Ballincollig Sewerage Scheme

DOCUMENT TITLE: **Emergency Measures Report**

DOCUMENT No:

MODULE: **Wastewater Treatment Plant** ☒

Collection System ☐

PROJECT NUMBER:

Client: **Cork County Council**

Project Location: **Ballincollig, County Cork**

Project Manager Authorisation: **Date:**

Client Authorisation: **Date:**

			APPROVALS		
Rev	**Date**	**Issue Description**	**By**	**Check**	**Approve**
A	07.06.2007	Issued for Client Review	RJB	MJOS	RJB

☒ Entire Specification Issued this Revision	SPECIFICATION ISSUED FOR:	
	☐ In-house Review	☐ Purchase
☐ Revised Pages Only Issued this Revision	☐ Client Approval	☐ Construction
	☐ Expression of Interest	☐ Tender

Malachy Walsh & Partners
Consulting Engineers
JACOBS BABTIE

BALLINCOLLIG SEWERAGE SCHEME
WASTEWATER TREATMENT PLANT

Emergency Measures

June 2007

Cork County Council
Ballincollig WWTP

Malachy Walsh & Partners
Consulting Engineers

JACOBS BABTIE

Ballincollig Sewerage Scheme
Wastewater Treatment Plant – Emergency Measures

Table of Contents

Ballincollig Sewerage Scheme
Wastewater Treatment Plant – Emergency Measures

1 INTRODUCTION

At the request of Mr. Conal Courtney, SEE, Cork County Council, the Consultants visited Ballincollig Wastewater Treatment Plant and met him with site personnel, and Mr. Michael Murphy, SEE, to discuss the abatement of a number of problems at the Plant.

In preparing this report, the Consultants have taken account of the following:

- ✓ That the existing plant was designed and installed in the 1980's and represents the state of technology at that time
- ✓ The characteristics of the wastewater, its flow and load have changed significantly since the plant was commissioned
- ✓ The catchment has dramatically changed and the impact of rainfall has intensified
- ✓ That any proposals to install new plant and equipment must be accomplished without significant down time
- ✓ That the inlet works will be extensively upgraded in the near future
- ✓ That proposals for the complete upgrading of the WWTP are being prepared

The report summarises a number of recommendations to improve, in the short-term, the operation of the WWTP and will not obviate the need for the complete upgrade works which is the objective of the Consultants Brief.

2 COMMENTARY ON THE WWTP

2.1 Inlet Works - Screening

As the existing screening comprises only coarse screening, solids up to 20mm pass directly to biological treatment. These solids generally find their way to the final clarifiers where they accumulate in the stilling box and together with biological solids form a thick crust. The bars are "cleaned" by continuously operating rakes and the removed screenings are collected in a trough. In general the spacing (~20mm) between the bars is too great to prevent the ingress of much of the smaller, inorganic material passing through. This includes plastic and other "stringy" material, which would also pass through the grit channels.

The passage of time and the impact of several maintenance operations has resulted in a dramatic reduction in the efficiency of the coarse bar screens. The "contact" between the raking mechanisms and the bars has been compromised. The positioning of the rake relative to the screens is incorrect which results in much of the screenings not being removed from the top of the screens.

While the curator is doing an excellent job in very adverse circumstances, the situation can be greatly improved.

Action

To minimise the quantity of solids, which pass the screens, accumulated material should be regularly removed (manually if necessary) and disposed. This will help the passage of organic (soft solids) and minimise odours. As can be seen from the photograph below the rake is fitted with a hard plastic backing strip. The function of this strip is to improve the contact between the rake and the screen. It is recommended that the plastic strips be replaced on both screens and this will improve the screening action.

Consideration should also be given to adjusting the position of the rake cleaning mechanisms in order that the screenings clear the screen itself and are deposited in the trough.

As problems will still remain with the operation of these screens, notwithstanding the recommendations above, it will be necessary for site staff to devote additional resources to the manual removal of screenings as required.

2.2 Inlet Works – Grit Removal

Grit and other heavy material is deposited along the floor of the channels when the velocity of flow is less than 300 mm/s and is manually removed. Currently the three grit channels are all operating in parallel.

During periods of low flow, organic solids also settle in the grit channels and are carried forward to the Carousel when the flow increases. When the velocity of flow in the channels increases (above 300 mm/s) accumulated grit will be carried forward into the Carousel and accumulate on the floor or be carried forward to the clarifiers. Grit can cause excessive wear on the scroll of the decanter and ultimately result in failure.

Additionally grit and other solids are accumulating in the transitions both before the grit channels and after the grit channels. This occurs because of the extremely low velocities in these sections.

As can be seen from the photograph below, the original intent was that at least one of the channels would be closed, for cleaning purposes and to ensure that the flow is regularly directed towards each channel regularly. Currently most of the flow is directed towards the right hand channel (as viewed from the coarse bar screens).

Accumulation of deposited materials can clearly be seen in the areas marked in red.

Action

Ensure that accumulated grit is regularly removed from the floor of the grit channels. Preferably this should be done daily. As the grit will contain some organic solids (due to the current configuration) removed grit should be disposed off-site.

Consideration should also be given to the streamlining of the approach to the channels. This could be accomplished by installing an overflow weir along the line marked in blue. The level of this weir will be set to overflow excess flows to the currently unused Primary and Humus Tanks as described in Section 3.

Any materials which accumulate in the transition should also be removed.

2.3 Fats, Oils and Grease (FOG)

There are no facilities for fat and grease removal. Significant quantities of FOG find their way to the Carousel and thence to the final clarifiers.

Action

FOG is discharged by all domestic users and the majority of non-domestic users (NDCs) (particularly those in the hospitality sector). While little can be done to control the FOG level in discharges from domestic users, it is recommended that a campaign be launched to "educate" the general public in the adverse impacts of such discharges.

Discharges from NDCs can be controlled by the licensing process. The general level of FOG in discharges should be reduced to <50 mg/l.

