flow is stored in the chamber specifically designed for the project’s expected flows. The operation is carried out by gravity with the flow regulator housed either in a separate chamber or a stage of the tank.  
The second method utilises the Anua Horizontal Pump Stations range: the pumps are set at the required discharge rate as the flow regulator. This option is suitable where the site levels do not provide a suitable fall by gravity. For more detail on our pumping solutions please see the Anua Pump Stations brochure.  
Tank sizes for both methods are project dependent, with single unit capacity up to 100,000 litres and multiple units utilised thereafter.

**2. Anua Separation Systems**

Separators remove oil and liquid hydrocarbons from surface water run-off while aiding settlement of silt and other suspended solids to avoid pollution of receiving waters. For instance, diesel, petrol and engine oil in surface water run-off from vehicle hard standings. All Anua Separators are supplied in two distinct ranges dependent on the application characteristics, are fully certified to BS EN 858 – 1 and comply with PPG3 requirements.

**Quality and Precision You Can Rely On**

The Anua chambers are manufactured at our dedicated facility from GRP (Glass Reinforced Plastic) to the highest standard in accordance with BS EN 4994. Utilising GRP means our chambers are robust, corrosion resistant, maintenance free and durable with a design life of over 25 years.

We have developed rigorous control procedures at all stages of manufacture to ensure that your product is built to the highest possible standards in accordance with the quality procedures of the ISO 9001:2000 Quality Assurance system and the ISO 14001 Environmental system.

**Anua Bypass Separators**

Used in low risk applications, such as retail car parks or roadways, the system accepts and treats the initial surface water entering the separator up to a defined flowrate. The operational capacity of the system is designed for settlement of pollutant contaminants and floatation of hydrocarbons. These elements are retained in this chamber with the settled flow traveling through final coalescing filtration for full treatment prior to discharge.

As the flowrate intensifies above this defined level, the flow will bypass though a weir arrangement directly to the discharge point. All Anua Bypass Separators are designed with oil storage, silt storage and coalescing filters included as standard.

**Anua Full Retention Separators**

Full Retention Separators are used in a wide variety of high-risk applications, such as commercial garages and breakers yards, where the risk of oil spillage is significantly greater. In this instance the system treats the complete throughput in a similar manner to the initial bypass separator flow, with all flows required to travel through the coalescing filter before discharge. An automatic closure devise is provided as standard to ensure no contaminants pass to discharge and activates when oil storage levels reach designed storage capacity.

**Anua Forecourt Separators**

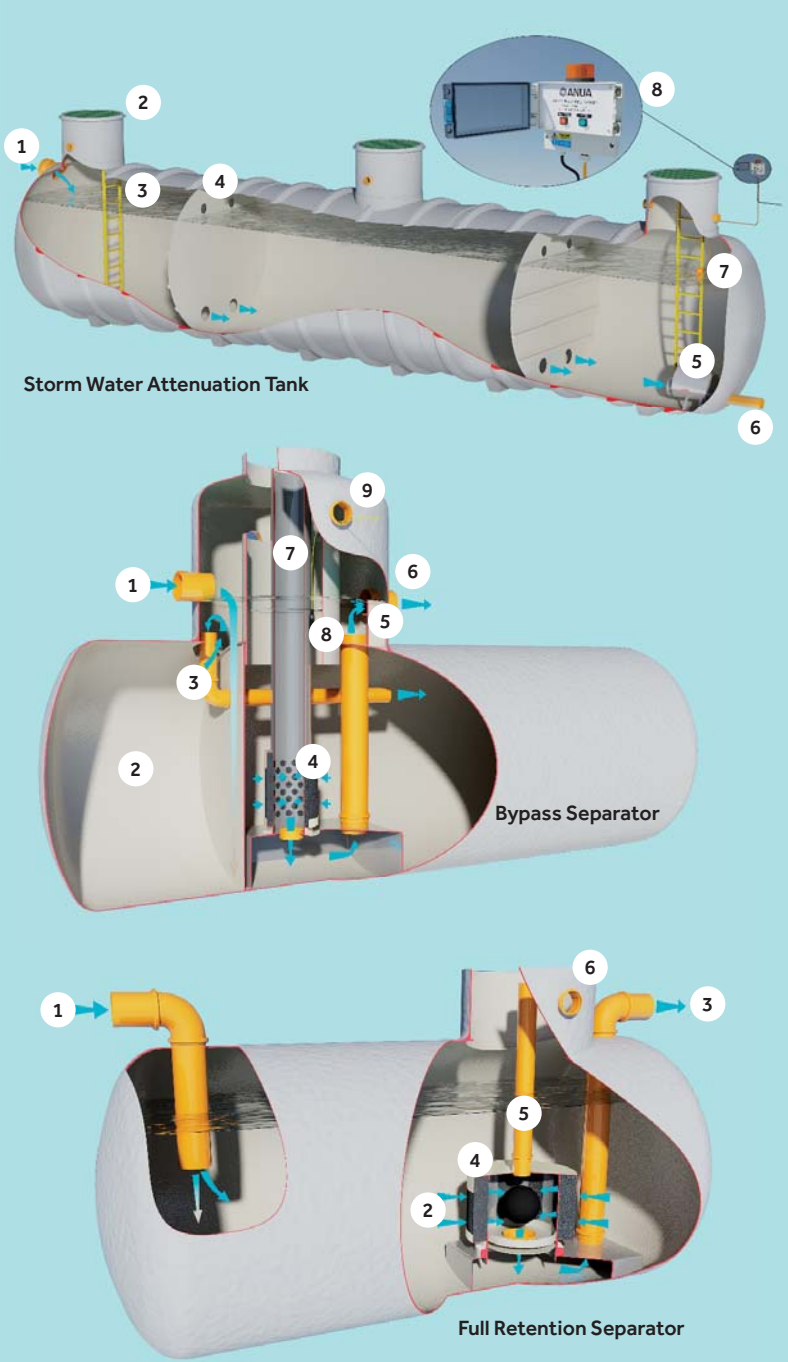
Forecourt Separators which are similar in configuration and operation to Full Retention Separators are used where any retail or commercial fuel is dispensed. Adequate capacity must be provided to contain any spillage from the delivery vehicle refueling the site storage tanks. For example, a domestic retail fuel station requires a separator with a capacity of 7,600 litres in case the tanker has a spillage on the forecourt.

**3. Anua RainSava Systems**

Collection and utilisation of rainwater offers a sustainable, environmental alternative to purified drinking water for non-potable use while reducing the level of surface water run-off from the development. Purified mains water is necessary for drinking, cooking, dishwashing and body care. But typically, that accounts for less than half of commercial water usage with almost a third of the water being used to flush toilets. For more details, please see the Anua RainSava Residential and Commercial brochures.

All Anua Separator Systems are designed, manufactured and certified to BS EN 858 – 1 and are in compliance with PPG3. Our SUDS solutions are developed in consultation with regulatory documentation such as British Building Regulations Part H3, and the SUDS manuals C697 and C698.

Our flexible manufacturing process allows us to tailor the solution to best fit your project requirements with units built to suit deep inverts, shallow inverts or above / below ground installations.



The illustrations above are a typical Storm Water Attenuation Tank, Bypass Separator and Full Retention Separator.

**Diagram Index**

**Storm Water Attenuation Tank**  
1. Inlet  
2. Access turret  
3. Access ladder  
4. Overflows  
5. Flow controller  
6. Outlet  
7. Level indication  
8. Alarm unit

**Full Retention Separator**  
1. Inlet  
2. Coalescing filter  
3. Outlet  
4. Filter closure device  
5. Service duct  
6. Vent

**Bypass Separator**  
1. Inlet  
2. Silt storage  
3. Forward feed line  
4. Coalescing filter  
5. Bypass weir  
6. Outlet  
7. Service duct  
8. Oil level sensor  
9. Vent

**Detailed Design Approach**

Our dedicated technical design team provides individual attention to each project to build the optimum solution around your needs, working with you to focus on:

**Application:** Housing, school, hotel, offices, retail parks.

**Peak Flow Rates:** The design flow rates from the development will have a number of considerations such as the material type of surface areas e.g. concrete, the amount of area, the rainfall detail for the geographical location and the design rainfall intensity.

