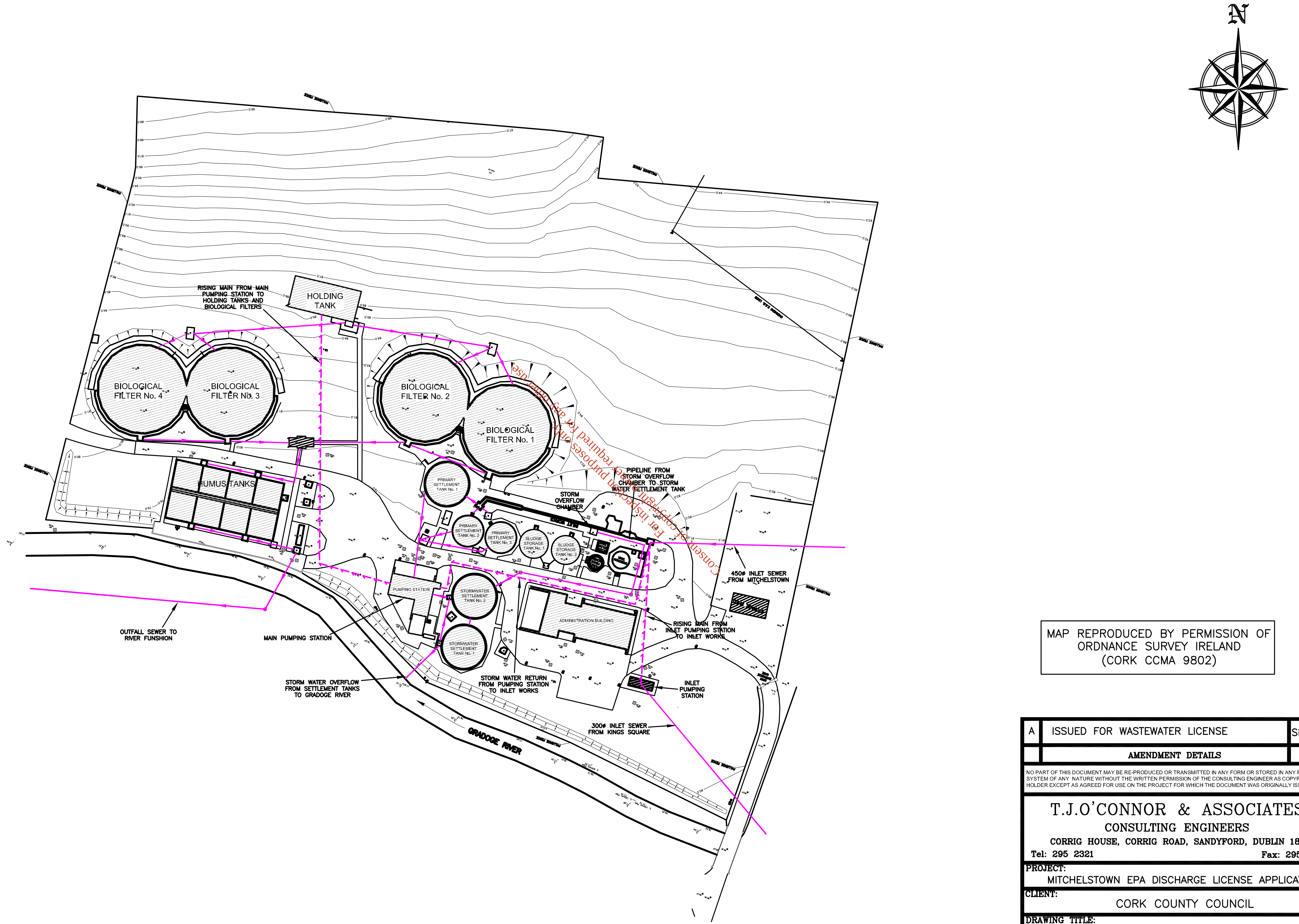
Attachment C.1

Operational Information Requirements

Drawing Number MITCHELSTOWN_C1_13



MAP REPRODUCED BY PERMISSION OF ORDNANCE SURVEY IRELAND (CORK CCMA 9802)

A	ISSUED FOR WASTEWATER LICENSE	SEPT'08
	AMENDMENT DETAILS	**DATE**

T.J.O'CONNOR & ASSOCIATES
CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 295 2321 Fax: 295 4541

PROJECT: MITCHELSTOWN EPA DISCHARGE LICENSE APPLICATION

CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: ATTACHMENT C.1 – LAYOUT OF THE WASTEWATER TREATMENT PLANT

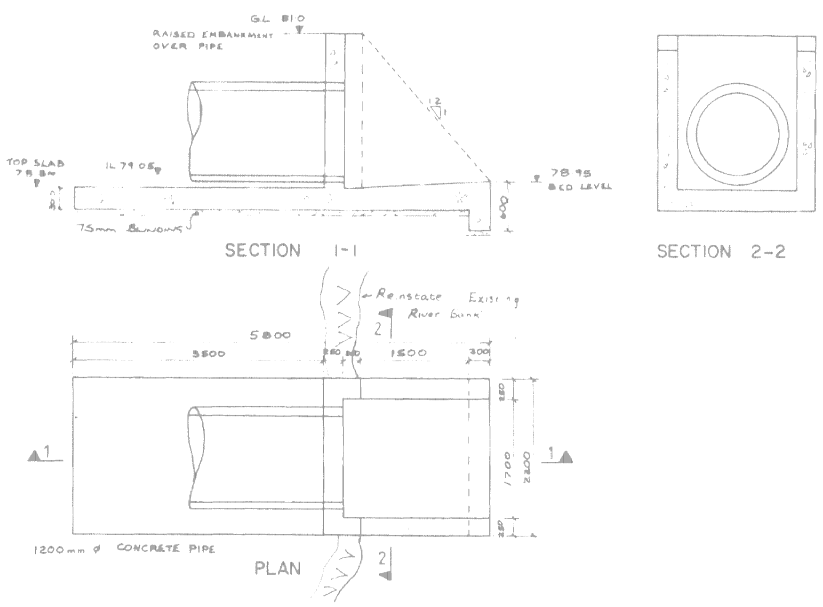
SCALE: NTS		**JOB NO:** 2844	**DRAWING NO:** MITCHELSTOWN_C1_13[A]
DATE: AUG'08	**DRAWN BY:** JH		

Attachment C.2

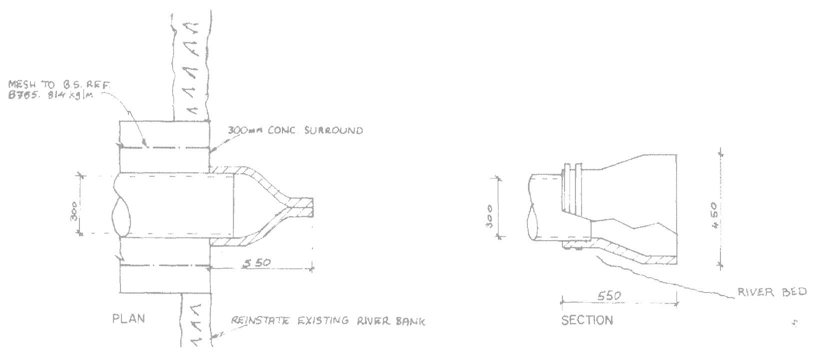
Outfall Design and Construction

Drawing Number MITCHELSTOWN_C2_14

Drawing Number MITCHELSTOWN_C2_15



STORMWATER DISCHARGE SW05-MITC
DETAIL OF OUTFALL TO GRADOGE RIVER



SECONDARY DISCHARGE SW02-MITC
DETAIL OF OUTFALL TO GRADOGE RIVER

A	ISSUED FOR WASTEWATER LICENSE	SEPT'08
	AMENDMENT DETAILS	**DATE**

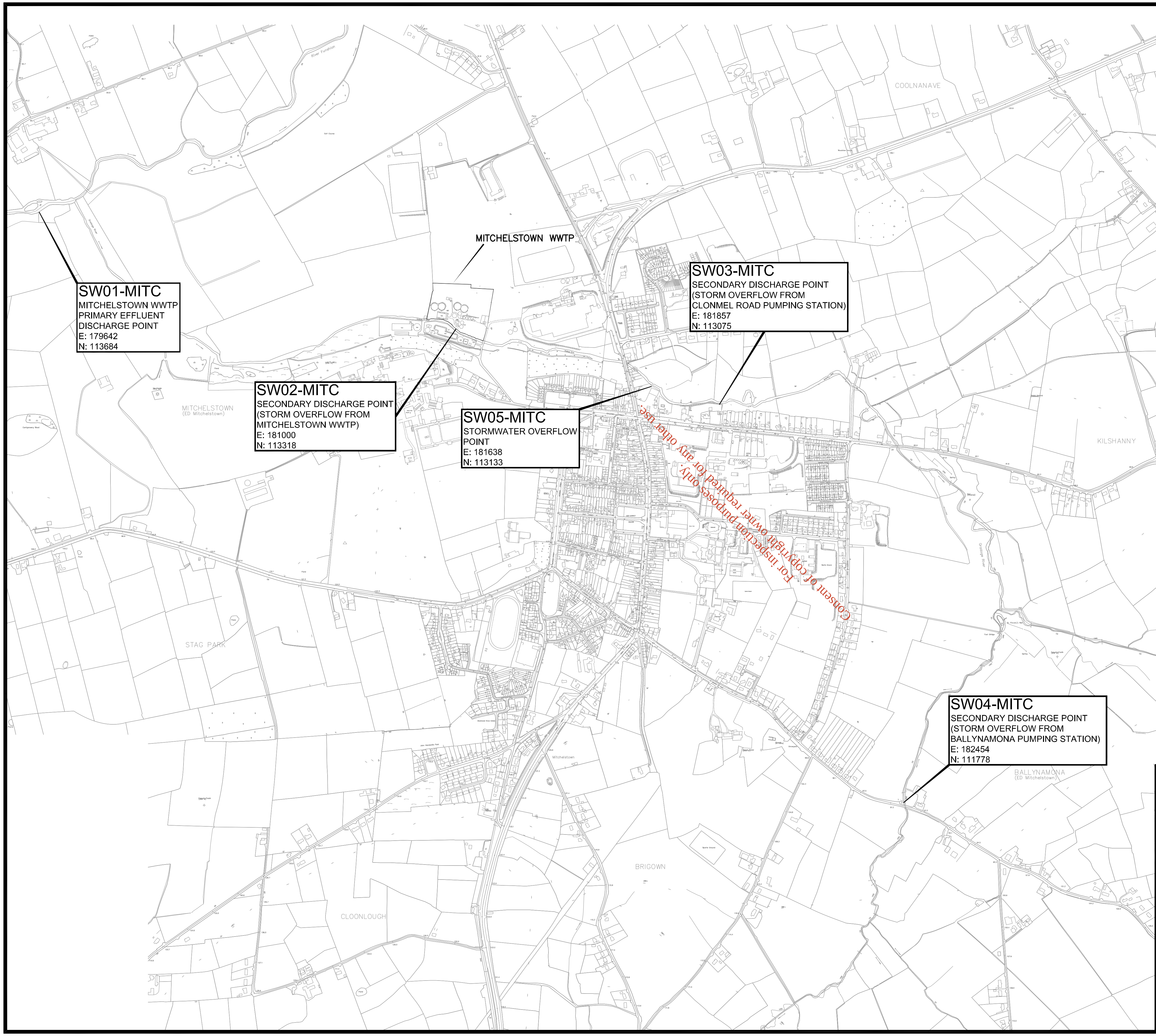
T.J.O'CONNOR & ASSOCIATES
CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 295 2321 Fax: 295 4541

PROJECT: MITCHELSTOWN EPA DISCHARGE LICENSE APPLICATION

CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: ATTACHMENT C.2 – DETAIL OF OUTFALLS

SCALE: NTS		**JOB NO:** 2844	**DRAWING NO:** MITCHELSTOWN_C2_14^A
DATE: AUG'08	**DRAWN BY:** JH		



MAP REPRODUCED BY PERMISSION OF ORDNANCE SURVEY IRELAND (CORK CCMA 9802)

A	ISSUED FOR WASTEWATER LICENSE	SEPT'08
	AMENDMENT DETAILS	DATE

T.J.O'CONNOR & ASSOCIATES
CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 295 2321 Fax: 295 4541

PROJECT: MITCHELSTOWN EPA DISCHARGE LICENSE APPLICATION

CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: ATTACHMENT C.2 – LOCATION OF ALL DISCHARGE POINTS

SCALE: NTS		**JOB NO:** 2844	**DRAWING NO:** MITCHELSTOWN_C2_15A
DATE: AUG'08	**DRAWN BY:** JH		

Attachment D.1

Discharges to Surface Waters

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

Discharge Point Code: SW01- Mitchelstown

Source of Emission:	Mitchelstown Wastewater Treatment Plant + Dairygold Mitchelstown Treated Effluent
Location:	Mitchelstown
Grid Ref. (12 digit, 6E, 6N):	E:179642 N:113684
Name of receiving waters:	River Funshion
River Basin District:	South Western River Basin District
Designation of receiving waters:	None
Flow rate in receiving waters:	1.00 $m^3.sec^{-1}$ Dry Weather Flow 1.93 $m^3.sec^{-1}$ 95%ile flow

Emission Details:

(i) Volume emitted			
Normal/day	10000*+1567= 11567m^3	Maximum/day	10000*+3269=13269m^3
Maximum rate/hour	416*+200= 616m^3	Period of emission (avg)	60 min/hr 24 hr/day 365 day/yr
Dry Weather Flow	9.5m^3/sec		

*=Dairygold Mitchelstown IPPC PO404-02

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

Discharge Point Code: SW01 MITCHELSTOWN

Number	Substance	As discharged	
		Max. daily average	
1	pH	6.5 – 9.0	Not Applicable
2	Temperature	<30°C	Not Applicable
3	Electrical Conductivity(@25°C)	1000	Not Applicable
		Max. daily average (mg/l)*	**kg/day***
4	Suspended Solids	35	404.85
5	Ammonia (as N)	Not Applicable	Not Applicable
6	Biochemical Oxygen Demand	25	289.18
7	Chemical Oxygen Demand	125	1445.88
8	Total Nitrogen (as N)	25	289.18
9	Nitrite (as N)	Not Applicable	Not Applicable
10	Nitrate (as N)	Not Applicable	Not Applicable
11	Total Phosphorus (as P)	2.0	23.134
12	Orthophosphate (as P) Note 1	1.7	19.664
13	Sulphate (SO_4)	Not Applicable	Not Applicable
14	Phenols (sum) Note 2 (μg/l)	Not Applicable	Not Applicable

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

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

Primary Discharge Point - Characteristics of the emission

Discharge Point Code:____SW01 MITCHELSTOWN_________________

Number	Substance	As discharged		
		Max. daily average (µg/l)	kg/day*	kg/year*
1	Atrazine	Not available	Not available	Not available
2	Dichloromethane	Not available	Not available	Not available
3	Simazine	Not available	Not available	Not available
4	Toluene	Not available	Not available	Not available
5	Tributyltin	Not available	Not available	Not available
6	Xylenes	Not available	Not available	Not available
7	Arsenic	Not available	Not available	Not available
8	Chromium	Not available	Not available	Not available
9	Copper	Not available	Not available	Not available
10	Cyanide	Not available	Not available	Not available
11	Fluoride	Not available	Not available	Not available
12	Lead	Not available	Not available	Not available
13	Nickel	Not available	Not available	Not available
14	Zinc	Not available	Not available	Not available
15	Boron	Not available	Not available	Not available
16	Cadmium	Not available	Not available	Not available
17	Mercury	Not available	Not available	Not available
18	Selenium	Not available	Not available	Not available
19	Barium	Not available	Not available	Not available

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

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

Discharge Point Code: SW02-Mitchelstown

Source of Emission:	Mitchelstown Wastewater Treatment Plant Emergency Overflow From Storm Holding Tanks
Location:	Mitchelstown
Grid Ref. (12 digit, 6E, 6N):	E:181000 N:113318
Name of receiving waters:	Gradoge River at Mitchelstown
River Basin District:	South West River Basin District
Designation of receiving waters:	None
Flow rate in receiving waters:	Not known $m^3.sec^{-1}$ Dry Weather Flow Not Known $m^3.sec^{-1}$ 95%ile flow

Emission Details:

(i) Volume emitted		**Not Available**	
Normal/day	Varies m^3	Maximum/day	N/A m^3
Maximum rate/hour	N/A m^3	Period of emission (avg)	___/____min/hr ____/____hr/day ____/____day/yr
Dry Weather Flow	N/A m^3/sec		

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

Discharge Point Code: SW02-Mitchelstown

Number	Substance	As discharged	
		Max. daily average	
1	pH	Not available	Not available
2	Temperature	Not available	Not available
3	Electrical Conductivity (@25°C)	Not available	Not available
		Max. daily average (mg/l)	**kg/day**
4	Suspended Solids	Not available	Not available
5	Ammonia (as N)	Not available	Not available
6	Biochemical Oxygen Demand	Not available	Not available
7	Chemical Oxygen Demand	Not available	Not available
8	Total Nitrogen (as N)	Not available	Not available
9	Nitrite (as N)	Not available	Not available
10	Nitrate (as N)	Not available	Not available
11	Total Phosphorus (as P) Note 1	Not available	Not available
12	Orthophosphate (as P)	Not available	Not available
13	Sulphate (SO_4)	Not available	Not available
14	Phenols (sum) Note 2 (ug/l)	Not available	Not available

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

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

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

Discharge Point Code: SW02-Mitchelstown

Number	Substance	As discharged		
		Max. daily average (μg/l)	kg/day	kg/year
1	Atrazine	Not available	Not available	Not available
2	Dichloromethane	Not available	Not available	Not available
3	Simazine	Not available	Not available	Not available
4	Toluene	Not available	Not available	Not available
5	Tributyltin	Not available	Not available	Not available
6	Xylenes	Not available	Not available	Not available
7	Arsenic	Not available	Not available	Not available
8	Chromium	Not available	Not available	Not available
9	Copper	Not available	Not available	Not available
10	Cyanide	Not available	Not available	Not available
11	Fluoride	Not available	Not available	Not available
12	Lead	Not available	Not available	Not available
13	Nickel	Not available	Not available	Not available
14	Zinc	Not available	Not available	Not available
15	Boron	Not available	Not available	Not available
16	Cadmium	Not available	Not available	Not available
17	Mercury	Not available	Not available	Not available
18	Selenium	Not available	Not available	Not available
19	Barium	Not available	Not available	Not available

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

Discharge Point Code:__________SW03-Mitchelstown______________________

Source of Emission:	Clonmel Road Pumping Station Emergency Overflow
Location:	Clonmel Road, Mitchelstown
Grid Ref. (12 digit, 6E, 6N):	E: 181857 N:113075
Name of receiving waters:	Gradoge River at Mitchelstown
River Basin District:	South West River Basin District
Designation of receiving waters:	None
Flow rate in receiving waters:	______Not known________________$m^3.sec^{-1}$ Dry Weather Flow _______Not known________________$m^3.sec^{-1}$ 95%ile flow

Emission Details:

(i) Volume emitted		**Not Available**	
Normal/day	Varies m^3	Maximum/day	N/A m^3
Maximum rate/hour	N/A m^3	Period of emission (avg)	___/____min/hr ____/____hr/day ____/____day/yr
Dry Weather Flow	N/A m^3/sec		

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

Discharge Point Code: SW03-Mitchelstown

Number	Substance	As discharged	
		Max. daily average	
1	pH	Not available	Not available
2	Temperature	Not available	Not available
3	Electrical Conductivity (@25°C)	Not available	Not available
		Max. daily average (mg/l)	**kg/day**
4	Suspended Solids	Not available	Not available
5	Ammonia (as N)	Not available	Not available
6	Biochemical Oxygen Demand	Not available	Not available
7	Chemical Oxygen Demand	Not available	Not available
8	Total Nitrogen (as N)	Not available	Not available
9	Nitrite (as N)	Not available	Not available
10	Nitrate (as N)	Not available	Not available
11	Total Phosphorus (as P) Note 1	Not available	Not available
12	Orthophosphate (as P)	Not available	Not available
13	Sulphate (SO_4)	Not available	Not available
14	Phenols (sum) Note 2 (ug/l)	Not available	Not available

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

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

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

Discharge Point Code:__________SW03-Mitchelstown_________________

Number	Substance	As discharged		
		Max. daily average (μg/l)	kg/day	kg/year
1	Atrazine	Not available	Not available	Not available
2	Dichloromethane	Not available	Not available	Not available
3	Simazine	Not available	Not available	Not available
4	Toluene	Not available	Not available	Not available
5	Tributyltin	Not available	Not available	Not available
6	Xylenes	Not available	Not available	Not available
7	Arsenic	Not available	Not available	Not available
8	Chromium	Not available	Not available	Not available
9	Copper	Not available	Not available	Not available
10	Cyanide	Not available	Not available	Not available
11	Fluoride	Not available	Not available	Not available
12	Lead	Not available	Not available	Not available
13	Nickel	Not available	Not available	Not available
14	Zinc	Not available	Not available	Not available
15	Boron	Not available	Not available	Not available
16	Cadmium	Not available	Not available	Not available
17	Mercury	Not available	Not available	Not available
18	Selenium	Not available	Not available	Not available
19	Barium	Not available	Not available	Not available