2.4 Fine Screening

Because of the inefficiency of the installed coarse bar screens, significant quantities of solids are discharged to the biological treatment plant. These solids cause problems by:

- ✓ Inhibiting the operation of the aerators (by becoming entangled and interfering with the aeration equipment)

- ✓ Float as solids on the surface of the clarifiers
- ✓ Cause blockage of the diffusion drum
- ✓ Cause blockage in the picket fence thickener and sludge feed pumps to dewatering
- ✓ Are washed out to the River when the plant becomes inundated

Action

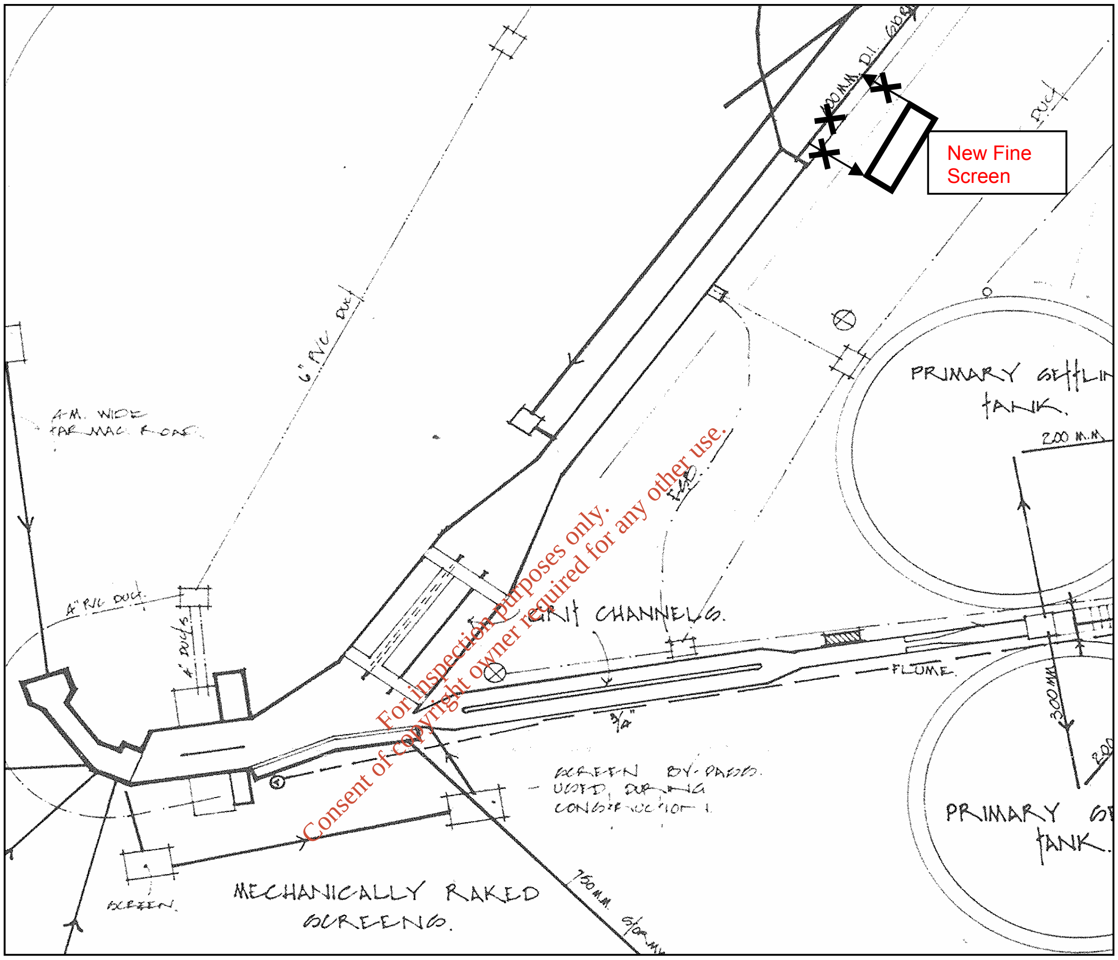


Figure 1: Installation of New Fine Screen

It is proposed to break the pipe down stream of the measuring channel and install packaged fine screening equipment generally as shown on Figure 1.

- ✓ Procure a fine screen package rated at 1000 m^3/hr
- ✓ Divert flow down stream of the measuring channel to the new fine screen
- ✓ Return the flow following screening
- ✓ Install valves to enable maintenance

3 STORMWATER MANAGEMENT

As there are currently no facilities for stormwater balancing, the wastewater arrives at the activated sludge plant in an uncontrolled manner and this causes significant hydraulic overloading of the biological plant, during periods of rainfall. Washout of sludge and overloading of the clarifiers can be caused by this hydraulic overload and this inevitably results in the discharge of significant solids to the receiving waters.

Action

- Arrange the inlet works so that flows in excess of 509 m^3/hr are diverted, after screening and degritting to existing Primary Settling Tanks

- As discussed above in Section 2.2, a weir plate to be installed along the line marked in blue.
- Bring into use the original Primary Settling Tanks as temporary Stormwater Tanks.
- End suction pumps to be connected to the sludge withdrawal pipes to enable settled stormwater return to inlet works for treatment.
- Overflow from Primary Settling Tanks can be diverted to Humus Tanks for additional storage. This can be achieved by breaking one or more of the feed pipes to the filters and allowing the outflow from the siphon chamber discharge directly to the filter outlet channels. (as the red marked location shown below.

- The existing sludge pumps will enable stormwater return to inlet works for treatment.
- If there is still overflow from these tanks it would be discharged directly to the receiving waters

3.1 Summary of actions

- Install a weir plate in the transition section upstream of the Grit Channels as described in Section 2.2. Weir Height: 290mm. Materials of Construction: SS304
- Open both sluice gates at inlet to "old" grit channels.
- If possible, remove concrete flume.
- Install 2 x Positive Displacement pump of capacity xx m^3/h on each desludging pipe. Remove bellmouth arrangement and connect suction to flange. Pump delivery to be to the transition section upstream of the Grit Channels. Suction and delivery pipework to be in reinforced flexible hose ~ 6" diameter.
- Break filter feed pipe as indicated on photograph above.

4 ACTIVATED SLUDGE SYSTEM

4.1 Carousel

Notwithstanding the hydraulic problems, the biological treatment plant is still capable of producing a good final effluent.

Since there is only one activated sludge basin, there is always a risk to treatment efficiency due to equipment malfunction or ingress of wastewater which is toxic. The volume of this basin is approximately 9000 m^3 and this would limit the average daily BOD load to 1890 kg at a space loading rate of 0.21 kg BOD/m^3 of aeration volume.

At an average MLVSS of 3500 this is equivalent to a F/M ratio of 0.06 kg BOD/kg MLVSS. This is quite a low loading rate and should result in a very good BOD removal rate.