**Discharge Rates:** Permitted discharge rate from the development by the applicable authority, the receiving water conditions and the level of treatment if required.

**Rainwater Potential Demand:** How much captured water is required to which locations within the development, such as toilets.

**Pipework Detail:** Drainage pipework sizes, materials and depths.

**Chamber Design:** Required storage volume , installation depth, ground conditions.

**Installation:** Civil, mechanical & electrical installation requirements for your solution.

**Efficiencies & Savings:** Pump, station pipework and rising main selection to provide optimum life cycle costs.

**Regulation / Legislation:** What specific requirements the solution needs to meet.

**Full Retention Separator Specification**

Separator Model	Area Drained (m <sup>2</sup> )	Tank Diameter (mm)	Tank Length (mm)	Oil Storage (litres)	Silt Storage (litres)
NS3	167	1000	2763	30	300
NS4	222	1200	3300	40	400
NS6	333	1500	2670	60	600
NS8	444	1500	3010	80	800
NS10	556	1500	3900	100	1000
NS15	833	1800	4400	150	1500
NS20	1111	1800	4600	200	2000
NS25	1389	1800	5840	250	2500
NS30	1667	1800	7000	300	3000
NS40	2222	1800	9260	400	4000
NS50	2778	1800	9570	500	5000
NS60	3333	2600	7300	600	6000
NS70	3889	2600	8465	700	7000
NS80	4444	2600	9643	800	8000
NS90	5000	2600	10820	900	9000
NS100	5556	2600	12000	1000	10000
NS110	6111	2600	13175	1100	11000
NS120	6667	2600	14841	1200	12000

**Bypass Separator Specification**

Separator Model	Area Drained (m <sup>2</sup> )	Tank Diameter (mm)	Tank Length (mm)	Oil Storage (litres)	Silt Storage (litres)
NSB3	1667	1000	1800	45	300
NSB4.5	2500	1000	2380	67.5	450
NSB6	3333	1000	2711	90	600
NSB8	4444	1200	2162	120	800
NSB10	5556	1200	2690	150	1000
NSB15	8333	1800	2925	225	1500
NSB20	11111	1800	3090	300	2000
NSB25	13889	1800	4562	375	2500
NSB30	16667	1800	4570	450	3000
NSB40	22222	1800	4750	600	4000
NSB50	27778	1800	5900	750	5000
NSB60	33333	2600	4794	900	6000
NSB70	38889	2600	5556	1050	7000
NSB80	44444	2600	6320	1200	8000
NSB90	50000	2600	7080	1350	9000
NSB100	55556	2600	8400	1500	10000
NSB110	61087	2600	9220	1650	11000





## Meeting the Highest Standards

Anua is committed to meeting and surpassing the highest quality standards required for each of its products. That's why you will always see national and/or international standards, accreditations for all Anua products.

Free  
pre-planning  
and site  
reports

Free  
no obligation  
quotations

Nationwide  
maintenance  
call-out service

Expert customer  
support

## Simple Installation, Minimum Maintenance

We understand the pressures to minimise installation costs while maintaining quality. Therefore we design and manufacture the system with ease of installation and maintenance in mind. Our in-house manufacturing and fitting capabilities ensure that all tank pipe inverts / positions meet with your exact requirements for a quick, simple installation. Anua's systems have all internal parts pre-fitted which means no requirement to enter the tank, reducing Health & Safety risks.

## The Anua Guarantee

Every Anua Sustainable Drainage System comes with a 12-month parts and labour warranty, but Anua's commitment to you goes far beyond this.

We have a national network of approved agents and installers, who will provide you with:

Free Pre-Planning and Site Reports

Free No Obligation Quotations

Expert Customer Support

Nationwide Maintenance Call-out Service

For further information, go to [www.anua.co.uk](http://www.anua.co.uk) or [www.anuaenv.ie](http://www.anuaenv.ie)

## Complementary Products for SUDS

- Oil Monitoring Alarms
- Pump Station Alarms
- Remote Monitoring Unit
- Inspection Chambers
- Commissioning by our highly trained engineers
- Non-standard covers sizes and load ratings
- Service & Maintenance Agreement
- Weatherproof GRP Kiosks

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### Renew



Wastewater  
Treatment

### Recover



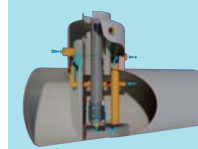
Rainwater  
Harvesting

### Re-direct



Pumps

### Recycle



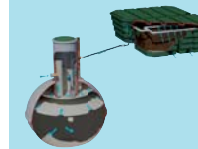
SUDS

### Rarefy



Odour  
Abatement

### Retain



Holding  
Tanks

In keeping with company policy of continuing research and development and in order to offer our clients the most advanced products, Anua reserves the right to alter specifications and drawings without prior notice.



Paper made from trees matured in sustainable,  
well managed forests and is certified to FSC standards

**CALCULATION SHEET**

<b>Ref No:</b>	<b>6301</b>
<b>Sheet No:</b>	<b>1</b>
<b>Designer:</b>	<b>DC</b>
<b>Date:</b>	<b>28/02/2012</b>

**PROJECT: Drehid Mechanical Biological Treatment Facility**
**ELEMENT: Surface Water Flow Calculation**

**File location:** W:\Projects\6301 - Drehid MBT Facility\05-Design\01-Calculations\Engineering  
**This Element:** Surface Water Flow Calculation

**Note:** "A" Refers to Impervious Area Only  
 Rainfall Intensity (i) mm 50

Sewer Ref:		Area		Runoff		Pipe				
		A (Ha)	Cum. A (Ha)	Q l/s	Cum. Q l/s	Run m	Dia mm	Gradient 1 : x	Velocity m/sec	Capacity l/sec
MHS 1.0	P.S.	0.0000	8.8055	0.000	1223.965	24.00	975	350	1.753	1308.560
MHS 1.1	MHS 1.0	0.3403	8.8055	47.302	1223.965	30.00	975	350	1.753	1308.560
MHS 1.2	MHS 1.1	0.5236	5.6908	72.780	791.021	90.70	800	300	1.675	842.036
MHS 1.3	MHS 1.2	0.0000	3.1904	0.000	443.466	19.87	650	300	1.471	488.255
MHS 1.4	MHS 1.3	0.0000	3.1904	0.000	443.466	56.68	650	300	1.471	488.255
MHS 1.5	MHS 1.4	2.7365	3.1904	380.374	443.466	285.81	650	300	1.471	488.255
MHS 1.6	MHS 1.5	0.3196	0.4539	44.424	63.092	59.42	300	300	0.901	63.694
MHS 1.7	MHS 1.6	0.0000	0.2949	0.000	40.991	23.65	275	300	0.852	50.606
MHS 1.8	MHS 1.7	0.1343	0.1343	18.668	18.668	55.80	225	300	0.748	29.751
MHS 1.2.1	MHS 1.2	0.7214	1.9768	100.275	274.775	16.90	525	300	1.287	278.511
MHS 1.2.2	MHS 1.2.1	0.0000	1.2554	0.000	174.501	35.01	450	300	1.167	185.623
MHS 1.2.3	MHS 1.2.2	1.2554	1.2554	174.501	174.501	50.67	450	300	1.167	185.623
MHS 1.2.4	MHS 1.2.3	1.2254	1.2254	170.331	170.331	130.25	450	300	1.167	185.623
MHS 1.5.1	MHS 1.5	0.3268	0.7278	45.425	101.164	59.42	375	300	1.039	114.801
MHS 1.5.2	MHS 1.5.1	0.0273	0.4010	3.795	55.739	23.60	300	300	0.901	63.694
MHS 1.5.1.1	MHS 1.5.1	0.1411	0.2972	19.613	41.311	55.82	275	300	0.852	50.606
MHS 1.5.3	MHS 1.5.2	0.1642	0.1642	22.824	22.824	70.60	225	300	0.748	29.751
MHS 1.5.4	MHS 1.5.2	0.0684	0.0684	9.508	9.508	55.82	225	300	0.748	29.751
MHS 1.6.1	MHS 1.6.	0.0877	0.0877	12.190	12.190	55.82	225	300	0.748	29.751
MHS 1.7.1	MHS 1.7	0.0729	0.0729	10.133	10.133	27.00	150	300	0.574	10.137
MHS 1.9	MHS 1.1	0.6358	2.7744	88.376	385.642	142.06	625	300	1.436	440.456
MHS 1.10	MHS 1.9	0.8208	2.1386	114.091	297.265	154.60	575	300	1.362	353.782
MHS 1.11	MHS 1.10	0.0000	1.3178	0.000	183.174	12.47	450	300	1.167	185.623
MHS 1.12	MHS 1.11	1.3178	1.3178	183.174	183.174	203.20	450	300	1.167	185.623