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

Discharge Point Code:_________SW04-Mitchelstown___________________

Source of Emission:	Ballynamona Pumping Station Emergency Overflow
Location:	Ballynamona, Mitchelstown
Grid Ref. (12 digit, 6E, 6N):	E: 182454 N:111778
Name of receiving waters:	Gradoge River at Mitchelstown
River Basin District:	South West River Basin District
Designation of receiving waters:	None
Flow rate in receiving waters:	______Not known________________$m^3.sec^{-1}$ Dry Weather Flow _______Not known________________$m^3.sec^{-1}$ 95%ile flow

Emission Details:

(i) Volume emitted		**Not Available**	
Normal/day	Varies m^3	Maximum/day	N/A m^3
Maximum rate/hour	N/A m^3	Period of emission (avg)	___/____min/hr ____/___hr/day ____/___day/yr
Dry Weather Flow	N/A m^3/sec		

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

Discharge Point Code: SW04-Mitchelstown

Number	Substance	As discharged	
		Max. daily average	
1	pH	Not available	Not available
2	Temperature	Not available	Not available
3	Electrical Conductivity (@25°C)	Not available	Not available
		Max. daily average (mg/l)	**kg/day**
4	Suspended Solids	Not available	Not available
5	Ammonia (as N)	Not available	Not available
6	Biochemical Oxygen Demand	Not available	Not available
7	Chemical Oxygen Demand	Not available	Not available
8	Total Nitrogen (as N)	Not available	Not available
9	Nitrite (as N)	Not available	Not available
10	Nitrate (as N)	Not available	Not available
11	Total Phosphorus (as P) Note 1	Not available	Not available
12	Orthophosphate (as P)	Not available	Not available
13	Sulphate (SO_4)	Not available	Not available
14	Phenols (sum) Note 2 (ug/l)	Not available	Not available

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

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

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

Discharge Point Code:__________SW04-Mitchelstown________________

Number	Substance	As discharged		
		Max. daily average (μg/l)	kg/day	kg/year
1	Atrazine	Not available	Not available	Not available
2	Dichloromethane	Not available	Not available	Not available
3	Simazine	Not available	Not available	Not available
4	Toluene	Not available	Not available	Not available
5	Tributyltin	Not available	Not available	Not available
6	Xylenes	Not available	Not available	Not available
7	Arsenic	Not available	Not available	Not available
8	Chromium	Not available	Not available	Not available
9	Copper	Not available	Not available	Not available
10	Cyanide	Not available	Not available	Not available
11	Fluoride	Not available	Not available	Not available
12	Lead	Not available	Not available	Not available
13	Nickel	Not available	Not available	Not available
14	Zinc	Not available	Not available	Not available
15	Boron	Not available	Not available	Not available
16	Cadmium	Not available	Not available	Not available
17	Mercury	Not available	Not available	Not available
18	Selenium	Not available	Not available	Not available
19	Barium	Not available	Not available	Not available

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

Discharge Point Code:_________SW05-Mitchelstown____________________

Source of Emission:	Stormwater Overflow from CSO. In Mitchelstown
Location:	Mitchelstown
Grid Ref. (12 digit, 6E, 6N):	E: 181638 N:113133
Name of receiving waters:	Gradoge River at Mitchelstown
River Basin District:	South West River Basin District
Designation of receiving waters:	None
Flow rate in receiving waters:	______Not known________________ $m^3.sec^{-1}$ Dry Weather Flow _______Not known________________ $m^3.sec^{-1}$ 95%ile flow

Emission Details:

(i) Volume emitted		**Not Available**	
Normal/day	Varies m^3	Maximum/day	N/A m^3
Maximum rate/hour	N/A m^3	Period of emission (avg)	___/____min/hr ____/____hr/day ____/____day/yr
Dry Weather Flow	N/A m^3/sec		

Attachment D.2

Tabular Data on Discharge Points

TABLE D.2

PT_CD	PT_TYPE	LA_NAME	RWB_TYPE	RWB_NAME	DESIGNATION	EASTING	NORTHING
SW1-MITC	Primary	Cork County Council	River	Funshion River	None	179642	113684
SW2-MITC	Secondary	Cork County Council	River	Gradoge River	None	181000	113318
SW3-MITC	Secondary	Cork County Council	River	Gradoge River	None	181857	113075
SW4-MITC	Secondary	Cork County Council	River	Gradoge River	None	182454	111778
SW5-MITC	Storm Water Overflow	Cork County Council	River	Gradoge River	None	181638	113133

Attachment E.1

Waste water Discharge Frequency and Quantities – Existing & Proposed

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

Identification Code for Discharge point	Frequency of discharge (days/annum)	Quantity of Waste Water Discharged (m^3/annum)
SW1-MITC	365/year	571,955
SW2-MITC	Varies	Not Known
SW3-MITC	Varies	Not Known
SW4-MITC	Varies	Not Known
SW5-MITC	Varies	Not Known

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

Identification Code for Discharge point	Frequency of discharge (days/annum)	Quantity of Waste Water Discharged (m^3/annum)	Complies with Definition of Storm Water Overflow
SW5-MITC	Varies	Not Known	Yes

Attachment E.2

Monitoring and Sampling Points

Attachment E.3

Tabular Data on Monitoring and Sampling Points

TABLE E.3 (ii): MONITORING AND SAMPLING POINTS

PT_CD	PT_TYPE	MON_TYPE	EASTING	NORTHING	VERIFIED
SW01-MITC	Primary	Monitoring	180967	113351	Unknown
aSW01u-MITC	River Upstream	Sampling	180636	114351	Unknown
aSW01d-MITC	River Downstream	Sampling	177956	112602	Unknown

Attachment E.4

Sampling Data

Mitchelstown Application
Attachment E4

IPPC Dairygold

Sample Date	07/08/08
Sample	Outfall
Flow M^3/Day	
pH	8.3
Temperature °C	
Cond 20°C	1156
SS mg/L	<2.5
NH_3 mg/L	0.7
BOD mg/L	1.75
COD mg/L	<21
TN mg/L	
Nitrite mg/L	1.93
Nitrate mg/L	6.45
TP mg/L	<0.20
O-PO4-P mg/L	<0.05
SO4 mg/L	<30
Phenols µg/L	0.98
Atrazine µg/L	<0.01
Dichloromethane µg/L	<5.0
Simazine µg/L	<0.01
Toluene µg/L	<0.1
Tributyltin µg/L	<0.05
Xylenes µg/L	<0.1
Arsenic µg/L	<2.0
Chromium mg/L	<0.02
Copper mg/L	<0.02
Cyanide µg/L	<5.0
Fluoride µg/L	60
Lead mg/L	<0.02
Nickel mg/L	<0.02
Zinc mg/L	<0.02
Boron mg/L	<0.02
Cadmium mg/L	<0.02
Mercury µg/L	<0.2
Selenium µg/L	<2.0
Barium mg/L	0.036

Final discharge Location
Combined Effluent

Sample Date	07/08/08
Sample	Outfall
Flow M^3/Day	
pH	8.3
Temperature °C	
Cond 20°C	4480
SS mg/L	5
NH_3 mg/L	0.3
BOD mg/L	<1.0
COD mg/L	25
TN mg/L	
Nitrite mg/L	0.1
Nitrate mg/L	2.24
TP mg/L	2.48
O-PO4-P mg/L	3.82
SO4 mg/L	81.4
Phenols µg/L	0.05
Atrazine µg/L	<0.01
Dichloromethane µg/L	<5.0
Simazine µg/L	<0.01
Toluene µg/L	<0.1
Tributyltin µg/L	<0.05
Xylenes µg/L	<0.1
Arsenic µg/L	<2.0
Chromium mg/L	<0.02
Copper mg/L	<0.02
Cyanide µg/L	<5.0
Fluoride µg/L	33
Lead mg/L	0.042
Nickel mg/L	<0.02
Zinc mg/L	<0.02
Boron mg/L	0.025
Cadmium mg/L	<0.02
Mercury µg/L	<0.2
Selenium µg/L	<2.0
Barium mg/L	<0.02

Mitchelstown Inlet

	2008										2007			
Sample Date	07/02/08	26/03/08	03/04/08	28/05/08	12/06/08	17/07/08	08/07/08	16/01/08	04/11/08	15/07/08	16/08/07	27/09/07	03/10/07	22/11/07
Sample	Influent	Influent	Influent	influent	Influent	Influent	Influent	Influent	Influent	Influent	Inffluent	Inffluent	Inffluent	Inffluent
Flow M^3/Day	2268	1516	*	*	*	*	*	*	*	*	*	*	*	947
pH	*	*	*	*	*	7.8	7.5	7.7	4.9	7.4	*	*	*	*
Temperature ℃	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cond 20℃	*	*	711	*	*	828	605	681	790	773	*	*	*	*
SS mg/L	*	*	*	*	*	204	96	54	155	454	*	*	*	*
NH_3 mg/L	8.8	*	*	21.7	29.8	40.4	6	9	28	23	9.6	*	23.8	*
BOD mg/L	*	*	*	*	*	235	108	110	50	550	*	*	*	*
COD mg/L	162	*	547	*	509	622	280	355	152	1199	137	717	857	539
TN mg/L	15.4	*	*	*	*	*	*	*	*	*	*	*	*	*
Nitrite mg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Nitrate mg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*
TP mg/L	1.66	*	*	*	1.97	4.15	3	3	3.7	9	2.25	*	7.9	*
O-PO4-P mg/L	0.78	3.57	3.34	4.17	3.54	4.93	3	2	2.8	2	0.87	*	2.76	*
SO4 mg/L	<30	*	*	*	*	39.1	*	*	*	*	33	63	54.7	*
Phenols µg/L	*	*	*	*	*	<0.1	*	*	*	*	*	*	*	*
Atrazine µg/L	*	*	*	*	*	<0.01	*	*	*	*	*	*	*	*
Dichloromethane µg/L	*	*	*	*	*	<1	*	*	*	*	*	*	*	*
Simazine µg/L	*	*	*	*	*	<0.01	*	*	*	*	*	*	*	*
Toluene µg/L	*	*	*	*	*	<1.0	*	*	*	*	*	*	*	*
Tributyltin µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Xylenes µg/L	*	*	*	*	*	<1.0	*	*	*	*	*	*	*	*
Arsenic µg/L	*	*	*	*	*	1	*	*	*	*	*	*	*	*
Chromium mg/L	<0.02	*	*	<0.02	<0.02	*	*	*	*	*	<0.02	*	*	<0.02
Copper mg/L	<0.02	*	*	0.04	0.038	*	*	*	*	*	<0.02	*	*	0.073
Cyanide µg/L	*	*	*	*	*	<5	*	*	*	*	*	*	*	*
Fluoride	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lead mg/L	0.02	*	*	0.045	0.069	*	*	*	*	*	<0.02	*	<0.02	0.05
Nickel mg/L	<0.02	*	*	<0.02	<0.02	*	*	*	*	*	<0.02	*	<0.02	<0.02
Zinc mg/L	0.029	*	*	0.132	0.089	*	*	*	*	*	0.034	*	0.164	0.086
Boron mg/L	<0.02	*	*	0.044	0.034	*	*	*	*	*	*	*	<0.02	0.04
Cadmium mg/L	<0.02	*	*	<0.02	<0.02	*	*	*	*	*	<0.02	*	<0.02	<0.02
Mercury µg/L	*	*	*	*	*	0.4	*	*	*	*	*	*	*	*
Selenium µg/L	*	*	*	*	*	1	*	*	*	*	*	*	*	*
Barium mg/L	0.032	*	*	0.091	0.099	*	*	*	*	*	0.041	*	0.068	0.059

Mitchelstown Outlet

	2008												
Sample Date	02/07/2008	26/03/08	04/03/2008	28/05/2008	12/06/2008	17/07/2008	07/08/2008	16/01/08	04/11/2008	15/07/08			
Sample	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	**Average**	**Kg/Day**	**Kg/year**
Flow m^3/Day	3178	1482	1930	965	822	1030	*	*	*	*	1567.83333	*	
pH	7.7	*	*	7.2	7.8	7.5	*	7.9	7.1	7.7	7.55714286	*	
Temp. °C	*	*	*	*	*	*	*	*	*	*	*	*	
Cond 20°C	*	*	635	*	739	660	*	653	774	730	698.5	*	
SS mg/L	21	53	72	105	187	111	*	46	86	77	84.2222222	132.046407	48196.939
NH_3 mg/L	4.1	85	9.5	*	16.2	9.4	*	3	10	8	18.15	28.456175	10386.504
BOD mg/L	12.97	22	32	64	80.4	36.9	*	6	19	40	34.8077778	54.5727943	19919.070
COD mg/L	42	89	127	174	410	130	*	46	181	151	150	235.175	85838.875
TN mg/L	9.2	10.2	32	80	96	14.2	30.22	*	*	*	38.8314286	60.8812081	22221.641
Nitrite mg/L	*	*	*	*	*	*	2.32	*	*	*	2.32	3.63737333	1327.641
Nitrate mg/L	*	*	*	*	*	*	9.9	*	*	*	9.9	15.52155	5665.366
TP mg/L	1.09	1.31	4.03	4.4	7	5.45	*	1	2.1	3	3.26444444	5.11810481	1868.108
O-PO4-P mg/L	*	1.18	1.15	2.41	2.72	1.35	*	0.2	1.1	1	1.38875	2.17732854	794.725
SO4 mg/L	42.1	*	*	*	*	56.2	*	*	*	*	49.15	77.0590083	28126.538
Phenols µg/L	*	*	*	*	*	<0.1	0.06	*	*	*	<0.08	<0.1254	<45.781
Atrazine µg/L	*	*	*	*	*	<0.01	<0.01	*	*	*	<0.01	<0.0000156	<0.00572
Dichloromethan	*	*	*	*	*	<1.0	<5.0	*	*	*	<1.0	<0.0015678	<0.57225
Simazine µg/L	*	*	*	*	*	<0.01	<0.01	*	*	*	<0.01	<0.0000156	<0.00572
Toluene µg/L	*	*	*	*	*	<1.0	<0.1	*	*	*	<1.0	<0.0015678	<0.57225
Tributyltin µg/L	*	*	*	*	*	*	<0.05	*	*	*	<0.05	<0.0000783	<0.02861
Xylenes µg/L	*	*	*	*	*	<1.0	<0.1	*	*	*	<1.0	<0.0015678	<0.57225
Arsenic µg/L	*	*	*	*	*	1	<2	*	*	*	<1.5	<0.0023518	<0.85838
Chromium mg/L	*	*	<0.02	<0.02	<0.02	*	<0.01	*	*	*	<0.0175	<0.0274370	<10.014
Copper mg/L	*	*	<0.02	<0.02	0.023	*	0.0679	*	*	*	<0.032725	<0.0513073	<18.727
Cyanide µg/L	*	*	*	*	*	<5.0	<5.0	*	*	*	<5.0	<0.0078391	<2.861
Fluoride	*	*	*	*	*	*	0.26	*	*	*	0.26	0.00040764	0.1488
Lead mg/L	*	*	0.023	<0.02	0.063	*	0.0074	*	*	*	<0.01715	<0.0277741	<10.137
Nickel mg/L	*	*	<0.02	<0.02	<0.02	*	0.0109	*	*	*	<0.017725	<0.0277898	<10.143
Zinc mg/L	*	*	<0.02	0.095	0.093	*	0.0853	*	*	*	<0.073325	<0.1149614	<41.960
Boron mg/L	*	*	<0.02	0.05	<0.02	*	<0.02	*	*	*	<0.0275	<0.0431154	<15.737
Cadmium mg/L	*	*	<0.02	<0.02	<0.02	*	<0.001	*	*	*	<0.01525	<0.0239094	<8.726
Mercury µg/L	*	*	*	*	*	0.7	<0.2	*	*	*	<0.45	<0.0007055	<0.257
Selenium µg/L	*	*	*	*	*	1	<2	*	*	*	<1.5	<0.0023518	<0.8583
Barium mg/L	*	*	<0.02	0.072	0.096	*	0.0841	*	*	*	<0.068025	<0.1066518	<38.927

	2007												
Sample Date	17/01/2007	21/02/2007	15/03/2007	12/04/2007	03/05/2007	12/06/2007	28/06/2007	16/08/2007	27/09/2007	03/10/2007	24/10/2007	22/11/2007	06/12/2007
Sample	effluent	effluent	effluent	effluent	effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	effluent
Flow m^3/Day	3269	6061	2277	1477	1013	*	1446	*	1129	963	1456	916	*
pH	7.7	7.4	7.5	7.5	7.3	*	7.4	7.6	7.9	7.3	7.3	7.6	*
Temp. °C	*	*	*	*	*	*	*	*	*	*	*	*	*
Cond 20°C	*	*	*	*	*	*	*	*	*	*	609	*	*
SS mg/L	30	44	26	82	62	47	46	42	60	71	45	45	47
NH_3 mg/L	*	*	*	*	*	4.1	*	3.8	11.9	8.3	9.3	9.7	4.1
BOD mg/L	12	12	10	32	32	18.32	26	19	29	37	31	35.8	22.1
COD mg/L	40	40	35	114	132	79	87	68	60	130	120	113	*
TN mg/L	12	10.5	10.1	17	16.9	22.1	17	*	26	12.9	27	*	*
Nitrite mg/L	*	*	*	*	*	*	*	*	*	*	*	*	1.93
Nitrate mg/L	*	*	*	*	*	*	*	*	*	*	*	*	0.9
TP mg/L	0.87	1.03	0.55	2.05	4.25	1.93	3.4	1.97	4.18	3.03	2.25	3.18	*
O-PO4-P mg/L	*	*	*	*	*	0.9	*	0.74	2.51	2.2	2.08	1.48	*
SO4 mg/L	*	*	*	*	*	*	*	43.2	32.4	<30	31.5	46.2	*
Phenols µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*
Atrazine µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*
Dichloromethan	*	*	*	*	*	*	*	*	*	*	*	*	*
Simazine µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*
Toluene µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*
Tributyltin µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*
Xylenes µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*
Arsenic µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*
Chromium mg/L	*	*	*	*	<0.02	*	<0.02	*	<0.02	<0.02	<0.02	<0.02	<0.02
Copper mg/L	*	*	*	*	<0.02	*	<0.02	*	<0.02	<0.02	<0.02	0.032	<0.02
Cyanide µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*
Fluoride	*	*	*	*	*	*	*	*	*	*	*	*	*
Lead mg/L	*	*	*	*	<0.02	*	<0.02	*	<0.02	<0.02	<0.02	0.047	0.05
Nickel mg/L	*	*	*	*	<0.02	*	<0.02	*	<0.02	<0.02	<0.02	<0.02	<0.02
Zinc mg/L	*	*	*	*	0.043	*	0.043	*	0.03	0.026	0.032	0.062	0.05
Boron mg/L	*	*	*	*	*	*	*	*	*	*	*	*	<0.02
Cadmium mg/L	*	*	*	*	<0.02	*	<0.02	*	<0.02	<0.02	<0.02	<0.02	<0.02
Mercury µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*
Selenium µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*
Barium mg/L	*	*	*	*	0.036	*	0.032	*	0.023	<0.02	0.044	0.044	0.035

Mitchelstown Downstream

	2008					2007							
Sample Date	07/02/08	26/03/08	03/04/08	12/06/08	17/07/08	17/01/07	21/02/07	15/03/07	12/04/07	03/05/07	28/06/07	27/09/07	03/10/07
Sample	River	River	River	River	River	river	river	river	river	river	River	River	River
Flow M^3/Day	*	*	*	*	*	*	*	*	*	*	*	*	*
pH	7.7	*	*	*	8.1	7.8	7.6	7.8	*	*	8	7.9	7.7
Temperature ℃	*	*	*	*	*	*	*	*	*	*	*	*	*
Cond 20℃	*	*	408	*	570	*	*	*	*	*	*	*	*
SS mg/L	5	<2.5	7	<2.5	<2.5	*	*	*	*	*	*	<2.5	*
NH_3 mg/L	0.3	<0.1	*	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	<0.1	0.2	0.5
BOD mg/L	1.24	1.5	2.38	5.62	<1.0	<1	1.5	<1	2	1.3	*	1.17	3.98
COD mg/L	<21	<21	*	*	<21	*	*	<21	*	*	*	*	*
TN mg/L	3	2.3	*	6.8	1.3	3.3	9.1	471	6	5.91	*	9.2	6
Nitrite mg/L	*	*	*	*	*	*	*	<21	*	*	*	*	*
Nitrate mg/L	*	*	*	*	*	*	*	471	*	*	*	*	*
TP mg/L	<0.2	*	0.31	3.68	<0.2	<0.2	<0.2	*	0.91	0.59	<0.2	1.25	0.34
O-PO4-P mg/L	<0.05	0.24	0.27	2.87	0.05	*	*	*	*	*	*	1.29	0.19
SO4 mg/L	<30	*	*	*	<30	*	*	0.29	*	*	*	<30	<30
Phenols µg/L	*	*	*	*	<0.1	*	*	*	*	*	*	*	*
Atrazine µg/L	*	*	*	*	<0.01	*	*	*	*	*	*	*	*
Dichloromethane	*	*	*	*	<1	*	*	*	*	*	*	*	*
Simazine µg/L	*	*	*	*	<0.01	*	*	*	*	*	*	*	*
Toluene µg/L	*	*	*	*	<1.0	*	*	*	*	*	*	*	*
Tributyltin µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*
Xylenes µg/L	*	*	*	*	<1.0	*	*	*	*	*	*	*	*
Arsenic µg/L	*	*	*	*	<0.96	*	*	*	*	*	*	*	*
Chromium mg/L	<0.02	*	<0.02	<0.02	<0.02	*	*	<0.02	<0.02	*	<0.02	<0.02	<0.02
Copper mg/L	<0.02	*	<0.02	<0.02	<0.02	*	*	<0.02	<0.02	*	<0.02	<0.02	<0.02
Cyanide µg/L	*	*	*	*	<5	*	*	*	*	*	*	*	*
Fluoride	*	*	*	*	*	*	*	*	*	*	*	*	*
Lead mg/L	<0.02	*	0.025	<0.021	<0.02	*	*	<0.02	<0.02	*	<0.02	<0.02	<0.02
Nickel mg/L	<0.02	*	<0.02	<0.02	<0.02	*	*	<0.02	<0.02	*	<0.02	<0.02	<0.02
Zinc mg/L	<0.02	*	<0.02	<0.02	<0.02	*	*	<0.02	<0.02	*	<0.02	<0.02	<0.02
Boron mg/L	<0.02	*	<0.02	<0.02	<0.02	*	*	*	*	*	*	*	*
Cadmium mg/L	<0.02	*	<0.02	<0.02	<0.02	*	*	<0.02	<0.02	*	<0.02	<0.02	<0.02
Mercury µg/L	*	*	*	*	0.5	*	*	*	*	*	*	*	*
Selenium µg/L	*	*	*	*	1	*	*	*	*	*	*	*	*
Barium mg/L	0.02	*	<0.02	<0.02	0.039	*	*	<0.02	0.024	*	<0.02	<0.02	<0.02