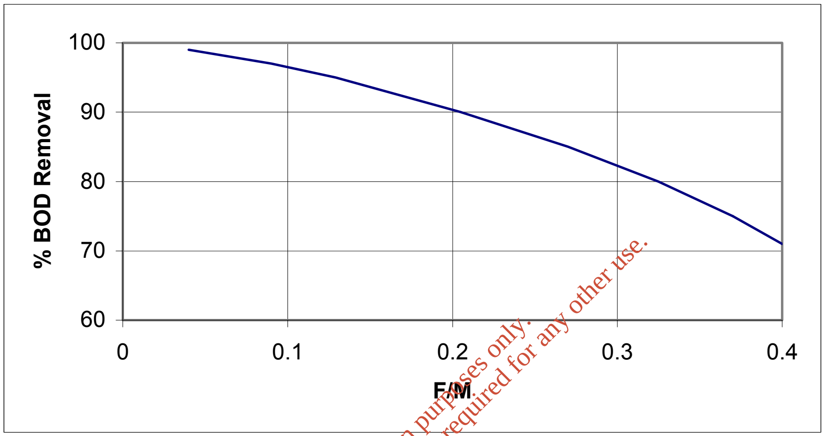


Figure 2: % BOD Removal vs F/M Ratio

The oxygen required for BOD removal can be calculated from the figure below:

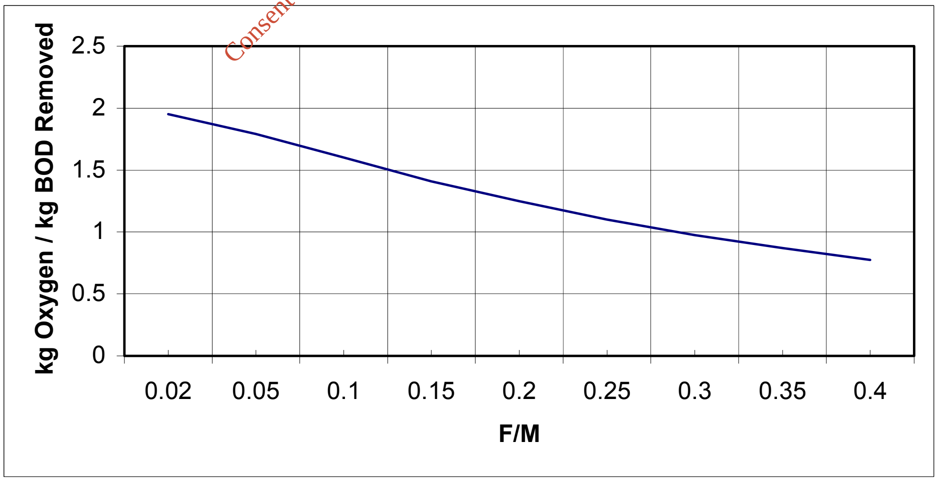


Figure 3: Oxygen Requirements

In addition to removal of BOD, ammonia is also nitrified in the Carousel and this should be taken into account in determining the total oxygen requirements according to the following formula:

Total Oxygen Demand =

$$0.75\ Q\ (BOD_i - BOD_e) + 2\ V_A.\ MLSS + 4.3\ Q\ (Amm_i - Amm_e) - 2.83\ Q\ [(Amm_i - Amm_e) - N_e]$$

where

BOD_i = inflow BOD (mg/l)

BOD_e = outflow BOD (mg/l)

Amm_i = inflow ammoniacal nitrogen (mg/l)

Amm_e = outflow ammoniacal nitrogen (mg/l)

N_e = outflow nitrate nitrogen (mg/l)

In general, the Dissolved Oxygen should be maintained within the range 1 – 2 mg/l if the basin were completely mixed (not the case for a Carousel).

Since the appointment of the new curator, a dramatic improvement has been achieved in the operation of the Carousel. The MLSS has been reduced to ~4000 mg/l and the SVI has been improved significantly. However he is still lacking adequate information about the correct operating level in the tank to achieve maximum oxygen transfer. Despite telephone and email contact with the Simcar Licensees, it has not been possible to establish an oxygen transfer curve for the aerators.

For this type of aerator, the oxygen transfer increases with increased immersion on the impellar up to a maximum immersion, after which there is a dramatic reduction in the transfer efficiency.

Actions

- Continue the programme of flow proportional composite sampling to determine the actual BOD load applied to the Plant. Analyses should report BOD, COD, TSS, VSS, Ammonia, Total P. Aside from the importance of this information to the present operation of the plant, this information will be required for the Upgrade Works.

- Continue the daily analysis of the Mixed Liquor from the Carousel to confirm both the MLSS and MLVSS. Samples should be taken occasionally in at least, five(5) locations to confirm the mixing.
- Continue to waste sufficient sludge from the system to maintain the MLVSS to ~ 4000. Wasting should be carried out daily, with the period adjusted to maintain the required MLVSS.
- It will be necessary to identify the transfer characteristics of the aerators.

4.2 Clarifiers

The outflow from the aeration basin is distributed between the clarifiers at a division of flow chamber.

The clarifier mechanism is not capable of removing the floating material from the surface of the clarifier (as the amount removed each cycle is insignificant); however the floating material is generally retained in the tank by the peripheral scum board.

Sludge is withdrawn from the clarifiers under hydrostatic head, however as the withdrawal chamber is inundated, control of the withdrawal rate from either clarifier is minimal.

The quantity of sludge floating on the surface of the clarifier could be expected to reduce when the operating regime in the Carousel is improved; however it will be necessary to review the operation of the sludge return pumps to ensure that sludge is not allowed to accumulate on the floor of the clarifiers.

Action

- Floating solids on the Final Settling Tanks increases the potential for solids carry-over with the final effluent. Floating solids should be constantly removed from the surface and disposed of.
- The material collected in the stilling well should be removed to ensure that the mixed liquor is properly distributed in the clarifier.
- It is critical that the sludge settled in each of the clarifiers is removed consistently and returned to the clarifiers in a timely manner.
- Ensure that the sludge withdrawal mechanisms are regulated to ensure that sludge is withdrawn consistently

One of the problems which are frequently found in activated sludge plants is the presence of biological foam.

Activated Sludge Foaming

Activated sludge foaming is caused mostly by two filaments: *Nocardia* spp. and *Microthrix parvicella* (there are other non-filament causes of foaming). Both of these filaments have three causes in combination: (1) high grease and oil; (2) longer sludge age; and (3) low oxygen conditions or septicity.

Nocardia appears to be favoured at higher aeration basin temperature and *M. parvicella* at lower temperature. Antifoam chemicals are not effective to control this type of foam, due to the physical interlocking of the filaments in the foam. RAS chlorination is of limited use in *Nocardia* foam control, but is more useful for *M. parvicella*. This is because *Nocardia* is found mostly within the floc, and the higher chlorine dosages needed to get at *Nocardia* may destroy the activated sludge floc. For *Nocardia* foams, surface spraying of a 50 mg/L chlorine solution can be effective.

Both these filaments grow on grease and oil. Systems that do not have either primary settlement or FOG removal (the main grease and oil removal mechanisms) appear to suffer more foaming problems. Communities which enforce strict grease and oil standards appear to suffer less from foaming problems. Treatment of septage, which contains substantial grease and oil, has been associated with foaming problems.

