SECTION C: INFRASTRUCTURE & OPERATION

Advice on completing this section is provided in the accompanying Guidance Note.

C.1 Operational Information Requirements

Provide a description of the plant, process and design capacity for the areas of the waste water works where discharges occur, to include a copy of such plans, drawings or maps, (site plans and location maps, process flow diagrams), and such other particulars, reports and supporting documentation as are necessary to describe all aspects of the area of the waste water works discharging to the aquatic environment. Maps and drawings must be no larger than A3 size.

Attachment C.1 should contain supporting documentation with regard to the plant and process capacity, systems, storm water overflows, emergency overflows, etc., including flow diagrams of each with any relevant additional information. These drawings / maps should also be provided as geo-referenced digital drawing files (e.g. ESRI Shapefile, MapInfo Tab, AutoCAD or other upon agreement) in Irish National Grid Projection. This data should be provided to the Agency on a separate CD-Rom containing sections B.1, B.2, B.3, B.4, B.5, D.2, E.3 and F.2.

Attachment included	Yes	No
	✓	

C.2 Outfall Design and Construction

Provide details on the primary discharge point & secondary discharge points and storm overflows to include reference, location, design criteria and construction detail.

Attachment C.2 should contain any supporting documentation on the design and construction of any and all discharge outfalls, including stormwater overflows, from the waste water works.

Attachment included	Yes	No
	✓	

C.1 Operational Information Requirements

Provide a description of the process

The Midleton WWTP is designed for a Population Equivalent (PE) of 10,000PE and BOD loading of 600Kg/day. The influent sewage arriving at the plant is a cumulated pumped flow from Bailick No.1 Pumping Station and Bailick No.2 Pumping Station.

The maximum hydraulic capacity of the Midleton WWTP is 90l/s which is 3 Dry Weather Flow (3DWF). In order that this capacity is not exceeded the maximum discharge capacity of Bailick No.1 Pump Station is 75 l/s and Bailick No.2 Pump Station is 15l/s. In order to cope with flows above 3DWF storm storage has been provided at both Terminal Pumping Stations.

The volume of storm storage at Bailick No. 1 Pumping Station is approximately 1750m^3 and at Bailick No. 2 Pumping Station is approximately 350m^3. Flows in excess of the storage volume are screened to 5mm and then discharge into the adjacent water course. The main Waste Water Treatment Plant process stages consist of: -

- Inlet works – 2 No. screens, 2 No. macerator pumps and liquid separator, aerated grit and grease removal system, flow measurement and grit classifier with 3 No. grit suction pumps, gas detection system, 2 No. air blowers and skip.

- The screened influent passes directly to the aeration tanks – there is no primary settlement stage. The aeration system comprises 2 separate lanes, with 4 aeration chambers per lane, each chamber having a volume of 406m^3 and a liquid depth 4.5m. The first chamber acts as an anoxic zone, and there is internal sludge recirculation from chamber 4 back to the anoxic zone. Each chamber is equipped with fine bubble membrane disc aeration under dissolved oxygen control. A central mixer in each cell ensures adequate mixing during those periods when the air supply to the diffusers is switched off, due to high Dissolved Oxygen. Aeration equipment comprises of 3 No. blowers, 8 No. mixers, 8 No. DO probes, 2 No. flow meters and 1 No. sampler.

- Final Settlement – There are 2 No. 18.5m diameter final settlement tanks with half bridge scrapers. Surplus Activated Sludge (SAS) is withdrawn between the aeration tank and final settlement tank for each process stream. The SAS is pumped to 1 No. 5.4m diameter picket fence thickener for thickening from 0.5% to 3% Dry Solids. Return Activated Sludge (RAS) is withdrawn from the bottom of each final settlement tank and is pumped back into the inlet of the aeration tank via the RAS Pumping Station.

- UV Disinfection – The final effluent overspills the 2 No. final settlement tanks and combines to the UV disinfection chamber, which comprises 2 No. banks of Ultra-Violet lamps acting in duty/assist mode, and includes flow measurement and final effluent sampler unit.

- The final effluent then discharges via 1 No. 400mm gravity main (that discharges into the 750mm Irish Distillers Treated Effluent gravity main adjacent to Bailick No. 2 PS which then gravitates to Ballinacurra No. 1 Treated Effluent PS which pumps the flows into Rathcoursey tidal holding tank which is capable of holding 2,120m^3 at low tide then discharges into the Ballynacorra River/Estuary.

The sludge treatment process consists of: -

- Raw Sludge Holding Tank – 1 No. mixer and air extraction unit, and raw sludge pump sump equipment with 2 No. Pumps. The plant is currently not receiving any imported sludges from any other Waste Water Treatment Plants.

- Sludge Return Chamber – 2 No. Return Activated Sludge (RAS) pumps, 1 No. sludge drain pump, 1 No. chamber drain pump, 1 No. scum pump, and 2 No. RAS flow meters

- Surplus Activated Sludge Chambers – 2 No. Surplus Activated Sludge (SAS) pumps, 2 No. SAS flow meters.

- Sludge Holding Tank with Picket Fence Thickener – 1 No. sludge blanket detector and air extraction unit.

- Dewatering Room – 2 No. sludge transfer pumps, 1 No. flow meter, 1 No. centrifuge including 2 No. poly dosing and transfer pumps, 1 No. Seepex cake pump and skip.

Ancillary equipment at the WWTP also includes the following:

- Odour Control – 2 No extractor fans, air flow meter and woodchip scrubber.

- Standby Generator and SCADA system covering all the plant including sludge treatment process.

- Buildings – Inlet and sludge building, electricity transformer building, laboratory and control room building with fire alarm and security alarm systems.

- Telemetry System – WWTP, Bailick No. 1 & No. 2, Ballinacurra No. 1 Treated Effluent Pumping Stations.

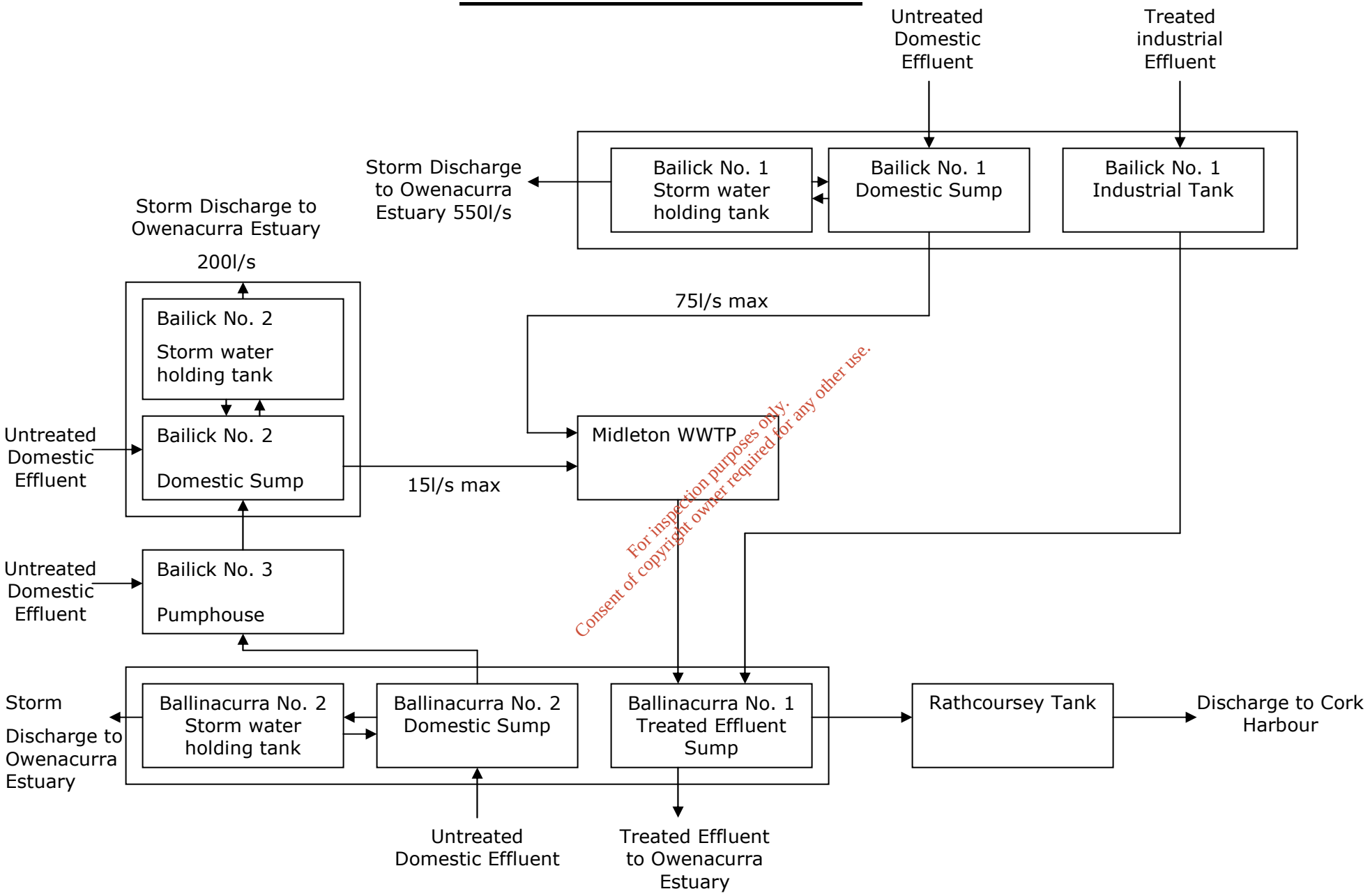
- Private access road to WWTP.

The Midleton WWTP is currently operated by a private operator under a 10 year Operation and Maintenance Contract (Commenced September 2006). The plant is manned during the working week 8.00am – 5.30pm (Monday – Friday) by a plant manager and 2 No. operators. During out of hours the SCADA system will send alarms to a mobile phone of the person on standby.

There is provision made in the site general arrangement for the extension of the WWTP to accommodate a future total population of 15,000 P.E by the addition of a further aeration lane and 1 No. final settlement tank.

As mentioned above Irish Distillers discharges its treated waste to the council sewers at Baby's Walk for eventual discharge to the Ballynacorra Estuary at Rathcoursey Point. The waste from Irish Distillers does not go through the WWTP but makes its way to the discharge point via the Bailick 1 and Ballinacurra pumping stations. Treated effluent from Midleton is gravity fed to Ballinacurra, it combines on route with the distillery waste and both are pumped from Ballinacurra to Rathcoursey.

Midleton Schematic of Network



Provide a description of the plant

Picket Fence Thickener

Volume: 91m^3
Internal Dimensions: 5.4mϕ x 4m (d)

Raw Sludge Holding Tank

Volume: 60m^3
Internal Dimensions: 5.4mϕ x 2.625m (d)

Aeration Chambers:

No. of: 8
Volume of Each: 406m^3
Liquid Depth: 4.5m
Internal Dimensions: 9.5m (l) x 9.5mn (d)

Clarifiers

No. of: 2
Sidewall Height: 2.0m
Internal Diameter: 18.5m

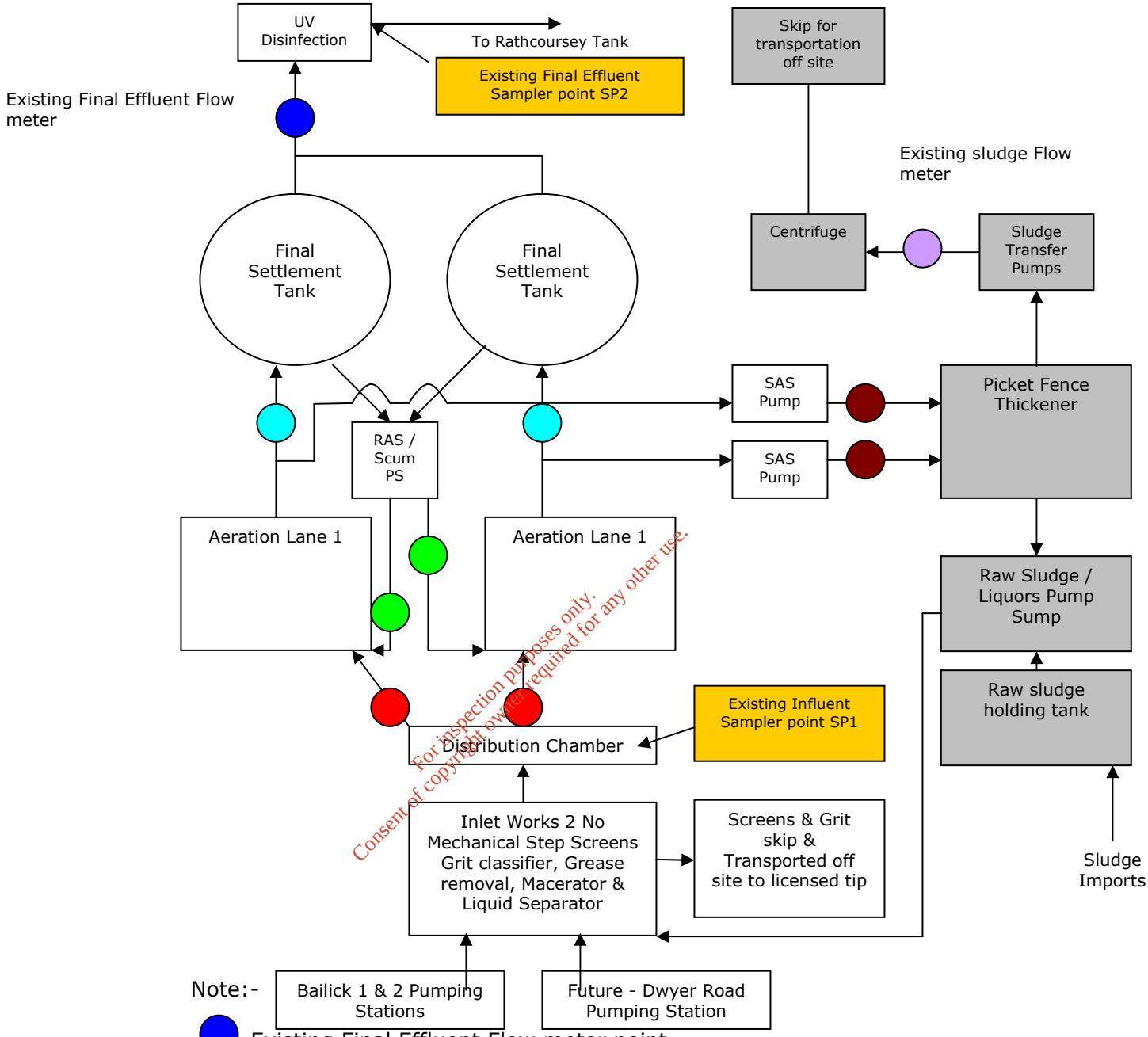
Sludge Return Pumps

Pumping Capacity: 33lt/sec

Surplus Sludge Pumps

Pumping Capacity: 1 – 4lt/sec

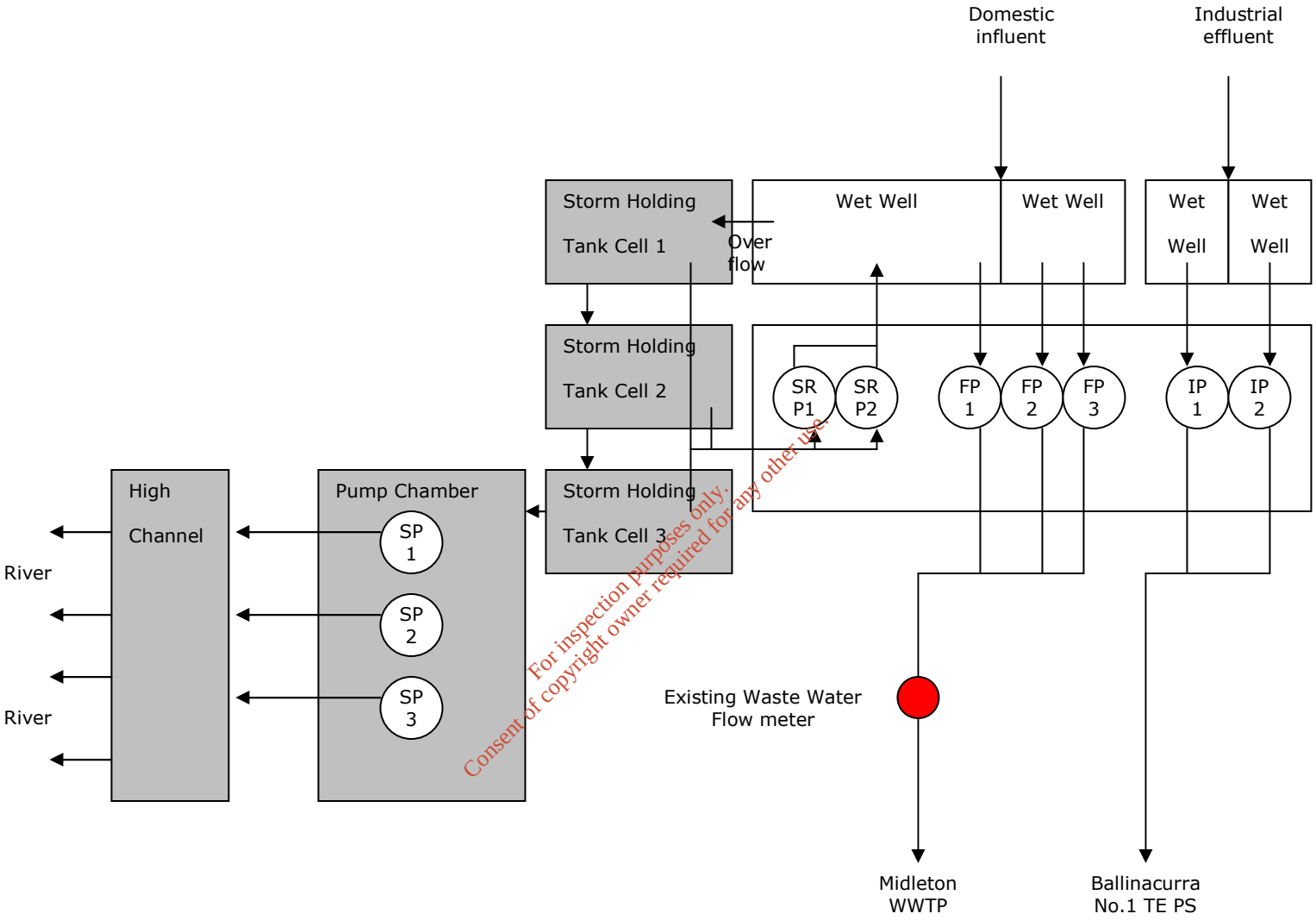
Midleton WWTP Process Diagram



Note:-

- Existing Final Effluent Flow meter point
- Existing Flow meters measuring flow to Settlement Tanks
- Existing Flow meters measuring RAS/Scum return to Aeration Lanes
- Existing Flow meters measuring flow to Aeration Lanes
- Existing Flow meters measuring SAS to Picket Fence Thickener
- Existing Flow meter measuring flow into Centrifuge
- Inlet Sample point SP1 - Outlet Sample Point SP2

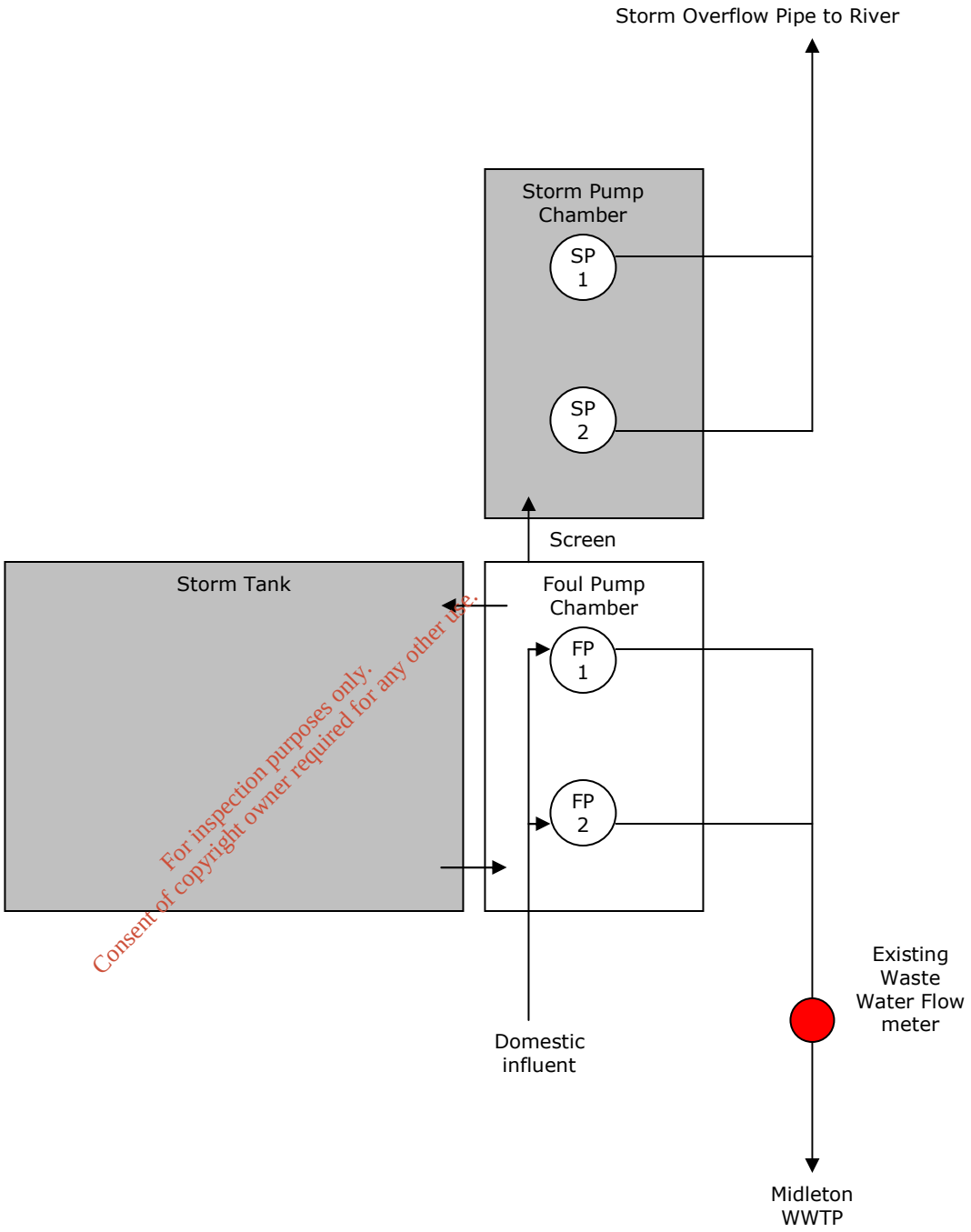
Bailick No 1 Pumping Station Process Diagram



Note:-

Existing Flow meter to measure flows pumped forward to Midleton WWTP

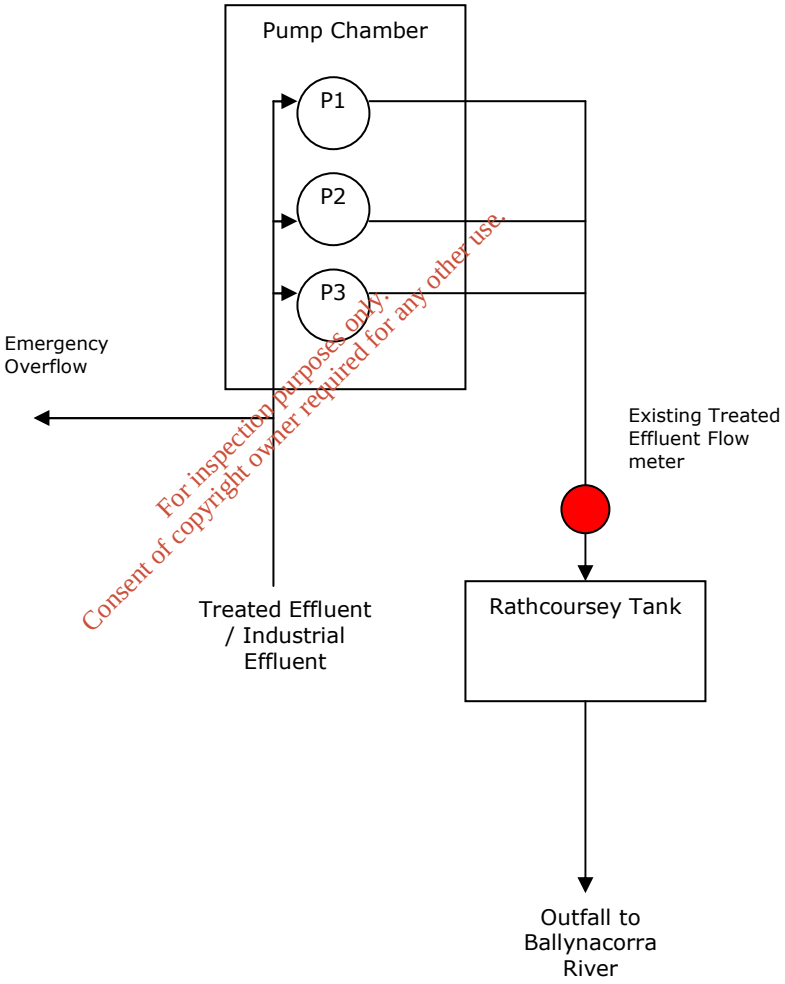
Bailick No 2 Pumping Station Process Diagram



Note:-

Existing Flow meter to measure flows pumped forward to Midleton WWTP

Ballinacurra No. 1 Treated Effluent Pumping Station Process Diagram



Note:-

Proposed Flow meter to measure flows pumped forward to Rathcoursey Tank

Design Capacity for the areas of the waste water works where discharge occurs:

Design of the plant:

The flow (hydraulic load) to the sewage treatment plant is pumped and is therefore fixed at the pumping capacity of the pumps. Up to 3 D.W.F. is pumped to the sewage treatment plant with a storm water balancing tank being provided at both pumping stations, i.e. at the existing Bailick Road Pumphouse and at the Bailick Road underpass beside the station road.