22/11/07
River
*
7.9
*
*
*
0.6
2.32
*
9
*
*
0.4
0.39
<30
*
*
*
*
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*
<00.02
<0.02
*
*
<0.02
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<0.02
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*
<0.02

Mitchelstown Upstream

	2008					2007									
Sample Date	07/02/08	26/03/08	03/04/08	12/06/08	17/07/08	17/01/07	21/02/07	15/03/07	12/04/07	03/05/07	10/06/07	28/06/207	27/09/07	03/10/07	22/11/07
Sample	River	River	River	River	River	river	river	river	river	river	River	River	River	river	River
Flow M^3/Day	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
pH	7.7	*	*	*	8	7.7	7.7	7.8	*	*	7.8	7.9	7.9	7.8	7.9
Temperature °C	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cond 20°C	*	*	218	*	201	*	*	*	*	*	*	*	*	*	*
SS mg/L	7	<2.5	<2.5	<2.5	<2.5	<2.5	4	6	<2.5	<2.5	9	<2.5	<2.5	9	<2.5
NH_3 mg/L	<0.1	<1.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BOD mg/L	<1.0	2.3	<1.0	1.7	<1.0	<1	<1	<1	<1	<1	1.77	1.4	1.4	1.77	1.3
COD mg/L	<21	<21	*	*	<21	*	*	<21	*	*	*	*	*	*	<21
TN mg/L	<0.5	4.1	*	3.1	1.6	2.8	4.2	3.05	5.2	4.28	3.5	*	6.9	3.5	8.9
Nitrite mg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Nitrate mg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
TP mg/L	<0.2	*	<0.20	0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
O-PO4-P mg/L	<0.05	0.24	<0.05	<0.05	<0.05	*	*	*	*	*	<0.05	*.	<0.05	<0.05	<0.05
SO4 mg/L	<30	*	*	*	<30	*	*	*	*	*	<30	*	<30	<30	<30
Phenols µg/L	*	*	*	*	<0.1	*	*	*	*	*	*	*	*	*	*
Atrazine µg/L	*	*	*	*	<0.01	*	*	*	*	*	*	*	*	*	*
Dichloromethane	*	*	*	*	<1	*	*	*	*	*	*	*	*	*	*
Simazine µg/L	*	*	*	*	<0.01	*	*	*	*	*	*	*	*	*	*
Toluene µg/L	*	*	*	*	<1.0	*	*	*	*	*	*	*	*	*	*
Tributyltin µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Xylenes µg/L	*	*	*	*	<1.0	*	*	*	*	*	*	*	*	*	*
Arsenic µg/L	*	*	*	*	<0.96	*	*	*	*	*	*	*	*	*	*
Chromium mg/L	<0.02	*	<0.02	*	<0.02	*	*	<0.02	*	*	<0.02	<0.02	<0.02	<0.02	<0.02
Copper mg/L	<0.02	*	<0.02	*	<0.02	*	*	<0.02	*	*	<0.02	<0.02	<0.02	<0.02	<0.02
Cyanide µg/L	*	*	*	*	<5	*	*	*	*	*	*	*	*	*	*
Fluoride	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lead mg/L	0.047	*	0.025	*	<0.02	*	*	<0.02	*	*	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel mg/L	<0.02	*	<0.02	*	<0.02	*	*	<0.02	*	*	<0.02	<0.02	<0.02	<0.02	<0.02
Zinc mg/L	<0.02	*	<0.02	*	<0.02	*	*	<0.02	*	*	<0.02	<0.02	<0.02	<0.02	<0.02
Boron mg/L	<0.02	*	<0.02	*	<0.02	*	*	*	*	*	*	*	*	*	<0.02
Cadmium mg/L	<0.02	*	<0.02	*	<0.02	*	*	<0.02	*	*	<0.02	<0.02	<0.02	<0.02	<0.02
Mercury µg/L	*	*	*	*	<0.2	*	*	*	*	*	*	*	*	*	*
Selenium µg/L	*	*	*	*	<0.74	*	*	*	*	*	*	*	*	*	*
Barium mg/L	0.029	*	<0.02	*	0.054	*	*	<0.02	*	*	<0.02	<0.02	<0.02	<0.02	<0.02

Attachment F.1

Assessment of Impact on Receiving Surface or Ground Water

Attachment F1 Assessment of impact on the Receiving or Ground Water

Provide details of the extent and type of groundwater emissions at the works.

There are no emissions to groundwater from the existing wastewater treatment plant.

Describe the existing environment in terms of water quality with particular reference to environmental quality standards or other legislative standards.

Wastewater discharged in the Mitchelstown agglomeration is collected and conveyed to a Wastewater Treatment Plant where it undergoes primary and secondary treatment before it is discharged to the River Funshion via a 300mm diameter pipeline.

The biological quality rating of the River Funshion expressed in the Q rating was reported in 2004 at Q_4. In 2005 in order to increase the river water quality of the River Funshion a nutrient (phosphorus) removal plant was installed at the Wastewater Treatment Plant. This plant was designed to reduce the total phosphorus discharge in the final effluent to 2mg/l (max).

There are three secondary discharge points to the River Gradoge in the form of emergency overflows from the pumping stations at Clonmel Road and Ballynamona and a storm water overflow from Mitchelstown Wastewater Treatment Plant. A report entitled "Preliminary Report on Nutrient Removal" states the water quality in the River Gradoge is substantially worse for all parameters than the quality of the River Funshion. The report further states that the "most likely source of the pollution load is discharges upstream or from the storm water overflows on the town network". The design and detail of all discharge points will be reviewed as part of the Mitchelstown Sewerage Scheme project for which funds have been allocated as part of the Water Services Investment Programme 2007 to 2009.

The enclosed tables demonstrate that the existing plant has negligible on existing Phosphorous, BOD and SS levels within the Funshion River.

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

The emissions from the wastewater treatment plant in Mitchelstown indicated that, for those substances which were monitored, none were likely to impair the environment.

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

No water abstraction point exists downstream.

Indicate whether or not emissions from the agglomeration or any plant, methods, processes, operating procedures or other factors which affect such emissions are likely to have a significant effect on Natural Heritage Areas or Special Areas of Conservation

Not applicable.

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

Not applicable.

FUNSHION RIVER
Phosphorus Removal

discharging to:

Qmean of river (Hydra/AutoCAD)	Q95 =	8.59	m^3/s
Population (Design Report)	future =	6000	
Phosphorus (3 g P/day/pe)	future =	18000	g/day
Flow (225L/day/pe)	future =	1476.0	m^3/day
Influent concentration of P	future =	12.2	mg/l

fully mixed concentration

$$C_{fm} = \frac{(Ceff)(Qeff)+(Qback)(Cback)}{(Qeff+Qback)}$$

final effluent P conc.	C_{eff} =	2	mg/l

(assumed figure based on secondary treatment with no specific phosphorus removal in place)

Flow from WWTW in future	Q_{eff} =	1476	m^3/day
Qmean of river (Hydra/AutoCAD)	Q_{back} =	742176	m^3/day
P conc. of river u/s (from EPA)	C_{back} =	0.02	mg/l

Therefore:

P concentration downstream	C_{fm} =	0.024	mg/l

With P removal:

final effluent P conc.	C_{eff} =	2	mg/l
P concentration downstream	C_{fm} =	0.024	mg/l

Total P removal =	C =	35.683	kg/day

FUNSHION RIVER
BOD removal

discharging to:

Q95 of river (Hydra/AutoCAD)	Q95 = 1.93	m^3/s
Population (Design Report)	future = 6000	
BOD (60g BOD/day/pe)	future = 360000	g/day
Flow (225 L/day/pe)	future = 1476.0	m^3/day
Influent concentration of BOD	future = 243.9	mg/l

fully mixed concentration

$$C_{fm} = \frac{(Ceff)(Qeff)+(Qback)(Cback)}{(Qeff+Qback)}$$

final effluent BOD conc. C_{eff} = 25 mg/l

(assumed figure based on secondary treatment with no specific phosphorus removal in place)

Flow from WWTW in future	Q_{eff} = 1476	m^3/day
Q95 of river (Hydra/AutoCAD)	Q_{back} = 166752	m^3/day
BOD conc. of river u/s (from EPA)	C_{back} = 1.60	mg/l

Therefore:

BOD concentration downstream C_{fm} = 1.805 mg/l

With BOD removal:

final effluent BOD conc.	C_{eff} = 25	mg/l
BOD concentration downstream	C_{fm} = 1.805	mg/l

Total BOD removal = C = 186.07 kg/day

FUNSHION RIVER
SS Removal

discharging to:

Q95 of river (Hydra/AutoCAD)	Q95 =	1.93 m^3/s
Population (Design Report)	future =	6000
SS (70g P/day/pe)	future =	420000
Flow (225L/day/pe)	future =	1080.0 m^3/day
Influent concentration of SS	future =	388.9 mg/l
fully mixed concentration	C_{fm} =	$\frac{(Ceff)(Qeff)+(Qback)(Cback)}{(Qeff+Qback)}$
final effluent SS conc.	C_{eff} =	35 mg/l

(assumed figure based on secondary treatment with no specific phosphorus removal in place)

Flow from WWTW in future	Q_{eff} =	1080 m^3/day
Q95 of river (Hydra/AutoCAD)	Q_{back} =	166752 m^3/day
SS conc. of river u/s (from EPA)	C_{back} =	7 mg/l

Therefore:

SS concentration downstream	C_{fm} =	7.180 mg/l

With SS removal:

final effluent SS conc.	C_{eff} =	35 mg/l
SS concentration downstream	C_{fm} =	7.180 mg/l
Total SS removal =	C =	1,238.61 kg/day

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

Discharge Point Code: ***SWO1- MITCHELSTOWN***

MONITORING POINT CODE: ***SWO1- MITC***

Parameter	Results (mg/l[Note 1])				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	03/04/2008	28/05/2008	12/06/2008	17/07/2008			
pH	Not available	7.2	7.8	7.5	Composite	2	Electrochemical
Temperature	Not available	Not available	Not available	Not available	Composite	N/A	N/A
Electrical Conductivity (@20°C)	635	Not available	739	660	Composite	0.5 µmhos/cm	Electrochemical
Suspended Solids	72	105	187	111	Composite	0.5 mg/L	Gravimetric
Ammonia (as N)	9.5	Not available	16.2	9.4	Composite	0.02 mg/L	Colorimetric
Biochemical Oxygen Demand	32	64	80.4	36.9	Composite	0.06 mg/L	Electrochemical
Chemical Oxygen Demand	127	174	410	130	Composite	8 mg/L	Digestion + Calorimetric
Dissolved Oxygen	Not available	Not available	Not available	Not available	Composite	N/A	N/A
Hardness (as $CaCo_3$)	Not available	Not available	Not available	Not available	Composite	N/A	N/A
Total Nitrogen (as N)	32	80	96	14.2	Composite	0.5 mg/L	Digestion + Calorimetric
Nitrite (as N)	Not available	Not available	Not available	Not available	Composite	0.004mg/L	Colorimetric
Nitrate (as N)	Not available	Not available	Not available	Not available	Composite	0.4 mg/L	Colorimetric
Total Phosphorus (as P)	4.03	4.4	7	5.45	Composite	0.2 mg/L	Digestion + Calorimetric
Orthophosphate (as P) - unfiltered	1.15	2.41	2.72	1.35	Composite	0.02 mg/L	Colorimetric
Sulphate (SO_4)	Not available	Not available	Not available	56.2	Composite	30 mg/L	Turbidimetric
Phenols (sum) [Note 2] (ug/l)	Not available	Not available	Not available	<0.1	Composite	0.1 µg/L	GC-MS 2

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

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

Discharge Point Code: SWO1- MITCHELSTOWN

MONITORING POINT CODE: *SWO1- MITC*

Parameter	Results (µg/l)				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	03/04/2008	28/05/2008	12/06/2008	17/07/2008			
Atrazine	Not available	Not available	Not available	<0.01	Composite	0.96 µg/L	HPLC
Dichloromethane	Not available	Not available	Not available	<1	Composite	1 µg/L	GC-MS 1
Simazine	Not available	Not available	Not available	<0.01	Composite	0.01 µg/L	HPLC
Toluene	Not available	Not available	Not available	<1.0	Composite	0.02 µg/L	GC-MS 1
Tributyltin	Not available	Not available	Not available	Not available	Composite	1 µg/L as Sn	GC-MS 1
Xylenes	Not available	Not available	Not available	<1.0	Composite	0.96 µg/L	GC-MS 1
Arsenic	Not available	Not available	Not available	1	Composite	0.02 mg/L	ICP-MS
Chromium	<20	<20	<20	Not available	Composite	0.02 mg/L	ICP-OES
Copper	<20	<20	23	Not available	Composite	5 mg/L	ICP-OES
Cyanide	Not available	Not available	Not available	<5	Composite	0.01 µg/L	Colorimetric
Fluoride	Not available	Not available	Not available	Not available	Composite	100 µg/L	ISE
Lead	23	<20	63	Not available	Composite	0.02 mg/L	ICP-OES
Nickel	<20	<20	<20	Not available	Composite	0.02 mg/L	ICP-OES
Zinc	<20	95	93	Not available	Composite	0.02 mg/L	ICP-OES
Boron	<20	5	<20	Not available	Composite	0.02 mg/L	ICP-OES
Cadmium	<20	<20	<20	Not available	Composite	0.02 mg/L	ICP-OES
Mercury	Not available	Not available	Not available	0.7	Composite	0.02 µg/L	ICP-MS
Selenium	Not available	Not available	Not available	1	Composite	0.74 µg/L	ICP-MS
Barium	<20	72	96	Not available	Composite	0.02 mg/L	ICP-OES

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

Discharge Point Code:__________SWO1- MITCHELSTOWN_______________________

MONITORING POINT CODE: ___*a.SWO1(u) MITC*__________

Parameter	Results (mg/l[Note 1])				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	26/03/2008	03/04/2008	12/06/2008	17/07/2008			
pH	Not available	Not available	Not available	8	Grab	2	Electrochemical
Temperature	Not available	Not available	Not available	Not available	Grab	N/A	N/A
Electrical Conductivity (@20°C)	Not available	218	Not available	201	Grab	0.5 µmhos/cm	Electrochemical
Suspended Solids	<2.5	<2.5	<2.5	<2.5	Grab	0.5 mg/L	Gravimetric
Ammonia (as N)	<1.0	<0.1	<0.1	<0.1	Grab	0.02 mg/L	Colorimetric
Biochemical Oxygen Demand	2.3	<1.0	1.7	<1.0	Grab	0.06 mg/L	Electrochemical
Chemical Oxygen Demand	<21	Not available	Not available	<21	Grab	8 mg/L	Digestion + Calorimetric
Dissolved Oxygen	4.1	Not available	3.1	1.6	Grab	N/A	N/A
Hardness (as $CaCo_3$)	Not available	Not available	Not available	Not available	Grab	N/A	N/A
Total Nitrogen (as N)	4.1	Not available	3.1	1.6	Grab	0.5 mg/L	Digestion + Calorimetric
Nitrite (as N)	Not available	Not available	Not available	Not available	Grab	0.004mg/L	Colorimetric
Nitrate (as N)	Not available	Not available	Not available	Not available	Grab	0.4 mg/L	Colorimetric
Total Phosphorus (as P)	Not available	<0.20	0	<0.2	Grab	0.2 mg/L	Digestion + Calorimetric
Orthophosphate (as P) - unfiltered	0.24	<0.05	<0.05	<0.05	Grab	0.02 mg/L	Colorimetric
Sulphate (SO_4)	Not available	Not available	Not available	<30	Grab	30 mg/L	Turbidimetric
Phenols (sum) [Note 2] (ug/l)	Not available	Not available	Not available	<0.1	Grab	0.1 µg/L	GC-MS 2

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

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

***Discharge Point Code:* ___________ *SWO1- MITCHELSTOWN* ___________**

MONITORING POINT CODE: ___ *a.SWO1(u) MITC* ______

Parameter	**Results (µg/l)**				**Sampling method (grab, drift etc.)**	**Limit of Quantitation**	**Analysis method / technique**
	26/03/2008	03/04/2008	12/06/2008	17/07/2008			
Atrazine	Not available	Not available	Not available	<0.01	Grab	0.96 µg/L	HPLC
Dichloromethane	Not available	Not available	Not available	<1	Grab	1 µg/L	GC-MS 1
Simazine	Not available	Not available	Not available	<0.01	Grab	0.01 µg/L	HPLC
Toluene	Not available	Not available	Not available	<1.0	Grab	0.02 µg/L	GC-MS 1
Tributyltin	Not available	Not available	Not available	Not available	Grab	1 µg/L as Sn	GC-MS 1
Xylenes	Not available	Not available	Not available	<1.0	Grab	0.96 µg/L	GC-MS 1
Arsenic	Not available	Not available	Not available	<0.96	Grab	0.02 mg/L	ICP-MS
Chromium	Not available	<20	Not available	<20	Grab	0.02 mg/L	ICP-OES
Copper	Not available	<20	Not available	<20	Grab	5 mg/L	ICP-OES
Cyanide	Not available	Not available	Not available	<5	Grab	0.01 µg/L	Colorimetric
Fluoride	Not available	Not available	Not available	Not available	Grab	100 µg/L	ISE
Lead	Not available	25	Not available	<20	Grab	0.02 mg/L	ICP-OES
Nickel	Not available	<20	Not available	<20	Grab	0.02 mg/L	ICP-OES
Zinc	Not available	<20	Not available	<20	Grab	0.02 mg/L	ICP-OES
Boron	Not available	<20	Not available	<20	Grab	0.02 mg/L	ICP-OES
Cadmium	Not available	<20	Not available	<20	Grab	0.02 mg/L	ICP-OES
Mercury	Not available	Not available	Not available	<0.2	Grab	0.02 µg/L	ICP-MS
Selenium	Not available	Not available	Not available	<0.74	Grab	0.74 µg/L	ICP-MS
Barium	Not available	<20	Not available	54	Grab	0.02 mg/L	ICP-OES

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

Discharge Point Code:_______________SWO1- MITCHELSTOWN___________________

MONITORING POINT CODE: ___*a.SWO1 (d)MITC*__________

Parameter	Results (mg/l[Note 1])				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	26/03/2008	03/04/2008	12/06/2008	17/07/2008			
pH	Not available	Not available	Not available	8.1	Grab	2	Electrochemical
Temperature	Not available	Not available	Not available	Not available	Grab	N/A	N/A
Electrical Conductivity (@20°C)	Not available	408	Not available	570	Grab	0.5 µmhos/cm	Electrochemical
Suspended Solids	<2.5	7	<2.5	<2.5	Grab	0.5 mg/L	Gravimetric
Ammonia (as N)	<0.1	Not available	<0.1	<0.1	Grab	0.02 mg/L	Colorimetric
Biochemical Oxygen Demand	1.5	2.38	5.62	<1.0	Grab	0.06 mg/L	Electrochemical
Chemical Oxygen Demand	<21	Not available	Not available	<21	Grab	8 mg/L	Digestion + Calorimetric
Dissolved Oxygen	Not available	Not available	Not available	Not available	Grab	N/A	N/A
Hardness (as $CaCo_3$)	Not available	Not available	Not available	Not available	Grab	N/A	N/A
Total Nitrogen (as N)	2.3	Not available	6.8	1.3	Grab	0.5 mg/L	Digestion + Calorimetric
Nitrite (as N)	Not available	Not available	Not available	Not available	Grab	0.004mg/L	Colorimetric
Nitrate (as N)	Not available	Not available	Not available	Not available	Grab	0.4 mg/L	Colorimetric
Total Phosphorus (as P)	Not available	0.31	3.68	<0.2	Grab	0.2 mg/L	Digestion + Calorimetric
Orthophosphate (as P) - unfiltered	0.24	0.27	2.87	0.05	Grab	0.02 mg/L	Colorimetric
Sulphate (SO_4)	Not available	Not available	Not available	<30	Grab	30 mg/L	Turbidimetric
Phenols (sum) [Note 2] (ug/l)	Not available	Not available	Not available	<0.1	Grab	0.1 µg/L	GC-MS 2