**CALCULATION SHEET**

<b>Ref No:</b>	<b>6301</b>
<b>Sheet No:</b>	<b>2</b>
<b>Designer:</b>	<b>DC</b>
<b>Date:</b>	<b>28/02/2012</b>

**PROJECT: Drehid Mechanical Biological Treatment Facility**
**ELEMENT: Manhole Schedule**
**File location:** W:\Projects\6301 - Drehid MBT Facility\05-Design\01-Calculations\Engineering Services

**This Element:** Manhole Schedule

 Min cover in Trafficked areas is  
 Min cover in Other areas is

1.2 m
0.9 m

MH No.	MH No.	Upstream C.L	Downstream C.L	Upstream I.L	Downstream I.L	Upstream Cover	Downstream Cover	Distance
MHS 1.0	P.S.	84.00 mOD	84.00 mOD	79.80 mOD	79.73 mOD	3.23 m	3.29 m	24.00
MHS 1.1	MHS 1.0	84.00 mOD	84.00 mOD	79.89 mOD	79.80 mOD	3.14 m	3.23 m	30.00
MHS 1.2	MHS 1.1	84.00 mOD	84.00 mOD	80.86 mOD	79.89 mOD	2.34 m	3.32 m	90.70
MHS 1.3	MHS 1.2	84.00 mOD	84.00 mOD	80.92 mOD	80.86 mOD	2.43 m	2.49 m	19.87
MHS 1.4	MHS 1.3	84.00 mOD	84.00 mOD	81.11 mOD	80.92 mOD	2.24 m	2.43 m	56.68
MHS 1.5	MHS 1.4	84.00 mOD	84.00 mOD	82.06 mOD	81.11 mOD	1.29 m	2.24 m	285.81
MHS 1.6	MHS 1.5	84.00 mOD	84.00 mOD	82.31 mOD	82.06 mOD	1.39 m	1.64 m	59.42
MHS 1.7	MHS 1.6	84.00 mOD	84.00 mOD	82.39 mOD	82.31 mOD	1.34 m	1.41 m	23.65
MHS 1.8	MHS 1.7	84.00 mOD	84.00 mOD	82.58 mOD	82.39 mOD	1.20 m	1.39 m	55.80
MHS 1.2.1	MHS 1.2	84.00 mOD	84.00 mOD	81.63 mOD	81.57 mOD	1.84 m	1.90 m	16.90
MHS 1.2.2	MHS 1.2.1	84.00 mOD	84.00 mOD	81.75 mOD	81.63 mOD	1.80 m	1.92 m	35.01
MHS 1.2.3	MHS 1.2.2	84.00 mOD	84.00 mOD	81.92 mOD	81.75 mOD	1.63 m	1.80 m	50.67
MHS 1.2.4	MHS 1.2.3	84.00 mOD	84.00 mOD	82.35 mOD	81.92 mOD	1.20 m	1.63 m	130.25
MHS 1.5.1	MHS 1.5	84.00 mOD	84.00 mOD	82.26 mOD	82.06 mOD	1.36 m	1.56 m	59.42
MHS 1.5.2	MHS 1.5.1	84.00 mOD	84.00 mOD	82.34 mOD	82.26 mOD	1.36 m	1.44 m	23.60
MHS 1.5.1.1	MHS 1.5.1	84.00 mOD	84.00 mOD	82.53 mOD	82.34 mOD	1.20 m	1.39 m	55.82
MHS 1.5.3	MHS 1.5.2	84.00 mOD	84.00 mOD	82.58 mOD	82.34 mOD	1.20 m	1.44 m	70.60
MHS 1.5.4	MHS 1.5.2	84.00 mOD	84.00 mOD	82.58 mOD	82.39 mOD	1.20 m	1.39 m	55.82
MHS 1.6.1	MHS 1.6.	84.00 mOD	84.00 mOD	82.58 mOD	82.39 mOD	1.20 m	1.39 m	55.82
MHS 1.7.1	MHS 1.7	84.00 mOD	84.00 mOD	82.65 mOD	82.56 mOD	1.20 m	1.29 m	27.00
MHS 1.9	MHS 1.1	84.00 mOD	84.00 mOD	81.12 mOD	80.64 mOD	2.26 m	2.73 m	142.06
MHS 1.10	MHS 1.9	84.00 mOD	84.00 mOD	81.63 mOD	81.12 mOD	1.79 m	2.31 m	154.60
MHS 1.11	MHS 1.10	84.00 mOD	84.00 mOD	81.67 mOD	81.63 mOD	1.88 m	1.92 m	12.47
MHS 1.12	MHS 1.11	84.00 mOD	84.00 mOD	82.35 mOD	81.67 mOD	1.20 m	1.88 m	203.20

**CALCULATION SHEET**

Ref No:	6301
Sheet No:	1
Designer:	DC
Date:	28/02/2012

**PROJECT: Drehid Mechanical Biological Treatment Facility**
**ELEMENT: Attenuation Pond Calculation**
**SURFACE WATER STORAGE : PIPE/TANK**

Storm Return Period	0.5	1	2	5	10	20	50
Shortcut Key	Ctrl + l	Ctrl + j	Ctrl + y	Ctrl + h	Ctrl + t	Ctrl + e	Ctrl + q

Storm Return Period =	100	Years
Total Site Area =	26.9	Hectares (ha)
Existing Open Space =	26.9	ha
Proposed Impermeable Area		
Roof Area =	6.13	ha
Hard Standing /Road Area =	6.92	ha
Open Area =	13.86	ha
Allowable Outflow =	5.22	Litres/sec/ha

.....@	100%
.....@	100%
.....@	50%

**Rainfall Intensity as recorded at Drehid.**
**1 hectare = 10,000m<sup>2</sup>**

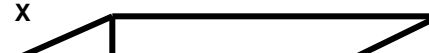
Duration	Rainfall	Intensity	Rainfall	Proposed Runoff	Total Runoff	Allowable Outflow	Storage Req'd
(min)	(mm)	(mm/hr)	(m <sup>3</sup> /ha)	(m <sup>3</sup> )	(m <sup>3</sup> )	(m <sup>3</sup> )	(m <sup>3</sup> )
2	6.2	185.00	62	1232	1232	17	1215
5	11.3	135.36	113	2253	2253	42	2211
10	16.7	100.32	167	3339	3339	84	3255
15	22	86.57	216	4322	4322	126	4196
30	28	55.32	277	5524	5524	253	5271
60	34	33.97	340	6783	6783	506	6278
120	40	20.22	404	8076	8076	1011	7065
240	48	12.00	480	9584	9584	2022	7562
360	55	9.11	547	10915	10915	3033	7882
720	67	5.58	670	13373	13373	6066	7307
1440	78	3.25	780	15586	15586	12132	3454
2880	91	1.90	910	18176	18176	24264	5068

**Minimum value of storage required =**
**7882 m<sup>3</sup>**
**Oversized Pipe Requirements**

Pipe dia.	Length
(mm)	(m)
600	27879
900	12390
1050	9103
1200	6970
1500	4461

**Tank Requirements**

X =	51	m
Y =	3.0	m
Z =	51	m

**Y**
**Z**
**X**


# CALCULATION SHEET

Ref No: 6301  
 Sheet No: 2  
 Designer: DC  
 Date: 28/02/2012

PROJECT: Drehid Mechanical Biological Treatment Facility



1 Calculation

## Extreme Rainfall Return Periods

Location: Lulymore, Co. Kildare

Average Annual Rainfall: 834mm

Maximum rainfall (mm) of indicated duration expected in the indicated return period.

