Appendix A:
Waste Water Treatment Plant Non Technical Description.

1.0 Non-Technical Description of the Plant Control Philosophy

The main design criteria for the design of this plant is to "reduce to acceptable levels the concentrations of metals named in the discharge consent, which applies to the factory".

The plant is designed to treat 8m^3 per hour.

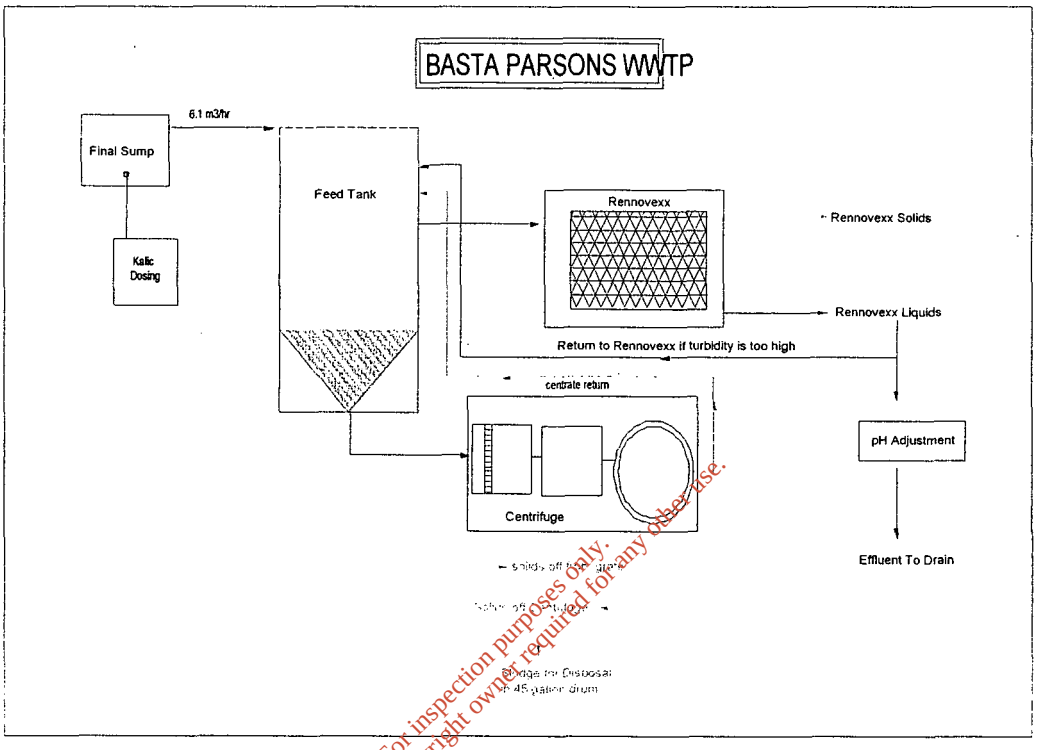
All of the incoming effluent is conveyed through a series of conveyances to a central effluent sump where it is pumped via 2 float controlled submersible pumps to a cylindrical feed tank with a conical base. There is a pH correction stage at effluent sump stage where "Kalic" (liquid Lime) is dosed to effect a pH increase to pH 10. The efficacy of the pH dosing is measured by a pH probe at the inlet to the tank and measured on a chart recorder. The reason for the pH correction is to drop out the metal compounds within the process stream. The solids float to the bottom of the tank and are fed to a centrifuge for a more concentrated solid removal stage. The liquid is then taken from the middle of the effluent tank and pumped through the Renovexx microfiltration unit. On passing through the unit the effluent is passed through a turbidity meter where if a certain turbidity level is not attained the effluent is rejected to the feed tank again. If the turbidity reading is less than the expected values the effluent will be sent forward for pH correction and discharge to the stream under EPA consent.

On the sludge handling side the sludge from the bottom of the effluent feed tank is pumped into a 2 chamber centrifuge feed tank. The gross solids are strained out of the effluent stream and the remainder is forwarded to the unit for centrifugation. The solid material after this phase is dropped to a containment vessel and taken away for disposal by a registered contractor. The liquid from this process is returned to the effluent sump and fed back through the plant.

2.0 The Treatment Plant

This section will address the waste water treatment plant and describe the unit processes in the plant and also describe the design capacity of each of the unit processes.

