EFFLUENT DISCHARGE

FLOWMETER & SAMPLER

EXISTING SLUDGE HOLDING TANK

STORMWATER OVERFLOW

PLATFORM PIPEWORK

DECANT RETURN

EXISTING CLARIFIER

SLUDGE RETURN

EXISTING AERATION TANK

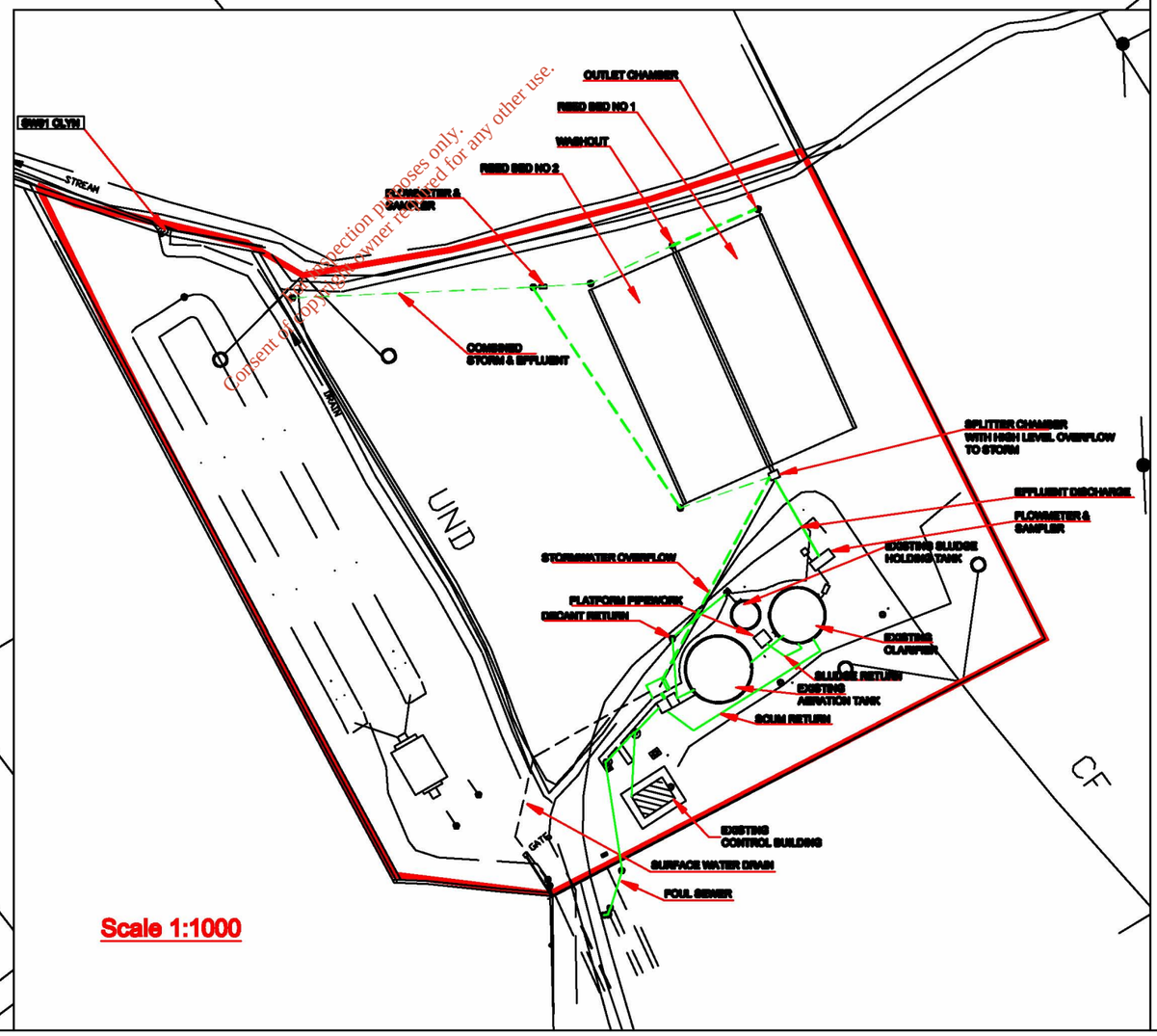
SCUM RETURN

EXISTING CONTROL BUILDING

SURFACE WATER DRAIN

FOUL SEWER

Not to Scale



Scale 1:1000

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Rev.	Date	By	Description

CORK COUNTY COUNCIL
SOUTHERN DIVISION

Niall O Keeffe, B.E. C.Eng., Hon.Eng.F.I.E.I.I.M.E.I. — A/County Engineer, County Hall, Cork.
Patrick Power, Director of Services, Area Operations South.

Project:	CLOYNE WWTP WASTE WATER DISCHARGE LICENCE APPLICATION
Title:	APPLICATION FORM ATTACHMENT C1_Dwg01 OPERATION INFORMATION REQUIREMENTS

Designed:	ER	Checked:	MH	Scales:	1:1000 @ A3
Drawn:	SD	Approved:	MH	Date:	NOV '08
File Path:				Status:	_

Drawing No: C1_Dwg01

Rev: A

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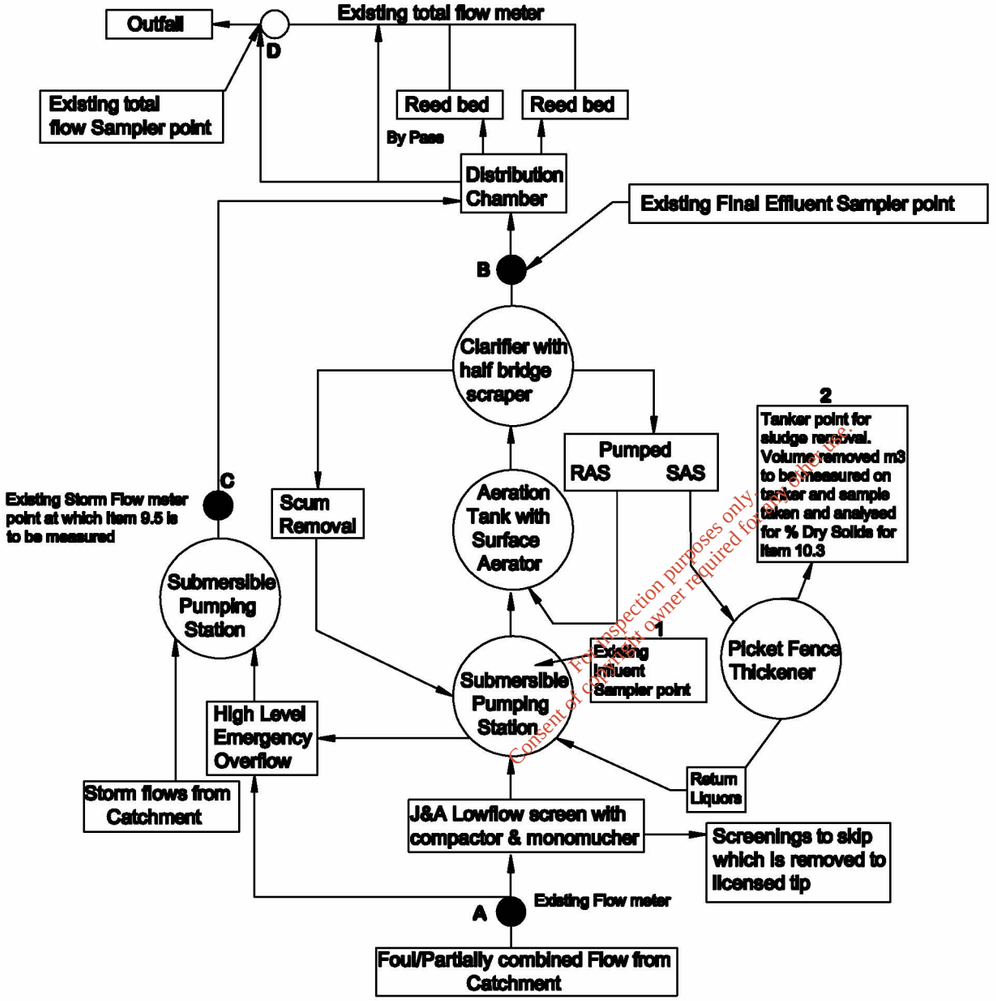
CLOYNE WWTP PROCESS DIAGRAM SHOWING EXISTING & PROPOSED FLOW & SAMPLE POINTS



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A : Influent flow measurement for foul/partially combined flows
B : Final Effluent flow measurement and sample point (new sampler purchased as part of contract) where Item 9.3 is to be measured.
C : Storm flow measurement where Item 9.5 is to be measured
D : Total flow measurement and existing sample point (new sampler is to be purchased as part of this contract)
1 : Inlet Sampler point SP5 - Outlet Sampler Point SP6 to measure removal ot Item 9.4.
2 : Tanker point to remove sludge. Tanker is to measure Item 10.3 and sample to be taken and analysed % Dry Solid content of sludge removed.

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Rev.	Date	By	Description

CORK COUNTY COUNCIL
SOUTHERN DIVISION
Noel O'Keeffe, B.E. C.Eng., Hon.Eng.F.I.E.I.M.I.E.I.R. — A/County Engineer, County Hall, Cork.
Patricia Power, Director of Services, Area Operations South

Project:	CLOYNE WWTP WASTE WATER DISCHARGE LICENCE APPLICATION
Title:	APPLICATION FORM ATTACHMENT C1_Dwg02 OPERATION INFORMATION REQUIREMENTS

Designed: ER	Checked: MH	Scales: Not to Scale @ A3	Drawing No: C1_Dwg02	
Drawn: SD	Approved: MH	Date: NOV '08		
File Path:			Status: —	Rev: A

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PT_CD	PT_TYPE	LA_NAME	RWB_TYPE
SWO1CLYN	Primary Discharge	Cork County Council	Stream
SWO2CLYN	Storm Water Overflow	Cork County Council	Stream

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RWB_NAME	DESIGNATION	EASTING	NORTHING
Spital Stream	None	E 191060	N 067821
Spital Stream	None	E 191060	N 067821

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VERIFIED

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KNOCKNAMADDEREE
Cnoc na Madraí

BURGARY
Burgáiste

KILGRELLANE

TOWN PARKS
(ED CLOYNE)
Na Burgáistí
(T Cluain)

sSW01u
UPSTREAM SAMPLING POINTS
E 121851.000
N 68008.000

sSW01d
DOWNSTREAM SAMPLING POINTS
E 122884.000
N 75589.000

WASTE WATER TREATMENT PLANT

BALLYDWYRE

CASTLEMARY

CASTLEMARY
Carraig an Chotaigh

SPITAL
Gort An Spidéil

COMMONS WEST
An Coimín Thiar

KILBOY

LISSANLY

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Rev.	Date	By	Description

CORK COUNTY COUNCIL
SOUTHERN DIVISION

Noel O Keeffe, B.E. C.Eng. Bus.Eng F.I.E.I.I.M.C.S. — A/County Engineer, County Hall, Cork.
Patrick Power, Director of Services, Area Operations South.

Project:	CLOYNE WWTP WASTE WATER DISCHARGE LICENCE APPLICATION
Title:	APPLICATION FORM ATTACHMENT E2_ Map11 LOCATION OF UPSTREAM & DOWNSTREAM MONITORING POINTS

Designed: ER	Checked: MH	Scales: 1:10,000 @ A3	Drawing No: E2_Map11	
Drawn: SD	Approved: MH	Date: NOV '08		
File Path:			Status: _	Rev: A

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PT_CD	PT_TYPE	MON_TYPE	EASTING
SW01CLYN	Primary Discharge	S	E 191124
aSWO1u	Primary Discharge	S	E 191631
aSW01d	Primary Discharge	S	E 122684

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NORTHING	VERIFIED
N 067811	N
N 068006	N
N 075589	N

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Attachment E4 Cloyne Inlet Table E4

Sample Date	27/11/2008	Average	Kg/Day	Kg/year	
Sample	Influent				
Sample Code	GS1280				
Flow M^3/Day	*	945			Maximum Flow
pH	8	8			
Temperature ℃	*	*			
Cond 20℃	920	920			
SS mg/L	93	93	87.885	32078.025	
NH_3 mg/L	30.5	30.5	28.8225	10520.213	
BOD mg/L	337	337	318.465	116239.73	
COD mg/L	688	688	650.16	237308.4	
TN mg/L	48	48	45.36	16556.4	
Nitrite mg/L	0.606	0.606	0.57267	209.02455	
Nitrate mg/L	0.865	0.865	0.817425	298.36013	
TP mg/L	6.5	6.5	6.1425	2242.0125	
O-PO4-P mg/L	3.24	3.24	3.0618	1117.557	
SO4 mg/L	62.1	62.1	58.6845	21419.843	
Phenols µg/L	31.29	31.29	29.56905	10792.703	
Atrazine µg/L	<0.01	<0.01	<0.00945	<3.44925	
Dichloromethane µg/L	<1	<1	<0.945	<344.925	
Simazine µg/L	<0.01	<0.01	<0.00945	<3.44925	
Toluene µg/L	<1	<1	<0.945	<344.925	
Tributyltin µg/L	*	*	*	*	
Xylenes µg/L	<1	<1	<0.945	<344.925	
Arsenic µg/L	<0.96	<0.96	<0.9072	<331.128	
Chromium mg/L	<0.02	<0.02	<0.0189	<6.8985	
Copper mg/L	<0.02	<0.02	<0.0189	<6.8985	
Cyanide µg/L	<5	<5	<4.725	<1724.625	
Fluoride µg/L	437	437	412.965	150732.23	
Lead mg/L	<0.02	<0.02	<0.0189	<6.8985	
Nickel mg/L	<0.02	<0.02	<0.0189	<6.8985	
Zinc mg/L	0.078	0.078	0.07371	26.90415	
Boron mg/L	0.307	0.307	0.290115	105.89198	
Cadmium mg/L	<0.02	<0.02	<0.0189	<6.8985	
Mercury µg/L	<0.2	<0.2	<0.189	<68.985	
Selenium µg/L	1.9	1.9	1.7955	655.3575	

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Barium mg/L	<0.02	<0.02	<0.0189	<6.8985

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Attachment E4 Cloyne Discharge Outlet Table E4

Sample Date	08/03/2006	12/04/2006	07/06/2006	20/09/2006	05/10/2006	17/01/2007	07/03/2007	04/04/2007	30/05/2007	17/10/2007	07/02/2008	03/04/2008	22/05/2008	03/09/2008	09/10/2008	27/11/2008	Average	Kg/Day	Kg/year	
Sample	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent				
Sample Code											GS035	GS278	GS439	GS827	GS1020	GS1279				
Flow M^3/Day	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	945			Maximum Flow
pH	7.6	7.8	7.5	7.5	7.4	7.6	7.4	7.5	7.6	7.6	7.5	*	8	8	*	7.9	7.56			
Temperature ℃	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*				
Cond 20℃	*	*	*	*	*	*	*	*	*	*	*	620	1029	858	*	837	836			
SS mg/L	53	<2.5	4	<2.5	5	5	<2.5	3	5	3	11	8	20	<2.5	5	4	9.37	8.85465	3231.9473	
NH_3 mg/L	*	*	*	*	*	*	*	*	*	16.2	3	<0.1	9.7	3.2	*	2.5	5.775	5.457375	1991.9419	
BOD mg/L	8.4	2.4	1.8	1.2	1.1	*	1.5	3.9	2.3	1.69	5.07	3.29	12.8	1.51	2.54	1.8	3.42	3.2319	1179.6435	
COD mg/L	63	<21	<21	<21	<21	21	<21	24	<21	22	<21	26	59	<21	<21	<21	20	18.9	6898.5	
TN mg/L	*	*	*	10.3	8.3	23	9.1	10.4	3.26	14.9	4.4	3.7	*	3	*	12	9.3054545	8.7936545	3209.6839	
Nitrite mg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0.0862	0.0862	0.081459	29.732535	
Nitrate mg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	1.36	1.36	1.2852	469.098	
TP mg/L	2.95	2.45	2.7	3.68	2.65	3.08	0.73	2.18	2.14	3.64	2.1	1.47	4.1	*	*	2.4	2.5907143	2.448225	893.60213	
O-PO4-P mg/L	*	*	*	*	*	*	*	*	*	*	2.06	1.09	2.88	3.03	*	1.89	2.2225	2.1002625	766.59581	
SO4 mg/L	*	*	*	*	*	*	*	*	*	40.9	31.1	*	*	*	*	44.1	44.1	41.6745	15211.193	
Phenols µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<0.10	<0.10	0.0945	34.4925	
Atrazine µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<0.01	<0.01	0.00945	3.44925	
Dichloromethane	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<1	<1	0.945	344.925	
Simazine µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<0.01	<0.01	<0.00945	<3.44925	
Toluene µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<1	<1	<0.945	<344.925	
Tributyltin µg/L	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	
Xylenes µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<1	<1	<0.945	<344.925	
Arsenic µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<0.96	<0.96	<0.9072	<331.128	
Chromium mg/L	*	*	*	*	*	*	*	*	*	<0.02		<0.02	<0.02	<0.02	*	<0.02	<0.02	<0.0189	<6.8985	
Copper mg/L	*	*	*	*	*	*	*	*	*	<0.02		<0.02	<0.02	<0.02	*	<0.02	<0.02	<0.0189	<6.8985	
Cyanide µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<5	<5	<4.725	<1724.625	
Fluoride µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	375	375	354.375	129346.88	
Lead mg/L	*	*	*	*	*	*	*	*	*	<0.02	*	0.053	0.024	<0.02	*	<0.02	0.0214	0.020223	7.381395	
Nickel mg/L	*	*	*	*	*	*	*	*	*	<0.02	*	<0.02	<0.02	<0.02	*	<0.02	0.01	0.00945	3.44925	
Zinc mg/L	*	*	*	*	*	*	*	*	*	<0.02	*	<0.02	<0.02	<0.02	*	<0.02	0.01	0.00945	3.44925	
Boron mg/L	*	*	*	*	*	*	*	*	*	*	*	0.0682	0.176	0.191	*	<0.02	0.113	0.106785	38.976525	
Cadmium mg/L	*	*	*	*	*	*	*	*	*	<0.02	*	<0.02	<0.02	<0.02	*	<0.02	<0.02	<0.0189	<6.8985	
Mercury µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<0.2	<0.2	<0.189	<68.985	
Selenium µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	2.3	2.3	2.1735	793.3275	
Barium mg/L	*	*	*	*	*	*	*	*	*	<0.02	*	<0.02	<0.02	<0.02	*	0.055	0.019	0.017955	6.553575	

values recorded at 1/2 the LOD for satistical purposes

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Attachment E4 Cloyne Upstream Table E4