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

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

Discharge Point Code: SWO1- MITCHELSTOWN

MONITORING POINT CODE: *a.SWO1(d) MITC*

Parameter	Results (µg/l)				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	26/03/2008	03/04/2008	12/06/2008	17/07/2008			
Atrazine	Not available	Not available	Not available	<0.01	Grab	0.96 µg/L	HPLC
Dichloromethane	Not available	Not available	Not available	<1	Grab	1 µg/L	GC-MS 1
Simazine	Not available	Not available	Not available	<0.01	Grab	0.01 µg/L	HPLC
Toluene	Not available	Not available	Not available	<1.0	Grab	0.02 µg/L	GC-MS 1
Tributyltin	Not available	Not available	Not available	Not available	Grab	1 µg/L as Sn	GC-MS 1
Xylenes	Not available	Not available	Not available	<1.0	Grab	0.96 µg/L	GC-MS 1
Arsenic	Not available	Not available	Not available	<0.96	Grab	0.02 mg/L	ICP-MS
Chromium	Not available	<20	<20	<20	Grab	0.02 mg/L	ICP-OES
Copper	Not available	<20	<20	<20	Grab	5 mg/L	ICP-OES
Cyanide	Not available	Not available	Not available	<5	Grab	0.01 µg/L	Colorimetric
Fluoride	Not available	Not available	Not available	Not available	Grab	100 µg/L	ISE
Lead	Not available	25	<21	<20	Grab	0.02 mg/L	ICP-OES
Nickel	Not available	<20	<20	<20	Grab	0.02 mg/L	ICP-OES
Zinc	Not available	<20	<20	<20	Grab	0.02 mg/L	ICP-OES
Boron	Not available	<20	<20	<20	Grab	0.02 mg/L	ICP-OES
Cadmium	Not available	<20	<20	<20	Grab	0.02 mg/L	ICP-OES
Mercury	Not available	Not available	Not available	0.5	Grab	0.02 µg/L	ICP-MS
Selenium	Not available	Not available	Not available	1	Grab	0.74 µg/L	ICP-MS
Barium	Not available	<20	<20	39	Grab	0.02 mg/L	ICP-OES

Attachment G.1

Compliance with Council Directives

Cork County

Water Services Investment Programme 2007 - 2009

Schemes at Construction	W/S	Est. Cost
Cork North		
* Mitchelstown Sewerage Scheme (Nutrient Removal)	S	221,000
Cork South		
Ballyvourney/ Ballymakeery Sewerage Scheme	S	3,049,000
Cobh/ Midleton/ Carrigtwohill Water Supply Scheme	W	10,135,000
Cork Lower Harbour Sewerage Scheme (Crosshaven SS) (G)	S	4,850,000
Cork Water Strategy Study (G)	W	941,000
Kinsale Sewerage Scheme	S	20,000,000
Midleton Sewerage Scheme (Infiltration Reduction) (G)	S	2,078,000
		41,274,000
Schemes to start 2007		
Cork North		
North Cork Grouped DBO Wastewater Treatment Plant (Buttevant, Doneraile & Kilbrin)	S	5,150,000
Cork West		
Skibbereen Sewerage Scheme	S	20,000,000
		25,150,000
Schemes to start 2008		
Cork North		
Mallow/ Ballyviniter Regional Water Supply Scheme (H)	W	8,652,000
Mallow Sewerage Scheme (H)	S	5,408,000
Cork South		
Ballincollig Sewerage Scheme (Nutrient Removal) (G)	S	948,000
Ballingeary Sewerage Scheme	S	1,296,000
Bandon Sewerage Scheme Stage 2	S	14,729,000
City Environs (CASP) Strategic Study (G)	S	153,000
Cloghroe Sewerage Scheme (Upgrade)	S	683,000
Coachford Water Supply Scheme	W	1,318,000
Garrettstown Sewerage Scheme	S	2,153,000
Inniscarra Water Treatment Plant Extension Phase 1	W	2,678,000
Little Island Sewerage Scheme (G)	S	2,200,000
Cork West		
Bantry Sewerage Scheme	S	7,148,000
Dunmanway Sewerage Scheme	S	2,153,000
Leap/ Baltimore Water Supply Scheme	W	6,365,000
Schull Water Supply Scheme	W	5,253,000
		61,137,000
Schemes to start 2009		
Cork North		
Banteer/Dromahane Regional Water Supply Scheme	W	1,576,000
Conna Regional Water Supply Scheme Extension	W	2,627,000
Cork NE Water Supply Scheme	W	4,326,000
Cork NW Regional Water Supply Scheme	W	6,046,000
Millstreet Wastewater Treatment Plant (Upgrade)	S	1,628,000

Schemes to start 2009 contd.	W/S	Est. Cost
Cork South		
Ballincollig Sewerage Scheme (Upgrade) (G)	S	22,248,000
Cork Lower Harbour Sewerage Scheme (excl. Crosshaven SS)	S	73,542,000
Shannagarry/ Garryvoe/ Ballycotton Sewerage Scheme	S	3,780,000
Youghal Sewerage Scheme	S	14,420,000
Cork West		
Ballydehob Sewerage Scheme	S	683,000
Bantry Water Supply Scheme	W	14,935,000
Clonakilty Sewerage Scheme (Plant Capacity Increase)	S	3,677,000
Courtmacsherry/ Timoleague Sewerage Scheme	S	2,472,000
Dunmanway Regional Water Supply Scheme Stage 1	W	12,669,000
		164,629,000
Serviced Land Initiative		
Cork North		
Ballyclough Water Supply Scheme	W	139,000
Ballyhooley Improvement Scheme	W/S	139,000
Broghill-Rathgoggin Sewerage Scheme	S	406,000
Bweeng Water Supply Scheme	W	115,000
Churchtown Sewerage Scheme (incl. Water)	W/S	543,000
Clondulane Sewage Treatment Plant	S	417,000
Freemount Sewerage Scheme	S	150,000
Pike Road Sewerage Scheme (incl. Water)	W/S	2,080,000
Rathcormac Sewerage Scheme (incl. Water)	W/S	555,000
Spa Glen Sewerage Scheme	S	736,000
Uplands Fermoy Sewerage Scheme (incl. Water)	W/S	1,174,000
Watergrasshill Water Supply Scheme (incl. Sewerage) (G)	W/S	4,151,000
Cork South		
Ballincollig Sewerage Scheme (Barry's Rd Foul and Storm Drainage) (G)	S	1,164,000
Belgooley, Water Supply Scheme (incl. Sewerage)	W/S	2,913,000
Blarney Water Supply Scheme (Ext. to Station Rd) (G)	W	416,000
Carrigtwohill Sewerage Scheme (Treatment and Storm Drain) (G)	S	7,632,000
Castlematyr Wastewater Treatment Plant Extension	S	1,200,000
Crookstown Sewerage Scheme (incl. Water)	W/S	1,200,000
Dripsey Water Supply Scheme (incl. Sewerage)	W/S	1,112,000
Glounthane Sewerage Scheme (G)	S	1,576,000
Innishannon Sewerage Scheme	S	277,000
Innishannon Wastewater Treatment Plant	S	694,000
Kerrypike Sewerage Scheme	S	832,000
Kerrypike Water Supply Scheme	W	416,000
Killeagh Wastewater Treatment Plant Extension	S	1,200,000
Killeagh Water Supply Scheme (includes Sewerage)	W/S	485,000
Killeens Sewerage Scheme	S	420,000
Kilnagleary Sewerage Scheme	S	694,000
Midleton Wastewater Treatment Plant Extension	S	4,050,000

Cork County contd.

Water Services Investment Programme 2007 - 2009

Serviced Land Initiative contd.	W/S	Est. Cost
Cork South contd.		
Mogeely, Castlemartyr & Ladysbridge Water Supply Scheme	W	2,566,000
North Cobh Sewerage Scheme (G)	S	3,193,000
Riverstick Water Supply Scheme (incl. Sewerage)	W/S	525,000
Rochestown Water Supply Scheme	W	2,700,000
Saleen Sewerage Scheme	S	1,051,000
Youghal Water Supply Scheme	W	2,300,000
Cork West		
Castletownshend Sewerage Scheme	S	1,576,000
		50,797,000
Rural Towns & Villages Initiative		
Cork North		
Buttevant Sewerage Scheme (Collection System)	S	2,446,000
Doneraile Sewerage Scheme (Collection System)	S	1,738,000
Cork South		
Innishannon (Ballinadee/ Ballinspittle/ Garrettstown) Water Supply Scheme	W	6,726,000
Cork West		
Ballylicky Sewerage Scheme	S	2,153,000
Baltimore Sewerage Scheme	S	3,162,000
Castletownbere Sewerage Scheme	S	5,202,000
Schull Sewerage Scheme	S	3,523,000
		24,950,000
Schemes to Advance through Planning		
Cork North		
Mitchelstown North Galtees Water Supply Scheme	W	3,152,000
* Mitchelstown Sewerage Scheme	S	3,000,000
Newmarket Sewerage Scheme	S	3,152,000

Schemes to Advance through Planning cond.	W/S	Est. Cost
Cork South		
Carrigtwohill Sewerage Scheme (G)	S	20,000,000
Cork Sludge Management (G)	S	14,420,000
Cork Water Supply Scheme (Storage - Mount Emla, Ballincollig & Chetwind) (G)	W	8,500,000
Inniscarra Water Treatment Plant (Sludge Treatment)(G)	W	5,356,000
Macroom Sewerage Scheme	S	5,150,000
Minane Bridge Water Supply Scheme	W	1,421,000
Cork West		
Bantry Regional Water Supply Scheme (Distribution)	W	9,455,000
Cape Clear Water Supply Scheme	W	1,679,000
Castletownbere Regional Water Supply Scheme	W	8,405,000
Glengarriff Sewerage Scheme	S	2,500,000
Roscarberry/Owenahincha Sewerage Scheme	S	1,576,000
Skibbereen Regional Water Supply Scheme Stage 4	W	7,880,000
		95,646,000
Water Conservation Allocation		**12,206,000**
Asset Management Study		**300,000**
South Western River Basin District (WFD) Project[1]		**9,400,000**
Programme Total		**485,489,000**

[1] This project is being led by Cork County Council on behalf of other authorities in the River Basin District

(H) Refers to a Hub as designated in the National Spatial Strategy

(G) Refers to a Gateway as designated in the National Spatial Strategy

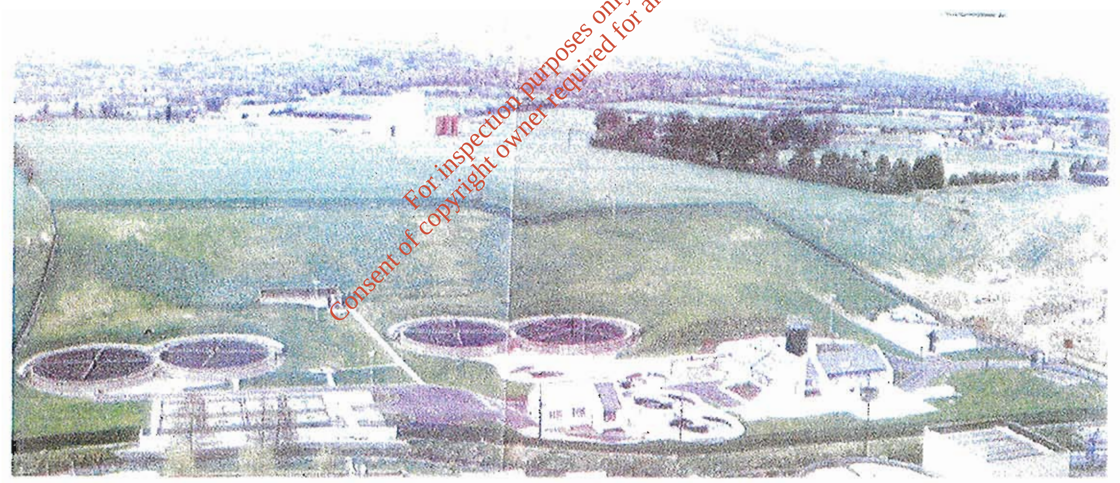
Attachment G.2

Compliance with Water Quality Standards for Phosphorous Regulations (S.I. No. 258 of 1998)

MITCHELSTOWN WASTEWATER TREATMENT PLANT

PRELIMINARY REPORT ON NUTRIENT REMOVAL

FEBRUARY 2004



Cork County Council,
County Hall,
Cork.

T.J. O'Connor & Associates,
Consulting Engineers,
Corrig House, Corrig Road,
Sandyford, Dublin 18

In association with
DHV Water BV
The Netherlands

MITCHELSTOWN WASTEWATER TREATMENT PLANT

DOCUMENT No : 1375 – 001

Title : Preliminary Report on Nutrient Removal

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A	*29/01/04*	Draft of Preliminary Report on Nutrient Removal	KM	LC	EF

TABLE OF CONTENTS Page

APPENDICES

1 INTRODUCTION

The wastewater treatment works at Mitchelstown discharges to the Funshion River just downstream of the confluence with the Gradoge, which flows through Mitchelstown. The Funshion is a tributary of the Blackwater River.

The water quality of the Funshion River and of the Blackwater River has deteriorated in the recent years. The biological quality of the Funshion upstream of the outfall, expressed in the Q-rating, has reduced from Q_5 in the seventies toQ_4 now. This means that the phosphate concentrations in the river have increased. Possible sources are the outfalls from wastewater treatment plant, but also agricultural discharges.

Cork County Council is the local authority responsible for the quality of the river. They take an overall approach to improvement of the quality of the rivers, in which the various sources are identified and subsequently mitigation measures are proposed for the different sources. As part of this programme, the discharge of Mitchelstown wastewater treatment plant has to be investigated and measures have to be proposed for the improvement of the treatment efficiency and hence the river quality.

Cork County Council has assigned T.J. O'Connor & Associates to prepare a Preliminary Report on Nutrient Reduction for the Mitchelstown Wastewater Treatment Plant. In this Preliminary Report appropriate effluent standards are established consistent with the relevant water quality directives for the waterbodies. Secondly, an overview of the existing wastewater treatment plant is given. Thirdly, a preliminary design is made for nutrient removal measures. Finally, the proposed costs are calculated.

2 EFFLUENT REQUIREMENTS

2.1 Introduction

The wastewater treatment works at Mitchelstown discharges to the Funshion River just downstream of the confluence with the Gradoge, which flows through Mitchelstown. The Funshion is a tributary of the Blackwater River.

2.2 Statutory Water Quality Objectives for the Funshion River

There are a number of legislative requirements concerning the quality of effluent discharges from WWTPs, which must be taken into account before deciding upon appropriate standards for the Mitchelstown plant. Foremost among these legislative requirements are the Urban Waste Water Treatment Regulations (SI No. 254 of 2001) which place mandatory standards and dates for compliance on local authority WWTPs. Other relevant legislation which needs to be considered in determining the effluent discharge standards include the phosphorous regulations (SI. No.258 of 1998) and Salmonid Regulations (SI No. 293 of 1988).

2.2.1 Urban Wastewater Treatment Regulations

The Urban Wastewater Treatment Regulations have been in force in Ireland since 1994 under SI No. 419 of 1994 and give effect to a European Union Directive 91/271/EEC. These regulations were recently replaced by SI No. 254 of 2001 under which a significant number of water bodies in the Republic were redesignated as sensitive for the purposes of the regulations. The River Blackwater is designated as such in the stretch downstream of Mallow Railway Bridge to Ballyduff Bridge under Part 2 of the Third Schedule of the Regulations.

Water quality in the Funshion River is routinely monitored by the EPA at a number of sampling stations both upstream and downstream of the outfall from the WWTP. The concentrations of various substances in these samples are analysed in accordance with the recommendations of the EPA Handbook on Implementation (of the UWWTD) for Sanitary Authorities.

The UWWT Regulations state that a sanitary authority shall provide treatment plants which provide more stringent treatment than secondary treatment or an equivalent treatment in respect of all discharges from agglomerations with a population equivalent of more than 10,000 into sensitive areas or into the relevant catchment areas of sensitive areas where the discharge contributes to the pollution of these areas.

Since the capacity of the Mitchelstown WWTP is only 6,000, the requirements of the Directive as regards more stringent treatment i.e. Part 2 of the second schedule of the Regulations do not apply.

The treatment plant at Mitchelstown already complies with the requirements of Article 4 of the Regulations, i.e. a treatment plant providing secondary treatment or an equivalent in respect of discharge to freshwater from an agglomeration with a population equivalent between 2,000 and 10,000.

For Mitchelstown the discharge standard required under the regulations is based on the three parameters as shown in Table 1 below. The regulations provide for local authorities achieving either a specified effluent concentration as in column two below, ***or*** a specified reduction in the influent load and are those set out in Part 1 of the Second Schedule of the Regulations.

Table 1 – Effluent discharge requirements under the wastewater treatment regulations

Parameters	Concentration (mg/l)	Minimum Percentage Reduction
BOD	*25 mg O_2/l	90
Suspended Solids	*35 mg/l	90
COD	*125 mg O_2/l	75

* Standard to be achieved by 95% of samples or more

In practice most local authorities adopt a concentration based approach (column 2) to the management of WWTP discharges.

In Table 2 the average effluent concentrations of Mitchelstown WWTP over the period 1997-1999 are presented. Table 3 gives some data from four months in 2000, the whole years 2001 and 2002 and 5 months in 2003.

Table 2 – Effluent concentrations 1997-1999

Parameters	Concentration (mg/l)		
	1997	1998	1999
COD	57	45	51
BOD	10.6	13.3	17.9
Suspended Solids	11	8.5	20.3
NH_4-N	3.7	3.1	4.2

Table 3 – Effluent concentrations 2000

Parameters	Concentration (mg/l)			
	2000	2001	2002	2003
COD	97	70	76	70
BOD	36	18	18	14
Suspended Solids	22	39	44	24
NH_4-N	6.2	19.8	18.5	14.1
P_{total}	25.8	3.5	2.9	2.7

As can be concluded from Tables 2 and 3, the effluent standards for BOD and Suspended Solids were not met on some occasions in 2000 and 2001. In previous years, the WWTP consistently exceeded the requirements of the Urban Wastewater Treatment Directive.

2.2.2 Phosphorous Regulations

These regulations (SI 258 of 1998) known as the Local Government (Water Quality Standards for Phosphorous) Regulations 1998, were brought into force to tackle a significant deterioration in water quality standards in Irish surface waters in the recent past and principally the problem of eutrophication. The regulations place an obligation on local authorities to maintain or improve water quality standards in terms of biological quality ratings. Each major river within the state including the Funshion River has been assigned a biological water quality rating (referred to a Q rating) based on sampling at different stations along the river conducted in the period 1971 to 2000. The regulations provide 7 classes of biological water quality ratings based either on surveys of macro invertebrate communities and faunal groups in the water or on concentrations of Molybdate Reactive Phosphorous (MRP). Three of these Q ratings represent higher MRP values and are an unsatisfactory classification under the regulations while two are termed transitional and the remaining two are satisfactory. Under the regulations the local authority must maintain these standards in the case of satisfactory Q ratings, and must in the case of unsatisfactory Q ratings, bring about an improvement to a satisfactory or transitional standard by no later than 31 December 2007. Table 4 below summarises the MRP limits in the regulations and the target Q rating to be achieved.