The treatment plant is designed to treat a hydraulic load of 3 D.W.F. with another 3 D.W.F. held for a minimum of 2 hours retention in both storm tanks.

By holding 3 D.W.F. for 2 hours it is ensured that any overflow gets at least primary sedimentation, thereby reducing the $B.O.D._5$ of the overflow by between 30% and 50% of the diluted overflow, thus giving an overflow $B.O.D._5$ of between 28 and 20mg/l at worst. In addition the overflow from the holding tanks at the existing pumping stations on the Bailick Road which enters the Ballinacurra River is fine screened so that the $B.O.D._5$ of the overflow liquid is well below 20mg/l.

Pumping all the effluent to the treatment plant has the effects of liquidising the faecal matter which then passes through fine screens at the treatment plant.

Balancing the flow at the pumping station supersedes the need for flow balancing the treatment plant.

The following stages occur at the treatment plant:

a) Screening
b) Grit removal
c) Aeration
d) Sedimentation
e) Sludge Settlement and Thickening
f) Sludge Dewatering

Below are the current agreed treatment capacities which have been contractually agreed with the current operator.

Midleton WWTP	**Unit**		
Design Dry Weather Flow	l/s	30	
Maximum Instantaneous Flow	l/s	90	
Maximum Duration of Instantaneous Flow	Hours	0.5	say every 3 hours
Maximum Daily Flow Volume	m^3/day	3248	18 hours HRT
Maximum BOD Load	Kg/day	1200	

Irish Distillers Limited

Irish Distillers Limited Reg ***No. P0442-01*** discharges its treated waste to the council's sewer at Baby's Walk, Grid Ref: E18879 N: 07346. From here it is taken to Rathcoursey point for eventual discharge to Cork Harbour. According to the IPPC Licence the maximum permissible volumes to be emitted by Irish Distillers are as follows:

Irish Distillers	**Unit**	
Maximum volume in one day	m^3/day	750
Maximum rate per hour	m^3/hr	45
Maximum BOD Load	kg/day	45

C.2 Outfall Design and Construction

Provide details on the primary discharge point & secondary discharge points and storm overflows to include reference, location, design criteria and construction detail.

Primary Discharge Point

The final effluent then discharges via 1 No. 400mm gravity main (that discharges into the 750mm main adjacent to Bailick No. 2 PS which then gravitates to Ballinacurra No. 1 Treated Effluent PS which pumps the flows into Rathcoursey tidal holding tank which is capable of holding 2,120m^3 at low tide then discharges into the Ballinacurra River/Estuary.

Secondary Discharge Point

At Ballinacurra No. 1 Treated Effluent PS which pumps forward treated effluent flows to Rathcoursey tidal holding tank there is a high level emergency overflow that operates in the event of mechanical breakdown of the pumps. The overflow to the river contains a coarse screen.

Storm Overflow Discharge Points

Bailick No. 1 Pumping Station

Bailick No. 1 Pumping Station comprises the following equipment: -

- 2 No. Industrial Pumps;
- 3 No. Foul Pumps;
- 1 No macerator screen;
- 3 No. Storm Pumps and 3 No Storm holding tanks with 6 No. tipping bucket cleaning systems;
- 2 No Storm Return Pumps;
- 1 No. 300mm Foul Rising Main to Midleton WWTP;
- 1 No. 300mm Industrial Rising Main to Ballinacurra No. 1 Treated Effluent PS;
- 4 No. 525mm Storm Overflow Pipes with penstocks to Ballynacorra River;
- Flow meter, generator, fuel store, gas detection system, odour control Telemetry System;
- Odour Control – 2 No extractor fans air flow meter and woodchip scrubber; and

- Buildings – foul/industrial/storm pumping station building, Storm Overflow pumping station building with fire alarm and security alarm systems.

The combined foul and storm water influent which arrives into Bailick No.1 Pumping Station is pumped via 3 No. dry well centrifugal foul pumps operating on a duty/assist/standby basis via a 300mm rising main to Midleton WWTP. The dry well centrifugal pumps are equipped with variable speed drives and the total output of the pumping station is 75l/s to match the hydraulic capacity of the WWTP (in conjunction with the flows received from Bailick No.2 Pumping Station).

Influent Flows in excess of 75l/s are diverted to the storm water storage facilities (3 No. storm storage tanks acting in series) and subsequently screened to 5mm and pumped to the Ballynacorra River if the volumes of storm water are greater than the storage capacity.

Storm overflow to the Ballynacorra River is by 3 No. Storm pumps (acting duty/assist/standby) pumping through 3 No. 525mm diameter outfall pipelines located below the Ballynacorra River low water mark. The discharge volume to the river outfall can thus be directly monitored by the capacity of the storm pumps and the number of hours of operation of the storm pumps.

On cessation of the storm event, 2 No. storm (1 duty/1 assist) return pumps return the accumulated storm volume in the storm tanks back to the pump station wet-well for on-ward pumping to Midleton WWTP. Under normal dry weather conditions the Storm cells remain empty and are flushed clean with a tipping bucket arrangement using water from the drinking water mains, after each storm event.

Bailick No, 2 Pumping Station

Bailick No. 2 Pumping Station comprises the following equipment: -

- 2 No. Foul Pumps;
- 1 No. Screen;
- 2 No. Storm Pumps and 1 No storm holding tanks with 2 No. tipping bucket cleaning systems;
- 1 No. 250mm Foul Rising Main to Midleton WWTP;
- 1 No. 600mm Storm Overflow to the Ballynacorra River;
- Flow meter and Telemetry System; and

- GRP Kiosk housing control panels and transformer.

The Bailick No 2 Pumping Station is a pre-fabricated Pumping Station and receives all the wastewater collected in the local sewerage network and pumps it forward via 2 No. submersible pumps (1 duty/ 1 standby) to the Midleton WWTP. All flows in excess of the designated Pumping Station capacity of 15 l/s are treated as storm water and receive preliminary treatment and 5mm screening prior to being discharged to the Ballynacorra River.

There is 1 No. storm tank and 2 No. storm pumps operating in duty/standby mode discharging to the river via a 600mm diameter outfall pipe. The discharge volume to the river outfall can thus be directly monitored by the capacity of the storm pumps and the number of running hours of each pump.

There are no storm return pumps and on cessation of a storm event, the storm water is returned by gravity to the foul wet well, for onward pumping via the 250mm diameter rising main to Midleton WWTP. Under normal dry weather conditions the Storm cell remains empty and is flushed clean with a tipping bucket arrangement using water from the drinking water mains, after each storm event.

Ballinacurra No. 2, Untreated Effluent Pumping Station

Ballinacurra No. 2 Untreated Effluent Pumping Station contains the following equipment: -

- 2 No. Storm Pumps;
- 1 No. 6mm stainless steel mesh Screen;
- 1 No. 450mm overflow pipe to manhole;
- 1 No. 450mm outfall pipe to river with flap valve;

Ballinacurra No. 2 untreated effluent outfall is designed to be used in the event of a power failure. The capacity of the storm tank is approximately 275m^3.

Bailick No. 3, Pumping Station

Bailick No. 3 pumping station is an emergency storm overflow which is utilised in the event of power failure.

ATTACHMENT No C.1

SUPPORTING DOCUMENTATION WITH REGARDS TO PLANT & PROCESS CAPACITY, SYSTEMS, STORM WATER OVERFLOWS & EMERGENCY OVERFLOWS

APPENDIX 1

HYDRAULIC DESIGN (ADJUSTMENT TO THE EXISTING SEWER SYSTEMS)

APPENDIX I

The calculation sheets used in the 1972 Preliminary Report are used here for calculating flows with the exception that flows from any new developments will be separated where possible:

a) Separation of Domestic From Industrial Main

A 225 mm. diameter sewer is to be laid from E1-181 to PF-45 to take the foul waste from Lourdesville Estate out of the 525 mm. diameter industrial main and to the foul main. This sewer takes the foul flows from 21 houses.

6 D.W.F. = 21 x 4 x 0.02153
= 1.8 lt/sec (taking water usage to be 310 l/hd/day)

A 225 mm. diameter sewer is more than adequate.

300 mm. diameter and 225 mm. diameter sewers are to be laid at the rear of the houses on the north eastern side of Main Street from E1-50 to PF-38, and from PF-40 to PF-42 as shown on Drawing No. 005. The exact volume from these areas which will contribute to these sewers is difficult to quantify exactly but from experience the size of sewers given are adequate.

A 225 mm. diameter sewer changing to a 300 mm. diameter sewer at PF-43 is to be laid from E1-79 to E1-306 which takes Area 23 out of the industrial sewer. This area contributes 8.7 lt/sec.

A small submersible with a rising main 80 mm. diameter shall be provided to pump the foul waste from the Lewis Bridge area to E1-82.

Finally a 300 mm. diameter sewer is to be laid from E2-420a (Church View) to the existing pumphouse at the Bailick Road.

b) Design of Knockgriffin Sewers

i) *Area 12*

New developments in this area are to have a separate sewer system.

Hard paved area contributing to foul sewer	= 0.66 ha.
Hard paved area contributing to storm sewer	= 0.64 ha.
Time of concentration	= 16.2 min.
Intensity of rainfall	= 25.4 mm./hr.
Population	= 344 persons

Foul Sewer

Storm Flow = 2.787 x 0.66 x 25.4 = 46.72 l/s

Foul Flow (2 DWF) = $\frac{344 \times 0.02153}{3}$ = 2.47 l/s

=> Max. flow to foul sewer = 49.19 l/s

A 300 mm. diameter foul sewer is to be laid at 1/315 between PF-19 and PF-20.

Flow to storm sewer = 2.787 x 0.64 x 25.4
= 45.31 lt/sec.

ii) *Area 13*

This area is fully developed.

Flows from Area 12 to be included.

Hard paved area contributing to foul sewer 0.08(13) + 0.66(12)	= 0.74 ha.
Hard paved area contributing to storm sewer	= 0.64 ha.
Time of concentration	= 16.8 min.
Intensity of rainfall	= 25.4 mm./hr.
Population (Area 13)	= 40 persons

Foul Sewer

Storm flow = 2.787 x 0.74 x 25.4 = 52.38 l/s

Foul Flow (2 DWF) = 384 x $\frac{0.02153}{3}$ = 2.76 l/s

=> Max. flow to foul sewer = 55.14 l/s

A 300 mm. diameter foul sewer is to be laid at 1/315 between PF-17 and PF-19.

A 375 mm. diameter storm sewer is to be laid at 1/315 between PS-7 and PS-9.

iii) *Area 29*

This area is to have a separate sewer system.

Flows from Areas 12 and 13 to be included.

Hard paved area contributing to foul sewer 0.53(29) + 0.08(13) + 0.66(12)	= 1.27 ha.
Hard paved area contributing to storm sewer 6.47(29) + 0.64(12)	= 7.11 ha.
Time of concentration	= 22.7 min.
Intensity of rainfall	= 23.4 mm./hr.
Population (Area 29)	= 1,600 persons

Foul Sewer

Storm Flow = 2.787 x 1.27 x 23.4	=	82.82 l/s
Foul Flow (6 DWF) = 1,600 x 0.02153	=	34.45 l/s
Foul Flow (2 DWF)	=	2.76 l/s
=> Max. flow to foul sewer	=	120.03 l/s

A 375 mm. diameter foul sewer is to be laid at 1/260 between PF-16 and PF-17.

Flow to storm sewer = 2.787 x 7.11 x 23.4
= 463.7 l/s

A 750 mm. diameter storm sewer is to be laid at 1/400 between PS-6 and PS-7.

iv) *Area 28*

This area is fully developed.

Flows from Areas 12, 13 & 29 to be included.

Hard paved area contributing to foul sewer 0.05(28) + 0.53(29) + 0.08(13) + 0.66(12)	= 1.32 ha.
Hard paved area contributing to storm sewer	= 7.11 ha.
Time of concentration	= 22.7 min.
Intensity of rainfall	= 23.4 mm./hr.
Population (Area 28)	= 24 persons

Foul Sewer

Storm Flow = 2.787 x 1.32 x 23.4	=	86.08 l/s
Foul Flow (6 DWF)	=	34.45 l/s
Foul Flow (2 DWF)	=	2.93 l/s
=> Max. flow to foul sewer	=	123.46 l/s

A 375 mm. diameter foul sewer is to be laid at 1/260 between PF-15 and PF-16.

Flow to storm sewer = 463.7 l/s

A 750 mm. diameter storm sewer is to be laid at 1/400 between PS-5 and PS-6.

v) *Area 28A*

Flows from Areas 12, 13, 29 and 28 to be included.

Hard paved area contributing to foul sewer 1.32 + 0.36(28A)	= 1.68 ha.
Hard paved area contributing to storm sewer	= 7.11 ha.
Time of concentration	= 23.2 min.
Intensity of rainfall	= 23.15 mm./hr.
Population (Area 28A)	= 128 persons

Foul Sewer

Storm Flow = 2.787 x 168 x 23.15	=	108.39 l/s
Foul Flow (6 DWF)	=	34.45 l/s
Foul Flow (2 DWF)	=	3.85 l/s
=> Max. flow to foul sewer	=	146.69 l/s

A 450 mm. diameter foul sewer is to be laid at 1/250 between PF-13 and PF-15.

Flow to storm sewer = 463.7 l/s

A 750 mm. diameter storm sewer is to be laid at 1/400 between PS-3 and PS-5.

vi) *Area 30*

New developments in this area are to have a separate sewer system and development shall only occur north of the bypass.

Flows from Areas 12, 13, 29, 28 & 28A to be included.

Hard paved area contributing to foul sewer 1.68 + 0.05(30)	= 1.73 ha.
Hard paved area contributing to storm sewer 7.11 + 0.97(30)	= 8.08 ha.
Time of concentration	= 24.25 min.
Intensity of rainfall	= 22.60 mm./hr.
Population (Area 30)	= 252 persons

Foul Sewer

Storm Flow = 2.787 x 1.73 x 22.60	=	108.97 l/s
Foul Flow (6 DWF)	=	39.88 l/s
Foul Flow (2 DWF)	=	3.85 l/s
=> Max. flow to foul sewer	=	152.70 l/s

A 450 mm. diameter foul sewer is to be laid at a minimum slope of 1/320 between PF-9 and PF-13.

Flow to storm sewer = 2.787 x 8.08 x 22.60
= 508.93 l/s

A 750 mm. diameter storm sewer is to be laid at 1/400 between the storm outfall and PS-3.

vii) *Area 31*

This area is to have a separate sewer system with new developments being confined to the northern side of the bypass.

Flows from Areas 12, 13, 29, 28, 28A & 30 to be included.

Hard paved area contributing to foul sewer	= 1.73 ha.
Hard paved area contributing to storm sewer 8.08 + 1.94(31)	= 10.02 ha.
Time of concentration	= 25.87 min.
Intensity of rainfall	= 21.80 mm./hr.
Population (Area 30)	= 480 persons

Foul Sewer

Storm Flow = 2.787 x 1.73 x 21.80	= 105.11 l/s
Foul Flow (6 DWF)	= 50.21 l/s
Foul Flow (2 DWF)	= 3.85 l/s
=> Max. flow to foul sewer	= 159.17 l/s

A 450 mm. diameter foul sewer is to be laid at a minimum slope of 1/320 between E1-27 and PF-9.

Flow to storm sewer = 2.787 x 10.02 x 21.80
= 608.78 l/s

Storm sewer as for Area 30 to be used.

c. Design of Ballinacurra Sewers & Submersible Pumping Station

At all pumping stations it is proposed to store 3 DWF in storm tanks for treatment when the storm has passed, if the pumps are pumping only 3 DWF. These tanks should give a retention of 2 hours and act as a sedimentation tank.

A second criterion to be met by the storm tanks is the retention of the first flush of storm flow before overflowing. This storage should be equal to the volume of storm flow arriving at the pumping station during the time of concentration.

Therefore, the storm tanks must be capable of accommodating the larger of the above two volumes.

Areas 42 to 47 shall contribute flow to a submersible pumping station at Ballinacurra.

Hard paved area	= 3.12 ha.
Time of concentration	= 22.5 min.
Rainfall intensity	= 23.53 mm.
Population from calculation sheets	= 1,072 persons

Foul Sewer

Foul Flow (6 DWF) = 1,072 x 0.02153 = 23.00 l/s
Foul Flow (2 DWF) = 7.67 l/s

2 year flood = 2.787 x 3.12 x 23.53
= 204.60 l/s

During a 2 year storm, flow to pump sump =

$$204.60 + 7.67 = 212.27 \text{ l/s}$$

To design against a 30 year flood which could cause surface flooding a multiplier is obtained from the 1975 Flood Studies Report. The 2 year flow is multiplied by this multiplier = 1.644. Therefore, during a 30 year flood, flow to pump sump =

$$204.60 \times 1.644 + 7.67 = 344.03 \text{ l/s}$$

To prevent flooding in the Ballinacurra area the TWL in the pump sump must be set at a level which prevents water backpounding in the sewers from coming up through manhole covers and road gullies, taking into account friction losses in the sewers during a 30 year flood.

Lowest ground level occurs at Mh. E2-425 m. = 2.07 m. O.D.

Distance from proposed submersible pumping station to this manhole = 120 m.

Evaluating this 450 mm. diameter sewer as a pressure main, it has a capacity of 344 l/s at a gradient of 1/125.

$$=> \text{Top water level in pump sump} \leq 2.07 - \frac{120}{125} = 1.11 \text{ m. O.D.}$$

If overflow weir in pump sump = 7.5 m. long, then to pass 344 l/s a head of 85 mm. must be built up over the weir.

This implies that to prevent flooding during a 30 year flood the highest level that an overflow weir can be set at is 1.11 - 0.085 = 1.025, Say 1.00 m. O.D.

In this case a weir set at the above level discharges flow to the existing pumphouse at Ballinacurra through a 450 mm. diameter sewer laid at 1/125.

A second weir may be set at 1.00 - 0.085 = 0.915 m.

Say 0.85 m. O.D.

This overflow discharges directly to the sea and will be the overflow which will normally be in use except at high tide.

Volume of storage required shall be that which is capable of retaining the first flush of storm flow through the sewers as 6 DWF is being pumped in this case. The first flush shall occur over the time of concentration = 22.5 minutes.

Total flow to pump sump	=	212.27 l/s
6 DWF is pumped to Mh. PF-65	=	23.00 l/s
Balancing required for	=	189.27 l/s

(over a period of 22.5 minutes = time for concentration)

. . Capacity required = $189.27 \times 60 \times 22.5 \times 10^{-3}$ cu.m.
= 255.51 cu.m.

However, the sewers are also capable of holding a volume of effluent:

Sewer from	E2 - 423 to E2 - 424 can hold	7.48 cu.m.
	E2 - 424 to E2 - 425 can hold	11.61 cu.m.
	E2 - 425 to E2 - 427 can hold	1.70 cu.m.
		20.80 cu.m.

Multiply this volume by 1.2 to allow for storage capacity of branches, manholes, etc.

=> Sewers can hold 20.8 x 1.2 = 24.96 cu.m.

Therefore, storage to be provided for

255.51 - 24.96 = 230.55 cu.m.

If depth of tank = 3.35 m. then

Area required = $\frac{230.55}{3.35}$ = 68.82 sq.m. = 8.3 x 8.3 m.

Provide a tank 8.3 m. x 8.3 m. and 3.35 m. deep at Ballinacurra.

Rising main from submersible pumping station at Ballinacurra to Header Manhole PF-65.

6 DWF = 23 l/s = 82.8 cu.m./hour
Length = 257 m.

The head loss H(m.) in a pipeline of length L(m.) and internal diameter d(m.) with a Hazen Williams co-efficient C discharging a flow Q cu.m./hour is given by:-

$$H = \frac{2.79 \times 10^{-6} \times L}{d^{4.865}} \left(\frac{Q}{C}\right)^{1.85}$$

For any particular pipeline, L, d and C are fixed.

From published literature a value of C = 130 may be used for general design.

The length L may be increased by 10% to allow for bends, etc.

Length of rising main from Ballinacurra to PF-65 = 257 m.

Q = 82.8 cu.m./hour

Design length = 257 x 1.1 = 282.7 m.

Assume a 150 mm. pipe, i.e. v = 1.30 m./sec

$$=> H = \frac{2.79 \times 10^{-6} \times 282.7}{0.15^{4.865}} \left(\frac{82.8}{130}\right)^{1.85} = 3.49 \text{ m.}$$

This headloss is acceptable

Use d = 150 mm.

d. Design of Sewers in Castleredmond & Riverside

i) *Area 41*

This area is to have a separate sewer system.

Flows from Areas 42 - 47 to be included.

Hard paved area	= 0.82 ha.
Time of concentration	= 17.90 min.
Intensity of rainfall	= 25.10 mm./hr.
Population (Area 41)	= 204 persons

Foul Sewer

Foul Flow (6 DWF) = 204 x 0.02153	=	4.39 l/s
Pumped flow from Areas 42-47	=	23.00 l/s
Max. flow to foul sewer	=	27.39 l/s

A 225 mm. diameter foul sewer is to be laid at 1/148 between Manholes PF-63 and PF-65.

Max. flow to storm sewer = 2.787 x 0.82 x 25.1
= 57.36 l/s

A 300 mm. diameter storm sewer is to be laid at 1/148 between Manholes PS-24 and PS-26.

ii) *Area 40*

New developments in this area are to have a separate sewer system.

Flows from Areas 41 - 47 to be included.