There is some relationship of foaming by these filaments and low oxygen concentration/septicity in the system. Septicity appears to cause the breakdown of grease and fat to organic acids, which specifically favour these filaments. Successful foam control requires control of septicity and elimination of low oxygen conditions.

The most used control method for foaming is to reduce the system sludge age. *M. parvicella* can usually be controlled by a sludge age reduction to between 8 and 10 days. *Nocardia* can often be controlled by reducing the MLSS sludge age to <8 days, but this is variable and somewhat temperature dependent. Plants in warmer climates have had to reduce the sludge age to <3 days for *Nocardia* control.

Sludge Age can be calculated using the following formula:

$$\text{Sludge age} = \left(\frac{\text{MLSS}\,(V_A + V_C)}{Q_W \cdot S_W} \right)$$

where

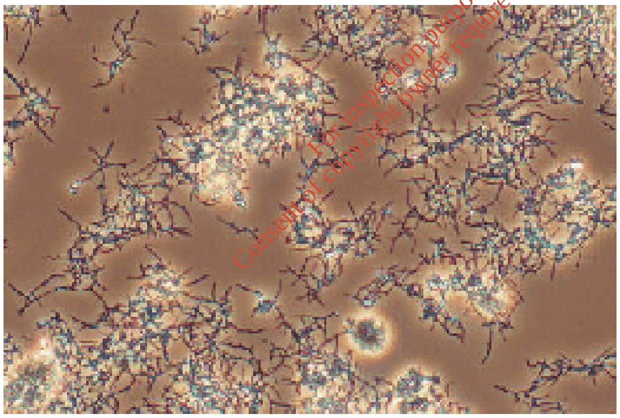
V_A is the aeration volume in m^3

V_C is the clarifier volume in m^3

Q_W is the quantity of waste activated sludge in m^3/d

S_W is the waste activated sludge solids in mg/l

MLSS is the concentration of suspended solids in the mixed liquor (mg/l)



Nocardia Foam (200X)

Many foams reach problem levels because they are not removed and build-up on the surface of aeration basins and final clarifiers. More efficient surface scum removal and forceful water sprays are required to carry this material out of the basin or the clarifier. Foam should be removed entirely from the system and not recycled back into the plant (for example, into the headworks).

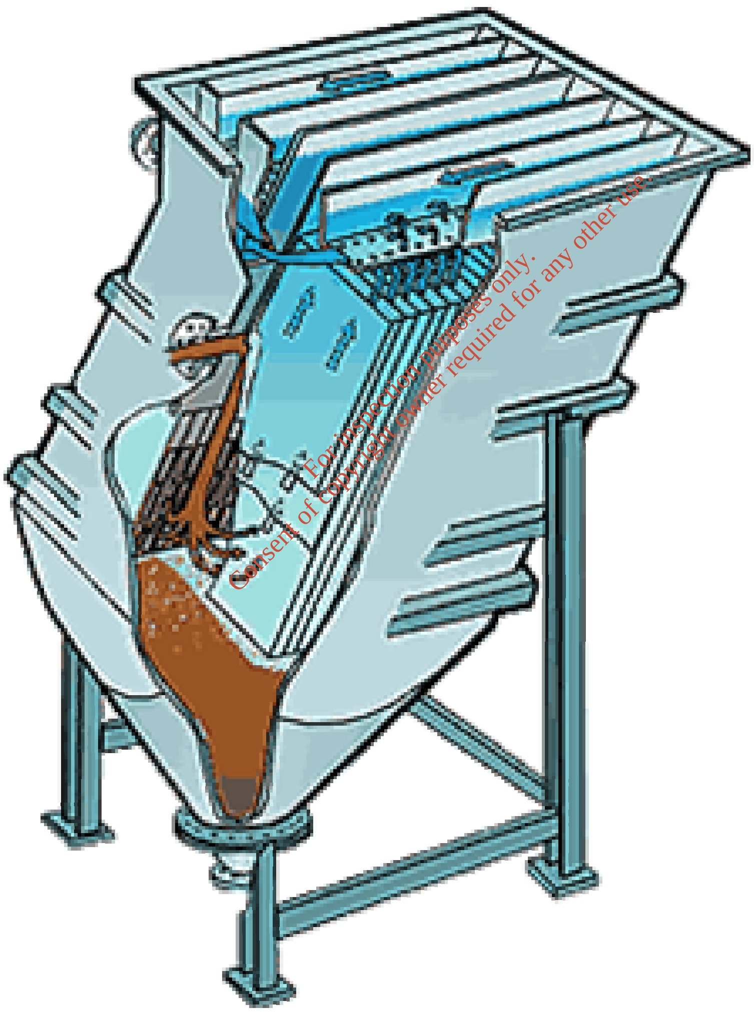
5 SUPPLEMENTARY CLARIFICATION

It is clear that the two final clarifiers are not capable of settling the solids from the Carousel during periods of high flow. This results in significant carry-over of sludge and the discharge of highly coloured final effluent (which exceeds the consent standards) to the River.

To partially overcome this problem consideration should be given to the installation of additional clarification capacity.

Action

- ✓ Install two Lamella Clarifiers, each of capacity 125 m^3/hr
- ✓ Provide two mixed liquor feed pumps each of capacity 250 m^3/hr
- ✓ Provide Feed and Sludge Withdrawal Chambers
- ✓ Provide inlet pipework, sludge return pipework and clarified effluent pipework
- ✓ Provide suitable support structure



6 SLUDGE RETURN

Sludge problems are exacerbated by extended retention periods in the Clarifiers. This will encourage denitrification, which causes floating sludge on the clarifier surface.

Failure to remove settled sludge from the clarifiers also results in high sludge levels within the clarifier and makes sludge carryover from the clarifier during periods of high flow.

Action

- ✓ Install a supplementary sludge return pump of capacity 250 m^3/hr in the vacant screw pump chamber

7 OUTLET TO RIVER LEE

It is clear from observations during Autumn/Winter 2006 and Spring/Summer 2007 that under certain circumstances, lack of capacity in the pipework from the clarifiers to the outfall pipe can result in flooding of the final clarifiers and discharge of floating solids to the river.

This situation is untenable and arrangements must be considered to prevent this.

The following should be considered:

- Collect the outlet from both scum chambers in a new scum collection chamber of dimensions 2m x 2m x 2m below Clarifier TWL.
- Install a submersible pump to pump the underflow back to the clarifier inlet chamber
- Empty the accumulated scum regularly and dispose offsite
- Duplicate the pipe from manhole A7 to the outfall.