Figure 4.0 schematic of the main unit process in the WWTP



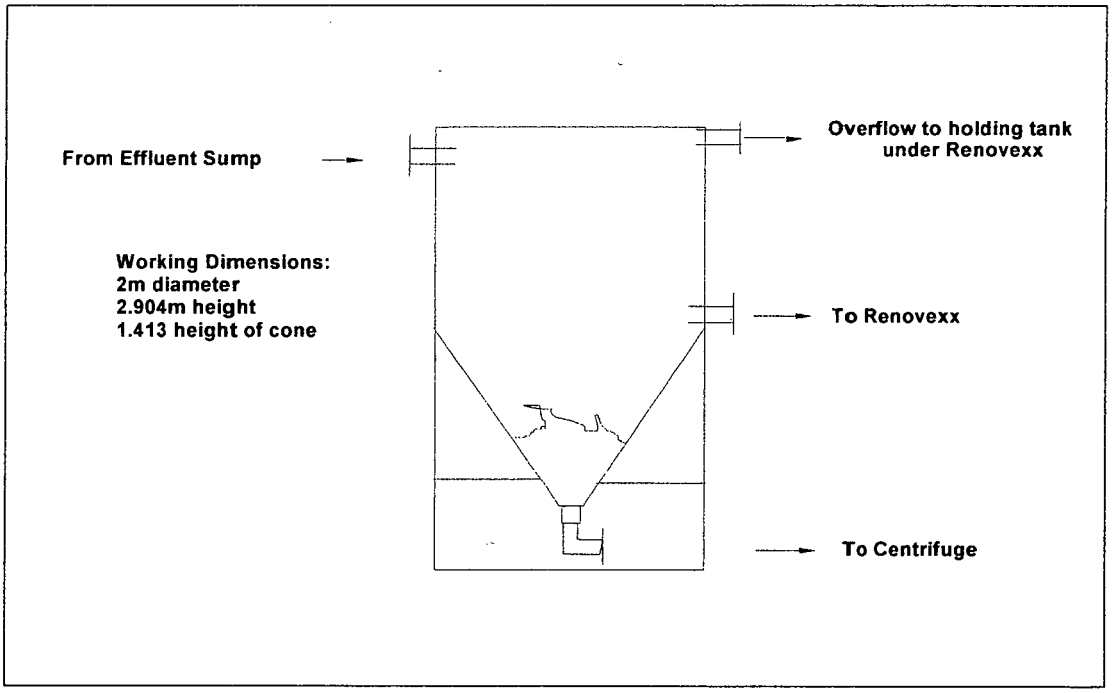
The main unit processes in the WWTP at Basta Parsons Ltd. are:

1. ***Effluent Sump***
   This is a small pump sump which forms the entry point for all wastewater to the plant. It is located in the underground section of the wastewater treatment plant and receives effluent from the vibrosump, the over flow from the rinse water and drip wastewater from the centrifuge on a daily basis. The sump dimensions are:

   $0.905m \times 1.2m \times 0.61 = 0.662\ m^3$ Effluent Sump Capacity

2. ***Feed Tank***
   From the effluent sump the wastewater is pumped to the feed tank. This tank is a cylinder with a conical bottom to allow separation of metals for removal to a further treatment process. The tank has a capacity of $6.5m^3$.