Sample Date	27/11/2008				
Sample	River				
Sample Code	GS1281	Average			
Flow M^3/Day	*				
pH	8.1	8.1			
Temperature ℃	*	*			
Cond 20℃	360	360			
SS mg/L	4	4			
NH_3 mg/L	<0.1	<0.1			
BOD mg/L	<1.0	<1.0			
COD mg/L	<21	<21			
TN mg/L	12	12			
Nitrite mg/L	0.0616	0.0616			
Nitrate mg/L	5.95	5.95			
TP mg/L	<0.20	<0.20			
O-PO4-P mg/L	<0.05	<0.05			
SO4 mg/L	<30	<30			
Phenols µg/L	<0.10	<0.10			
Atrazine µg/L	<0.01	<0.01			
Dichloromethane	<1	<1			
Simazine µg/L	<0.01	<0.01			
Toluene µg/L	<1	<1			
Tributyltin µg/L	*	*			
Xylenes µg/L	<1	<1			
Arsenic µg/L	<0.96	<0.96			
Chromium mg/L	<0.02	<0.02			
Copper mg/L	<0.02	<0.02			
Cyanide µg/L	<5	<5			
Fluoride µg/L	112	112			
Lead mg/L	0.021	0.021			
Nickel mg/L	<0.02	<0.02			
Zinc mg/L	<0.02	<0.02			
Boron mg/L	<0.02	<0.02			
Cadmium mg/L	<0.02	<0.02			
Mercury µg/L	<0.2	<0.2			
Selenium µg/L	2.7	2.7			
Barium mg/L	0.03	0.03			

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Attachment E4 Cloyne Downstream Table E4

Sample Date	27/11/2008				
Sample	River	Average			
Sample Code	GS1282				
Flow M^3/Day	*				
pH	7.7	7.7			
Temperature ℃	*	*			
Cond 20℃	388	388			
SS mg/L	<2.5	<2.5			
NH_3 mg/L	<0.1	<0.1			
BOD mg/L	<1.0	<1.0			
COD mg/L	<21	<21			
TN mg/L	13	13			
Nitrite mg/L	0.0378	0.0378			
Nitrate mg/L	7.53	7.53			
TP mg/L	<0.20	<0.20			
O-PO4-P mg/L	0.12	0.12			
SO4 mg/L	<30	<30			
Phenols µg/L	<0.10	<0.10			
Atrazine µg/L	<0.01	<0.01			
Dichloromethane	<1	<1			
Simazine µg/L	<0.01	<0.01			
Toluene µg/L	<1	<1			
Tributyltin µg/L	*	*			
Xylenes µg/L	<1	<1			
Arsenic µg/L	<0.96	<0.96			
Chromium mg/L	<0.02	<0.02			
Copper mg/L	<0.02	<0.02			
Cyanide µg/L	<5	<5			
Fluoride µg/L	89	89			
Lead mg/L	<0.02	<0.02			
Nickel mg/L	<0.02	<0.02			
Zinc mg/L	<0.02	<0.02			
Boron mg/L	<0.02	<0.02			
Cadmium mg/L	<0.02	<0.02			
Mercury µg/L	<0.2	<0.2			
Selenium µg/L	1.9	1.9			

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Barium mg/L	0.025	0.025			

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DEPARTMENT OF THE ENVIRONMENT, HERITAGE AND LOCAL GOVERNMENT

NDP NATIONAL DEVELOPMENT PLAN

CORK COUNTY COUNCIL

UPGRADING OF THE WASTEWATER TREATMENT FACILITIES AT MIDLETON, CASTLEMARTYR, CLOYNE, SALEEN AND BALLYCOTTON

Design Report

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Cork County Council
WSIP Office,
Model Business Park,
Model Farm Road,
Cork

WYG Engineering (Ireland) Ltd.,
Consulting Engineers,
Unit 2, University Technology Centre,
Curraheen Road,
Cork

November 2008

C006196

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CORK COUNTY COUNCIL

UPGRADING OF THE WASTEWATER TREATMENT FACILITIES AT MIDLETON, CASTLEMARTYR, CLOYNE, SALEEN AND BALLYCOTTON

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Design Report

WYG Engineering (Ireland) Ltd.,
Unit 2,
University Technology Centre,
Curraheen Road,
Cork

Tel.: **021- 4933200**
Fax: **021- 4933250**
Project No.: **C006196**

Issue No.:	1	2			
Date:	04-04-2008	25-11-2008			
Prepared by:	B Hyde	S Little / B Hyde			
Approved by:	K Thornton	K Thornton			

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APPENDICES

TABLES AND FIGURES

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1 INTRODUCTION

1.1 Background

In October 2007, WYG Engineering (Ireland) Limited were appointed by Cork County Council as Consulting Engineer / Client's Representative for the preparation of a Design Report and Contract Documents for the upgrading of the Midleton, Castlemartyr, Cloyne and Saleen Waste Water Treatment Plants. The terms of reference for the appointment is the Brief prepared by the Water Services Investment Programme Project Team (South), dated August 2007.

Subsequently, the provision of a treatment plant at Ballycotton was included in the scope of the Project (Letter CCC_WYG 13.02.2008)

This report constitutes the Design Review for the upgrading at each centre as required by the Brief. The Report supersedes and incorporates the Design Report (Issue 1, April 2008), Supplementary Report – Saleen Wastewater Treatment Facilities (April 2008) and Supplementary Report – Longer Term Effluent Disposal: Castlemartyr and Ladysbridge (June 2008).

Refer to Figure 1, Appendix 7 for a location map of the area.

2 DEMOGRAPHICS

2.1 Population Trends

The recent Census figures for the Midleton Rural Area / District and for the three main urban centres (Midleton, Cloyne & Castlemartyr – Saleen is not a statistical entity in the Census) are listed in Table 2.1 below. An analysis of the figures is shown in Table 2.2 below.

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Table 2.1 Populations

Centre	1991	1996	2002	2006
Midleton	5,951	6,209	7,957	10,048
Castlemartyr	587	484	577	978
Cloyne	731	673	785	1,095
Saleen	-	-	-	351 (2)
Total (1)	7,269	7,366	9,319	12,121
Midleton Rural Area/District	17,887	18,558	21,133	26,663

Source: Central Statistics Office (not including Saleen)

(1) Excluding Saleen
(2) Figure adopted from RPS Preliminary Report (April, 2006)

Table 2.2 Population Growth Rates

Centre	1991 – 2006	1996 – 2006	2002 -2006
Midleton	3.6%	4.9%	6.0%
Castlemartyr	3.5%	7.3%	14.1%
Cloyne	2.7%	5.0%	8.7%
Saleen	-	-	-
Overall	3.5%	5.1%	6.8%
Rural Area / District	2.7%	3.7%	6.0%

Note - The Population Growth Rates above are the Annual Compound Growth Rates over the specified Period

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Reliance on the statistics obtained over a relatively short (4 year) period is considered unsound and it is extremely doubtful if the recent rapid growth in house building in the area, and consequent population growth, is sustainable. The longer term but still recent trends over the past 10-15 years are therefore considered more applicable in any projections of future growth.

2.2 Population Projections

Standardised "high" and "low" population growth projections, based on the recent medium term (10 & 15 years) growth trends as identified in Table 2.2, are made as follows:

- "High": 5% p.a. compound for the period 2008-2018 (10 years from now), which is comparable to the average growth for the three urban areas for the 10 year period 1996-2006, and 3.5% p.a. for 10 years thereafter, comparable to the rate for the 15 year period 1991-2006. This allows for the population at each centre to increase by almost 120% over the next 20 years.
- "Low": 3.5% p.a. compound for the period 2008-2018, comparable to that obtaining for the period 1991-2006, declining to 2.3% ($^2/_3$ of 3.5%) over the following 10 years. This yields a c.80% increase in the current population by 2028.

Population projections for the four centres are shown in Table 2.3 below, and graphically (excluding Saleen) in Figures 2.1 and 2.2. The 2006 Census figures are used as a baseline, except for Saleen where the figure was adapted from the RPS Preliminary Report on the sewerage scheme, dated April 2006. A 5% compound annual growth rate for the period 2006-2008 has been used to estimate the current population.

Table 2.3 Population Projections

	2008	2018		2028	
Centre		High	Low	High	Low
Midleton	11,000	18,000	15,600	25,000	19,600
Castlemartyr	1,100	1,750	1,500	2,500	1,900
Cloyne	1,200	2,000	1,700	2,800	2,150
Saleen	390	630	550	890	690

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Figure 2.1 Population Trends and Projections for Midleton, Midleton Rural Area, Castlemartyr and Cloyne

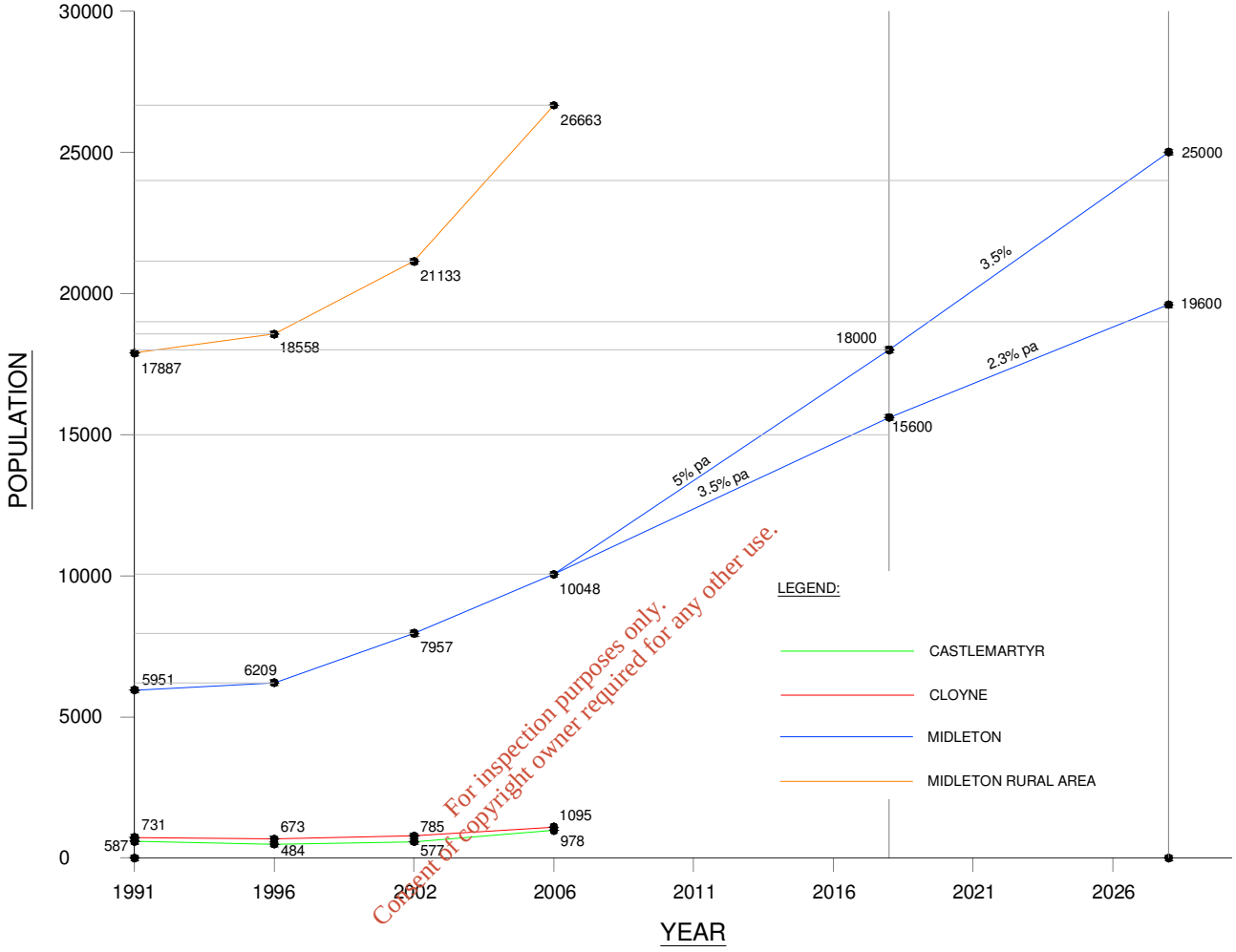

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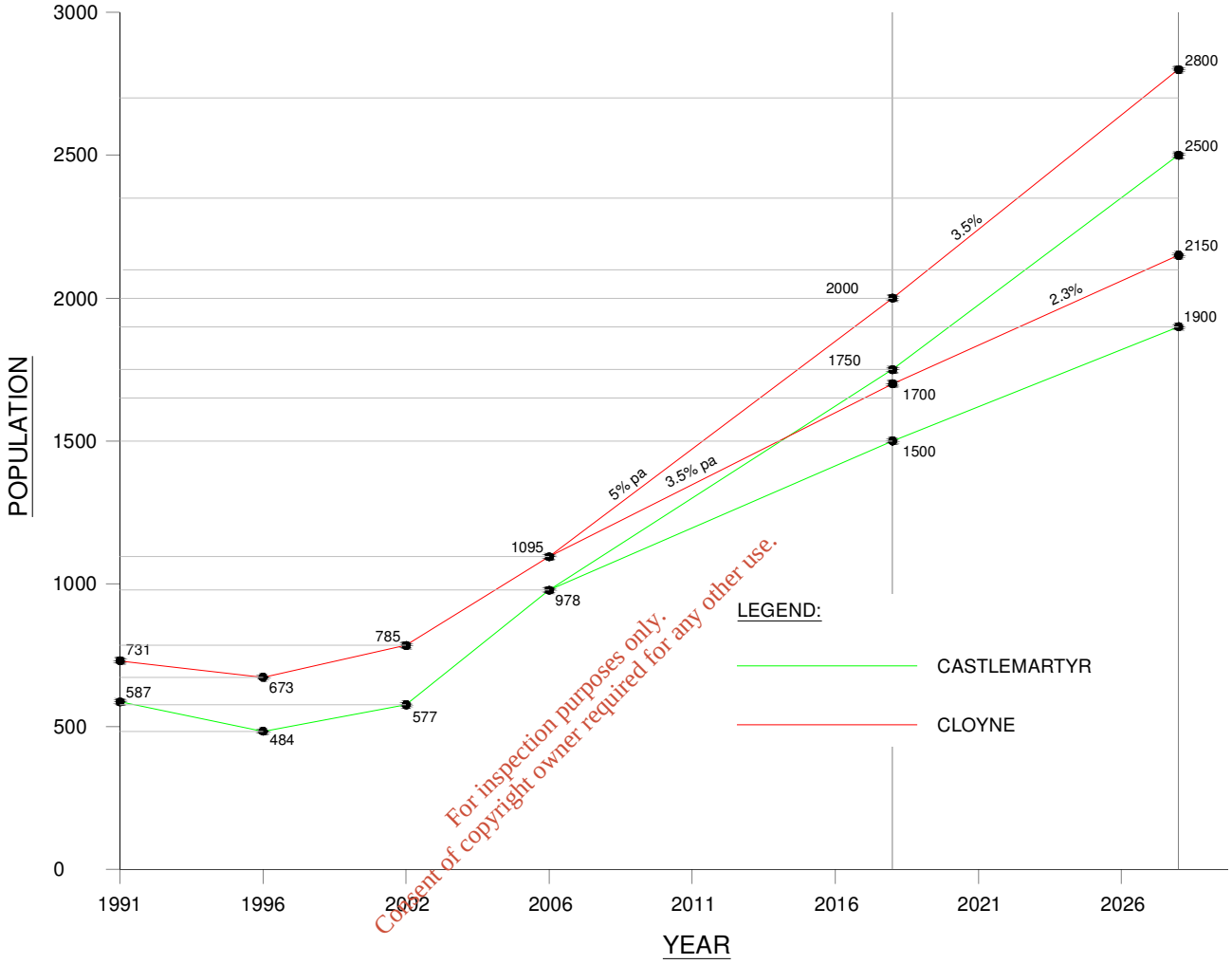
Figure 2.2 Population Trends and Projections for Castlemartyr & Cloyne



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The low projection is considered the more appropriate for planning purposes. However, in the light of the recent rapid expansion of the settlements in the area, any proposals developed need to be reviewed for the higher projection, particularly in the short to medium term. The facilities have therefore been designed using an average of the high and low population projections.