8 SLUDGE DEWATERING AND DISPOSAL

During earlier visits to the WWTP in Autumn 2005 and during 2006, a major factor which was affecting the operation of the biological WWTP was the effect of sludge dewatering regime. Sludge produced on the site together with imported sludge was stored in a sludge holding tank (thickener). It is intended that any supernatant which is released from the sludge as a result of thickening would be drawn off in the decanting channels and gravitate to the inlet works for treatment.

When the sludge produced and imported exceeded the capacity of the equipment and staff to dewater, the sludge holding tanks become over-full and sludge was discharged to the biological plant. Aside from potential adverse on sludge quality in the biological plant, an additional BOD and Ammonia load was exerted on the plant and this was exacerbated by the addition of the filtrate and/or centrate from the dewatering. While excess sludges produced on the site and imported may be the residual of treatment processes, they still have the potential to exert significant BOD and ammonia loads. The solids may not be compatible with the microbial population (biomass) present in the Carousel. Even the centrate/filtrate will exert a significant load if discharged in an uncontrolled manner.

The new curator has very effectively dealt with these problems; however odours are now being detected at the point where the centrate is returned to the inlet channel

Action

- To eliminate the problems associated with the centrate, collect the centrate in a stainless steel tank adjacent to the temporary sludge building and pump it directly to the aeration basin.
- Ensure that the rate of sludge wasting does not exceed the sludge dewatering capacity.
- By ensuring that the sludge produced on site and imported to the site is dewatered before it overflows from the Sludge Holding/Thickening Tank, the discharge of potentially harmful solids to the Carousel will be minimised/eliminated.
- By discharging the centrate/filtrate in a controlled manner (by dewatering the sludge over the longest possible period) the shock to the aeration system will be also be minimised
- Ensure that the sludge holding tank is empty at the end of the “dewatering week” after which is should be thoroughly cleaned down in preparation for the following period.
- Do not waste sludge when the sludge dewatering plant is not operating. If the Carousel receives 1890 kg BOD per day then sludge production will be approximately 945 kg/d + inorganic solids. 1000 mg/l MLVSS is equivalent to 9000 kg of solids so the increase in MLVSS in the Carousel will only be ~100 mg/l + inorganic solids for each day sludge is not dewatered.

As Ballincollig operates as a sludge hub, the importing of sludge is and will be a fact of life. In general sludges from other “extended aeration” treatment plants should not be incompatible with that produced by the WWTP itself, however primary sludges and in particular septic tank sludge are unstabilised and can adversely affect the operation of the activated sludge plant.

- These unstabilised sludges should be received and stored separately from other sludges.
- Inorganic material should be screened out
- If adequate aeration capacity exists, it is preferable that following screening they are “bled” into the Carousel at a point where mixing is intense
- In assessing the appropriate MLVSS at which the Carousel is operated, the amount of additional solids added must be taken into account

- Where adequate aeration capacity is not available, these sludges should be appropriately blended with the extended aeration sludges prior to dewatering

8.1 Sludge Dewatering Capacity

A limiting factor in the control of MLSS and Sludge Age in the Carousel plant is the ability to dewater and dispose of sludge from the works. There is a serious on-going risk of failure of the centrifuge plant, which would result in major process failure.

Consideration should be given to completely refurbishing the old filter belt press and its ancillary equipment for use as a supplementary/standby sludge dewatering plant.

8.2 Action

- Install a stainless tank ~ 2m x 1m x 0.9m high tank adjacent to sludge dewatering building
- Connect a variable speed drive positive displacement pump of capacity ~ 25 m^3/h and pump under level control to a location adjacent to aerator platform.
- Use flexible hose of diameter 3” and appropriately protect at access road crossing
- Rehabilitate old filter belt plant

9 ODOUR MINIMISATION

The principal sources of odour at most WWTPs are

- The inlet pipes
- Screening storage
- Accumulated organics in the grit channels
- Organics and slime adhering to pipes, walls and steelwork
- Clarifier inlet chamber
- Clarifiers
- Sludge withdrawal chamber
- Sludge return pumping chamber
- The sludge holding tank
- Dewatered sludge storage

Minimising most of these odours is achieved by good housekeeping. Walls and steelwork should be regularly cleaned down and debris removed. Channels should be kept clean.

At Ballincollig, particular attention should be paid to the following:

Inlet Pipes

- If sewage has been in the collection system for a protracted period, it will release noxious odours at the inlet works. Frequently inspect collection system to ensure that pipes are free of blockages
- Ensure that there are no “rogue” discharges of sludge and other wastes within the collection system
- Maintain the pumping stations to ensure that solids do not build-up in sumps etc.

Grit Channels

Ensure that accumulated grit is removed frequently together with any deposited organic or other solids

Carousel

- Maintain aerobic conditions in the aeration tank at all times (not less than 0.5 mg/l)
- Ensure that the velocity of the mixed liquor in the tank is at a minimum of 0.15m/s.

Clarifiers

- Frequent clean scum scrapers, channels, weirplates and chambers thereby reducing the biological breakdown of grease and scum;
- Consistent sludge withdrawal ensuring that solids residence times of <1 hour at average flow conditions are established;
- Prevent septic conditions by reducing sludge retention times during times of high solids loading
- Regularly inspect scraper blades to ensure the efficiency of settled solids scraping
- Remove accumulated scum regularly

Sludge Holding Tank

- Frequent clean walls, scraper, decanting channels, and chambers thereby reducing the biological breakdown of sludge
- Consistent sludge withdrawal ensuring that solids residence times of <2 hours at average dewatering rates are established
- Ensure that sludge or scum does not accumulate in the tank and that tank is cleaned out if not in use
- Ensure that sludge or scum does not overflow the decanting channels
- If odours persist, consider "covering" of tank to ensure that installed odour control equipment is treating the headspace of the holding tank and not the general atmosphere.
- When dewatered sludge has to be retained on site, cover skips with a tarpaulin or similar cover

Imported Sludge

- Introduce any septic tank sludge, over a protracted period, below liquid level in the Carousel at a point of intense mixing
- Ensure that other biological sludges are fresh – if not apply the above

10 STAFFING

The current staff at the WWTP is achieving consistently outstanding results, when the flow and load to the plant are within the capacity of the plant, notwithstanding the shortcomings of a plant which has already given more than 20 years service.

The inlet works, which are typical of their time, are no longer appropriate for a modern treatment plant and will soon be upgraded.

For the time being, maintaining the screenings and manually removing grit from the grit channels, while at the same time increasing the quantity of sludge being dewatered will exert great pressure on the existing staff.

In addition significant manhours will be required to remove accumulated scum from the clarifiers and other housekeeping duties.