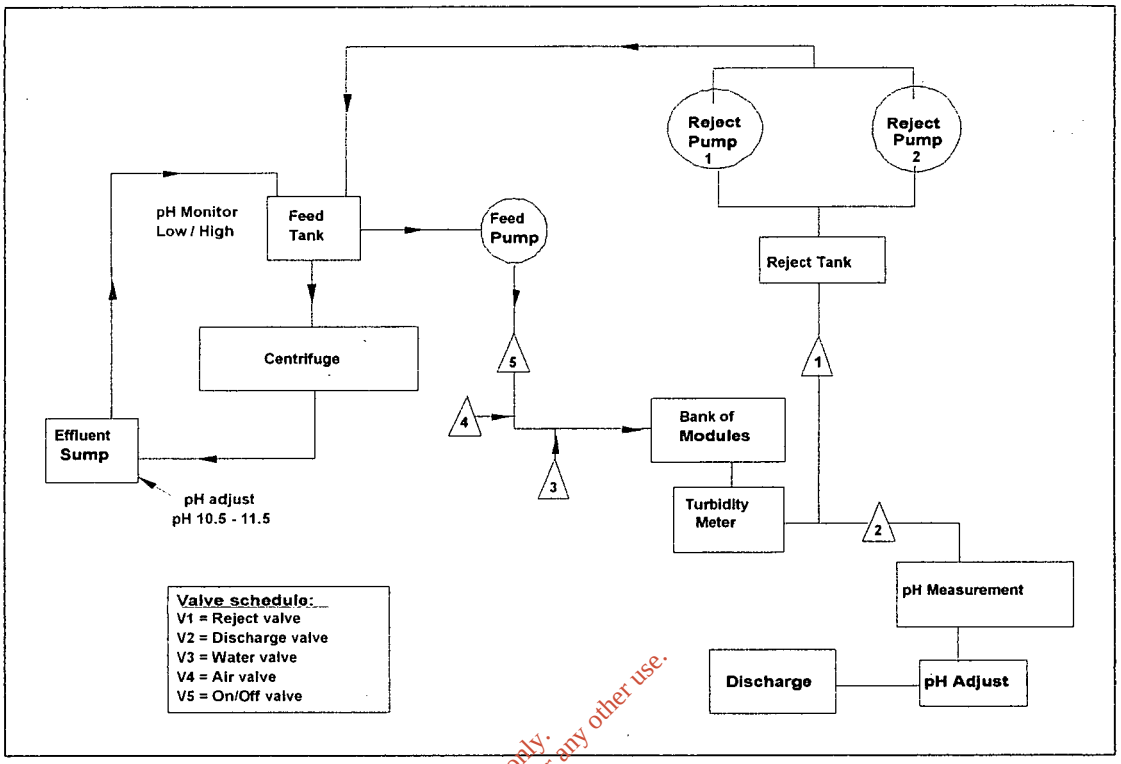
Fig. 4.0 shows the dimensions of the feed tank



3. Renovexx Plant

Effluent from the feed tank is pumped through the Renovexx plant. The plant design specification is to treat a maximum flow of 8.0m^3/ hour of effluent. There are 8 no. 3.0m long simplex filtration modules. The filter modules are arranged in two banks, offering duty and standby operation. The plant is not designed for both banks to run simultaneously, or for only two modules to operate in one bank. The working pressure of the system is 2.0 bar.

Figure 5.0 P & I D of the Renovexx Plant



4. Centrifuge

This stage of the plant involves the abstraction of the settled solid sludge from the bottom of the feed tank. The sludge is passed through a gross filter in the first reception tank and then diverted to the centrifuge feed tank where it is continually stirred. For the purposes of the study based on the information received the capacity of the centrifuge has been calculated as 1.5 m^3/hr.

5. p H correction tank

Effluent from the cloths is pumped into this tank where it is pH adjusted using a hydrochloric acid dosing pump controlled via a pH meter which brings the effluent back to pH 7. The effluent is then conveyed off-site to stream.

There are a number of ancillary tanks for the storage of maintenance liquids and surplus effluent that hasn't been sufficiently treated for discharge. These tanks do not form part of the core philosophy of the plant design and are not integral to this assay.

4.0 Unit Process Effluent Characteristics

Effluent Sump:	**Total Capacity = 0.662 m^3**		
Total volume in:	Vibrolines Barrel line Powder line		1.8 m^3/hr
	Rinse water		4.8 m^3/hr
	Centrifuge return		0.134 m^3/hr
	Kalic		0.007 m^3/ hr
Total Volume out:			6.7 m^3/hr
Feed tank:	**Total Capacity**	**= 6.5 m^3**	
Total volume in:	Effluent sump		6.7 m^3/hr
	Renovexx Reject		0
Total volume out:	To Centrifuge		0.14m^3/hr
	To Membrane		6.56 m^3/hr
Membrane Plant:	**Total Capacity**	**= 8.0 m^3 per hour**	
Total volume in:	Feed tank	= 6.56 m3/hr	
Total volume out:	To pH Correction	= 6.56 m^3 / hr	
PH correction:			
Total Volume in:	Membrane plant	= 8.0 m^3/ hour	
Centrifuge:	**Total Capacity**	= 1.5 m^3/ hour	
Total Volume in:		**= 1.5 m^3 per hour at 1% solids**	
Total Volume out:	**liquor** **Solids**	**= 1.364 m^3/hr** **= 0.136 m^3/hr**	