

GEI Consultants Canada

CITY OF BRANTFORD

Water and Wastewater Master Servicing Plan – Development Charges Update
2025 Amendment

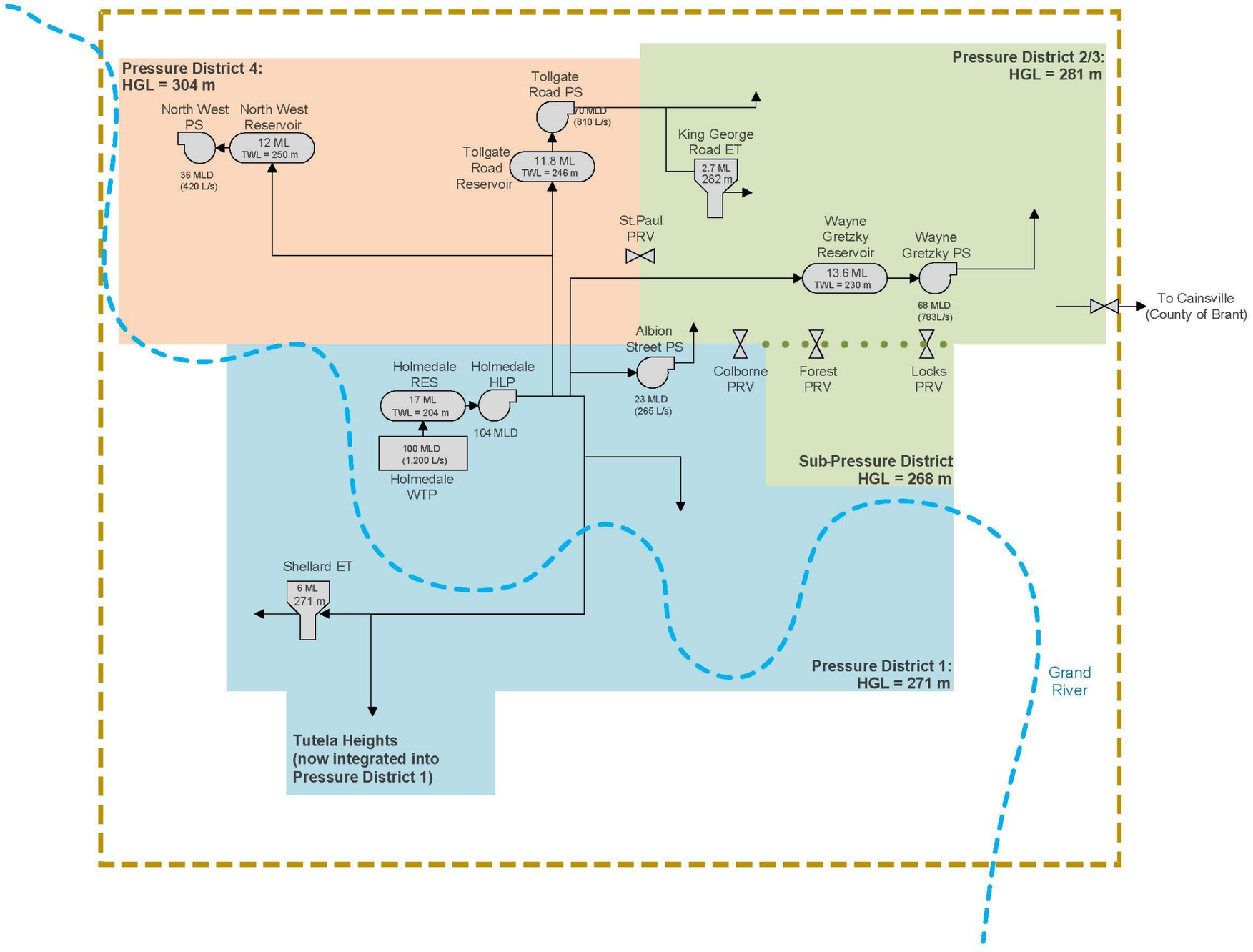
Volume III – Water Master Plan Appendices

June 2026
Project No. 2404322

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APPENDIX A:
Water System Schematics



Legend

- Water Treatment Plant (WTP, RATED CAPACITY)
- Pumping Station (FIRM CAPACITY)
- Reservoir (Volume, TWL)
- Elevated Tanks (Volume, TWL)
- Valve
- Trunk Watermain Network
- Water Feature
- Region Boundary

Pressure Districts

- Pressure District 1: 271 m
- Pressure District 2/3: 281m
- Pressure District 4: 304 m

Existing Water System

Project Name:
Water and Wastewater Master Servicing Plan – Development Charges Update 2025 Amendment

Client Name:
City of Brantford
(Ontario, Canada)

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Last Updated: July 2026
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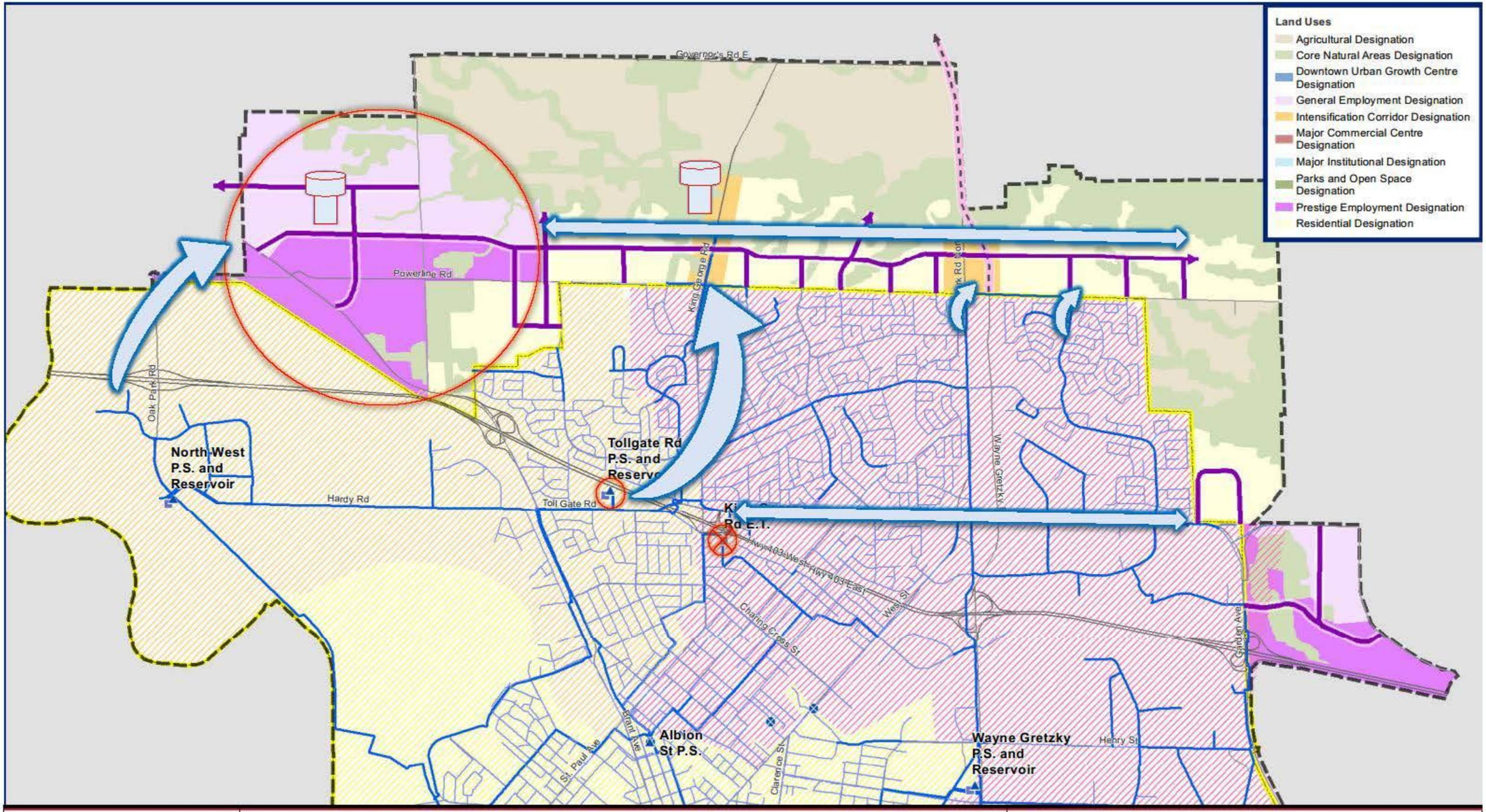
APPENDIX B:
Existing and Future Planning Details

Existing and Future Planning Details - Wastewater Flows

Water Pressure District	2021 RES	2021 EMP	2021 Total	2051* RES	2051* EMP	2051* Total	2051 ADD-RES (MLD)	2051 ADD-EMP (MLD)	2051 ADD-TOTAL (MLD)
PD 1	47,702	9,346	57,048	85,237	25,104	110,341	23	7	30
PD 2/3	47,261	24,487	71,748	95,961	48,259	144,220	26	13	39
PD 4	8,633	3,160	11,793	14,846	23,429	38,275	4	6	10
Total	**103,596**	**36,993**	**140,589**	**196,044**	**96,792**	**292,836**	**53**	**26**	**79**

* Not including growth in LOSB

APPENDIX C:
Expansion Lands Concepts



THE CORPORATION OF THE CITY OF BRANTFORD

Water, Wastewater and Stormwater Master Servicing Plan Update

Water Network
- Water Treatment Plant
- Pumping Station
- Elevated Tank / Reservoir
- Pressure Reducing Valve
- Watermains (<= 250 mm)
- Water Transmission (> 250 mm)

Water Pressure Districts
- Pressure District 1
- Pressure District 2/3
- Pressure District 4

General Features
- 2016 Municipal Boundary
- New Municipal Boundary

Road Options
- Collector Roads
- Major Arterial Roads
- Controlled Access Major Arterial

New Elevated Tank

Trunk Watermains

Water Servicing Concepts

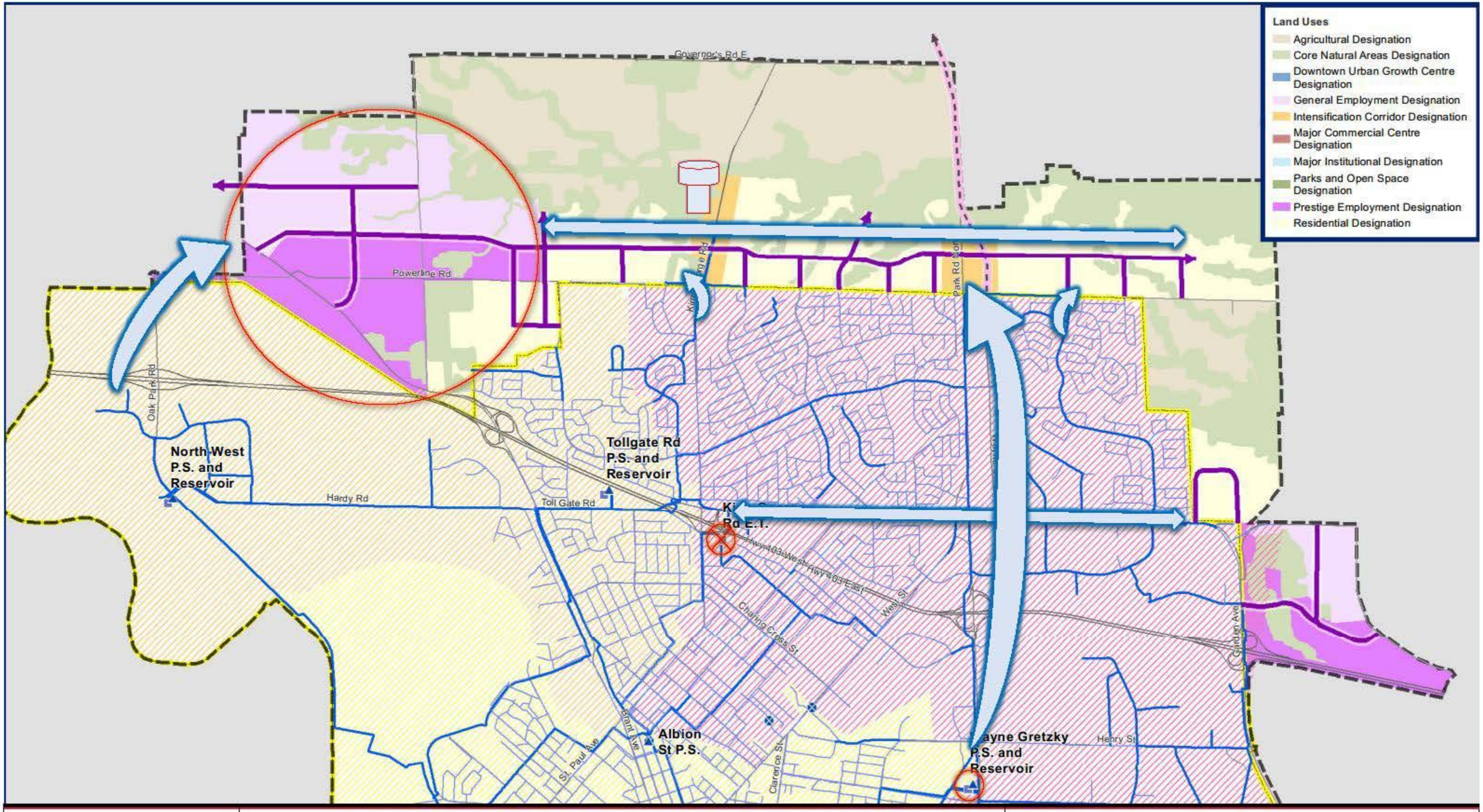
King George and Oak Park Supply Concept

0 0.65 1.3 Kilometers

N

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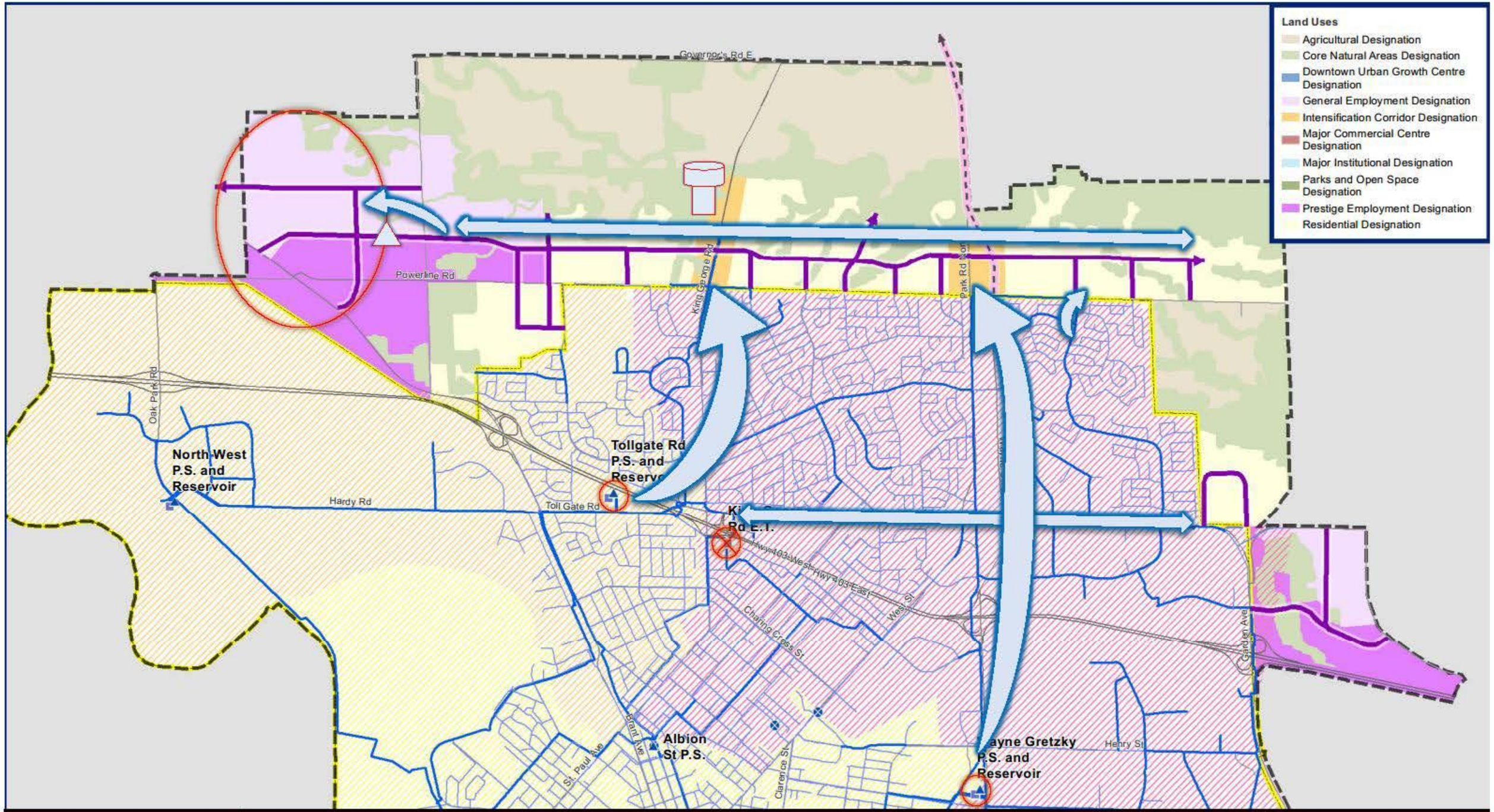
Park Road Supply Concept