11 SUMMARY AND PRIORITY ACTIONS

Short term measures to improve plant performance and minimise odour nuisance should initially be directed towards

- Improve the screening of the wastewater by the incorporation of a new fine screen
- Utilise the existing Primary and Humus tanks as temporary Stormwater Storage Tanks
- Continue the efficient management and disposal of solids generated on the plant
- Rehabilitate the Filter Belt Press Plant to ensure that sludge dewatering facilities are enhanced
- Increase Final Clarification
- Minimise risk to sludge return by installation of a new sludge return pump
- Control of the MLVSS by careful management of the sludge wasting in line with sludge generation
- Minimisation of the impact of high hydraulic loads
- Minimise Final Clarifier back-up by upgrading final effluent discharge pipe
- Early identification and elimination of the causes of fugitive odours

Appendix: Equipment Listing and Timeframe

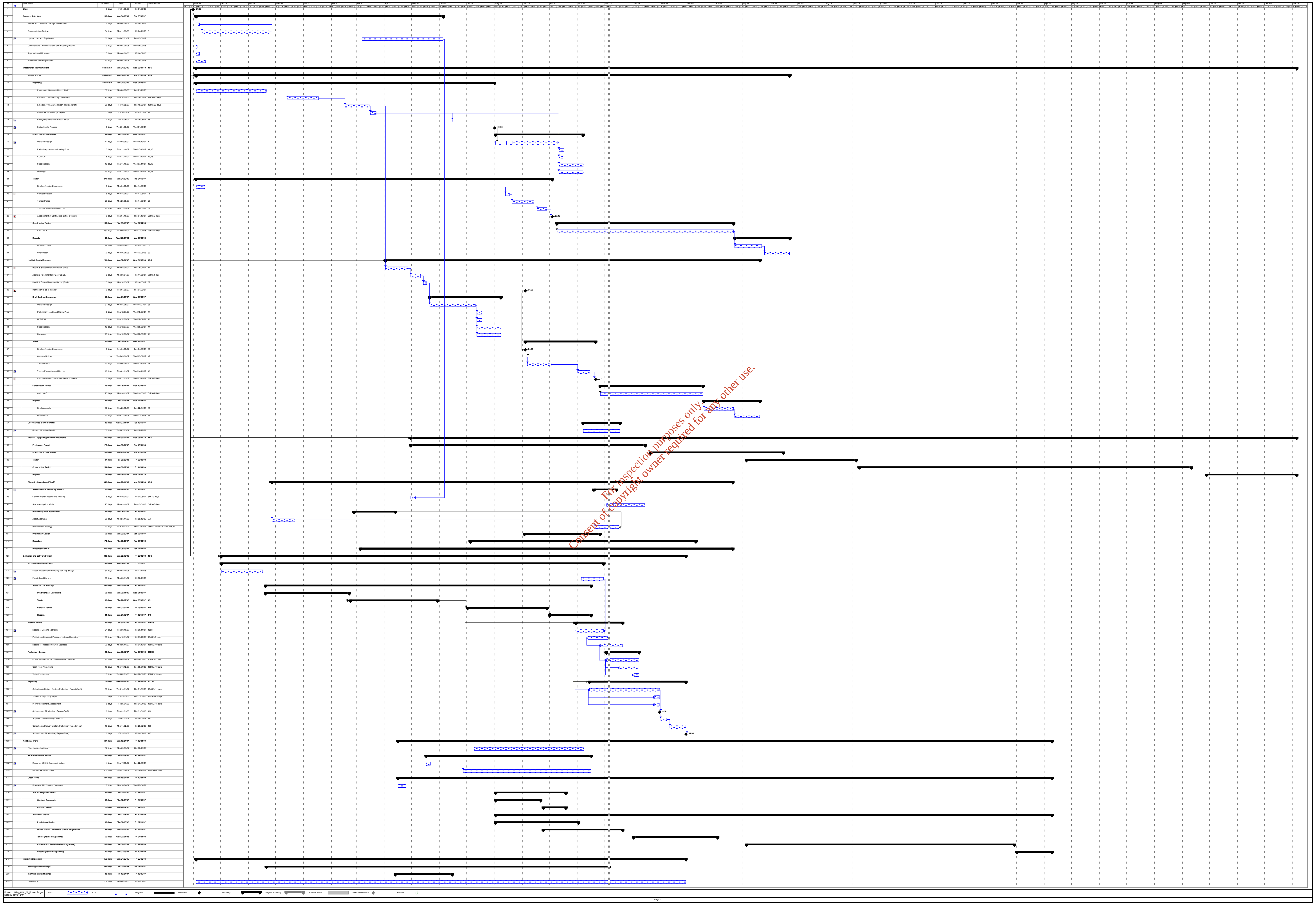
Stage	Item	Description	Availibility of Equipment from Date of Order	Installation from Date of Equipment Supply
Coarse Bar Screens	Wear Strips	Fabricate and fit purpose fabricated wear strips (4 No) to improve raking of bars. Fabricated from Polyproplene or similar	4 weeks	1 week
Grit Channels	Guide/Overflow Weir	Install a weir plate in the transition section upstream of the Grit Channels as described in Section 2.2. of the Emergency Measures Report. Weir Length: 2.0 m, Weir Height: 290mm. Materials of Construction: SS304	4 weeks	1 day
Fine Screening	Fine Screen Package	Install a REM or similar Fine Screen Package	10 weeks	1 week
		Divert flow from existing pipe including pipes and valves		2 days
		Provide reinforced concrete plinth, including all civil works	6 weeks	
		Electrical works		2 weeks
"Old" Grit Channels	Penstocks	Refurbish 4 No. Penstocks		2 weeks
	Grit Channels	Clean out grit channels		ongoing
"Old" Primary Settling Tanks	Dewatering Pumps	Install 2 x Positive Displacement pump of capacity 50 m^3/h on each desludging pipe. Remove bellmouth arrangement and connect suction to flange. Pump delivery to be to the transition section upstream of the Grit Channels. Suction and delivery pipework to be in reinforced flexible hose ~ 6” diameter	6 weeks	2 weeks
		150 Gate Valve fitted on Suction side of pump		included
		Purpose designed suction pipework in 150 mm carbon steel		included
		Delivery hose in 100 mm reinforced plastic from pump to transition of grit channels c/w flanges specials		included
		Local control panel suitable for manual operation containing starters, etc. Panel to be suitable for external mounting		included
		Level controls for pumps		included
		Electrical Installation	4 weeks	2 weeks
"Old" Stone Media Filters		Break filter feed pipe as indicated on photograph as indicated in Section 3 of Emergency Measures Report		1 day
Final Clarification	Scum Removal	Install new Scum Boxes and discharge system	Already installed	
		Scum balancing tank, pumps and rising main	5 weeks	2 weeks
Sludge Dewatering	Centrate Return Pump	Install one variable speed drive positive displacement pump of capacity ~ 25 m^3/h and pump under level control to a location adjacent to aerator platform.	6 weeks	1 week
		Gate Valve fitted on Suction side of pump		included
		Install a stainless tank ~ 2m x 1m x 0.9m high tank adjacent to sludge dewatering building	4 weeks	included
		Protection of delivery pipe		
		Local control panel suitable for manual operation containing starters, etc. Panel to be suitable for external mounting	4 weeks	2 weeks
		Level controls for pumps		
		Interconnecting pipework from existing outlet pipework to collection tank in PVC	4 weeks	included
		Delivery hose in 100 mm reinforced plastic from pump to aeration basin c/w flanges specials	4 weeks	included
		Electrical Installation	4 weeks	2 weeks
Sludge Dewatering	Rehabilitation of old Filter Belt Installation	Rehabilitate and refurbish filter belt press and ancilliary equipment	TBA	
Supplementary Clarification	Lamella Clarifiers	2 Lamella Plate Clarifiers each capable of handling 125 m3/h	16 weeks	2 weeks