The adopted design populations are shown in Table 2.4 below.

Table 2.4 Adopted Design Populations

Centre	**2008**	**2028**
Midleton	11,000	22,500
Castlemartyr	1,100	2,200
Cloyne	1,200	2,475
Saleen	390	790

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3 DEVELOPMENT PLANS

3.1 Local Area Plan

Development in Castlemartyr, Cloyne and Saleen is covered by the Midleton Electoral Area Local Area Plan (LAP) (Sept 2005), which is to remain in force until late 2011 but is subject to interim variation. The LAP is guided by the County Development Plan 2003. Midleton is covered by a Special Local Area Plan (SLAP).

The LAP maps for Castlemartyr, Cloyne and Saleen are attached in Appendix 1. Estimates of the residential development potential for the Specific Zoning Objectives, in addition to the existing population, for each centre are shown in Tables A1.1 – A1.3 (Appendix 1), and summarised below:

Centre	Population
Castlemartyr	2178
Cloyne	2845
Saleen	1026

The projected population figures for 20 years hence (as per Section 2.2) are also shown in Appendix 1. The comparison would indicate that the lands currently zoned residential at each town/village are adequate to cater for foreseeable development well beyond the LAP objective date of 2011, and that the current zoning will cover normal development over the next 20 years. This is based on the assumption that all the zoned areas become available for development.

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3.2 Midleton Special Local Area Plan

The SLAP mapping for Midleton, finalised in 2005, is shown in Appendix 2. An estimate of the existing population plus the population that could be accommodated by the housing potential of the lands zoned for residential development and the "Special Zoning Objectives" Areas X-03 to X-08 is shown in Table A2.1, Appendix 2, and the final figure shown below:

Centre	Population
Midleton	19100

The projected population figures for 2028 are also shown in Appendix 2. A comparison indicates that these areas are adequate to accommodate the "Low" projected population for the year 2028, well beyond the SLAP objective date of 2011.

Two "special zoning" areas in the Plan, X-01 and X-02, are not included in the above assessment. Both are located to the North of the town. X-02, 25.4ha in extent, is designated for mixed use, including an unspecified residential component. X-01 is an extensive area of 133.8ha and is designated as a "Major New Residential Neighbourhood". Any development of these two areas, in particular X-01, would accommodate any longer term population growth above the "Low" projection of 19,000 for the year 2028.

Thus current zoned lands under the Midleton SLAP appear to be more than sufficient to cater for potential development for the next 20-25 years.

A review of planning applications for Midleton for the past 2 years indicates approval for 2,298 dwellings.

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3.3 Cork Area Strategic Plan

The Cork Area Strategic Plan Strategy set a target of 6,605 new dwellings to be constructed in Midleton during the period 2000–2020. This represents a population growth of c.20,000, or an average of 1000 persons per year. For the first six years of the Plan, a period of unprecedented development in the town, less than 50% of the targeted growth has been achieved. Designing for the CASP Strategic Targets are therefore deemed unwarranted at present.

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4 PROPOSED PLANT DESIGN CAPACITIES

The proposed design capacities for the plants at each centre are shown in Table 4.1 below. This allows for a 20 year design horizon, the mean of the 'High' and 'Low' population projections as detailed in Section 2, and an allowance of 15%-20% of the projected domestic component to cover commercial, institutional and industrial requirements. From experience on other schemes, an allowance of 20% is considered suitable for Midleton, and approximately 15% for the other centres.

The allowance does not cater for the advent of any major water user to the catchments, particularly to a centre other than Midleton.

Figures for Ballycotton have also been included in the Table, taken from the Shanagarry, Garryvoe, Ballycotton Sewerage Scheme Preliminary Report, WYG July 2006.

Table 4.1 Area Population and Plant Capacity Information

	Estimated Current Population (2008)	Design Population – 2028[1]	Proposed Design PE - 2028	Existing Plant Design Capacity (PE)	Current Throughput [2] (PE)
Midleton	11,000	22,500	27,000	10,000	11,500
Castlemartyr	1,100	2,200	3,000 [3]	2,000	2,600 [4]
Cloyne	1,200	2,475	3,000	1,400	1,820 [4]
Saleen	390	790	1,000	-	-
Ballycotton [5]	750	960	1,200	-	-

(1) Refer Table 2.4
(2) Jan – Oct 2007 (BOD) (EPS Operation Reports)
(3) Includes 300 for the Capella Development
(4) These figures are potentially skewed due to spikes in the data
(5) (Design population is the summer projection for the year 2030.

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Table 4.1 also shows the design capacities of the existing plants and indicative current throughput. Utilising these, the upgrading requirement for each centre is examined in more detail below.

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5 MIDLETON

5.1 Design Capacity

An analysis of the recent inflow records for the Midleton Plant is shown on Figure 3.1 (Appendix 3). Based on BOD, the results indicate a current average daily loading of c.11,600 PE (695 kg/d), as compared to the design PE of 10,000. The biological load varies significantly however, with an average inflow of over 17,000 PE recorded in May and less than 7,000 in February.

The daily maximums for each month are also shown on Figure 3.1. This indicates a peak day loading of 35,000 PE for May and a minimum of 11,200 in February.

The town's sewerage network is a combined system, and the wastewater from the collection system is pumped to the Treatment Plant from the Bailick 1 and Bailick 2 pump stations. Both stations have limited storm water holding capacity, leading to significant overflow discharges to the Ballynacorra River/Estuary. There is no storm water holding facility at the Treatment Plant and thus the hydraulic loading on the plant correlates to the pumping capacity of the two pumping stations. Thus the average daily hydraulic load on the plant is relatively consistent at c.31,000 PE (6,200m^3/d), with a peak monthly average of 40,000 (8,000m^3/d) indicated for January (Figure 3.1, Appendix 3).

The 10,000 PE nominal plant capacity is thus constantly exceeded, both biologically and hydraulically. At times the biological load is consistently 170% of the design capacity and hydraulically is constantly over three times the design throughput. A project is currently in progress to eliminate infiltration from the collection system. The future plant design capacity should be reviewed once this project is completed.

The pumps at Bailick should be controlled to deliver 3DWF only. Stormwater holding at the treatment plant will be addressed in the next expansion stage.

Despite the overloading, recent monitoring would indicate that the treated effluent quality is satisfactory. Figures 3.2-3.6 (Appendix 3) show the results for BOD, Suspended Solids (SS), Phosphorus, Nitrogen, and faecal coliforms, which can be summarised as follows:

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Table 5.1 Midleton Effluent Monitoring 2007

	Unit	Mean	Max	Required Standard (1)
BOD	mg/l	3.0	5.0 (2)	20
SS	mg/l	7.3	17.1 (2)	30
Total P	mg/l P	0.55	1.2	2.0
Total N	mg/l N	2.9	9.5	15
Faecal Coliforms	f.c/100ml	12 (3)	460	<250 (3)

(1) Environmental Impact Statement (MCOS, Nov.1996)
(2) Monthly Average
(3) Geometric mean, 50 sample rolling programme, 95% to be less than 1,000/100ml

5.2 Midleton Effluent Disposal and Receiving Waters

The treated effluent from the existing plant is discharged to a 750mm sewer on Bailick Road, through which it is conveyed to the Ballinacorra Pump Station No. 2. From the pump station, the effluent, combined with treated effluent from Irish Distillers, is pumped through a 750mm main to an outfall on the Ballinacorra River at Rathcoursey West. The outfall is in the tidal reach of the river, c.3km to the Southwest of the Treatment Plant Site.

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As part of the design and planning process for the existing plant, an Environmental Impact Statement (EIS) was prepared by MCOS (dated November 1996). The EIS identified the current site as the preferred location for a new waste water treatment plant for Midleton and the then existing outfall at Rathcoursey as the discharge point. The EIS and other planning documents allowed for the construction of a 15,000PE plant on the site. Staged construction was envisaged, the initial construction to be for a design PE of 10,000 and a Stage 2 expansion catering for an additional 5,000. It is recommended that this expansion now proceed.

The modelling of effluent dispersion at the Rathcoursey Outfall, carried out as part of the EIS, was for a Dry Weather Flow (DWF) of 54l/s (4665 m^3/day) of the combined effluent, with a maximum faecal coliform (fc) concentration of 1 x 10^5/100ml.

A Foreshore Licence Application for the above flow at the outfall was made in October 1997. The licence was granted in March 1999, subject to the following condition:

- The geometric mean of faecal coliforms per 100ml of effluent must be 250 fc or less, compliance to be measured on the basis of a 50 sample rolling programme.
- 95% of all samples shall be less than 1,000 fc/100ml.

Upgrading of the existing plant to 15,000 PE and discharge of the effluent at Rathcoursey is thus deemed to be covered by the EIS and Licence, provided the stated chemical and bacteriological requirements are adhered to.

The recent performance of the UV disinfection at the existing plant is shown in Fig 3.6 (Appendix 3). This shows the discharge is well within the bacteriological requirements of the licence.

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5.3 Statutory Requirements / Legislation

The following outlines the current status for the site regarding Statutory Requirements / Legislation:

- Land acquisition and wayleaves are not required.
- Part 8 Planning for a 15,000 PE Plant is in place.
- A Foreshore Licence is in place for the Rathcoursey Outfall.
- A Waste Discharge Licence application was submitted to the EPA in December 2007.

5.4 Proposal

In Table 4.1, a design P.E. for Midleton of 27,000 is arrived at for the year 2028. This can be achieved in a number of stages. The existing 10,000 PE plant is a two stream design, with facility at the inlet works for a third stream. In the original design this was intended to be an additional 5,000 PE extension, and a 15,000 PE plant was covered in the planning process and the Foreshore Licence Application for the existing plant and outfall (1997/1998). It is therefore proposed that this extension, deemed to be covered by the original planning process, proceeds immediately and that plans are formulated for the continued phased upgrading of the plant for a longer term treatment capacity of up to 30,000 PE. It is expected that the 15,000 plant will be able to treat flows only up to the year 2011.

Sludge handling facilities need to be upgraded in the shorter term. In particular the picket-fence thickener capacity, indicated as being inadequate for the current throughput, will have to be significantly augmented. A third sludge holding tank (two at present, one picket fence thickener, and one reception tank) was included in the original planning and this should be constructed as part of the immediate upgrading. It is also proposed that a second centrifuge is provided, with a capacity of 10 m^3/hr to supplement the existing 6 m^3 unit.

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Handling and transportation of the dewatered sludge should be reviewed during detailed design. A provisional sum has been included in the cost estimate for any necessary modification.

The existing U.V Disinfection Installation is indicated as being sized for flows up to 133 l/s or a 20,000 PE at 3 DWF. It is currently functioning well and therefore does not appear to require upgrading in the shorter term.

A layout of the expanded 15,000PE plant is shown in Figure 2, Appendix 7. This is reasonably similar to that in the original planning documents. The proposed upgrading is detailed in Appendix 8.

A summary of proposed upgrade works include:

- Splitter chamber
- Aeration Tank - 5000 PE four stage unit (12m x 40m), similar to the existing units
- Clarifier - 19m dia (as existing).
- Sludge Holding Tank: Picket fence thickener - 120m³
- Centrifuge - 10m³/hr capacity unit

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6 CASTLEMARTYR

6.1 Design Capacity

An analysis of the recent inflow records for the Castlemartyr Plant is shown in Figure 3.7 (Appendix 3). The hydraulic and biological load figures are anomalous in that there was a huge and currently unexplained surge in the biological load in particular, during the summer months (June-August 2007). This leads to an average BOD loading of 156 kg/d (2600 PE). If these three months are excluded however, a PE of c.1800 obtains. This is much more compatible with the estimated current population of c.1100 and the recent connection of the "Capella" complex to the scheme.

The sewer network is a combined system, which terminates at a pump station in the middle of the village, from where the wastewater is pumped to the treatment plant. A storm overflow at the pump station discharges to the adjacent Kiltha River. There is no storm water holding tank at the treatment plant and the pumps thus regulate the inflow. Wastewater from the Capella development is pumped separately to the Plant.

The results of the more recent monitoring of the treated effluent are shown on Figures 3.8 - 3.10 (Appendix 3). They can be summarised as follows:

Table 6.1 Castlemartyr Treated Effluent Monitoring

	Unit	Mean	Max (1)	Required Standard (2)
BOD	mg/l	5.2	7.7	25
SS	mg/l	16.7	38	35
Orthophosphate	mg/l P	4.4	11	-
Total N	mg/l N		-	-

(1) Monthly Average
(2) Urban Waste Water Directive, the Phosphorous Regulations 1998 and Nitrate Directive 1991

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This indicates that while BOD and SS concentrations are tolerable, phosphate, and probably nitrate, levels are unacceptably high, particularly when the available dilution is factored in.

6.2 Effluent Disposal and Receiving Waters

Treated effluent from the existing treatment plant is discharged to the Kiltha River, which runs approx 100m to the West of the site. The Kiltha is a tributary of the Womanagh and as such is covered by the "Womanagh Catchment Assessment" carried out by the environmental consultants Dixon Brosnan for Cork County Council, reporting in 2006.

This assessment was of the potential impact of the discharges, current and future, from the WWTPs in the catchment. With regard to Castlemartyr, the findings were as follows:

- The EPA Biological Quality Rating / Q Value at the bridge in Castlemartyr (Stn 1,000-200m upstream of the outfall) has been rated 3-4 (moderately polluted) over the past 10/15 years.
- Following sampling in March 2006, a Q value of 4 (unpolluted) was ascribed to the stretch of river just downstream (45m) of the outfall.
- The available hydrometric data for the catchment (5 no. stations) indicates a relatively low 95% ile flow of only 36 l/s at the outfall (CA = 30km^2).

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- This estimated 95% flow (36 l/s) indicates a dilution factor of less than 6:1 for the discharge volume (@ 180 l/h/d) from a putative 3,000 PE treatment plant. For the standard 8:1 minimum dilution to apply, the throughput of plant would be limited to 2,200 PE or only marginally in excess of the current rated capacity (2,000 PE).

- The background nutrient concentrations at the EPA monitoring station at Castlemartyr Bridge, upstream of the outfall, are high. Nitrate levels are in excess of the limit set for Clean Water Quality in the Drinking Water Regulations 2000 (50mg/l NO_3 ≈ 11.3 mg/l N) and fall into the Doubtful Water Quality Category under the Nitrate Directive 1991.

- Orthophosphate levels are over four times the limit set for Satisfactory Water Quality under the 1998 Phosphorous Regulations.

The relevant water quality data for Stn. 1,000 is shown in Table A4.1 Appendix 4. The high nutrient levels shown, allied to the relatively low flows and consequent low dilution available at the discharge point, indicates that any increase in the current treatment capacity is not practical, if continuing with the existing outfall. Rather, the existing plant needs to be upgraded to produce a higher quality effluent, including denitrification and phosphate removal. If the Phosphorous Regulations are to be complied with and to a lesser degree the Nitrate Directive, a catchment management plan to reduce the background concentrations also needs to be formulated and successfully implemented.

With the recent rapid population growth in the village, throughput at the Treatment Plant has almost reached design capacity. To cater for future development, treatment capacity has to be increased and a new effluent disposal point will be required. Alternative new outfall locations are examined below.

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6.3 New Outfall for Castlemartyr

6.3.1 Womanagh at Ladysbridge

The Kiltha flows southwards from Castlemartyr and joins the Womanagh River, just over 1km downstream and 0.5 km to the West of Ladysbridge. At Ladysbridge, a new 1000 PE plant, with the facility for longer term expansion to 1500 PE, has been constructed on the bank of the Womanagh, discharging to the adjacent river. The catchment area at this outfall is 45 km^2, an increase of 50% on that at Castlemartyr. While a commensurate 50% increase in the estimated 95%ile flow, to 54 l/s, would technically increase the dilution available at Ladysbridge, the assimilative capacity, for nutrients in particular, is not boosted. Thus with the current water quality, and continuing, if improved, discharge from the Castlemartyr plant, the assimilative capacity for the 1000 PE discharge at Ladysbridge is considered marginal. Expansion of the plant to 1500 PE would certainly create problems, so pumping of some or all of the treated effluent from an expanded plant at Castlemartyr is not feasible. The dilution ratio for the 95%ile flow at Ladysbridge for the combined existing capacity at Ladysbridge and Castlemartyr (3,000 PE) is less than 9:1, which for the projected future combined discharge of 774 m^3/d (4,500 PE) reduces to less than 6:1.