Return Period (years)									
Duration	1/2	1	2	5	10	20		50	100
1 min	1.8				2.1	2.5		3.1	3.6
2 min	3.1				3.6	4.3		5.4	6.2
5 min	5.5				6.5	7.8		9.8	11.3
10 min	7.9				9.3	11.3		14.5	16.7
15 min	4.8	6.1	6.8	9.5	11.8	14.4		18.6	22
30 min	6.3	8.0	8.9	12.4	15.2	18.5		24	28
60 min	8.2	10.2	11.4	15.6	19.1	23		29	34
2 hour	10.6	13.1	14.7	19.5	23	28		35	40
4 hour	14.3	17.5	19.2	25	29	34		42	48
6 hour	16.8	20.4	22	29	34	39		48	55
12 hour	21.5	26	28	36	42	49		59	67
24 hour	26	31	34	43	50	57		69	78
48 hour	32	38	42	52	60	68		81	91

Notes: Larger margins of error for 1, 2, 5 and 10 minute values and for 100 year return periods

M560: 15.6 M52d: 49 M560/m52d: 0.32

**CALCULATION SHEET**

Ref No:	6301
Sheet No:	1
Designer:	DC
Date:	28/02/2012

**PROJECT: Drehid Mechanical Biological Treatment Facility**
**ELEMENT: Attenuation Pond Calculation**
**SURFACE WATER STORAGE : PIPE/TANK**

Storm Return Period	0.5	1	2	5	10	20	50
Shortcut Key	Ctrl + l	Ctrl + j	Ctrl + y	Ctrl + h	Ctrl + t	Ctrl + e	Ctrl + q

Storm Return Period =	100	Years
Total Site Area =	1.5206	Hectares (ha)
Existing Open Space =	1.5206	ha
Proposed Impermeable Area		
Roof Area =	0.11	ha
Hard Standing /Road Area =	1.36	ha
Open Area =	0.05	ha
Allowable Outflow =	5.22	Litres/sec/ha

.....@	100%
.....@	100%
.....@	50%

**Rainfall Intensity as recorded at Drehid.** **1 hectare = 10,000m<sup>2</sup>**

Duration (min)	Rainfall (mm)	Intensity (mm/hr)	Rainfall (m <sup>3</sup> /ha)	Proposed Runoff (m <sup>3</sup> )	Total Runoff (m <sup>3</sup> )	Allowable Outflow (m <sup>3</sup> )	Storage Req'd (m <sup>3</sup> )
2	6.2	185.00	62	92	92	1	91
5	11.3	135.36	113	169	169	2	167
10	16.7	100.32	167	250	250	5	246
15	21.6	86.57	216	324	324	7	317
30	27.7	55.32	277	414	414	14	400
60	34.0	33.97	340	509	509	29	480
120	40.4	20.22	404	606	606	57	548
240	48.0	12.00	480	719	719	114	604
360	54.7	9.11	547	819	819	171	647
720	67.0	5.58	670	1003	1003	343	660
1440	78.0	3.25	780	1169	1169	686	483
2880	91.0	1.90	910	1363	1363	1372	0

**Minimum value of storage required =** **660** m<sup>3</sup>
**Oversized Pipe Requirements**

Pipe dia. (mm)	Length (m)
600	2334
900	1037
1050	762
1200	584
1500	373

**Tank Requirements**

X =	15	m
Y =	3.0	m
Z =	15	m

Y

Z

X



# CALCULATION SHEET

Ref No: 6301  
 Sheet No: 2  
 Designer: DC  
 Date: 28/02/2012

PROJECT: Drehid Mechanical Biological Treatment Facility



**TOBIN**  
 Patrick J. Tobin & Co. Ltd.

1 Calculation

## Extreme Rainfall Return Periods

Location: Lulymore, Co. Kildare  
 Average Annual Rainfall: 834mm

Maximum rainfall (mm) of indicated duration expected in the indicated return period.

Duration	Return Period (years)								
	1/2	1	2	5	10	20	30	50	100
1 min				1.8	2.1	2.5		3.1	3.6
2 min				3.1	3.6	4.3		5.4	6.2
5 min				5.5	6.5	7.8		9.8	11.3
10 min				7.9	9.3	11.3		14.5	16.7
15 min	4.8	6.1	6.8	9.5	11.8	14.4		18.6	22
30 min	6.3	8.0	8.9	12.4	15.2	18.5		24	28
60 min	8.2	10.2	11.4	15.6	19.1	23		29	34
2 hour	10.6	13.1	14.7	19.5	23	28		35	40
4 hour	14.3	17.5	19.2	25	29	34		42	48
6 hour	16.8	20.4	22	29	34	39		48	55
12 hour	21.5	26	28	36	42	49		59	67
24 hour	26	31	34	43	50	57		69	78
48 hour	32	38	42	52	60	68		81	91

Notes: Larger margins of error for 1, 2, 5 and 10 minute values and for 100 year return periods

M560: 15.6 M52d: 49 M560/m52d: 0.32

**CALCULATION SHEET**

Ref No:	6301
Sheet No:	1
Designer:	DC
Date:	28/02/2012

**PROJECT: Dredge Mechanical Biological Treatment Facility**
**ELEMENT: Greenfield Runoff Calculation**

File location: W:\Projects\6301 - Dredge MBT Facility\05-Design\01-Calculations\Engineering Services Report\Appendix III - Surface Water\6301 - Greenfield Runoff Calculation  
 This Element: Greenfield Runoff  
 Engineer: David Conneran

**Runoff Estimation**

$$Q_{bar} = 0.00108 * (AREA)^{0.89} * (SAAR)^{1.17} * (SOIL)^{2.17}$$

SAAR = 834 mm

 Area = 50 ha  
 = 0.5 km<sup>2</sup>

 SOIL = 0.3 (0.15S<sub>1</sub> + 0.3S<sub>2</sub> + 0.4S<sub>3</sub> + 0.45S<sub>4</sub> + 0.5S<sub>5</sub>)

Soil type	S <sub>1</sub>	0
	S <sub>2</sub>	1
	S <sub>3</sub>	0
	S <sub>4</sub>	0
	S <sub>5</sub>	0

$$Q_{bar} = 0.111847031 \text{ m}^3/\text{s}$$

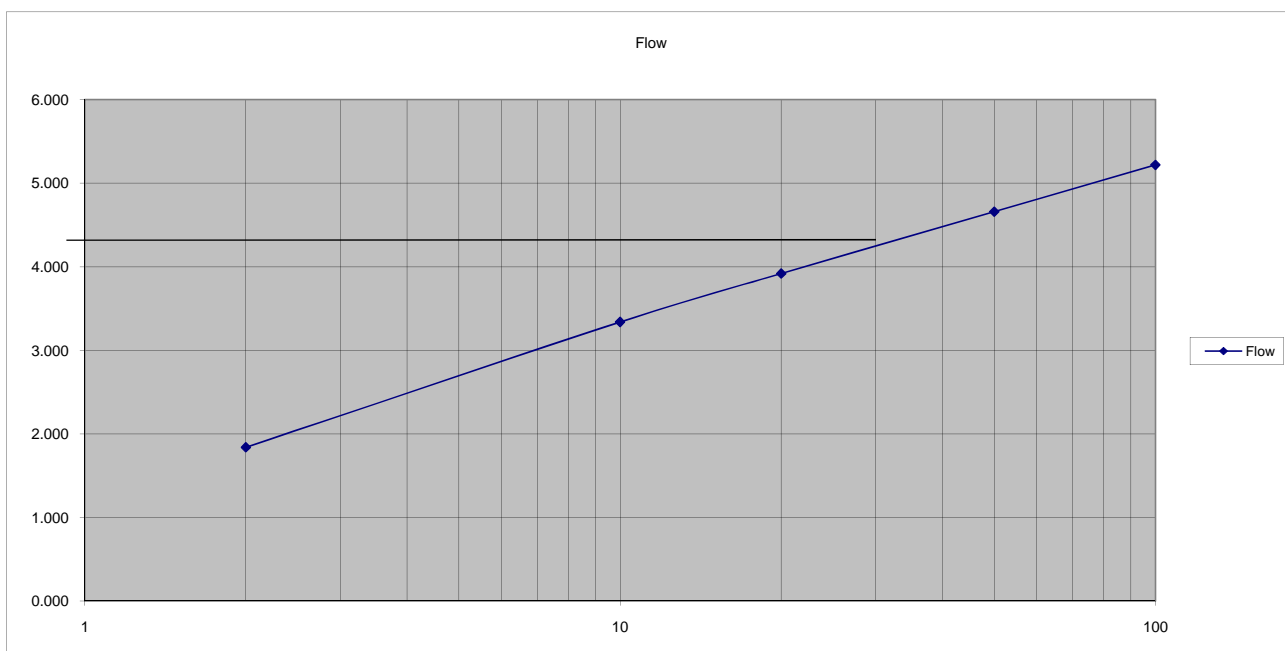
$$= 111.85 \text{ l/s}$$

Allowable Runoff = 2.236940626 l/s/ha use 2l/s/ha (Criterion 4.3, Table 6.3, GDSDS - Volume 2)