Hard paved area contributing to foul sewer	= 0.40 ha.
Hard paved area contributing to storm sewer 0.82(41) + 0.7(40)	= 1.52 ha.
Time of concentration	= 18.20 min.
Intensity of rainfall	= 24.80 mm./hr.
Population (Area 40)	= 304 persons

Foul Sewer

Storm Flow = 2.787 x 0.4 x 24.8	=	27.65 l/s
Foul Flow (6 DWF)	=	27.39 l/s
Foul Flow (2 DWF) = $\frac{304 \times 0.02153}{3}$	=	2.18 l/s
Max. flow to foul sewer	=	57.22 l/s

A 225 mm. diameter foul sewer is to be laid at 1/100 between Manholes PF-62 and PF-63.

Max. flow to storm sewer = 2.787 x 1.52 x 24.8
= 105.06 l/s

A 300 mm. diameter storm sewer is to be laid at 1/100 between Manholes PS-23 and PS-24.

iii) *Area 39*

New developments in this area are to have a separate sewer system.

Flows from Areas 40 - 47 to be included.

Hard paved area contributing to foul sewer 0.17(39) + 0.40(40)	= 0.57 ha.
Hard paved area contributing to storm sewer 0.57(39) + 0.7(40) + 0.82(41)	= 2.09 ha.
Time of concentration	= 19.90 min.
Intensity of rainfall	= 23.20 mm./hr.
Population (Area 39)	= 208 persons

Foul Sewer

Storm Flow = 2.787 x 0.57 x 23.2	=	36.86 l/s
Foul Flow (6 DWF)	=	27.39 l/s
Foul Flow (2 DWF)	=	3.67 l/s
Max. flow to foul sewer	=	67.92 l/s

A 225 mm. diameter foul sewer is to be laid at a minimum slope of 1/505 between Manholes PF-59 and PF-62 and a 300 mm. diameter sewer is to be laid at a slope of 1/262.5 between Manholes PF-57 and PF-59.

A 225 mm. diameter sewer at a slope of 1/87.5 is to be laid between Manholes PF-60 and PF-72.

Max. flow to storm sewer = 2.787 x 2.09 x 23.2 = 135.14 l/s

A 300 mm. diameter storm sewer is to be laid at a slope of 1/27.5 between Manholes PS-21 and PS-23.

iv) *Area 38*

New developments in this area are to have a separate sewer system.

Flows from Areas 39 - 47 to be included.

Hard paved area contributing to foul sewer 0.49(38) + 0.17(39) + 0.40(40)	= 1.06 ha.
Hard paved area contributing to storm sewer 0.77(38) + 0.57(39) + 0.7(40) + 0.82(41)	= 2.86 ha.
Time of concentration	= 25.20 min.
Intensity of rainfall	= 22.12 mm./hr.
Population (Area 38)	= 320 persons

Foul Sewer

Storm Flow = 2.787 x 1.06 x 22.12	= 65.35 l/s
Foul Flow (6 DWF)	= 27.39 l/s
Foul Flow (2 DWF)	= 5.97 l/s
Max. flow to foul sewer	= 98.71 l/s

A 375 mm. diameter foul sewer is to be laid at a slope of 1/300 between Manholes PF-54 and PF-57.

Max. flow to storm sewer = 2.787 x 2.86 x 22.12
= 176.31 l/s

A 375 mm. diameter sewer is to be laid at a slope of 1/50.8 between Manholes PS-20 and PS-21 and a 450 mm. diameter sewer is to be laid at a slope of 1/300 between the outfall to the Owenacurra River and PS-20.

v) *Area 37*

This area is to remain on a combined system.

Flows from Areas 38 - 47 to be included.

Hard paved area contributing to foul sewer	
0.26(37) + 0.49(38) + 0.17(39) + 0.40(40)	= 1.32 ha.
Time of concentration	= 27.70 min.
Intensity of rainfall	= 20.96 mm./hr.
Population (Area 37)	= 80 persons

Foul Sewer

Storm Flow = 2.787 x 1.32 x 20.96	=	77.11 l/s
Foul Flow (6 DWF)	=	27.39 l/s
Foul Flow (2 DWF)	=	6.54 l/s
Max. flow to foul sewer	=	111.04 l/s

A 375 mm. diameter foul sewer is to be laid at a slope of 1/258 between Manholes PF-50 and PF-54.

vi) *Areas 25 to 27*

These areas are on a combined system.

Hard paved area	= 2.62 ha.
Time of concentration	= 24.40 min.
Intensity of rainfall	= 22.52 mm./hr.
Population (Area 38)	= 768 persons + 1,100 pupils

Foul Sewer

Storm Flow = 2.787 x 22.52 x 2.62	=	164.44 l/s
Foul Flow (2 DWF) = $768 \times \frac{0.02153}{3} + 1{,}100 \times \frac{0.02153}{3} \times \frac{1}{3}$	=	8.36 l/s
Max. flow to foul sewer	=	172.80 l/s

A 450 mm. diameter foul sewer is to be laid at 1/300 between Manholes PF-50 and E2-450.

e) Design of Submersible Pumping Station at the Bailick Road Underpass

Areas 25 to 27 and 37 to 47 are contributing flows to this submersible pumping station.

Hard paved area contributing to this pump sump 2.62 (Areas 25-27) + 1.32 (Areas 37-47)	= 3.94 ha.
Time of concentration	= 27.70 min.
Intensity of rainfall	= 20.96 mm./hr.

Foul Sewer

Storm Flow = 2.787 x 3.94 x 20.96	=	230.16 l/s
Foul flow to pump sump	=	42.29 l/s
Total flow to pump sump	=	272.45 l/s

1 DWF = 10.79 l/s (2,956 persons + 50 tourists @ 310 l/head
+ 1.27 l/s (1,100 pupils @ 100 l/head)

= 12.06 l/s

=> 3 DWF = 36.18 l/s (to be pumped to treatment plant)

To design against a 30 year flood which could cause surface flooding a multiplier is obtained from the 1975 Flood Studies Report. The 2 year storm flow is multiplied by this multiplier = 1.644

Therefore, during a 30 year flood, flow to pump sump

= 230.16 x 1.644 + 42.29

= 420.67 l/s

To prevent flooding on the Bailick Road, the TWL in the pump sump must be set at a level which prevents water backpounding in the sewers from coming up through manhole covers and road gullies, taking into account friction losses in the sewer during a 30 year flood.

Lowest road level on southern side occurs at Mh. PF-56 on the Bailick Road = 2.2 m. O.D.

Distance from proposed submersible pumping station to this manhole = 348 m. and includes 18 m. of 600 mm. diameter sewer and 330 m. of 375 mm. diameter sewer.

30 year flood through 600 mm. diameter sewer
= 420.67 l/s (i.e. all areas)

= **1,514.41 cu.m./hour**

30 year flood through first 170 m. of the 375 mm. diameter sewer
= 77.11 x 1.644 + 27.39 + 6.54

= 160.70 l/s = **578.52 cu.m./hour**

30 year flood through the next 160 m. of the 375 mm. diameter sewer
= 65.35 x 1.644 + 27.39 + 5.97

= 140.80 l/s = **506.88 cu.m./hour**

To get the combined head losses through these sewers use the Hazen Williams Formula:-

$$H = 2.79 \times 10^{-6}\left[\frac{18\times1.1}{0.6^{4.865}}\left(\frac{1,514.41}{130}\right)^{1.85} + \frac{170\times1.1}{0.375^{4.865}}\left(\frac{578.52}{130}\right)^{1.85} + \frac{160\times1.1}{0.375^{4.865}}\left(\frac{506.88}{130}\right)^{1.85}\right]$$

= 1.757 m.

Top water level in pump sump ≤ 2.2 - 1.757 = 0.443 m. O.D.

However, this may not be the worst scenario for flooding as it is possible that flooding could occur at Mh. PF-59, ground level = 2.48 m., before it occurs at Mh. PF-56 due to friction losses in the pipe.

30 year flood through the rest of the 275 mm. diameter sewer (80 m. in length) = 140.8 l/s = 506.88 cu.m./hour.

30 year flood through the 300 mm. diameter sewer between Mhs. PF-57 and PF-59 (84 m. in length)

= 36.86 x 1.644 + 27.39 + 3.67
= 91.66 l/s

= 329.97 cu.m./hour

Combined head loss through these sections of sewers:

$$= 2.79 \times 10^{-6}\left[\frac{80 \times 1.1}{0.375^{4.865}}\left(\frac{506.88}{130}\right)^{1.85} + \frac{84 \times 1.1}{0.3^{4.865}}\left(\frac{329.97}{130}\right)^{1.85}\right]$$

$$= 0.865 \text{ m.}$$

Total head loss from submersible pump sump to Mh. PF-59

$1.757 + 0.865 = 2.622$

Top water level in pump sump $= 2.48 - 2.622 = -0.142$ m. O.D.

If overflow weir in pump sump is 10 m. long then to pass 420.67 - 36.18(3 DWF) = 384.49 l/s a head of 77 mm. must be built up over the weir.

This implies that to prevent flooding during a 30 year flood the highest level that an overflow weir can be set at is:

$= -0.142 - 0.077 = -0.219$ m. O.D.

However, if the overflow weir is set at this level there would be difficulty in getting the liquid overflowed into the existing 750 mm. diameter sewer on the Bailick Road without pumping.

At Mh. E2-413 soffit of 750 mm. diameter sewer $= -0.05$

Distance from submersible pumping station to E2-413 = 25 m.

To pass 420.67 l/s a 600 mm. diameter sewer must be laid at 1/260

$$\Rightarrow \text{Headloss over 25 m.} = \frac{25}{260} = 0.096 \approx 0.1 \text{ m.}$$

therefore soffit of 600 mm. diameter sewer at pumping station should be $\geq$ $-0.05 + 0.1 = 0.05$ m. O.D.

However, from previous calculations, T.W.L. must not exceed - 0.142 m. O.D. or else flooding shall occur.

To overcome this problem it is proposed to lay a 450 mm. diameter sewer from PF-50 to PF-53 giving a total head loss from submersible pump sump to Mh. PF-59

$$= 2.79 \times 10^{-6}\left[\frac{18 \times 1.1}{0.6^{4.865}}\left(\frac{1,514.41}{130}\right)^{1.85} + \frac{90 \times 1.1}{0.45^{4.865}}\left(\frac{578.52}{130}\right)^{1.85} + \frac{80 \times 1.1}{0.375^{4.865}}\left(\frac{578.22}{130}\right)^{1.85} + \frac{240 \times 1.1}{0.375^{4.865}}\left(\frac{506.88}{130}\right)^{1.85} + \frac{84 \times 1.1}{0.3^{4.865}}\left(\frac{329.97}{130}\right)^{1.85}\right]$$

$= 2.317$ m.

Top water level in pump sump $\leq 2.48 - 2.317$

$= 0.163$ m. O.D.

Weir may be set at $0.163 - 0.077 = 0.086$ m.

Say 0.00 m. O.D.

Lowest ground level on northern side occurs at Mh. E2-450 on the Bailick Road = 2.11 m. O.D.

Distance from proposed submersible pumping station to this manhole = 170 m. and include 18 m. of 600 mm. diameter sewer and 152 m. of 450 mm. diameter sewer.

30 year flood through 600 mm. diameter sewer = 420 l/s

= 1,514.41 cu.m./hr

30 year flood through 450 mm. diameter sewer
$164.44 \times 1.644 + 8.36 = 278.7$ l/s

= 1,003.3 cu.m./hr

$$H = 2.79 \times 10^{-6}\left[\frac{18 \times 1.1}{0.6^{4.865}}\left(\frac{1,514.41}{130}\right)^{1.85} + \frac{152 \times 1.1}{0.45^{4.865}}\left(\frac{1,003.3}{130}\right)^{1.85}\right]$$

$= 1.06$ m.

Flood level on northern side shall reach only
$0.00 + 0.077 + 1.06$

$= 1.137 \leq 2.11$ O.K.

Volume of storage required shall be that which is capable of retaining 2 hours of 3 DWF or the first flush of storm flow through the sewer, whichever is the greater. The first flush shall occur over the time of concentration = 27.7 minutes.

a) **Retention of 3 D.W.F. for 2 hours**

Capacity required = 36.18 x 3,600 x 2 x 10^{-3} cu.m.
= 260.50 cu.m.

b) **Retention of First Flush**

Total flow to pump sump	=	272.45 l/s
3 DWF is pumped to treatment plant	=	36.18 l/s
Balancing required for		236.27 l/s

(over a period of 27.7 min. = time of concentration)

. . Capacity required =

236.27 x 60 x 27.7 x 10^{-3} = 392.68 cu.m.

. . Install a tank capable of holding the first flush.

However, the sewers are also capable of holding a volume of effluent:

Sewer from Sump to PF-50 can hold	5.09 mm.
PF-50 to E2-450 can hold	21.50 mm.
PF-50 to PF-54 can hold	18.56 mm.
Total	45.15 mm.

(Note: No branches to these sewers)

Local pump sump = 3.5 x 2 x 1.5	10.50 mm.
	55.65 mm.

Therefore storage to be provided for:
392.68 - 55.65 = 337.03 mm.

If depth of tank = 3.35 m. then
Area required = $\frac{337.03}{3.35}$ = 100.6 sq.m. ≈ 10m x 10m

Provide a tank 10 m. x 10 m. x 3.35 m. deep at the Bailick Road Underpass.

Rising main from this submersible pumping station to the treatment plant.

3 D.W.F. = 36.18 l/s	=	130.25 cu.m./hour
Length	=	650 m.
Design Length = 650 x 1.1	=	715 m.

Assume a 200 mm. diameter pipe, i.e. v = 1.15 m/s

$$H = \frac{2.79 \times 10^{-6} \times 715}{0.2^{4.865}} \left(\frac{130.25}{130}\right)^{1.85}$$

$$= 5.034 \text{ m.}$$

This head loss is acceptable
Use d = 200 mm.

f) Design of Storm Tank at the Existing Bailick Road Pumping Station

Areas 1-24 and 28-36 contribute flow to this pumphouse.

Areas 12, 13, 29, 28, 28A, 30, 31, 14 and 15 contribute flow to this pumping station through a 525 mm. diameter sewer from the western side.

Hard paved area contributing to foul sewer
0.66(12) + 0.08(13) + 0.53(29) + 0.05(28) +
0.36(28A) + 0.05(30) + 2.15(14) = 3.88 ha.

Foul Sewer

Foul Flow (6 DWF) = 54.61 l/s
Foul Flow (2 DWF) = 6.83 l/s

Areas 8, 8A, 9, 19, 20, 21, 22, 23, 24, 33, 34, 35 & 36 contribute flow to this pumping station through a 600 mm. diameter sewer from the eastern side as far as Mh. E1-4 and then through a 900 mm. diameter sewer to the pumping station.

Hard paved area contributing to foul sewer
0.88(8) + 0.1(8A) + 0.33(9) + 0.6(19) +
0.65(20) + 0.23(21) + 0.37(22) + 0.12(23)
+ 0.79(24) = 4.07 ha.

Foul Sewer

Foul Flow (6 DWF) = 23.92 l/s
Foul Flow (2 DWF) = 7.95 l/s

Areas 1-7, 10, 11, 16, 17 & 18 contribute flow to this pumping station through a 750 mm. diameter sewer from the northern side as far as Mh. E1-4 and then through a 900 mm. diameter sewer to the pumping station.

Hard paved area contributing to foul sewer
9.48(1-7) + 0.46(10) + 0.74(11) + 0.54(16)
+ 0.21(17) + 0.44(18) = 11.87 ha.

2 DWF from above areas = 16.41 l/s

Total hard paved area = 19.82 ha.
3.88 + 4.07 + 11.87
Time of concentration = 35.5 minutes
Intensity of rainfall = 18.02 mm./hour

Foul Sewer

Storm Flow = 2.787 x 19.82 x 18.02	=	995.39 l/s
Foul Flow 54.61 + 6.83 + 26.92 + 7.95 + 16.41	=	112.72 l/s
Total flow to pumping station	=	1,108.11 l/s

1 DWF = 33.49 l/s (9,184 persons + 150 tourists @ 310 l/h) + 0.23 l/s (113 hog units @ 175 l)

= 33.72 l/s

3 DWF = 101.16 l/s (to be pumped to treatment plant)

To limit flooding in the centre of Midleton to once in 30 years the T.W.L. in the storm tank at the existing Bailick Road Pumping Station must be set at a level which prevents water backpounding in the sewers from coming up through manhole covers and road gullies, taking into account friction losses in the sewers during a 30 year flood.

As before, a multiplier = 1.644 is applied to the 2 year storm flows to get the 30 year flood.

Lowest street level in the centre of Midleton Town occurs at Mh. E1-49 = 2.6 m. O.D.

Distance from pumping station to this manhole = 390 m. and includes 170 m. of 900 mm. diameter sewer and 220 m. of 600 mm. diameter sewer

Hard paved area contributing to 900 mm. diameter sewer = 4.07 + 11.87	= 15.94 ha.
Foul flow to this sewer = 26.92 + 7.95 + 16.41	= 51.28 l/s
Hard paved area contributing to 600 mm. diameter sewer	= 4.07 ha.
Foul flow to this sewer = 26.92 + 7.95	= 34.87 l/s
Time of concentration	= 35.5 minutes
Intensity of rainfall	= 18.02 mm./hour

Therefore total flow in 900 mm. diameter sewer

2.787 x 15.94 x 18.02 + 51.28 = 800.53 + 51.28

= 851.81 l/s

and total flow in 600 mm. diameter sewer

$= 2.787 \times 4.07 \times 18.02 + 34.87 = 204.40 + 34.87$

$= 239.27$ l/s

The 30 year flood through the 900 mm. diameter sewer

$= 800.53 \times 1.644 + 51.28 = 1,367.35$ l/s

$= 4,922.46$ cu.m./hour

Velocity in sewer $= 2.15$ m/s

The 30 year flood through the 600 mm. diameter sewer

$= 204.40 \times 1.644 + 34.87 = 370.90$ l/s

$= 1,335.25$ cu.m./hour

Velocity in sewer $= 1.30$ m/s

To get the combined head losses through these sewers use the Hazen Williams Formula:-

$$H = 2.79 \times 10^{-6}\left[\frac{170 \times 1.1}{0.9^{4.865}}\left(\frac{4,922.46}{130}\right)^{1.85} + \frac{220 \times 1.1}{0.6^{4.865}}\left(\frac{1,335.25}{130}\right)^{1.85}\right]$$

$= 1.327$ m.

Due to the high velocity in the 900 mm. diameter sewer, entry and exit losses for this sewer must be taken into account.

Entry and exit losses $= 2 \times \frac{v^2}{2g} = 2 \times \frac{2.15^2}{2 \times 9.81} = 0.471$ m.

Total head losses $= 1.327 + 0.471 = 1.798 \approx 1.8$ m.

Therefore the top water level in the storm tank

$\leq 2.6 - 1.8 = 0.8$ m. O.D.

30 year flow to storm tank

= 995.39 x 1.644 + 112.72

= 1,749.14 l/s

Quantity of flow over the overflow weir = 30 year flood minus 3 DWF which is being pumped to the treatment plant

= 1,749.14 - 101.16

= 1,647.98 l/s

If overflow weir = 21.85 m. then the head necessary over the weir to pass 1,647.98 l/s = 0.125 m.

Top of weir ≤ 0.8 - 0.125 = 0.675 m. O.D.

Say 0.6 m. O.D.

However, it is preferable to have a short length of the weir a little lower than the rest so that the time it takes for the overflow to stop working once a storm has stopped is reduced.

Therefore, set 8 m. of the weir at 0.57 m. O.D. and the rest at 0.6 m. O.D.

Due to the fact that the weir has to be set at such a low level to prevent flooding, the overflow has to be pumped during times of high tide.

Volume of storage required shall be that which is capable of retaining 2 hours of 3 D.W.F. or the first flush of storm flow through the sewers, whichever is the greater. The first flush shall occur over the time of concentration = 35.5 minutes.

a) Retention of 3 DWF for 2 hours

Capacity required = 101.16 x 3,600 x 2 x 10^{-3} cu.m.
= 728.35 cu.m.

b) Retention of First Flush

Total flow to pumping station	=	1,108.11 l/s
3 DWF is pumped to treatment plant	=	101.16 l/s
Balancing required for		1,006.95 l/s

Time of concentration = 35.5 minutes

. . Capacity required =

1,006.95 x 60 x 35.5 x 10^{-3} = 2,144.80 cu.m.

. . Install a tank capable of holding the first flush.

However, the sewers are also capable of holding a volume of effluent:

900 mm. diameter sewer from pumping station to E1-4 can hold	106.87 cu.m.
750 mm. diameter sewer from E1-4 to E1-10 can hold	56.59 cu.m.
600 mm. diameter sewer from E1-4 to E1-49 can hold	35.64 cu.m.
525 mm. diameter sewer from pumping station to E1-27 can hold	76.64 cu.m.
Wet wells can hold	94.64 cu.m.
Splitter chamber can hold	24.36 cu.m.
Inlet manhole can hold	8.37 cu.m.
Total	403.11 cu.m.

(Note: The volume which the sewers can hold was not multiplied by 1.2 as the branches would hold only a very small volume in comparison)

Therefore, a storm tank with a capacity of

2,144.8 - 403.11 = 1,741.69 cu.m.

should be provided to return the first flush.

This tank is detailed in Drawing No. 040.

Domestic rising main from the existing pumping station on Bailick Road to the treatment plant

3 DWF = 101.16 l/s	= 364.18 cu.m./hour
Length	= 670 m.
Design Length = 670 x 1.1	= 737 m.

Assume a 300 mm. diameter pipe, i.e. v = 1.43 m/s

$$H = \frac{2.79 \times 10^{-6} \times 737}{0.3^{4.865}} \left(\frac{364.18}{130}\right)^{1.85}$$

$$= 4.836 \text{ m.}$$

This head loss is acceptable
Use d = 300 mm.

Industrial rising main from the existing pumping station on Bailick Road to the treatment plant.

Flow = 17.36 l/s	= 62.5 cu.m./hour (I.D.L. effluent)
Length	= 927 m.
Design Length = 927 x 1.1	= 1,019.7 m.

Assume that the first 353 m. is a 200 mm. diameter pipe, i.e. v = 0.55 m/s. (This low velocity is O.K. as the effluent is already screened).

Assume that the next 574 m. is a 300 mm. diameter pipe as this is the rising main from Campbells conveying 63 l/s = 226.8 cu.m./hour at a velocity of 0.89 m/s.

This implies that the head loss when I.D.L. effluent only is being pumped

$$H = 2.79 \times 10^{-6} \left(\frac{62.5}{130}\right)^{1.85} \frac{353 \times 1.1}{0.2^{4.865}} + \frac{574 \times 1.1}{0.3^{4.865}}$$

$$= 0.703 \text{ m.}$$

This head loss is acceptable
Use d = 200 mm. for first 353 m.

Check size of proposed rising main from Campbell Foods:

Q = 63 l/s	= 226.8 cu.m./hour
L	= 2,220 m.
Design length 2,220 x 1.1	= 2,442 m.

$$H = \frac{2.79 \times 10^{-6} \times 2,442}{0.3^{4.865}} \left(\frac{226.8}{130}\right)^{1.85}$$

$$= 6.67 \text{ m.}$$

This head loss is acceptable
Use d = 300 mm. diameter.

APPENDIX 3

DESIGN OF DOMESTIC SEWAGE TREATMENT PLANT

DESIGN OF DOMESTIC SEWAGE TREATMENT PLANT

POLLUTION LOAD

Stage 1:

Existing Population	5,951 @ 70 grams/head =	416.57 kg.
Increase in Population	1,369 @ 60 grams/head =	82.14 kg.
Tourists	200 @ 60 grams/head =	12.00 kg.
Abattoirs	428 kg/week =	85.60 kg.
Total		596.31 kg.

Equivalent Population = 9,939

Design For 10,000 p.e.

Stage 2:

Existing Population	5,951 @ 70 grams/head =	416.57 kg.
Increase in Population	6,189 @ 60 grams/head =	371.34 kg.
Tourists	200 @ 60 grams/head =	12.00 kg.
Abattoirs	565 kg/week =	113.00 kg.
Total		912.91 kg.

Equivalent Population = 15,215

Design For 15,000 p.e.

HYDRAULIC LOAD (1 D.W.F.)