0 0.65 1.3 Kilometers

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Water Servicing Concepts

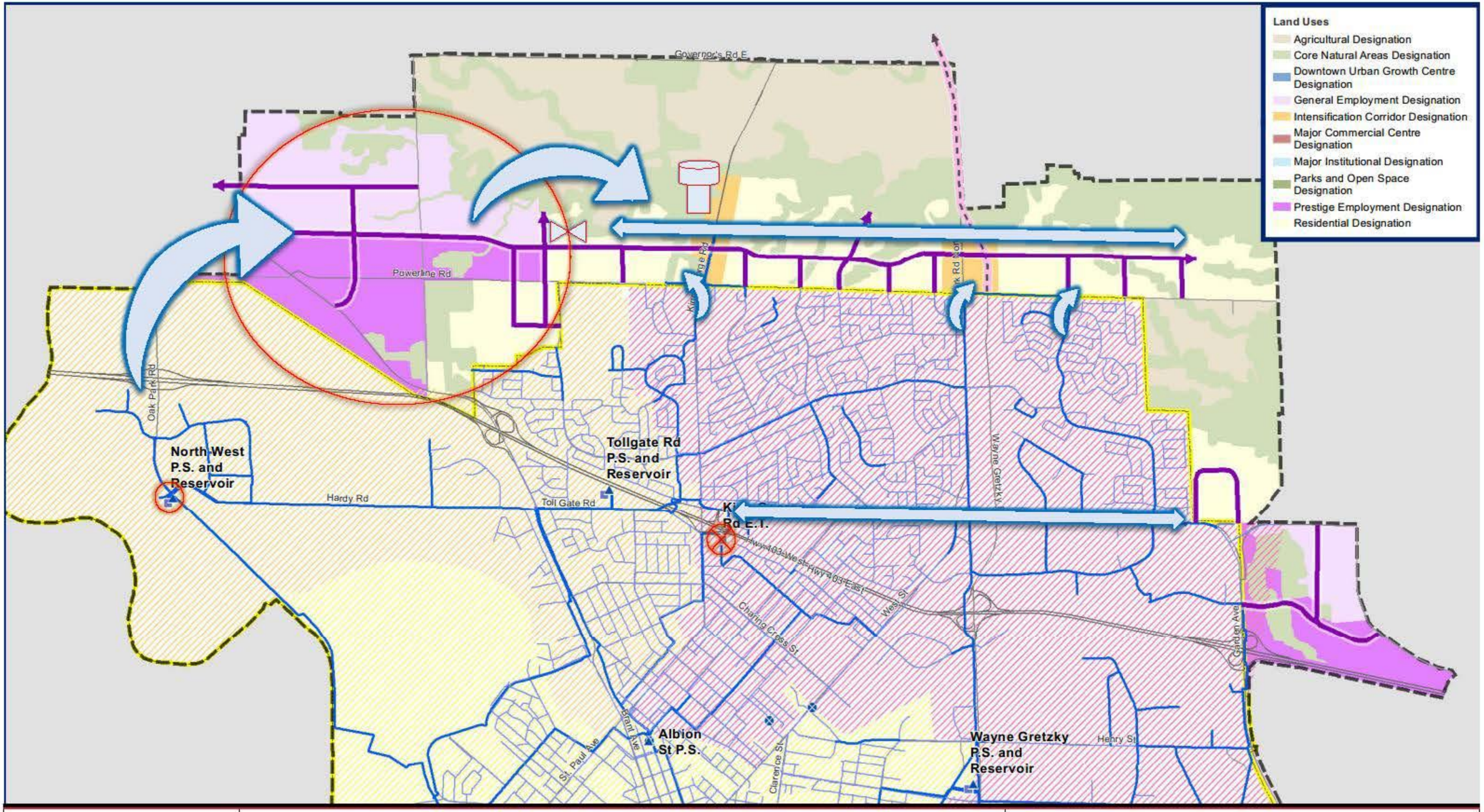
PD 2/3 Supply Only Concept

0 0.65 1.3 Kilometers

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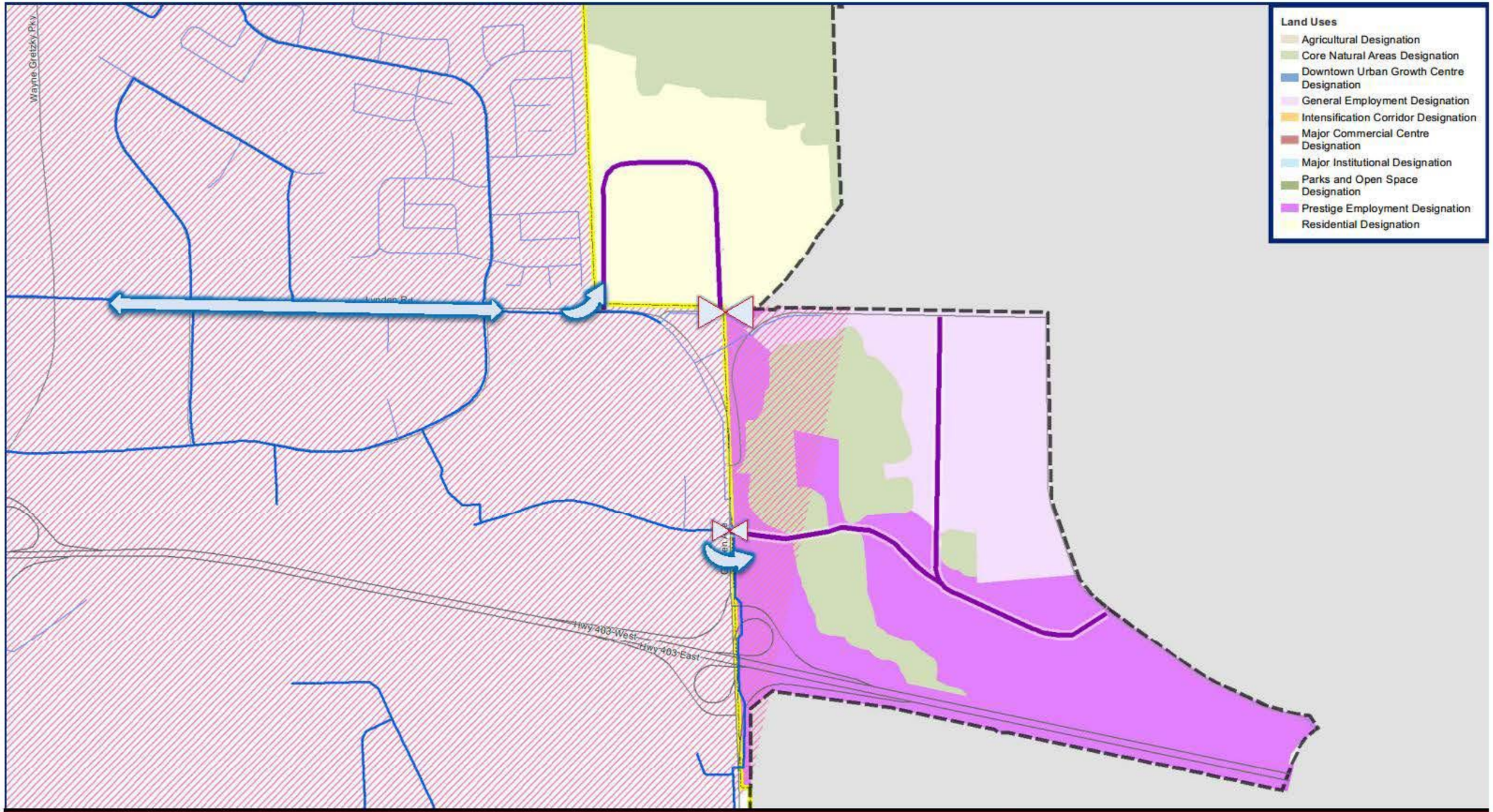
PD 4 Supply Only Concept

0 0.65 1.3 Kilometers

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Water Servicing Concepts

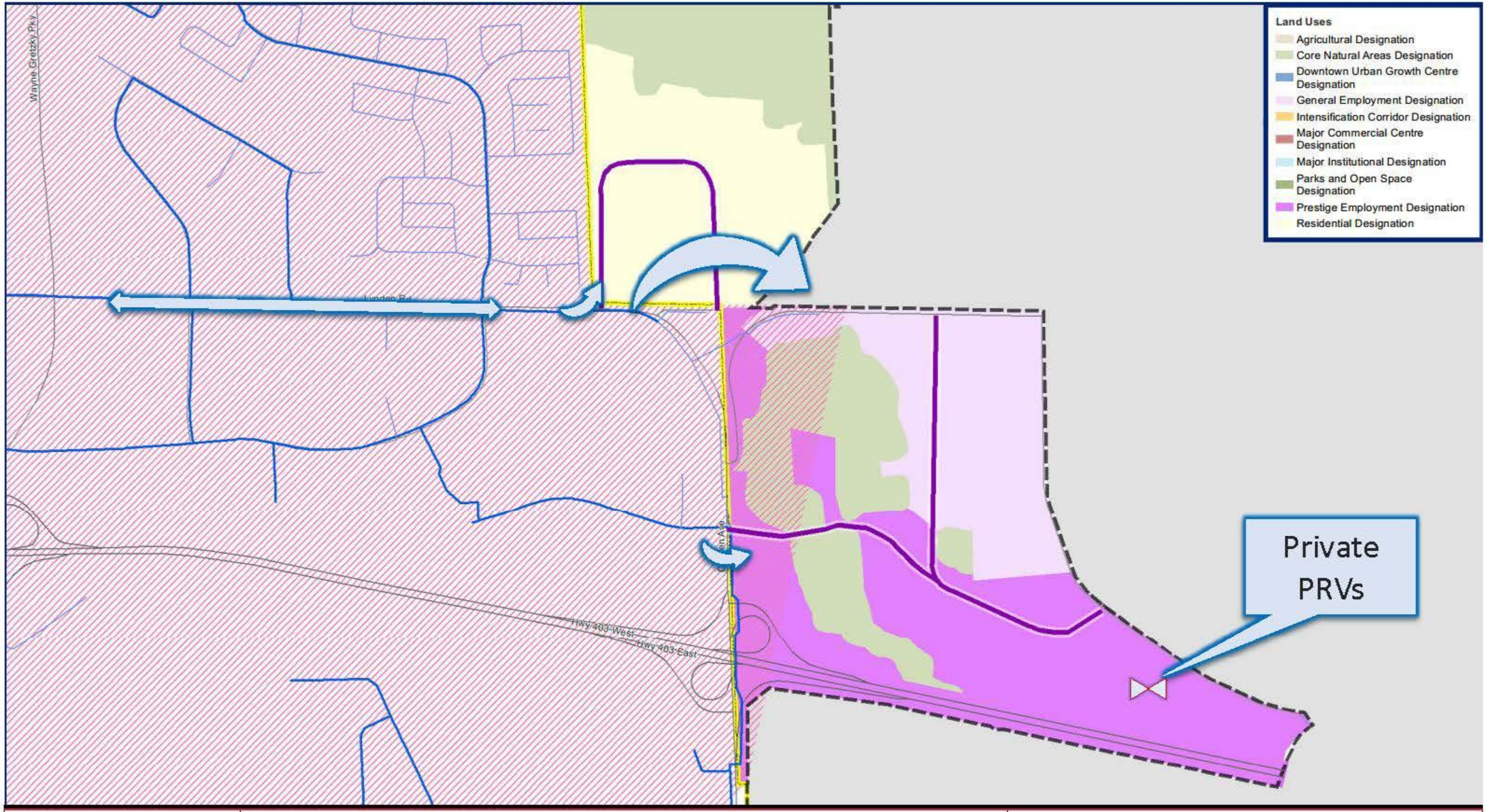
New Pressure District Concept

0 0.2 0.4 Kilometers

N

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Road Options
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- Trunk Watermains

Water Servicing Concepts

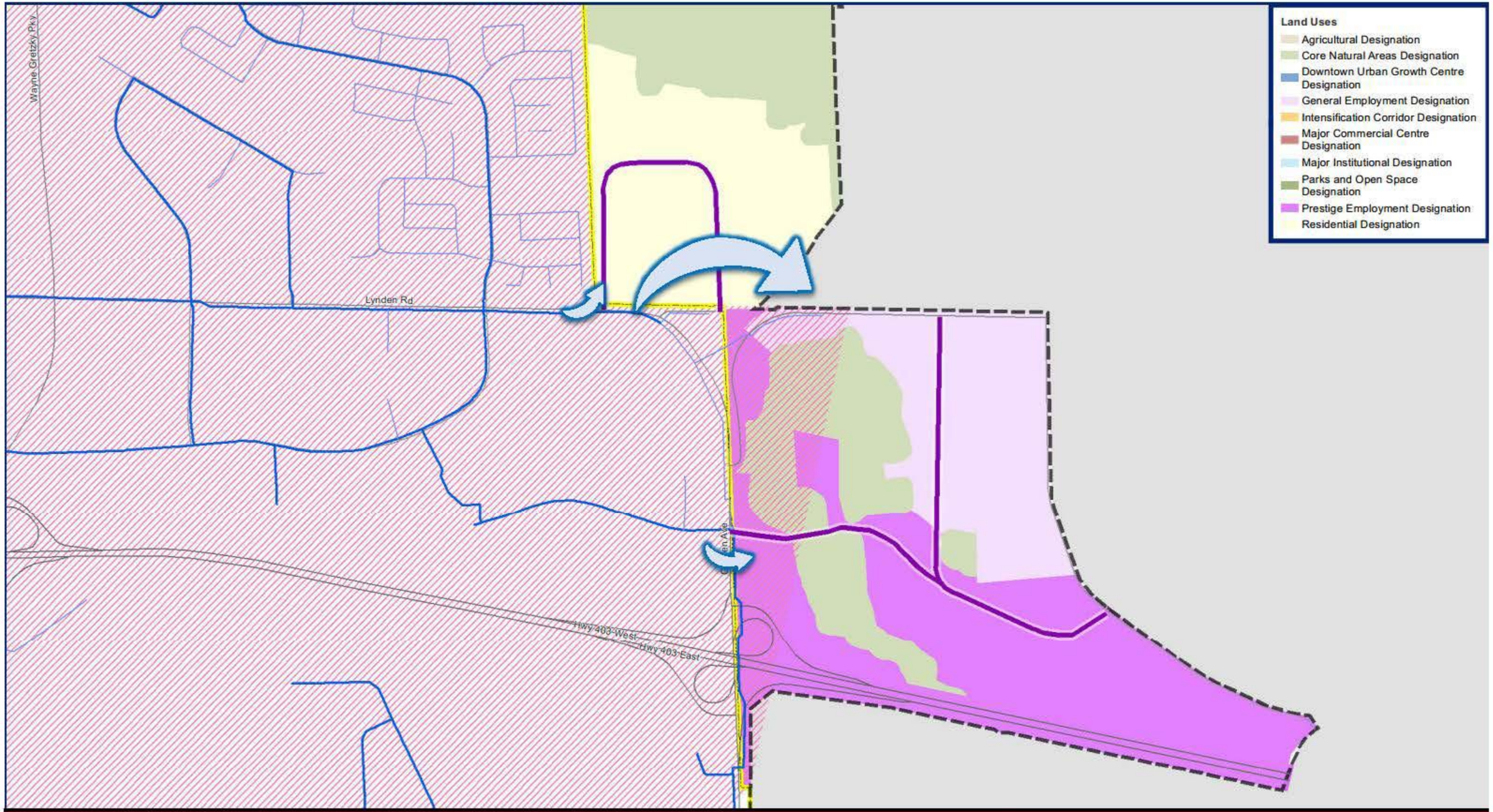
Private PRV's Concept

0 0.2 0.4 Kilometers

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Road Options
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- Trunk Watermains