 Institute of Hydrology report No.  
 124 - Flood Estimation for Small  
 Catchments

T	Multiplier	Flow
2	0.92	1.840
10	1.67	3.340
20	1.96	3.920
50	2.33	4.660
100	2.61	5.220

157.053





# APPENDIX 4

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## **Foul Water Design**

Foul Discharge Loading

Waste Water Storage Tank Supplier Catalogue

Pumping Station Supplier Catalogue

**CALCULATION SHEET**

Ref No:

6301

PROJECT:

Drehid Mechanical Biological Treatment Facility

Sheet No:

1

Designer:

DC

ELEMENT:

Foul Water Discharge

Date:

28/02/2012

**File location:** W:\Projects\6301 - Drehid MBT Facility\05-Design\01-Calculations\Engineering Services Report\Appendix IV -  
**This Element:** Foul Water Discharge

Applying BS EN 752:

Design Population

Site	Max. No. Visitors per day	Max. No. Employees
Drehid MBT Facility Recovery Facility	25.0 persons	74.0 persons

Average DWF

Staff Foul Discharge	60.0 l/person/day
Visitor Foul Discharge	10.0 l/person/day

DWF

0.054 l/sec

or

4.690 m³/d

Peak Design Flow

6\*DWF

0.326 l/sec

Colebrook-White Formula

Q =	0.326 l/sec	Pipe Dia. Ø =	250.00 mm
ks =	1.50 mm	Gradient =	1 in 200.0
Kinematic viscosity	1.141x10 <sup>-6</sup> m²/sec	Q =	42.619 l/sec <b>OK</b>
Self Cleansing Vel.	0.750 m/sec	v =	0.868 m/sec <b>OK</b>

 BOD<sub>5</sub>

Staff BOD <sub>5</sub>	30.0 g/person/day
Visitor BOD <sub>5</sub>	15.0 g/person/day
Total BOD <sub>5</sub>	2.60 kg/day

WWTP

PE	43.25
Setback Distance	34 m

Summary

Use 225mmØ min. pipe size if using gravity sewers  
 Use 1:200 min. gradient to ensure self-cleansing velocities are achieved with gravity sewers.

Notes:

 1. The Flow and BOD<sub>5</sub> rates are obtained from Table 3 Wastewater Treatment Manuals (pg.8).

# Pump Stations

For the Residential,  
Commercial, Municipal,  
and Utility Markets



## Technology That Serves Customers and the Environment

Anua means 'to renew'. It describes our renewed contract with nature and our renewed focus on the development of innovative environmental solutions. We continue to develop and produce the sustainable technologies that our customers demand. Anua is part of Bord na Móna, a highly successful organisation and Ireland's leading resources company for over 75 years, which has a unique heritage and understanding of the natural environment. Bord na Móna has used its expert insights into natural processes, allied to its excellent in-house research facilities, to develop sustainable solutions across a wide range of environmental challenges – wastewater treatment, odour abatement, land reclamation, power generation, resource recovery and renewable energy. This is both Anua's history and our mission for the future.

Our customers range from homeowners to major commercial, municipal and utility clients, united in seeking cost-effective solutions based on environmentally sound principles. Anua exists to serve both our customers and the natural environment. Across a broad range of sectors in countries around the world, our customers trust us to deliver the best sustainable solutions, backed by superior customer service. That is why we work with our clients throughout every project to achieve the best possible result, one that will build both our reputations.

Anua enjoys the benefit of the support of a highly respected parent company with over 20 years experience in developing sustainable clean air and clean water solutions. As part of this wider organisation, we adhere to their world-class standards and values for both the technology we provide and the service we give our customers.

## Complete Solutions

We don't just sell technologies. With our extensive laboratories and Innovation Centres located in Europe and the USA, we understand new challenges, pioneer research and create new processes. We work with you to create the systems you require, ensure correct installation and offer the full services of our nationwide network of support agents and technicians. From pre-planning to installation, service and maintenance, as well as the offer of monitoring and laboratory services, Anua stands by its technology and its customers.

## Customised for Customers

Customers need a partner – and products – they can trust. Like nature itself, Anua must be adaptable and responsive to change. That means developing the solutions that best suit each individual project.

For Anua staff, understanding their customers' world is their business. That depth of understanding is matched by the depth of our customer support and focus. We work with clients to design solutions that are technically superior and cost-effective. We're with you every step of the way.



### The Anua Pump Station Advantages for You

Flexible design approach to achieve the optimum result

Dedicated manufacturing facilities to meet your specific requirements

Reduced installation costs – quick and easy due to packaged nature

Pre-fitted units means reduced Health & Safety risk onsite

Robust, corrosion resistant, maintenance free GRP chambers with a long design life



# The Anua Pump Stations At Work

Anua offers a comprehensive range of Pump Stations for diverse uses, from domestic installations to large scale commercial and industrial sites. Utilising our design team and in-house manufacturing capability, Anua's Pump Stations can be made to exact customer specifications to meet precise needs and operating conditions.

### Detailed Design Approach

Our dedicated technical design team provides individual attention to each project to build the optimum solution around your project's needs. Utilising our extensive experience in wastewater treatment design, we work with you and focus on:

#### Application Type

Housing, school, hotel, offices, industrial

#### Type of Flow

Wastewater (foul), treated effluent, surface water (storm) or industrial process flow