Formulation and implementation of a catchment management plan and upgrading of the plant at Castlemartyr would bring environmental benefits along the watercourse but with such low dilutions occurring, this is unlikely to bring such improvements as to allow any significant increase in any of the discharges to the river. Thus to increase the discharge to the Kiltha, in the short to medium term at least, a high standard “Clean River Water Quality” effluent would have to be produced as follows:

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Parameter	Conc. Limit (mg/l)
BOD	3
SS	25
oPO_4 (as P)	0.03 - Median Value
NH_3	0.02
NH_4	0.3
NO_2	0.5
NO_3	25

Research has indicated that even high cost advanced technologies (e.g. MBRs) would not produce an effluent guaranteed to adhere to this standard, particularly with regard to Ammonia, Nitrates and Orthophosphate. Such a plant would also require sophisticated and costly operation and maintenance.

Disposal outside the catchment is therefore seen as the only practical option, to facilitate the construction of new plants or the expansion of the existing plants in the catchment.

6.3.2 Sea Outfall at Ballycotton

There are significant constraints on the expansion of treatment facilities throughout the Womanagh catchment, and to the disposal of the treated effluent within the catchment, even when applying extremely rigorous treatment standards. Formulation and implementation of a catchment management plan will improve current river conditions, which are relatively poor, but will not allow any significant increase in the volume of treated effluent discharged to the river.

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There are no significant watercourses in the adjacent catchments to which some or all or the treated effluent could be diverted, except perhaps for the Lower Harbour, some 15 km to the south-east. The obvious solution is therefore to pump the treated effluent, to discharge through the proposed sea outfall at Ballycotton.

A proposal for pumping all effluent from Castlemartyr through Ladysbridge to Ballycotton is shown on Figure 3, Appendix 7. This would permit significant development at the treatment facilities for both centres and a significant improvement in water quality in the Kiltha. Mogeely and Killeagh, the other two major urban centres in the Womanagh catchment, could also potentially be connected to the system at some stage in the future if warranted.

The discharge from the Ladysbridge Treatment Plant could also be effectively routed to the Ballycotton Outfall, further improving water quality in the Kiltha.

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6.4 Budget Cost

The budget cost for this proposal is as follows:

Budget Cost

		€
(i)	Pumpstation - Castlemartyr	75,000
(ii)	Pumpstation - Ladysbridge	100,000
(iii)	Rising Main - Castlemartyr to Ladysbridge (1.35 km x 150 Φ)	175,000
(iv)	Rising Main - Ladysbridge to Ballycotton (8.8 km x 200 Φ)	1,235,000
Subtotal		**1,585,000**
Preliminaries (c. 20%)		317,000
Contingency / Design Development (c. 10%)		158,500
Subtotal		2,060,500
VAT @ 13.5%		278,168
Total including VAT		**2,338,668**
	Say	**2.34M**

The Capitalised Pumping Costs (@5% over 20 years) associated with the proposal are estimated to amount to €91,000. This allows for the pumping of the full discharge from both plants.

These costs are offset somewhat by the estimated €300,000 capital cost required to upgrade the existing Castlemartyr plant, costs associated with enabling licensing and continued discharge to the Kiltha, and the increased operating and maintenance costs associated with the nutrient reduction.

Moreover, the final third (2.8 km) of the rising main between Shanagarry and Ballycotton, is routed in parallel with the proposed twin 150mm diameter raw sewerage rising mains from Shanagarry / Garryvoe to Ballycotton and, over the final part of the route, is also in parallel with the proposed treated effluent rising main from Cloyne (Section 7 below). This scenario (shown in Figure 3, Appendix 7) can obviously be rationalised to effect significant savings and also to facilitate construction.

The viability of eliminating the twin 150mm diameter 'raw' mains, proposed for the conveyance of sewage from Shanagarry/Garryvoe to the proposed centralised treatment at Ballycotton, was thus examined (shown in Figure 4, Appendix 7). This would entail:

- Construction of a 1200 PE treatment plant at Ballycotton to serve Ballycotton only;
- Construction of a 2000 PE plant at Shanagarry to serve Shanagarry and Garryvoe or, depending on exigencies, individual plants at each centre (the former is adopted for costing purposes);
- Pumping of the treated effluent from Shanagarry / Garryvoe through the proposed Castlemartyr – Ballycotton rising main.

A cost comparison of these alternative schemes is shown below:

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Alternative 1

- 3,200 PE plant in Ballycotton
- Pumpstation and 2 x 150mm diameter rising mains from Shanagarry to Ballycotton (raw sewerage) (Shanagarry & Garryvoe)

Cost Estimate (Incl. VAT)

		€	€
(i)	Treatment Plant	2,500,000	
	Land acquisition and Site Investigation	250,000	2,750,000
(ii)	Pumpstation and Rising Mains (raw)		1,575,000
			4,325,000

[1] Base Cost - PR + 5% p.a. for inflation

Alternative 2

- 1,200 PE plant in Ballycotton
- 2,000 PE Plant in Shanagarry
- Pumpstation - Shanagarry

Cost Estimate (including VAT)

		€	€
(i)	Ballycotton - 1200 PE plant	1,460,000	
	Land acquisition and Site Investigation	200,000	1,660,000
(ii)	Shanagarry - 2000 PE plant	1,720,000	
	Land acquisition and Site Investigation	200,000	1,920,000
(iii)	Pumpstation		110,000
			3,690,000

Indicative Saving = €635,000

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This indicates significant savings for the evolved layout. The scheme also offers more flexibility for phased implementation and is therefore recommended for adoption.

6.5 Upgrading of the Wastewater Treatment Plant at Castlemartyr

Assuming that the above proposal for the provision of a regional pumped network to convey treated effluent for disposal at Ballycotton is adopted, this will permit further development in Castlemartyr and the resultant requirement to increase in WWTP capacity. In Table 4.1, the current population of c.1,100 was projected to double over the next 20 years, indicating a requirement to increase treatment capacity to 2,800PE. However, it is recommended that the plant be upgraded to a nominal capacity of 3,000 PE. An indicative layout of this expansion, incorporating the treated effluent pumping station is shown on Figure 5, Appendix 7. The required effluent standard could be relaxed from that which would be required for continued disposal to the Kiltha, and high nutrient reduction is no longer necessary.

The estimated cost of the proposed upgrading, amounting to €977,000 (including VAT) is shown in Appendix 9. This does not include the costs associated with the treated effluent pump station or the rising main to Ballycotton, as costed above.

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6.6 Outfall

The outfall at Ballycotton was designed for a nominal maximum discharge of 20 l/s (3200 PE @ 180 l/h/d: 3 DWF), and a foreshore licence application has been made for the 350mm diameter line extending c. 330m into the bay on this basis. The outfall is adequate hydraulically to take the additional flow from Castlemartyr and Ladysbridge. An assessment of the previous modelling work (Shanagarry Garryvoe Ballycotton Preliminary Report, WYG, 2006) has also indicated that the required water quality standards would not be breached due to the additional discharge volume. It is recommended however that the discharge of treated effluent be remodelled to confirm that there is no unacceptable impact on the receiving waters. The viability of extending the line as against providing disinfection, should the current discharge location prove inadequate, would also be examined.

6.7 Proposal

Expansion of the treatment plant at Castlemartyr above the current 2000 PE is constrained by the limited assimilative capacity at the existing plant outfall on the Kiltha River. Expansion of the plant therefore requires a new disposal point but assimilative capacity throughout the Womanagh catchment and neighbouring catchments is fully utilised. Pumping treated effluent from Castlemartyr to the proposed sea outfall at Ballycotton is therefore seen as the only practical solution in catering for future development in the village and the requisite commensurate increase in treatment capacity. Effluent from Ladysbridge, where the receiving waters are also under stress, could also be conveyed to Ballycotton under the scheme.

The estimated cost of providing pump stations at Castlemartyr and Ladysbridge, and the 10.15 km 150/200mm diameter rising main to Ballycotton is €2.34 million (including VAT) but this is offset by an estimated €300,000 capital cost to be spent in the upgrading of the existing treatment plant in Castlemartyr. However, a review of the proposal to pump to Ballycotton in conjunction with current proposals for the upgrading of the sewerage schemes at Cloyne and Shanagarry, Garryvoe & Ballycotton has led to the development of a regional network, and a reappraisal and revision of the proposed scheme for Shanagarry, Garryvoe and Ballycotton, resulting in an indicative capital saving of €635,000 on the individual schemes. Up to half of this saving would be absorbed by the probable need to provide disinfection or extend the outfall at Ballycotton to cater for the significantly increased discharge, and the capitalisation of the pumping costs associated with the proposal. The regional network does however appear to offer the only practical solution to facilitating any further significant development in the Womanagh catchment, in Castlemartyr in particular, and for improving water quality in the Womanagh and the Lower Harbour (Saleen and Cloyne).

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The works proposed would include:

- Upgrading the plant at Castlemartyr to cater for a capacity of 3,000 PE (commensurate with the projected 2028 requirement of 2,800 PE) involving:
  - Upgrading / duplicating the inlet works (screens and pumps)
  - Addition of a 9m diameter Aeration tank
  - An additional 7m diameter Clarifier
  - A second 60m^3 (6m diameter) Sludge Thickening/Holding Tank
  - A storm water holding/balancing tank (80m^3)
  - Odour Control
- Construction of treated effluent pumping stations at Castlemartyr and Ladysbridge;
- Construction of an 10.15km 150/200mm diameter rising main from Castlemartyr, via Ladysbridge to Ballycotton.

The cost estimate for the Proposal is included in Appendix 9.

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6.8 Statutory Processes

The following outlines the current status for the site regarding statutory requirements / legislation:

- Land acquisition and wayleaves - currently underway.
- Part 8 Planning is being processed.
- A Waste Discharge Licence Application for the existing plant has been lodged with the EPA.

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7 CLOYNE

7.1 Design Capacity

An analysis of the recent inflow records for the Cloyne plant is shown on Figure 3.11 (Appendix 3). The average biological load for 2007 was 110kg/day (1800 P.E). If the anomalous result for April is ignored, this reduces to a P.E of c.1500, which is closer to the estimated current population of approximately 1200.

The sewer network is a combined system, with gravity flow to the Treatment Plant. The setting of the storm water overflow at the inlet to the plant insures a relatively consistent hydraulic loading of the plant. Both the treated effluent and the storm overflow discharges to the adjacent reed bed, (which provides some treatment of the overflow) before discharge to the stream bordering the site to the North.

The results from the recent monitoring of both the treated effluent quality and the discharge from the reed bed (which includes the storm overflow) are shown on Figures 3.12 - 3.14 (Appendix 3), which can be summarised as follows:

Table 7.1 Cloyne Effluent Monitoring

	Unit	Mean (1)	Max (2)	Required Standard (3)
BOD_5	mg/l-O_2	3.6	9.0	25
SS	mg/l	5.4	16	35
Orthophosphate	mg/l-PO_4	2.1	4.1	0.03
Total N	mg/l-N		-	5.6

(1) After Reed Bed
(2) Monthly Average
(3) Urban Waste Water Regulations, Drinking Water Regulations, Phosphorous Regulations and Nitrates Directive, as well as in accordance with the Cork County Council Wastewater Strategies and Guidelines – Guidelines for the discharge of treated Wastewaters Treatment Systems for Small Communities, Business, Leisure Centres and Hotels required a Discharge Licence.

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This indicates that while BOD and SS levels are acceptable, nutrient concentrations are relatively high and need to be significantly reduced, even for the present throughput.

7.2 Cloyne Effluent Disposal and Receiving Waters

The treatment plant at Cloyne discharges through a reed bed to a small stream and marsh area on the northern boundary of the site. The reed bed also receives the overflow from the inlet chamber but still appears to be effective in reducing the BOD and SS concentrations of the plant effluent, as demonstrated in Figures 3.12 and 3.13, Appendix 3. The results show the average BOD being reduced from 5.1 mg/l to a more acceptable 3.6mg and SS from an average of 8.4 mg/l to 5.4mg. From Figure 3.14 (Appendix 3) however, it appears that significant nutrient reduction is not taking place in the bed, with average orthophosphate levels increasing from 1.2 to 2.2 mg/l P over the monitoring period. Much of this increase could be ascribed to the routing of the inlet overflow through the bed.

The catchment area of the stream at the outfall is small (c. 2km^2), indicating a DWF of less than 2 l/s and a 95% ile flow of less than 4 l/s. This compares to a current average daily throughout for the plant of c. 290m^3 (1450 PE) or 3.3 l/s. Thus, at present, dilution at the 95% ile flow is only just over 1:1. The desirable dilution factor of 1:8 is not being achieved and a new discharge point is thus urgently required.

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There is no significant stream or river in the immediate vicinity that would have the assimilative capacity even for the effluent from the existing 1,400 PE plant. The options for the discharge of the effluent are shown in Figure 6, Appendix 7 as described below:

Option 1 – Disposal to Cork Harbour
This requires the laying of a 10km x 200mm rising main westwards along the R631 and R630, passing through Rostellan, Farsid and Lower Aghada, to discharge into the existing pumpstation in Whitegate for onward conveyance through the existing outfall at Long Point. This pumped outfall currently handles the untreated sewerage from upper Aghada and Whitegate, and the effluent from the ESB Power Station.

Option 2 – Disposal to the Sea at Ballycotton
This requires the laying of a 9.5km x 200mm diameter rising main eastwards to Monagurra (where it would join with the proposed rising main from Castlemartyr), and onwards, to the proposed new treatment plant at Ballycotton, where it would combine with the effluent from the Plant to discharge through a new outfall to Ballycotton Bay.

Option 3 – Intense Treatment and Filtration
Treatment by a membrane bio-reactor followed by treatment by an ultra filtration plant., required to reduce effluent to 3/25 (BOD/SS), in addition to reducing nutrient concentrations. This option has very high capital costs, and ongoing operation and maintenance costs.

The routing to Whitegate is slightly longer (10km v 9.5km). The existing outfall also discharges into Whitegate Bay and it is considered doubtful if it could effectively handle the large discharge from Cloyne. Extensive surveying and modelling would be required to assess this.

Discharge to the open sea through the proposed outfall at Ballycotton is therefore the preferred option.

The proposed new marine outfall for Ballycotton extends c. 330m into Ballycotton Bay. It was designed to cater for the treated combined effluent from Ballycotton, Shanagarry and Garryvoe with a peak/summer DWF of 6.6l/s (3,200 PE). Peak flow was taken as 3 DWF or 20l/s. The proposed 350mm dia pipeline is hydraulically adequate to cater for the additional flow from Cloyne and Castlemartyr.

The modelling of the outfall is to be reviewed to establish if the pipeline needs to be extended or if UV disinfection should be provided at the Ballycotton Plant.

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7.3 Statutory Processes

The following outlines the current status for the site regarding requirements / legislation:

- Land acquisition and wayleaves for the site are in place.
- Land acquisitions and wayleaves for the pipe route are currently in progress.
- Part 8 planning for the upgrades is in progress.
- A Waste Discharge Licence for the existing plant has been applied for.

7.4 Proposal

In Table 4.1, a design PE for Cloyne of 2,800 is derived for the year 2028. The existing plant is indicated as having a design capacity of 1,400 PE but the aeration tank and clarifier are deemed adequate to cater for 2000 PE. For 2007, it was thus operating constantly at or near this rated capacity and significantly in excess of this during April and May.

To cater for similar short-term shock loading, the projected longer term requirements, and to reduce the loading on the reed bed from the storm water overflow, it is proposed that the existing plant, including the inlet works, be duplicated to provide a nominal capacity of 3,000 PE.

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In Section 8 below, instead of the construction of a new local treatment plant as previously planned, it is proposed that the raw effluent from Saleen is pumped to Cloyne for treatment. This will increase the required treatment capacity at Cloyne to 4,000 PE.

The proposed upgrade work therefore include:

- Duplication of the existing treatment plant
- Construction of a treated effluent pumping station and associated 9km long rising main from Cloyne to Monagurra

An indicative layout of the duplication of the plant is included as Figure 7 in Appendix 7.

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8 SALEEN

8.1 Existing Situation

The existing foul collection system drains to a septic tank, located approximately 200m to the south of the village, as shown in Figure 8 (Appendix 7). The tank was put in place originally to serve just 12 houses (40 PE) and is therefore totally inadequate for the present loading (c. 400 PE). Effluent from the tank discharges to the "Saleen Stream", just upstream of it's confluence with the "Cloyne River".

Saleen is not included as an identifiable entity in the national census but based on an estimated current population figure of 351 adopted in the 2006 Report, and the general growth trends and projections applied at the other centres, a design PE of 900 for the year 2028 has been recommended.

8.2 Assessment of Previous Reports

A Preliminary Report for the upgrading of the Sewerage Scheme in Saleen was drawn up by RPS in early 2006 (dated April 2006). The report proposed an extensive upgrading and extension of the existing foul and storm water collection systems to serve current and future developments. The report also proposed the replacement of the septic tank with a treatment plant to be sited on Coillte lands, c.200 metres further to the south east.

The proposal was for a conventional extended aeration plant, incorporating denitrification and phosphate removal - the plant to be constructed for a PE of 1,000 but allowing for future expansion to 1,500 PE. The effluent would be treated to the standards identified in Appendix 5, and discharged to an outfall on the nearby Cloyne Stream, just upstream of the HWM.

