CANADIAN CONSULTING ENGINEERING AWARDS 2014

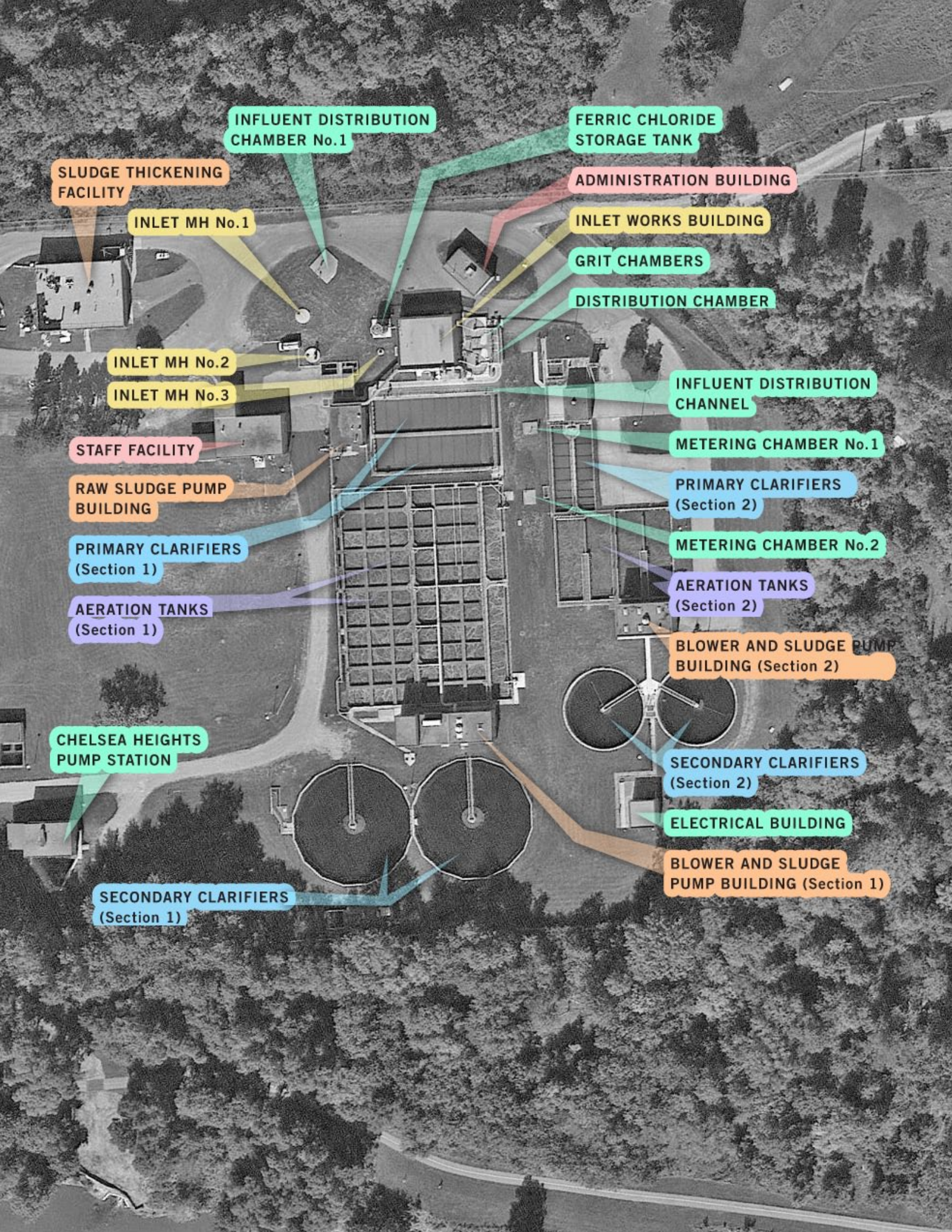
London
CANADA

VAUXHALL

POLLUTION CONTROL PLANT UPGRADE

SUBMISSION BY:

DILLON
CONSULTING


INFLUENT DISTRIBUTION CHAMBER No.1
FERRIC CHLORIDE STORAGE TANK
SLUDGE THICKENING FACILITY
ADMINISTRATION BUILDING
INLET MH No.1
INLET WORKS BUILDING
GRIT CHAMBERS
DISTRIBUTION CHAMBER
INLET MH No.2
INLET MH No.3
INFLUENT DISTRIBUTION CHANNEL
STAFF FACILITY
METERING CHAMBER No.1
RAW SLUDGE PUMP BUILDING
PRIMARY CLARIFIERS (Section 2)
PRIMARY CLARIFIERS (Section 1)
METERING CHAMBER No.2
AERATION TANKS (Section 2)
AERATION TANKS (Section 1)
BLOWER AND SLUDGE PUMP BUILDING (Section 2)
CHELSEA HEIGHTS PUMP STATION
SECONDARY CLARIFIERS (Section 2)
ELECTRICAL BUILDING
BLOWER AND SLUDGE PUMP BUILDING (Section 1)
SECONDARY CLARIFIERS (Section 1)

DETAILS

Location: London, Ontario

Year Completed: April 2012

Dillon's Role: Prime Consultant

Project Leaders:

- **Louis Tasfi**, Project Manager, Dillon Consulting Limited
- **Geordie Gauld**, Division Manager, Wastewater Treatment Operations, City of London
- **Bryan O'Hearn**, Baseline Contractors Inc.

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SUMMARY

The City of London retained Dillon to design plant upgrades for the Vauxhall Pollution Control Plant (PCP) to minimize the impact of wet weather overflows on Thames River. This PCP previously experienced periodic sewer overflow during wet weather conditions, where flows to the plant exceed 100 000 m^3/d. Dillon completed detailed design of all outlined plant upgrades, obtained permits, approvals and provided construction administration services, including ongoing support and site services during commissioning and start-up.