Water Servicing Concepts

PD 2/3 Split Concept

0 0.2 0.4 Kilometers

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Road Options
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- Controlled Access Major Arterial

Connection to City's PD1

Trunk Watermains

Water Servicing Concepts

Connect Only Concept

0 0.5 1 Kilometers

N

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Road Options
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Connection to City's PD1

Trunk Watermains

Water Servicing Concepts

Connect and Upgrade Local Network Concept

0 0.5 1 Kilometers

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- New Municipal Boundary

Road Options
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- Major Arterial Roads
- Controlled Access Major Arterial

Connection to City's PD1

Trunk Watermains

Water Servicing Concepts

Connect, Upgrade, and Loop Concept

0 0.5 1 Kilometers

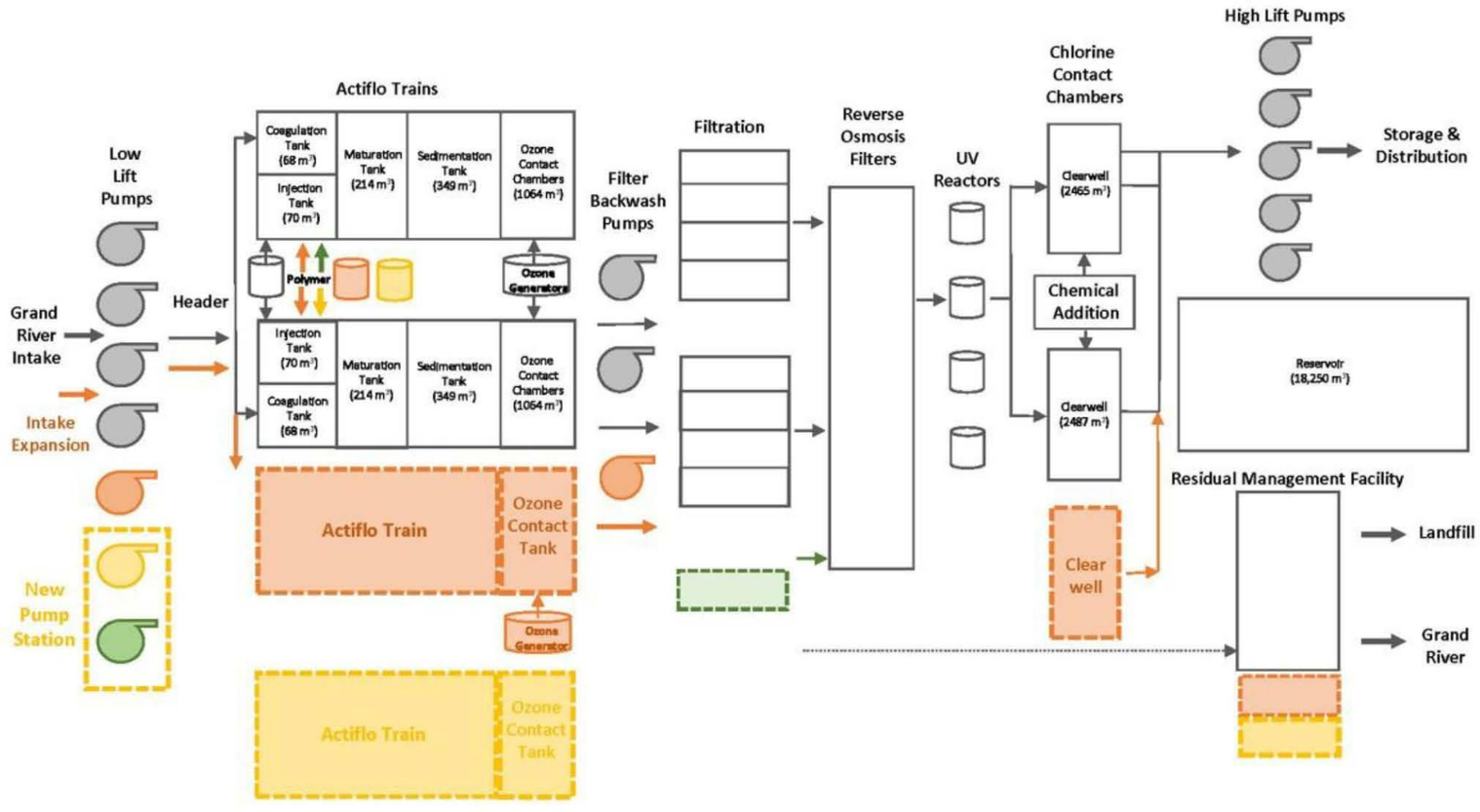
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APPENDIX D:
Water Treatment Plant Concepts

Water Treatment Plant Concepts
Alternative 1 – Utilize Existing Processes



2051 Low Growth Capacity

2051 Medium Growth Capacity

2051 High Growth Capacity

Water Treatment Plant
Alternative 1: Utilize Existing Processes

Project Name:
Water and Wastewater Master Servicing Plan – Development Charges Update 2025 Amendment

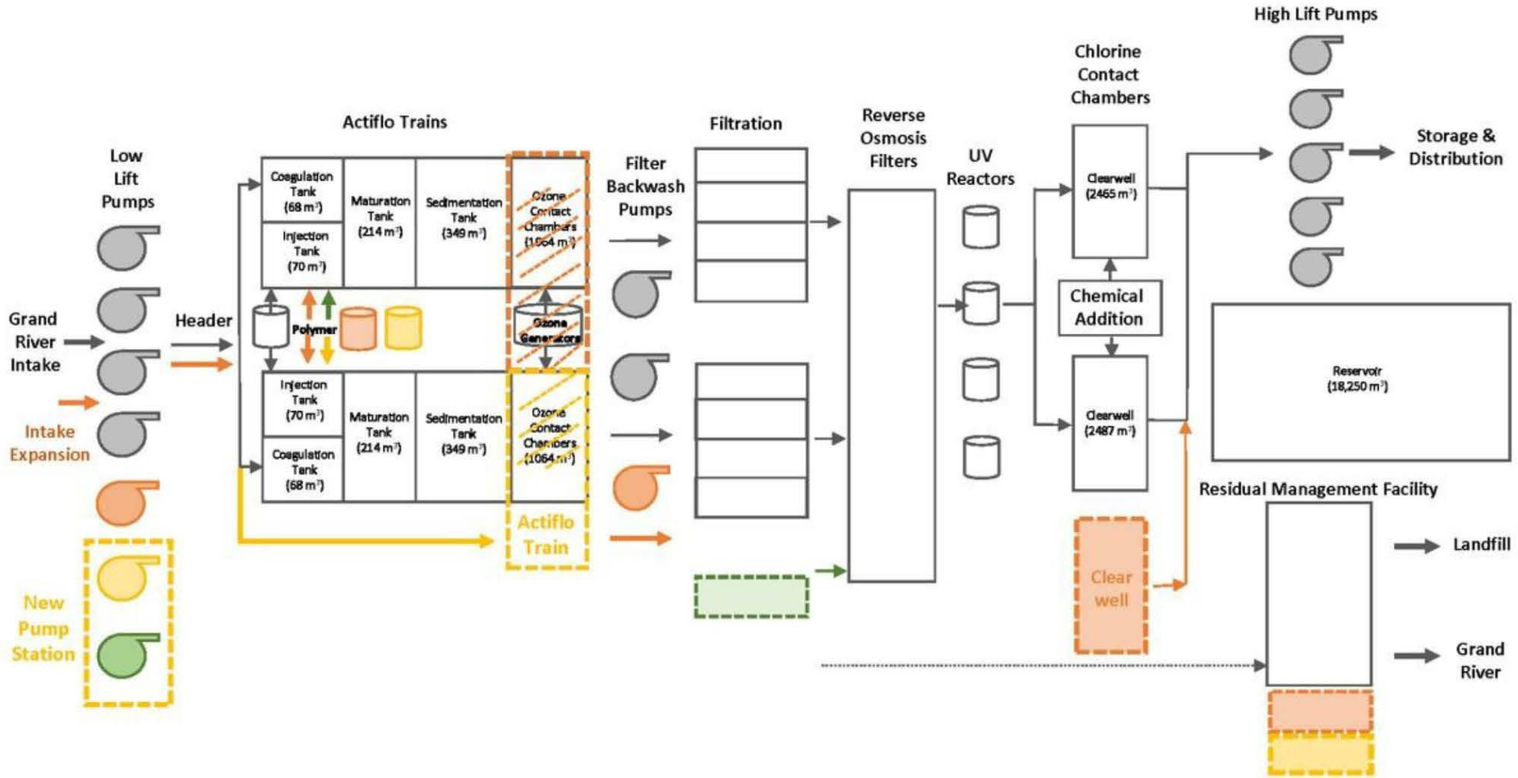
Client Name:
City of Brantford (Ontario, Canada)

GEI Consultants Canada

Last Updated: July 2026
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Water Treatment Plant Concepts
Alternative 2 – Decommission Ozone



2051 Low Growth Capacity

2051 Medium Growth Capacity

2051 High Growth Capacity

Water Treatment Plant
Alternative 2: Decommission Ozone

Project Name:
Water and Wastewater Master Servicing Plan – Development Charges Update 2025 Amendment

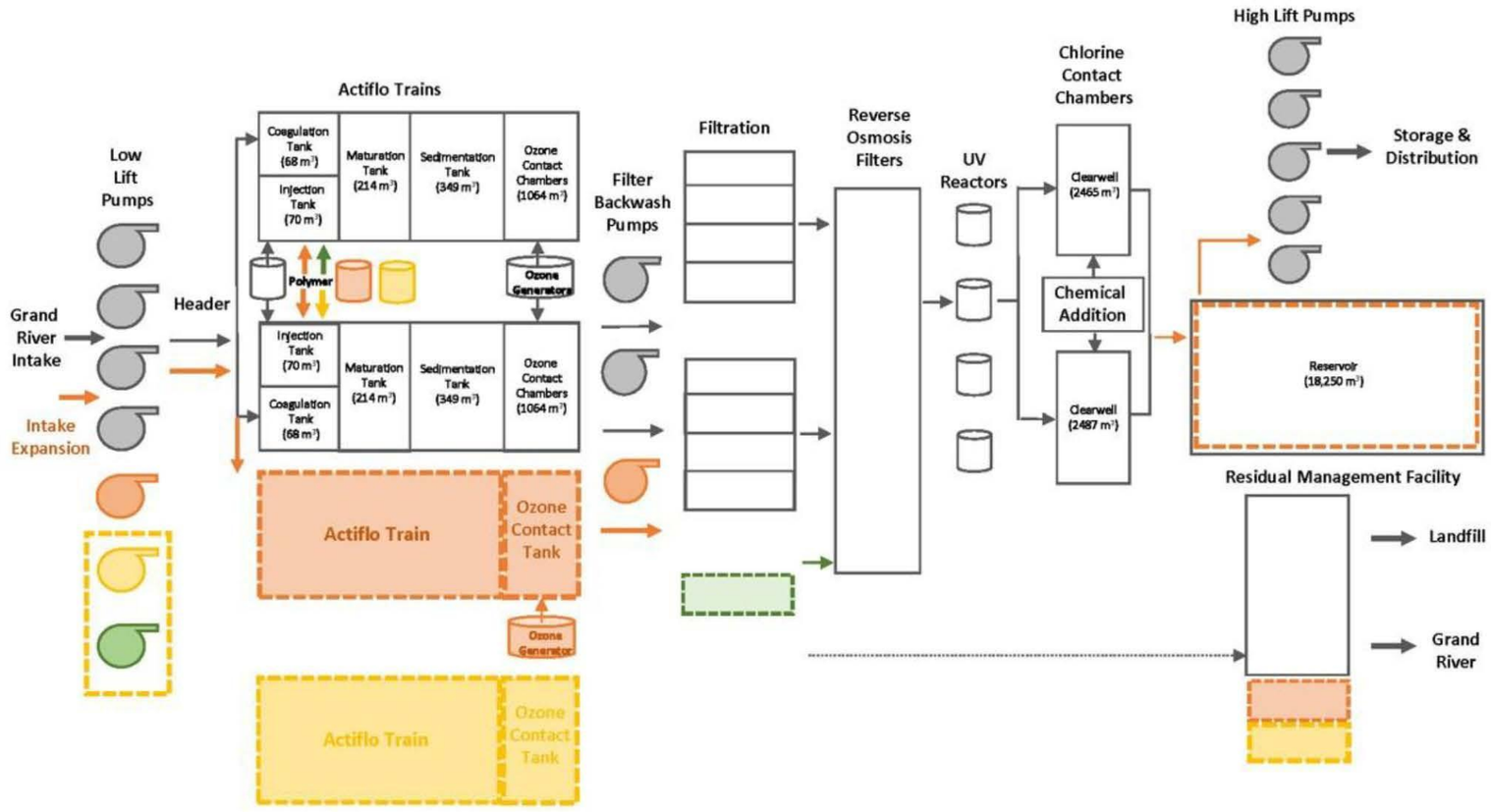
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Water Treatment Plant Concepts
Alternative 3 – Utilize Reservoir for Chlorine Contact Time



2051 Low Growth Capacity

2051 Medium Growth Capacity

2051 High Growth Capacity

Water Treatment Plant
Alternative 3: Utilize Reservoir for Chlorine Contact Time

Project Name:
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APPENDIX E:
Evaluation Tables

Appendix E Table 1: Holmedale Water Treatment Plant Evaluation

Category	Criteria	Alternative 1: Upgrading Existing Processes	Alternative 2: Decommission Ozonation System	Alternative 3: Use Reservoir for Disinfection Contact Time
Technical Impacts	Meets existing and future servicing needs	- Supports growth to 2051; more challenging to accommodate due to space restrictions onsite	- Supports growth to 2051	- Supports growth to 2051
	Provides a reliable service	- Provides the same reliability of service as the existing plant	- Removes one treatment option for disinfection and taste/odour removal	- Reduces redundancy in disinfection and treated water storage
	Minimizes and manages construction risk	- Moderate impacts during construction	- Moderate impacts during construction	- Moderate impacts during construction
	Supports phased expansion of the system	- New units can be added as population grows	- The two ozone trains can be decommissioned separately as new Actiflo trains are needed	- Piping adjustments can be made when clearwell volume is no longer sufficient
	Operational Complexity	- Minimal changes to existing operations	- Reduces number of treatment units to operate	- Increases complexity of managing disinfection contract time
	Resiliency to climate change	- RO treatment will increase resiliency to quality impacts that may result from climate change	- RO treatment will increase resiliency to quality impacts that may result from climate change	- RO treatment will increase resiliency to quality impacts that may result from climate change
Environmental Impacts	Protects environment features	- Canal expansion may have impacts that would require mitigation	- Canal expansion may have impacts that would require mitigation	- Canal expansion may have impacts that would require mitigation
	Protects wildlife and species at risk	- Construction to avoid	- Construction to avoid	- Construction to avoid
	Minimizes climate change impacts	- Minimal to no changes to existing GHG production	- Eliminates energy consumption from ozone generators	- Minimal to no changes to existing GHG production
Social and Cultural Impacts	Protects resident quality of life	- Minimal to no impacts to existing residents	- Potentially reduces ability to use advanced oxidation to treat taste and odour compounds	- Minimal to no impacts to existing residents
	Manages and minimizes construction impacts	- Some potential noise and dust	- Some potential noise and dust	- Some potential noise and dust
	Protects cultural heritage and archeological features	- Unknown impacts to cultural heritage and archeological	- Unknown impacts to cultural heritage and archeological	- Unknown impacts to cultural heritage and archeological
Financial Impacts	Capital and life-cycle costs	~ $118 - 184 M	~ $102 - 165 M	~ $118 - 178 M
	Operation and maintenance costs	- Proportional increase of O&M costs	- Lower if ozonation is decommissioned	- Proportional increase of O&M costs
	Aligns with approval and permitting process	- Aligns with process	- Aligns with process	- Aligns with process