Stage 1:

Design for 310 lts/head/day for actual population

Existing Population	5,951 @ 310 lts =	1,844.81 cu.m.
Increase in Population	1,369 @ 310 lts =	424.39 cu.m.
Tourists	200 @ 310 lts =	62.00 cu.m.
Abattoirs	85.6 hog units @ 175 lts =	14.98 cu.m.
Total		2,346.18 cu.m.

Say 2,350 cu.m./day = 27.2 lts/sec (1 D.W.F.)

Design for 310 lts/head/day for actual population

Existing Population	5,951 @ 310 lts =	1,844.81 cu.m.
Increase in Population	6,189 @ 310 lts =	1,918.59 cu.m.
Tourists	200 @ 310 lts =	62.00 cu.m.
Abattoirs	113 hog units @ 175 lts =	19.78 cu.m.
Total		3,845.18 cu.m.

Say 3,850 cu.m./day = 44.5 lts/sec (1 D.W.F.)

SUMMARY

Design Population (Stage 1) = 10,000 p.e. (2 x 5,000 p.e.)

1 D.W.F. = 27.2 lts/sec

Design Population (Stage 2) = 15,000 p.e. (3 x 5,000 p.e.)

1 D.W.F. = 44.5 lts/sec

POLLUTION LOAD

Design the plant for 3 modules of 5,000 p.e. each @ 60 grams $B.O.D._5$/head/day.

Stage 1 load = 600 kgs. $B.O.D._5$ (10,000 p.e.)
Stage 2 load (ultimate) = 900 kgs. $B.O.D._5$ (15,000 p.e.)

DESIGN OF PLANT

The flow (hydraulic load) to the sewage treatment plant is pumped and is therefore fixed at the pumping capacity of the pumps. It is proposed to pump just 3 D.W.F. to the sewage treatment plant with a storm water balancing tank being provided at both pumping stations, i.e. at the existing Bailick Road Pumphouse and at the Bailick Road underpass beside the bypass road.

Therefore it is proposed to design the treatment plant for a hydraulic load of 3 D.W.F. with another 3 D.W.F. held for a minimum of 2 hours retention in both storm tanks.

By holding 3 D.W.F. for 2 hours it is ensured that any overflow gets at least primary sedimentation, thereby reducing the $B.O.D._5$ of the overflow by between 30% and 50% of the diluted inflow, thus giving an overflow $B.O.D._5$ of between 28 and 20 mg./lt. at worst. In addition, the overflow from the holding tank at the existing pumping station on the Bailick Road which enters the Owenacurra River will be fine screened so that the $B.O,D._5$ of the overflowed liquor shall be well below 20 mg./l.

The overflow from the proposed pumping station near the bypass will enter the 750 mm. diameter sewer to Ballinacurra, where it shall be fine screened before being pumped to the existing outfall at Rathcoursey.

Pumping all the effluent to the proposed treatment plant has the effect of liquidising the faecal matter which will then pass through the fine screens at the treatment plant.

Balancing of the flow at the pumping station supercedes the need for flow balancing at the treatment plant.

The following stages are proposed within the treatment plant:-

a) Screening
b) Grit Removal
c) Bio Reactors (Extended Aeration)
d) Sedimentation
e) Sludge Settlement and Thickening
f) Sludge Digestion
g) Sludge Dewatering

A. SCREENING

As all the faecal matter is liquidised, a 5 mm. fine stepped screen will remove all other solids and convey them to a top feed launder press (similar to Jones & Attwood) which will bale the screenings.

B. GRIT REMOVAL

An aerated grit chamber is proposed for this site to allow for the cleanest possible grit removal. Aerated grit chambers are easily adjusted by changing the aeration rate to ensure that grit down to a desired particle size is removed. This can be adjusted during plant operation as the optimum requirements become clear.

The aerated grit trap performs a dual function as a grease trap. This grease would be taken directly to the digesters.

A bypass of both screens and grit trap will be provided to allow for maintenance.

Grit Tank Design:-

Peak flow rate = 133.50 litres/second

Take a retention time of 5 minutes

. . Volume of tank = 0.1335 x 5 x 60 cu.m.

= 40.05 cu.m.

Take a depth to width ratio of 1:1.2 and a depth of 3.0 m.

Then length of tank = $\frac{40.05}{3 \times 3.6}$

= 3.708 m.

Increase length by 15% to allow for inlet and outlet conditions, i.e.

$$3.708 \times 1.15$$

$$= 4.265 \text{ m.}$$

Say 4.5 m.

Air requirement

The requirement for air in an aerated grit trap may vary between 1 and 3 cu.m. air/cu.m. of tank capacity/hour.

i.e. 48.6 - 145.8 cu.m. air/hour

Volume of Grit Removal

In a sewerage system between 0.004 and 0.2 cu.m. of grit/1,000 cu.m. of flow may be expected. Therefore, facilities to handle up to 2.31 cu.m. grit/day are required.

Secondary Treatment

A treatment plant of this size is on the borderline where primary sedimentation and anaerobic digestion would be economically feasible. It is not proposed to install such a system in this case due to the odour problems which could arise from such a system.

Instead it is proposed to construct an entirely aerobic system with the use of aerobic sludge digesters to reduce the volume of sludge.

The treatment will consist of a full nitrification/denitrification plant followed by secondary sedimentation. The facility for denitrification is not strictly required but it is proposed to install it as the extra cost of the required tankage is low and it will give additional versatility to the plant to cater for increased loads or more stringent standards in the future.

The facility to install phosphate reduction by chemical precipitation will be provided but it is not proposed to install this at this stage.

C. BIO REACTORS

Design load = 3 streams of 300 kgs. B.O.D. each
A loading rate of 190 mg./litre is applicable for the bio-reactor to include an anoxic zone.

$$\text{Volume of tank} = \frac{300 \times 10^6}{190 \times 10^3} \text{ cu.m.}$$

$$= 1{,}578.95 \text{ cu.m.}$$

Retention Time

3 D.W.F. for 5,000 p.e.	= 44.5 lts/sec.
Retention	= $\frac{1,579 \times 10^3 \text{ lts}}{44.5 \text{ lts/sec.}}$
	= 35,483 secs.
	= 9 hours 50 minutes
for 1 D.W.F. retention	= 29 hours 34 minutes

A plug flow system is proposed for greater control of anoxic and aerobic conditions.

The first 25% of the reactor will be anoxic to allow for denitrification in the presence of carbon provided by the raw sewage.

Take a liquid depth of 4.5 m.

Then each Bio-Reactor will consist of 4 no. tanks in series each tank being 9.5 m. x 9.5 m. x 4.5 m. deep.

Air Requirement

Oxygenation Capacity	= 2.5 kg.O_2 to 1 kg. B.O.D.$_5$
Oxygen Transfer	= 0.267 kgs.O_2/cu.m. air
Oxygen transfer efficiency	= 15% (for fine bubble diffuser)
. . Air blower capacity	= 780 cu.m./hour/stream

. . Install 3 no. blowers now each with 780 cu.m./hr. capacity to give 50% standby. One of the blowers is to be inverter controlled to allow for variation in oxygenation requirements.

D. SEDIMENTATION (1 OF 3 STREAMS)

The sedimentation tanks will be designed for a surface loading of 22 cu.m./sq.m./day (i.e. 0.9 m./hour) upward flow velocity.

The hydraulic loading on each tank will be 3 D.W.F. + 1 D.W.F. return sludge = 4 D.W.F.

The surface area required for each stream (5,000 p.e.) is:

$$\frac{5,126.4}{22} = 233 \text{ sq.m.}$$

Use circular tanks.
Then tank equals 17.22 m. diameter, say 17.25 m.
side wall depth = 1.5 m.

The final effluent shall be decanted from around the circumference of the sedimentation tanks by a decanting channel.

Sludge Return Pumps:-

For Denitrification return the mixed liquor to the anoxic zone at a rate of 5 D.W.F. This will give an 83% reduction in nitrogen.

A return rate of 5 D.W.F. would normally place quite a high hydraulic load on the plant and particularly on the sedimentation tanks.

Therefore, it is proposed that 4 D.W.F. will be returned to the anoxic zone from the Bio-Reactor outlet. This allows for a minimal lift and therefore makes for very economical pumping.

The M.L.S.S. return pumps will be axial flow submersible inline pumps mounted in the bio-reactor outlet channel. Each pump will be capable of pumping 59 litres/second against a head of 250 m.

The last 1 D.W.F. would be returned from the hopper of the sedimentation tanks as normal.

The settled sludge return pumps will be dry mounted submersible centrifugal pumps also isolated by sluice valves and will be capable of pumping 15 litres/second against a head of 275 mm.

Both sets of pumps will have inverter frequency control to allow for maximum flexibility within the system.

Excess Sludge Pumps:-

Excess sludge will be wasted directly from the outlet of the Bio-Reactor rather than, in the more traditional way, from the settling tank.

The purpose of this is twofold:-

i) The sludge would be wasted over the entire 24 hours each day rather than in a much shorter period (2 hours) from the settling tank, thereby substantially reducing the hydraulic load on the picket fence thickener.

ii) The sludge age of the plant is directly controlled by wasting an exact fraction of the Bio-Reactor volume each day. This fraction can be varied easily to give optimum sludge conditions.

Install excess activated sludge pumps each capable of pumping 0 - 4 litres/second (normal range 0.73 litres/second - 1.46 litres/second)

This pump would be controlled by frequency inverter and flow meter.

Sludge Treatment:-

Excess activated sludge from all three phases of the plant (15,000 p.e.) will amount to approximately 45 grams D.S./head/day if phosphate removal is included.

i.e. 675 kgs. D.S./day

If this is dewatered directly from the sludge thickening tank then sludge cake of between 15% and 18% D.S. could be expected. This would give a total load for disposal offsite each day of **4.5 tonnes @ 15% D.S.**

The sludge cake produced above could not be used on agricultural land without long term storage (3 months). Storage for this volume (410 tonnes) is not practical.

In addition, there is an unresolved question mark over disposal of sewage sludge to landfill sites with regard particularly to dry solids content.

Therefore it is proposed to further treat the excess sludge by Thermophilic Aerobic Digestion to:

a) Kill off pathogens.

b) Reduce sludge volumes (by 40%).

c) Improve dewatering characteristics.

E. SLUDGE SETTLEMENT & THICKENING

Design tank for a surface loading of 14 cu.m./sq.m./day

Waste sludge stream = 325.0 cu.m./day maximum @ 0.3% D.S.

Surface area required = $\frac{325}{14}$ = 23.21 sq.m.

Use a tank 5.5 m. in diameter

Allow a 1.75 m. depth for settling and a sludge blanket section for gravity thickening of the sludge.

This gravity section should be capable of storing 3 days sludge @ 4% D.S.

i.e. 3 days @ 675 kgs. @ 4% = 50.625 cu.m.

The depth of tank required for this volume = 2.14 m.

. . sludge settling/thickening tank is 5.5 m. diameter x 4 m. deep.

F. SLUDGE DIGESTION

Aerobic Digester

Hydraulic retention time required = 10 - 15 days for aerobic digestion.
Use 12 days

Extended aeration gives rise to a sludge of dry solids content of 45 grams/head/day at concentration of 4%

=> Required digestion volume
= 15,000 x 45 grams x $\frac{100}{4}$ x 12 days

= 202.5 cu.m.

Using 2 no. digesters to ensure good feed rate in initial stages each tank has volume of 102 cu.m.

Hydraulic loading is:

$$\frac{0.8 \times 15{,}000 \times 0.045}{204} = \frac{0.8 \times 675}{204} = 2.65$$

i.e. 2.65 kg/cu.m. of digester volume. ---------- O.K.

Hydraulic loading range should be between 1.6 and 4.8 kg. of volatile solids per cu.m. [volatile = 80% of total]

Oxygen requirement = 0.8 x 675 x 0.4 x 2.3
= 496.8 kg. of O_2

Air requirement = $\frac{496.8}{0.267}$

= 1,861 cu.m. of air

Transfer efficiency = 10%. The required air volume/day = 18,610 cu.m. (coarse bubble diffuser)

= 775 cu.m. of air/hour

The requirement for good mixing is that the air supply should be 20 - 40 cu.m. of air/1,000 cu.m. of volume/minute.

Amount of air/minute provided = $\frac{775}{60}$

= 12.92 cu.m./minute

Requirement = $\frac{204}{1,000}$ x 40 cu.m.

= 8.16 cu.m./minute

Hence air supplied at 12.92 cu.m./minute is quite adequate for mixing.

G. SLUDGE DEWATERING

Volume of sludge remaining after digestion

= 675 x 0.6 kg. @ 10% D.S.

= 4.050 tonnes/day

Dewatering should produce a cake of 20% - 25%

. . volume to be disposed off = 2.025 tonnes/day

Use either filter belt press or centrifuge

Install 2 no. Series 2 1500 belt presses or equivalent centrifuge.

Air Requirements for Treatment Plant

	Initial	Ultimate
Grit Chamber	146 cu.m./hour	146 cu.m./hour
Bio-Reactors	1,560 cu.m./hour	2,340 cu.m./hour
Aerobic Digesters	517 cu.m./hour	775 cu.m./hour
Total	2,223 cu.m./hour	3,261 cu.m./hour

Install 3 no. air blowers (2 duty and 1 standby) capable of 1,200 cu.m./hour at 500 m.bar. Holmes Dresser Roots Type HR/31 would be suitable. This is capable of 1,227 cu.m./hour at 1,622 r.p.m. using a 30 kW. motor.

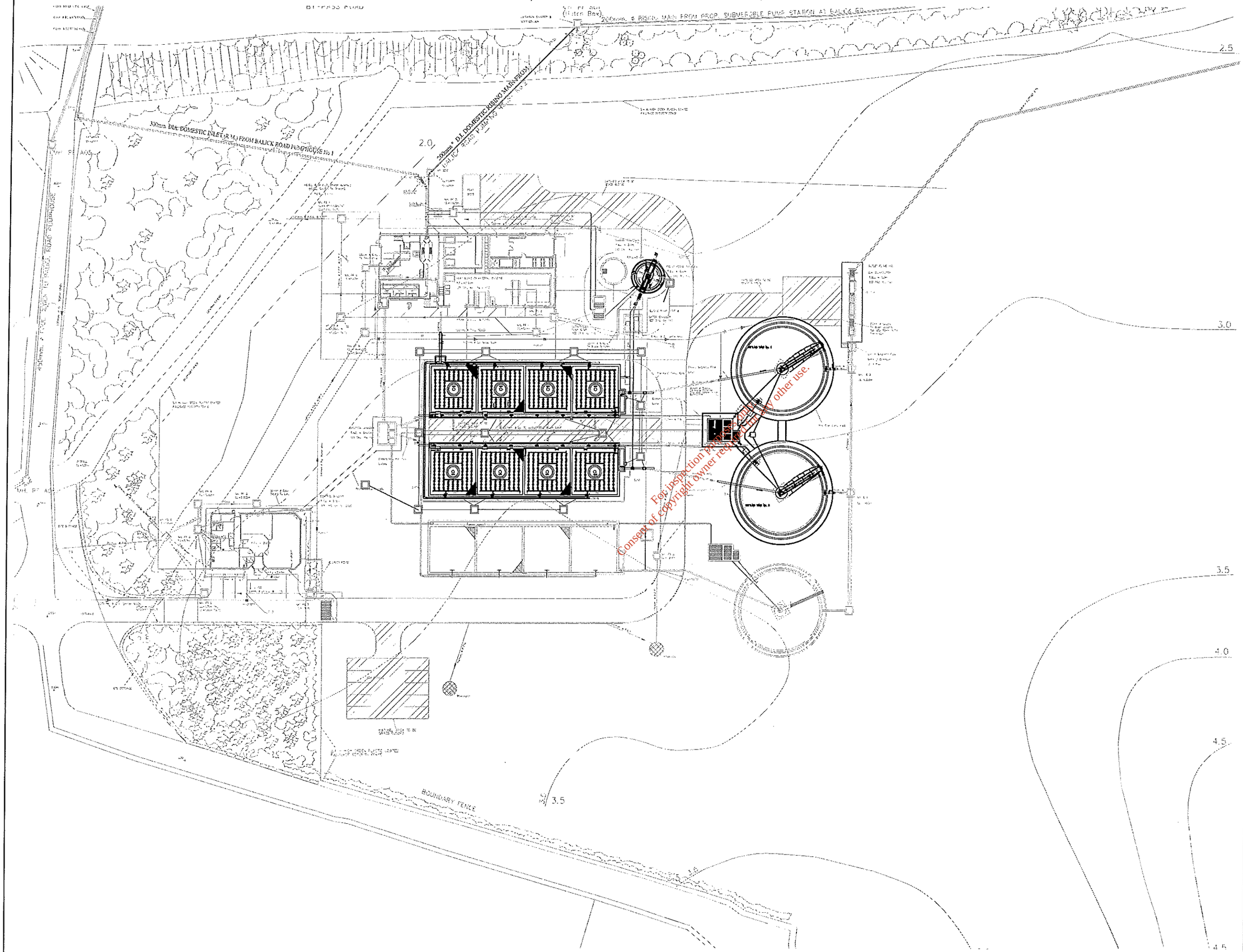
Initially one duty blower would provide basic air requirements while the second would be invertron controlled to top up requirements exactly.

Ultimately, a further blower would be added.

HYDRAULICS THROUGH TREATMENT PLANT

Element	Flow Range (lt/sec)	Channel Dimensions (mm.)	Head Loss (min)
Fine Screen (INKA Step Screen)	0 - 133.50	500 mm. (55 - 1800)	85 mm.
Grit Chamber	0 - 133.50	Inlet = 500	1/500
Grit Chamber to Splitter	0 - 133.50	350 mm.	1/300 (3 DWF) 1/1600 (3 DWF)
Splitter	0 - 44.50 each	3 no. 600 mm. weirs	116 mm. head on weir
Splitter Grit Chamber to Bio-Reactors	0 - 44.50 each	200	1/100 (3 DWF 1/2100 (1/2 DWF)
Bio-Reactor to Sedimentation Tank	0 - 59.33 each stream	200	1/100 (3 DWF 1/750 (1/2 DWF)
Sedimentation Tank to Outfall	0 - 133.50	450	1/300
Sedimentation Sludge Return (each stream)	14.83	150	1/80
Bio-Reactor Sludge Return	74.17	500	1/100 (244 depth)
Excess Waste Activated Sludge	3 x (0.75 -> 1.50)	80	1/1700 -> 1/460

IF IN DOUBT ASK DO NOT SCALE OFF THIS DRAWING



NOTES

Rev.	Name	Date	Description
No. Reqd.		Materials:	Finish:

EPS Pumping & Treatment Systems
Quarterstown Industrial Estate, Ballincollig, Co. Cork.
Phone: 021-21064
Fax: 021-21378
Email: epscork@indigo.ie
Ballyhaunis, Co. Mayo.
Phone: 0907-30358
Fax: 0907-30781
Mountrath, Co. Laois.
Phone: 0502-32278
Fax: 0502-32616

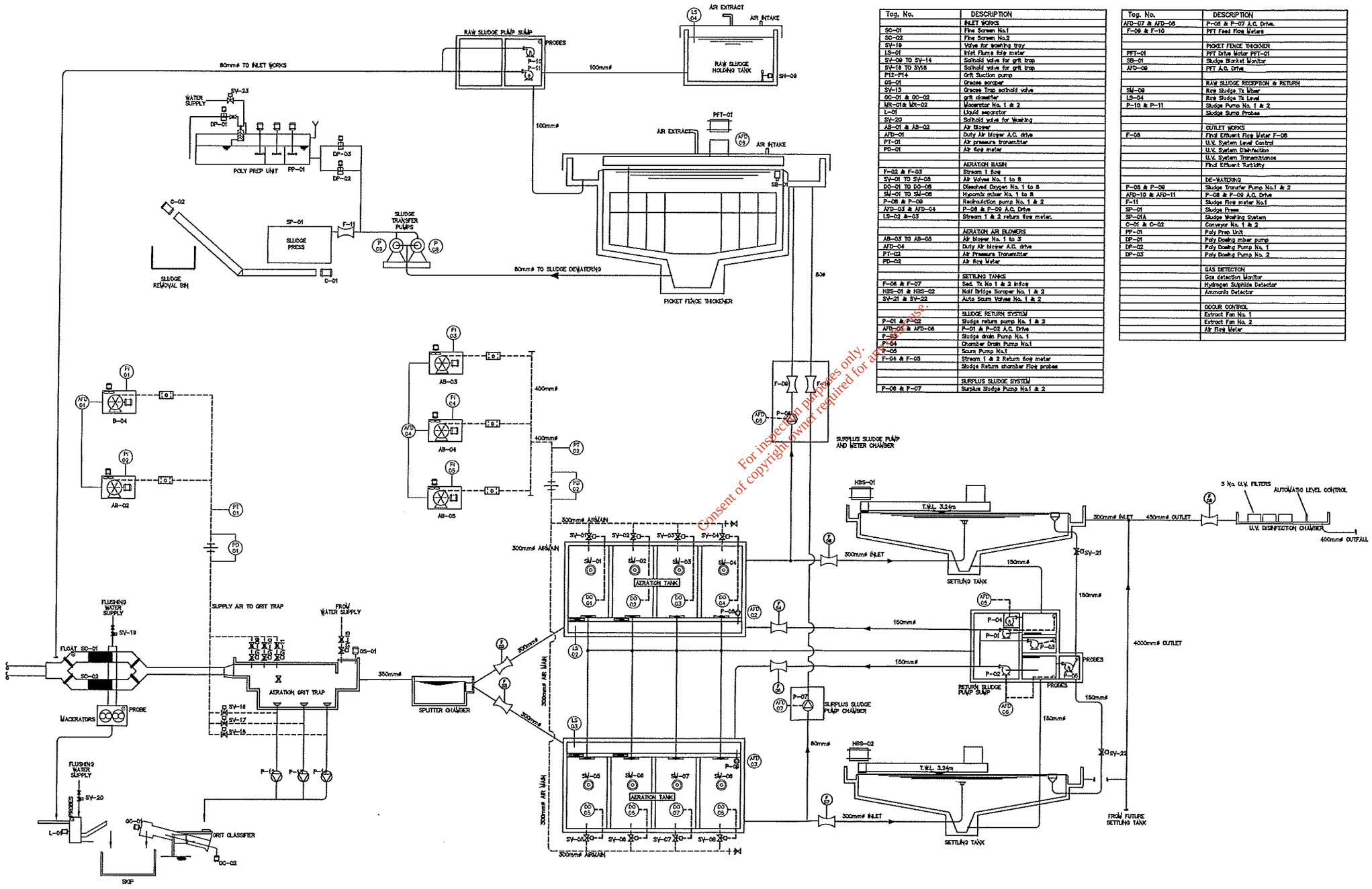
Job Title:
MIDELTON MAIN DRAINAGE

Drawing Title:
SITE LAYOUT

Scale: 1:250			
Drwn By: VML	Checked By: GH	Date:	
Revision Suffix:	0		
Job No.:	PC395		
Drg No.:	PC395-01		
Workshop No.:			