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The proposal to discharge to the Cloyne was based on preliminary estimates of low flows and water quality in the river/stream, and on an assessment of the hydrodynamic and dispersion regimes in the Saleen Creek area, into which the river flows. Flow monitoring of the river was carried out subsequently (Dixon Brosnan, December 2006). This monitoring, subject to the proviso of limited available data, tended to confirm the relatively high dry weather and 95%ile unit area flows ascribed to the catchment but also indicated a strong tidal influence at the proposed discharge point, particularly during higher and spring tides. Sampling upstream of the existing tank outfall indicated consistently high Nitrate (average 7.6 mg/l N) and Orthophosphate levels (average 0.2 mg/l P) over the period July 2005 – November 2006.

The results of this flow and quality monitoring, carried out subsequent to the issue of the Preliminary Report, warrants a reappraisal of the proposed discharge location. The proposed shellfish designation of an area at the mouth of Saleen Creek and another immediately to the south also calls for a reappraisal.

A review of the dispersion studies carried out in 2005 (Irish Hydrodata Limited, September 2005), allied to the subsequent flow monitoring of the influent Cloyne River, indicates flow conditions in Saleen Creek and along the northern shore at the mouth of the creek to be relatively stagnant, as indicated by both the drogue and dye surveys. The survey indicated a mean velocity in the creek of c. 470 m/hr.

This means that the travel time from the proposed outfall point to the mouth of the creek (1.5 km) is at least 3 hours and that there is very little flushing action in the creek. The surveys also show that on the falling tide, the out-flowing current from the creek tends to adhere to the northern shore and enter the Ballynacorra River, and then, possibly, with a change of the tide, return along the same route. An alternative discharge point, within BATNEEC parameters, is therefore seen as desirable.

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8.3 Alternative Scheme

A number of possible outfall locations were examined for the Preliminary Report, including discharge to the Creek and the Lower Harbour. A further option has now emerged however, with the proposal to pump the treated effluent from Cloyne to the sea outfall at Ballycotton. This means that the effluent from Saleen, and potentially also from Whitegate / Aghada / Rostellan could be pumped to Cloyne for onward transmission to Ballycotton, thus significantly reducing discharge to the Lower Harbour. The estimated capital cost for the pump station and rising main is €775,000, as compared to only €75,000 for the local outfall. The pumped system could however include provision for a connection from Whitegate etc. at Cloyne Cross, thus spreading the cost of the pipeline.

A development of this option is to eliminate treatment at Saleen, and pump the raw sewerage to Cloyne (4.05km) for treatment. Indicative layouts of the rising main route and proposed pump station are included as Figure 3 and Figure 9 in Appendix 7, respectively. The estimated costs associated with the proposal are shown in Appendix 6. These are estimated, at current charges, to average €6,375 per annum. Capitalisation at 5% over 20 years yields a NPV of €80,000.

The pumps would be the non-clogging type, thus eliminating the need for screening at Saleen. Twentyfour hours (180 m^3) emergency/stormwater storage would be provided, and an emergency overflow to the nearby Cloyne River, to mitigate any disruption to flow in the rising main. An emergency generator (10 KVA) would also be provided.

A comparison of the combined cost of the pumped scheme as against local treatment is shown in Table A6.3 (Appendix 6). This indicates a capital cost saving of c. €40,000 for the pumped scheme, reducing to c. €60,000 when the NPV of the pumping costs is included. This represents 11% and 5% of the estimated cost of the Stage 1 plant at Saleen.

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Dispensing with treatment and effluent disposal locally in Saleen in favour of pumping to Cloyne for treatment, and effluent disposal in Ballycotton is thus seen as cost effective and a more effective technical / environmental solution. While there may be some implications for the increasing discharge at Ballycotton, it is recommended that this option be adopted.

The advantages of this option are:

- More economic;
- Improved assimilative capacity at Ballycotton;
- Eliminates risk of adverse impact on the water quality in the Cloyne River, Saleen Creek and adjacent harbour area;
- Reduced risk of liability with respect to contamination of future shellfish operations in Cork Harbour;
- Combined wastewater treatment for two settlements resulting in more efficient operation;
- Offers opportunity to incorporate Whitegate / Rostellan / Agada in the proposed scheme with all of the above advantages accruing to this area also.

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The disadvantages of this option are:

- Ongoing operation and maintenance of pumping station and rising main;
- Risk of damage to rising main resulting in interruption of operations;
- Potential for septicity in rising main. With a retention time of up to 8 hours initially and 4 hours in the longer term, septicity could be a problem, resulting in odours at Cloyne. Odour control would therefore be provided for at the Cloyne inlet works, which would also be of benefit to Cloyne. If Whitegate / Aghada / Rostellan were added to the scheme in the future, the risk of septicity would reduce, due to the increased flow in the rising main.
- Potential upgrade required to proposed Ballycotton outfall or higher level of treatment.

8.4 Proposal

It is recommended, based on the above analysis, that:

- Untreated wastewater from the Saleen sewerage system be pumped to Cloyne for treatment;
- The facilities at Saleen should include:
  - A raw sewage pumping station (6kW);
  - Duty / standby non-clogging submersible pumps;
  - An emergency generator (10KVA);
  - A 4.05 km x 100mm diameter HDPE rising main;
  - Odour control at the header chamber at the Treatment Plant.
- Minor modification of the village collection system and its extension to the pumpstation site are also required.

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8.5 Statutory Processes

The following outlines the current status for the site regarding requirements / legislation:

- Land acquisition is currently underway for the Saleen site.
- Part 8 planning for the pumping station has been obtained.
- A Foreshore Licence is not required for the overflow to the Cloyne Stream.
- A Waste Discharge Licence will be required for the overflow.

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9 BALLYCOTTON

9.1 Existing Situation / Proposal

A Preliminary Report was prepared by WYG in 2006 for a sewerage scheme covering the Shanagarry, Garryvoe, Ballycotton coastal area. The Report recommended:

- A new collection system comprising gravity sewers, pumping stations and rising mains for Shanagarry
- An extension of the existing collection system, and new pumping stations and associated rising mains for Garryvoe.
- Extensions of the existing collection system, replacement of existing sewers and new pumping stations and associated rising mains to be provided in Ballycotton
- Provision of stormwater trunk sewers in Ballycotton
- A new treatment plant to be constructed at Ballycotton to treat the combined flows from Shanagarry, Garryvoe and Ballycotton, with a marine outfall to Ballycotton Bay.

To cater for the high seasonal variation in load, the treatment plant was recommended to be at least two-stream, with a design capacity of 3,200 PE and a 25/35 treated effluent standard. Dilution/dispersion at the outfall was calculated to be such as to not require disinfection but retrofitting would be allowed for in the design of the plant.

The implementation of the proposals for the treatment plant and the sea outfall at Ballycotton are now incorporated into this Project.

The proposal to lay a treated effluent rising main from Castlemartyr to Balltycotton, passing through Shanagarry, has changed the economics which led to the proposed centralised treatment and disposal at Ballycotton. An economic analysis indicates (see Section 6.4) that local treatment at Ballycotton and Shanagarry/Garryvoe and pumping of the treated effluent from the latter to Ballycotton is now a more economic solution. This option needs to be considered in more detail to ensure that it is the best option on environmental and technical grounds.

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It is therefore proposed that the treatment plant at Ballycotton has a capacity of 1,200 PE, for expansion in the future. The future capacity of the plant will be dependent on the final adopted solution for Shanagarry and Garryvoe. An indicative layout for the plant is shown on Figure 10 in Appendix 7. The layout incorporates a UV channel which will cater for the discharge from Castlemartyr /Ladysbridge, Cloyne/Saleen as well as Shanagarry, Garryvoe and Ballycotton.

The proposal includes the installation of:

- Grit removal and screening
- A Storm Holding Tank
- An Inlet flow measurement chamber
- Extended aeration tanks 2 x 600PE
- A Clarifier (6m dia.)
- Sludge picket-fence thickener
- Final effluent flow measurement chamber
- A UV Channel (76 l/s)
- Control House
- Odour control units – 2 at different locations

The proposed new marine outfall for Ballycotton extends 330m into Ballycotton Bay. It was designed to cater for the combined effluent from Ballycotton, Shanagarry and Garryvoe with a peak/summer DWF of 6.6l/s (3,200 PE). Peak flow was taken as 3 DWF or 20l/s. Treated effluent from Cloyne and Castlemartyr will be combined with that from Ballycotton at the outlet from the treatment plant, for discharge through the outfall. The 350mm diameter pipeline is hydraulically adequate.

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The total flow now to be discharged through the proposed outfall at Ballycotton is 76 l/s (3 x DWF). The 350mm n.b. diameter pipeline is hydraulically adequate to take this flow.

An assessment of the dilution and dispersion study for the outfall was carried out. This indicates that the proposed outfall discharge point, c.300m offshore, is capable of handling the increased discharge and will maintain bathing water quality in the Bay and blue flag standard at Garryvoe. It is however recommended that the outfall be remodelled and a U.V. channel provided at the Treatment Plant to facilitate retrofitting of disinfection if required. Costs for both are included in the Estimate.

A UV channel at Ballycotton to treat the combined effluent for all seven centres is therefore recommended.

The recommended treated effluent standards for the Ballycotton plant are in accordance with the Urban Waste Water Treatment Regulations 2001. These are set out in the following table:

Table 9.1 Ballycotton Effluent Monitoring

	Unit	Concentration	Minimum percentage of reduction
BOD_5	mg/l O_2	25	70 – 90
COD	mg/l O_2	125	75
SS	mg/l	35	90

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9.2 Collection System

The location of the proposed treatment plant is on elevated ground to the west of the village. The effectiveness of the plant is thus totally contingent on the upgrading and remodelling of the existing collection system, including the construction of three pumping stations. This upgrading and remodelling, as proposed in the WYG Preliminary Report is shown in Figure 11, Appendix 7 and the cost thereof has been included in the Estimate.

In the Preliminary Report, it was proposed that three surface water sewers be laid in conjunction with the upgrading/remodelling of the existing collection system. They were specifically to service lands zoned for development in the Local Area Development Plan. Due to current economic circumstances, these have not been included in the Project and will only proceed when the need arises.

9.3 Statutory Processes

The following outlines the current status for the site regarding requirements / legislation:

- Land acquisition and wayleaves – in progress for the treatment plant site and 3 No. pump station sites.
- Part 8 planning is required for the 4 sites.
- Foreshore Licence - A foreshore licence application has been lodged for the outfall.
- A Waste Discharge Licence will be required for the outfall and the storm overflows from the pumping stations.

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10 COSTS

A detailed cost estimate for each centre is included as Appendix 9. The totals are as follows (inclusive of VAT):

Centre	€	€
Midleton		1,844,000
Castlemartyr		
(i) Treatment Plant	977,000	
(ii) Rising Main and Pumpstations	2,014,000	
Subtotal		2,991,000
Cloyne		
(i) Treatment Plant	1,055,000	
(ii) Rising Main and Pumpstation	2,088,000	
Subtotal		3,143,000
Saleen		
(i) Pump Station	329,000	
(ii) Rising Main	657,000	
(iii) Collection System	258,000	
Subtotal		1,244,000
Ballycotton		
(i) Treatment Plant	1,387,000	
(ii) Outfall	1,928,000	
(iii) Collection System	1,072,000	
Subtotal		4,387,000
		€13,609,000

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The estimates include a 10% contingency.

The estimate for Saleen includes for the laying of the proposed new trunk sewer connecting the existing village foul sewer network to the treatment plant site and minor modifications to the collection system.

An estimate of the non-contract costs is also shown in Appendix 9. They amount to €1,720,000, covering land acquisition, design fees, construction supervision etc, and remodelling of the Ballycotton outfall to cater for the increase in discharge from Cloyne and Castlemartyr.

A separate sum (€100,000) is shown for the commissioning of an EIS for the continued expansion of Midleton Treatment Plant.

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In summary, the total project costs (inclusive of VAT) are shown below:

Item	€
Contract Costs	13,609,000
Non-Contract Costs Total	1,720,000
Midleton EIS	100,000
Total Project Costs	15,429,000

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11 CONTRACT STRATEGY

The treatment plants at Midleton, Castlemartyr and Cloyne are currently being operated and maintained by EPS under a 10 year contract, of which there is approximately 8 ½ years to run. There are therefore a number of options for the procurement, as a bundle, of the upgrades of these plants and the construction, maintenance and operation of the new plants at Saleen and Ballycotton. The procurement of the necessary associated upgrading of the collection systems in Saleen and Ballycotton are also a consideration. The various options have been reviewed in the Public Private Partnership Assessment Report and procurement through two contracts using DB/DBO for Contract 1 and Public Works Designed by the Employer for Contract 2 has been recommended.

12 SUMMARY

The original project covered four urban centres – Midleton, Castlemartyr, Cloyne and Saleen. Subsequently Ballycotton was included. All have experienced significant growth since the census year 1996 (average 5.1% p.a.) and particularly so in the latest census period 2002 – 2006 (average 6.8% p.a.). To cater for this recent rapid development and projected future requirements, the following upgrades of the wastewater treatment facilities are proposed:

12.1 Midleton

For the 2006 Census the population of Midleton is shown as 10,048. This is projected to rise to between 19,600 (low/medium growth) and 25,000 (high growth) by the year 2028. This order of development can be catered for within the zoning of the current Midleton Special Local Area Plan.

The existing treatment plant at Midleton has an indicated design capacity of 10,000 PE and is currently operating at an average daily throughput of c.11,500 PE (BOD). To cater for a design PE of 27,000 (including commercial, industrial and community contributions) for the year 2028, the following phased upgrading of the existing plant is proposed:

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Phase 1
Provision of:

- A third 5,000 PE EAS tank similar to the existing (40m x 12m)
- A clarifier (19m diameter)
- A picket fence thickener (120m^3)
- A second centrifuge (10m^3/hr)

Phase 2
Development of an EIS and planning documents for the continued expansion of the works up to a long term design capacity of 30,000 PE.

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12.2 Castlemartyr

The population of Castlemartyr for the 2006 Census is shown as 978. This is projected to rise to between 1,900 and 2,500 by the year 2028. This order of development can be catered for within the zoning of the current Local Area Plan for the village.

The existing treatment plant at Castlemartyr has an indicated design capacity of 2,000PE but last year had an anomalous average throughput of 2,600 PE (BOD). The projected long term (year 2028) requirement at Castlemartyr is for 3,000 PE. The Kiltha River, to which the plant effluent is discharged, is deemed to provide inadequate dilution and to have inadequate assimilative capacity to accommodate this discharge, even if high treatment standards are applied. It is therefore proposed to increase the existing plant capacity to 3,000 PE, and pump the treated effluent to the proposed sea outfall at Ballycotton for discharge.

The upgrade works proposed would include:

- Upgrading the plant at Castlemartyr to 3,000 PE capacity;
- Construction of a pump station and associated 8.6km rising main from Castlemartyr, via Ladysbridge to Monagurra; where it would join with the proposed Cloyne to Ballycotton treated effluent rising main.

12.3 Cloyne

The 2006 Census population for Cloyne was 1,095. This is projected to rise to between 2,150 and 2,700 by the year 2028, producing a design PE of 3,000, including commercial, industrial and community contributions. This projected level of development could be accommodated within the zoning contained in the current Cloyne Local Area Plan.

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The existing treatment plant has an indicated capacity of 1,400 PE but the units are considered to equate more to a 2,000 PE plant. To cater for the projected longer term development and the additional raw effluent to be pumped from Saleen for treatment at Cloyne, it is proposed that the existing plant is duplicated by the provision of:

- Upgrading / duplicating the inlet works (screens and pumps)
- A second 11m diameter aeration tank
- A second 9m diameter clarifier
- A second 60m^3 Sludge Thickening/Holding Tank

Disposal of the effluent from the plant is problematic with no significant watercourse in the area. It is therefore proposed to provide a pumpstation and a 9.6km long, 200mm diameter rising main to pump the effluent to the proposed sea outfall at Ballycotton.

12.4 Saleen

Existing treatment at Saleen is a totally inadequate septic tank which discharges to the adjacent “Saleen Stream”. It is proposed that the untreated wastewater from Saleen be pumped to Cloyne for treatment.

Proposed works include construction of:

- A sewage pumping station (6KW) with duty/standby non-clogging submersible pumps;
- A Control House to house pump controls and an emergency generator (10kW);
- A 4.05 km100mm diameter rising main to Cloyne;
- A header chamber with odour control at Cloyne WWTP.

It is also proposed to lay a new trunk sewer (0.5 km x 225mm diameter) connecting the existing collection network in the village to the pump station and to carry out minor modification of the existing collection system to facilitate this.

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12.5 Ballycotton

There is currently a septic tank in Ballycotton for wastewater treatment. In the WYG Preliminary Report, dated July 2006, a 3,200 PE treatment plant was proposed for Ballycotton, to serve the coastal area of Shanagarry, Garryvoe and Ballycotton. Effluent disposal through a marine outfall to Ballycotton Bay was part of the proposal, as was upgrading of the collection systems at each centre.

