Kimberley Pollution Control Design Data

Basic Data

Population	12,000		
Waste Water Flow			
Average per Capital Flow, L/cap'd	523		
Average Flow, ML/d	6.27		
Peak Day Flow, ML/d	14.55		
Loadings			
5-day, 20°C, BOD, g/cap'd	90	kg/d	1080
Suspended Solids, g/cap'd	90	kg/d	1080
Volatile Suspended solids, g/cap'd	67.5	kg/d	810

Screening

Mechanically - Cleaned Bar Screen	1
Channel Width, mm	610
Clear Space Between Bars, mm	12.7

Activated Sludge

Aeration Tanks	2
Water Depth, m	7.925
Volume, each, m^3	933
Detention Time, at Average Flow, h	7.1
at Peak Day Flow, h	3.1
Volumetric Loading, kg BOD_5/100 m^3 .d	579
Assumed Mean Cell Residence Time, d	10
Mixed Liquor Vol. Suspended Solids	2, 230 (MLVSS) mg/L
Food/Micro Organism Ration, kg BOD_5/kg	0.25 (MLVSS.d)
Activated Sludge Blowers	3
Capacity, each, 20°C, sea level, L/s	3
Discharge Pressure, gauge, kPa	82.7

Sedimentation

Sedimentation Tanks	2
Diameter, m	12.2
Side Water Depth, m	4.57
Effective Area, each, m^2	117
Overflow Rate at Average Flow, L/m^2d	26,853
Overflow Rate at Peak Day Flow, L/m^2d	62,315
Weir Length, each, m	34.5
Weir Rate at Average Flow, L/m.d	90,870
Weir Rate at Peak Day Flow, L/m.d	210,870
Return Activated Sludge Air Lifts	2 - each tank
Capacity Range, Each Pump, L/s	15 & 30

Disinfection

Chlorinator, Capacity kg/d	46
Sulphonator, Capacity kg/d	46
Contact Tank	
Length, m	14.6
Width, m	11.3
Depth, m	2.13
Volume, m^3	351.4
Contact Time at Average Flow, Min.	45
Contact Time at Peak Day Flow, Min.	20

Sludge Digestion

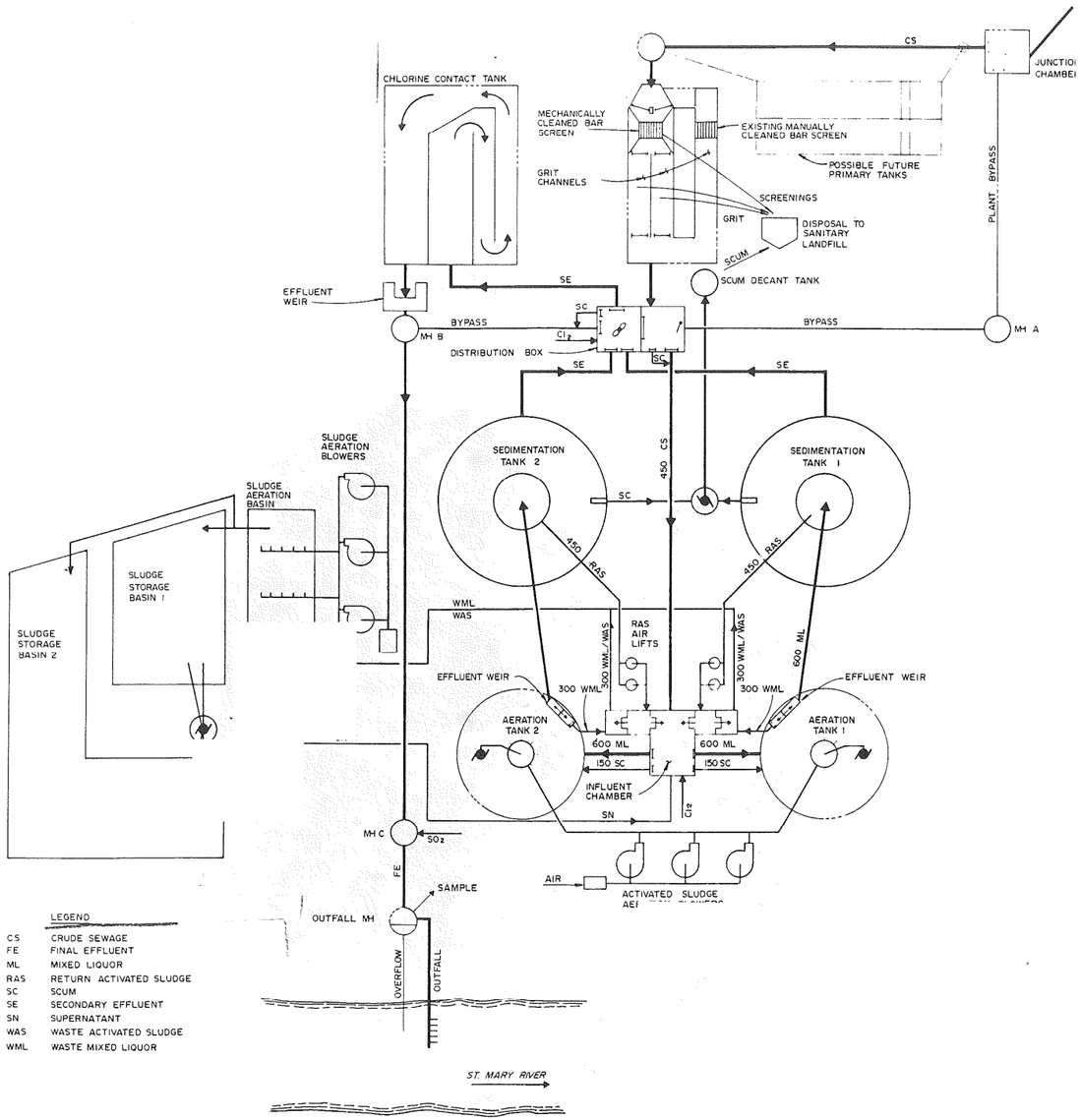
Aeration Basin	
Avg. Length, m	32
Avg. Width, m	15
Depth, m	2.50
Volume, m^3	2,200
Volume per Capita, L/cap	183
Sludge Aeration Basin Blowers	3
Capacity, 20°C, Sea Level, L/s	354-590
Discharge Pressure, Gauge, KPa	51.7