IF IN DOUBT ASK DO NOT SCALE OFF THIS DRAWING

AWAITING DETAILS FROM MCOS



Tag. No.	DESCRIPTION
	INLET WORKS
SC-01	Fine Screen No.1
SC-02	Fine Screen No.2
SV-19	Valve for washing tray
LS-01	Inlet Flume high meter
SV-08 TO SV-14	Solhold valve for grit trap
SV-16 TO SV18	Solhold valve for grit trap
P12-P14	Grit Suction pump
GS-01	Grease scraper
SV-13	Grease trap solhold valve
GC-01 & GC-02	grit classifier
MR-01& MR-02	Macerator No. 1 & 2
L-01	Liquid separator
SV-20	Solhold valve for Washing
AB-01 & AB-02	Air Blower
AFD-01	Duty Air blower A.C. drive
PT-01	Air pressure transmitter
FD-01	Air flow meter
	AERATION BASIN
F-02 & F-03	Stream 1 flow
SV-01 TO SV-08	Air Valves No. 1 to 8
DO-01 TO DO-08	Dissolved Oxygen No. 1 to 8
SM-01 TO SM-08	Hycomix mixer No. 1 to 8
P-08 & P-09	Recirculation pump No. 1 & 2
AFD-03 & AFD-04	P-08 & P-09 A.C. Drive
LS-02 &-03	Stream 1 & 2 return flow meter.
	AERATION AIR BLOWERS
AB-03 TO AB-05	Air blower No. 1 to 3
AFD-04	Duty Air blower A.C. drive
PT-02	Air Pressure Transmitter
FD-02	Air flow Meter
	SETTLING TANKS
F-06 & F-07	Sed. Tk No 1 & 2 Inflow
HRS-01 & HRS-02	Half Bridge Scraper No. 1 & 2
SV-21 & SV-22	Auto Scum Valves No. 1 & 2
	SLUDGE RETURN SYSTEM
P-01 & P-02	Sludge return pump No. 1 & 2
AFD-05 & AFD-06	P-01 & P-02 A.C. Drive
P-03	Sludge drain Pump No. 1
P-04	Chamber Drain Pump No.1
P-05	Scum Pump No.1
F-04 & F-05	Stream 1 & 2 Return flow meter
	Sludge Return chamber Flow probes
	SURPLUS SLUDGE SYSTEM
P-06 & P-07	Surplus Sludge Pump No.1 & 2

Tag. No.	DESCRIPTION
AFD-07 & AFD-08	P-06 & P-07 A.C. Drive.
F-09 & F-10	PFT Feed Flow Meters
	PICKET FENCE THICKNER
PFT-01	PFT Drive Motor PFT-01
SB-01	Sludge Blanket Monitor
AFD-09	PFT A.C. Drive
	RAW SLUDGE RECEPTION & RETURN
SM-09	Raw Sludge Tk Mixer
LS-04	Raw Sludge Tk Level
P-10 & P-11	Sludge Pump No. 1 & 2
	Sludge Sump Probes
	OUTLET WORKS
F-08	Final Effluent Flow Meter F-08
	U.V. System Level Control
	U.V. System Disinfection
	U.V. System Transmittance
	Final Effluent Turbidity
	DE-WATERING
P-08 & P-09	Sludge Transfer Pump No.1 & 2
AFD-10 & AFD-11	P-08 & P-09 A.C. Drive
F-11	Sludge Flow meter No.1
SP-01	Sludge Press
SP-01A	Sludge Washing System
C-01 & C-02	Conveyor No. 1 & 2
PP-01	Poly Prep Unit
DP-01	Poly Dosing mixer pump
DP-02	Poly Dosing Pump No. 1
DP-03	Poly Dosing Pump No. 2
	GAS DETECTION
	Gas detection Monitor
	Hydrogen Sulphide Detector
	Ammonia Detector
	ODOUR CONTROL
	Extract Fan No. 1
	Extract Fan No. 2
	Air Flow Meter

NOTES

Rev.	Name	Date	Description
0	JL	01/02/00	INITIAL ISSUE

No. Reqd. Materials: Finish:

EPS Pumping & Treatment Systems

Quartertown Industrial Estate, Mallow, Co. Cork.
Phone: 022-31200
Fax: 022-31250
Email: contracts@epsireland.com

Ballyhaunis, Co. Mayo.
Phone: 0907-30226
Fax: 0907-30781

Mountrath, Co. Laois.
Phone: 0502-32279
Fax: 0502-32518

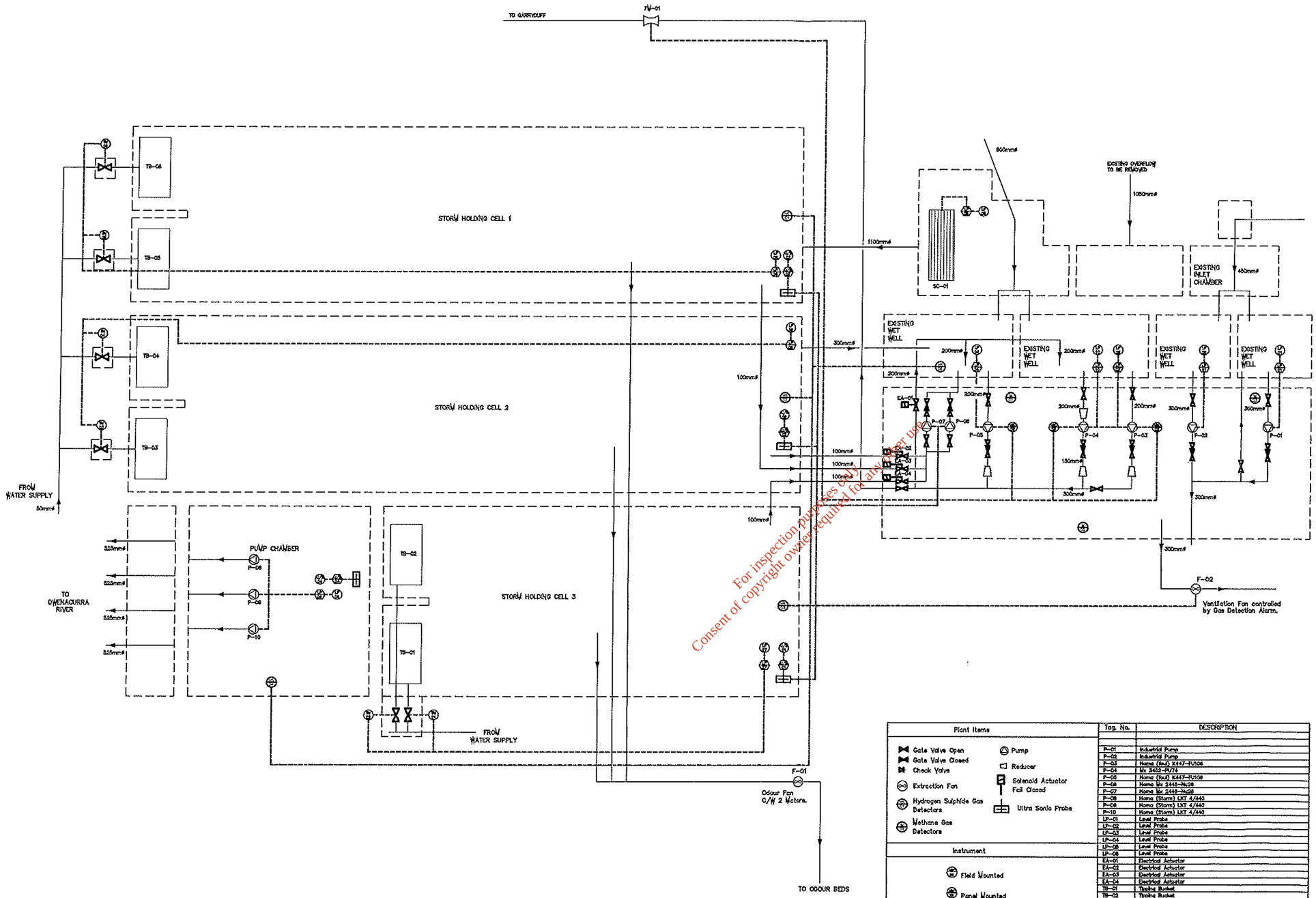
Job Title:

MIDLETON
MAIN DRAINAGE

Drawing Title:

PROCESS AND
INSTRUMENTATION
DIAGRAM

Scale: N.T.S.			
Drawn By: JL	Checked By: GH	Date:01-02-00	
Revision Suffix:			
Job No.:	PC 395		
Drg No.:	PC 395-10		
Workshop No.:			



Plant Items			
Gate Valve Open	Pump		
Gate Valve Closed	Reducer		
Check Valve	Solenoid Actuator Fail Closed		
Extraction Fan	Ultra Sonic Probe		
Hydrogen Sulphide Gas Detectors			
Methane Gas Detectors			
Instrument			
Field Mounted			
Panel Mounted			
PLC Function			
Level Probe Control Line			
Ultra Sonic Probe Control Line			
Hydrogen Sulphide Gas Detection Control Line			

Tag. No.	DESCRIPTION
P-01	Industrial Pump
P-02	Industrial Pump
P-03	Homa (Foul) K447-FU106
P-04	Wx 3462-PU76
P-05	Homa (foul) K447-FU106
P-06	Homa Wx 2445-Nu28
P-07	Homa Wx 2445-Nu28
P-08	Homa (Storm) LXT 4/440
P-09	Homa (Storm) LXT 4/440
P-10	Homa (Storm) LXT 4/440
LP-01	Level Probe
LP-02	Level Probe
LP-03	Level Probe
LP-04	Level Probe
LP-05	Level Probe
LP-06	Level Probe
EA-01	Electrical Actuator
EA-02	Electrical Actuator
EA-03	Electrical Actuator
EA-04	Electrical Actuator
TB-01	Tipping Bucket
TB-02	Tipping Bucket
TB-03	Tipping Bucket
TB-04	Tipping Bucket
TB-05	Tipping Bucket
TB-06	Tipping Bucket
LP-07	Level Probe
LP-08	Level Probe
LP-09	Level Probe
U/S-01	Ultrasonic Level Sensor
U/S-02	Ultrasonic Level Sensor
U/S-03	Ultrasonic Level Sensor
U/S-04	Ultrasonic Level Sensor
SV-01	Solenoid Valve
SV-02	Solenoid Valve
SV-03	Solenoid Valve
SV-04	Solenoid Valve
SV-05	Solenoid Valve
SV-06	Solenoid Valve
FM-01	Flowmeter
SC-01	Brushed Side Weir Screen
F-01	Fan (Odour)
F-02	Fan (Ventilation)
LP-10	Level Probe
HS-01	Hydrogen Sulphide Gas Detector
HS-02	Hydrogen Sulphide Gas Detector
HS-03	Hydrogen Sulphide Gas Detector
HS-04	Hydrogen Sulphide Gas Detector
HS-05	Hydrogen Sulphide Gas Detector
M-01	Methane Gas Detector
M-02	Methane Gas Detector
M-03	Methane Gas Detector

1	MOS	29.03.00	CHANGES AS REQUIRED
0	MOS	16.03.00	INITIAL ISSUE

MIDLETON MAIN DRAINAGE BALLICK No.1

PROCESS AND INSTRUMENTATION DIAGRAM

N.T.S.

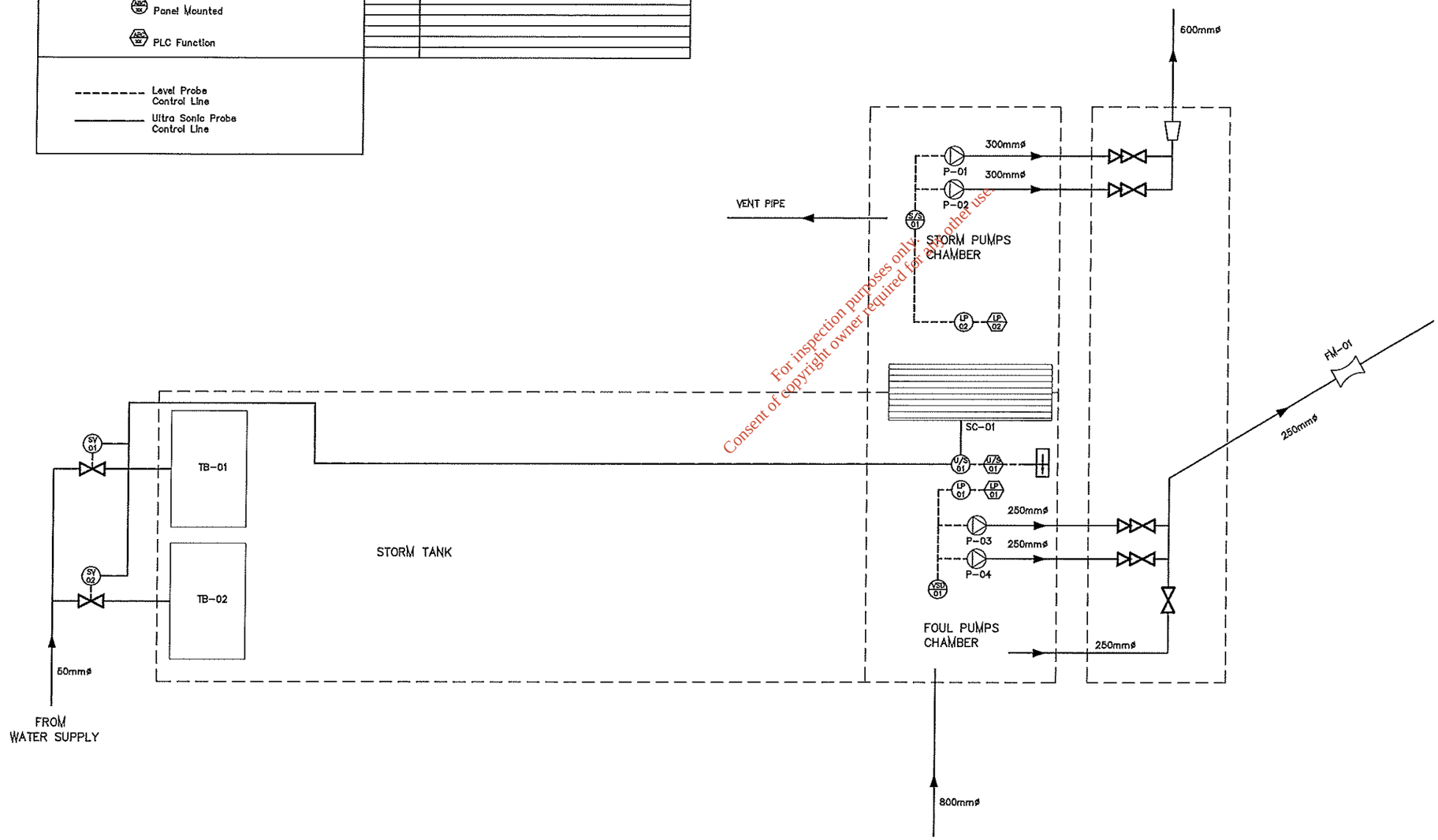
MOS 16/03/00

PC 395

PC 395-10B

Xref F:\engineering\current\ACAD\SHEETS\A1.DWG

Plant Items	Tag. No.	DESCRIPTION
Gate Valve Open / Pump		
Gate Valve Closed / Reducer	P-01	Homa (Storm) Kx 6587-G128EX
Check Valve / Ultra Sonic Probe	P-02	Homa (Storm) Kx 6587-G128EX
Flowmeter	P-03	Homa (foul) K4475-F106EX
	P-04	Homa (foul) K4475-F106EX
Instrument	LP-01	Level Probe
	LP-02	Level Probe
Field Mounted	TB-01	Tipping Bucket
Panel Mounted	TB-02	Tipping Bucket
PLC Function	U/S-01	Ultrasonic Level Sensor
	FM-01	Flowmeter
Level Probe Control Line	SV-01	Solenoid Valve
Ultra Sonic Probe Control Line	SV-02	Solenoid Valve
	SC-01	Brushed Stds Weir Screen
	VSD	Variable Speed Drive
	S/S	Soft Start



1	MOS	29.03.00	CHANGES AS REQUIRED
0	MOS	15.03.00	INITIAL ISSUE

MIDLETON
MAIN DRAINAGE
BALLICK No.2

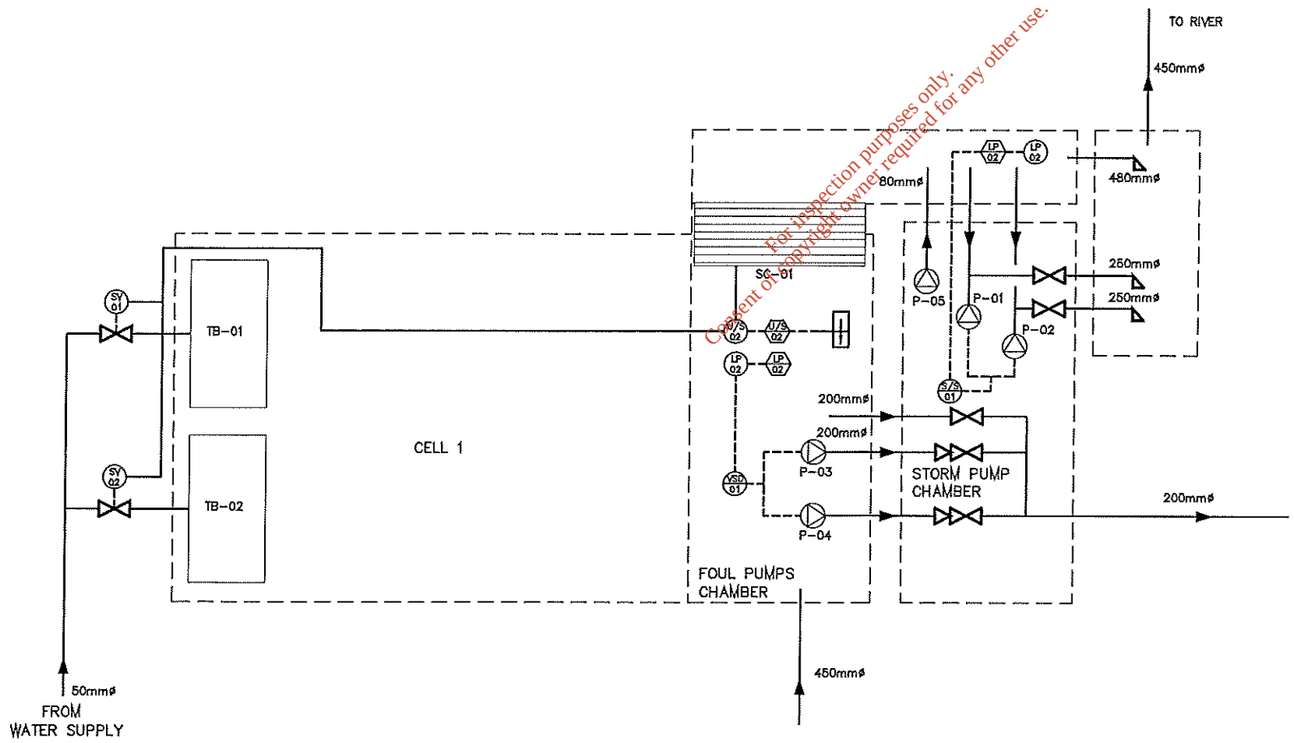
PROCESS AND
INSTRUMENTATION
DIAGRAM

N.T.S. (plot A1 @ 1:1)
MOS 15/03/00

PC395
PC395-100

Xref F:\engineering\current\ACAD\SHEETS\A1.DWG

Plant Items	Tag. No.	DESCRIPTION
⋈ Gate Valve Open — Pump		
⋈ Gate Valve Closed — Reducer	P-01	Homa (Storm) K5564-F86
⋈ Check Valve — Ultra Sonic Probe	P-02	Homa (Storm) K5564-F86
◺ Flap Valve	P-03	Homa (Foul) Mx 3462-P104EX
	P-04	Homa (Foul) Mx 3462-P104EX
	P-05	Homa Drain Pump -Float Control
	LP-01	Level Probe
	LP-02	Level Probe
	TB-01	Tipping Bucket
	TB-02	Tipping Bucket
	U/S-01	Ultrasonic Level Sensor
	SV-01	Solenoid Valve
	SV-02	Solenoid Valve
Instrument	SC-01	Brushed Side Weir Screen
	VSD	Variable Speed Drive
	S/S	Soft Start
Field Mounted	----------	Level Probe Control Line
Panel Mounted	————	Ultra Sonic Probe Control Line
PLC Function		



1	MOS	29.03.00	CHANGES AS REQUIRED
0	MOS	15.03.00	INITIAL ISSUE

MIDLETON
MAIN DRAINAGE
BALLYNACORRA

PROCESS AND INSTRUMENTATION DIAGRAM

N.T.S. (plot A1 @ 1:1)
MOS 15/03/00

PC395
PC395-10D

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SECTION D: DISCHARGES TO THE AQUATIC ENVIRONMENT

Advice on completing this section is provided in the accompanying Guidance Note.

Give particulars of the source, location, nature, composition, quantity, level and rate of discharges arising from the agglomeration and, where relevant, the period or periods during which such emissions are made or are to be made.

The applicant should address in particular all discharge points where the substances outlined in Tables D.1(i), (b) & (c) and D.1(ii), (b) & (c) of Annex 1 are emitted.

Where it is considered that any of the substances listed in Annex X of the Water Framework Directive (2000/60/EC) or any of the Relevant Pollutants listed in Annex VIII of the Water Framework Directive (2000/60/EC) are being discharged from the waste water works or are seen to be present in the receiving water environment downstream of a discharge from the works (as a result of any monitoring programme) the applicant shall screen the discharge for the relevant substance.

D.1 Discharges to Surface Waters

Details of all discharges of waste water from the agglomeration should be supplied. Tables D.1(i)(a), (b) & (c), should be completed for the primary discharge point from the agglomeration and Tables D.1(ii)(a), (b) & (c) of Annex 1 should be completed for **each** secondary discharge point, where relevant. Table D.1(iii)(a) should be completed for **each** storm water overflow. Individual Tables must be completed for each discharge point.

Supporting information should form **Attachment D.1**

Attachment included	Yes	No
	✓	

D.2 Tabular Data on Discharge Points

Applicants should submit the following information for each discharge point:

Table D.2:

PT_CD	PT_TYPE	LA_NAME	RWB_TYPE	RWB_NAME	DESIGNATION	EASTING	NORTHING
Point Code Provide label ID's	Point Type (e.g., Primary/ Secondary/ Storm Water Overflow)	Local Authority Name (e.g., Donegal County Council)	Receiving Water Body Type (e.g., River, Lake, Groundwater, Transitional, Coastal)	Receiving Water Body Name (e.g., River Suir)	Protected Area Type (e.g., SAC, candidate SAC, NHA, SPA etc.)	6E-digit GPS Irish National Grid Reference	6N-digit GPS Irish National Grid Reference

An individual record (i.e. row) is required for each discharge point. Acceptable file formats include Excel, Access or other upon agreement with the Agency. A Standard Excel template can be downloaded from the EPA website at www.epa.ie. This data should be submitted to the Agency on a separate CD-Rom containing sections B.1, B.2, B.3, B.4, B.5, C.1, E.3 and F.2.