Legend: High Medium Low

Appendix E Table 2: Pressure District Alternative Evaluation

Category	Criteria	Alternative 1 – Existing Pressure District Boundary	Alternative 3 – Maximize Pressure District 4
Technical Impacts	Meets existing and future servicing needs	- Yes	- Yes
	Provides a reliable service	- Reliance on conveyance to north lands - ET provides more reliable service	- Reliance on conveyance to north lands - ET provides more reliable service
	Minimizes and manages construction risk	- Potential construction delays related to land acquisition - Setbacks needed for residential ET	- Complex implementation of boundary change including valving & connections - New ET in employment lands
	Supports phased expansion of the system	- KG ET can be decommissioned - Moderate modifications to facilities	- KG ET can be decommissioned - Complex modification to facilities and watermains
	Operational Complexity	- More hydraulically efficient	- More hydraulically efficient - Operation of storage surplus in PD4
	Resiliency to climate change	- ET to reduce energy consumption and operations in event of a power failure	- ET to reduce energy consumption and operations in event of a power failure
Environmental Impacts	Protects environment features	- ET site location to avoid	- ET site location to avoid
	Protects wildlife and species at risk	- ET site location to avoid	- ET site location to avoid
	Minimizes climate change impacts	- Reduced GHG production due to operational efficiency	- Reduced GHG production due to operational efficiency
Social and Cultural Impacts	Protects resident quality of life	- Construction disruptions in developed and greenfield areas	- Construction disruptions in developed and greenfield areas
	Manages and minimizes construction impacts	- Moderate watermain construction - Coordination potential with other projects	- Major watermain construction - Coordination potential with other projects
	Protects cultural heritage and archeological features	- Unknown impacts to Cultural Heritage and Archeological	- Unknown impacts to Cultural Heritage and Archeological
Financial Impacts	Capital and life-cycle costs	$$$ - $86-87M	$$$ - $89-91M + $6 for implementation
	Operation and maintenance costs	- Decreased O&M costs due to new ET	- Decreased O&M costs due to new ET
	Aligns with approval and permitting process	- Land acquisition in residential greenfield development	- Land acquisition in employment greenfield development

Appendix E Table 3: PD1 and PD2/3 Storage Alternative Evaluation

Category	Criteria	Alternative 1 – Existing Pressure District Boundary	Alternative 3 – Maximize Pressure District 4
Technical Impacts	Meets existing and future servicing needs	- Yes	- Yes
	Provides a reliable service	- PD1 is reliant on pumped storage, less efficient - Additional emergency storage at the WTP	- PD1 security of supply is provided by ET
	Minimizes and manages construction risk	- Construction needed for two facilities (WTP and ET)	- Construction needed only at ET, minor construction needs at WG PS for new PRV
	Supports phased expansion of the system	- Maximizes use of pumping and storage at WTP - Opportunity to oversize storage to accommodate post-2041 needs	- Reliant on watermain upgrades to accommodate flows - ET may be oversized in the interim - Oversizing can be used by trigger lands post 2041
	Operational Complexity	- Increased reliance on WTP pumping due to reduced floating storage	- Oversized ET may result in WQ constraints in the interim - More complex operation of PD to accommodate
	Resiliency to climate change	- Reliant on PS and emergency power	- PRV to reduce energy consumption and operations in event of a power failure due to less pumping needs
Environmental Impacts	Protects environment features	- Construction to avoid	- Construction to avoid
	Protects wildlife and species at risk	- Construction to avoid	- Construction to avoid
	Minimizes climate change impacts	- Increased GHG production due to increased pumping	- Minimal increase in GHG production due to reliance on
Social and Cultural Impacts	Protects resident quality of life	- Minimal impact to existing residents	- Minimal impact to existing residents
	Manages and minimizes construction impacts	- Construction impacts at existing facility and greenfield area	- Construction impacts at existing facility and greenfield area
	Protects cultural heritage and archeological features	- Unknown impacts to Cultural Heritage and Archeological	- Unknown impacts to Cultural Heritage and Archeological
Financial Impacts	Capital and life-cycle costs	$$ - $4.5 M	$$ - $4 M
	Operation and maintenance costs	- Additional O&M costs needed to maintain pumping capacity at WTP	- Reduced O&M costs due to new PRV
	Aligns with approval and permitting process	- WTP reservoir expansion at existing site	- New PRV at existing site

Appendix E Table 4: PD4 Storage Alternative Evaluation

Category	Criteria	Alternative 1 – Upgrade storage at Northwest Reservoir	Alternative 2 – New Pressure District 4 Elevated Tank
Technical Impacts	Meets existing and future servicing needs	- Yes	- Yes
	Provides a reliable service	- Reliant on pumped storage, less efficient	- PD4 security of supply is provided by ET - ET location can be optimized
	Minimizes and manages construction risk	- Minimal construction risk as there is currently sufficient space on existing site	- Potential construction delays due to site acquisition - Surrounding land use is employment
	Supports phased expansion of the system	- Maximizes use of pumping and storage at NW as existing facility has space to accommodate	- Phasing needs to be aligned with storage deficiency and development blocks
	Operational Complexity	- Reliance on pumping due to no floating storage - Large closed PD	- Reduced operational constraints with ET
	Resiliency to climate change	- Reliant on PS and emergency power	- ET to reduce energy consumption and operations in event of a power failure
Environmental Impacts	Protects environment features	- Construction to avoid	- Construction to avoid
	Protects wildlife and species at risk	- Construction to avoid	- Construction to avoid
	Minimizes climate change impacts	- Increased GHG production due to increased pumping	- Minimal increase in GHG production due to ET
Social and Cultural Impacts	Protects resident quality of life	- Minimal impact to existing residents	- Two ETs may be viewed negatively by the public
	Manages and minimizes construction impacts	- Land acquisition needed and construction at existing facility	- Construction impacts in employment greenfield area
	Protects cultural heritage and archeological features	- Unknown impacts to Cultural Heritage and Archeological	- Unknown impacts to Cultural Heritage and Archeological
Financial Impacts	Capital and life-cycle costs	$$ - $3.5-7.5 M	$$ - $4M
	Operation and maintenance costs	- Additional O&M costs needed to maintain pumping capacity	- Reduced O&M costs due to new ET
	Aligns with approval and permitting process	- Land acquisition may not be needed to expand reservoir	- New ET within employment development lands, agreement with developer and set backs are needed

Appendix E Table 5: Tutela Heights Alternative Evaluation

Category	Criteria	Alternative 1: Connect Only	Alternative 2: Connect and Upgrade Local Network	Alternative 3: Connect, Upgrade, and Loop	Alternative 4: Connect, Upgrade, Loop, and Booster Pumping Station
Technical Impacts	Meets existing and future servicing needs	- Will not service all growth	- Services most of growth	- Accommodates all future growth	- Accommodates all future growth
	Provides a reliable service	- Localized reduction in available fire flow	- Increases/maintains fire flows	- Increased fire flow	- Increased fire flow
	Minimizes and manages construction risk	- Minimal construction required	- Moderate construction required	- Moderate construction required; may require land acquisition	- Major construction required; may require land acquisition
	Supports phased expansion of the system	- Future staging can occur for further expansion of system	- Future staging can occur for further expansion of system	- System accommodates expansion of system	- System accommodates expansion of system
	Operational Complexity	- Automatic flushers required	- Automatic flushers required	- Minimizes need to flush	- No need to flush - Increased operations with BPS
	Resiliency to climate change	- No changes to energy consumption	- Minimal changes to energy consumption	- Minimal changes to energy consumption	- BPS to increase energy consumption
Environmental Impacts	Protects environment features	- Construction to avoid	- Construction to avoid	- Construction to avoid	- Construction to avoid
	Protects wildlife and species at risk	- Construction to avoid	- Construction to avoid	- Construction to avoid	- Construction to avoid
	Minimizes climate change impacts	- Minimal to no increase in GHG	- Minimal to no increase in GHG	- Minimal increase in GHG	- Increase in GHG for BPS
Social and Cultural Impacts	Protects resident quality of life	- Pressure drop expected for existing users	- Pressure drop is expected for existing users	- Pressure drop is expected for existing users	- System pressures and LOS can be provided
	Manages and minimizes construction impacts	- Minimal construction	- Increased construction; longer to implement	- Increased construction; longer to implement	- Greatest construction; longest to implement
	Protects cultural heritage and archeological features	- Unknown impacts to Cultural Heritage and Archeological	- Unknown impacts to Cultural Heritage and Archeological	- Unknown impacts to Cultural Heritage and Archeological	- Unknown impacts to Cultural Heritage and Archeological
Financial Impacts	Capital and life-cycle costs	$	$$	$$$$	$$$$$$
	Operation and maintenance costs	- No increase in O&M costs	- Minimal increase in O&M costs	- Moderate increase in O&M costs	- High increase in O&M costs
	Aligns with approval and permitting process	- Land acquisition not required - Short term implementation	- Land acquisition likely not required - Longer time to implement	- Land acquisition may be required - Longer time to implement	- Land acquisition required - Longest time to implement

APPENDIX F:
Capital Program Project Sheets

Water Capital Program

The following appendix provides detailed information on the Water Capital Program. It includes a summary table providing an overview of the specific capital projects included as well as detailed costing sheets for each individual project. The summary table is provided first and includes a reference to the specific page number where you can find additional information about each project. Accessible formats and communication supports are available upon request. For more information, please contact the City of Brantford Accessibility Coordinator at accessibility@brantford.ca.