#### Pipework Detail

Incoming drainage size, material and depth

#### Chamber Design

Storage, installation depth, ground conditions

#### Pump Design

Flow rate, pumping distance, friction losses, static head, electrical supply

#### Rising Main

Length, diameter, material, outlet detail

#### Installation

Civil, mechanical & electrical installation requirements for your solution

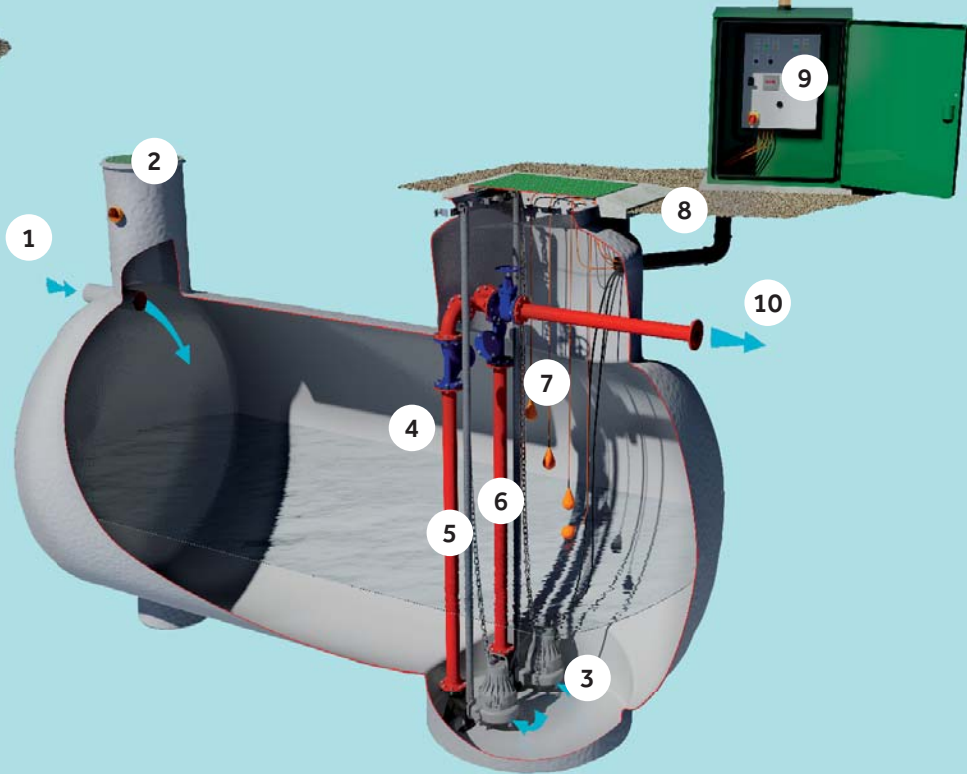
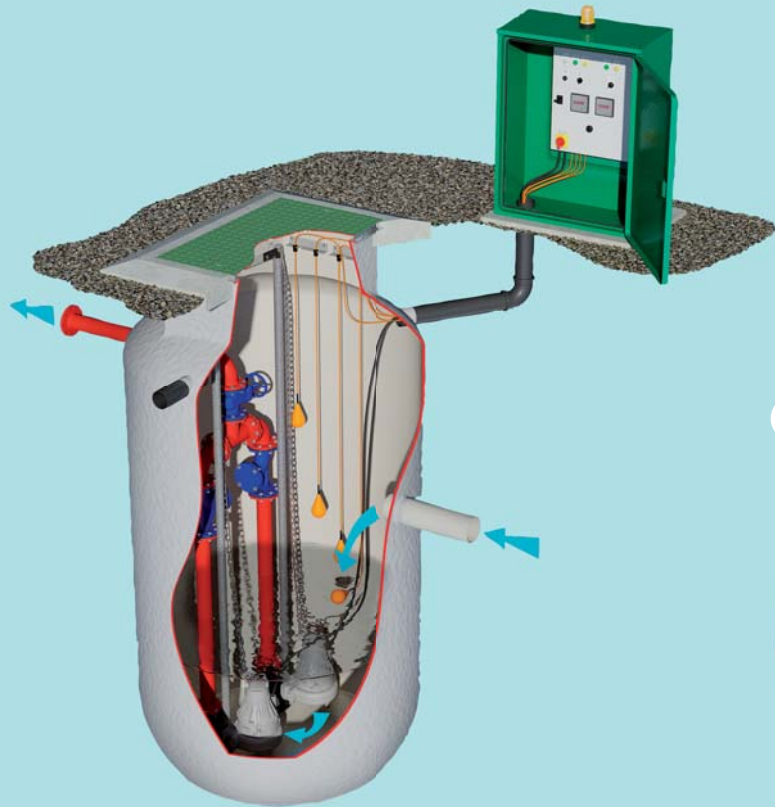
#### Efficiencies & Savings

Pump, station pipework and rising main selection to provide optimum life cycle costs.

#### Regulation / Legislation

What specific requirements the installation needs to meet

Anua's Pump Stations are provided in either vertical or horizontal configuration. Our horizontal ranges of pumping stations are typically supplied as a singular unit up to 100,000 litres with multiple tank systems available for any capacities above this. The horizontal units incorporate an integral pump sump as shown with feet for stability during transportation and installation. Vertical stations are available from standard units to bespoke packaged solutions in a range of diameters in typical incremental depths. External valve chambers are available for ease of maintenance and to meet with project requirements.



Anua's chambers are manufactured at our dedicated facility from GRP (Glass Reinforced Plastic) to the highest standard in accordance with BS EN 4994 and comply with BS EN 12050. We have developed rigorous control procedures at all stages of manufacture to ensure that your product is built to the highest possible standards in accordance with quality procedures of BS EN ISO 9001:2000 Quality Assurance system and the ISO 14001 Environmental system.

Our flexible manufacturing process allows us to tailor the solution to best fit your project requirements with units built to suit deep inverts,

shallow inverts or above / below ground installations. The installed pipework diameters range from DN50mm through to a maximum of DN300mm.

Our range of GRP pumping stations are offered with 24 hour storage capacity as standard to meet with the requirements of Building Regulations Document H1 Foul Drainage, ensuring peace of mind in the unlikely event of a disruption in service.

Utilising GRP means our chambers are robust, corrosion resistant, maintenance free and durable with a design life of over 25 years.

### Diagram Index

- 1 Inlet
- 2 Pump station vent
- 3 Pumps intake
- 4 Station pipework
- 5 Guiderrails
- 6 Lifting chains
- 7 Control switches
- 8 Cable ducting
- 9 Electrical control panel & weatherproof kiosk
- 10 Outlet

### Installation

While an Anua Pump Station is made up of a number of separate components, we understand the pressures to minimise installation costs while maintaining quality. Therefore we design and manufacture the system with ease of installation and maintenance in mind. Our in-house manufacturing and fitting capabilities ensures that all pipe inverts / positions meet with your exact requirements for a quick, simple installation.

Anua's Pump Stations are delivered complete with the internal pipework and valves pre-assembled in the tank. The benefits of this are:

- No on-site labour costs for pipework installation.
- No requirement to enter the tank, reducing any Health & Safety risks that could arise.

We can also offer delivery on HI-AB vehicles – please ask our sales team about this additional service.

### Pumps & Controls

Anua offer a wide selection of high quality submersible pumps to cater for all types of applications and to meet with site requirements. Working with our pump manufacturing partners, our range of pumps includes solids handling, cutter and drainage pumps. Pump controls are typically float control or ultrasonic.

Our pumping stations are manufactured to allow for many different types of pump installation including single pump, dual pump or three pump configuration to ensure that we meet your project requirements. The pumps are offered as free standing or guiderail mounted onto a pre-installed pedestal.

### Control Panels

Anua's standard dual pump control panels are manufactured from stove enameled mild steel enclosures, providing IP54 protection, suitable for internal wall or kiosk mounting (available on request). Typically incorporated as standard:

- Door interlocked incoming mains power isolator
- Hand-Off-Auto selector switches
- Automatic duty pump rotation after each pumping cycle
- Pump motor overload protection
- Terminals to configure station for duty/standby or duty/assist operation
- Long life LED indication lamps
- Volt free contacts for pump tripped and high level alarm
- High level alarm lamp, buzzer, mute button and 24v terminals to power remote flashing beacon
- All out going terminal mounted on internal stand off brackets for easy on-site connection

In addition to the above the panels can incorporate additional features on request, such as hours run indication and remote monitoring telemetry.

### Anua Pump Station Technical Specification\*

Diameter (metres)	Vertical	Horizontal
0.6	•	
1	•	
1.2	•	
1.5	•	•
1.8	•	•
2.6	•	•
3	•	•
4	•	•
Standard Pipework Diameters	Vertical	Horizontal
Internal Diameter (mm)		
50	•	•
80	•	•
100	•	•
150	•	•

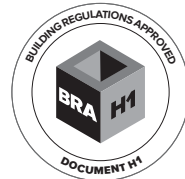
Pump Station Pipework	Vertical	Horizontal
Ductile Iron	•	•
PVC	•	•
Galvanised Iron	•	•
ABS	•	•
Stainless Steel	•	•

Typical Increments (metres)	Vertical	Horizontal
Vertical Depth	0.5	
Horizontal Length		0.5

**External Valve Chambers are available for both vertical and horizontal models.**

\*Availability is territory dependant.

*The illustrations above are typical Vertical and Horizontal Pump Station installations*



## Meeting the Highest Standards

Anua is committed to meeting and surpassing the highest quality standards required for each of its products. That's why you will always see national and/or international standards, accreditations for all Anua products.

**Free**  
pre-planning  
and site  
reports

**Free**  
no obligation  
quotations

**Nationwide**  
maintenance  
call-out service

**Expert customer**  
support

## The Anua Guarantee

Every Anua Pump Station comes with a 12-month parts and labour warranty, but Anua's commitment to you goes far beyond this.