TABLE D.1(i)(a): EMISSIONS TO SURFACE/GROUND WATERS
(Primary Discharge Point)

Discharge Point Code: SW01 MIDL

Source of Emission:	Rathcoursey Final Treated Effluent Outfall.
Location:	Rathcoursey point
Grid Ref. (12 digit, 6E, 6N):	E: 186177 N:069506
Name of receiving waters:	North Great Channel
River Basin District:	South Western
Designation of receiving waters:	RPA Species SPA, RPA Nutrient Sensitive Estuary
Flow rate in receiving waters:	n/a $m^3.sec^{-1}$ Dry Weather Flow n/a $m^3.sec^{-1}$ 95%ile flow

Emission Details:

(i) Volume emitted 3,646,225 m^3/yr*			
Normal/day	11,994m^3	Maximum/day	8,760m^3
Maximum rate/hour	365m^3	Period of emission (avg)	min/hr hr/day 365 day/yr
Dry Weather Flow	m^3/sec		

*** Results based on data from 01st Jan'07 – 31st Oct'07 (304 days)**

TABLE D.1(i)(b): EMISSIONS TO SURFACE/GROUND WATERS - Characteristics of the emission (Primary Discharge Point)

Discharge Point Code: SW01 MIDL

Number	Substance	As discharged	
		Max. daily average	
1	pH	7.5	
2	Temperature	-	
3	Electrical Conductivity(@25°C)	418	
		Max. daily average (mg/l)	**kg/day**
4	Suspended Solids	10.3	113.65
5	Ammonia (as N)	<0.1	1.18
6	Biochemical Oxygen Demand	2.65	29.55
7	Chemical Oxygen Demand	23	266.2
8	Total Nitrogen (as N)	5.6	47.85
9	Nitrite (as N)	n/a	n/a
10	Nitrate (as N)	0.2	2.49
11	Total Phosphorus (as P)	0.38	4.159
12	Orthophosphate (as P) Note 1	0.29	3.61
13	Sulphate (SO_4)	151.45	1281.32
14	Phenols (sum) Note 2 (ug/l)	<0.10	1.17×10^{-3}

Note 1: For waste water samples this monitoring should be undertaken on a sample filtered on 0.45µm filter paper.
Note 2: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

TABLE D.1(i)(c): DANGEROUS SUBSTANCE EMISSIONS TO SURFACE/GROUND WATERS

Primary Discharge Point - Characteristics of the emission

Discharge Point Code: SW01 MIDL

Number	Substance	As discharged		
		Max. daily average (µg/l) (24/10/07)	kg/day	kg/year
1	Atrazine	<0.01	$<1.18 \times 10^{-4}$	$<4.29 \times 10^{-2}$
2	Dichloromethane	<1	$<1.17 \times 10^{-2}$	<4.29
3	Simazine	<0.01	$<1.18 \times 10^{-4}$	$<4.29 \times 10^{-2}$
4	Toluene	<0.01	$<1.18 \times 10^{-4}$	$<4.29 \times 10^{-2}$
5	Tributyltin	<0.02	$<2.35 \times 10^{-4}$	$<8.589 \times 10^{-2}$
6	Xylenes	<0.01	$<1.18 \times 10^{-4}$	$<4.29 \times 10^{-2}$
7	Arsenic	7	8.23×10^{-2}	30.06
8	Chromium	<0.02	$<2.35 \times 10^{-4}$	$<8.589 \times 10^{-2}$
9	Copper	<0.02	$<2.35 \times 10^{-4}$	$<8.589 \times 10^{-2}$
10	Cyanide	<5	$<5.88 \times 10^{-2}$	<21.47
11	Fluoride	n/a	n/a	n/a
12	Lead	<0.02	$<2.35 \times 10^{-4}$	$<8.589 \times 10^{-2}$
13	Nickel	<0.02	$<2.35 \times 10^{-4}$	$<8.589 \times 10^{-2}$
14	Zinc	<0.02	$<2.35 \times 10^{-4}$	$<8.589 \times 10^{-2}$
15	Boron	<0.02	$<2.35 \times 10^{-4}$	$<8.589 \times 10^{-2}$
16	Cadmium	<0.02	$<2.35 \times 10^{-4}$	$<8.589 \times 10^{-2}$
17	Mercury	<0.2	$<2.35 \times 10^{-3}$	$<8.589 \times 10^{-1}$
18	Selenium	<0.02	$<2.35 \times 10^{-4}$	$<8.589 \times 10^{-2}$
19	Barium	<0.02	$<2.35 \times 10^{-4}$	$<8.589 \times 10^{-2}$

TABLE D.1(ii)(a): EMISSIONS TO SURFACE/GROUND WATERS
(Secondary Discharge Point) (1 table per discharge point)

Discharge Point Code: SW02 MIDL

Source of Emission:	Treated Effluent
Location:	Ballinacurra No. 1 Treated Effluent Outfall (Emergency Overflow)
Grid Ref. (12 digit, 6E, 6N):	E: 188366 N: 071791
Name of receiving waters:	Ballynacorra Estuary
River Basin District:	South Western
Designation of receiving waters:	RPA Species SPA, RPA Nutrient Sensitive Estuary
Flow rate in receiving waters:	_____ $m^3.sec^{-1}$ Dry Weather Flow _____ $m^3.sec^{-1}$ 95%ile flow

Emission Details:

(i) Volume emitted : 0 m^3			
Normal/day	0 m^3	Maximum/day	0 m^3
Maximum rate/hour	0 m^3	Period of emission (avg)	0 min/hr 0 hr/day 0 day/yr
Dry Weather Flow	0 m^3/sec		

TABLE D.1(ii)(b): EMISSIONS TO SURFACE/GROUND WATERS - Characteristics of the emission (1 table per discharge point)
(Secondary Discharge Point)

Discharge Point Code: **Not Applicable**

Number	Substance	As discharged	
		Max. daily average	
1	pH	X	
2	Temperature	X	
3	Electrical Conductivity (@25°C)	X	
		Max. daily average (mg/l)	**kg/day**
4	Suspended Solids	x	x
5	Ammonia (as N)	x	x
6	Biochemical Oxygen Demand	x	x
7	Chemical Oxygen Demand	x	x
8	Total Nitrogen (as N)	x	x
9	Nitrite (as N)	x	x
10	Nitrate (as N)	x	x
11	Total Phosphorus (as P) Note 1	x	x
12	Orthophosphate (as P)	x	x
13	Sulphate (SO_4)	x	x
14	Phenols (sum) Note 2 (ug/l)	x	x

Note 1: For waste water samples this monitoring should be undertaken on a sample filtered on 0.45µm filter paper.
Note 2: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

TABLE D.1(ii)(c): DANGEROUS SUBSTANCE EMISSIONS TO SURFACE/GROUND WATERS

Secondary Discharge Point - Characteristics of the emission (1 table per discharge point)

Discharge Point Code: **Not Applicable**

Number	Substance	As discharged		
		Max. daily average (µg/l)	kg/day	kg/year
1	Atrazine	X	X	X
2	Dichloromethane	X	X	X
3	Simazine	X	X	X
4	Toluene	X	X	X
5	Tributyltin	X	X	X
6	Xylenes	X	X	X
7	Arsenic	X	X	X
8	Chromium	X	X	X
9	Copper	X	X	X
10	Cyanide	X	X	X
11	Fluoride	X	X	X
12	Lead	X	X	X
13	Nickel	X	X	X
14	Zinc	X	X	X
15	Boron	X	X	X
16	Cadmium	X	X	X
17	Mercury	X	X	X
18	Selenium	X	X	X
19	Barium	X	X	X

TABLE D.1(iii)(a): EMISSIONS TO SURFACE/GROUND WATERS
(Storm Water Overflow) (1 table per discharge point)

Discharge Point Code: SW03 MIDL

Source of Emission:	Screened Storm Overflow
Location:	Bailick 1 Storm Overflow
Grid Ref. (12 digit, 6E, 6N):	E: 187973 E: 073127
Name of receiving waters:	Dungourney River / Ballinacurra River
River Basin District:	South Western
Designation of receiving waters:	RPA Drinking Water River
Flow rate in receiving waters:	0.0200 $m^3.sec^{-1}$ Dry Weather Flow 0.0300 $m^3.sec^{-1}$ 95%ile flow

Emission Details:

(i) Volume emitted 994,594 m^3/yr *			
Normal/day	500m^3	Maximum/day	13,871m^3
Maximum rate/hour	1980m^3	Period of emission (avg)	____min/hr ____hr/day 117 day/yr*

*** Results based on data from 01st Jan'07 – 31st Oct'07 (304 days)**

TABLE D.1(iii)(b): EMISSIONS TO SURFACE/GROUND WATERS - Characteristics of the emission (1 table per discharge point) (Storm Water Overflow)

Discharge Point Code: SW03 MIDL

Number	Substance	As discharged	
		Max. daily average	
1	pH	7.4	
2	Temperature	n/a	
3	Electrical Conductivity (@25°C)	882	
		Max. daily average (mg/l)	**kg/day**
4	Suspended Solids	41	112.62
5	Ammonia (as N)	5.1	13.89
6	Biochemical Oxygen Demand	36	98.10
7	Chemical Oxygen Demand	105	286.11
8	Total Nitrogen (as N)	11.4	31.06
9	Nitrite (as N)	n/a	n/a
10	Nitrate (as N)	0.52	1.41
11	Total Phosphorus (as P) Note 1	1.3	3.46
12	Orthophosphate (as P)	0.11	0.30
13	Sulphate (SO_4)	450.6	1227
14	Phenols (sum) Note 2 (ug/l)	<0.01ug/l	$<2.72 \times 10^{-4}$

Note 1: For waste water samples this monitoring should be undertaken on a sample filtered on 0.45µm filter paper.
Note 2: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

TABLE D.1(iii)(c): DANGEROUS SUBSTANCE EMISSIONS TO SURFACE/GROUND WATERS

Storm Water Overflow - Characteristics of the emission (1 table per discharge point)

Discharge Point Code: SW03 MIDL

Number	Substance	As discharged		
		Max. daily average (µg/l)	kg/day	kg/year
1	Atrazine	<0.01	2.725×10^{-5}	$<9.94 \times 10^{-3}$
2	Dichloromethane	<1.0	2.725×10^{-3}	$<9.94 \times 10^{-1}$
3	Simazine	<0.01	2.725×10^{-5}	$<9.94 \times 10^{-3}$
4	Toluene	<0.01	2.725×10^{-5}	$<9.94 \times 10^{-3}$
5	Tributyltin	NS		-
6	Xylenes	<0.01	2.725×10^{-5}	$<9.94 \times 10^{-3}$
7	Arsenic	8	2.18×10^{-2}	7.957
8	Chromium	0.073	1.99×10^{-4}	7.26×10^{-2}
9	Copper	<0.02	5.44×10^{-5}	$<1.98 \times 10^{-2}$
10	Cyanide	<5	1.13×10^{-2}	<4.97
11	Fluoride	n/a	n/a	n/a
12	Lead	<0.02	5.44×10^{-5}	$<1.989 \times 10^{-2}$
13	Nickel	<0.02	5.44×10^{-5}	$<1.989 \times 10^{-2}$
14	Zinc	0.582	1.585×10^{-3}	5.788×10^{-1}
15	Boron	0.622	1.695×10^{-3}	6.186×10^{-1}
16	Cadmium	<0.02	5.44×10^{-5}	$<1.989 \times 10^{-2}$
17	Mercury	1.9	5.177×10^{-3}	1.889
18	Selenium	15	4.087×10^{-2}	14.91
19	Barium	<0.02	5.44×10^{-5}	$<1.989 \times 10^{-2}$

TABLE D.1(iv)(a): EMISSIONS TO SURFACE/GROUND WATERS
(Storm Water Overflow) (1 table per discharge point)

Discharge Point Code: SW04 MIDL

Source of Emission:	Screened Storm Overflow
Location:	Bailick No. 2 Storm Overflow
Grid Ref. (12 digit, 6E, 6N):	E: 188045 E: 072513
Name of receiving waters:	Ballynacorra River
River Basin District:	South Western
Designation of receiving waters:	RPA Drinking Water River
Flow rate in receiving waters:	0.024 $m^3.sec^{-1}$ Dry Weather Flow 0.0800 $m^3.sec^{-1}$ 95%ile flow

Emission Details:

(i) Volume emitted 82,900 m^3/yr*			
Normal/day	184m^3	Maximum/day	2,779m^3
Maximum rate/hour	720m^3	Period of emission (avg)	____min/hr ____hr/day 205 day/yr*

*** Results based on data from 01st Jan'07 – 31st Oct'07 (304 days)**

TABLE D.1(v)(a): EMISSIONS TO SURFACE/GROUND WATERS
(Storm Water Overflow) (1 table per discharge point)

Discharge Point Code: SW05 MIDL

Source of Emission:	Screened Storm Overflow
Location:	Ballinacurra No. 2 Storm Overflow
Grid Ref. (12 digit, 6E, 6N):	E: 188520 E: 071783
Name of receiving waters:	Dungourney River / Ballynacorra River
River Basin District:	South Western
Designation of receiving waters:	RPA Drinking Water River
Flow rate in receiving waters:	0.024$m^3.sec^{-1}$ Dry Weather Flow 0.0800 $m^3.sec^{-1}$ 95%ile flow

Emission Details:

(i) Volume emitted 0m^3/yr			
Normal/day	0m^3	Maximum/day	m^3
Maximum rate/hour	1980m^3	Period of emission (avg)	_____min/hr _____hr/day _____day/yr

TABLE D.1(vi)(a): EMISSIONS TO SURFACE/GROUND WATERS
(Storm Water Overflow) (1 table per discharge point)

Discharge Point Code: SW06 MIDL

Source of Emission:	Screened Storm Overflow
Location:	Bailick No. 3 Storm Overflow
Grid Ref. (12 digit, 6E, 6N):	E: 188268 E: 072058
Name of receiving waters:	Ballynacorra River
River Basin District:	South Western
Designation of receiving waters:	RPA Drinking Water River
Flow rate in receiving waters:	_____ $m^3.sec^{-1}$ Dry Weather Flow _____ $m^3.sec^{-1}$ 95%ile flow

Emission Details:

(i) Volume emitted 0 m^3/yr			
Normal/day	m^3	Maximum/day	m^3
Maximum rate/hour	m^3	Period of emission (avg)	_____min/hr _____hr/day _____day/yr

Table D.2 Tabular Data on Discharge Points

PT_CD	PT_TYPE	LA_NAME	RWB_TYPE	RWB_NAME	DESIGNATION	EASTING
SW01 MIDL	Primary Discharge	Cork County Council	Transitional	North Channel Great Island	RPA Species SPA & Nutrient Sensitive Lakes & Estuaries	186177
SW02 MIDL	Secondary Discharge	Cork County Council	Transitional	Owenacurra Estuary	RPA Species SPA & Nutrient Sensitive Lakes & Estuaries	188366
SW03 MIDL	Storm Water Overflow	Cork County Council	River	Dungourney River/ Ballinacorra River	N/A	187973
SW04 MIDL	Storm Water Overflow	Cork County Council	River	Ballinacorra River	RPA Drinking Water River	188045
SW05 MIDL	Storm Water Overflow	Cork County Council	River	Ballinacorra River	RPA Drinking Water River	188520
SW06 MIDL	Storm Water Overflow	Cork County Council	River	Ballinacorra River	RPA Drinking Water River	188268

NORTHING	VERIFIED
69506	N
71791	N
73127	N
72513.8	N
71783	N
72058	N

SECTION E MONITORING

Advice on completing this section is provided in the accompanying Guidance Note.

E.1 Waste Water Discharge Frequency and Quantities – Existing & Proposed

Provide an estimation of the quantity of waste water likely to be emitted in relation to all primary and secondary discharge points applied for. This information should be included in Table E.1(i) of the Annex. The primary discharge shall be annotated with a **(P)**.

Provide an estimation of the quantity of waste water likely to be emitted in relation to all storm water overflows within the agglomeration applied for. This information should be included in Table E.1(ii) of the Annex.

E.2. Monitoring and Sampling Points

Programmes for environmental monitoring should be submitted as part of the application. These programmes should be provided as Attachment E.2.

Reference should be made to, provision of sampling points and safe means of access, sampling methods, analytical and quality control procedures, including equipment calibration, equipment maintenance and data recording/reporting procedures to be carried out in order to ensure accurate and reliable monitoring.

In determining the sampling programme to be carried out, the variability of the emission and its effect on the receiving environment should be considered.

Details of any accreditation or certification of analysis should be included.

Attachment E.2 should contain any supporting information.

Attachment included	**Yes**	**No**
	✓	

E.3. Tabular data on Monitoring and Sampling Points

Applicants should submit the following information for each monitoring and sampling point:

PT_CD	**PT_TYPE**	**MON_TYPE**	**EASTING**	**NORTHING**	**VERIFIED**
Point Code Provide label ID's assigned in section E of application	Point Type (e.g., Primary, Secondary, Storm Water Overflow)	Monitoring Type M = Monitoring S = Sampling	6E-digit GPS Irish National Grid Reference	6N-digit GPS Irish National Grid Reference	Y = GPS used N = GPS not used

An individual record (i.e., row) is required for each discharge point. Acceptable file formats include Excel, Access or other upon agreement with the Agency. A standard

Excel template can be downloaded from the EPA website at www.epa.ie. This data should be submitted to the Agency on a separate CD-Rom containing sections B.1, B.2, B.3, B.4, B.5, C.1, D.2 and F.2.

E.4 Sampling Data

Regulation 16(1)(h) of the Waste Water Discharge (Authorisation) Regulations 2007 requires all applicants in the case of an existing waste water treatment plant to specify the sampling data pertaining to the discharge based on the samples taken in the 12 months preceding the making of the application.

Regulation 16(1)(l) of the regulations requires applicants to give details of compliance with any applicable monitoring requirements and treatment standards.

Attachment E.4 should contain any supporting information.

Attachment included	**Yes**	**No**
	✓	

TABLE E.1(i): WASTE WATER FREQUENY AND QUANTITY OF DISCHARGE – Primary and Secondary Discharge Points

Identification Code for Discharge point	Frequency of discharge (days/annum)	Quantity of Waste Water Discharged (m^3/annum)
SW01 MIDL(P)	365	3,646,225/yr *
SW02 MIDL	Assumed 0	Assumed 0

*** Results based on data from 01st Jan 07 – 31st Oct 07 (304 days)**

TABLE E.1(ii): WASTE WATER FREQUENY AND QUANTITY OF DISCHARGE – Storm Water Overflows

Identification Code for Discharge point	Frequency of discharge (days/annum)	Quantity of Waste Water Discharged (m^3/annum)	Complies with Definition of Storm Water Overflow
SW03 MIDL	117	994,594	No
SW04 MIDL	223	82,900	No
SW05 MIDL	0	0	Yes
SW06 MIDL	N/A	N/A	N/A

Sampling

Flow measurement, sampling, and laboratory analysis are carried out throughout the O&M Phase. Regular independent laboratory analysis are undertaken throughout the Operation & Maintenance Phase. Additional sampling and analysis may also undertake such as the Service Provider feels is appropriate. Flow proportional or time based 24 hour samples are collected at the same well defined point at the inlet and outlet of the treatment works in order to monitor compliance with the requirements. A refrigerated sampler minimizes degradation between collection and analysis. The flow monitoring, sampling, and laboratory analysis regime was agreed with the Employer prior to takeover. Certain heavy metal analyses are also required on an annual basis as identified in 'Code of Good Practice for Use of Biosolids in agriculture'.
The procedures include independent analysis, at an accredited laboratory, of the statutory samples. The Service Provider is responsible for developing and implementing procedures to remedy defects in the laboratory procedures where the independent checking shows variations of more than ±10%.
The sampling of the statutory samples is in accordance with the following procedures: -

- All samples are representative of the appropriate stream.
- Daily grab samples are taken at approximately the same times each day.
- Samples are fixed, stored and handled as per standard methods. Analysis of the samples (both Service Provider's and Employer's) are undertaken within 24 hours and reported to the Employer's Representative within 48 hours. Exceptions are BOD, metals and pathogens, which are reported within 7 days.
- Analysis of samples by the Service Provider are carried out in accordance with the methods specified in the latest editions of:-
    i. The "Standard Method of Examination of Water and Wastewater" (APHA)
    ii. Urban Wastewater Treatment Regulations, 2001 (SI No. 254 of 2001)
    iii. The "Methods of the Examination of Waters and Associated Materials" published by the HMSO (UK)
- As specified, representative laboratory analysis are undertaken at an accredited laboratory approved by the Employer's Representative, who reserves the right, in the case of an independent laboratory, to visit the premises in order to ascertain that the testing is being carried out accurately, and in accordance with accepted procedures.

The monitoring and recording of the status of all parameters appropriate to proper control and operation of the plant is carried out. Specifically the following parameters are monitored and recorded:

- All parameters required by the Service Provider to operate the facility in accordance with his methods and practices;

- Totalised daily and instantaneous flows into the WWTP from the Bailick No. 1 & No. 2 Pumping Stations;

- Totalised daily flows into the WWTP from other sources including imports;

- Totalised daily and instantaneous flows gravitated from the WWTP to the Ballinancurra No. 1 Treated Effluent Pumping Station and the proposed Dwyers Road Pumping Station;

- Totalised daily and instantaneous RAS, SAS, Centrifuge and pre thickened and post thickened sludge

- Daily (5 Days per Week) COD analysis of 24 hour flow proportional samples of the waste water received from the catchment to be taken at the distribution chamber prior to the aeration tanks – Sample Point 1;

- Weekly BOD_5 analysis of random 24 hour flow proportional samples of the waste water received from the catchment to be taken at the distribution chamber prior to the aeration tanks – Sample Point 1;

- Daily (5 Days per Week) SS analysis of 24 hour flow proportional samples of the waste water received from the catchment to be taken at the distribution chamber prior to the aeration tanks – Sample Point 1;

- Daily (5 Days per Week) pH analysis of 24 hour flow proportional samples of the waste water received from the catchment to be taken at the distribution chamber prior to the aeration tanks – Sample Point 1;

- Daily (5 Days per Week) NH3 analysis of 24 hour flow proportional samples of the waste water received from the catchment to be taken at the distribution chamber prior to the aeration tanks – Sample Point 1;

- Weekly TON TKN TN analysis of 24 hour flow proportional samples of the waste water received from the catchment to be taken at the distribution chamber prior to the aeration tanks – Sample Point 1;

- Weekly TP OP OFG analysis of 24 hour flow proportional samples of the waste water received from the catchment to be taken at the distribution chamber prior to the aeration tanks – Sample Point 1;

- Weekly Total & Faecal Coliform analysis of 24 hour flow proportional samples of the waste water received from the catchment to be taken at the distribution chamber prior to the aeration tanks – Sample Point 1;

- Daily (5 Days per Week) COD analysis of 24 hour flow proportional samples of the treated effluent discharged from the WWTP – Sample Point 2;

- Weekly BOD_5 analysis of random 24 hour flow proportional samples of the treated effluent discharged from the WWTP – Sample Point 2;

- Daily (5 Days per Week) SS analysis of 24 hour flow proportional samples of the treated effluent discharged from the WWTP – Sample Point 2;
- Daily (5 Days per Week) pH analysis of 24 hour flow proportional samples of the treated effluent discharged from the WWTP – Sample Point 2;

- Daily (5 Days per Week) NH3 analysis of 24 hour flow proportional samples of the treated effluent discharged from the WWTP – Sample Point 2;

- Weekly TON TKN TN analysis of 24 hour flow proportional samples of the treated effluent discharged from the WWTP – Sample Point 2;

- Weekly TP OP OFG analysis of 24 hour flow proportional samples of the treated effluent discharged from the WWTP – Sample Point 2;

- Weekly Total & Faecal Coliform analysis of 24 hour flow proportional samples of the treated effluent discharged from the WWTP – Sample Point 2;

- Daily (5 Days per Week) U.V. Disinfection analysis of U.V Transmission of the treated effluent;

- Weekly Salinity analysis of 24 hour flow proportional samples of the treated effluent discharged from the WWTP – Sample Point 2;

- Instantaneous analysis of the turbidity of the treated effluent discharged from the WWTP – Sample Point 2;

- The Collection and issuing of samples for pH, BOD, COD, SS, TN-N, TP-P, Total Coliforms once a month to an independent laboratory for analysis

- All parameters necessary to demonstrate the proper performance of the treatment process including the other flow monitors on the WWTP and DO, SVI & MLSS monitoring.