It is proposed that the treatment plant at Ballycotton will cater for an initial design capacity of 1,200 PE, with room for expansion to 3,200 PE. The ultimate capacity of the WWTP will be dependent on the final solution adopted for Shanagarry and Garryvoe.

The proposed works thus cover:

- The construction of a 1,200 PE treatment plant;
- Construction of a new marine outfall;
- Provision of a UV disinfection channel with capacity for the regional discharge through the outfall;
- Upgrading and extension of the collection system including three pumping stations.

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Appendix 1

Development Plans

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Table A1.1 **LAP Development Potential – Castlemartyr**

Residential	Ha.	No. of Units		PE [1]
Medium Density [2]	11.9	240		700
Low Density [3]	17.2	170		500
				1,200
Current (2006 Census)				978
Total				2,178
Projected (2028)			High	2,500
			Low	1,900

Table A1.2 **LAP Development Potential – Cloyne**

Residential	Ha.	No. of Units		PE[1]
Medium Density[2]	23.1	460		1,350
Low Density[3]	14.1	140		400
				1,750
Current (2006 Census)				1,095
Total				2,845
Projected (2028)			High	2,780
			Low	2,150

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Table A1.3 **LAP Development Potential – Saleen**

Residential	Ha.	No. of Units		PE[1]
Medium Density[2]	10.4	210		600
Low Density[3]	2.6	25		75
				675
Current (PR)				351
Total				1,026
Projected (2028)			High	890
			Low	690

[1] CSO: c. 3 persons / dwelling
[2] Midleton Electoral LAP: MD = 12-25/ha – Allow 20
[3] Midleton Electoral LAP: LD = 5-12/ha – Allow 10

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Appendix 2

Midleton Special Local Area Plan

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Table A2.1 Midleton Special Local Area Plan – Development Potential

Residential	Ha.	No. of Units	PE (1)
High Density (2)	3.5	175	500
Medium Density (3)	83.9	2,500	7,000
Low Density (4)	11.5	120	350
			7,850
Special Zoning (X03 – X08)	34.9	Mixed Development	1,200
			9,050
Current (2006 Census)			10,050
			19,100
Projections (2028)		High	25,000
		Low	19,600

(1) CSO: c. 3 persons / dwelling
(2) Midleton Electoral LAP: HD = >50/ha – Allow 50
(3) Midleton Electoral LAP: MD = 20-50/ha – Allow 30
(4) Midleton Electoral LAP: LD = 8-12/ha – Allow 10

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Appendix 3

Existing WWTPs: Current Performance

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Midleton

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Castlemartyr

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Cloyne

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Appendix 4

Water Quality: Kiltha River

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Table A4.1 Water Quality - Castlemartyr Bridge (Stn. 1000)

Parameter	Unit	1998 – 2000	2002 – 2005	Limit (1)
pH	-	8.0	-	-
BOD	mg/l	1.3	-	3.0
COD	mg/l	-	-	-
SS	mg/l	-	-	25
Nitrate	mg/l N		6.2	5.6
Nitrite	mg/l N	6.5	0.014	0.5
Orthophosphate	mg/l P	0.2	0.135	0.03
Ammonia	mg/l NH_3	0.001	-	0.02
Ammonium	Mg/l NH_4	0.076	0.046	0.3

(1) Source: Cork County Council Guideline Water Quality Limit Values.

Table A4.2 Potential Treated Effluent Standard (for upgraded existing plant)

PE	2,000
Av. Flow	360m^3/d
BODs	10mg/l
SS	10mg/l
Ammonium	4mg/l NH_4
Orthophosphate	0.5mg/l P
Total Nitrogen	15mg/l N (1)

(1) Predominately Nitrate

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Table A4.3 Projected Water Quality – Upgraded 2000 PE Plant

	Unit	Current	Post Discharge.	Limit
Flow	l/s	36	40	-
pH	-	8.0	8.0	-
BOD_5	mg/l	1.3	2.2	3
SS	mg/l	-	-	25
Ammonium	mg/l NH_4	0.06	0.45	0.3
Orthophosphate	mg/l P	0.16	0.29	0.03
Nitrate	mg/l N	6.2	6.8	5.6

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Appendix 5

RPS Recommended WWTP Effluent Standards for the Proposed Plant at Saleen

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Wastewater Treatment Plant Effluent Standards

The discharge standards recommended in the RPS Preliminary Report for the Saleen Sewerage Scheme are:

Biochemical Oxygen Demand (BOD)	10	mg/l (max)
Suspended Solids (SS)	35	mg/l (max)
Total Nitrogen	15	mg/l N (max)
Total Phosphorous	1	mg/l P (max)
Faecal Coliforms	2×10^6	No./100ml (mean) i.e. 95% reduction

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Appendix 6

Costs and Cost Comparisons
Potential Treated Effluent Disposal: SE Cork.

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1.0 Capital Costs

Table A6.1 Capital Costs for the Pumped Outfall: Saleen to Cloyne

	€
PS including pumps (6KW), standby generator (10KW) and 16 hr emergency storage	223,000
Rising Main 4.05km x 100 diameter	445,000
Odour Control at Cloyne	40,000
Subtotal	708,000
Preliminaries (20%)	141,600
Contingency (10%)	70,800
Subtotal	920,400
VAT @ 13.5%	124,254
Total	1,044,654
Say	**€1,045,000**

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2.0 Pumping Costs

Saleen – Cloyne

Saleen = 1000 PE
Q = 6.3 l/s (3DWF)

Static Head	≈ 18m
Friction Head	≈ 41m (4.05km x 100mm diameter pipe)
Total Head	= 59m
Power Requirement	= 6.1 KW (η = 60%)
Power Consumption	= 6.1 x 8
	= 48.8 KWh/day, allow 49 KWhrs (for 1,000 PE)
Current (500 PE)	= 0.5 x 4.8
	= 24.4 KWh/d
Allow average	= 36.6 KWh/d over 20 years

Cost	€
Standing charge (per day)	0.41
Unit Price: 36.6 x €0.161	5.89
Daily Charge (nett)	**6.30**
Annual Cost (incl. VAT)	2,611
Say	**€2,600**

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Pumping Costs -continued

Cloyne – Ballycotton

Rising Main: 9600m x 200mm diameter

	Cloyne CURRENT	Cloyne FUTURE	Cloyne + Saleen CURRENT	Cloyne + Saleen FUTURE
PE	1,800	2,700	2,300	3,700
Qp (3DWF) (l/s)		16.9		23.2
Hf (m)		18.5		33.8
Hs (m)		20.0		20.0
Hp (m)		38.5		53.8
P (n = 65%) (KW)		9.8		18.8
Daily Power Requirement (KWh)	52	78.4	93.5	150.4
Annual Pumping Cost (including VAT)	€3,650	€5,400	€6,400	€10,200
Average Annual Pump Cost (incl. VAT)	€4,525		€8,300	
Differential	€3,775			

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Table A6.2 Summary of Pumping Costs

Estimated Average Annual Pumping Costs (including VAT)	€
(i) Saleen - Cloyne	2,600
(ii) Cloyne - Ballycotton (additional cost)	3,775
Total Annual Pumping Costs	6,375

Capitalised @ 5% over 20 years, the Nett Present Value equals €80,000.

3.0 Cost Comparison

Table A6.3 Cost Comparison: Treatment at Cloyne Vs Saleen

	€
Pump Station at Saleen and Rising Main	1,045,000
Additional 1000 PE Capacity at Cloyne	100,000
Subtotal	1,145,000
Capitalised Pumping Costs	80,000
Subtotal	1,225,000
less WWTP at Saleen	1,286,000
Indicative Cost Saving	**€61,000**

A cost saving of approximately 5%.

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Appendix 7

Figures

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Appendix 8

Outline Designs

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Midleton

Existing

Inlet Works: 15,000 PE; 6 DWF (190 l/s)

Secondary Treatment: 2 x 5000 PE four stage streams (2no. 12mx40m); extended aeration
Two clarifiers

Disinfection (UV): nom.20,000 PE (133 l/s) – duty and assist

Sludge:
Sludge Holding tank for reception of external sludge.
Picket Fence Thickener – Storage 50 m³ ~ 1 days storage @ 1% DS prethickening
(Note – currently wasted sludge @ 0.5 – 0.6% DS)

Centrifuge: 4 – 6 m³ @ 2 – 2.5% DS producing 5 – 6 tonne/day dewatered sludge @ 15 – 18% DS

Proposed Upgrade

Inlet Works: - Splitter Chamber

Secondary Treatment: 1 x 5000 PE four stage Aeration unit similar to the existing units (12m x 40m)
1 no. 19m dia Clarifier

Sludge Holding Tank for 20,000 PE:
Excess Sludge Production

Excess Sludge Production	= 0.85 kg DS / kg BOD removed
BOD in	= 1,200 kg/d
BOD out (3600 m^3/d @ 5ppm)	= 18 kg/d
BOD removed	= 1,182 kg/d
Excess Sludge	= 1182 x 0.85
	= 1004 kg/d DS
Sludge Volume	= 100 m^3/d pre-thickening @ 1% DS
	= 50 m^3/d post-thickening @ 2% DS

Therefore with a 3600 m^3/d throughput, a New PFT – 120m³ ~ 2 days storage for 20,000 PE @1% DS prethickening & 2% post.

Centrifuge: New 10m³ capacity unit

Dewatered sludge handling to be reviewed.

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Castlemartyr

Existing

1) Inlet Works
Design PE = 2,000
DWF = 360 m^3/d = 15m^3/hr

2) Aeration Tank
Tank dimensions: Diameter = 12m; Area = 113 m^2; h_w = 2.5m
Tank Volume ≈ 280 m^3
Detention time = 18.6 hours

BOD loading = 2000 x 60mg
= 120 kg/d

Organic loading = 120/280
= 0.43 kg BOD/m^3.d (recommended organic loading range is 0.3 – 0.6).

Allow MLVSS = 2,000 mg/l
FM Ratio (F) = 120 x 10^3 / 280 x 10^3 x 2
= 0.21 /d (recommended F range is 0.2 – 0.5)

3) Clarifier
Clarifier dimensions: Diameter = 9m; Area = 64 m^2; h_w = 1.8m.
Clarifier Volume = 115 m^3
Detention time = 7.6 hours

Surface loading = 5.6 m/d @ 1 DWF
= 16.8 m/d @ 3 DWF (recommended maximum 30-40 m/d)

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4) Sludge Holding Tank
Sludge holding tank dimensions: Diameter = 5.5m; Area = 23.7m^2; h_s = 3m
Sludge holding tank Volume = 71 m^3

Excess Sludge Production	= 0.85 kg DS / kg BOD removed
BOD in	= 120 kg/d
BOD out (360 m^3/d @ 5ppm)	= 1.8 kg/d
BOD removed	≈ 118 kg/d
Excess Sludge	= 118 x 0.85
	= 100 kg/d DS
Sludge Volume	= 10 m^3/d pre-thickening @ 1% DS
	= 4.0 m^3/d post-thickening @ 2.5% DS

Currently c. 10 days storage for 2000 PE / 360 m^3/d throughput

Proposed Upgrade

Design PE = 3000

- Upgrading / duplicating the inlet works (screens and pumps)
- Additional 9m diameter Aeration tank
- Additional 7m diameter Clarifier
- A second 60m^3 (6m diameter) Sludge Thickening/Holding Tank
- Storm Water Holding/Balancing Tank (80m^3)
- Treated effluent pumping stations
- Odour Control Unit

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Cloyne

Existing

1) Inlet Works
Design PE = 1,400
DWF = 252 m^3/d
= 10.5 m^3/hr

2) Aeration Tank
Aeration Tank dimensions: Diameter = 11m; Area = 95 m^2; h_w = 2.5m
Aeration tank Volume = 237.5 m^3
Detention time = 22.6 hours

BOD loading = 1400 x 60mg
= 84 kg/d

Organic loading = 84/237.5
= 0.35 kg BOD/m^3.d (recommended organic loading range is 0.3 – 0.6).

Allow MLVSS = 2,000 mg/l
FM Ratio (F) = 84 x 10^3 / 237.5 x 10^3 x 2
= 0.18 /d (recommended F range is 0.2 – 0.5)

3) Clarifier
Clarifier dimensions: Diameter = 9m; Area = 64 m^2; h_w = 1.8m.
Clarifier Volume = 115 m^3
Detention time = 11 hours

Surface loading = 3.9 m/d @ 1 DWF
= 11.8 m/d @ 3 DWF (recommended maximum 30-40 m/d)

4) Sludge Holding Tank
Sludge holding tank dimensions: Diameter = 5m; Area = 19.6m^2; h_s = 3m
Sludge holding tank Volume = 59 m^3

Excess Sludge Production = 0.85 kg DS / kg BOD removed
BOD in = 84 kg/d
BOD out = 0.6 kg/d
BOD removed ≈ 83.4 kg/d
Excess Sludge = 83.4 x 0.85
= 71 kg/d DS
Sludge Volume = 7.1 m^3/d pre-thickening @ 1% DS
= 2.8 m^3/d post-thickening @ 2.4% DS
Currently c. 12 days storage for 1400 PE / 252 m^3/d throughput

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Proposed Upgrade

Design PE = 4000

Duplicate the existing plant.
- Upgrading / duplicating the inlet works (screens and pumps)
- A second 11m diameter aeration tank
- A second 9m diameter clarifier
- A second 60m^3 Sludge Thickening/Holding Tank
- Treated effluent pumping station

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Saleen

Existing
Septic Tank

Proposed
Pump untreated wastewater from Saleen sewerage system to Cloyne for treatment.

Proposed works include:

- 6.3l/s (6kW) pumping station;
- Duty / standby non-clogging submersible pumps;
- Emergency generator (10kW);
- Control House;
- 4.05 km of 100mm diameter rising main;
- Header chamber with odour control at Cloyne WWTP.

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Ballycotton

Existing

Septic Tank

Proposed

Extended Aeration – Design PE = 3,200 – phased.

Phase 1 - 1200 PE

- Grit removal and screening
- Storm Holding Tank
- Inlet flow measurement chamber
- Extended aeration tank 2 x 600PE
- Clarifier
- Sludge picket-fence thickener
- Final effluent flow measurement chamber
- UV channel (for combined effluent from Cloyne, Castlemartyr and Ballycotton)
- Control House
- Odour control units – 2 at different locations

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Appendix 9

Cost Estimates

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Midleton Contract Cost Estimate

WWTP

		€	€
Civil Works			
(i)	Aeration Basin (12m x 40m)	300,000	
(ii)	Clarifier (19m diameter)	200,000	
(iii)	PFT (120m^3)	35,000	
(iv)	Pipe & Duct Work	35,000	
(v)	Sumps & Chambers	30,000	
(vi)	Modifications to Dewatered Sludge Handling (provisional)	50,000	
	Civil Works Subtotal		650,000
Mechanical and Electrical			
(i)	Aeration Basin	150,000	
(ii)	Clarifier	100,000	
(iii)	PFT	75,000	
(iv)	Pumps	30,000	
(v)	Control Equipment, Cabling etc	50,000	
(vi)	Centrifuge (10m^3/h)	135,000	
(vii)	Modifications to Sludge Handling (provisional)	60,000	
	M&E Subtotal		600,000
Subtotal			1,250,000
Preliminaries (20%)			250,000
Contingency (10%)			125,000
Subtotal			1,625,000
VAT @ 13.5%			219,375
Overall total including VAT			**€1,844,375**
		Say	**€1,844,000**

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Castlemartyr Contract Cost Estimate

WWTP

Civil Works		€	€
(i)	Splitter and Inlet Chamber	10,000	
(ii)	Storm Water Storage	15,000	
(iii)	Aeration Tank (9m Φ)	60,000	
(iv)	Clarifier (7m Φ)	50,000	
(v)	Sludge Holding Tank (6m Φ)	40,000	
(vi)	Splitter Chamber	12,000	
(vii)	Sampling / Flow monitoring	15,000	
(viii)	Landscaping	20,000	
(ix)	Fencing and Entrance Gate	35,000	
(x)	Site Roads	40,000	
(xi)	Pipework, ducting etc	20,000	
(xii)	Control House	60,000	
	Civil Works Subtotal		377,000
Mechanical and Electrical			
(i)	Inlet Screen	35,000	
(ii)	Aeration Tank	70,000	
(iii)	Clarifier	50,000	
(iv)	Sludge Holding Tank	50,000	
(v)	Sampling / Flow monitoring	20,000	
(vi)	Control Equipment, cabling etc	30,000	
(vii)	Upgrading Odour Control Unit	30,000	
	M&E Subtotal		285,000
WWTP Subtotal			662,000
Preliminaries (20%)			132,400
Contingency / Design Development (10%)			66,200
Subtotal			860,600
VAT @ 13.5%			116,181
Total including VAT			**€976,781**
		Say	**€977,000**

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Pumpstations

		€	€
(i)	Pumpstation - Castlemartyr	75,000	
(ii)	Pumpstation - Ladysbridge	100,000	
Subtotal			175,000
Preliminaries (20%)			35,000
Contingency (10%)			17,500
Subtotal			227,500
VAT @ 13.5%			30,713
Total including VAT			**€258,213**
		Say	**€258,000**