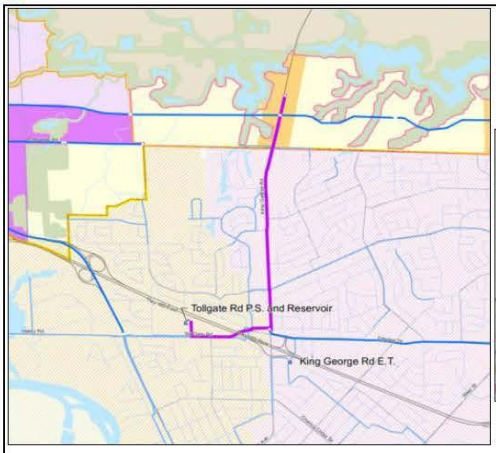
Water Capital Program

Capital Program ID	Name	Overview	Pressure District	Project Description	Required Studies	Study Scope	Objectives	Class EA Schedule	Revised EA Schedule	Size/Capacity	Length (m)	Class Estimate Type	Project Complexity	Area Condition	Total Estimated Cost (2025$)	Property Requirement Cost (2025$)	Timeline	2025 BTE Class	2025 BTE (%)	Benefit to Existing ($)	In-Period Benefit (Now -2051)	Post-Period Benefit (Post-2051)	Development Charges ($2025)	DC Criteria	Page Reference for Detailed Costing Project Sheet
W-M-001	King George Road Watermain	Watermain upgrades on King George Road from Tollgate Pumping Station to the proposed East-West Collectors Road	Pressure District 2/3	Watermain upgrades on King George Road from Tollgate Pumping Station to the proposed East-West Collectors Road in the North Expansion Lands or the new Pressure District 2/3 Elevated Tank	-	-	-	A+	Eligible for Screening	750 mm	3,578	Class 4	High	Suburban	$ 25,564,000	$ 329,700	0-5 Years	C	40%	$ 10,225,600	100%	0%	$ -	$ 15,338,400	Page 2 of 50
W-M-002	Oak Park Road Trunk Watermain	New trunk watermain from Oak Park Road to Powerline Road	Pressure District 4	New trunk watermain extending from Oak Park Road watermain limit to Powerline Road in Pressure District 4	Municipal Class Environmental Assessment (EA)	This Study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will evaluate the preferred watermain alignment as either Oak Park Road or Paris Road (W-M-002 or W-M-006)as well as cover both Capital Program Project W-M-003 and be done in conjunction with the Oak Park Road Trunk Sewer alignment (Capital Program project WW-SS-001) with costs shared between water and wastewater.	Determine the best alignment and construction type (ie. Open cut or tunnel) for the trunk watermain crossing Highway 403 including a railway crossing and overhead powerlines along Powerline Road. Determine if alignment can be coordinated with local development.	B	B	600 mm	1,090	Class 4	High	Suburban	$ 20,006,000	$ 256,200	0-5 Years	A	0%	$ -	100%	0%	$ -	$ 20,006,000	Page 3 of 49
W-M-003	Powerline Road Trunk Watermain	New trunk watermain from Powerline Road to East-West Collector Road	Pressure District 4	New trunk watermain in Pressure District 4 along Powerline Road from new Oak Park Road watermain to the proposed East-West Collector's Road	Municipal Class Environmental Assessment (EA)	This Study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will evaluate the preferred watermain alignment as either Oak Park Road or Paris Road (W-M-002 or W-M-006)as well as cover both Capital Program Project W-M-003 and be done in conjunction with the Oak Park Road Trunk Sewer alignment (Capital Program project WW-SS-001) with costs shared between water and wastewater.	Determine the best alignment and construction type (ie. Open cut or tunnel) for the trunk watermain crossing Highway 403 including a railway crossing and overhead powerlines along Powerline Road. Determine if alignment can be coordinated with local development.	B	B	600 mm	1,853	Class 4	Med	Suburban	$ 11,257,000	$ 113,600	0-5 Years	A	0%	$ -	100%	0%	$ -	$ 11,257,000	Page 4 of 49
W-M-004	North-South Collector Road Trunk Watermain	New trunk watermain from Powerline Road to East-West Collector Road	Pressure District 4	New trunk watermain in Pressure District 4 along proposed North-South Collector Road from Powerline Road to proposed East-West Collector Road	-	-	-	A	EA Exempt	600 mm	405	Class 4	Low	Rural	$ 1,602,000	$ 11,500	10-20 Years	A	0%	$ -	100%	0%	$ -	$ 1,602,000	Page 5 of 49
W-M-005	North-South Collector Road Local Watermain	New local watermain from East-West Collector Road to North Expansion Lands Boundary	Pressure District 4	New local watermain in Pressure District 4 along proposed North-South Collector Road from proposed East-West Collector Road to north expansion limit	-	-	-	A	EA Exempt	300 mm	426	Class 4	Low	Rural	$ 779,000	$ 5,600	10-20 Years	A	0%	$ -	100%	0%	$ -	$ 779,000	Page 6 of 49
W-M-006	Paris Road Trunk Watermain	New trunk watermain from Tollgate Road to North-South Collector Road at Powerline Road	Pressure District 4	New watermain in Pressure District 4 along Paris Road from Tollgate Road to proposed North-South Collector Road at Powerline Road	Municipal Class Environmental Assessment (EA)	This Study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will evaluate the preferred watermain alignment as either Oak Park Road or Paris Road (W-M-002 or W-M-006)as well as cover both Capital Program Project W-M-003 and be done in conjunction with the Oak Park Road Trunk Sewer alignment (Capital Program project WW-SS-001) with costs shared between water and wastewater.	Determine the best alignment and construction type (ie. Open cut or tunnel) for the trunk watermain crossing Highway 403 including a railway crossing and overhead powerlines along Powerline Road. Determine if alignment can be coordinated with local development.	B	B	600 mm	3,108	Class 4	High	Suburban	$ 15,834,000	$ 204,200	5-10 Years	C	40%	$ 6,333,600	65%	35%	$ 5,541,900	$ 3,958,500	Page 7 of 49
W-M-007	Powerline Road Distribution Watermain	New distribution watermain east of North-South Collector Road	Pressure District 4	New distribution watermain in Pressure District 4 along Powerline Road from proposed North-South Collector Road 400 m east of Golf Road	-	-	-	A+	Eligible for Screening	300 mm	1,028	Class 4	Med	Rural	$ 2,020,000	$ 20,700	5-10 Years	A	0%	$ -	100%	0%	$ -	$ 2,020,000	Page 8 of 49
W-M-008	Powerline Road Distribution Watermain	New distribution watermain east of North-South Collector Road	Pressure District 4	New distribution watermain in Pressure District 4 along Powerline Road 400 m east of Golf Road to Balmoral Drive Road extension	-	-	-	A+	Eligible for Screening	300 mm	823	Class 4	Med	Rural	$ 2,152,000	$ 22,000	5-10 Years	A	0%	$ -	100%	0%	$ -	$ 2,152,000	Page 9 of 49
W-M-009	Pressure District 4 East-West Collector Road Trunk Watermain	New trunk watermain along East-West Collector Road from North-South Collector Road to Pressure District 4 Boundary	Pressure District 4	New trunk watermain in Pressure District 4 along East-West Collector Road from North-South Collector Road to Pressure District 4 Boundary at Balmoral Drive Road extension	-	-	-	A	EA Exempt	400 mm	1,738	Class 4	Low	Rural	$ 4,892,000	$ 35,100	10-20 Years	A	0%	$ -	100%	0%	$ -	$ 4,892,000	Page 10 of 49
W-M-010	Pressure District 2/3 East-West Collector Road Trunk Watermain	New trunk watermain along East-West Collector Road in Pressure District 2/3 west of King George	Pressure District 2/3	New trunk watermain in Pressure District 2/3 along East-West Collector Road from Pressure District 4 trunk watermain to King George Road	-	-	-	A	EA Exempt	400 mm	1,554	Class 4	Low	Rural	$ 3,994,000	$ 28,700	10-20 Years	A	0%	$ -	100%	0%	$ -	$ 3,994,000	Page 11 of 49
W-M-011	Pressure District 2/3 East-West Collector Road Trunk Watermain	New trunk watermain along East-West Collector Road in Pressure District 2/3 east of King George	Pressure District 2/3	New trunk watermain in Pressure District 2/3 along East-West Collector Road from King George Road to Ivanhoe Road extension	-	-	-	A	EA Exempt	600 mm	1,233	Class 4	Low	Rural	$ 4,988,000	$ 35,800	10-20 Years	A	0%	$ -	100%	0%	$ -	$ 4,988,000	Page 12 of 49
W-M-012	Pressure District 2/3 East-West Collector Road Trunk Watermain	New trunk watermain along East-West Collector Road in Pressure District 2/3 east of King George Road	Pressure District 2/3	New trunk watermain in Pressure District 2/3 along East-West Collector Road from Ivanhoe Road extension to Park Road North	-	-	-	A	EA Exempt	600 mm	1,152	Class 4	Low	Rural	$ 4,720,000	$ 33,900	10-20 Years	A	0%	$ -	100%	0%	$ -	$ 4,720,000	Page 13 of 49
W-M-013	East-West Collector Road Trunk Watermain	New trunk watermain along East-West Collector Road in Pressure District 2/3 east of Park Road North	Pressure District 2/3	New trunk watermain in Pressure District 2/3 along East-West Collector Road from Park Road North to Brantwood Road	-	-	-	A	EA Exempt	400 mm	960	Class 4	Low	Rural	$ 2,238,000	$ 16,100	0-5 Years	A	0%	$ -	100%	0%	$ -	$ 2,238,000	Page 14 of 49
W-M-014	Brantwood Park Road Trunk Watermain	New trunk watermain along Brantwood Road in Pressure District 2/3	Pressure District 2/3	New trunk watermain in Pressure District 2/3 along Brantwood Road from Powerline Road to East-West Collector Road	-	-	-	A	EA Exempt	400 mm	367	Class 4	Low	Rural	$ 959,000	$ 6,900	0-5 Years	A	0%	$ -	100%	0%	$ -	$ 959,000	Page 15 of 49
W-M-015	Park Road North Trunk Watermain	New trunk watermain from Powerline Road to East-West Collector Road	Pressure District 2/3	New trunk watermain in Pressure District 2/3 along Park Road North from Powerline Road to East-West Collector Road	-	-	-	A+	Eligible for Screening	600 mm	383	Class 4	Low	Suburban	$ 1,657,000	$ 11,900	0-5 Years	A	0%	$ -	100%	0%	$ -	$ 1,657,000	Page 16 of 49
W-M-016	Powerline Road Local Watermain	New local watermain from Brantwood Park Road to East-West Collector Road	Pressure District 2/3	New local watermain in Pressure District 2/3 along Powerline Road from Brantwood Park Road to East-West Collector Road eastern limit	-	-	-	A+	Eligible for Screening	300 mm	1,027	Class 4	Low	Suburban	$ 2,127,000	$ 15,300	0-5 Years	A	0%	$ -	100%	0%	$ -	$ 2,127,000	Page 17 of 49
W-M-017	East-West Collector Road Local Watermain	New local watermain from Powerline Road eastern limit to Brantwood Park Road	Pressure District 2/3	New local watermain in Pressure District 2/3 along East-West Collector Road from Powerline Road eastern limit to Brantwood Park Road	-	-	-	A	EA Exempt	300 mm	1,401	Class 4	Low	Rural	$ 2,499,000	$ 18,000	0-5 Years	A	0%	$ -	100%	0%	$ -	$ 2,499,000	Page 18 of 49
W-M-018	Lynden Road Trunk Watermain Upgrades (From Brantwood Park Road to Eastern limit of East Expansion Lands)	Watermain upgrades on Lynden Road from Brantwood Park Road to eastern limit	Pressure District 2/3	Upgrade existing watermain on Lynden Road from Brantwood Park Road to Eastern limit for East Expansion Lands	-	-	-	A+	Eligible for Screening	300 mm	599	Class 4	Med	Suburban	$ 1,306,000	$ 13,400	5-10 Years	B	20%	$ 261,200	100%	0%	$ -	$ 1,044,800	Page 19 of 49
W-M-019	Lynden Road Distribution Main Extension	New watermain extension from existing Lynden Road trunk watermain to East Expansion Lands limit	Pressure District 2/3	New local watermain in Pressure District 2/3 along Lynden Road from Lynden Road trunk watermain to East Expansion Lands limit	-	-	-	A+	Eligible for Screening	300 mm	925	Class 4	High	Suburban	$ 4,388,000	$ 54,400	0-5 Years	A	0%	$ -	100%	0%	$ -	$ 4,388,000	Page 20 of 49
W-M-020	East Expansion Lands Residential Loop	New distribution watermain loop in residential lands north of Lynden Road	Pressure District 2/3	New local watermain in East Expansion Lands along proposed Collector Road north of Lynden Road	-	-	-	A	EA Exempt	300 mm	1,280	Class 4	Low	Rural	$ 2,286,000	$ 16,400	0-5 Years	A	0%	$ -	100%	0%	$ -	$ 2,286,000	Page 21 of 49
W-M-021	East Expansion Lands Employment Loop	New distribution watermain along employment lands collector road and Sinclair Road	Pressure District 2/3	New local watermain in East Expansion Lands along employment lands collector Road from Lynden Road watermain extension to Sinclair Road connection including PRV for East Expansion Lands	-	-	-	A	EA Exempt	300 mm	1,608	Class 4	Low	Rural	$ 3,698,000	$ 26,600	5-10 Years	A	0%	$ -	100%	0%	$ -	$ 3,698,000	Page 22 of 49
W-M-022	Mount Pleasant Road Watermain Upgrades	Upsize existing watermain on Mount Pleasant Road from Beckett Drive to new collector road	Pressure District 1	Upsize existing 200 mm watermain on Mount Pleasant Road in Tutela Heights from Conklin Road to Clench Ave.	-	-	-	A+	Eligible for Screening	300 mm	2,367	Class 4	Med	Suburban	$ 5,089,000	$ 52,000	0-5 Years	D	50%	$ 2,544,500	75%	25%	$ 1,272,250	$ 1,272,250	Page 23 of 49
W-M-023	Conklin Road Watermain Upgrades	Upsize existing watermain on Conklin Road	Pressure District 1	Upsize existing 200 mm watermain on Conklin Road from Blackburn Drive to Mount Pleasant Road	-	-	-	A+	Eligible for Screening	300 mm	653	Class 4	Low	Suburban	$ 1,295,000	$ 9,300	0-5 Years	D	50%	$ 647,500	75%	25%	$ 323,750	$ 323,750	Page 24 of 49
W-M-024	Tutela Heights Road Upgrades	Upsize existing watermain on Tutela Heights	Pressure District 1	Upsize existing 200 mm watermain on Tutela Heights from Mount Pleasant Road to Davern Road	-	-	-	A+	Eligible for Screening	300 mm	1,180	Class 4	Med	Suburban	$ 2,544,000	$ 26,000	5-10 Years	B	20%	$ 508,800	75%	25%	$ 636,000	$ 1,399,200	Page 25 of 49
W-M-025	Tutela Heights Collector Road Distribution Watermain	New distribution watermain along Tutela Heights Collector Road	Pressure District 1	New distribution watermain along Collector Road from Mount Pleasant Road to Phelps Road in Tutela Heights	-	-	-	A	EA Exempt	300 mm	1,883	Class 4	Low	Rural	$ 3,447,000	$ 24,800	10-20 Years	A	0%	$ -	100%	0%	$ -	$ 3,447,000	Page 26 of 49
W-M-026	Davern Road Distribution Watermain	New distribution watermain along Davern Road	Pressure District 1	New distribution watermain along Davern Road from Mount Pleasant Road southern limit to collector road	-	-	-	A+	Eligible for Screening	300 mm	836	Class 4	Low	Suburban	$ 1,650,000	$ 11,900	10-20 Years	A	0%	$ -	100%	0%	$ -	$ 1,650,000	Page 27 of 49
W-M-027	Upsize Fairview Drive Trunk Watermain	Watermain upgrades on Fairview Drive from King George Road to Park Road North	Pressure District 2/3	Watermain upgrades on Fairview Drive from King George Road to Park Road North to support growth in Pressure District 2/3	-	-	-	A+	Eligible for Screening	600 mm	2,497	Class 4	Med	Suburban	$ 10,977,000	$ 112,200	0-5 Years	B	20%	$ 2,195,400	100%	0%	$ -	$ 8,781,600	Page 28 of 49
W-M-028	Downtown Trunk Watermain	Upsize existing watermains in downtown to create trunk loop	Pressure District 1	Upsize existing watermain along Pearl Street from St. James Street to West Street	-	-	-	A+	Eligible for Screening	400 mm	860	Class 4	Med	Urban	$ 2,628,000	$ 26,900	5-10 Years	D	50%	$ 1,314,000	100%	0%	$ -	$ 1,314,000	Page 29 of 49
W-M-029	Garden Avenue Watermain Upgrade	Upsize existing watermain along Garden Avenue to create loop	Pressure District 2/3	Upsize existing watermain along Garden Avenue from Lynden Road to Sinclair Boulevard to create loop within Pressure District 2/3	-	-	-	A+	Eligible for Screening	300 mm	719	Class 4	Med	Urban	$ 1,700,000	$ 17,400	5-10 Years	B	20%	$ 340,000	100%	0%	$ -	$ 1,360,000	Page 30 of 49
W-M-030	Fire Flow Watermain Upgrades	Replace watermains including upsizing and looping to strengthen local trunk network for fire flows.	All Pressure Districts	Fire Flow program to include replacing watermains less than or equal to 100 mm, replacing CI watermains, replacing AC/DI watermains (installed before 1990), and upsizing and looping to strengthen local trunk network. Watermains will be replaced with PVC.	-	-	-	A+	Eligible for Screening	300 mm	-	Class 4	Med	Urban	$ 14,545,000	$ 148,700	0-5 Years	D	50%	$ 7,272,500	100%	0%	$ -	$ 7,272,500	Page 31 of 49
W-M-031	Shellard Lane Watermain Upgrade	Upsize existing watermain on Shellard Lane	Pressure District 1	Upsize existing 400 mm watermain on Shellard Lane from Spalding Drive to Diana Ave	-	-	-	A+	Eligible for Screening	600 mm	750	Class 4	Low	Suburban	$ 8,733,000	$ 62,700	0-5 Years	C	40%	$ 3,493,200	100%	0%	$ -	$ 5,239,800	Page 32 of 49
W-M-032	Upsize Lynden Road Trunk Watermain (From Park Road North to Brantwood Park Road)	Watermain upgrades on Lynden Road from Park Road North to Brantwood Park Road to support growth in Pressure District 2/3	Pressure District 2/3	Watermain upgrades on Lynden Road from Park Road North to Brantwood Park Road to support growth in Pressure District 2/3	-	-	-	A+	Eligible for Screening	600 mm	1,671	Class 4	Med	Suburban	$ 7,683,000	$ 78,500	5-10 Years	B	20%	$ 1,536,600	100%	0%	$ -	$ 6,146,400	Page 33 of 49
W-M-034	Albion Street Trunk Watermain	New trunk watermain in PD1 along Albion Street from Bedford Street to St. James Street.	Pressure District 1	New trunk watermain in PD1 along Albion Street from Bedford Street to St. James Street.	-	-	-	A+	Eligible for Screening	400 mm	143	Class 4	Med	Suburban	$ 1,020,000	$ 10,400	0-10 Years	C	40%	$ 408,000	100%	0%	$ -	$ 612,000	Page 34 of 49
W-M-035	McMurray Street Trunk Watermain	New trunk watermain in PD1 from McMurray Street to the existing 600mm on Albion Street.	Pressure District 1	New trunk watermain in PD1 from McMurray Street to the existing 600mm on Albion Street.	-	-	-	A+	Eligible for Screening	300 mm	48	Class 4	Med	Suburban	$ 204,000	$ 2,100	0-10 Years	C	40%	$ 81,600	100%	0%	$ -	$ 122,400	Page 35 of 49
W-ET-001	Pressure District 2/3 Elevated Tank (Phase 1)	New Elevated Tank along King George Road in North Expansion Lands (Twinned)	Pressure District 2/3	New Elevated Tank in Pressure District 2/3. Sized to service Pressure District 2/3 and Pressure District 1 storage deficit including North Expansions Lands until 2051 and Pressure District 2/3 and Trigger Lands post 2051 with additional storage needed in Pressure District 1 post 2051. Allows King George Elevated Tank to be decomissioned. Twinned to W-ET-003.	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment	Determine the requirements for a new water tower, including preferred locations.	B	B	6.0 ML	-	Class 4	Med	Rural	$ 29,627,000	$ 307,700	0-5 Years	C	40%	$ 11,850,800	85%	15%	$ 4,444,050	$ 13,332,150	Page 36 of 49
W-ET-002 - High	Pressure District 4 Elevated Tank	New Elevated Tank North of Highway 403 in North Expansion Lands	Pressure District 4	New Elevated Tank in Pressure District 4 to service Pressure District 4 storage deficit including North Expansions Lands and Trigger Lands.	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment	Determine the requirements for a new water tower, including preferred location	B	B	9.0 ML	-	Class 4	Med	Rural	$ 37,098,000	$ 387,300	10-20 Years	C	40%	$ 14,839,200	80%	20%	$ 7,419,600	$ 14,839,200	Page 37 of 49
W-ET-004 - High	Pressure District 2/3 Elevated Tank (Phase 2)	New Elevated Tank along King George Road in North Expansion Lands (Twinned)	Pressure District 2/3	New Elevated Tank in Pressure District 2/3. Sized to service Pressure District 2/3 and Pressure District 1 storage deficit including North Expansions Lands until 2051 and Pressure District 2/3 and Trigger Lands post 2051 with additional storage needed in Pressure District 1 post 2051. Twinned to W-ET-001.	Municipal Class Environmental Assessment (EA)	This study will used the Schedule B Class EA from W-ET-001	Determine the requirements for a new water tower, including preferred location	A	EA Exempt	11.0 ML	-	Class 4	Low	Suburban	$ 27,025,000	$ -	5-10 Years	C	40%	$ 10,810,000	70%	30%	$ 8,107,500	$ 8,107,500	Page 38 of 49
W-D-001	Decommissioning of King George ET	Decommissioning of King George ET to be replaced by new Pressure District 2/3 ET	Pressure District 2/3	Decommissioning of King George ET to be replaced by new Pressure District 2/3 ET	-	-	-	A+	Eligible for Screening	-	-	Class 4	Med	Suburban	$ 1,337,000	$ 13,700	5-10 Years	C	40%	$ 534,800	100%	0%	$ -	$ 802,200	Page 39 of 49
W-P-001-High	Holmedale WTP High Lift Pump Upgrades	Install additional pump to supply elevated tank and reservoirs in Pressure District 1.	Pressure District 1	Install additional pump to supply elevated tank and reservoirs in Pressure District 1.	-	-	-	A+	Eligible for Screening	-	-	Class 4	Med	Rural	$ 3,779,000	$ 38,600	0-5 Years	C	40%	$ 1,511,600	100%	0%	$ -	$ 2,267,400	Page 40 of 49
W-P-002	Wayne Gretzky Pump Upgrades	Pumping capacity upgrades at Wayne Gretzky PS.	Pressure District 2/3	Install 3 new pumps at Wayne Gretzky Pump Station to improve operational capacity and suport new Pressure District HGL. Install new PRV to allow Pressure District 2/3 to backfeed Pressure District 1.	-	-	-	A+	Eligible for Screening	-	-	Class 4	Med	Rural	$ 9,355,000	$ 95,600	5-10 Years	C	40%	$ 3,742,000	100%	0%	$ -	$ 5,613,000	Page 41 of 49
W-P-003	Tollgate Pump Upgrades	Pumping capacity upgrades at Tollgate PS	Pressure District 2/3	Install 3 new pumps at Tollgate Pump Station to improve operational capacity and support new Pressure District HGL. Install new PRV to allow Pressure District 2/3 to backfeed Pressure District 1.	-	-	-	A+	Eligible for Screening	-	-	Class 4	Med	Rural	$ 10,691,000	$ 109,300	5-10 Years	C	40%	$ 4,276,400	100%	0%	$ -	$ 6,414,600	Page 42 of 49
W-P-004	Colborne Street West Booster Pumping Station	New Booster Pumping Station to service development off of Colborne Street West at municipal boundary.	Pressure District 1	Install new Booster Pumping station to be serviced off of Pressure District 1 to service existing properties on Colborne Street and development extending west to the municipal boundary. Pumping station includes single jockey pump and a fire pump.	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment.	Determine the best construction methodology for the newpumping station including location of buildings.	A	EA Exempt	128 L/s	-	Class 4	Med	Rural	$ 18,181,000	$ 193,500	0-5 Years	B	20%	$ 3,636,200	100%	0%	$ -	$ 14,544,800	Page 43 of 49
W-P-005	Strawberry Hill Booster Pumping Station	New Booster Pumping Station to service development off of Colborne Street West at municipal boundary.	Pressure District 1	Install new Booster Pumping station to be serviced off of Pressure District 1 to service new sub-pressure district to extend from Shellard Lane to Mount Pleasant Street. BPS required to service future development. Sized to provide MDD with fire flow provided via check valves.	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment.	Determine the best construction methodology for the newpumping station including location of buildings.	B	B	10 L/s	-	Class 4	Med	Suburban	$ 13,744,000	$ 137,600	10-20 Years	B	20%	$ 2,748,800	100%	0%	$ -	$ 10,995,200	Page 44 of 49
W-P-006	Albion Booster Pumping Station Upgrades	Pumping capacity upgrades at Albion BPS.	Pressure District 1	Replace 3 pumps at Albion Booster Pump Station to improve operational capacity.	-	-	-	A+	Eligible for Screening	300 L/s	-	Class 4	Med	Suburban	$ 5,213,000	$ -	0-10 Years	C	40%	$ 2,085,200	100%	0%	$ -	$ 3,127,800	Page 45 of 49
W-TP-001	Water Treatment Plant Upgrades - 0-5 Years	Implementation of Reverse Osmosis System	Pressure District 1	Implementation of Reverse Osmosis System	-	-	-	A+	Eligible for Screening	-	-	Class 4	Med	Suburban	$ 126,507,000	$ 2,400,500	0-5 Years	D	50%	$ 63,253,500	100%	0%	$ -	$ 63,253,500	Page 46 of 49
W-TP-002 - High	Water Treatment Plant Upgrades - 5-10 Years	Increase intake canal capacity and optimize existing Actiflo process	Pressure District 1	Increase intake canal capacity and optimize existing Actiflo process	-	-	-	A+	Eligible for Screening	-	-	Class 4	Med	Rural	$ 8,840,000	$ -	5-10 Years	A	0%	$ -	100%	0%	$ -	$ 8,840,000	Page 47 of 49
W-TP-003 - High	Water Treatment Plant Upgrades - 10-20 Years	Upgrades to low lift, Actiflo, filtration, RO, disinfection and residuals management to provide capacity for growth to 2051	Pressure District 1	Upgrades to low lift, Actiflo, filtration, RO, disinfection and residuals management to provide capacity for growth to 2051	-	-	-	A+	Eligible for Screening	-	-	Class 4	Med	Rural	$ 151,490,000	$ -	10-20 Years	A	0%	$ -	100%	0%	$ -	$ 151,490,000	Page 48 of 49
W-TP-004 - High	New Intake Canal to Holmedale WTP	Increase intake storage capacity to meet 48 hours of total system storage under future MDD in the long term.	Pressure District 1	Increase intake storage capacity to meet 48 hours of total system storage under future MDD in the long term.	-	-	-	A+	Eligible for Screening	-	-	Class 4	Med	Rural	$ 80,250,000	$ -	10-20 Years	A	0%	$ -	100%	0%	$ -	$ 80,250,000	Page 49 of 49
TOTAL															**$ 703,618,000**					**$ 156,451,000**			**$ 27,745,050**	**$ 519,421,950**	