ATTACHMENT No E.4
COMPLIANCE WITH APPLICABLE MONITORING REQUIREMENTS AND TREATMENT STANDARDS

Midleton July 2006 - Effluent

EFFLUENT ANALYSIS																			
Date	Day	Q m3/d	COD mg/l	BOD mg/l	SS mg/l	pH	NH3-N mg/l	NO3 mg/l	NO2 mg/l	TKN mg/l	TON mg/l	TN mg/l	TP mg/l	OP mg/l	OFG mg/l	Salinity mg Cl/l	Tms'm %	Total Coliform /100ml	Faecal Coliform /100ml
01-Jul-06																	78		
02-Jul-06																	79		
03-Jul-06			26		9	7.6	0.3										75		
04-Jul-06			27		13	7.4											77	1120	119
05-Jul-06			27		2	7.9	0.3										79		
06-Jul-06			<15	<2	<5	7.5	1.2			3.0	2.8	6.0	0.43	0.32	<10	140	78		
07-Jul-06			<15	2	<5	7.4	0.2			<2	3.3	3.0	0.22	0.18	<10	135	79	2420	308
08-Jul-06																	79		
09-Jul-06																	79		
10-Jul-06			16		12	7.6	0.1										78		
11-Jul-06			23		12	7.7											78		
12-Jul-06			20		12	7.7	0.1										79		
13-Jul-06			20	<2	6	7.2	<0.1			<2	0.9	<2	0.37	0.34	<10	652	79		
14-Jul-06			18	<2	<5	7.4	<0.1			<2	2.0	2.0	0.30	0.40	<10	705	79	1414	88
15-Jul-06																	79		
16-Jul-06																	80		
17-Jul-06			22		20	7.7	0.2										80	727	18
18-Jul-06			21		17	7.7											80		
19-Jul-06			24		16	7.7	0.1										79		
20-Jul-06			20	<2	<5	7.5	<0.1			<2	1.3	<2	0.46	0.46	<10		79		
21-Jul-06			20	<2	<5	7.6	0.1			<2	1.2	<2	0.64	0.56	<10		71	5850	435
22-Jul-06																	79		
23-Jul-06																	79		
24-Jul-06			86		2	7.7	0.1										79		
25-Jul-06			24		6	7.7											80		
26-Jul-06			16		26	7.6	0.3										79	1986	107
27-Jul-06			20	3	<5	7.6	0.2			<2	1.1	<2	0.44	0.47	<10		80		
28-Jul-06			19	<2	<5	7.5	0.1			<2	0.9	<2	0.40	0.45	<10		79	36	5
29-Jul-06																	77		
30-Jul-06																	79		
31-Jul-06			25		33	7.6	0.30										78		
Average			**25**	**3**	**13**	**7.6**	**0.3**			**3**	**2**	**4**	**0**	**0**		**408**	**78**	**1936**	**154**

Legend: Consult_US Weekend Holiday EPS

Midleton Aug 2006 - Effluent

EFFLUENT ANALYSIS																		
Date	Day	Q m3/d	COD mg/l	BOD mg/l	SS mg/l	pH	NH3-N mg/l	NO3 mg/l	NO2 mg/l	TKN mg/l	TON mg/l	TN mg/l	TP mg/l	OP mg/l	OFG mg/l	Salinity mg Cl/l	Trns'm %	Total Coliform /100ml	Faecal Coliform /100ml
01-Aug-06					24														
02-Aug-06						7.7													
03-Aug-06			21	<2	<5	7.5	1.6			2.0	1.7	4.0	0.40	0.40	<10	310		75	6
04-Aug-06			22	3	<5	7.5	3.5			4.0	1.4	5.0	1.00	1.05	<10	239		921	36
05-Aug-06																			
06-Aug-06																			
07-Aug-06																			
08-Aug-06			33		5	7.6													
09-Aug-06			35		19	7.3													
10-Aug-06			24	2	<5	7.6	5.2			6.0	3.6	10.0	0.73	0.64	<10	346			
11-Aug-06			23	2	<5	7.6	3.8			6.0	2.6	9.0	0.6	0.5	<10	579		79	3
12-Aug-06																			
13-Aug-06																			
14-Aug-06			25		24	7.5	8.8												
15-Aug-06			33		73	7.2													
16-Aug-06			50		62	7.4	4.9											411	49
17-Aug-06			44	4	5	7.5	8.4			10.0	1.4	11.4	4.79	4.59	<10	1413			
18-Aug-06			37	4	<5	7.5	5.7			7.0	2.4	9.0	4.2	3.8	<10	991		1414	68
19-Aug-06																			
20-Aug-06																			
21-Aug-06			25.0		15	7.5													
22-Aug-06			45.0		24	7.7													
23-Aug-06					26	7.5	7.7											2180	1986
24-Aug-06			39	4	17	7.5	2.6			5.0	0.7	6.0	0.44	0.45	<10	1112			
25-Aug-06			33	3	7	7.6	2.5			4.0	1.0	5.0	0.5	0.5	<10	1158		548	25
26-Aug-06																			
27-Aug-06																			
28-Aug-06			35.0		61	7.6	6.8												
29-Aug-06			47.0		63	7.5													
30-Aug-06					48	7.5													
31-Aug-06																			
Average			34	3	32	7.5	5			6	2	7	2	1		769		365	21
																		749	274

Legend: Consult_US Weekend Holiday EPS

- Midleton September 2006 - Effluent

EFFLUENT ANALYSIS

Date	Day	Q m3/d	COD mg/l	BOD mg/l	SS mg/l	pH	NH3-N mg/l	NO3 mg/l	NO2 mg/l	TKN mg/l	TON mg/l	TN mg/l	TP mg/l	OP mg/l	OFG mg/l	Salinity mg Cl/l	Tms'm %	Total Coliform /100ml	Faecal Coliform /100ml
01-Sep-06		4111	28.0	3	5	7.5	0.5			4.0	0.9	5.0	0.25	0.23	<10	536	78	488	50
02-Sep-06		5597															77		
03-Sep-06		4689															79		
04-Sep-06		4057	28.1		7	7.5	0.2										75		
05-Sep-06		4180	21.0		2	7.6											73		
06-Sep-06		4257			5	7.6	0.1										77		
07-Sep-06		4244	28.50		17	7.5	0.1										78		
08-Sep-06		4592	23.0	<4	<5	7.4	0.2			<2	1.4	<2	0.14	0.12	<10		76	109	5
09-Sep-06		4416															79		
10-Sep-06		4483															50		
11-Sep-06		4854	40.2			7.6	0.1					1.3	0.4	0.2			77		
12-Sep-06		5427	32.4		30	7.7	0.1										79		
13-Sep-06		5209	95.00		12	7.5	0.3										77		
14-Sep-06		5123	12.40		27	7.5	0.3										75		
15-Sep-06		4417		<2						<2	0.8	<2			<10		75		
16-Sep-06		4518															75		
17-Sep-06		3844															75		
18-Sep-06		4074	27.7		2	7.6	0.1					1.9	0.3	0.3			75		
19-Sep-06		4185	20.3		2	7.6	0.1										76		
20-Sep-06		6189	27.5		14	7.7	0.2										74		
21-Sep-06		7008	30.5		3	7.6	0.1										77		
22-Sep-06		6188		4.0						<2	1.0	<2			<10		68		
23-Sep-06		7227															68		
24-Sep-06		6174															70		
25-Sep-06		6289															68		
26-Sep-06		5658	33.1		13	7.4	0.3										67		
27-Sep-06		5621															68		
28-Sep-06		5688	35.8		17	7.4	0.4										71		
29-Sep-06		5690		2.0						<2	1.5	<2	1.1	0.9	<10		71		
30-Sep-06		6096															68		
Average		**5137**	**32**	**3**	**11**	**7.5**	**0.2**			**4**	**1**	**3**	**0.4**	**0.4**		**536**	**73**	**299**	**28**

Legend: Consult_US Weekend Holiday EPS

- Midleton October 2006 - Effluent

EFFLUENT ANALYSIS																			
Date	Day	Q m3/d	COD mg/l	BOD mg/l	SS mg/l	pH	NH3-N mg/l	NO3 mg/l	NO2 mg/l	TKN mg/l	TON mg/l	TN mg/l	TP mg/l	OP mg/l	OFG mg/l	Salinity mg Cl/l	Trns'm %	Total Coliform /100ml	Faecal Coliform /100ml
01-Oct-06		10460															73		
02-Oct-06		4788	69.5		25	7.3	0.4										72		
03-Oct-06		5245	50.6		4	7.3	0.1										70		
04-Oct-06		3727	34.1		3	7.4	0.3					1.9	0.44	0.26			72		
05-Oct-06		5920	38.9		2	7.5	0.6										70		
06-Oct-06		5872	24	2	5	7.4	0.1			<2	2.0	2.0	0.56	0.55	<10		73	64880	46
07-Oct-06		5605															74		
08-Oct-06		5344															75		
09-Oct-06		5922	27.7		17	7.7	0.1					2.4	0.81	0.63			75		
10-Oct-06		5761	36.3		26	7.4	0.5										73		
11-Oct-06		4073	36.3			7.6	0.8										75		
12-Oct-06		7146	62.5		30	7.2	0.1										73		
13-Oct-06		7185	64	<2	15	7.3	0.1			<2	<2	<2			<10		74		
14-Oct-06		6649															73		
15-Oct-06		4659															73		
16-Oct-06		6917	26.3		7	7.2	0.1										76		
17-Oct-06		6188	23.5		3	7.5	0.7										75		
18-Oct-06		7291	25.0		3	7.3	1.2										77		
19-Oct-06		6476	30.4		5	7.4	0.2					4.6	0.3	0.1			76		
20-Oct-06		6905	37.9	<2	12	7.3	0.2			<2	2.2	2.2			<10		77	71	<1
21-Oct-06		6339															76		
22-Oct-06		4947															77		
23-Oct-06		5325	33.9		22	7.1	0.2										75		
24-Oct-06		6384	44.1			7.4	0.1										76		
25-Oct-06		7890	44.9			7.4	0.1					3.0	0.4	0.3			76		
26-Oct-06		8211	25.3		9	7.2	0.5										77		
27-Oct-06		7461		<2						<2	2.8	3.0			<10		76		
28-Oct-06		8632															79		
29-Oct-06		7796															79		
30-Oct-06		7339															79		
31-Oct-06		7843															79		
Average		**6461**	**38.68**	**2**	**11.8**	**7.36**	**0.334**				**2.33**	**2.7**	**0.5**	**0.4**			**75**	**32476**	**46**

Legend: Consult_US | Weekend | Holiday | EPS

Monthly Report - Midleton November 2006 - Effluent

EFFLUENT ANALYSIS

Date	Day	Q m3/d	COD mg/l	BOD mg/l	SS mg/l	pH	NH3-N mg/l	NO3 mg/l	NO2 mg/l	TKN mg/l	TON mg/l	TN mg/l	TP mg/l	OP mg/l	OFG mg/l	Salinity mg Cl/l	Tms'm %	Total Coliform /100ml	Faecal Coliform /100ml
01-Nov-06																	79		
02-Nov-06			21.0		2	7.3	0.3										79		
03-Nov-06			21.0	2	5	7.4	0.2			<2	3.5	4.0	0.31	0.23	<10		79	73	10
04-Nov-06																	79		
05-Nov-06																	80		
06-Nov-06			26.90		10	7.5	0.5										80		
07-Nov-06			23.85		22	7.4	0.1										80		
08-Nov-06			14.6		29	7.5	0.1										79		
09-Nov-06			35.2		9	7.5	0.1					3.7	0.39	0.24			80		
10-Nov-06			28.0	4	2	7.6	0.1			<2	3.5	4.0			<10	152	80	15	1
11-Nov-06																	79		
12-Nov-06																	79		
13-Nov-06			29.10		2	7.5	0.1										79		
14-Nov-06			23.60		2	7.3	0.6										77		
15-Nov-06			23.5		2	7.5	0.1										79		
16-Nov-06			28.4		2	7.4	0.1					0.7	0.22	0.0			100	11	1
17-Nov-06			17.6	2	4	7.6	0.1			<2	<2	3.0			<10	90	83		
18-Nov-06																	82		
19-Nov-06																	84		
20-Nov-06			12.9		2	7.4	0.1										100		
21-Nov-06			20	2.0	5		0.1			<2	4.8	5.0	0.3		<10		100		
22-Nov-06																	100		
23-Nov-06			15.1		3	7.7	0.1										100	45	5
24-Nov-06			22.3		2	7.6	0.1					2.9	0.38	0.23			100		
25-Nov-06																	100		
26-Nov-06																	100		
27-Nov-06			15.6		3	7.5	0.1										100		
28-Nov-06			18		2	7.5	0.2										100		
29-Nov-06			22.6		2	7.6	0.2										100		
30-Nov-06			16.0		2	7.4											100		
Average			**21.8**	**2.5**	**5.6**	**7.5**	**0.2**				**3.9**	**3.3**	**0.3**	**0.2**		**121.0**	**87.9**	**36.0**	**4.3**

Legend: Consult_US Weekend Holiday EPS

Fortnightly Report - Midleton December 2006 - Effluent

EFFLUENT ANALYSIS																		
Date	Day	Q m3/d	COD mg/l	BOD mg/l	SS mg/l	pH	NH3-N mg/l	NO3 mg/l	NO2 mg/l	TKN mg/l	TON mg/l	TN mg/l	TP mg/l	OP mg/l	OFG mg/l	Salinity mg Cl/l	Trns'm %	Total Coliform /100ml	Faecal Coliform /100ml
01-Dec-06			22.7		2	7.3	0.1					1.7	0.39	0.26			100	26	2
02-Dec-06																	100		
03-Dec-06																	100		
04-Dec-06			12.6		2	7.5	0.1										100		
05-Dec-06			2.2		2	7.3	0.1										87		
06-Dec-06			13.30		2	7.4	0.3										87		
07-Dec-06			18.00		2	7.7	0.1					6.1	0.48	0.41			86		
08-Dec-06			15.0	2	5	7.4	0.1				4.8	4.8	0.41	0.38	<10	53	87	4	1
09-Dec-06																	87		
10-Dec-06																	89		
11-Dec-06			10.0		2	7.4	0.1										88		
12-Dec-06			10.6		2	7.5	0.1										88		
13-Dec-06			14.40		4	7.5	0.1										88		
14-Dec-06			13.40		2	8.0	0.1					6.1	0.5	0.5			88		
15-Dec-06			25.7		2	7.6	0.2										87	8	1
16-Dec-06																	86		
17-Dec-06																	87		
18-Dec-06			14.3		2	7.5	0.2										87		
19-Dec-06			17.8		2	7.6	0.1					2.0	0.3	0.2			87		
20-Dec-06			19.9		4	7.3	0.2										87		
21-Dec-06			24.1		2	7.5	0.1										87		
22-Dec-06			19.3		2	7.5	0.3										87	25	1
23-Dec-06																	87		
24-Dec-06																	88		
25-Dec-06																	88		
26-Dec-06																	89		
27-Dec-06																	87		
28-Dec-06			12.3		2		0.1					1.5	0.3	0.2			88	15	1
29-Dec-06																	89		
30-Dec-06																	88		
31-Dec-06																	88		
Average			**15.6**	**2.0**	**2.4**	**7.5**	**0.1**				**4.8**	**3.7**	**0.4**	**0.3**		**53.0**		**15.6**	**1.2**

Legend: Consult_US Weekend Holiday EPS

- Midleton January 2007 - Effluent

EFFLUENT ANALYSIS																			
Date	Day	Q m3/d	COD mg/l	BOD mg/l	SS mg/l	pH	NH3-N mg/l	NO3 mg/l	NO2 mg/l	TKN mg/l	TON mg/l	TN mg/l	TP mg/l	OP mg/l	OFG mg/l	Salinity mg Cl/l	Trns'm %	Total Coliform /100ml	Faecal Coliform /100ml
01-Jan-07																	84		
02-Jan-07																	88		
03-Jan-07																	88		
04-Jan-07			15.0	2	5	7.4	0.1			<2	4.5	5.0	0.39	0.34	10	60	89	20	4
05-Jan-07			28.1		2	7.5	0.1					0.5	0.38	0.31			88		
06-Jan-07																	88		
07-Jan-07																	89		
08-Jan-07			17		2		0.1										88		
09-Jan-07			13.8		2	7.5	0.1										89		
10-Jan-07			12.6		2	7.4	0.1										88		
11-Jan-07			21		2	7.4	0.6					9.5	0.5	0.4			88		
12-Jan-07			18	2	2	7.7	0.3			<2	4.0	4.0			10	49	88	49	2
13-Jan-07																	88		
14-Jan-07																	89		
15-Jan-07			17		2	7.4	0.1										88		
16-Jan-07			21.6		2	7.5	0.1										89		
17-Jan-07			18.4		2	7.9	0.1										88		
18-Jan-07			20.1		2	7.2	0.2					3.6	0.43	0.33			88		
19-Jan-07			17	2	2	7.3	0.1			<2	3.8	4.0			10	89	89	4	1
20-Jan-07																	88		
21-Jan-07																	88		
22-Jan-07			17		2	7.1	0.1										88		
23-Jan-07			22		2	7.4	0.1										88		
24-Jan-07			19.2		2	7.5	0.1					8.5	0.71	0.53			89		
25-Jan-07			21.7		2	7.5	0.1										88		
26-Jan-07			14	3	2	7.1	0.3			<2	5.0	5.4			10	149	89	5	4
27-Jan-07																	88		
28-Jan-07																	88		
29-Jan-07			17		2	7.6	0.1										88		
30-Jan-07			19.8		2												88		
31-Jan-07			19.7		2		0.10										89		
Average			**18.4**	**2.3**	**2.2**	**7.4**	**0.2**				**4.3**	**5.1**	**0.5**	**0.4**	**10.0**	**86.8**	**88.2**	**19.5**	**2.8**

Legend: Consult_US Weekend Holiday EPS

Monthly Report - Midleton February 2007 - Effluent

EFFLUENT ANALYSIS																			
Date	Day	Q m3/d	COD mg/l	BOD mg/l	SS mg/l	pH	NH3-N mg/l	NO3 mg/l	NO2 mg/l	TKN mg/l	TON mg/l	TN mg/l	TP mg/l	OP mg/l	OFG mg/l	Salinity mg Cl/l	Tms'm %	Total Coliform /100ml	Faecal Coliform /100ml
01-Feb-07		7047	30.6		2	7.5	0.1					6.0	0.48	0.38			89		
02-Feb-07		7245	15.0	2	5	7.2	0.1			<2	2.0	2.0	0.40	0.40	10	97	89	3	2
03-Feb-07		7323															88		
04-Feb-07		6393															87		
05-Feb-07		7214	28		6	7.6	0.2										88		
06-Feb-07		7406	25		2	7.2											88		
07-Feb-07		5124	23		10	7.6	0.1										88		
08-Feb-07		7316	27		6	7.5	0.1					2.9	0.52	0.42			88		
09-Feb-07		8192	23	2	2	7.1	0.1			<2	2.9	3.0			<10	176	86	9	1
10-Feb-07		6621															86		
11-Feb-07		6808															87		
12-Feb-07		7344															87	160	5
13-Feb-07		6606															87		
14-Feb-07		7159	6		2	7.1	0.1										87		
15-Feb-07		6810	28		2	7.5	0.4					2.5	0.49	0.39			86		
16-Feb-07		7880	22	4	2	7.5	0.1			<2	2.9	3.0			10	87	88		
17-Feb-07		6696															87		
18-Feb-07		6404															87		
19-Feb-07		6894			2	7.6	0.2										86		
20-Feb-07		6590	14		2	7.6	0.2										88		
21-Feb-07		7856	14		2	7.3	0.2										88		
22-Feb-07		7352	21		2	7.5	0.4					0.1	0.40	0.32			88		
23-Feb-07		7690	19	2	4	7.6	0.1			<2	6.0	6.0			10	177	88	1	1
24-Feb-07		6786															88		
25-Feb-07		5955															88		
26-Feb-07		7036	16		2	7.5	0.1										89		
27-Feb-07		7761	9		2	7.5	0.1										88		
28-Feb-07		7608	15			7.5	0.2										88	60	6
Average		7039.9	19.8	2.5	3.2	7.4	0.2				3.5	4.1	0.5	0.4	10.0	134.3	87.6	46.6	3.0

Legend: Consult_US Weekend Holiday EPS

- Midleton March 2007 - Effluent

EFFLUENT ANALYSIS

Date	Day	Q m3/d	COD mg/l	BOD mg/l	SS mg/l	pH	NH3-N mg/l	NO3 mg/l	NO2 mg/l	TKN mg/l	TON mg/l	TN mg/l	TP mg/l	OP mg/l	OFG mg/l	Salinity mg Cl/l	Trns'm %	Total Coliform /100ml	Faecal Coliform /100ml
01/03/2007			18		2	7.3	0.1					6.5	0.94	0.79			86		
02/03/2007			16	2	5	7.2	0.1			<2	5.0	5.0	0.75		10	60	87		
03/03/2007																	88		
04/03/2007																	88		
05/03/2007			16		2	7.4	0.1										88	21	2
06/03/2007			18		2	7.5	0.1										88		
07/03/2007			19		2	7.7	0.1										88		
08/03/2007			23		2	7.5	0.3					3.1	0.39	0.34			89		
09/03/2007			11	2	2	7.6	0.2			<2	4.5	5.0			10	106	88		
10/03/2007																	88		
11/03/2007																	88		
12/03/2007			17		2	7.4	1.3										88		
13/03/2007			21		2	7.2	0.1										88		
14/03/2007			15		2	7.4	0.6										87		
15/03/2007			16		2	7.4						3.5	0.6	0.51			88	64	4
16/03/2007			19	2	2	7.4	0.2			<2	4.8	5.0			10	38	87		
17/03/2007																	88		
18/03/2007																	87		
19/03/2007																	89		
20/03/2007			16		2	7.5	0.1										88	461	37
21/03/2007			22		4	7.4	0.1										88		
22/03/2007			19		10	7.3	0.1					3.7	0.8	0.64			88		
23/03/2007			21	4	12	7.6	0.1			<2	3.4	4.0			10	73	88		
24/03/2007																	86		
25/03/2007																	88		
26/03/2007			28		2	7.5	0.1										88		
27/03/2007			21		2	7.5	0.1										87		
28/03/2007			25		2	7.6	0.1										86		
29/03/2007			22		2	7.6						3.5	0.9	0.71			87		
30/03/2007			17	2	2	7.7	1.20			<2	1.4	2.0			10	78	86	24	3
31/03/2007																	87		
Average			**19**	**2**	**3**	**7.5**	**0.27**				**4**	**4.1**	**0.7**	**0.6**	**10**	**131**	**88**	**143**	**12**

Midleton April 2007 - Effluent

EFFLUENT ANALYSIS																			
Date	Day	Q m3/d	COD mg/l	BOD mg/l	SS mg/l	pH	NH3-N mg/l	NO3 mg/l	NO2 mg/l	TKN mg/l	TON mg/l	TN mg/l	TP mg/l	OP mg/l	OFG mg/l	Salinity mg Cl/l	Trns'm %	Total Coliform /100ml	Faecal Coliform /100ml
01-Apr-07																	87		
02-Apr-07			26		2	7.6	0.2										88		
03-Apr-07			18		2	7.5	0.2										89		
04-Apr-07			23		2	7.8	0.1										86		
05-Apr-07			20		4	7.7	0.1					1.9	0.29	0.20			86		
06-Apr-07			15	2	5	7.4	0.1			<2	1.4	2.0	0.37	0.37	10	429	87		
07-Apr-07																	87		
08-Apr-07																	86		
09-Apr-07																	86		
10-Apr-07			17		2	7.5						1.9					86		
11-Apr-07			6		2	7.4							1.20	0.67			86		
12-Apr-07																	87		
13-Apr-07				2						<2	3.0	3.0			10	48	84	1120	137
14-Apr-07																	87		
15-Apr-07																	86		
16-Apr-07																	86		
17-Apr-07																	84		
18-Apr-07																	87		
19-Apr-07												3.5	0.26	0.10			87	5	1
20-Apr-07			19	2	16	7.6	0.1			<2	2.5	3.0			10	305	86		
21-Apr-07																	86		
22-Apr-07																	84		
23-Apr-07																	83		
24-Apr-07																	88		
25-Apr-07																	81	14	1
26-Apr-07			26		2	7.4	0.1					7.2	0.27	0.16			81		
27-Apr-07			19	2	2	7.5	0.2			<2	3.0	3.4			10	135	80		
28-Apr-07																	83		
29-Apr-07																	85		
30-Apr-07			20		2	7.5	0.10										84		
Average			**19**	**2**	**4**	**7.5**	**0.13**				**2.48**	**3.24**	**0.48**	**0.30**	**10.00**	**229.25**	**85.43**	**379.67**	**46.33**