We have a national network of approved agents and installers, who will provide you with:

**Free Pre-Planning and Site Reports**

**Free No Obligation Quotations**

**Expert Customer Support**

**Nationwide Maintenance Call-out Service**

For further information, go to [www.anua.co.uk](http://www.anua.co.uk) or [www.anuaenv.ie](http://www.anuaenv.ie)

## Complementary Products for the Anua Pump Station

- Commissioning by our highly trained engineers
- Non-standard covers sizes and load ratings
- Service & Maintenance agreement
- Weatherproof GRP Kiosks
- Remote Monitoring Units

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w [www.aircleansrl.it](http://www.aircleansrl.it)

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### Renew



Wastewater  
Treatment

### Recover



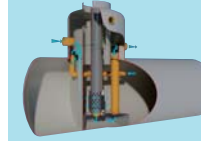
Rainwater  
Harvesting

### Re-direct



Pumps

### Recycle



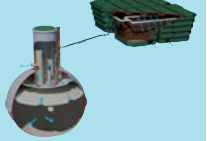
SUDS

### Rarefy



Odour  
Abatement

### Retain



Holding  
Tanks

In keeping with company policy of continuing research and development and in order to offer our clients the most advanced products, Anua reserves the right to alter specifications and drawings without prior notice.



Paper made from trees matured in sustainable,  
well managed forests and is certified to FSC standards



# Storage Tanks

For the Residential,  
Commercial, Municipal,  
Utility and Industrial  
Markets



## Technology That Serves Customers and the Environment

Anua means 'to renew'. It describes our renewed contract with nature and our renewed focus on the development of innovative environmental solutions. We continue to develop and produce the sustainable technologies that our customers demand. Anua is part of Bord na Móna, a highly successful organisation and Ireland's leading resources company for over 75 years, which has a unique heritage and understanding of the natural environment. Bord na Móna has used its expert insights into natural processes, allied to its excellent in-house research facilities, to develop sustainable solutions across a wide range of environmental challenges – wastewater treatment, odour abatement, land reclamation, power generation, resource recovery and renewable energy. This is both Anua's history and our mission for the future.

Our customers range from homeowners to major commercial, municipal and utility clients, united in seeking cost-effective solutions based on environmentally sound principles. Anua exists to serve both our customers and the natural environment. Across a broad range of sectors in countries around the world, our customers trust us to deliver the best sustainable solutions, backed by superior customer service. That is why we work with our clients throughout every project to achieve the best possible result, one that will build both our reputations.

Anua enjoys the benefit of the support of a highly respected parent company with over 20 years experience in developing sustainable clean air and clean water solutions. As part of this wider organisation, we adhere to their world-class standards and values for both the technology we provide and the service we give our customers.

## Complete Solutions

We don't just sell technologies. With our extensive laboratories and Innovation Centres located in Europe and the USA, we understand new challenges, pioneer research and create new processes. We work with you to create the systems you require, ensure correct installation and offer the full services of our nationwide network of support agents and technicians. From pre-planning to installation, service and maintenance, as well as the offer of monitoring and laboratory services, Anua stands by its technology and its customers.

## Customised for Customers

Customers need a partner – and products – they can trust. Like nature itself, Anua must be adaptable and responsive to change. That means developing the solutions that best suit each individual project.

For Anua staff, understanding their customers' world is their business. That depth of understanding is matched by the depth of our customer support and focus. We work with clients to design solutions that are technically superior and cost-effective. We're with you every step of the way.

### The Anua Storage Tanks Advantages for You

Easy to install

Lightweight durable design

Lockable cover supplied as standard

Tanks manufactured to meet with exact requirements

Spherical or horizontal configurations available

The Anua warranty





# The Anua Storage Tanks

Anua offer a wide range of storage tanks to cater for your every need. Typical applications are:

- Sewage Storage
- Stormwater Attenuation
- Potable Water Storage
- Silage Effluent
- Settlement Tanks
- Bespoke Holding Solutions (such as chemical toilet wastewater)

The Anua storage tanks are manufactured at our dedicated facility from GRP (Glass Reinforced Plastic) to the highest standards, in accordance with BS EN 4994, and in compliance with BS EN 12566-1. Anua's storage tanks are fully sealed to prevent any discharge to the surrounding area and can be supplied with internal liners to suit your storage requirements.

Anua offer storage tanks in either a spherical or horizontal configuration. Our range of horizontal Storage Tanks offers large storage capacities typically up to 100,000L with multiple tanks available for any capacities above this.

Typically the Anua range of storage tanks is supplied with a 1m inlet invert, however we can also manufacture tanks to suit deep inverts to meet with your site requirements. For added peace of mind, our deep invert tanks are suitably reinforced to suit additional ground pressures and potential high water tables.

Anua's range of storage tanks is also available for above ground installations. Our above ground tanks have been designed to help minimise installation costs – a level concrete base is all that is required.

Please speak with our sales team who will be happy to assist and design a bespoke storage tank, tailor-made to your exact requirements.

### Spherical Storage Tank

Tank Capacity (litres)	Diameter (metres)	Overall Height (metres)
2800	1.8	2.7
3800	1.99	2.8
4500	2.2	2.9
6000	2.3	3.4

### Anua Silage Tanks

Storage of silage, slurry and agricultural fuel oil is regulated by the Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (England) Regulations 2010. According to these regulations, farmers have a duty to avoid causing pollution and provide installations, which minimise the risk of farm effluents polluting watercourses.

#### Silage includes:

- crops being made into silage
- effluent from silage
- slurry composed of excreta produced by livestock
- rainwater / washings from a building / yard used by livestock.

### Cylindrical Storage Tank

Capacity (litres)	Diameter (metres)	Overall Length (metres)
7500	1.8	3.8
9000	1.8	4.3
12000	1.8	5.5
18000	2.64	4.1
25000	2.64	5.5
30000	2.64	6.6
36000	2.64	7.8
40000	2.64	8.6
45000	2.64	9.6
50000	2.64	10.7
54000	2.64	11.5
60000	2.64	12.7
70000	2.64	14.7
80000	2.64	16.8
90000	2.64	18.9
100000	2.64	20.9

### The Anua Cesspools at work

A cesspool is a raw sewage storage vessel without an outlet that requires emptying on a regular basis, depending on usage. Cesspools are the last solution in locations without mains drainage and where all other options such as sewage treatment plants or pumping stations are not viable (see dedicated Anua product brochures for these other solutions).

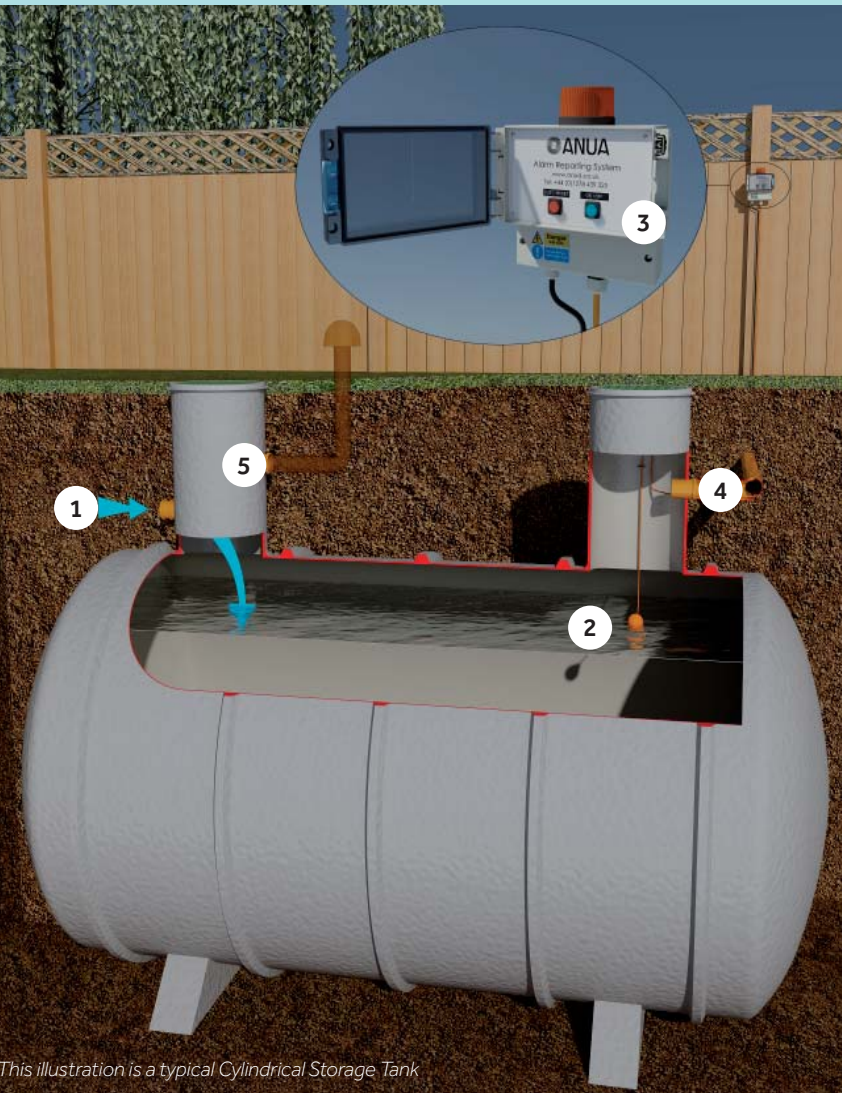
The operation of a cesspool is simple, wastewater flows into the cesspool and is retained there until the tank is emptied - no treatment is involved. Emptying of a cesspool is on a periodical basis dependant on the volume installed.