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Rising Mains Castlemartyr - Monagurra	€	€
(i) Rising Main - Castlemartyr to Ladysbridge (1.35 km x 150 Φ)	175,000	
(ii) Rising Main - Ladysbridge to Monagurra (7.25 km x 200 Φ)	1,015,000	
Subtotal		1,190,000
Preliminaries (20%)		238,000
Contingency (10%)		119,000
Subtotal		1,547,000
VAT @ 13.5%		208,845
Total including VAT		**€1,755,845**
	Say	**€1,756,000**

Overall total including VAT **€2,991,000**

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Cloyne Contract Cost Estimate

WWTP

		€	€
Civil Works			
(i)	Splitter Chamber	20,000	
(ii)	Inlet Works	30,000	
(iii)	Aeration Tank (11m Φ)	80,000	
(iv)	Clarifier (9m Φ)	75,000	
(v)	Sludge Holding	50,000	
(vi)	Pipe and Duct Work	30,000	
(vii)	Extension of Control Building	30,000	
(Viii)	Sumps and Chambers	15,000	
	Civil Subtotal		330,000
Mechanical and Electrical			
(i)	Inlet Works	70,000	
(ii)	Aeration Tank	100,000	
(iii)	Clarifier	70,000	
(iv)	Sludge Handling	70,000	
(v)	Control Equipment, Cabling etc.	35,000	
(vii)	Odour Control	40,000	
	M&E Subtotal		385,000
Subtotal			715,000
Preliminaries (20%)			143,000
Contingency (10%)			71,500
Subtotal			929,500
VAT @ 13.5%			125,483
Total including VAT			**€1,054,983**
		Say	**€1,055,000**

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Pumpstation

		€	€
(i)	Pump Sump	30,000	
(ii)	Pumping Plant (2 x 12kw)	40,000	
Subtotal			70,000
Preliminaries (20%)			14,000
Contingency (10%)			7,000
Subtotal			91,000
VAT @ 13.5%			12,285
Total including VAT			**€103,285**
		Say	**€103,000**

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Rising Main - Cloyne to Ballycotton		€
(i)	Rising Main (9.6km x 200mm Φ)	1,345,000
Preliminaries (20%)		269,000
Contingency (10%)		134,500
Subtotal		1,748,500
VAT @ 13.5%		236,048
Total including VAT		**€1,984,548**
	Say	**€1,985,000**

Overall total including VAT **€3,143,000**

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Saleen Contract Cost Estimate

Pumpstation	€	€
Pump Sump including 16 hours storage	60,000	
Pumps 2 x 6 KW	45,000	
Standby Generator (10 KW)	30,000	
Kiosk	20,000	
Access Road	25,000	
Internal Roadway	10,000	
Fencing Site (post and rail)	15,000	
Fencing Pumpstation (palisade)	10,000	
Entry Gates	3,000	
Landscaping / Screening	5,000	
Subtotal		223,000
Preliminaries (20%)		44,600
Contingency (10%)		22,300
Subtotal		289,900
VAT @ 13.5%		39,137
Total including VAT		**€329,037**
	Say	**€329,000**

Rising Main - Saleen to Cloyne		€
Rising Main 4.05km x 100mmΦ		445,000
Preliminaries (20%)		89,000
Contingency (10%)		44,500
Subtotal		578,500
VAT @ 13.5%		78,098
Total including VAT		**€656,598**
	Say	**€657,000**

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Collection System	€	€
Trunk Sewer from Village (510m x 225mmΦ)	160,000	
Modifications to Collection System (80m x 225mmΦ)	15,000	
Subtotal		175,000
Preliminaries (20%)		35,000
Contingency (10%)		17,500
Subtotal		227,500
VAT @ 13.5%		30,713
Total including VAT		**€258,213**
	Say	**€258,000**

Overall total including VAT **€1,244,000**

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Ballycotton Contract Cost Estimate

WWTP	€	€
Civil Works		
Site Clearence and Earthworks	100,000	
Inlet Works	20,000	
Intlet Flow Measurement / Sampling	10,000	
Stormwater Tank	25,000	
Distribution chambers	15,000	
Aeration Tank	75,000	
Clarifier	50,000	
Sludge holding and Thickening (PFT)	40,000	
Outlet Flow Measurement / Sampling	10,000	
Control Building	80,000	
Site Services (pipework, ducts, etc)	20,000	
Access road	15,000	
Internal roadway	20,000	
Fencing site (palisade)	40,000	
Fencing access road (post and rail)	5,000	
Entry gates	5,000	
Landscaping	20,000	
3 phase power supply	15,000	
UV channel	10,000	
Civil Subtotal		575,000
Mechanical and Electrical		
Inlet Works	35,000	
Secondary Treatment	120,000	
Sludge Treatment and Handling Plant	60,000	
Odour Control	50,000	
Control equipment, cabling, etc	50,000	
SCADA / Telemetry	20,000	
Flow measurement & sampling	30,000	
M&E Subtotal		365,000
WWTP Subtotal		940,000
Preliminaries (20%)		188,000
Contingency (10%)		94,000
Subtotal		1,222,000
VAT @ 13.5%		164,970
Total		€1,386,970
	Say	**€1,387,000**

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Outfall	€	€
Outfall pipe -land (1290m)	387,000	
Outfall pipe - marine (360m)	720,000	
Extension to Outfall / UV channel (provisional)	200,000	
Subtotal		1,307,000
Preliminaries (20%)		261,400
Contingency (10%)		130,700
Subtotal		1,699,100
VAT @ 13.5%		229,379
Total		€1,928,479
	Say	**€1,928,000**

Collection System	€	€
F5.01 - F71		
180m x 225mmΦ @ €185	33,300	
3 No. MHs @ €1500	4,500	
Connection to existing	500	
		38,300
F4.01 - PS No. 3		
235m x 300mmΦ @ €200	47,000	
3 No. MHs @ €1500	4,500	
		51,500
F3.07 - F3.10		
150m x 375mmΦ @ €215	32,250	
4 No. MHs @ €2000	8,000	
		40,250
F60 - F3.07		
300m x 225mmΦ @ €185	55,500	
8 No. MHs @ €1500	12,000	
Connection to existing	1,000	
		68,500
F2.01 - F50		
285m x 225mmΦ @ €185	52,725	
5 No. MHs @ €1500	7,500	
Connection to existing	500	
		60,725

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F17 - F24		
100m x 225mmΦ @ €185	18,500	
2 No. MHs @ €1500	3,000	
Connection to existing	1,000	
		22,500
Cow Slip		
50m x 150mmΦ @ €150	7,500	
2 No. MHs @ €1500	3,000	
		10,500
PS1		
Pump Station (including pumps, inlet and overflow)	100,000	
Retaining Wall	30,000	
Rising Main (365m x 100mmΦ)	40,000	
		170,000
PS2		
Pump Station (including pumps and overflow)	20,000	
Rising Main (85m x 50mmΦ)	7,000	
		27,000
PS3		
Pump Station (including pumps and overflow)	100,000	
Rising Main (1100m x 50mmΦ)	137,500	
		237,500
Subtotal		726,775
Preliminaries (20%)		145,355
Contingency (10%)		72,678
Subtotal		944,808
VAT @ 13.5%		127,549
Total		€1,072,357
	Say	**€1,072,000**
Overall total including VAT		**€4,387,000**

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Non-Contract Costs

All costs inclusive of VAT

Item	€
Topographical Surveys	10,000
Site Investigations	200,000
Archaeology	100,000
Publicity, advertisements and notices	20,000
Legal Costs	30,000
Land Acquisition	
(i) Castlemartyr	40,000
(ii) Saleen	40,000
(iii) Ballycotton	250,000
Wayleaves	
(i) Saleen	5,000
Foreshore Licence - Ballycotton	25,000
Design Fees and Expenses	700,000
Site Supervision	300,000
Total Non-Contract Costs	**€1,720,000**

* Includes for remodelling of Ballycotton outfall (€ 35,000)

Note - Midleton EIS is not included. Estimated cost €100,000

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N

REED BED NO. 2

REED BED NO. 1

DRAIN

STORMWATER OVERFLOW

PROPOSED CLARIFIER

PROPOSED SLUDGE HOLDING TANK

PROPOSED AERATION TANK

PROPOSED SCREENING PUMP SUMP

EFFLUENT PUMP STATION

EXISTING SLUDGE HOLDING TANK

CLARIFIER

AERATION TANK

PROPOSED SPLITTER CHAMBER

RISING MAIN

CONTROL BUILDING

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PLAN - SCALE 1:500

Proposed Upgrade of Cloyne WWTP

Figure 5.5

Job. No.:	Date:
C006196	19.03.08
Drawn By:	Scale:
GW	1:500

White Youn Greer

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TOWN PARKS
(ED CLOYNE)
Na Burgaistý
(T Cluain)

SPITAL
Gort An SpidÚil

CASTLEMARY
Carraig an Chotaigh

COMMONS WEST
An CoimÝn Thiar

COMMONS EAST
An CoimÝn Thoir

MALAPARDAS
R-10

MONEARANISKA
M¾inÚar an Uisce

R-01
R-02
R-03
R-04
R-05
R-06
R-07
R-08
R-09
R-10
R-11
U-01
U-02
U-03
U-04
U-05
E-01
T-01
T-02
C-01
I-01
I-02
O-01
O-02

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0 250 500
metres

Cork County Council
Local Area Plans

Midleton Electoral Area Local Area Plan

Issue 1
- September 2005

Settlement Map 5
Cloyne

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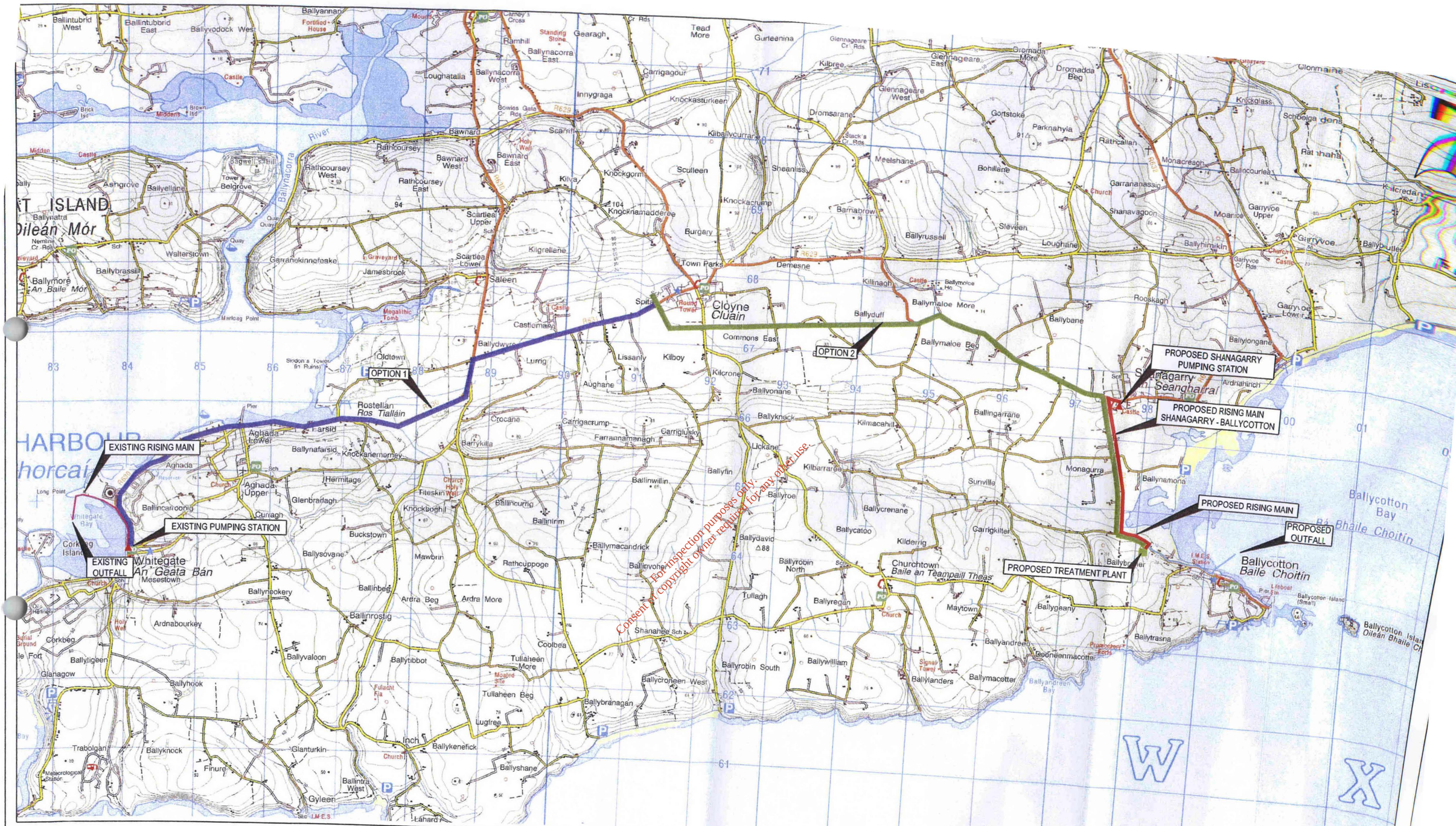

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Cloyne - Outfall Options

Figure 5.2

Job. No.:	Date:
C006196	19.03.08
Drawn By:	Scale:
GW	1:50,000

White Young Green

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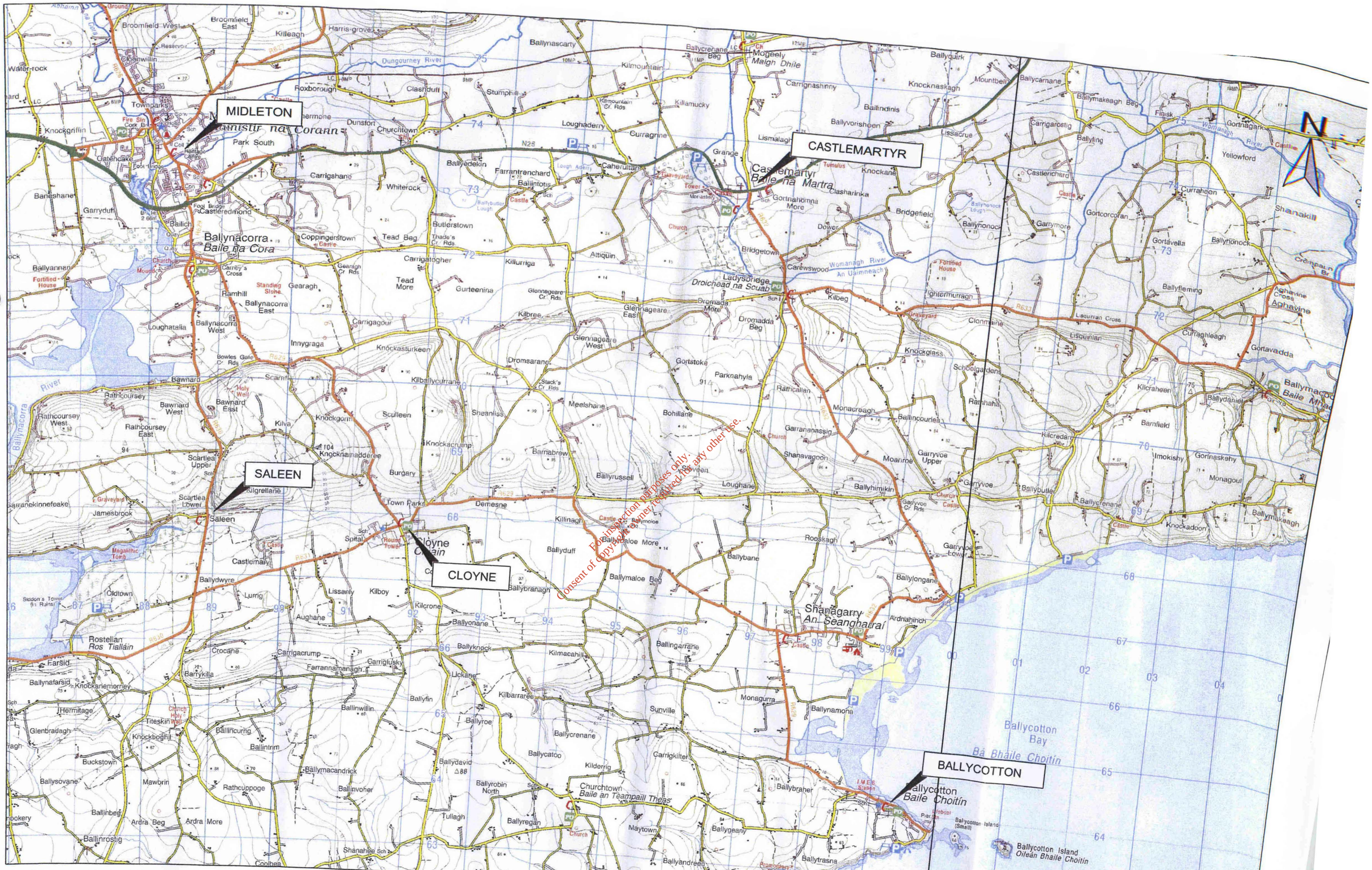