Table 4 –Q-Ratings

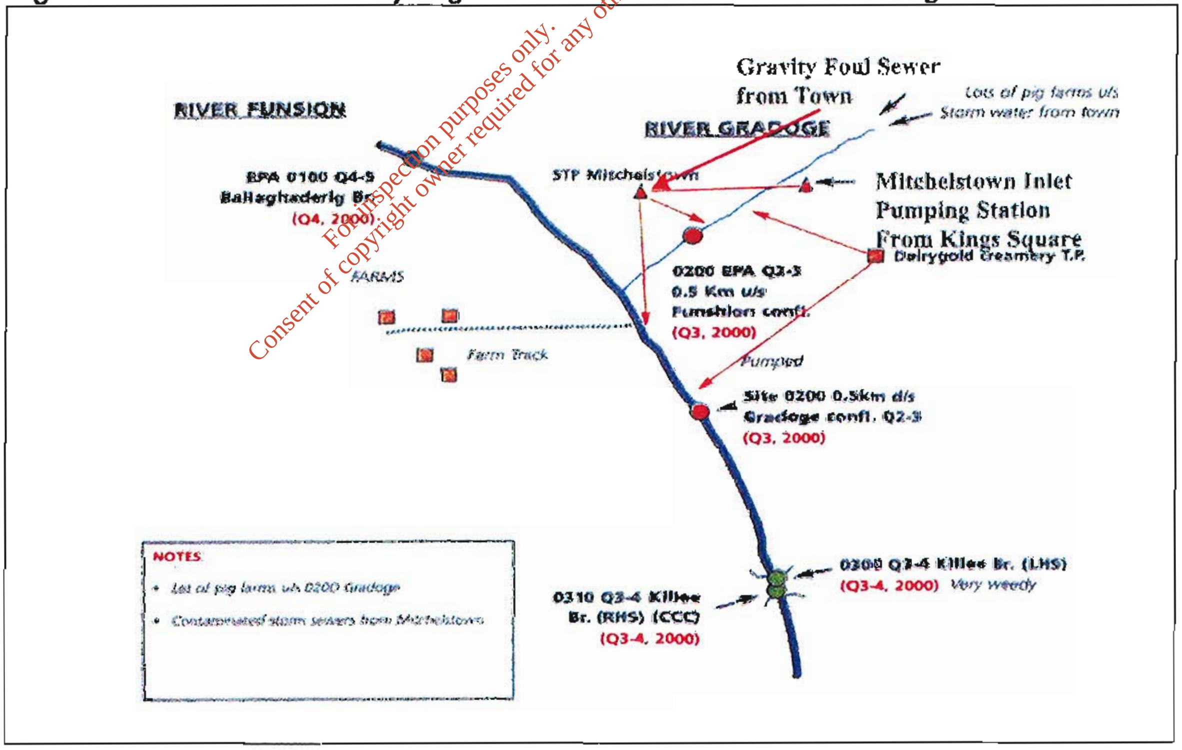
Existing Biological Quality (Q) Rating		Molybdate-Reactive Phosphorus Annual Median Concentration (mg/l)	Minimum Target Biological Quality (Q) Rating
5	Unpolluted	0.015	5
4-5		0.020	4-5
4		0.030	4
3-4	Slightly Polluted	0.030	4
3	Moderately Polluted	0.050	3-4
2-3		0.070	3
<2	Seriously Polluted	0.070	3

The baseline and most recent results for two sampling stations on the Funshion River, one upstream and one downstream of both the WWTP outfall and the confluence with the Gradoge, are presented in the Table 5 below. Also, the Q-ratings of the two sampling stations on the Gradoge River are given. An overview of the Q-ratings for these sampling stations for the period 1971-2000 is included in Appendix 1. The various sampling points are presented in Figure 1.

Table 5 – Baseline and most recent Q ratings under the Phosphorous regulations.

Station	***Location***	***Q rating***		***Designation***
		baseline	***most recent***	
Funshion River				
0100	Ballaghaderg Bridge	4-5	4	Satisfactory
0200	0.5 km d/s Gradoge confluence	2-3	3	Transitional
Gradoge River				
0100	Bridge 1 km east of Mitchelstown	- (in '90:3)	-	
0200	Just u/s Funshion confluence	2-3	3	Transitional

Figure 2 – Overview of sampling stations at Funshion and Gradoge rivers



The overview from 1971-2000 shows a slight deterioration of the water quality of the Funshion upstream of the Gradoge confluence, The Q-rating was Q_5 in the seventies, $Q_{4/5}$ in the eighties and nineties and is now Q_4. Downstream of the confluence a slight improvement can be seen with Q_1 in the early seventies to $Q_{2/3}$ or Q_3 afterwards. The same pattern can be seen in the Gradoge River downstream of Mitchelstown. The Q-ratings was Q_1 in the seventies and eighties and became $Q_{2/3}$ or Q_3. This is most likely due to the construction of improved wastewater treatment plant facilities at the Dairy

Gold Complex and at the municipal plant.

Low water quality ratings are often associated with poor nutrient management and spreading practices by farmers causing runoff of agricultural slurries and artificial fertilisers. However WWTPs have also been identified as a significant source of phosphorous. In these instances higher standards of treatment including phosphorous removal may be required to comply with the regulations. Phosphorous removal under the wastewater treatment regulations is only mandatory for plants over 10,000 PE discharging to 'Sensitive Waters' as designated under the Urban Wastewater Treatment Regulations, 1994-2001, but may also be required at smaller plants where these are seen to have a significant impact on Q-ratings.

2.2.3 Salmonid Regulations

These regulations are designed to protect the habitat of game fish in selected waters in the Republic. The European Communities (Quality of Salmonid Waters) 1988, SI No. 293 of 1988 gives effect to the Fresh Water Fish Directive of 1978 (78/659/EEC) and places limits on 13 key parameters affecting the viability of game fish in the designated water bodies, including BOD, dissolved oxygen, nitrites and un-ionised ammonia. Under the Directive, a second water quality designation (cyprinid) requires a lower water quality standard than salmonid status. This standard is appropriate to support coarse fish. However currently there are no designated cyprinid waters in the state and all designations to-date have been to salmonid status. Table 6 below gives the main water quality requirements for salmonid status. The table does not show the standards for petroleum and phenolic compounds nor zinc and copper the latter of which have variable permissible concentrations depending on water hardness.

Table 6 - Salmonid water quality parameters and limits under SI No. 293 of 1988

Parameter	Standard
Dissolved Oxygen	50% of samples >9 mg O_2/l and not less than 6mg O_2/l
Suspended Solids	25 mg/l
PH	>6.9*
BOD	5 mg O_2/l*
Nitrites	0.05 mg NO_2/l*
Un-ionised ammonia	0.02 mg NH_3/l*
Total ammonia	1 mg NH_4/l*
Residual Chlorine	0.005 mg HOCl/l*

*Standard to be achieved by 95% of samples or more

Although the Funshion River is not a designated salmonid water, it is a tributary of the Blackwater River, which is designated. However, some of the concentrations of the parameters mentioned in Table 6 measured upstream of the confluence of the Funshion and the Blackwater River exceed the standards. To improve the water quality of the Blackwater River, it is not only necessary to reduce the direct discharges into the river (e.g. improvement of the treatment efficiency of WWTPs in Mallow and Fermoy), but also to reduce the loads in the tributaries.

2.3 EPA Water Quality Sampling and Measurement

EPA water quality sampling is routinely undertaken at 6 stations along the Funshion River. Results from the analysis of these samples for the period 1998 to 2002 are presented in Appendix 2. The first station is upstream of the treatment works, the other five downstream.

Table 7 below is a summary of water quality sampling results at two stations for this period. The table provides the median values of several parameters analysed over the three-year period.

Table 7 – Median water quality sampling results at station 0150 and 0310 (1998-2002)

	Un-ionised Ammonia (mg/l)	Total Ammonia (mg/l)	Oxidised Nitrogen (mg/l)	BOD (mg/l)	Dissolved Oxygen (mg/l)	Ortho-Phosphate (mg/l)
0150	<0.001	0.03	11.5	1.0	-	0.02
0310	0.002	0.11	2.0	1.6	10.0	0.09

Station 0150 is approximately 0.6 km downstream of Ballaghaderg Bridge. It provides an indication of water quality in the river after any diffuse agricultural losses have entered the river but before pollution associated with villages. An examination of the individual sample results shows that the samples would comply with the salmonid standards.

Station 0310 is at Killee Bridge, approximately 1.5 km downstream of the confluence with the Gradoge and the outfall f the WWTP. There is a marked deterioration in water quality from station 0100 under a number of parameters including un-ionised ammonia, total ammonia, BOD, oxidised nitrogen and ortho-phosphate. But as at station 0100, the results show that the river would meet the salmonid standard.

As a reference, the water quality of the Gradoge River and the Blackwater River is presented in Table 8 below.

Table 8 – Median water quality sampling results at stations at Gradoge and Blackwater Rivers (1998-2002)

	Un-ionised Ammonia (mg/l)	Total Ammonia (mg/l)	Oxidised Nitrogen (mg/l)	BOD (mg/l)	Dissolved Oxygen (mg/l)	Ortho-Phosphate (mg/l)
Gradoge						
0100	0.003	0.06	3.4	2.2	-	0.06
0200	0.005	0.12	3.7	2.0	9.6	0.08
Blackwater						
2300	0.001	0.04	3.2	1.2	10.6	0.05
2450	0.001	0.04	3.5	1.2	10.8	0.05

The water quality of the Gradoge River is substantially worse for all parameters than the quality of the Funshion. The results of the Blackwater show a relatively good quality compared to the Funshion with the exception of oxidised nitrogen and ortho-phosphate.

Independent analysis carried out by Cork County Council in the Gradoge River in 2000 show some remarkable concentrations, as can be seen in Table 9 below. The sampling location is 6g, east of the bridge in Mitchelstown.

Table 9 –Water quality sampling results at station 6g at Gradoge River

	Total Ammonia (mg/l)	COD (mg/l)	BOD (mg/l)	Ortho-Phosphate (mg/l)
22/6/00	0.05	1,930	> 190	1.8
27/6/00	0.42	300	340	2.5
6/7/00	0.01	22	12	2.4
30/8/00	0.03	26	6	1.0
13/9/00	0.37	980	549	4.1
18/7/02	0.41	9	1.1	8.9

These concentrations are multiples of the concentrations as presented by the EPA and in some cases even do exceed raw wastewater concentrations. The most likely source of the pollution load is discharges upstream or from the storm overflows on th etown pipe network.

2.4 Funshion River Flow

For the purposes of estimating the required effluent discharge standards, low flows in the river are of particular importance. These are used for calculations of dilution, and fully mixed pollutant concentrations and, when combined with background water quality measurements, they provide an accepted basis for determining appropriate effluent discharge standards. A widely accepted characterisation of low flows in rivers is the ninety-fifth percentile flow. This represents the value at which, statistically, flow in the river will be higher for 95% of the time.

The Office of Public Works (OPW) operates a gauging station on the Funshion River at Downing Bridge, near the confluence with the Blackwater River. This gauging station has been in place since 1973. The estimated 95 percentile flow is 1.93 m^3/s. It should be noted, that this is lower near Mitchelstown.

2.5 Effluent Discharge Standards

The discharge standards for the treated effluent from the upgraded Mitchelstown plant needs to take account of both statutory requirements under the various enactments referred to above and other non statutory objectives relating to the improvement of the water course. The following as discussed in the previous sections will therefore need to be considered in defining the standard to be achieved.

1. The Urban Waste Water Treatment Regulations
2. The Phosphorous regulations
3. Assimilative Capacity of the Funshion River
4. Salmonid Standards for the Blackwater River

2.5.1 *UWWT Regulations*

These regulations provide for a minimum standard as described in 2.1 above. The requirements include the BOD, suspended solids and COD standards set out in the Table 1.

2.5.2 *Phosphorous Regulations*

The EPA results show an ortho-phosphate concentration of 0.02 mg P/l upstream of the WWTP outfall. The actual Q-rating of the Funshion River at that location is Q_4. The baseline rating however is Q_{4-5}. The biological quality of the river has deteriorated since the baseline date, which implies that the baseline rating should be aimed at. This means that the median MRP (which is comparable to ortho-phosphate) is limited at 0.02 mg P/l. This would imply that no additional phosphate might be discharged into the river downstream of the sampling station, resulting in an absolute phosphate removal at the WWTP. This is not realistic. The policy of Cork County Council is to improve the river quality by focusing on all possible discharges as wastewater treatment plants and agriculture.

The following discharge standard from the Mitchelstown plant is chosen as a pragmatic approach:

- assume an effluent concentration of 1 mg P/l;
- the average flow through the WWTP of 1,620 m^3/d;
- this results in a phosphate load of $1.10^{-3} \times 1,620 = 1.62$ kg/d;
- the 95 percentile flow of the Funshion River is 166,000 m^3/d;
- the phosphate contribution to the river by the effluent of the WWTP can be calculated at $1.62.10^3 / 166,000 = 0.01$ mg/l.

By setting a discharge standard of 1 mg/l for the WWTP, the total phosphate concentration in the River Funshion will increase by 0.01 mg/l. The ortho-phosphate (and hence MRP) concentration will increase by 0.8 mg/l. This will result in an improvement of the water quality, although the baseline Q-rating will not be achieved by this single measure. Additional measures, particularly in the agricultural sector, should also be taken.

A requirement of 1 mg/l for the WWTP in Mitchelstown can be considered as achievable with available techniques without extreme costs, thus in accordance with the BATNEEC principle.

The decreased phosphate load in the Funshion River will also result in lower phosphate concentrations in the Blackwater.

The proposed discharge standard of 1 mg P/l has been agreed upon by the Environmental Department of Cork County Council.

2.5.3 *Assimilative Capacity of the Funshion River*

The WWTP in Mitchelstown is already achieving partially nitrification and the ammonia concentrations in the effluent are low. With minor modifications of the existing plant, full nitrification is possible, resulting in ammonia concentrations of 2-3 mg/l. This will slightly improve the quality of the River Funshion, which already meets the standards for salmonid water in respect of ammonia.

The un-ionised ammonia concentrations in the effluent and the river depend on the pH of the water and are normally very low. By achieving full nitrification, the un-ionised ammonia concentration of the effluent is so low, that the contribution to the river is negligible. As can be seen from Tables 6 and 7, the quality of the River Funshion already meets the standards for un-ionised ammonia.

Although there is no strict requirement for ammonia concentrations, we would propose a target level of 3 mg/l, especially because it is achievable with the existing plant.

2.6 Summary

Table 10 below summarises the proposed treated effluent standards for the upgraded treatment works.

Table 10 - Proposed Treated Effluent Discharge Standards

Parameter	Concentration	Unit
COD	125	mg/l
BOD	25	mg/l
Suspended Solids	35	mg/l
Total Ammonia	3.0	mg/l
Total Phosphorous	1.0	mg/l

3 EXISTING WASTEWATER TREATMENT PLANT

3.1 Description of the Plant

Mitchelstown wastewater treatment plant was built in the late 1950's / early 1960's and refurbished in the 1990's. It has a design capacity of 6,000 PE, but serves a current population of about 4,100 and is located west of Mitchelstown on the banks of the Gradoge River. The effluent is discharged to the Funshion River via an outfall pipe along the banks of the Gradoge.

The works comprise the following:

- inlet works;
- 2 No. stormtanks (415 m^3);
- 3 No. primary sedimentation tanks (415 m^3);
- 4 No. biological filters (surface area 1,605 m^2, volume 415 m^3);
- 8 No. humus tanks (surface area 297 m^2);
- effluent pumping station;
- sludge pumping station;
- picket fence thickener;
- sludge digestion plant;
- sludge dewatering plant;
- sludge holding tanks;
- administration building.

Figure 2 - Layout of Mitchelstown WWTP

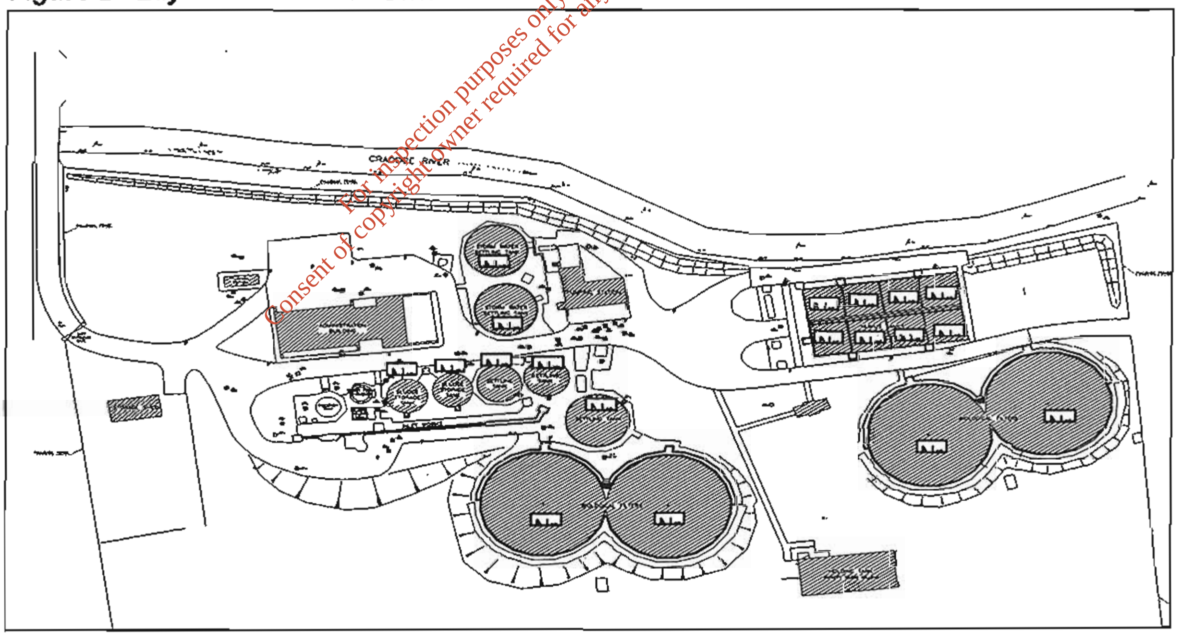
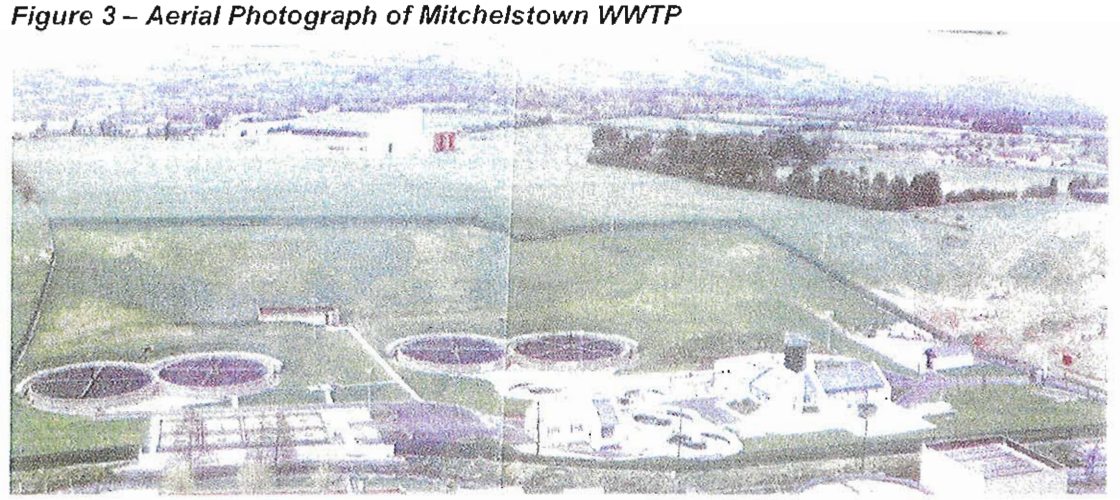


Figure 3 – Aerial Photograph of Mitchelstown WWTP



3.2 Treatment Efficiency

The available sampling data from both influent and effluent of the WWTP is given in Tables 11-14. The samples in the years 1997 to 2000 are composite samples, while the samples in the following years are grab samples.

Table 11 –COD

	Influent	Effluent	Removal Efficiency
1997	577	57	90
1998	485	45	91
1999	536	51	90
2000	313	97	69
2001		70	
2002		76	
2003		70	

Table 12 –BOD

	Influent	Effluent	Removal Efficiency
1997	284	10.6	96
1998	191	13.3	93
1999	284	17.9	94
2000	208	36	83
2001		18	
2002		18	
2003		14	

Table 13 – Suspended Solids

	Influent	Effluent	Removal Efficiency
1997	239	11	95
1998	134	8.5	94
1999	149	20.3	86
2000	62	22	65
2001		39	
2002		44	
2003		24	

Table 14 – Phosphate

	Influent	Effluent	Removal Efficiency
1997			
1998			
1999			
2000	19.6	25.8	-32
2001		3.5	
2002		2.9	
2003		2.7	

As can been seen from the previous tables, all results give a very fragmented view of the influent and effluent concentrations and hence the removal efficiency. The following, broad conclusions might be drawn:

- the COD and Suspended Solids efficiency has deteriorated since 1999;
- the BOD removal has improved since 1999;
- the Suspended Solids concentrations in 2000 are very low;
- phosphate shows a negative efficiency in 2000;
- there is a discrepancy in phosphate concentrations in 2000 and 2002 between Cork County Council Laboratory Analytical Report (> 20 mg P/l in both influent and effluent) and Cork County Council Wastewater Laboratory, Iniscara, Reports (± 3 mg P/l in effluent)

3.3 Status of Plant

T.J. O'Connor & Associates have visited the wastewater treatment plant during December 2003. During this visit the following observations of the status of the various process units were made. The numbers refer to Figure 2.

Table 15 – Status

Unit		Comments
Inlet Works		Some ragging on the screens
Administration Building		Locked
Pumping Station		Locked
Storm Water Settling Tanks	Nr. 1 & Nr. 2	These tanks were both full at the time of the visit. There were dried faeces on the overflow wall between the tank and the overflow channels. The bridges were not rotating during the period of the visit.
Settling Tank	Nr. 1	On the surface there were two arms on the bridge, but only one had a flexible end to push scum into the drop scoop. No surface scum in this tank
	Nr. 3	The water surface scraper and dipping scoop arrangement didn't seem to be working very effectively. As the scrapper passed over the dipping scoop about 30% of the surface scum passed under the bridge arm and avoided the scoop.
Biological Filters	Nr. 1	There is grass and moss growth around the outside edge of this filter about 1.0 to 0.5 m from the wall and approximately 2.0m from the centre. There are weeds growing in the channel outside the filter.

Unit		Comments
	Nr. 2	There are large clumps of grass (approx 2m x 2m) growing in two locations on top of the limestone medium.
	Nr. 3 & Nr. 4	There is grass and moss growth around the outside edge of this filter with a majority of the growth occurring at the common wall area of Biological filter Nr 3 & 4.
Humus Tanks	Nr. 1 to Nr. 8	Over grown with grass and rushes. Nr 2 was the only one where any water on the surface could be seen and it had green algae growing on it as well as large areas of grass.
Holding Tank for 'Creamery' Effluent		Would appear to have not been used in some time as it has a lot of moss growing in it.