Legend: Consult_US Weekend Holiday EPS

- Midleton May 2007 - Effluent

EFFLUENT ANALYSIS

Date	Day	Q m3/d	COD mg/l	BOD mg/l	SS mg/l	pH	NH3-N mg/l	NO3 mg/l	NO2 mg/l	TKN mg/l	TON mg/l	TN mg/l	TP mg/l	OP mg/l	OFG mg/l	Salinity mg Cl/l	Trns'm %	Total Coliform /100ml	Faecal Coliform /100ml
01-May-07			26.0		4	7.5	0.1										85	980	69
02-May-07			43.8		14	7.4	0.3										87		
03-May-07			26.5		18							2.8	0.33	0.18			88		
04-May-07			15.0	2	5	7.4	0.1			<2	2.5	3.0	0.24	0.17	<10	685	87		
05-May-07																	88		
06-May-07																	89		
07-May-07																	86		
08-May-07			26		2	7.5	0.2										88		
09-May-07			20		6	7.3	0.5										87	159	12
10-May-07			22		6	7.3	0.3					1.4	0.36	0.20			88		
11-May-07			17	2	2	7.5	0.4			2	2.0	2			<10	158	87		
12-May-07																	81		
13-May-07																	87		
14-May-07			36		2	7.3	0.1										88	31	2
15-May-07			22		2	7.4	0.2					1.3	0.26	0.12			88		
16-May-07			13		2	7.4	0.1										89		
17-May-07			20		2	7.5	0.2										89		
18-May-07				2						<2	2.0	2			<10	97	89		
19-May-07																	88		
20-May-07																	91		
21-May-07			14		2	7.5	0.3										88		
22-May-07			15		6	7.5	0.6										88		
23-May-07							7.2										86		
24-May-07			45.5		10	7.5	1.8					7.6	5.00	4.55			77	240	240
25-May-07			30.7	4	4	7.6				0.8	2.0	3.0			<10	216	86		
26-May-07																	84		
27-May-07																	82		
28-May-07			28.8		2	7.6	0.1										84		
29-May-07			24.6		2		0.1										82		
30-May-07			23.8		2	7.7						1.6	0.2	0.12			84		
31-May-07			32.2		2	7.5	0.20										84		
Average			**25.1**	**3**	**5**	**7.5**	**0.71**				**2.1**	**2.7**	**1**	**##**		**289**	**86.3**	**353**	**81**

Legend: Consult_US Weekend Holiday EPS

- Midleton June 2007 - Effluent

EFFLUENT ANALYSIS

Date	Day	Q m3/d	COD mg/l	BOD mg/l	SS mg/l	pH	NH3-N mg/l	NO3 mg/l	NO2 mg/l	TKN mg/l	TON mg/l	TN mg/l	TP mg/l	OP mg/l	OFG mg/l	Salinity mg Cl/l	Trns'm %	Total Coliform /100ml	Faecal Coliform /100ml
01-Jun-07			16.0	2	5	7.2	0.1			<2	2.2	2.2	0.12	0.07	<10	585	84	4	4
02-Jun-07																	82		
03-Jun-07																	73		
04-Jun-07																	83		
05-Jun-07			23		18	7.5	0.1										82		
06-Jun-07			40		20	7.7	0.9										82		
07-Jun-07			30		10	7.5	1.3					3	0.40	0.28			81		
08-Jun-07			32	4	10	7.3	3.2			3	1.1	4			<10	437	79	3	3
09-Jun-07																	81		
10-Jun-07																	80		
11-Jun-07			38		6	7.3	0.1										81		
12-Jun-07			22		2	7.3	0.1										78		
13-Jun-07			56		14	7.5	0.1										80		
14-Jun-07			27		12	7.4	0.4					2	0.48	0.35			80		
15-Jun-07			76	2	22	7.4	0.1			<2	0.5	2			10	648	77	460	93
16-Jun-07																	82		
17-Jun-07																	81		
18-Jun-07			60		38	7.6	0.1										80		
19-Jun-07			58		16	7.9	0.1										80		
20-Jun-07			36		14	7.9	0.2										81		
21-Jun-07			32		4	7.8	0.1					0.1	0.49	0.35			76	43	9
22-Jun-07			38	2	20	7.8	0.1			<2	1.6	2			10.0	248	74		
23-Jun-07																	76		
24-Jun-07																	75		
25-Jun-07																	78		
26-Jun-07			30.9		4	8.0											79		
27-Jun-07			53.6		4	8.0	0.2										68	1100	93
28-Jun-07			31.8		4	8.1	0.1					2.0	0.5	0.3			81		
29-Jun-07			3	4.0	2	7.9	0.4			<2	0.9	2.0			10.0	259	81		
30-Jun-07																	78		
Average			**36.9**	**2.8**	**11.8**	**7.6**	**0.43**			**3.0**	**1.3**	**1.9**	**0.4**	**0.3**	**10.0**	**435.4**	**79.1**	**322.0**	**40.4**

Legend: Consult_US Weekend Holiday EPS

SECTION F: EXISTING ENVIRONMENT & IMPACT OF THE DISCHARGE(S)

Advice on completing this section is provided in the accompanying Guidance Note.

Detailed information is required to enable the Agency to assess the existing receiving environment. This section requires the provision of information on the ambient environmental conditions within the receiving water(s) upstream and downstream of any discharge(s).

Where development is proposed to be carried out, being development which is of a class for the time being specified under Article 24 (First Schedule) of the Environmental Impact Assessment Regulations, the information on the state of the existing environment should be addressed in the EIS. **In such cases, it will suffice for the purposes of this section to provide adequate cross-references to the relevant sections in the EIS.**

F.1. Assessment of Impact on Receiving Surface or Ground Water

- Give summary details and an assessment of the impacts of any existing or proposed emissions on the environment, including environmental media other than those into which the emissions are to be made.

- Tables F.1(i)(a) & (b) should be completed for the primary discharge point. Surface water monitoring locations upstream and downstream of the discharge point shall be screened for those substances listed in Tables F.1(i)(a) & (b). Monitoring of surface water shall be carried out at not less than two points, one upstream from the discharge location and one downstream.

- For discharges from secondary discharge points Tables F.1(ii)(a) & (b) should be completed. Furthermore, provide summary details and an assessment of the impacts of any existing or proposed emissions on the surface water or ground (aquifers, soils, sub-soils and rock environment), including any impact on environmental media other than those into which the emissions are to be made.

- Provide details of the extent and type of ground emissions at the works. For larger discharges to groundwaters, e.g., from Integrated Constructed Wetlands, large scale percolation areas, etc., a comprehensive report must be completed which should include, inter alia, topography, meteorological data, water quality, geology, hydrology, and hydrogeology. The latter must in particular present the aquifer classification and vulnerability. The Geological Survey of Ireland Groundwater Protection Scheme Dept of the Environment and Local Government, Geological Survey of Ireland, EPA (1999) methodology should be used for any such classification. This report should also identify all surface water bodies and water wells that may be at risk as a result of the ground discharge.

- Describe the existing environment in terms of water quality with particular reference to environmental quality standards or other legislative standards. Submit a copy of the most recent water quality management plan or catchment management plan in place for the receiving water body. Give details of any designation under any Council Directive or Regulations that apply in relation to the receiving water.

- Provide a statement as to whether or not emissions of main polluting substances (as defined in the *Dangerous Substances Regulations S.I. No. 12 of 2001*) to water are likely to impair the environment.

- In circumstances where water abstraction points exist downstream of any discharge describe measures to be undertaken to ensure that discharges from the waste water works will not have a significant effect on faecal coliform, salmonella and protozoan pathogen numbers, e.g., Cryptosporidium and Giardia, in the receiving water environment.

- Indicate whether or not emissions from the agglomeration or any plant, methods, processes, operating procedures or other factors which affect such emissions are likely to have a significant effect on –

  (a) a site (until the adoption, in respect of the site, of a decision by the European Commission under Article 21 of Council Directive 92/43/EEC for the purposes of the third paragraph of Article 4(2) of that Directive) —

  (i) notified for the purposes of Regulation 4 of the Natural Habitats Regulations, subject to any amendments made to it by virtue of Regulation 5 of those Regulations,

  (ii) details of which have been transmitted to the Commission in accordance with Regulation 5(4) of the Natural Habitats Regulations, or

  (iii) added by virtue of Regulation 6 of the Natural Habitats Regulations to the list transmitted to the Commission in accordance with Regulation 5(4) of those Regulations,

  (b) a site adopted by the European Commission as a site of Community importance for the purposes of Article 4(2) of Council Directive 92/43/EEC[1] in accordance with the procedures laid down in Article 21 of that Directive,

  (c) a special area of conservation within the meaning of the Natural Habitats Regulations, or

  (d) an area classified pursuant to Article 4(1) or 4(2) of Council Directive 79/409/EEC[2];

[1]Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ No. L 206, 22.07.1992)

[2]Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds (OJ No. L 103, 25.4.1979)

- Describe, where appropriate, measures for minimising pollution over long distances or in the territory of other states.

- This section should also contain full details of any modelling of discharges from the agglomeration. Full details of the assessment and any other relevant information on the receiving environment should be submitted as **Attachment F.1.**

Attachment included	**Yes**	**No**
	✓	

F.2 Tabular Data on Drinking Water Abstraction Point(s)

Applicants should submit the following information for each downstream or downgradient drinking water abstraction point. The zone of contribution for the abstraction point should be delineated and any potential risks from the waste water discharge to the water quality at that abstraction point identified.

ABS_CD	**AGG_SERVED**	**ABS_VOL**	**PT_CD**	**DIS_DS**	**EASTING**	**NORTHING**	**VERIFIED**
Abstraction Code	Agglomeration served	Abstraction Volume in m^3/day	Point Code Provide label ID's	Distance Downstream in meters from Emission Point to Abstraction Point	6E-digit GPS Irish National Grid Reference	6N-digit GPS Irish National Grid Reference	Y = GPS used N = GPS not used

Note: Attach any risk assessment that may have been carried out in relation to the abstraction point(s) listed.

An individual record (i.e. row) is required for each abstraction point. Acceptable file formats include Excel, Access or other upon agreement with the Agency. A standard Excel template can be downloaded from the EPA website at www.epa.ie. This data should be submitted to the Agency on a separate CD-Rom containing sections B.1, B.2, B.3, B.4, B.5, C.1, D.2 and E.3.

Attachment F.2 should contain any supporting information.

Assessment of Impact on Receiving Surface or Ground Water

Owenacurra Estuary and North Channel

According to the Environmental Protection Agency's 2005 report 'Water Quality in Ireland 2001 – 2003', the Owenacurra Estuary has been shown to have disimproved in the period since the last assessment (1995 – 1999) now being categorised as a Eutrophic water body. The disimprovement in water quality from potentially eutrophic to eutrophic is largely due to the high levels of nitrogen in the Owenacurra River.

In the same period the trophic status of the North Channel has shown some improvement going from eutrophic to intermediate. The EPA has reported that there is a paucity of information relating to comprehensive nutrient data in respect of this water body particularly in winter months.

Under the Water Framework Directive these water bodies have jointly been designated as Nutrient Sensitive Areas.

The EPA's assessment of Estuarine and Coastal Water Quality has identified the Owenacurra Estuary as eutrophic and the North Channel/ Great Island as being intermediate in status.

Under the WFD Transitional Water Status both the Owenacurra Estuary and the North Channel/ Great Island are at risk of not achieving good status.

Cork Harbour is one of six water bodies which since the last assessment has retained its status as eutrophic.

Designation under Council Directives

The EU Birds Directive (79/409/EEC) requires designation of Special Protection Areas for:

- Listed rare and vulnerable species.
- Regularly occurring migratory species, such as ducks, geese and waders.
- Wetlands, especially those of international importance, which attract large numbers of migratory birds each year. (Internationally important means that 1% of the

population of a species uses the site, or more than 20,000 birds regularly use the site.)

Cork Harbour is one such SPA. It is a large sheltered bay system with several river estuaries. The SPA site comprises most of the intertidal areas of Cork Harbour, including all of the North Channel. It is an internationally important wetland site regulary supporting wintering waterfowl and other important bird species.

Extensive areas of estuarine habitat have been reclaimed since the 1950s for a variety of projects. Cork Harbour is adjacent to a major urban and industrial centre and has variable water quality with some areas being classified as eutrophic. Pollution may not have a significant impact on bird populations.

The legal basis on which SACs are selected and designated is the EU Habitats Directive, transposed into Irish law in the European Union (Natural Habitats) Regulations,1997 as amended in 1998 and 2005. The Directive lists certain habitats and species that must be protected within SACs. The Great Island Channel in Cork Harbour has been designated an SAC. This stretches from Little Island to Midleton with its southern boundary being formed by the Great Island. The Owenacurra and Dungourney Rivers provide the main source of freshwater into this system.

The main land use within the site is oyster farming however the main threats to its conservation significance comes from road works, infilling, sewage outflows and possible marina developments.

The area has not been designated under the Shellfish Directives but it has been proposed to do so in the near future.

TABLE F.1(i)(a): SURFACE/GROUND WATER MONITORING
(Primary Discharge Point – one table per upstream and downstream location)

Discharge Point Code: ***SW01 MIDL***

MONITORING POINT CODE: ***MP01SW01 MIDL***

Parameter	Results (mg/l[Note 1])				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	17/01/07	04/04/07	04/07/07	24/10/07			
pH	7.4	7.5	7.4	7.6	Grab (Holding tank)	2	Electrochemical
Temperature	Not available	Not available	Not available	Not available	Grab (Holding tank)	N/A	N/A
Electrical Conductivity (@25°C)	Not available	Not available	Not available	418	Grab (Holding tank)	0.5 µmhos/cm	Electrochemical
Suspended Solids	<2.5	6	6	7	Grab (Holding tank)	0.5mg/l	Gravimetric
Ammonia (as N)	Not available	<0.1	Not available	<0.1	Grab (Holding tank)	0.02 mg/l	Colorimetric
Biochemical Oxygen Demand	<1	2.8	5.8	1.6	Grab (Holding tank)	0.06 mg/l	Electrochemical
Chemical Oxygen Demand	<21	30	43	<21	Grab (Holding tank)	8 mg/l	Digestion & Calorimetric
Dissolved Oxygen	Not available	Not available	Not available	Not available	Grab (Holding tank)	N/A	N/A
Hardness (as $CaCo_3$)	Not available	Not available	Not available	Not available	Grab (Holding tank)	N/A	N/A
Total Nitrogen (as N)	3.6	2.6	<1	13	Grab (Holding tank)	0.5 mg/l	Digestion & Calorimetric
Nitrite (as N)	Not available	Not available	Not available	Not available	Grab (Holding tank)	N/A	N/A
Nitrate (as N)	Not available	Not available	Not available	0.2	Grab (Holding tank)	0.1 mg/l	Colorimetric
Total Phosphorus (as P)	0.28	0.49	0.37	0.67	Grab (Holding tank)	0.2 mg/l	Digestion & Calorimetric
Orthophosphate (as P) – unfiltered	Not available	Not available	Not available	0.29	Grab (Holding tank)	0.02 mg/l	Colorimetric
Sulphate (SO_4)	Not available	Not available	Not available	194	Grab (Holding tank)	30 mg/l	Turbidimetric
Phenols (sum) [Note 2] (ug/l)	Not available	Not available	Not available	<0.10	Grab (Holding tank)	0.1 µg/l	GC-MS 2

Note 1: Or other unit as appropriate – please specify.
Note 2: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

TABLE F.1(i)(b): SURFACE/GROUND WATER MONITORING (Dangerous Substances)
(Primary Discharge Point - one table per upstream and downstream location)

Discharge Point Code: ***SW01 MIDL***

MONITORING POINT CODE: ***MP01SW01 MIDL***

Parameter	Results (µg/l)				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	24/10/07	No further sample dates					
Atrazine	<0.01	x	x	x	Grab (Holding tank)	0.96 µg/L	HPLC
Dichloromethane	<1	x	x	x	Grab (Holding tank)	1 µg/L	GC-MS 1
Simazine	<0.01	x	x	x	Grab (Holding tank)	0.01 µg/L	HPLC
Toluene	<0.01	x	x	x	Grab (Holding tank)	0.02 µg/L	GC-MS 1
Tributyltin	<0.02	x	x	x	Grab (Holding tank)	1 µg/L as Sn	GC-MS 1
Xylenes	<0.01	x	x	x	Grab (Holding tank)	0.96 µg/L	GC-MS 1
Arsenic	7	x	x	x	Grab (Holding tank)	0.02 mg/L	ICP-MS
Chromium	<0.02	x	x	x	Grab (Holding tank)	0.02 mg/L	ICP-OES
Copper	<0.02	x	x	x	Grab (Holding tank)	5 mg/L	ICP-OES
Cyanide	<5	x	x	x	Grab (Holding tank)	0.01 µg/L	Colorimetric
Fluoride	Not available	x	x	x	Grab (Holding tank)	0.02 mg/L	ISE
Lead	<0.02	x	x	x	Grab (Holding tank)	0.02 mg/L	ICP-OES
Nickel	<0.02	x	x	x	Grab (Holding tank)	0.02 mg/L	ICP-OES
Zinc	<0.02	x	x	x	Grab (Holding tank)	0.02 mg/L	ICP-OES
Boron	0.262	x	x	x	Grab (Holding tank)	0.02 mg/L	ICP-OES
Cadmium	<0.02	x	x	x	Grab (Holding tank)	0.02 mg/L	ICP-OES
Mercury	<0.2	x	x	x	Grab (Holding tank)	0.02 mg/L	ICP-MS
Selenium	2	x	x	x	Grab (Holding tank)	0.74 µg/L	ICP-MS
Barium	0.02	x	x	x	Grab (Holding tank)	0.02 mg/L	ICP-OES

TABLE F.1(ii)(a): SURFACE/GROUND WATER MONITORING - (1 table per discharge point upstream and downstream locations) (Secondary Discharge Point)

Discharge Point Code: ***SW03 MIDL***

MONITORING POINT CODE: ***MPSW03 MIDL***

Parameter	Results (mg/l[Note 1])				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	07/03/07	04/04/07	24/10/07	N/A			
pH	7.2	7.2	7.7	x	Grab	2	Electrochemical
Temperature	Not available	Not available	Not available	x	Grab	N/A	N/A
Electrical Conductivity (@25°C)	Not available	Not available	882	x	Grab	0.5 µmhos/cm	Electrochemical
Suspended Solids	28	93	3	x	Grab	0.5mg/l	Gravimetric
Ammonia (as N)	Not available	Not available	Not available	x	Grab	0.02 mg/l	Colorimetric
Biochemical Oxygen Demand	30	77	1	x	Grab	0.06 mg/l	Electrochemical
Chemical Oxygen Demand	51	238	26	x	Grab	8 mg/l	Digestion & Calorimetric
Dissolved Oxygen	Not available	Not available	Not available	x	Grab	N/A	N/A
Hardness (as $CaCo_3$)	Not available	Not available	Not available	x	Grab	N/A	N/A
Total Nitrogen (as N)	7.9	21.3	5	x	Grab	0.5 mg/l	Digestion & Calorimetric
Nitrite (as N)	Not available	Not available	Not available	x	Grab	N/A	N/A
Nitrate (as N)	Not available	Not available	0.52	x	Grab	0.1 mg/l	Colorimetric
Total Phosphorus (as P)	0.81	2.98	<0.2	x	Grab	0.2 mg/l	Digestion & Calorimetric
Orthophosphate (as P) – unfiltered	Not available	Not available	0.11	x	Grab	0.02 mg/l	Colorimetric
Sulphate (SO_4)	Not available	Not available	450.6	x	Grab	30 mg/l	Turbidimetric
Phenols (sum) [Note 2] (ug/l)	Not available	Not available	<0.10	x	Grab	0.1 µg/l	GC-MS 2

Note 1: Or other unit as appropriate – please specify.
Note 2: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

TABLE F.1(ii)(b): SURFACE/GROUND WATER MONITORING - (1 table per discharge point upstream and downstream locations) (Secondary Discharge Point)

Discharge Point Code: ***SW03 MIDL***

MONITORING POINT CODE: ***MPSW03 MIDL***

Parameter	Results (µg/l)				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	24/10/07	No further sample dates					
Atrazine	<0.01	x	x	x	Grab	0.96 µg/L	HPLC
Dichloromethane	<1.0	x	x	x	Grab	1 µg/L	GC-MS 1
Simazine	<0.01	x	x	x	Grab	0.01 µg/L	HPLC
Toluene	<0.01	x	x	x	Grab	0.02 µg/L	GC-MS 1
Tributyltin	NS	x	x	x	Grab	1 µg/L as Sn	GC-MS 1
Xylenes	<0.01	x	x	x	Grab	0.96 µg/L	GC-MS 1
Arsenic	8	x	x	x	Grab	0.02 mg/L	ICP-MS
Chromium	0.073	x	x	x	Grab	0.02 mg/L	ICP-OES
Copper	<0.02	x	x	x	Grab	5 mg/L	ICP-OES
Cyanide	<5	x	x	x	Grab	0.01 µg/L	Colorimetric
Fluoride	N/A	x	x	x	Grab	0.02 mg/L	ISE
Lead	<0.02	x	x	x	Grab	0.02 mg/L	ICP-OES
Nickel	<0.02	x	x	x	Grab	0.02 mg/L	ICP-OES
Zinc	0.582	x	x	x	Grab	0.02 mg/L	ICP-OES
Boron	0.622	x	x	x	Grab	0.02 mg/L	ICP-OES
Cadmium	<0.02	x	x	x	Grab	0.02 mg/L	ICP-OES
Mercury	1.9	x	x	x	Grab	0.02 mg/L	ICP-MS
Selenium	15	x	x	x	Grab	0.74 µg/L	ICP-MS
Barium	<0.02	x	x	x	Grab	0.02 mg/L	ICP-OES

TABLE F.1(iii)(a): SURFACE/GROUND WATER MONITORING
(Secondary Discharge Point – one table per upstream and downstream location)

Discharge Point Code: ***SW04 MIDL***

MONITORING POINT CODE: ***MPSW04 MIDL***

Parameter	Results (mg/l[Note 1])				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	NO SAMPLE DATA						
pH	x	x	x	x	x	x	x
Temperature	x	x	x	x	x	x	x
Electrical Conductivity (@25°C)	x	x	x	x	x	x	x
Suspended Solids	x	x	x	x	x	x	x
Ammonia (as N)	x	x	x	x	x	x	x
Biochemical Oxygen Demand	x	x	x	x	x	x	x
Chemical Oxygen Demand	x	x	x	x	x	x	x
Dissolved Oxygen	x	x	x	x	x	x	x
Hardness (as $CaCo_3$)	x	x	x	x	x	x	x
Total Nitrogen (as N)	x	x	x	x	x	x	x
Nitrite (as N)	x	x	x	x	x	x	x
Nitrate (as N) (mg/l)	x	x	x	x	x	x	x
Total Phosphorus (as P)	x	x	x	x	x	x	x
Orthophosphate (as P) – unfiltered	x	x	x	x	x	x	x
Sulphate (SO_4)	x	x	x	x	x	x	x
Phenols (sum) [Note 2] (ug/l)	x	x	x	x	x	x	x

Note 1: Or other unit as appropriate – please specify.
Note 2: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

TABLE F.1(iii)(b): SURFACE/GROUND WATER MONITORING (Dangerous Substances)
(Secondary Discharge Point - one table per upstream and downstream location)

Discharge Point Code: ***SW04MIDL***

MONITORING POINT CODE: ***MPSW04 MIDL***

Parameter	Results (µg/l)				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	NO SAMPLE DATA						
Atrazine	x	x	x	x	x	x	x
Dichloromethane	x	x	x	x	x	x	x
Simazine	x	x	x	x	x	x	x
Toluene	x	x	x	x	x	x	x
Tributyltin	x	x	x	x	x	x	x
Xylenes	x	x	x	x	x	x	x
Arsenic	x	x	x	x	x	x	x
Chromium	x	x	x	x	x	x	x
Copper	x	x	x	x	x	x	x
Cyanide	x	x	x	x	x	x	x
Fluoride	x	x	x	x	x	x	x
Lead	x	x	x	x	x	x	x
Nickel	x	x	x	x	x	x	x
Zinc	x	x	x	x	x	x	x
Boron	x	x	x	x	x	x	x
Cadmium	x	x	x	x	x	x	x
Mercury	x	x	x	x	x	x	x
Selenium	x	x	x	x	x	x	x
Barium	x	x	x	x	x	x	x