INNOVATION

The Vauxhall PCP is one of the first Ontario municipal wastewater treatment plants to have implemented a wet weather strategy that involves flow diversion, chemically enhanced primary treatment (CEPT) and chemically enhanced secondary clarification processes. The $5.6M plant upgraded pulled together technologies already in use by the industry and reimagined them for this application in such a way that minimal new equipment was required that provided the City of London with cost savings.

To maximize the biological treatment system capacity, upgraded waste/return activated sludge pumps were included. Chemically enhanced secondary clarification (iron salt and cationic polymer) was implemented as it allowed for higher loading rates during wet weather conditions. Flows are diverted directly to an aeration basin following the inlet works for screening and grit removal, up to the biological or secondary treatment peak flow capacity (approximately 50 000 m^3/d). Iron salt and cationic polymer are added to the mixed liquor prior to entering the secondary clarifier to enhance secondary clarifier peak flow capacity. The remainder of the wet weather flow is directed to the existing primary clarifiers, where the primary influent is dosed with a coagulant (iron salt), along with the addition of anionic polymer to aid in the flocculation process.

The process works by treating and using existing primary clarifiers to separate solids and associated contaminants from the sewage before discharge in the Thames River. Pilot tests confirmed the design parameters and performance of the strategy.

The wet weather operating strategy was designed to accommodate peak plant flows of about 200 000 m^3/d, or nearly ten times the rated average day plant capacity. The process includes:

- Chemically enhanced primary clarification: 150 000 m^3/d
- Biological treatment, including aeration and secondary clarification: 50 000 m^3/d.

New inlet works incorporated an ozonation system for odour control which is considered an innovative form of odour control and provides full oxidation of odourous compounds, without use of chemicals, in a small and easy-to-operate unit. The combination of ozonation and heat recovery reduces chemical consumption for odour control and energy consumption required for ventilation. Only a handful of municipal treatment plants in Ontario have implemented this innovative form of odour control.

The wet weather operating strategy is considered particularly innovative and has been proposed and adopted in other Ontario municipal wastewater treatment plants, including the City of Toronto's Ashbridges Bay Wastewater Treatment Plant and the City of London's Greenway Pollution Control Centre.

COMPLEXITY

As with any upgrade to an existing facility, this project presented a number of challenges that were successfully addressed by the team. Key project challenges addressed include:

- A limited hydraulic grade line was available within the existing site to accommodate new inlet works equipment, channels and chambers and allow for flow control and diversion between the primary and aeration tanks within each plant section.
- Wet weather operating strategy involves the gradual increase of flows to the biological treatment capacity to avoid "washing out" and losing the biomass inventory in the aeration tank. This requires a sophisticated level of flow control as the wet weather flows increase during any given event.
- The new inlet works building has a main heating and ventilation unit that includes an air-to-air heat recovery feature. The inbuilt-heat-pipe type heat exchanger will generally re-capture 40-45% of the energy for make-up air heating that would otherwise be wasted. The heat recovery unit incorporated special start-up purge cycles to make natural gas heating suitable for classified spaces. Dual ventilation rates for air recirculation were implemented to reduce the energy consumption for heating, by using occupancy sensors and gas detectors.
- Staging of the plant upgrades required careful coordination during construction to ensure that flows were maintained without interruption.

SOCIAL and/or ECONOMIC BENEFITS

This project offered a key benefit of re-investment in existing infrastructure through re-use and rehabilitation, which provides a cost-effective approach and reduces the unit cost for treating wastewater. Investments made in the replacement, rehabilitation and construction of core infrastructure support the ongoing quality of the asset. This cost effective solution that accommodates treatment for total peak flows of nearly ten times the rated average day plant capacity ensures that the City of London is able to continually develop and implement tools that will improved the Health of the Thames River. The wet weather treatment strategy can be easily adopted by other municipalities operating plants with similar configuration to cost-effectively manage excess wet weather flows.

ENVIRONMENTAL BENEFITS

Over the past four years, the Vauxhall PCP was one of the three locations where wet weather bypasses occurred most frequently within the City of London. The untreated wet weather treatment plant overflow was a major environmental concern. The key objective of this project is a reduction in the number of bypass events at the Vauxhall PCP, thereby, improving the level of treatment of effluent that is discharged to the receiver during wet weather conditions and protecting the water quality of the receiver. Similar to the City of London's five other PCPs, the Vauxhall PCP discharges to the Thames River, which was designated as a Canadian Heritage River in 2000. By retrofitting an older facility to a state of the art facility allows the City of London to continue to receive benefits from existing infrastructure. In addition the use of control systems, biological treatment and separators reduces the amount of chemicals required to treat water before it is discharged into the river.

MEETING CLIENT'S NEEDS

The wet weather events were a major concern for the City of London and the Vauxhall PCP was one of the three locations where wet weather bypasses occurred most frequently within the City of London. The City of London has a long-term sewer separation program and the configuration of the Vauxhall PCP sewershed posed challenges for sewer separation and removal of all storm flows from the Vauxhall PCP.

Previously, major flow from storms would discharge directly into the Thames River when it was too much for the plant to handle. The solution designed by Dillon can effectively accommodate total peak flows of nearly ten times the rated average day plant capacity, thus ensuring that the City of London is able to provide its citizens with the best possible protection from flooding, based on effective wet weather flow management and treatment. The technical solution utilized existing plant infrastructure, the proper application of chemical treatment and process control that enhanced treatment capacity in a cost effective way.

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