It appears that the maintenance of the wastewater treatment plants has been on a low level in the recent years. Exceeding of the discharge standards for e.g. suspended solids might be due to the quality of the humus tanks.

Meeting the discharge standards for both organic substances (BOD and COD) and nutrients (phosphate, ammonia) will highly depend on the operational status of the various process units. It is recommended to clean all tanks and remove scum layers, grass, weeds and moss.

3.4 Increase of the Capacity

The design capacity of Mitchelstown WWTP is 6,000 PE, while the current load is approximately 4,100 PE.

From a process point of view, the dimensions of the primary sedimentation tanks, trickling filters and humus tanks are sufficient to cater for a load of 9,000 PE The plant currently operates as single pass through the biological filters. If the operation were switched to alternating double filtration mode, the increase to 9,000 PE should be accommodated. This would require the installation of additional pumping plant and the re-routing / diversion of flows but this could be readily achieved in the existing layout. However, a more detailed investigation would need to be carried out on the capacity of the pumps, the pipework and the airflow to the trickling filters.

With the available information on the sludge treatment it is not possible to give an opinion on the additional measures (storage, plant etc) that would be required to cater for a 50% increase in sludge load. Data on both the primary and humus sludge flows and concentrations, the actual status of the digesters and pipework is necessary for this.

4 DESIGN OF NUTRIENT REMOVAL

4.1 Method of Nutrient Removal

The WWTP Mitchelstown has to be upgraded to achieve nutrient removal. Phosphorous should be removed and the nitrification process should be improved to meet the effluent requirements as set out earlier in Table 10.

Due to the fact that the WWTP has trickling filters and no activated sludge process, it is not possible to remove the phosphorous biologically. Only chemical methods are possible. In principal, two different locations for chemical dosing can be distinguished:

1. before the primary sedimentation tanks;
2. before the humus tanks.

Dosing before primary sedimentation tanks

By dosing chemicals in the splitter box before the sedimentation tanks, the phosphate will be bound and drawn off with the primary sludge. An advantage of dosing at this location is that the overall removal efficiency of the primary sedimentation tanks will significantly increase, resulting in lower loads to the trickling filters and hence higher performances such as full nitrification.

Dosing before humus tanks

Dosing before the humus tanks is a kind of enhanced post-sedimentation process. The efficiency of the final stage will be increased resulting in lower suspended solids in the effluent. However, when the sedimentation tanks are properly functioning, these concentrations should already be low (< 10 mg/l).

For the reasons mentioned above dosing of chemicals before the primary sedimentation tanks is the preferred option. It will not only remove phosphorous, but also increase the removal of organic material and enhance the nitrification.

4.2 Chemical Dosage

The chemical dosage is normally based on the phosphorous concentrations in the wastewater influent and expressed as a metal – phosphorous ratio. The maximum general dose is 1.5, which means that for 1 mole of phosphorous, 1.5 mole of metal will be dosed.

The available data on phosphorous concentrations in the influent is very limited. Composite samples for a number of days in 2000 and 2002 can be used. They are listed in Table 16 below.

Table 16 – Influent phosphorous concentrations

Date	Concentration (mg/l)
22-6-2000	21.6
27-6-2000	17.7
6-7-2000	17.7
30-8-2000	18.8
13-9-2000	21.4
18-7-2002	24.6
28-8-2002	18.0

From Table 16, it can be concluded that the average phosphorous concentration in the wastewater is very high. It is approximately 2.5 times higher than in normal domestic

wastewater. Likely sewers should be investigated as it may be caused by discharges from the non-domestic sector.
The information in Table 16 needs to be expanded for a proper design of a chemical dosing installation. It is recommended to carry out a limited analysis of two weeks of daily sampling the influent flows and phosphate concentrations. This should be preferably done by flow proportional sampling, but when this is not possible time based sampling is a reasonable alternative.

The design flow for a population of 6,000 PE is 1,620 m^3/d. The maximum flow to works (MFW) is 400 m^3/h, while the flow to full treatment (FFT) is limited to 200 m^3/h. The latter figure is taken as starting point for the design of the dosing installation.

The calculations for the dosing installation have been listed in Table 17.

Table 17 – Sizing of dosing installation

Parameter	Unit	Value
Design influent P-concentration	mg P/l	20
Amount of P-moles	-	0.645
Mole/mole ratio (Fe/P)	-	1.5
Amount of iron moles	-	0.968
Design iron concentration	mg Fe/l	54.2
Solution $FeCl_3$	%	40
Design $FeCl_3$ concentration	mg $FeCl_3$/l	393
Maximum flow	m^3/h	200
Maximum $FeCl_3$ dosage	kg/h	78.6
Specific weight	kg/m^3	1,440
Necessary capacity	l/h	55
Number of pumps	-	1 (+1)
Capacity each	l/h	10-60
Average dose	m^3/d	0.44
Storage period	d	30
Storage volume	d	15
Number of tanks	-	1

5 OTHER ADDITIONAL WORKS

In the past we have been asked to address other possible works at the existing plant. These include:

1. the upgrading / re-commissioning of the aerobic sludge digester tank;
2. additional safety railings and walkways around the humus tanks;
3. general operational problems

Also the question of the possible addition of a fats, oil and grease removal plant was queried at the end of January of this year.

Subject to available funding, each of the above items can be addressed and incorporated in any refurbishment / upgrading programme of works. Provisional costings are given in Section 6.

In Appendix 3, a layout of the wastewater treatment plant is given with the location of all works mentioned in this report. Appendix 4 covers a number of photographs of the considered process units.

6 COSTINGS

The costs for the various items have been estimated and are listed in the following table.

Table 18 – Estimated Costs

Item	Costs [€]
Ferric Dosing Installation	75,000 + VAT
• civil: 35,000 € • mech./elec.: 40,000€	
Fat, Oil and Grease Removal	50,000 + VAT
Railings Humus Tanks	33,250 + VAT
Evaluation Visit for Possible Upgrade Digester Tank (Fuchs personnel)	2,950 + VAT
Total	**161,200 + VAT**
General Operation Problems	To be decided

In Appendix 5, correspondence on the costings for the railings for the humus tanks, the evaluation visit for the digester and the fat, oil and grease systems is enclosed. Also, a letter on general operational problems as issued by the resident engineer is attached.

Appendix 1: Q-Ratings

River and Code	:	**FUNSHION**	**18/F/05**
Tributary of	:	Blackwater (Munster)	OS Catchment No: 190
OS Grid Ref	:	W 837 002	

Sampling Stations — Biological Quality Ratings (Q Values)

No.	1971	1974	1975	1978	1979	1980	1982	1985	1986	1990	1994	1997	2000
0020	-	-	-	-	-	-	-	-	-	5	-	-	-
0030	-	-	-	-	-	-	-	-	-	-	5	5	5
0040	-	-	-	-	-	-	-	-	-	4-5	-	-	-
0060	-	-	-	-	-	-	-	-	-	4	**3**	4	-
0070	-	-	-	-	-	-	-	-	-	5	-	-	-
0100	5	5	5	5	-	4	5	4-5	4-5	4-5	4-5	4-5	4
0150	-	-	-	-	-	-	-	-	-	4-5	-	-	-
0200	**1**	**1**	**1-2**	**3**	-	**3**	**3**	**2-3**	**3**	**3**	**3**	**2-3**	**3**
0300	**1-2**	**1-2**	**2**	**3**	-	**3**	-	**2-3**	**2-3**	**3-4**	**3**	**3-4**	**3-4**
0310	-	-	-	-	-	-	-	-	-	**2-3**	-	**3-4**	**3-4**
0400	**2-3**	**3**	**2-3**	4	-	**3**	-	**3**	-	**3-4**	**3**	4	**3-4**
0500	4	4	4-5	4	-	4	-	**3-4**	-	4	**3-4**	4	4
0510	-	-	-	-	-	-	-	-	-	-	-	-	**3**
0600	-	-	-	-	4-5	-	-	4	-	4	-	-	-
0700	4-5	-	4-5	-	4	-	-	4	-	4	**3-4**	4	4
0760	-	-	-	-	-	-	-	-	-	4	-	-	-
0780	-	-	-	-	-	-	-	-	-	-	**3-4**	-	-
0800	-	-	-	-	**3-4**	-	4	4	-	4	4	4	4
0820	-	-	-	-	-	-	-	-	-	4-5	-	-	-
0900	5	-	5	-	4	-	4	4	-	4-5	4	4-5	4
1000	-	-	-	-	4-5	-	4	4	-	4	4-5	4	4
1100	4-5	-	4	-	4-5	-	-	4	-	4	4	4	4

No.	Location	No.	Location
0020	Br nr Galty Castle	0500	Glenavuddig Br (LHS)
0030	Brackbaun Br	0510	Glenavuddig Br (RHS)
0040	Ahnaseed Br	0600	Ford u/s Farahy R
0060	Kilbeheny Br	0700	Br NE of Carrigdownane
0070	1.1km d/s Kilbeheny Br	0760	Ford at Curraghoo More
0100	Ballaghaderg Br	0780	Ford W of Dunmahon
0150	0.6km d/s St 0100	0800	Br at Glanworth
0200	0.5km d/s Gradoge R confl	0820	1.6km d/s St 0800
0300	Killee Br (LHS)	0900	Ballynahow Br
0310	Killee Br (RHS)	1000	Downing Br
0400	Marshalstown Br	1100	Br u/s Blackwater R confl

River and Code : **GRADOGE*** **18/G/13**
Tributary of : Funshion OS Catchment No: 190
OS Grid Ref : R 797 137

Sampling Stations Biological Quality Ratings (Q Values)

No.	1971	1974	1975	1978	1980	1982	1985	1986	1988	1989	1990	1994	1997	2000
0050	-	-	-	-	4	3-4	-	-	-	-	3	-	-	-
0100	-	-	-	-	4	3-4	3	3	-	-	3	-	-	-
0200	1	1	1	1	2	1	1	1	2	2-3	2-3	2-3	2-3	3

No.	Location
0050	Br nr Ballynamona
0100	Br 1km E of Mitchelstown
0200	Just u/s Funshion R confl

Appendix 2: Water Quality Sampling Results

River and Code	:	**FUNSHION**	**18/F/05**
Tributary of	:	Blackwater (Munster)	OS Catchment No: 190
OS Grid Ref	:	W 837 002	

Results of Chemical Analyses 1998 to 2000:
Data Set: 1 18F05 Cork County Council

Station No.	pH				Conductivity µS cm-1				Temperature oC			
	No.	Min	Med	Max	*No.*	Min	Med	Max	*No.*	Min	Med	Max
0150	*7*	7.4	7.7	7.8	-	-	-	-	*9*	7.0	13.0	14.0
0310	*7*	7.5	7.8	7.9	-	-	-	-	*9*	7.0	13.0	15.6
0400	*6*	7.5	7.8	7.9	-	-	-	-	*7*	7.0	12.5	15.0
0500	*8*	7.4	7.8	7.9	-	-	-	-	*9*	7.0	12.5	15.0
0800	*7*	7.6	7.9	8.0	-	-	-	-	*9*	7.0	13.0	15.5
1000	*7*	7.5	7.9	8.1	-	-	-	-	*8*	7.0	12.2	16.0

Station No.	Dissolved Oxygen % Saturation				Dissolved Oxygen mg O_2 1-1				B.O.D mg O_2 1-1			
	No.	Min	Med	Max	*No.*	Min	Med	Max	*No.*	Min	Med	Max
0150	-	-	-	-	-	-	-	-	*7*	0.4	1.0	4.7
0310	*4*	85	99	110	*4*	9.1	10.0	11.8	*10*	1.0	1.6	**7.7**
0400	-	-	-	-	-	-	-	-	*7*	0.7	2.0	**8.0**
0500	*4*	77	90	117	*4*	8.1	9.4	12.5	*9*	0.8	1.5	**8.0**
0800	-	-	-	-	-	-	-	-	*7*	1.3	**3.1**	**6.2**
1000	*4*	**7**	92	98	*4*	**0.8**	9.4	10.5	*6*	0.6	2.3	**19.0**

Station No.	Chloride mg Cl 1-1				Total Ammonia mg N 1-1				Un-Ionised Ammonia mg NH_3 1-1			
	No.	Min	Med	Max	*No.*	Min	Med	Max	*No.*	Min	Med	Max
0150	-	-	-	-	*19*	0.02	0.03	**0.34**	*7*	<0.001	<0.001	0.002
0310	-	-	-	-	*18*	0.03	**0.11**	**0.47**	*7*	0.001	0.002	0.003
0400	-	-	-	-	*17*	0.02	0.10	**0.53**	*6*	<0.001	0.001	0.003
0500	-	-	-	-	*19*	0.02	0.07	**0.76**	*8*	<0.001	0.001	0.005
0800	-	-	-	-	*18*	0.02	0.04	**0.39**	*7*	0.001	0.001	0.005
1000	-	-	-	-	*17*	0.02	0.03	**2.93**	*7*	0.001	0.001	0.016

Station No.	Oxidised Nitrogen mg N 1-1				Ortho-Phosphate mg P 1-1				Colour Hazen			
	No.	Min	Med	Max	*No.*	Min	Med	Max	*No.*	Min	Med	Max
0150	*7*	1.0	1.5	2.0	*19*	<0.01	0.02	0.10	-	-	-	-
0310	*7*	1.4	2.0	3.1	*18*	**0.04**	**0.09**	**0.22**	-	-	-	-
0400	*6*	1.5	2.3	3.1	*17*	**0.03**	**0.09**	**0.21**	-	-	-	-
0500	*8*	1.8	2.4	3.8	*19*	**0.04**	**0.09**	**0.23**	-	-	-	-
0800	*7*	2.3	3.5	4.7	*18*	0.02	**0.09**	**0.20**	-	-	-	-
1000	*7*	2.3	4.4	5.1	*17*	**0.03**	**0.07**	**0.20**	-	-	-	-

River and Code	:	**GRADOGE***	**18/G/13**
Tributary of	:	Funshion	OS Catchment No: 190
OS Grid Ref	:	R 797 137	

Results of Chemical Analyses 1998 to 2000:
Data Set: 1 18G13 Cork County Council

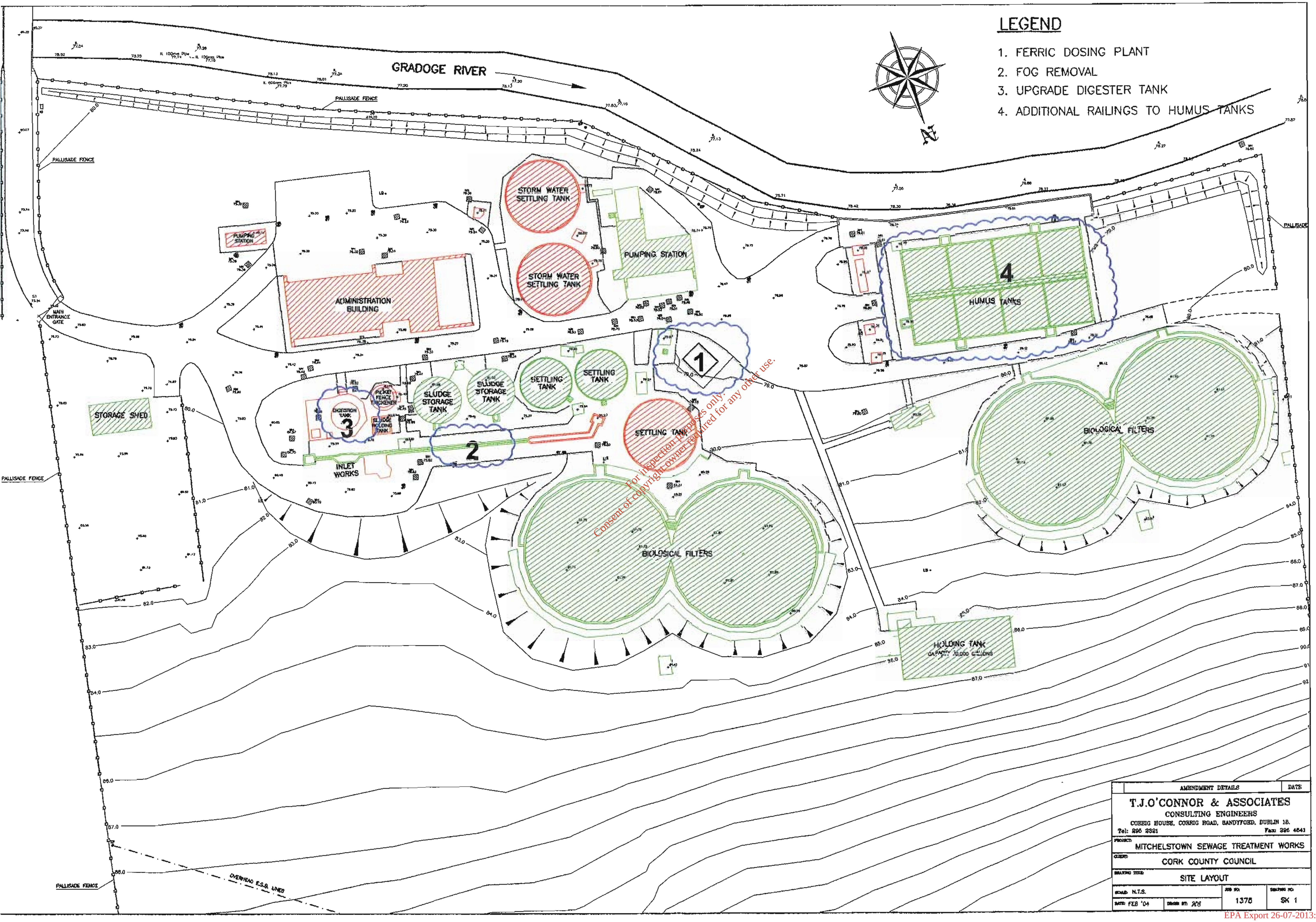
Station No.	pH				Conductivity µS cm^{-1}				Temperature oC			
	No.	Min	Med	Max	*No.*	Min	Med	Max	*No.*	Min	Med	Max
0100	*5*	7.4	7.8	7.8	-	-	-	-	*5*	7.0	13.0	16.4
0200	*6*	7.7	7.8	7.8	-	-	-	-	*7*	7.0	13.5	16.0

Station No.	Dissolved Oxygen % Saturation				Dissolved Oxygen mg $O_2 1^{-1}$				B.O.D mg $O_2 1^{-1}$			
	No.	Min	Med	Max	*No.*	Min	Med	Max	*No.*	Min	Med	Max
0100	-	-	-	-	-	-	-	-	*5*	0.8	2.2	**9.4**
0200	*5*	85	96	120	*5*	9.1	9.6	12.8	*10*	0.4	2.0	**5.2**

Station No.	Chloride mg Cl 1^{-1}				Total Ammonia mg N 1^{-1}				Un-Ionised Ammonia mg NH_3 1^{-1}			
	No.	Min	Med	Max	*No.*	Min	Med	Max	*No.*	Min	Med	Max
0100	-	-	-	-	*15*	0.02	0.06	**4.50**	*4*	<0.001	0.003	**0.080**
0200	-	-	-	-	*19*	0.04	**0.12**	**0.66**	*5*	0.001	0.005	0.014

Station No.	Oxidised Nitrogen mg N 1^{-1}				Ortho-Phosphate mg P 1^{-1}				Colour Hazen			
	No.	Min	Med	Max	*No.*	Min	Med	Max	*No.*	Min	Med	Max
0100	*5*	2.0	3.4	4.0	*15*	0.02	**0.06**	**0.60**	-	-	-	-
0200	*6*	2.4	3.7	**4.0**	*19*	**0.03**	**0.08**	**0.22**	-	-	-	-