PROJECT NO.: W-M-001
PROJECT NAME: King George Road Watermain
PROJECT OVERVIEW: Watermain upgrades on King George Road from Tollgate Pumping Station to the proposed East-West Collectors Road

TIMELINE: 0-5 Years

MAP



PRESSURE DISTRICT: Pressure District 2/3

PROJECT DESCRIPTION:
Watermain upgrades on King George Road from Tollgate Pumping Station to the proposed East-West Collectors Road in the North Expansion Lands or the new Pressure District 2/3 Elevated Tank

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	High	Complexity adjusted Construction Contingency, and specific accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	750 mm	
TOTAL LENGTH:	3578 m	
Tunnelled	0 m	0%
Open Cut	3578 m	100%

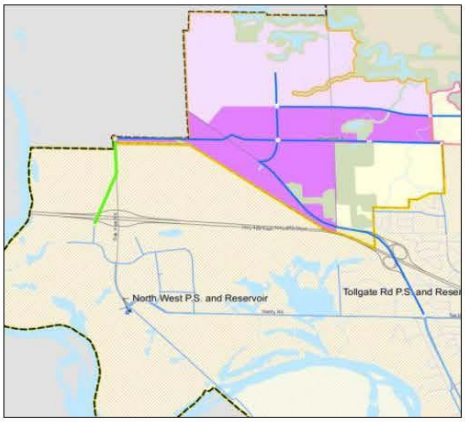
CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

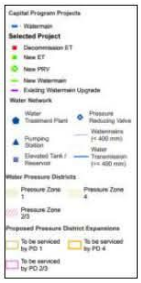
COST ESTIMATION SPREADSHEET

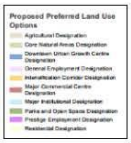
COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	3578 m	$2,267	$8,112,857	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$11,809	$0	
Minor Creek Crossings			ea.	0	$481,000	$0	
Major Creek Crossings			ea.	0	$2,016,000	$0	
Road Crossings			ea.	1	$953,000	$953,000	Powerline Road
Major Road Crossings (Highway)			ea.	1	$2,016,000	$2,016,000	Highway 403
Utility Crossings			ea.	0	$953,000	$0	
Valve and Chamber			ea.	4	$122,400	$489,600	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	10%					$1,108,186	
Additional Construction Costs	20%		ea.			$2,535,929	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$1,267,964	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$16,484,000	
Geotechnical / Hydrogeological / Materials	2.0%					$329,700	
Geotechnical Sub-Total Cost						$329,700	
Property Requirements	2.0%					$ 329,700	
Property Requirements Sub-Total						$329,700	
Consultant Engineering/Design	12%					$ 1,978,100	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$1,978,100	
In House Labour/Engineering/Wages/CA	6%					$ 989,000	
In-house Labour/Wages Sub-Total						$989,000	
Project Contingency	25%					$5,028,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$5,028,000	
Non-Refundable HST	1.76%					$425,000	
Non-Refundable HST Sub-Total						$425,000	
Total (2020 Dollars)						$25,564,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$25,564,000	2025 Estimate

PROJECT NO.: W-M-002 TIMELINE: 0-5 Years
PROJECT NAME: Oak Park Road Trunk Watermain
PROJECT OVERVIEW: New trunk watermain from Oak Park Road to Powerline Road

MAP







PRESSURE DISTRICT: Pressure District 4
PROJECT DESCRIPTION:
New trunk watermain extending from Oak Park Road watermain limit to Powerline Road in Pressure District 4

REQUIRED STUDIES: Municipal Class Environmental Assessment (EA)
STUDY SCOPE: This Study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will evaluate the preferred watermain alignment as either Oak Park Road or Paris Road (W-M-002 or W-M-006)as well as cover both Capital Program Project W-M-003 and be done in conjunction with the Oak Park Road Trunk Sewer alignment (Capital Program project WW-SS-001) with costs shared between water and wastewater.
OBJECTIVES: Determine the best alignment and construction type (ie. Open cut or tunnel) for the trunk watermain crossing Highway 403 including a railway crossing and overhead powerlines along Powerline Road. Determine if alignment can be coordinated with local development.

CONSTRUCTION

Class Estimate Type:	Class 4	Class aside from Construction Contingency and expected accuracy
Project Complexity:	High	Complexity aside from Construction Contingency, and specific accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition split: rural or urban/suburban

PROPOSED DIAMETER:	600 mm	
TOTAL LENGTH:	1090 m	
Tunnelled	500 m	46%
Open Cut	590 m	54%

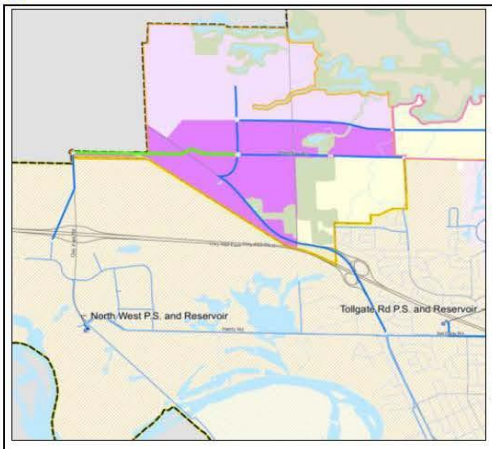
CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA			1	$144,000	$144,000	
Sub-Total Study Costs						$144,000	
Construction Cost							
Pipe Construction - Open Cut			m	590 m	$1,977	$1,166,574	Existing road ROW
Pipe Construction - Tunneling			m	500 m	$11,520	$5,760,000	
Minor Creek Crossings			ea.	0	$389,000	$0	
Major Creek Crossings			ea.	0	$1,886,000	$0	
Road Crossings			ea.	0	$850,000	$0	Powerline Road
Major Road Crossings (Highway)			ea.	1	$1,886,000	$1,886,000	Highway 403
Utility Crossings			ea.	0	$850,000	$0	
Valve and Chamber			ea.	2	$79,200	$158,400	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	10%					$881,267	
Additional Construction Costs	20%		ea.			$1,970,468	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding,insurance
Provisional & Allowance	10%		ea.			$985,234	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$12,808,000	
Geotechnical / Hydrogeological / Materials	2.0%					$256,200	
Geotechnical Sub-Total Cost						$256,200	
Property Requirements	2.0%					$ 256,200	
Property Requirements Sub-Total						$256,200	
Consultant Engineering/Design	12%					$ 1,537,000	Includes planning, pre-design, detailed design,training, CA, commissioning
Engineering/Design Sub-Total						$1,537,000	
In House Labour/Engineering/Wages/CA	6%					$ 768,500	
In-house Labour/Wages Sub-Total						$768,500	
Project Contingency	25%					$3,906,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$3,906,000	
Non-Refundable HST	1.76%					$330,200	
Non-Refundable HST Sub-Total						$330,200	
Total (2020 Dollars)						$20,006,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$20,006,000	2025 Estimate

PROJECT NO.:	W-M-003	TIMELINE:	0-5 Years
PROJECT NAME:	Powerline Road Trunk Watermain		
PROJECT OVERVIEW:	New trunk watermain from Powerline Road to East-West Collector Road		

MAP



PRESSURE DISTRICT: Pressure District 4

PROJECT DESCRIPTION:
New trunk watermain in Pressure District 4 along Powerline Road from new Oak Park Road watermain to the proposed East-West Collector's Road

REQUIRED STUDIES:	Municipal Class Environmental Assessment (EA)
STUDY SCOPE:	This Study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will evaluate the preferred watermain alignment as either Oak Park Road or Paris Road (W-M-002 or W-M-006)as well as cover both Capital Program Project W-M-003 and be done in conjunction with the Oak Park Road Trunk Sewer alignment (Capital Program project WW-SS-001) with costs shared between water and wastewater.
OBJECTIVES:	Determine the best alignment and construction type (ie. Open cut or tunnel) for the trunk watermain crossing Highway 403 including a railway crossing and overhead powerlines along Powerline Road. Determine if alignment can be coordinated with local development.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition splits out cost and restoration

PROPOSED DIAMETER:	600 mm
TOTAL LENGTH:	1853 m

Tunnelled	0 m	0%
Open Cut	1853 m	100%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Watermain

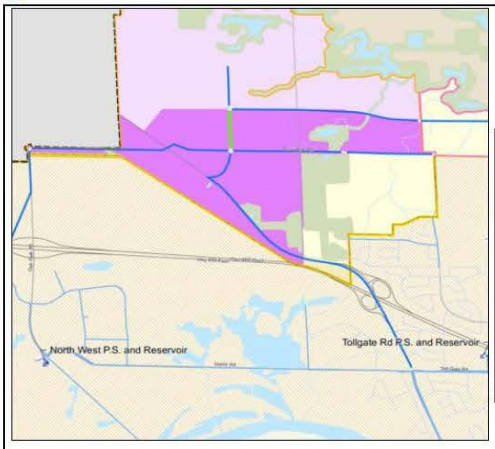
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA			1	$144,000	$144,000	
Sub-Total Study Costs						$144,000	
Construction Cost							
Pipe Construction - Open Cut			m	1853 m	$1,977	$3,664,149	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$11,520	$0	
Minor Creek Crossings			ea.	0	$389,000	$0	
Major Creek Crossings			ea.	0	$1,886,000	$0	
Road Crossings			ea.	1	$850,000	$850,000	Paris Road
Major Road Crossings (Highway)			ea.	0	$1,886,000	$0	
Utility Crossings			ea.	1	$850,000	$850,000	Powerlines
Valve and Chamber			ea.	2	$79,200	$158,400	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	10%					$536,415	
Additional Construction Costs	15%		ea.			$908,845	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$605,896	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$7,574,000	
Geotechnical / Hydrogeological / Materials	1.0%					$75,700	
Geotechnical Sub-Total Cost						$75,700	
Property Requirements	1.5%					$ 113,600	
Property Requirements Sub-Total						$113,600	
Consultant Engineering/Design	15%					$ 1,136,100	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$1,136,100	
In House Labour/Engineering/Wages/CA	8%					$ 605,900	
In-house Labour/Wages Sub-Total						$605,900	
Project Contingency	15%					$1,426,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$1,426,000	
Non-Refundable HST	1.76%					$181,700	
Non-Refundable HST Sub-Total						$181,700	
Total (2020 Dollars)						$11,257,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$11,257,000	2025 Estimate

