City of Campbell River

Norm Wood Environmental Centre

Dayton & Knight Ltd.
CONSULTING ENGINEERS

The Norm Wood Environmental Centre is a secondary wastewater treatment facility serving the City of Campbell River.

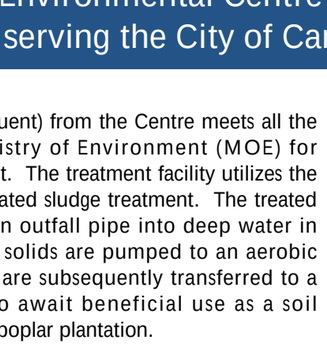
Treatment Processes

The treated wastewater (effluent) from the Centre meets all the requirements of the Ministry of Environment (MOE) for discharge to the environment. The treatment facility utilizes the oxidation ditch type of activated sludge treatment. The treated effluent is discharged by an outfall pipe into deep water in Discovery Passage. Waste solids are pumped to an aerobic digester for treatment and are subsequently transferred to a biosolids storage basin to await beneficial use as a soil conditioner on the adjacent poplar plantation.

Conformity of the effluent with MOE requirements is determined by measurements of five-day biochemical oxygen demand (BOD_5) and total suspended solids (TSS). The BOD_5 is a measurement of the amount of organic (oxygen-demanding) material in the wastewater, and TSS is a measurement of the solids content. Raw wastewater typically enters the plant with a BOD_5 of 180 mg/L and a TSS of 200 mg/L. Effluent requirements are maximum 45 mg/L BOD_5 and 45 mg/L TSS.

Biosolids Management

Poplar Plantation and Biosolids Fertilization

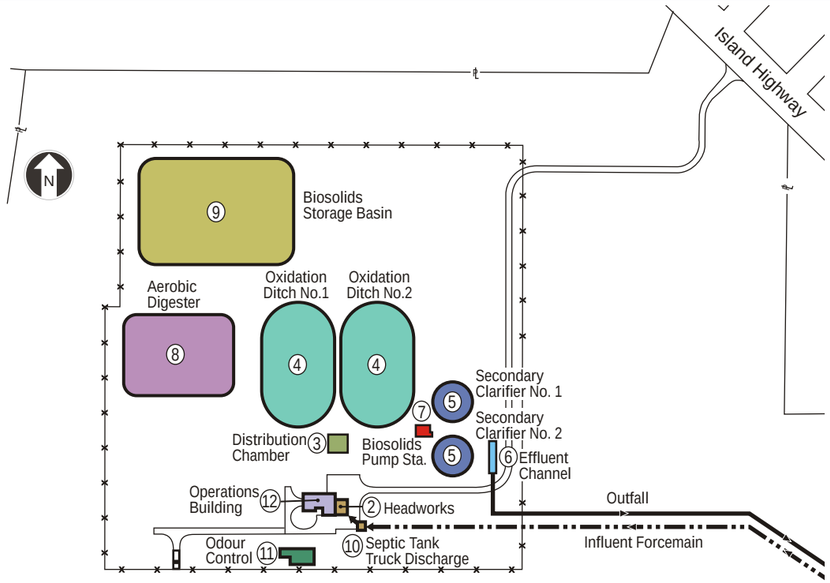


The City is currently developing a recycling program for the treated solids (biosolids) produced at the Centre. The biosolids are well within the Provincial standards for reuse, which are defined in the B.C. Organic Matter Recycling Regulation.

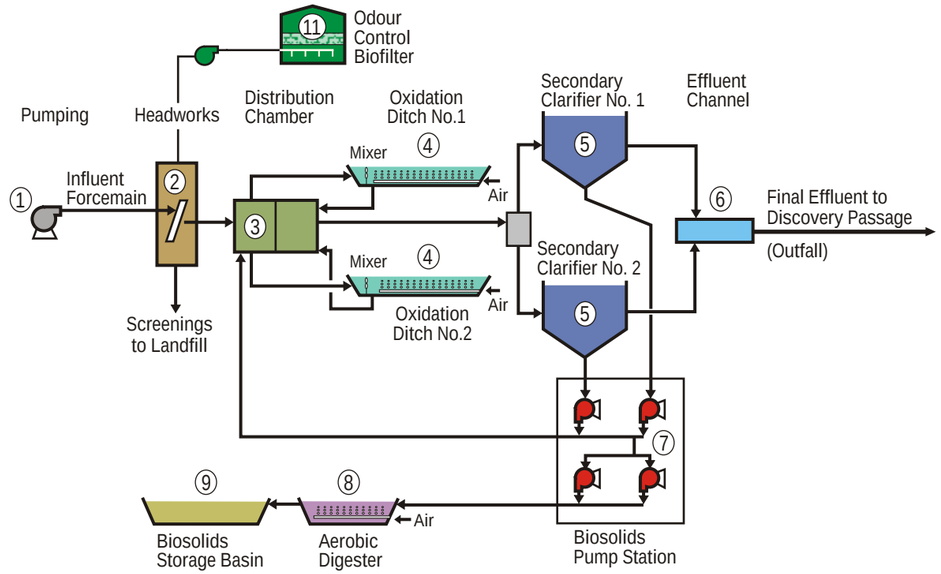
The biosolids are being used as an organic fertilizer and soil conditioner to promote the growth of hybrid poplar trees on a plantation located adjacent to the Centre. When the trees mature, sale of the wood will provide revenue to support the operation of the Centre. This project is a sustainable and beneficial way of converting the City's waste into a useful product.