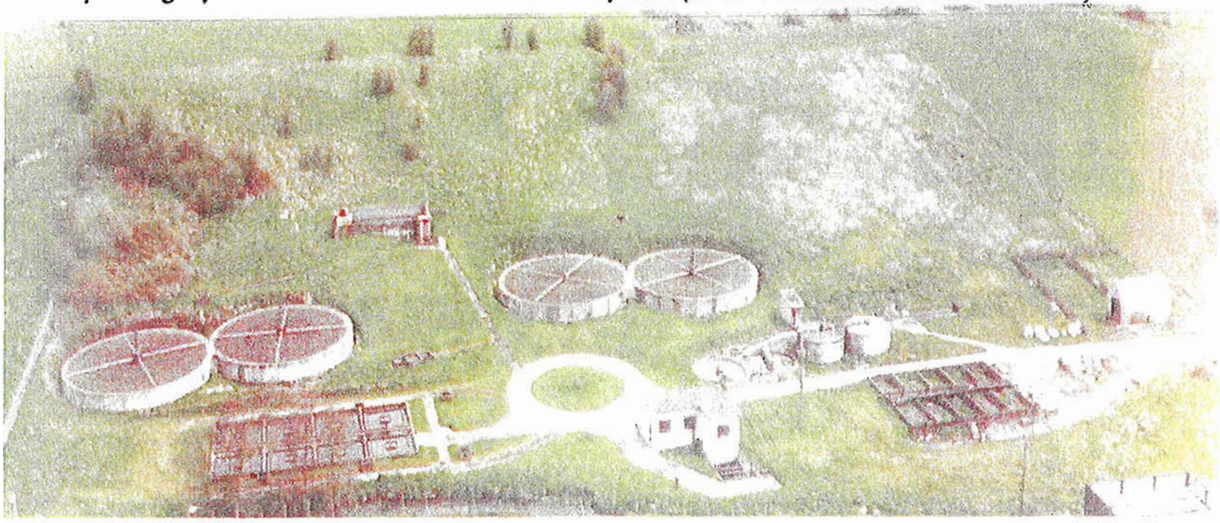
Appendix 3: Layout of Mitchelstown WWTP



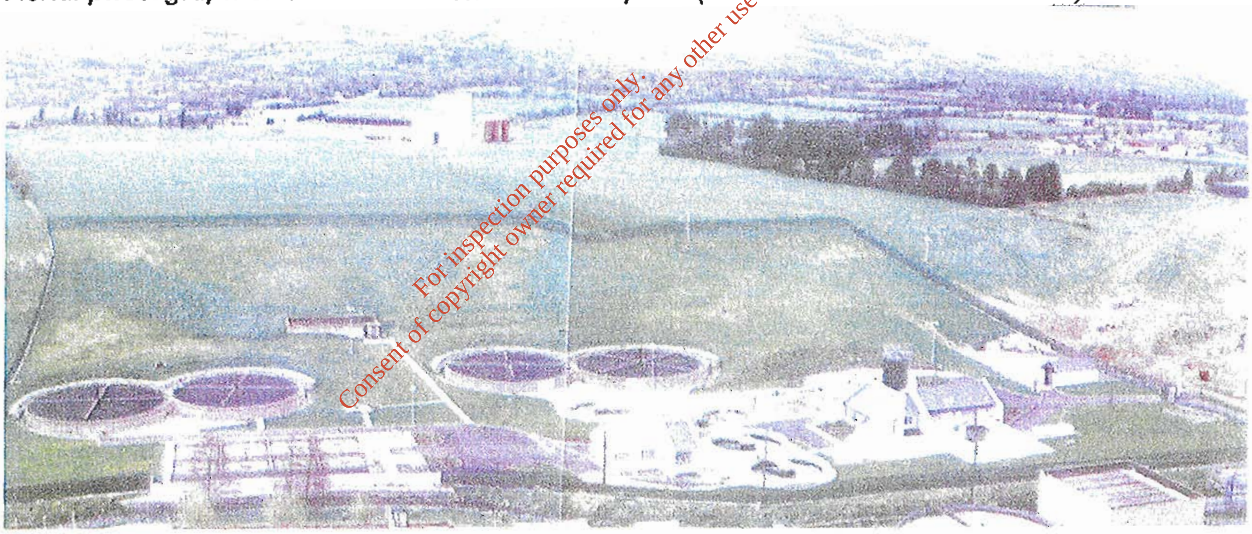
LEGEND
1. FERRIC DOSING PLANT
2. FOG REMOVAL
3. UPGRADE DIGESTER TANK
4. ADDITIONAL RAILINGS TO HUMUS TANKS
GRADOGE RIVER
PALLISADE FENCE
MAIN ENTRANCE GATE
PUMPING STATION
ADMINISTRATION BUILDING
STORM WATER SETTLING TANK
STORM WATER SETTLING TANK
PUMPING STATION
HUMUS TANKS
STORAGE SHED
DIGESTION TANK
PICKET FENCE THICKENER
SLUDGE HOLDING TANK
SLUDGE STORAGE TANK
SLUDGE STORAGE TANK
SETTLING TANK
SETTLING TANK
SETTLING TANK
INLET WORKS
BIOLOGICAL FILTERS
BIOLOGICAL FILTERS
HOLDING TANK
OVERHEAD E.S.B. LINES
AMENDMENT DETAILS
DATE
T.J.O'CONNOR & ASSOCIATES
CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 295 2321
Fax: 295 4641
MITCHELSTOWN SEWAGE TREATMENT WORKS
CORK COUNTY COUNCIL
SITE LAYOUT
N.T.S.
FEB '04
1378
SK 1

Appendix 4: Photographs of Mitchelstown WWTP

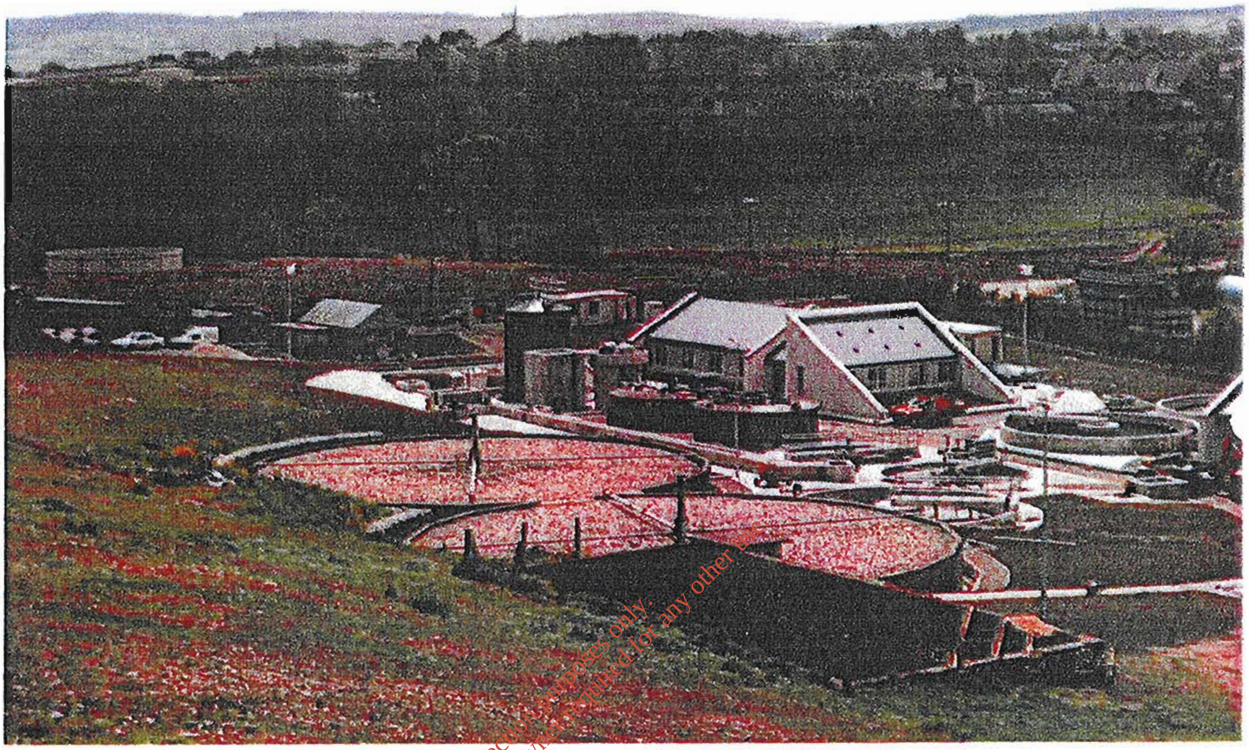
Aerial photograph of old wastewater treatment plant (before refurbishment of 1990's)



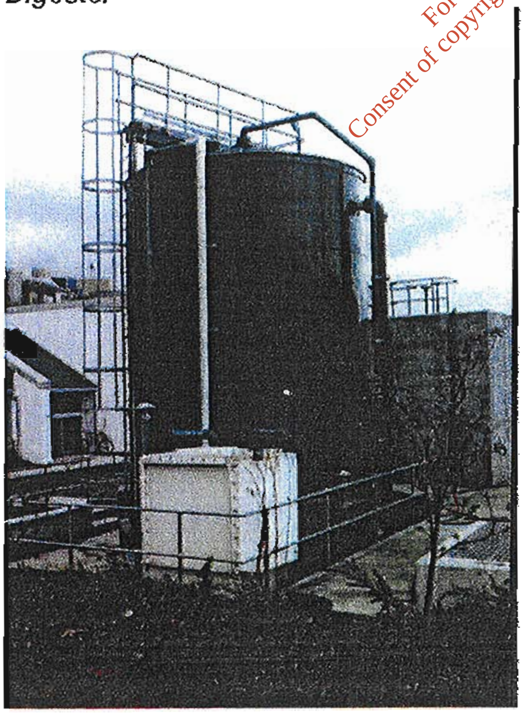
Aerial photograph of new wastewater treatment plant (after refurbishment of 1990's)



Administration Building and Biological Filters on Foreground



Digester



Appendix 5: Correspondence on Costings

FUCHS GAS- UND WASSERTECHNIK GmbH
Stocktal 2 · D-56727 Mayen
Phone: +49-26 51-80 04 0
Fax: +49-26 51-80 04 135
e-mail: info@fuchs-germany.com

air water biosolids

Fax-Message

Date: 2002-04-12
Pages: 1

To:	Mr Patrick Buckley EPS Pumping & Treatment Systems Ltd.	From:	Mr Hans-Gerd Schwinning
		e-mail:	h.schwinning@fuchs-germany.com
Phone:	00353-22-3 12 00	Phone:	+49-26 51-80 04 24
Fax:	00353-22-3 12 50	Fax:	+49-26 51-80 04 124

If any part of this transmission is poorly received or missing call +49-26 51-80 04 0.

– ATAD Mitchelstown / quotation no. 06533-02

Dear Patrick,

according to your latest inquiry we are pleased to give you a quotation for a visit to the wastewater treatment plant in Mitchelstown. The reason for the visit is to evaluate if a retrofit of the existing TAD-system (single stage, 87 m³) is possible. Based on our general business conditions we quote as follows:

Item 1	trip to Mitchelstown
Item 2	on-site-presence maximum 1 day for evaluation of the site
Item 3	trip back to Germany
Item 4	report of the visit incl. a proposal for a retrofit (if possible) or alternativly the design for a new TAD-system
Item 5	price	€ 2.950,00

Of course, in case that we will be chosen to deliver the equipment for a retrofit or a new TAD-system, the above mentioned amount can be offset. Based on flying times of roughly five hours per route, the trip will take approx. 3 days.

We hope that our proposal meets with your approval. As already discussed and looking over the TAD-reactor dimensions our goal would be to split the existing tank.

Best regards,
Fuchs Gas- und Wassertechnik GmbH

Hans-Gerd Schwinning, ChemEng
-Assistant Director-

EPS Pumping & Treatment Systems

Head office
Mallow, Co. Cork,
Ireland.
Tel: 022 31200
Fax: 022 31250
Email: info@epsireland.com
Website: www.epsireland.com

Ballyhaunis,
Co. Mayo.
Tel: 0907 30226
Fax: 0907 30761

Mountrath,
Co. Laois.
Tel: 0502 32279
Fax: 0502 32518

FAX

TO:	T.J. O'Connor & Associates	**FAX NO:**	01 2952321
ATTN:	Mr. Eddie Fitzgerald	**Our Ref:**	Eng/PC248/Corr/PDB002/AS
FROM:	Patrick D. Buckley		
RE:	Mitchelstown ATAD		
DATE:	22nd February 2002	**No. of Pages:**	12 incl.

Eddie,

Further to our discussion, please find as follows suggested route towards plant evaluation to start-up at Mitchelstown.

I feel that the best option with regard to the ATAD plant is to avail of the expertise of our colleagues in Germany.

I have spoken with them and forwarded some general information regarding the plant and have asked for budget prices for evaluation and any suggested modifications with newer technology.

This information should arrive on Monday next.

Regards,

Patrick D. Buckley
Contracts Engineer
For E.P.S. Ltd

Pumping & Treatment Systems

Mitchelstown S.T.W.
TAD Plant

Introduction

The TAD in Mitchelstown was re-commissioned and handed over to Cork County Council in May 1998 (Report attached).

Since that date the system is now out of operation.

At the request of T.J. O'Connor & Associates, E.P.S. are to provide a proposal for re-commissioning the system and to provide a general overhaul of the existing plant and to recommend any process or equipment modifications that would benefit the long term operation of the plant.

Over the past ten years, the technology utilised in ATAD has changed and improved significantly, leading to more efficient and effective aeration, more effective foam control and odour treatment.

It is the combination of all of these improvements that has led to the present type of system available where "new-build" plants are carried out.

Since the mid-nineties E.P.S. Pumping & Treatment Systems Ltd has been involved in the design, construction, commissioning and operation of a "new-build" ATAD system in Ireland. This was done in conjunction with one of the leading companies in the area of ATAD, namely Fuchs Gas Und Wassertechnik in Germany. The plant in question has a design capacity of 42,000p.e. with loading rates of 6.2m^3/day to 64.7m^3/day @ 6% d.s.

With this in mind, E.P.S. Pumping & Treatment Systems Ltd would propose to carry out an overall evaluation of the existing plant, present loadings, etc and to come up with a costed proposal for any process modifications that would be beneficial for the long term operation of the ATAD plant. This would be done in conjunction with Fuchs, who have significant experience in this area.

Once an evaluation of the existing plant and design is done, E.P.S. would then be in a position to fully price and cost for the re-commissioning of the ATAD in Mitchelstown coupled with the latest improvements in process technology.

Pumping & Treatment Systems

Summary of Process and Technological Advances for Discussion and Evaluation

- Sludge preparation, storage time, mixing, sludge volumes – imported sludge, screening
- Reactor height to width ratio
- Mixing system/aeration system
- Foam control system
- Heat removal system/temperature control and monitoring
- Odour control/treatment system – combination of scrubbers, Monoshell and filter technology
- Final product dewatering and disposal
- Overall long term operation, maintenance and monitoring

A lot of valuable information has been gathered in recent years in all of the above mentioned areas which now enables the construction/design of more efficient and robust systems for the digestion of sludges and the subsequent production of a Class A biosolid incorporating 30-40% reduction in both volatile solids and dry solids contents.

FUCHS GAS- UND WASSERTECHNIK GmbH

Postfach 13 62 · D-56703 Mayen

Telefon: 0 26 51/8 00 40
Telefax: 0 26 51/80 04 35
e-mail: FUCHSde@aol.com

Abluft Abwasser Klärschlamm

The fundamentals of the aerobic thermophilic methods technology

General

One byproduct which is an inherent part of the mechanical-biological treatment of domestic or commercial wastewater is sewage sludge. This sewage sludge has to be diposed without having any negative effect on the environment. From the economical as well as the ecological aspects it is higly desirable that biosolids to be returned to the natural circulation. In this regard the smaller and average-sized sewage installations are particularly well suited and it is the most favourably-priced form of sewage sludge disposal at the same time. Due to the fact that untreated sludge contains solid organic substances which are putrescible, as well as pathogenic germs such as bacteria, viruses, worm eggs and plant seeds, first of all it has to be stabilized and hygenized. The best way of doing this is the **Autoheated Thermophilic Aerobic Digestion** - otherwise known as **ATAD**. The following is a description of the most important fundamentals of this method.

Microbiological fundamentals

The biological stabilization of the sludge is based on the reduction of the organic substances contained in the sewage sludge. With the ATAD method the degradation of these materials is carried out by **aerobic microorganisms.** As the aerobic energy-metabolic exchange takes place **exothermically** the biochemical oxidation of the organic substances releases energy.
Part of this is stored chemically in the cell and is utilized with the material interaction, however a larger component is released to the environment in the form of heat. Thus, for example, **between 20 and 30 MJ** are released with the degradation of **one kilogram** of organic sewage sludge. Thus, at the completion of the aerobic degradation sequence, the final products mainly achieved are low-energy components like water (H_2O) and carbon dioxid (CO_2).

FUCHS GAS- UND WASSERTECHNIK GmbH

The fundamentals of the aerobic thermophilic methods technology/2

The operating technology

Basically speaking both mixed sludge as well as trickling filters and surplus sludge are suitable for the application of the aerobic thermophilic treatment. Various fringe parameters have to be adhered to in order to utilize the energy which is released during the aerobic degradation of the organic mass for the **substrate heating** up to the **thermophilic** temperature range.
The basic requirements necessary for successful operation at thermophilic conditions are:

- thermically insulated reactors
- an organic solid matter content in untreated sludge of at least 2.5 to 3 % and
- a highly efficient aeration and thorough mixing system.

The latter point is of particular importance because, on the one hand, the maintaining of the aerobic reaction environment is absolutely decisive for the success of the process and, on the other hand, the method places very high demands on the mechanical technology employed.
An optimal process sequence in the reactor is guaranteed by the transfer of atmospheric oxygen via the self-aspirating (spiral aerators / circulation aerators, refer to the diagram). These machines have already demonstrated their efficiency during 30 years of application in ATAD-installations. In addition to the transfer of oxygen they also provide a complete mixing of the reactors.

The aeration of the substrate results in the formation of a dense floating layer of foam. Therefore, the foam controlling system also constitutes an essential part of the method. The use of special foam controllers provides for the formation of a defined layer of foam. This does not only result in a natural, upward thermic isolation of the reaction medium, it also results in an improvement in the exploitation of the oxygen as well as an increase in the biological activity in the process.

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The fundamentals of the aerobic thermophilic methods technology/3

Disinfection

The following German requirements have to be maintained in an ATAD to achieve a biosolids product with regard to the epidemic-hygienic aspect of the treated sludge:

- two or multiple stage operation
- minimun hydraulic retention time: 6 days
- continours reaction times of at least:
  23 hours at temperatures ≥ 50 °C or
  10 hours at temperatures ≥ 55 °C or
  4 hours at temperatures ≥ 60 °C

From the practical aspects normally the first named time/temperature combination is to be preferred for an ATAD installation as compared to the two other possibilities. Nevertheless, the ATAD installation can be operated with different time/temperature functions in correspondendance with the requirements in other countries. It is recommended to operate the ATAD-plant at a temperature of not higher than 65 °C. If the temperature exceeds this value the reactor should be cooled with the installed heat exchanger. Subsequently however the installation may be only fed once a day whereby the emptying and filling sequences must not exceed one (1) hour altogether.

6% -> 3.2%

[ww\ATS\ba\engl\fundament\killarney]

FUCHS GAS- UND WASSERTECHNIK GmbH

Postfach 13 62 · D-56703 Mayen

Telefon: 0 26 51/8 00 40
Telefax: 0 26 51/80 04 35
e-mail: FUCHSde@aol.com

Abluft Abwasser Klärschlamm

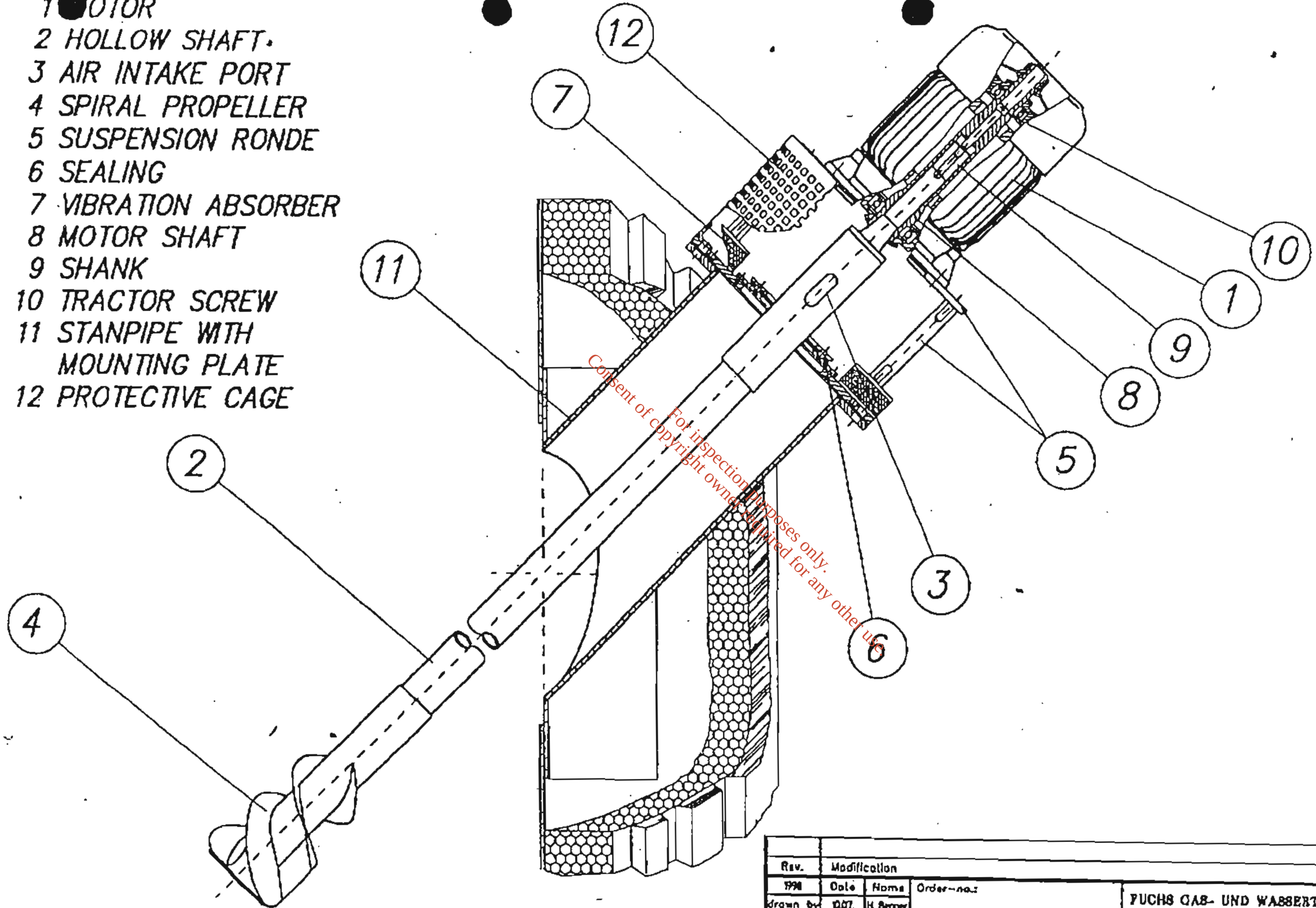
FUCHS Spiral Aerator for the aerobic-thermophilic treatment of sewage sludge

General

In addition to other applications Spiral Aerators are also used in reactors for the aerobic-thermophilic treatment of sewage sludge. In addition to the aeration with very fine bubbles with a high oxygen exploitation, they also provide the circulation and thorough mixing of the sewage sludge.