PROJECT NO.: W-M-004
PROJECT NAME: North-South Collector Road Trunk Watermain
PROJECT OVERVIEW: New trunk watermain from Powerline Road to East-West Collector Road

TIMELINE: 10-20 Years

MAP



PRESSURE DISTRICT: Pressure District 4

PROJECT DESCRIPTION:
New trunk watermain in Pressure District 4 along proposed North-South Collector Road from Powerline Road to proposed East-West Collector Road

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Low	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	600 mm
TOTAL LENGTH:	405 m

Tunnelled	0 m	0%
Open Cut	405 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

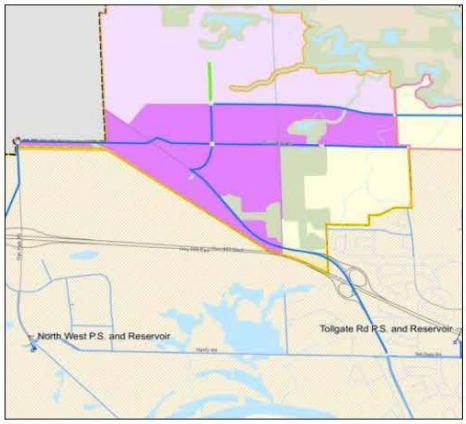
COST ESTIMATION SPREADSHEET

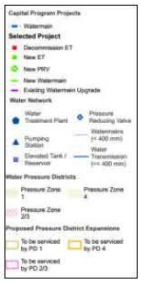
COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study			0		$0	
Study	EA			0		$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	405 m	$1,977	$800,853	Proposed Collector Road ROW
Pipe Construction - Tunneling			m	0 m	$11,520	$0	
Minor Creek Crossings			ea.	0	$389,000	$0	
Major Creek Crossings			ea.	0	$1,886,000	$0	
Road Crossings			ea.	0	$850,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,886,000	$0	
Utility Crossings			ea.	0	$850,000	$0	
Valve and Chamber			ea.	2	$79,200	$158,400	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$95,925	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$95,925	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$1,151,000	
Geotechnical / Hydrogeological / Materials	0.5%					$5,800	
Geotechnical Sub-Total Cost						$5,800	
Property Requirements	1.0%					$ 11,500	
Property Requirements Sub-Total						$11,500	
Consultant Engineering/Design	15%					$ 172,700	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$172,700	
In House Labour/Engineering/Wages/CA	8%					$ 92,100	
In-house Labour/Wages Sub-Total						$92,100	
Project Contingency	10%					$143,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$143,000	
Non-Refundable HST	1.76%					$26,100	
Non-Refundable HST Sub-Total						$26,100	
Total (2020 Dollars)						$1,602,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$1,602,000	2025 Estimate

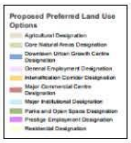
PROJECT NO.: W-M-005
PROJECT NAME: North-South Collector Road Local Watermain
PROJECT OVERVIEW: New local watermain from East-West Collector Road to North Expansion Lands Boundary

TIMELINE: 10-20 Years

MAP







PRESSURE DISTRICT: Pressure District 4

PROJECT DESCRIPTION:
New local watermain in Pressure District 4 along proposed North-South Collector Road from proposed East-West Collector Road to North expansion limit

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Low	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	300 mm
TOTAL LENGTH:	426 m

Tunnelled	0 m	0%
Open Cut	426 m	100%

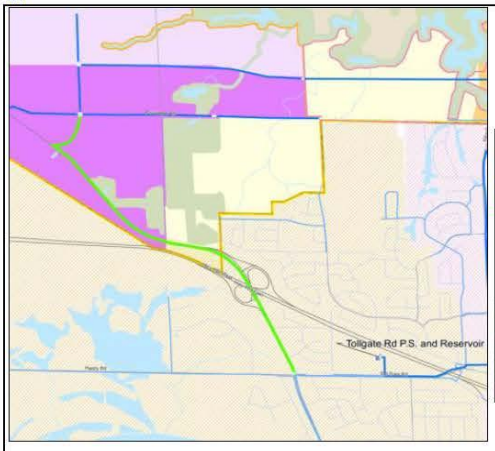
CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study			0		$0	
Study	EA			0		$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	426 m	$1,056	$450,024	Proposed Collector Road ROW
Pipe Construction - Tunneling			m	0 m	$2,088	$0	
Minor Creek Crossings			ea.	0	$58,000	$0	
Major Creek Crossings			ea.	0	$329,000	$0	
Road Crossings			ea.	0	$141,000	$0	
Major Road Crossings (Highway)			ea.	0	$329,000	$0	
Utility Crossings			ea.	0	$141,000	$0	
Valve and Chamber			ea.	2	$7,920	$15,840	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$46,586	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$46,586	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$559,000	
Geotechnical / Hydrogeological / Materials	0.5%					$2,800	
Geotechnical Sub-Total Cost						$2,800	
Property Requirements	1.0%					$ 5,600	
Property Requirements Sub-Total						$5,600	
Consultant Engineering/Design	15%					$ 83,900	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$83,900	
In House Labour/Engineering/Wages/CA	8%					$ 44,700	
In-house Labour/Wages Sub-Total						$44,700	
Project Contingency	10%					$70,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$70,000	
Non-Refundable HST	1.76%					$12,700	
Non-Refundable HST Sub-Total						$12,700	
Total (2020 Dollars)						$779,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$779,000	2025 Estimate

PROJECT NO.: W-M-006 TIMELINE: 5-10 Years
PROJECT NAME: Paris Road Trunk Watermain
PROJECT OVERVIEW: New trunk watermain from Tollgate Road to North-South Collector Road at Powerline Road

MAP



PRESSURE DISTRICT: Pressure District 4
PROJECT DESCRIPTION:
New watermain in Pressure District 4 along Paris Road from Tollgate Road to proposed North-South Collector Road at Powerline Road

REQUIRED STUDIES: Municipal Class Environmental Assessment (EA)
STUDY SCOPE: This Study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will evaluate the preferred watermain alignment as either Oak Park Road or Paris Road (W-M-002 or W-M-006)as well as cover both Capital Program Project W-M-003 and be done in conjunction with the Oak Park Road Trunk Sewer alignment (Capital Program project WW-SS-001) with costs shared between water and wastewater.
OBJECTIVES: Determine the best alignment and construction type (ie. Open cut or tunnel) for the trunk watermain crossing Highway 403 including a railway crossing and overhead powerlines along Powerline Road. Determine if alignment can be coordinated with local development.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	High	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	600 mm	
TOTAL LENGTH:	3108 m	
Tunnelled	0 m	0%
Open Cut	3108 m	100%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Watermain

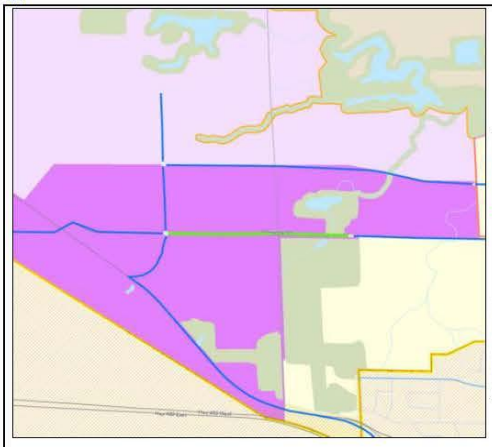
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	3108 m	$1,977	$6,146,804	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$11,520	$0	
Minor Creek Crossings			ea.	0	$389,000	$0	
Major Creek Crossings			ea.	0	$1,886,000	$0	
Road Crossings			ea.	1	$850,000	$850,000	Under High 403
Major Road Crossings (Highway)			ea.	0	$1,886,000	$0	
Utility Crossings			ea.	0	$850,000	$0	
Valve and Chamber			ea.	2	$79,200	$158,400	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	10%					$699,580	
Additional Construction Costs	20%		ea.			$1,570,757	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$785,378	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$10,210,000	
Geotechnical / Hydrogeological / Materials	2.0%					$204,200	
Geotechnical Sub-Total Cost						$204,200	
Property Requirements	2.0%					$ 204,200	
Property Requirements Sub-Total						$204,200	
Consultant Engineering/Design	12%					$ 1,225,200	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$1,225,200	
In House Labour/Engineering/Wages/CA	6%					$ 612,600	
In-house Labour/Wages Sub-Total						$612,600	
Project Contingency	25%					$3,114,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$3,114,000	
Non-Refundable HST	1.76%					$263,300	
Non-Refundable HST Sub-Total						$263,300	
Total (2020 Dollars)						$15,834,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$15,834,000	2025 Estimate

PROJECT NO.: W-M-007
PROJECT NAME: Powerline Road Distribution Watermain
PROJECT OVERVIEW: New distribution watermain east of North-South Collector Road

TIMELINE: 5-10 Years

MAP



PRESSURE DISTRICT: Pressure District 4

PROJECT DESCRIPTION:
New distribution watermain in Pressure District 4 along Powerline Road from proposed North-South Collector Road 400 m east of Golf Road

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity adjusted Construction Contingency, and specific accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	1028 m	
Tunnelled	0 m	0%
Open Cut	1028 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

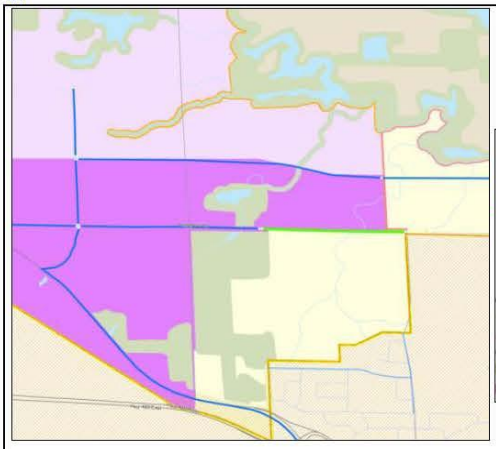
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY		COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	1028 m	$1,056	$1,085,973	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$2,088	$0	
Minor Creek Crossings			ea.	0	$58,000	$0	
Major Creek Crossings			ea.	0	$329,000	$0	
Road Crossings			ea.	0	$141,000	$0	
Major Road Crossings (Highway)			ea.	0	$329,000	$0	
Utility Crossings			ea.	0	$141,000	$0	
Valve and Chamber			ea.	2	$7,920	$15,840	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	15%		ea.			$165,272	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$110,181	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$1,377,000	
Geotechnical / Hydrogeological / Materials	1.0%					$13,800	
Geotechnical Sub-Total Cost						$13,800	
Property Requirements	1.5%					$ 20,700	
Property Requirements Sub-Total						$20,700	
Consultant Engineering/Design	15%					$ 206,600	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$206,600	
In House Labour/Engineering/Wages/CA	8%					$ 110,200	
In-house Labour/Wages Sub-Total						$110,200	
Project Contingency	15%					$259,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$259,000	
Non-Refundable HST	1.76%					$33,000	
Non-Refundable HST Sub-Total						$33,000	
Total (2020 Dollars)						$2,020,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$2,020,000	2025 Estimate

PROJECT NO.: W-M-008
PROJECT NAME: Powerline Road Distribution Watermain
PROJECT OVERVIEW: New distribution watermain east of North-South Collector Road

TIMELINE: 5-10 Years

MAP



PRESSURE DISTRICT: Pressure District 4

PROJECT DESCRIPTION:
New distribution watermain in Pressure District 4 along Powerline Road 400 m east of Golf Road to Balmoral Drive Road extension

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity adjusted Construction Contingency, and specific accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	823 m	
Tunnelled	0 m	0%
Open Cut	823 m	100%

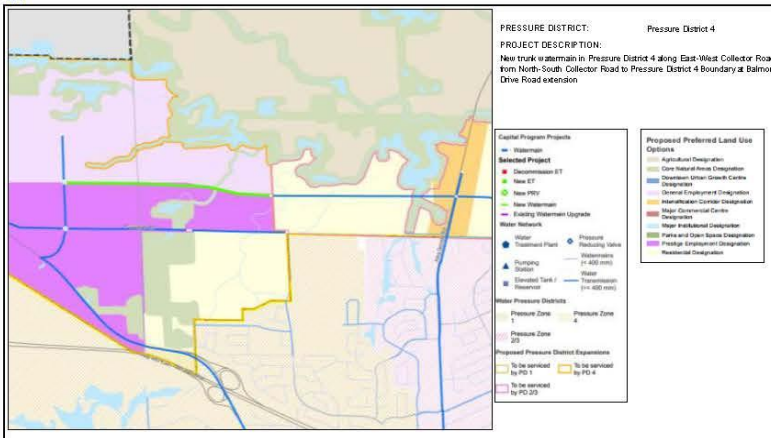
CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	823 m	$1,056	$869,412	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$2,088	$0	
Minor Creek Crossings			ea.	0	$58,000	$0	
Major Creek Crossings			ea.	0	$329,000	$0	
Road Crossings			ea.	0	$141,000	$0	
Major Road Crossings (Highway)			ea.	0	$329,000	$0	
Utility Crossings			ea.	0	$141,000	$0	
Valve and Chamber			ea.	2	$7,920	$15,840	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
New PRV Chamber			ea.	1	$360,000	$360,000	Pressure District 4 to Pressure District 2/3
Additional Construction Costs	15%		ea.			$132,788	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$88,525	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$1,467,000	
Geotechnical / Hydrogeological / Materials	1.0%					$14,700	
Geotechnical Sub-Total Cost						$14,700	
Property Requirements	1.5%					$ 22,000	
Property Requirements Sub-Total						$22,000	
Consultant Engineering/Design	15%					$ 220,100	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$220,100	
In House Labour/Engineering/Wages/CA	8%					$ 117,400	
In-house Labour/Wages Sub-Total						$117,400	
Project Contingency	15%					$276,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$276,000	
Non-Refundable HST	1.76%					$35,200	
Non-Refundable HST Sub-Total						$35,200	
Total (2020 Dollars)						$2,152,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$2,152,000	2025 Estimate

PROJECT NO.:	W-M-009	TIMELINE:	10-20 Years
PROJECT NAME:	Pressure District 4 East-West Collector Road Trunk Watermain		
PROJECT OVERVIEW:	New trunk watermain along East-West Collector Road from North-South Collector Road to Pressure District 4 Boundary		

MAP



PRESSURE DISTRICT: Pressure District 4

PROJECT DESCRIPTION:
New trunk watermain in Pressure District 4 along East-West Collector Road from North-South Collector Road to Pressure District 4 Boundary at Balmoral Drive Road extension

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class as per Construction Contingency and expected accuracy
Project Complexity:	Low	Complexity as per Construction Contingency, and specific accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	400 mm	
TOTAL LENGTH:	1738 m	
Tunnelled	0 m	0%
Open Cut	1738 m	100%