LOCATION PLAN - SCALE 1:50,000

Site Location Map

Figure 5.1

Job No.:	Date:
C006196	19.03.08
Drawn By:	Scale:
GW	1:50,000

White Young Green

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Agglomeration details

Leading Local Authority	Cork County Council
Co-Applicants	
Agglomeration	Cloyne
Population Equivalent	1800
Level of Treatment	Secondary
Treatment plant address	Cloyne WWTP
Grid Ref (12 digits, 6E, 6N)	191154 / 067799
EPA Reference No:	

Contact details

Contact Name:	Patricia Power
Contact Address:	Water Services South, Cork County Council, County Hall, Carrigrohane Road, Co. Cork
Contact Number:	021 4285285
Contact Fax:	0214276321
Contact Email:	patricia.power@corkcoco.ie

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

Discharge Point Code: SW-1

Local Authority Ref No:	SW01CLYN	
Source of Emission:	Primary Discharge	
Location:	Spital, Cloyne	
Grid Ref (12 digits, 6E, 6N)	191060 / 097821	
Name of Receiving waters:	Spital Stream	
Water Body:	River Water Body	
River Basin District	South Western RBD	
Designation of Receiving Waters:	None	
Flow Rate in Receiving Waters:	0.002	$m^3.sec^{-1}$ Dry Weather Flow
	0.004	$m^3.sec^{-1}$ 95% Weather Flow
Additional Comments (e.g. commentary on zero flow or other information deemed of value)		

Emission Details:

(i) Volume emitted			
Normal/day	315 m^3	Maximum/day	945 m^3
Maximum rate/hour	54 m^3	Period of emission (avg)	60 min/hr 24 hr/day 365 day/yr
Dry Weather Flow	0.004 m^3/sec		

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Table D.1(i)(b): EMISSIONS TO SURFACE/GROUND WATERS - Characteristics of The Emission (Primary Discharge Point)

Discharge Point Code: SW-1

Substance	As discharged			
	Unit of Measurement	Sampling Method	Max Daily Avg.	kg/day
pH	pH	24 hr composite	= 9	
Temperature	°C	24 hr flow proportional	= 25	
Electrical Conductivity (@ 25°C)	µS/cm	24 hr composite	= 1000	
Suspended Solids	mg/l	24 hr composite	= 35	33.08
Ammonia (as N)	mg/l	24 hr composite	= 0	0
Biochemical Oxygen Demand	mg/l	24 hr composite	= 25	23.63
Chemical Oxygen Demand	mg/l	24 hr composite	= 125	118.125
Total Nitrogen (as N)	mg/l	24 hr flow proportional	= 35	33.075
Nitrite (as N)	mg/l	24 hr composite	= 0	0
Nitrate (as N)	mg/l	24 hr composite	= 0	0
Total Phosphorous (as P)	mg/l	24 hr composite	= 8	7.56
OrthoPhosphate (as P)	mg/l	24 hr composite	= 6	5.67
Sulphate (SO_4)	mg/l	24 hr composite	= 0	0
Phenols (Sum)	µg/l	24 hr composite	= 0	0

For Orthophosphate: this monitoring should be undertaken on a sample filtered on 0.45µm filter paper
For Phenols: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

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Table D.1(i)(c): DANGEROUS SUBSTANCE EMISSIONS TO SURFACE/GROUND WATERS - Characteristics of The Emission (Primary Discharge Point)

Discharge Point Code: SW-1

Substance	As discharged			
	Unit of Measurement	Sampling Method	Max Daily Avg.	kg/day
Atrazine	µg/l	24 hr composite	= 0	0
Dichloromethane	µg/l	24 hr composite	= 0	0
Simazine	µg/l	24 hr composite	= 0	0
Toluene	µg/l	24 hr composite	= 0	0
Tributyltin	µg/l	24 hr composite	= 0	0
Xylenes	µg/l	24 hr composite	= 0	0
Arsenic	µg/l	24 hr composite	= 0	0
Chromium	µg/l	24 hr composite	= 0	0
Copper	µg/l	24 hr composite	= 0	0
Cyanide	µg/l	24 hr composite	= 0	0
Flouride	µg/l	24 hr composite	= 0	0
Lead	µg/l	24 hr composite	= 0	0
Nickel	µg/l	24 hr composite	= 0	0
Zinc	µg/l	24 hr composite	= 0	0
Boron	µg/l	24 hr composite	= 0	0
Cadmium	µg/l	24 hr composite	= 0	0
Mercury	µg/l	24 hr composite	= 0	0
Selenium	µg/l	24 hr composite	= 0	0
Barium	µg/l	24 hr composite	= 0	0

For Orthophosphate: this monitoring should be undertaken on a sample filtered on 0.45µm filter paper
For Phenols: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

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Table D.1(iii)(a): EMISSIONS TO SURFACE/GROUND WATERS (Storm Overflow)

Discharge Point Code: SW-2

Local Authority Ref No:	SW02CLYN	
Source of Emission:	Storm Overflow	
Location:	Spital	
Grid Ref (12 digits, 6E, 6N)	191060 / 097821	
Name of Receiving waters:	Spital Stream	
Water Body:	River Water Body	
River Basin District	South Western RBD	
Designation of Receiving Waters:	None	
Flow Rate in Receiving Waters:	0.002	$m^3.sec^{-1}$ Dry Weather Flow
	0.004	$m^3.sec^{-1}$ 95% Weather Flow
Additional Comments (e.g. commentary on zero flow or other information deemed of value)	The volume of discharge is not available.	

Emission Details:

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

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TABLE E.1(i): WASTE WATER FREQUENCY 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)
SW-1	365	114975

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TABLE E.1(ii): WASTE WATER FREQUENCY 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
SW-2			No

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TABLE F.1(i)(a): SURFACE/GROUND WATER MONITORING

Primary Discharge Point

Discharge Point Code:	SW-1
MONITORING POINT CODE:	aSW-1d
Grid Ref (12 digits, 6E, 6N)	122684 / 075589

Parameter	Results (mg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	27/11/08	01/01/09					
pH	= 7.7				Grab	2	Electrochemical
Temperature		= 0			Grab	0	Electrochemical
Electrical Conductivity (@ 25°C)	= 388				Grab	0.5	Electrochemical
Suspended Solids	< 2.5				Grab	0.5	Gravimetric
Ammonia (as N)	< 0.1				Grab	0.02	Colorimetric
Biochemical Oxygen Demand	< 1				Grab	0.06	Electrochemical
Chemical Oxygen Demand	< 21				Grab	8	Digestion & Colorimetric
Dissolved Oxygen		= 0			Grab	0	ISE
Hardness (as $CaCO_3$)		= 0			Grab	0	titrimetric
Total Nitrogen (as N)	= 13				Grab	0.5	Digestion & Colorimetric
Nitrite (as N)	= 0.0378				Grab	0.001	Colorimetric
Nitrate (as N)	= 7.53				Grab	0.5	Colorimetric
Total Phosphorous (as P)	< 0.2				Grab	0.2	Digestion & Colorimetric
OrthoPhosphate (as P)	= 0.12				Grab	0.02	Colorimetric
Sulphate (SO_4)	< 30				Grab	30	Turbidimetric
Phenols (Sum)	< 0.1				Grab	0.1	GC-MS 2

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For Orthophosphate: this monitoring should be undertaken on a sample filtered on 0.45µm filter paper
For Phenols: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

Additional Comments:	

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TABLE F.1(i)(b): SURFACE/GROUND WATER MONITORING (Dangerous Substances)

Primary Discharge Point

Discharge Point Code:	SW-1
MONITORING POINT CODE:	aSW-1d
Grid Ref (12 digits, 6E, 6N)	122684 / 075589

Parameter	Results (µg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	27/11/08	01/01/09					
Atrazine	< 0.01				Grab	0.96	HPLC
Dichloromethane	< 1				Grab	1	GC-MS1
Simazine	< 0.01				Grab	0.01	HPLC
Toluene	< 1				Grab	0.02	GC-MS1
Tributyltin		= 0			Grab	0.02	GC-MS1
Xylenes	< 1				Grab	1	GC-MS1
Arsenic	< 0.96				Grab	0.96	ICP-MS
Chromium	< 20				Grab	20	ICP-OES
Copper	< 20				Grab	20	ICP-OES
Cyanide	< 5				Grab	5	Colorimetric
Flouride	= 89				Grab	100	ISE
Lead	< 20				Grab	20	ICP-OES
Nickel	< 20				Grab	20	ICP-OES
Zinc	< 20				Grab	20	ICP-OES
Boron	< 20				Grab	20	ICP-OES
Cadmium	< 20				Grab	20	ICP-OES
Mercury	< 0.2				Grab	0.2	ICP-MS
Selenium	= 1.9				Grab	0.74	ICP-MS
Barium	= 25				Grab	20	ICP-OES

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Additional Comments:	TBT value is 0.02ug/l as Sn TBT testing not required on freshwater samples

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TABLE F.1(i)(a): SURFACE/GROUND WATER MONITORING

Primary Discharge Point

Discharge Point Code:	SW-1
MONITORING POINT CODE:	aSW-1u
Grid Ref (12 digits, 6E, 6N)	191631 / 068006

Parameter	Results (mg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	27/11/08	01/01/09					
pH	= 8.1				Grab	2	Electrochemical
Temperature		= 0			Grab	0	Electrochemical
Electrical Conductivity (@ 25°C)	= 360				Grab	0.5	Electrochemical
Suspended Solids	= 4				Grab	0.5	Gravimetric
Ammonia (as N)	< 0.1				Grab	0.02	Colorimetric
Biochemical Oxygen Demand	< 1				Grab	0.06	Electrochemical
Chemical Oxygen Demand	< 21				Grab	8	Digestion & Colorimetric
Dissolved Oxygen		= 0			Grab	0	ISE
Hardness (as $CaCO_3$)		= 0			Grab	0	titrimetric
Total Nitrogen (as N)	= 12				Grab	0.5	Digestion & Colorimetric
Nitrite (as N)	= 0.0616				Grab	0.001	Colorimetric
Nitrate (as N)	= 5.95				Grab	0.5	Colorimetric
Total Phosphorous (as P)	< 0.2				Grab	0.2	Digestion & Colorimetric
OrthoPhosphate (as P)	< 0.05				Grab	0.02	Colorimetric
Sulphate (SO_4)	< 30				Grab	30	Turbidimetric
Phenols (Sum)	< 0.1				Grab	0.1	GC-MS 2

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For Orthophosphate: this monitoring should be undertaken on a sample filtered on 0.45µm filter paper
For Phenols: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

Additional Comments:	

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TABLE F.1(i)(b): SURFACE/GROUND WATER MONITORING (Dangerous Substances)

Primary Discharge Point

Discharge Point Code:	SW-1
MONITORING POINT CODE:	aSW-1u
Grid Ref (12 digits, 6E, 6N)	191631 / 068006

Parameter	Results (µg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	27/11/08	01/01/09					
Atrazine	< 0.01				Grab	0.96	HPLC
Dichloromethane	< 1				Grab	1	GC-MS1
Simazine	< 0.01				Grab	0.01	HPLC
Toluene	< 1				Grab	0.02	GC-MS1
Tributyltin		= 0			Grab	0.02	GC-MS1
Xylenes	< 1				Grab	1	GC-MS1
Arsenic	< 0.96				Grab	0.96	ICP-MS
Chromium	< 20				Grab	20	ICP-OES
Copper	< 20				Grab	20	ICP-OES
Cyanide	< 5				Grab	5	Colorimetric
Flouride	= 112				Grab	100	ISE
Lead	= 21				Grab	20	ICP-OES
Nickel	< 20				Grab	20	ICP-OES
Zinc	< 20				Grab	20	ICP-OES
Boron	< 20				Grab	20	ICP-OES
Cadmium	< 20				Grab	20	ICP-OES
Mercury	< 0.2				Grab	0.2	ICP-MS
Selenium	= 2.7				Grab	0.74	ICP-MS
Barium	= 30				Grab	20	ICP-OES

Additional Comments:	TBT value is 0.02ug/l as Sn TBT testing not required

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Annex 2: Check List For Regulation 16 Compliance

Regulation 16 of the waste water discharge (Authorisation) Regulations 2007 (S.I. No. 684 of 2007) sets out the information which must, in all cases, accompany a discharge licence application. In order to ensure that the application fully complies with the legal requirements of regulation 16 of the 2007 Regulations, all applicants should complete the following.

In each case, refer to the attachment number(s), of your application which contains(s) the information requested in the appropiate sub-article.

Regulation 16(1) **In the case of an application for a waste water discharge licence, the application shall -**		**Attachment Number**	**Checked by Applicant**
(a)	give the name, address, telefax number (if any) and telephone number of the applicant (and, if different, of the operator of any treatment plant concerned) and the address to which correspondence relating to the application should be sent and, if the operator is a body corporate, the address of its registered office or principal office,	B1	Yes
(b)	give the name of the water services authority in whose functional area the relevant waste water discharge takes place or is to take place, if different from that of the applicant,	Not Applicable	Yes
(c)	give the location or postal address (including where appropriate, the name of the townland or townlands) and the National Grid reference of the location of the waste water treatment plant and/or the waste water discharge point or points to which the application relates,	B2	Yes
(d)	state the population equivalent of the agglomeration to which the application relates,	B9	Yes
(e)	specify the content and extent of the waste water discharge, the level of treatment provided, if any, and the flow and type of discharge,	C,D	Yes
(f)	give details of the receiving water body, including its protected area status, if any, and details of any sensitive areas or protected areas or both in the vicinity of the discharge point or points likely to be affected by the discharge concerned, and for discharges to ground provide details of groundwater protection schemes in place for the receiving water body and all associated hydrogeological and geological assessments related to the receiving water environment in the vicinity of the discharge.	D2, F	Yes
(g)	identify monitoring and sampling points and indicate proposed arrangements for the monitoring of discharges and, if Regulation 17 does not apply, provide details of the likely environmental consequences of any such discharges,	E3	Yes
(h)	in the case of an existing waste water treatment plant, specify the sampling data pertaining to the discharge based on the samples taken in the 12 months preceding the making of the application,	E4	Yes
(i)	describe the existing or proposed measures, including emergency procedures, to prevent unintended waste water discharges and to minimise the impact on the environment of any such discharges,	G3	Yes
(j)	give particulars of the nearest downstream drinking water abstraction point or points to the discharge point or points,	Not Applicable	Yes
(k)	give details, and an assessment of the effects, of any existing or proposed emissions on the environment, including any environmental medium other than those into which the emissions are, or are to be made, and of proposed measures to prevent or eliminate or, where that is not practicable, to limit any pollution caused in such discharges,	F1	Yes
(l)	give detail of compliance with relevant monitoring requirements and treatment standards contained in any applicable Council Directives of Regulations,	G	Yes
(m)	give details of any work necessary to meet relevant effluent discharge standards and a timeframe and schedule for such work.	G3	Yes
(n)	Any other information as may be stipulated by the Agency.	Not Applicable	Yes
Regulation 16(3) **Without prejudice to Regulation 16 (1) and (2), an application for a licence shall be accompanied by -**		**Attachment Number**	**Checked by Applicant**
(a)	a copy of the notice of intention to make an application given pursuant to Regulation 9,	B8	Yes
(b)	where appropriate, a copy of the notice given to a relevant water services authority under Regulation 13,	Not Applicable	Yes
(c)	Such other particulars, drawings, maps, reports and supporting documentation as are necessary to identify and describe, as appropriate -	B,C,E	Yes
(c) (i)	the point or points, including storm water overflows, from which a discharge or discharges take place or are to take place, and	B3, B5	Yes
(c) (ii)	the point or points at which monitoring and sampling are undertaken or are to be undertaken,	E3	Yes
(d)	such fee as is appropriate having regard to the provisions of Regulations 38 and 39.	B9(ii)	Yes

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Regulation 16(4) An original application shall be accompanied by 2 copies of it and of all accompanying documents and particulars as required under Regulation 16(3) in hardcopy or in an electronic or other format as specified by the Agency.		Attachment Number	Checked by Applicant
1	An Original Application shall be accompanied by 2 copies of it and of all accompanying documents and particulars as required under regulation 16(3) in hardcopy or in electronic or other format as specified by the agancy.		Yes
Regulation 16(5) **For the purpose of paragraph (4), all or part of the 2 copies of the said application and associated documents and particulars may, with the agreement of the Agency, be submitted in an electronic or other format specified by the Agency.**		**Attachment Number**	**Checked by Applicant**
1	Signed original.		
2	2 hardcopies of application provided or 2 CD versions of application (PDF files) provided.		
3	1 CD of geo-referenced digital files provided.		
Regulation 17 **Where a treatment plant associated with the relevant waste water works is or has been subject to the European Communities (Environmental Impact Assessment) Regulations 1989 to 2001, in addition to compliance with the requirements of Regulation 16, an application in respect of the relevant discharge shall be accompanied by a copy of an environmental impact statement and approval in accordance with the Act of 2000 in respect of the said development and may be submitted in an electronic or other format specified by the Agency**		**Attachment Number**	**Checked by Applicant**
1	EIA provided if applicable		
2	2 hardcopies of EIS provided if applicable.		
3	2 CD versions of EIS, as PDF files, provided.		

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