For the time being over three hundred (300) machines have been installed in ATAD plants. This special type of Spiral Aerator is designed for the ATAD application only. Therefore in the tough working day at ATAD installations they have shown themselves to be economical, environmentally-compatible and practically maintenance-free.

1 MOTOR
2 HOLLOW SHAFT
3 AIR INTAKE PORT
4 SPIRAL PROPELLER
5 SUSPENSION RONDE
6 SEALING
7 VIBRATION ABSORBER
8 MOTOR SHAFT
9 SHANK
10 TRACTOR SCREW
11 STANPIPE WITH MOUNTING PLATE
12 PROTECTIVE CAGE



Rev.	Modification			Date	Name
1998	Date	Name	Order-no.:		
drawn by	10.07.	H. Berner			
check.by	10.07.	Sch.e.	Final customer:		
appr. by					

FUCHS GAS- UND WASSERTECHNIK
P.O. Box 1062 (Stockfeld 2)
D-56703 MAYEN (Germany)

Scale: % Project: SPIRAL AERATOR (SA) Drawing-no.: 98-C-20

FUCHS GAS- UND WASSERTECHNIK GmbH

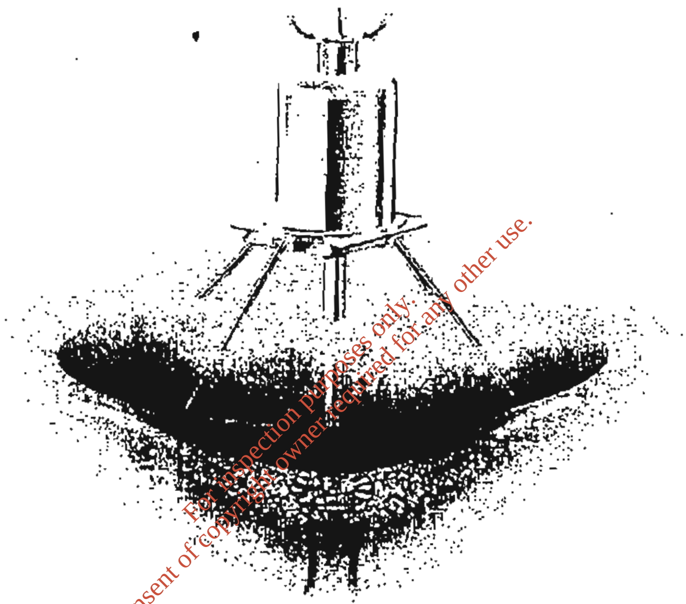
Postfach 13 62 · D-56703 Mayen

Telefon: 0 26 51/8 00 40
Telefax: 0 26 51/80 04 35
e-mail: FUCHSde@aol.com

Abluft Abwasser Klärschlamm

FUCHS Circulation Aerator

for ATAD installations

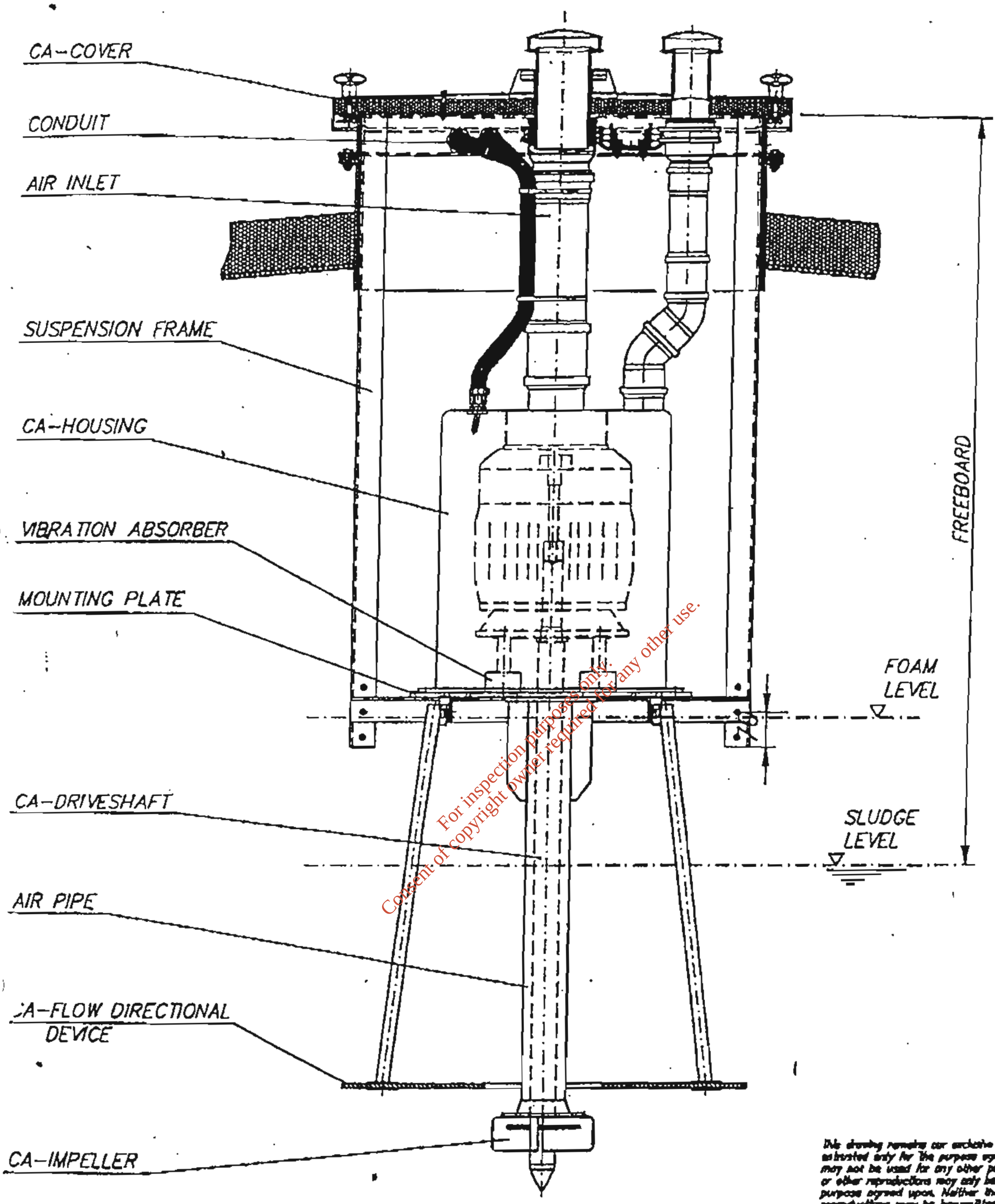


General

Typically FUCHS Circulation Aerators are used to supply oxygen to aerated lagoons, equalization tanks and activated sludge plants. Besides special designs of the Circulation Aerators are also used in ATAD reactors. In additon to the aeration by means of fine bubbles they also provide for the circulation and thorough mixing of the substrate to be treated.
Due to their efficient and sturdy design they are both environmentally-compatible as well as extrem robust aeration units which operate very reliable in difficult sludges. They are practically maintenance-free.

Description

The Circulation Aerator consists essentially of an air-cooled, vertically mounted stirrer motor, an air pipe coaxial to the drive shaft, the impeller with radial vanes at the immersed end as well as a flow directional device.
With stationary operation the drive motor and the air pipe are mounted to a stainless steel mounting plate. The drive motor is protected from the hot and humid environment by a stainless steel housing.



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1996	Date	Name	Order-no.:
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check.by	29.02.	[signature]	Final customer:
appr. by			

FUCHS GAS- UND WASSERTECHNIK
P.O. Box 1362 (Im Stocktal 2)
D-56708 MAYEN (Germany)
Telephone +49-2651-80040 Facsimile +49-2651-800435

Scale: %

Project: CIRCULATION AERATOR (CA)

Drawing-no.: 96-C-10

(132)

Replacement for:
Replaced by:

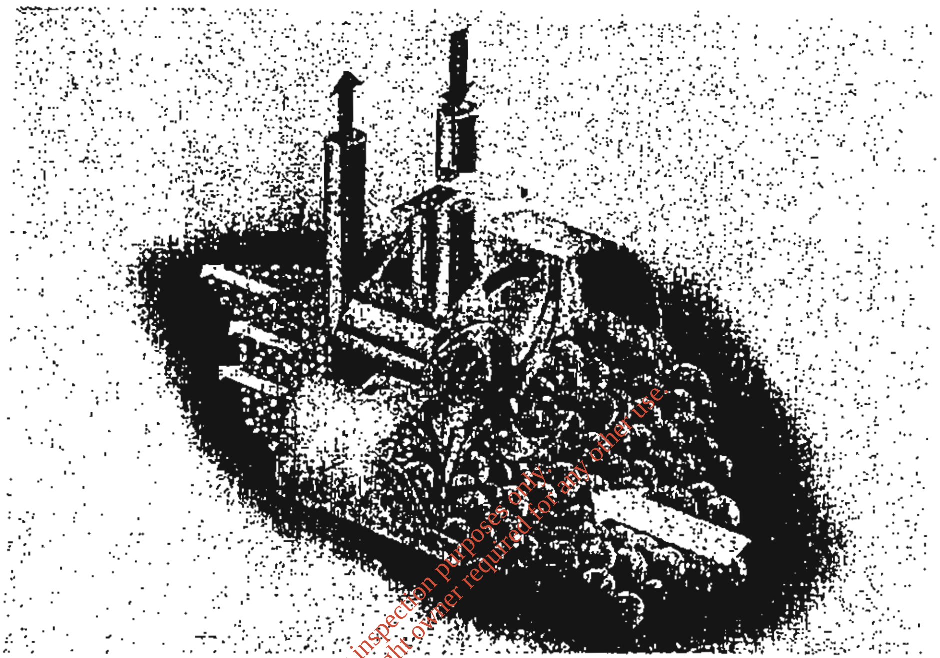
FUCHS GAS- UND WASSERTECHNIK GmbH

Postfach 13 62 · D-56703 Mayen

Telefon: 0 26 51/8 00 40
Telefax: 0 26 51/80 04 35
e-mail: FUCHSde@aol.com

Abluft Abwasser Klärschlamm

FUCHS Foam Controller



Foam is a by-product of numerous processes in wastewater treatment as well as food production. Such a foam can rapidely results in a problem which is extremely difficult to solve using conventional methods.

The aeration of the substrate in the aerobic-thermophilic sludge digestion is one of those processes where foam occurs. The foam layer acts as insulation for the reactor and also leads to an improvement of the utilization of oxygen as well as an increase in the biological activity. Therefore a certain foam layer is requested. The FUCHS Foam Controller was developed to keep the foam layer always constant.

The FUCHS Foam Controller consists essentially of an inhoused horizontally mounted a.c. motor (0.75 - 1.3 kW) and a stainless steel blade, which is connected to the drive shaft of the motor.
The four-sickled blade is equipped with a spray cover made of GRP.
The cooling air for the motor is sucked via a PVC pipe from outside the ATAD reactor and then blown out via a second pipe to the ambient.

The foam is delivered to the Foam Controller as a result of the rotation of the underlaying sludge and it is physically broken up by the vertically rotating blade to form a more dense and compact layer. The use of special Foam Controllers establish the formation, depth and, to some extent, the density of a defined foam layer in the reactors. Therefore the foam controlling system is a substantial aspect of the ATAD technology.

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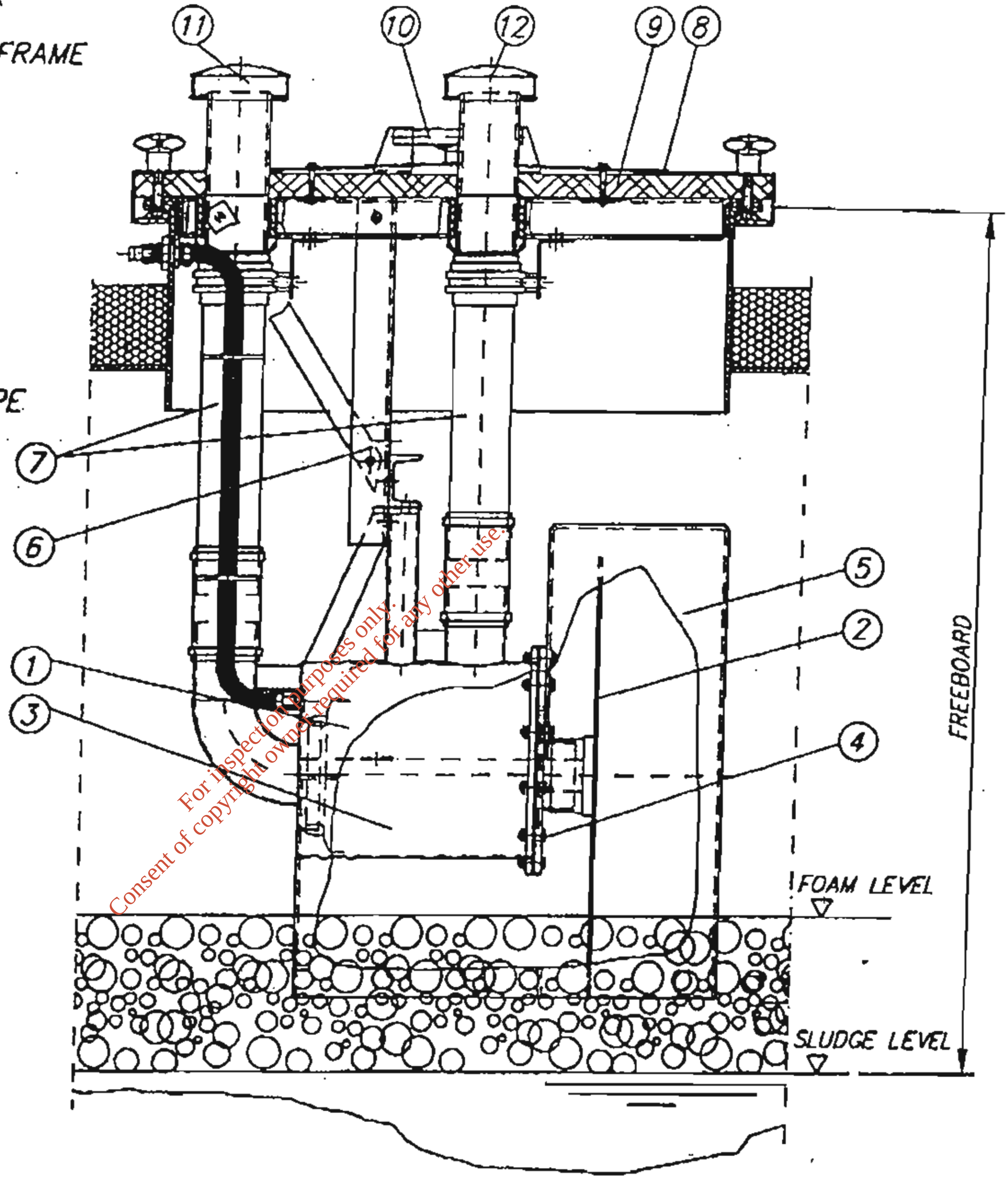
00 353 22 31250

(1) MOTOR
(2) FOAM KNIFE
(3) HOUSING
(4) GASKET
(5) SPRAY COVER
(6) SUSPENSION FRAME
(7) PIPEWORK
(8) COVER
(9) INSULATION
(10) GRIP
(11) SUCTION PIPE
(12) BLOW-OFF PIPE



Rev.	Modification	Date	Name
a	REVISED DRAWING	04.12.97	Benner

1997	Date	Name	
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check.by	04.12.	Schw.	Final customer:
appr. by			

FUCHS GAS- UND WASSERTECHNIK
P.O. Box 1362 (Im Stocktal 2)
D-56703 MAYEN (Germany)
Telephone +49-2651-80040 Facsimile +49-2651-800435

Scale: %

Project:

FOAM CONTROLLER (FC)

Drawing-no.: 96-C-07a

Replacement for: 96-C-07

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eps Pumping & Treatment Systems

Head office
Mallow, Co. Cork,
Ireland.
Tel: 022 31200
Fax: 022 31250
Email: info@epsireland.com
Website: www.epsireland.com

Ballyhaunis,
Co. Mayo.
Tel: 0907 30226
Fax: 0907 30761

Mountrath.
Co. Laois.
Tel: 0502 32279
Fax: 0502 32518

Fax

TO: T J O'Connor & Associates **FAX NO:** 021 450 2479

ATTN: Justin Brennan

FROM: Denis Taylor

RE: Mitchelstown

DATE: 19th June 2002 **No. of Pages:** 1

Dear Justin

I confirm that the cost of providing access bridges over the humus tanks at the above site is €33250 + VAT. The bridges will be fabricated from mild steel and hot dipped galvanised after. The handrail and decking will also galvanised. The normal width of the bridges is one metre but I have allowed for an area of 1.5 metre at the middle of each bridge over the diffusion drums.

Regards,

pp [signature]

Denis Taylor
For E.P.S. Ltd

DIRECTORS: J.P. BUCKLEY managing. P. BUCKLEY, T. BUCKLEY, E. O'CONNOR, T.A. RUDDY, m.e. tech. B.B.S. W. SHEAHAN, b.comm.
REGISTERED AS: ELECTRICAL & PUMP SERVICES LTD. QUARTERTOWN IND. ESTATE. MALLOW, CO. CORK. REGISTERED NO. 27769

FERMOY WATER SUPPLY - STAGE 3.

FACSIMILE

TO:......................Ms. Helen Casey,

COMPANY:...........T. J. O' Connor & Associates

FAX. No.:...............01 - 295 4541

TOTAL NUMBER OF PAGES: ......3.
(including cover sheet)

FROM:................ **LIAM LYNCH, Resident Engineer.**

TELEPHONE: ....025 - 31173 FAX:.........025 - 33496
087 2222461

RE: Mitchelstown Sewage works.

Helen,

Having discussed the matter with Jimmy the following appears to the problem/situation:

1. Digester: This tank is not in use at present, and hasn't been in use for at least 2 years. There appears to be a problem maintaining the temperature. When it did function it required a lot of diesel/energy to maintain the temperature at the required level.
   At present the sludge goes direct from the sludge holding tank to the presses, bypassing the digester.

2. Trickling filter: One of the filters is not in use at present, again a 2 - 3 year old problem.
   It appears that when the area around the split chamber was being reinstated with chippings, part of a load was inadvertently dropped into this chamber.
   A number of attempts, to remove the stones, were carried out, i.e. both using a vactor & power jet, however it appears that the feed pipe still remains partially full with stones, ditto around the central bearings.
   The arms 'cannot' move at present.

3. Old digester/storage tanks: The valves, 3 at each tank, used to draw off the liquid from the top of the sludge are difficult to turn and are leaking.
   At present one of the tanks cannot be used because the sludge cannot be retained in the tank, whilst the other tank, i.e. the one nearest the new digester, can be partially used because the bottom most valve works to a degree. Replacing the valves and adjoining pipework should solve this problem.
   For the new digester to work properly these tanks need to be operational.

4. Storm Tank: The pipe from the central hopper to the small 'collection' chamber is blocked.
This storm tank was temporarily used as a clarifier and the blockage is apparently caused by the solids which amassed at the base of the tank during this temporary usage.
The suggested solution is to pump the tank dry and suck the solids out.
The small 'collection' chamber, which is always partially full, is difficult to access due to the absence of any step irons/access ladder.

5. Old Pump-house: During periods of very heavy rainfall, approximately 1 - 2 times a year, Sump A fills and the surrounding area floods. — due to Storm tank not being completed
A void around the high level duct, or maybe the duct itself, from the house to the Sump pumps allow this rainwater to enter the house, sometimes to a height of 6 - 8 feet.
Once this occurs it takes the small sump pump on the floor 2 - 3 days to empty.
Solution is to seal the void/duct internally/externally.

6. Humus tanks: Weed growth on the tanks is a persistent problem since Dairygold ceased using them.
Manually removing the weeds is not a safe procedure as it involves climbing in over the safety railing and walking around the, often slippery, perimeter channel.
Removing the weeds and the top crust with a long-arm JCB is a messy operation but still preferable to the manual option.

Safety Equipment: There are no life belts/safety harnesses on site.

I trust the above is satisfactory.

Regards,

Liam Lynch,
Resident Engineer.

Dated:...20/06/00