Biosolids Application

Poplar Plantation



Site Plan



Flow Schematic

1. Influent Pumping

A pumping station is located on Spit Road, approximately 3 km south of the Norm Wood Environmental Centre. Wastewater enters the pumping station wet well from an interceptor pipeline system. Three pumps, one 100 HP and two 250 HP, pump the wastewater through a 750mm diameter forcemain to the wastewater treatment plant.

2. Headworks

Rags, sticks, plastics and other objects are removed by a mechanical bar screen, compressed and discharged to a waste bin.

3. Distribution Chamber

Screened wastewater from the headworks enters the distribution chamber, where control gates allow the wastewater to be directed to one or both oxidation ditches. A second section of the distribution chamber collects mixed liquor from the two oxidation ditches and discharges it to the secondary clarifiers.

4. Biological Treatment (Oxidation Ditches)

The wastewater is mixed and aerated in the oxidation ditches, where it is retained for approximately 18 hours. Bacteria grow in the oxidation ditches, feeding on the organic material in the wastewater. Biological treatment converts the dissolved oxygen-demanding organic material (BOD) into bacteria.

5. Gravity Settling (Secondary Clarifiers)

The mixed liquor from the oxidation ditches flows to the secondary clarifiers. The biological solids (bacteria) cultured in the oxidation ditches are separated from the liquid by gravity settling in the secondary clarifiers. Most of the settled biological solids are returned to the oxidation ditches, and some are wasted to the digester. The clean, treated liquid is discharged to the effluent channel.

6. Effluent Channel

The effluent channel collects the clear effluent from the two secondary clarifiers. The flow is measured in the channel before discharging by gravity to the outfall and to Discovery Passage.

7. Biosolids Pump Station

This structure houses two 30 HP variable speed pumps, which pump the settled biosolids from the secondary clarifiers to the distribution chamber, and two 7.5 HP variable speed pumps, which pump a portion of the settled biosolids from the secondary clarifiers to the aerobic digester.

8. Aerobic Digester

Waste biological solids are sent to the aerobic digester, where they are retained and aerated for about 30 days. The waste solids are broken down (digested) by bacteria under starvation conditions. The digested biosolids are an organic, humus-like product that meets Class B Provincial Regulations for beneficial reuse as a soil conditioner.

9. Biosolids Storage Basin

The digested biosolids are temporarily stored at the treatment plant site to await beneficial reuse. During storage, the biosolids are further thickened by gravity settling.

10. Septic Tank Truck Discharge

Discharges from septic tank trucks are measured and directed to a chamber ahead of the headworks for treatment in the plant.

11. Biological Odour Control Facility

Odorous air from the headworks is discharged through a biological filter to reduce the odours.

12. Operations Building

The operations building contains the office, laboratory, washrooms, motor control centre, workshop and blower room which houses the blowers that provide air to the oxidation ditches and the aerobic digester.

13. Outfall

The outfall consists of a 750 diameter steel pipe with a diffuser section. The discharge is into Discovery Passage, approximately 35 metres below sea level. The diffuser has 38 ports of which 6 are presently open. The outfall is located to optimize the integration of effluent with the generally parallel-to-shore tidal flows in Discovery Passage.

Facility Facts

Present

Service Population .... Approx. 30,000

Average Flow ..... 14,500 m^3/d

Design Capacity

Service Population 52,000

Average Flow ..... 23,700 m^3/d

Solids Treatment

Treated solids (biosolids) meet Provincial criteria for beneficial reuse (land application)

Liquid Treatment Efficiency

95% removal of oxygen demand and suspended solids

Typical Discharge Quality

Parameter	Maximum Permitted	Typical Actual Value
Oxygen Demand (BOD_5)	45 mg/L	10 mg/L
Total Suspended Solids (TSS)	45 mg/L	10 mg/L

Operation

The Centre is operated by trained City staff who devote their skills and efforts to ensure that the treated water and biosolids produced are of the highest possible quality.

Source Control

Source control is used to discourage the discharge of hazardous and toxic materials to the City's sewers. This is needed to protect the public health and the environment, and to prevent upsets to the biological treatment processes at the Centre.

Source control is also needed to ensure that the biosolids produced at the Centre continue to meet the Provincial standards for land application on the City's poplar plantation. To ensure meeting these objectives, the City has developed an up-to-date bylaw regulating discharges to the sewer system, as well as a bylaw monitoring and enforcing strategy.

In keeping with successful approaches elsewhere, the City intends to adopt a cooperative and educational approach with industry, with escalating enforcement action where needed.

Source Control Involves Education and Cooperation

Aerial View of Norm Wood Environmental Centre

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