Stage	Item	Description	Availibility of Equipment from Date of Order	Installation from Date of Equipment Supply
	Feed Pumps	2 x Submersible Pumps each capable of 250 m3/h	6 weeks	2 weeks
		Gate Valve fitted on Delivery side of pump	included	included
		Non return valve fitted on delivery side of each pump	included	included
		Install a stainless clarifier feed tank ~ 2m x 1m x 1.5m high tank adjacent to clarifiers	10 weeks	2 weeks
		Install a stainless sludge withdrawal tank ~ 2m x 1m x 1.5m high tank adjacent to clarifiers	included	included
		Structural steel support for both feed and sludge withdrawal tanks approximately 4m x 4m x 4.5m high	8 weeks	2 weeks
		Local control panel suitable for manual operation containing starters, etc. Panel to be suitable for external mounting	6 weeks	2 weeks
		Level controls for pumps	included	included
		Electrical Installation		2 weeks
		Interconnecting pipework from each pump to clarifier feed tank in reinforced PVC	included	included
		Inlet feed pipework from feed tank to clarifier in 300mm carbon steel	included	included
		Sludge withdrawal pipework from clarifier to sludge chamber in 200mm carbon steel	included	included
		Outlet pipework from clarifiers to WWTP outlet chamber in 300mm Carbon Steel	included	included
		Sludge return pipework from sludge withdrawal tank to aeration basin in 300mm carbon steel	included	included
Sludge Return	Sludge Return Pump	Submersible Pumps capable of 250 m3/h	6 weeks	2 weeks
		Gate Valve fitted on Delivery side of pump	included	included
		Non return valve fitted on delivery side of each pump	included	included
Outfall	Supplement existing Clarifier discharge to prevent flooding of Clarifiers	40 metres of 750 mm pipe including 2 new manholes	10 weeks	3 weeks

Extract from Current Projected Capital Expenditure on Ballincollig Sewerage Scheme Upgrade Project

Name of Project	WSIP Published Status (2007-2009)	WSIP Amended Status (2007-2009)	Fund Type	Comments-e.g. Current Status, Priority etc.	Latest Estimated Cost (Default WSIP figure) A	Q4 2008	Q1 2009	Q2 2009	Q3 2009	Q4 2009	Q1 2010	Q2 2010	Q3 2010	Q4 2010	Q1 2011	Q2 2011	Q3 2011	Q4 2011	Q1 2012	Q2 2012	Q3 2012	Q4 2012	Q1 2013
Ballincollig Sewerage Scheme (Nutrient removal)	Schemes to Start 2008	Start 2009	Public	Consultants currently working on Preliminary Report	€ 948,000	€ 13,628	€ 13,628	€ 13,628	€ 13,628	€ 13,628	€ 13,628	€ 13,628	€ 13,628	€ 1,106	€ 1,106	€ 1,106	€ 102,799	€ 102,799	€ 102,799	€ 102,799	€ 102,799	€ 102,799	€ 102,799
Ballincollig Sewerage Scheme Upgrade	Start 2009	Start 2009	Public	Consultant has been appointed and work on the Preliminary Report has commenced. Procurement of additional interim works at WWTP by design build with EPS is ongoing. Design commenced. To be completed April 2008. Procurement of advance works within the footprint of the Green Route proposals is also ongoing. Design/contract documents to be ready January, 2007.	€ 22,248,000	€ 319,815	€ 319,815	€ 319,815	€ 319,815	€ 319,815	€ 319,815	€ 319,815	€ 319,815	€ 25,956	€ 25,956	€ 25,956	€ 2,412,518	€ 2,412,518	€ 2,412,518	€ 2,412,518	€ 2,412,518	€ 2,412,518	€ 2,412,518

Q2 2013
€ 102,799
€ 2,412,518



Office of Environmental Enforcement

South/South West Region
Environmental Protection Agency
Regional Inspectorate, Inniscarra
County Cork, Ireland

Cigireacht Réigiúnach, Inis Cara
Contae Chorcaí, Éire

T: +353 21 487 5540
F: +353 21 487 5545
E: info@epa.ie
W: www.epa.ie

LoCall: 1890 33 55 99

Ms. Mary O' Halloran
Director of Services
South Cork – City Hinterland
Cork County Council
County Hall
Cork

07/06/2007

Section 63(3)(a) of the Environmental Protection Agency Acts 1992 and 2003*

Advice & Recommendations

Re: Ballincollig Sewage Works– PAE2007/206

Dear Ms. O' Halloran

Further to the Agency's request of 14th May 2007 under Section 63(1) of the EPA Acts 1992 and 2003, the Agency is in receipt of the Council's report of 28th May 2007 in reply thereto. The Agency has also visited the site on a number of occasions, most recently on the 1st June, and has received a number of complaints regarding the discharge from the Ballincollig Sewage works to the River Lee.

Further to the assessment carried out by the Agency under Section 63(2) of the EPA Acts 1992 and 2003, and having considered the information obtained in the course of that exercise, the Agency in accordance with Section 63(3)(a) of the EPA Acts 1992 and 2003 issues the following advice and recommendations to Cork County Council;

1. Submit full details, including timeframes, of short term corrective actions in preparation (use of currently redundant tanks on site for stormwater storage and installation of emergency additional clarification)
2. It is recommended that maintenance procedures are reviewed so as to ensure that plant performance is not compromised during planned works and that key infrastructure is offline for as short a time as possible
3. The Agency notes that the agreed procedure is to ring the City Waterworks after every incident. Please clarify whether or not Cork City Council were notified of the incident on the 8th May.
4. Provide a timeline for the development and implementation of the Incident Protocol being prepared for all Water Services sections.
5. The adequacy of the current effluent discharge system needs to be assessed in light of best practice for outfall location and design. The location of the current outfall to the Lee should be assessed in terms of diffusion characteristics and mixing zone etc. If the assessment indicates that best

practice is not being applied, proposals for upgrading of the discharge systems should be developed and implemented as a matter of priority.