Anua cesspools are available with an optional high level alarm that lets you know that the tank will shortly need emptying. The Anua high level alarm is supplied complete with a weatherproof control panel, flashing beacon, audible alarm and high level float switch.

**The Anua range of cesspools are sized in accordance with British Building Regulations 2002 Part H2 whereby a single domestic dwelling for two residents should have a minimum capacity of 18,000 litres (18m³). This capacity is increased by 6,800L (6.8m³) for each additional user.**

Silage or slurry tanks must be designed to be maintenance-free for 20 years. Anua achieve this by the introduction of resins into the tank manufacturing process resistant to the effluent to be stored within the tank structure.

Although many resins are suitable for making fibreglass, polyester is both the simplest and most economical; it provides excellent strength and moisture resistance. Although there are many different types of resin in use in the composite industry, the majority of structural parts are made with three main types, namely polyester, vinylester and epoxy.



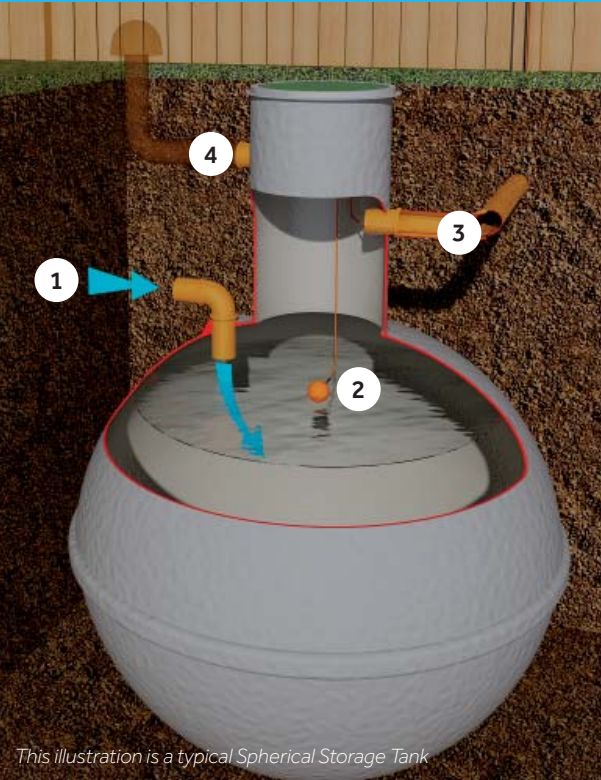
This illustration is a typical Cylindrical Storage Tank

### Cylindrical Storage Tank Diagram Index

- 1 Inlet
- 2 Control switch
- 3 Alarm unit
- 4 Cable duct
- 5 Vent

### Spherical Storage Tank Diagram Index

- 1 Inlet
- 2 Control switch
- 3 Cable duct
- 4 Vent



This illustration is a typical Spherical Storage Tank



### Minimum Capacity of Silage Effluent Tanks in Relation to Silo Capacity

Silo Capacity	Minimum Effluent Tank Capacity
Less than 1500m³	20 litres for every 1m³ silo capacity
1500m³ or more	30000 litres plus 6.7 litres for every 1m³ silo capacity in excess of 1500m³
500m³	10000 litres
1000m³	20000 litres
1500m³	30000 litres
2000m³	33350 litres - i.e. 30,000 + 3350
2500m³	36700 litres - i.e. 30,000 + 6700
3000m³	40050 litres - i.e. 30,000 + 10050
4000m³	46750 litres - i.e. 30,000 + 16750



## Meeting the Highest Standards

Anua is committed to meeting and surpassing the highest quality standards required for each of its products. That's why you will always see national and/or international standards, accreditations for all Anua products.

Free  
pre-planning  
and site  
reports

Free  
no obligation  
quotations

Nationwide  
maintenance  
call-out service

Expert customer  
support

## The Anua Guarantee

Every Anua Storage Tank comes with a 12-month parts and labour warranty, but Anua's commitment to you goes far beyond this.

We have a national network of approved agents and installers, who will provide you with:

Free Pre-Planning and Site Reports

Free No Obligation Quotations

Expert Customer Support

Nationwide Maintenance Call-out Service

For further information, go to [www.anua.co.uk](http://www.anua.co.uk) or [www.anuaenv.ie](http://www.anuaenv.ie)

## Complementary Products for the Anua Storage Tank

- Alarm Units
- High Level Alarms
- Remote Monitoring

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## Renew



Wastewater  
Treatment

## Recover



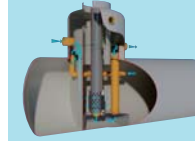
Rainwater  
Harvesting

## Re-direct



Pumps

## Recycle



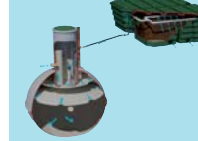
SUDS

## Rarefy



Odour  
Abatement

## Retain



Holding  
Tanks

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well managed forests and is certified to FSC standards



# APPENDIX 5

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## Drawings

<b>Drawing Number</b>	<b>Drawing Title</b>
6301-2600	Regional Site Location Map
6301-2601	Overall Site Layout Plan
6301-2602	Site Layout Plan
6301-2603	Existing Site Topography
6301-2604	Existing and Proposed Cross Sections
6301-2605	Drawing Not used
6301-2606	Drawing Not used
6301-2607	Drawing Not used
6301-2608	Drawing Not used
6301-2609	Drawing Not used
6301-2610	Services Layout Plan
6301-2611	Surface Water Layout Plan
6301-2612	Foul & Process Water Drainage Layout Plan
6301-2613	Watermain Layout Plan
6301-2614	General Arrangement Surface, Process & Fire Water Pumping Stations – Sht. 1 of 2
6301-2615	General Arrangement Surface, Process & Fire Water Pumping Stations – Sht. 2 of 2
6301-2616	Attenuation Lagoons 1 & 2 General Arrangement & Section
6301-2617	Wheelwash Standard Details
6301-2618	Weighbridge General Arrangement Plan & Sections

6301-2619	Drawing Not used
6301-2620	Typical Road & Carpark Construction Details
6301-2621	Typical Manhole Details
6301-2622	Trench Bedding Details
6301-2623	Typical Watermain Details
6301-2624	Typical Fencing Details
6301-2625	Schematic & Details of Heat Transfer Pipe
6301-2626	Existing Site Drainage
6301-2627	Surface Water Longitudinal sections – Sheet 1 of 2
6301-2628	Surface Water Longitudinal sections – Sheet 2 of 2
6301-2629	Foul Water Longitudinal Sections
6301-2630	Landscape Plan



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