

**CITY OF LONDON
ENVIRONMENTAL & ENGINEERING SERVICES
WASTEWATER TREATMENT OPERATIONS DIVISION**

The City of London operates five Wastewater Treatment Plants namely: Adelaide, Greenway, Oxford, Pottersburg and Vauxhall. The average daily flow through all the treatment plants is approximately 200,000 cubic metres per day in 2017. The flow to the plants comes from gravity sewers or force mains from 36 pumping stations. All the sewage receives primary and secondary treatment with nitrification, by what is known as an activated sludge process, phosphorous removal by chemical addition and then disinfected using ultra violet light before being discharged into the Thames River. Sewage flow above capacity of the wastewater treatment plant occurs due to rain or snow melt entering the sanitary sewer (from weeping tile around houses or combined sewers). Part of the flow above capacity receives primary treatment and all the excess flow is discharged into the river.

Treatment of the incoming sewage at all the treatment plants is primarily aimed at:

- removal of the majority of the carbonaceous (organic) and nitrogenous (ammonia etc.) impurities in order to reduce the oxygen demand of the plant effluent on the river; and
- reduction of the phosphorous levels; and
- reduction of suspended solids prior to the plant effluent discharging to the Thames River.

Wastewater Treatment Plants are presently following Ministry of the Environment criteria - suspended solids (SS) 10 mg/L or less- Biochemical Oxygen Demand (BOD) 10 mg/L or less - Phosphorous 1 mg/L or less.

In addition to the above, all plants are nitrifying (oxidation of ammonia) to reduce toxicity due to ammonia and reduce oxygen demand in the Thames River.

GENERAL OPERATION OF THE GREENWAY ACTIVATED SLUDGE SEWAGE TREATMENT PLANT

Screens:

Steel screens with 2 to 19 mm openings remove large material such as paper, plastic, wipes, etc. which are then disposed of at the landfill. This helps prevent clogging of equipment.

Grit Removal:

Heavier inorganic solids are removed using a vortex system. This is done to protect subsequent treatment equipment from excessive wear. The vortex units are enclosed to prevent odours from escaping and are connected to a chemical scrubber to neutralize any odours. The grit is generally free of organic material and is suitable for disposal at a landfill site.

Primary Settling Tanks:

These units are designed to remove the larger organic solids and grease. The solids settle out by gravity and the grease forms a scum which is skimmed from the surface of the tanks.

Aeration Tanks:

The effluent from the primary tanks flow to the aeration tanks where it is treated biologically to stabilize the dissolved and finely suspended impurities. The treatment process employed is called an activated sludge process and involves the use of bacteria and other minute organisms which, in the presence of air, utilize and consume the undesirable constituents of the wastes in their life cycle.

The air is supplied primarily through fine bubble diffusers located at the bottom of the tanks to supply oxygen to ensure a large mass of bacteria thrive.

Final Settling Tanks:

The effluent from the aeration tanks, called the "mixed liquor", passes to final tanks where the suspended solids settle out by gravity as activated sludge and is removed. The clear supernatant liquid being decanted over the weirs is discharged to the Disinfection process. The Oxford Wastewater Treatment Plant uses a membrane bioreactor (MBR) process where the mixed liquor is filtered through membranes rather than final settling tanks. Part of the activated sludge is returned to the aeration tanks to maintain the mass of bacteria (activated sludge process) and the remaining excess sludge, or "waste activated sludge", is mixed with polymer to aid in the filtering process. The thickened sludge is stored in holding tanks. The excess activated sludge from the other four operating plants is hauled to the Greenway Wastewater Treatment Centre.

Disinfection:

Before the treated effluent is discharged to the river, between April 1 and September 30, it is disinfected to destroy pathogenic bacteria. The treated sewage passes by Ultra Violet lights in a channel. Disinfection by ultra-violet light is monitored by E. Coli sampling.

Sludge Disposal:

The disposal of sludge generated by five operating treatment plants is as follows:

The sludge from the Oxford, Adelaide, Pottersburg, Lambeth and Vauxhall Plants is hauled by tanker truck to the Greenway Wastewater Control Centre where it is mixed with the Greenway sludge in holding tanks. The sludge from these tanks is then pumped to centrifuges where it is mixed with a polymer and dewatered. After the sludge has been dewatered, it is pumped to the fluid-bed incinerator or treated in the Bioset process and trucked to the Landfill if the incinerator is down for maintenance.

The ash produced from the burning of the sludge is disposed of at the Landfill site.

SUMMARY

Plant flow	Pollution Control Plant	Capacity - Cubic Metres per Day	2017 Actual Flow Cubic Metres per Day
	Adelaide	36,400	26,900
	Greenway	170,000	120,800
	Oxford	17,250	10,200
	Pottersburg	39,100	25,400
	Vauxhall	20,900	15,000

Sludge produced average day	Cubic metres (normalized to 3% solids)
Adelaide	257
Greenway	810
Oxford	86
Pottersburg	182
Vauxhall	61

GLOSSARY

- B.O.D.** - Biochemical Oxygen Demand - a measure of the amount of oxygen used in decomposing organic matter.
- Organic Material** - Relating to living organisms, plant or animal matter.
- Mixed Liquor** - A mixture of activated sludge and organic matter in the aeration tank.
- Sludge** - Settled organic and inorganic solids in the primary tank, produced by waste water treatment.
- Polymer** - A chemical used to help dewater sludge, make the sludge floc larger and thus lets the water escape easier.
- Fluid Bed Incinerator** - The incinerator has a 5 foot deep bed of sand which is heated and is held in suspension by the addition of hot gas and air. The sludge from the centrifuges is added to this suspended bed of hot sand where the sludge burns due to the heat.
- Gravity Sewers** - Sewers where wastewater flows naturally to a low point.
- Force main** - A sewer pipe leading from a pumping station, wastewater under pressure to (1) gravity sewer or (2) to a treatment plant.

Activated Sludge Process