6. It is recommended that the installation of a suitable continuous monitor at the effluent outfall be prioritised as a matter of urgency. The plant is considered to be vulnerable, particularly during periods of intense rainfall, and a system of rapid response in the event of poor effluent quality needs to be developed and implemented.
7. The composite sampler should continue to sample the effluent on an ongoing basis. It should be operated on a flow proportional basis (as opposed to time based). For the time being and until further notice from the EPA, analysis should be undertaken on a twice weekly basis for the full range of parameters. All of the composite samples taken off daily should be stored and not discarded until replaced with the next days sample.

It is noted that the wastewater section report dated 23rd May 2007 concludes that, following an extensive regime of analysis, that all of the samples are compliant with the Urban Wastewater regulations. This is clearly not the case as the EPA sample of the discharge taken at 21.20 on the 8th May shows significant exceedances with recorded BOD, COD and SS levels of 680, 1510 and 1280 mg/l respectively.

The Agency considers achievement of the seven requirements listed above to be necessary to the satisfactory performance by your Council of its statutory environmental protection functions in this matter.

Cork County Council is requested to submit a written report to the Agency on the achievement of these recommendations no later than 22nd June 2007.

These recommendations and advice are issued without prejudice to the right of the Agency to take any further action which it may in future decide is appropriate, whether under Section 63 of the EPA Acts 1992 and 2003 or otherwise.

The EPA person dealing with this file is Jim Moriarty to whom all correspondence and queries in relation to the matter should be addressed. Please use the reference number above in all future communications with the OEE regarding this matter.

Yours sincerely,

Jim Moriarty
Senior Inspector
Public Authority Enforcement
Office of Environmental Enforcement

*Section 63 of the EPA Act 1992 as amended by Section 13 of the Protection of the Environment Act 2003.

CC: Nicholas Bond, Environmental Complaints Coordinator
Michael Murphy, Area Engineer for Ballincollig

The results are part of the testing undertaken during the section 63 notice.
The analysis was run by Water Technology Ltd Laboratory.
The analysis on the 2nd 3rd and 4th of June was completed inhouse. The inspector did not have a difficulty with this one week-end of inhouse analysis

Date	Sample collection	Lab Ref	pH	COD	BOD	TSS			
19-May-07	18/05/07-19/05/07	07/19-5-07	7.61	16	5	13			
20-May-07	19/05/07-20/05/07	07/20-5-78	7.63	30	7	8			
21-May-07	20/05/07-21/05/08	07/21-5-79	7.71	20	4	5			
22-May-07	21/05/07-22/05/09	07/22-5-81	7.73	33	7	8			
26-May-07	upstream (g)	07/26-5-92	7.47	<1	<1	13			
26-May-07	25/05/07-26/05/09	07/26-5-94	8.02	13	3	9			
26-May-07	downstream (g)	07/26-5-93	7.6	<1	<1	6			
27-May-07	upstream	07/27-5-95	7.49	3	1	5			
27-May-07	26/05/07-27/05/09	07/27-5-97	8.05	30	6	14			
27-May-07	downstream (g)	07/27-5-96	7.43	<1	<1	4			
28-May-07	upstream (g)	07/28-5-98	7.45	<1	<1	6			
28-May-07	27/05/07-28/05/09	07/28-5-100	7.95	24	6	15			
28-May-07	downstream (g)	07/28-5-99	7.56	<1	<1	3			
29-May-07	upstream (g)	07/29-5-108	7.66	<1	<1	11			
29-May-07	28/05/07-29/05/09	07/29-5-110	7.91	20	7	6			
29-May-07	downstream (g)	07/28-5-99	7.72	<1	<1	5			
2-Jun-07	upstream (g)			9		1			
2-Jun-07	01/06/07-02/06/09			38		9			
2-Jun-07	downstream (g)			4		3			
3-Jun-07	upstream (g)			5		3			
3-Jun-07	02/06/07-03/06/09			42		7			
3-Jun-07	downstream (g)			6		5			
4-Jun-07	upstream (g)			4		1			
4-Jun-07	03/06/07-04/06/09			31		11			
4-Jun-07	downstream (g)			7		4			
5-Jun-07	upstream (g)	07/5-6-21	7.66	<1	<1	2.6			
5-Jun-07	04/06/07-05/06/09	07/5-6-23	8.48	12	5	5.6			
5-Jun-07	downstream (g)	07/5-6-22	7.74	<1	<1	5.2			
9-Jun-07	upstream (g)	07/9-6-56	7.4	<1	<1	9.7			
9-Jun-07	08/06/07-09/06/09	07/9-6-58	7.68	<1	2	10.6			
9-Jun-07	downstream (g)	07/9-6-57	7.47	<1	<1	3.9			
10-Jun-07	upstream (g)	07/11-6-59	7.3	<1	<1	6			
10-Jun-07	09/06/07-10/06/09	07/11-6-61	7.71	9	3	8			
10-Jun-07	downstream (g)	07/11-6-60	7.64	<1	<1	7			
11-Jun-07	upstream (g)	07/11-6-62	7.58	<1	<1	5			
11-Jun-07	10/06/07-11/06/09	07/11-6-64	7.75	14	5	4			
11-Jun-07	downstream (g)	07/11-6-63	7.6	<1	<1	7			
12-Jun-07	upstream (g)	07/12-6-69	7.41	<1	<1	3			
12-Jun-07	11/06/07-12/06/09	07/11-6-64	7.69	<1	<1	6			
12-Jun-07	downstream (g)	07/12-6-70	7.49	<1	<1	3	**Ammonia-N**	**Total Nitrogen**	**Total Phosphate -P**
19-Jun-07	upstream (g)	07/20-6-95			<1	4.6	<0.01	12.14	0.15
19-Jun-07	18/06/07-19/06/09	07/11-6-97	7.58	110	38	94.1		6.47	7.59
19-Jun-07	downstream (g)	07/20-6-96			<1	6.7	<0.01	5.64	0.36
26-Jun-07	upstream (g)	07/27-6-128			<1	2.4	<0.01	12.37	0.07
26-Jun-07	25/06/07-26/06/09	07/27-6-130	7.8	6	4	9.6		25.02	5.5
26-Jun-07	downstream (g)	07/27-6-129			<1	7.3	<0.01	11.14	0.07