Sludge Storage

Basin 1	Area, m^2 - 1,350	Basin 2	Area m^2 - 2,200
	Depth, m - 2.5		Depth, m - 2.5
	Volume, m^3 - 2,150		Volume, m^3 - 4,500

City of Kimberley

Pollution Control Centre



PROCESS FLOW DIAGRAM

The City of Kimberley Water Pollution Control Centre

PROJECT DEVELOPMENT

The present plant is an expansion of the Kimberley - Chapman Camp Pollution Control Centre constructed in 1967. The original plant produced a primary effluent for discharge into St. Mary River. Its major components consisted of two "spirogesters" which provided primary clarification and unheated, unmixed, anaerobic digestion of the sludge in a chamber below the clarifier. Influent screening, chlorination of the effluent and sludge drying beds were also provided. The plant had a capacity of 2.5ML/d and was capable of producing a primary effluent in compliance with the standards of the day.

By 1978 the plant was becoming overloaded, the effluent quality was deteriorating and in addition, effluent quality no longer complied with objectives issued by the Ministry of Environment.

The plant was, accordingly, upgraded and expanded in 1979 to provide secondary treatment to an average dry weather flow of 6.27 ML/d for a population of 12,000 persons.

UNIT PROCESSES

SCREENINGS: Rags, sticks, plastics and similar objects are screened from the sewage by an automated bar screen. Material removed is discharged to a container for transport to a Sanitary Landfill.

GRIT REMOVAL: The screened wastewater flows through channels with flow control weirs designed to hold the velocity to approximately 300 mm per second thus causing sand and grit to settle out. These channels are cleaned periodically and the grit transported to a Sanitary Landfill.

ACTIVATED SLUDGE: After passing through one side of the distribution box, the flow enters the aeration tank influent chamber. Return activated sludge from the secondary clarifiers is introduced to the flow at this point and the mixed liquor is then introduced to the aeration tanks. These tanks are the old "spirogester" tanks from which the clarifier and digester mechanisms have been removed. The tanks have large bulbous lower chambers which ideally suit centrally located, radial, multi-nozzled air/mixed liquor mixers. Air is supplied by positive displacement blowers and the mixed liquor by submersible pumps located in the bottom of the aeration tanks. Fine bubble aeration is achieved with these devices resulting in high oxygen transfer at low power consumption. Mixed liquor then flows over adjustable weirs to the clarification tanks.

CLARIFIERS: The mixed liquor enters the clarification tanks through to an energy dissipating box and a flocculation zone prior to descending into the tank for liquid/solids separation. The liquid (effluent) flows over the periferal weirs to the other side of the distribution box. The solids are removed from the bottom of the tank by syphon type collectors and air-lifted to a weir box adjacent to the aeration tank influent chamber. Flow of return activated sludge from this weir box is controlled by two weirs which are adjusted to control the amount of return activated sludge returned to the process and the amount wasted to the sludge aeration basin. The amount of return activated sludge retuned from the clarification tanks is controlled by adjusting the air flow to the air lifts. Scum is removed from the surface of the secondary clarifiers and pumped to a scum decant tank located in the headwork's area. Decanted scum is disposed of to a Sanitary Landfill along with the screenings and grit.

DISENFECTION: Clarified effluent from the clarification tanks is chlorinated in the distribution box and is held for approximately 1 hour in the chlorine contact tank located under the Control Building. It then flows over a measuring weir and out the outfall into the St. Mary River. Dechlorination facilities are provided. A new outfall diffuser section was installed to integrate the effluent into the river flow.

SLUDGE AERATION BASIN: The waste activated sludge is piped to the sludge aeration basin. Facilities are provided in the aeration tanks and waste sludge boxes which will also permit solids to be wasted in the mixed liquor should the operators wish. The waste sludge is aerobically stabilized in the basin. Three positive displacement blowers are provided to supply submerged course bubble aeration.

SLUDGE STORAGE BASINS: Two sludge storage basins are provided which permit decanting of the stabilized sludge with the supernatant being returned to the plant flow and the solids accumulating on the basin bottom. Periodically - every five years or so - it is projected that a basin will be allowed to dry out and the dried sludge is recovered as a soil conditioner.