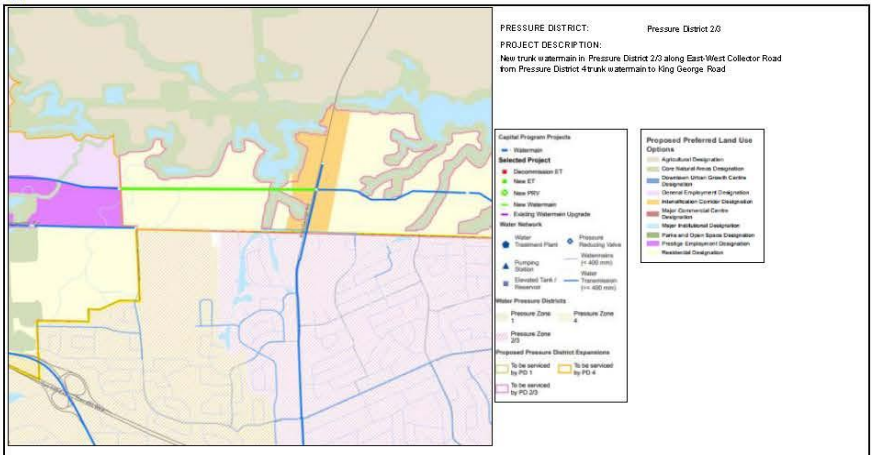
CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	1738 m	$1,291	$2,243,476	Proposed Collector ROW
Pipe Construction - Tunneling			m	0 m	$9,144	$0	
Minor Creek Crossings			ea.	1	$284,000	$284,000	
Major Creek Crossings			ea.	0	$1,472,000	$0	
Road Crossings			ea.	0	$649,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,472,000	$0	
Utility Crossings			ea.	0	$649,000	$0	
Valve and Chamber			ea.	2	$50,400	$100,800	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
New PRV Chamber			ea.	1	$360,000	$360,000	Pressure District 4 to Pressure District 2/3
Additional Construction Costs	10%		ea.			$262,828	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding,insurance
Provisional & Allowance	10%		ea.			$262,828	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$3,514,000	
Geotechnical / Hydrogeological / Materials	0.5%					$17,600	
Geotechnical Sub-Total Cost						$17,600	
Property Requirements	1.0%					$ 35,100	
Property Requirements Sub-Total						$35,100	
Consultant Engineering/Design	15%					$ 527,100	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$527,100	
In House Labour/Engineering/Wages/CA	8%					$ 281,100	
In-house Labour/Wages Sub-Total						$281,100	
Project Contingency	10%					$437,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$437,000	
Non-Refundable HST	1.76%					$79,700	
Non-Refundable HST Sub-Total						$79,700	
Total (2020 Dollars)						$4,892,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$4,892,000	2025 Estimate

PROJECT NO.:	W-M-010	TIMELINE:	10-20 Years
PROJECT NAME:	Pressure District 2/3 East-West Collector Road Trunk Watermain		
PROJECT OVERVIEW:	New trunk watermain along East-West Collector Road in Pressure District 2/3 west of King George		

MAP



REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Low	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	400 mm	
TOTAL LENGTH:	1554 m	
Tunnelled	0 m	0%
Open Cut	1554 m	100%

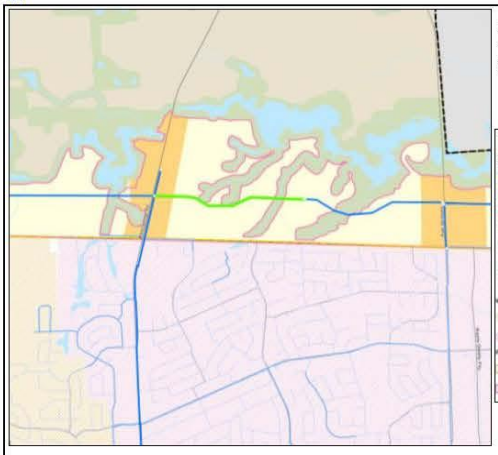
CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	1554 m	$1,291	$2,005,962	Proposed Collector ROW
Pipe Construction - Tunneling			m	0 m	$9,144	$0	
Minor Creek Crossings			ea.	1	$284,000	$284,000	
Major Creek Crossings			ea.	0	$1,472,000	$0	
Road Crossings			ea.	0	$649,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,472,000	$0	
Utility Crossings			ea.	0	$649,000	$0	
Valve and Chamber			ea.	2	$50,400	$100,800	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$239,076	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding,insurance
Provisional & Allowance	10%		ea.			$239,076	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$2,869,000	
Geotechnical / Hydrogeological / Materials	0.5%					$14,300	
Geotechnical Sub-Total Cost						$14,300	
Property Requirements	1.0%					$ 28,700	
Property Requirements Sub-Total						$28,700	
Consultant Engineering/Design	15%					$ 430,400	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$430,400	
In House Labour/Engineering/Wages/CA	8%					$ 229,500	
In-house Labour/Wages Sub-Total						$229,500	
Project Contingency	10%					$357,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$357,000	
Non-Refundable HST	1.76%					$65,100	
Non-Refundable HST Sub-Total						$65,100	
Total (2020 Dollars)						$3,994,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$3,994,000	2025 Estimate

PROJECT NO.:	W-M-011	TIMELINE:	10-20 Years
PROJECT NAME:	Pressure District 2/3 East-West Collector Road Trunk Watermain		
PROJECT OVERVIEW:	New trunk watermain along East-West Collector Road in Pressure District 2/3 east of King George		

MAP



PRESSURE DISTRICT: Pressure District 2/3

PROJECT DESCRIPTION:

New trunk watermain in Pressure District 2/3 along East-West Collector Road from King George Road to Nanhoe Road extension

REQUIRED STUDIES: -

STUDY SCOPE: -

OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Low	Complexity adjusted Construction Contingency, and specific accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	600 mm	
TOTAL LENGTH:	1233 m	
Tunnelled	0 m	0%
Open Cut	1233 m	100%

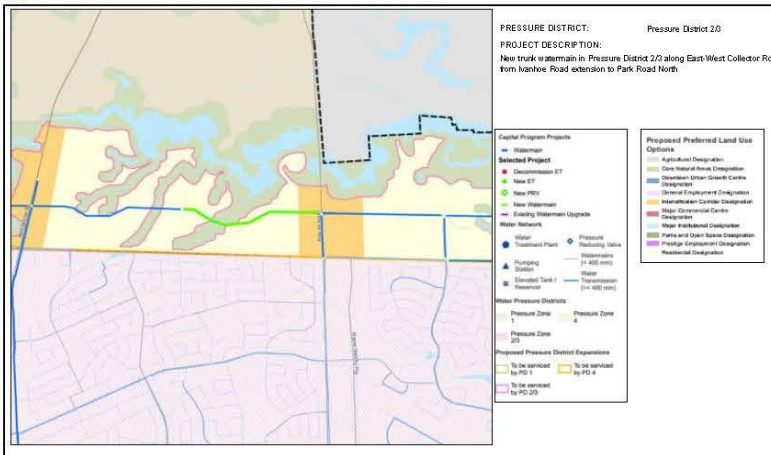
CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	1233 m	$1,977	$2,438,152	Proposed Collector ROW
Pipe Construction - Tunneling			m	0 m	$11,520	$0	
Minor Creek Crossings			ea.	1	$389,000	$389,000	
Major Creek Crossings			ea.	0	$1,886,000	$0	
Road Crossings			ea.	0	$850,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,886,000	$0	
Utility Crossings			ea.	0	$850,000	$0	
Valve and Chamber			ea.	2	$79,200	$158,400	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$298,555	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding,insurance
Provisional & Allowance	10%		ea.			$298,555	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$3,583,000	
Geotechnical / Hydrogeological / Materials	0.5%					$17,900	
Geotechnical Sub-Total Cost						$17,900	
Property Requirements	1.0%					$ 35,800	
Property Requirements Sub-Total						$35,800	
Consultant Engineering/Design	15%					$ 537,500	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$537,500	
In House Labour/Engineering/Wages/CA	8%					$ 286,600	
In-house Labour/Wages Sub-Total						$286,600	
Project Contingency	10%					$446,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$446,000	
Non-Refundable HST	1.76%					$81,300	
Non-Refundable HST Sub-Total						$81,300	
Total (2020 Dollars)						$4,988,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$4,988,000	2025 Estimate

PROJECT NO.:	W-M-012	TIMELINE:	10-20 Years
PROJECT NAME:	Pressure District 2/3 East-West Collector Road Trunk Watermain		
PROJECT OVERVIEW:	New trunk watermain along East-West Collector Road in Pressure District 2/3 east of King George Road		

MAP



REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Low	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	600 mm	
TOTAL LENGTH:	1152 m	
Tunnelled	0 m	0%
Open Cut	1152 m	100%

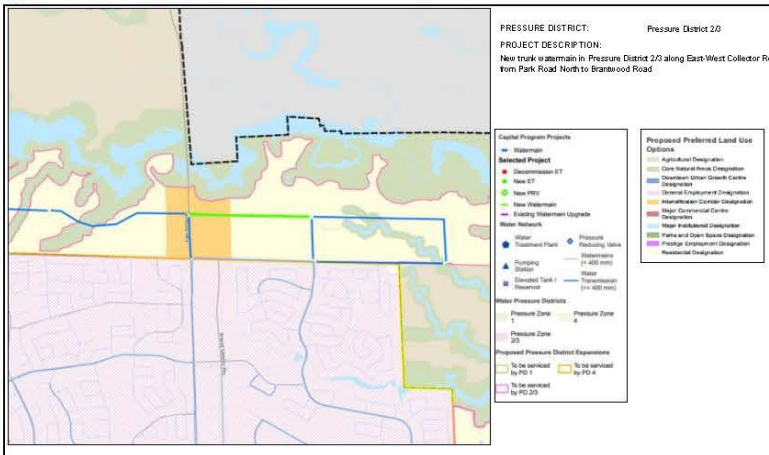
CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	1152 m	$1,977	$2,277,981	Proposed Collector Road ROW
Pipe Construction - Tunneling			m	0 m	$11,520	$0	
Minor Creek Crossings			ea.	1	$389,000	$389,000	
Major Creek Crossings			ea.	0	$1,886,000	$0	
Road Crossings			ea.	0	$850,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,886,000	$0	
Utility Crossings			ea.	0	$850,000	$0	
Valve and Chamber			ea.	2	$79,200	$158,400	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$282,538	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$282,538	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$3,390,000	
Geotechnical / Hydrogeological / Materials	0.5%					$17,000	
Geotechnical Sub-Total Cost						$17,000	
Property Requirements	1.0%					$ 33,900	
Property Requirements Sub-Total						$33,900	
Consultant Engineering/Design	15%					$ 508,500	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$508,500	
In House Labour/Engineering/Wages/CA	8%					$ 271,200	
In-house Labour/Wages Sub-Total						$271,200	
Project Contingency	10%					$422,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$422,000	
Non-Refundable HST	1.76%					$76,900	
Non-Refundable HST Sub-Total						$76,900	
Total (2020 Dollars)						$4,720,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$4,720,000	2025 Estimate

PROJECT NO.:	W-M-013	TIMELINE:	0-5 Years
PROJECT NAME:	East-West Collector Road Trunk Watermain		
PROJECT OVERVIEW:	New trunk watermain along East-West Collector Road in Pressure District 2/3 east of Park Road North		

MAP



PRESSURE DISTRICT: Pressure District 2/3

PROJECT DESCRIPTION:

New trunk watermain in Pressure District 2/3 along East-West Collector Road from Park Road North to Brantwood Road

REQUIRED STUDIES: -

STUDY SCOPE: -

OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Low	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplift to Watercrossing and restoration

PROPOSED DIAMETER:	400 mm	
TOTAL LENGTH:	960 m	
Tunnelled	0 m	0%
Open Cut	960 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

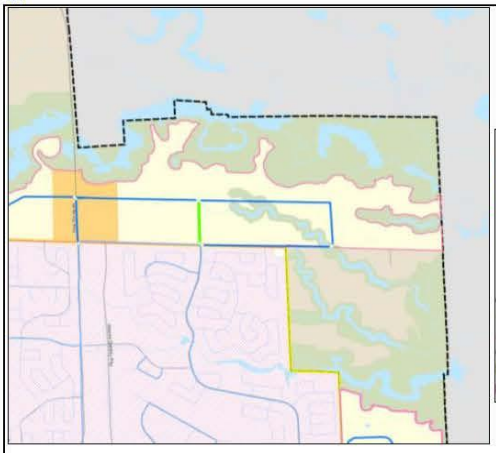
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	960 m	$1,291	$1,239,204	Proposed Collector Road ROW
Pipe Construction - Tunneling			m	0 m	$9,144	$0	
Minor Creek Crossings			ea.	0	$284,000	$0	
Major Creek Crossings			ea.	0	$1,472,000	$0	
Road Crossings			ea.	0	$649,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,472,000	$0	
Utility Crossings			ea.	0	$649,000	$0	
Valve and Chamber			ea.	2	$50,400	$100,800	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$134,000	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$134,000	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$1,608,000	
Geotechnical / Hydrogeological / Materials	0.5%					$8,000	
Geotechnical Sub-Total Cost						$8,000	
Property Requirements	1.0%					$ 16,100	
Property Requirements Sub-Total						$16,100	
Consultant Engineering/Design	15%					$ 241,200	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$241,200	
In House Labour/Engineering/Wages/CA	8%					$ 128,600	
In-house Labour/Wages Sub-Total						$128,600	
Project Contingency	10%					$200,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$200,000	
Non-Refundable HST	1.76%					$36,500	
Non-Refundable HST Sub-Total						$36,500	
Total (2020 Dollars)						$2,238,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$2,238,000	2025 Estimate

PROJECT NO.: W-M-014
PROJECT NAME: Brantwood Park Road Trunk Watermain
PROJECT OVERVIEW: New trunk watermain along Brantwood Road in Pressure District 2/3

TIMELINE: 0-5 Years

MAP



PRESSURE DISTRICT: Pressure District 2/3

PROJECT DESCRIPTION:
New trunk watermain in Pressure District 2/3 along Brantwood Road from Powerline Road to East-West Collector Road

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Low	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	400 mm
TOTAL LENGTH:	367 m

Tunnelled	0 m	0%
Open Cut	367 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

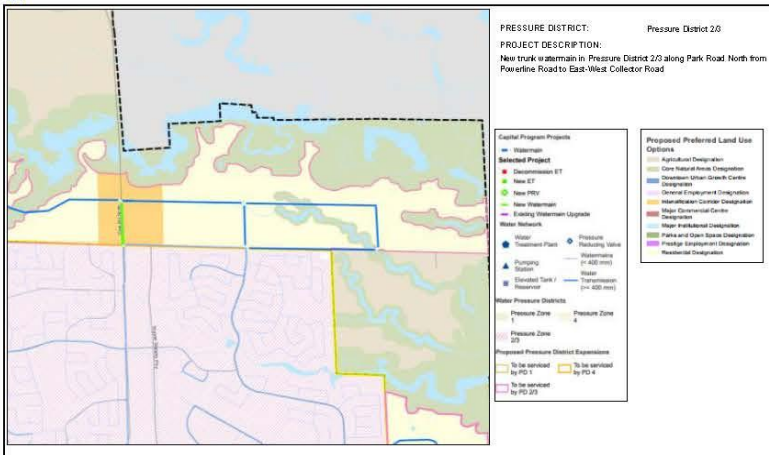
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	367 m	$1,291	$473,738	Proposed Collector Road ROW
Pipe Construction - Tunneling			m	0 m	$9,144	$0	
Minor Creek Crossings			ea.	0	$284,000	$0	
Major Creek Crossings			ea.	0	$1,472,000	$0	
Road Crossings			ea.	0	$649,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,472,000	$0	
Utility Crossings			ea.	0	$649,000	$0	
Valve and Chamber			ea.	2	$50,400	$100,800	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$57,454	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding,insurance
Provisional & Allowance	10%		ea.			$57,454	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$689,000	
Geotechnical / Hydrogeological / Materials	0.5%					$3,400	
Geotechnical Sub-Total Cost						$3,400	
Property Requirements	1.0%					$ 6,900	
Property Requirements Sub-Total						$6,900	
Consultant Engineering/Design	15%					$ 103,400	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$103,400	
In House Labour/Engineering/Wages/CA	8%					$ 55,100	
In-house Labour/Wages Sub-Total						$55,100	
Project Contingency	10%					$86,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$86,000	
Non-Refundable HST	1.76%					$15,600	
Non-Refundable HST Sub-Total						$15,600	
Total (2020 Dollars)						$959,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$959,000	2025 Estimate

PROJECT NO.: W-M-015
PROJECT NAME: Park Road North Trunk Watermain
PROJECT OVERVIEW: New trunk watermain from Powerline Road to East-West Collector Road

TIMELINE: 0-5 Years

MAP



PRESSURE DISTRICT: Pressure District 2/3

PROJECT DESCRIPTION:
New trunk watermain in Pressure District 2/3 along Park Road North from Powerline Road to East-West Collector Road

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class as per Construction Contingency and expected accuracy
Project Complexity:	Low	Complexity as per Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Suburban	Area Condition splits out to rural and restoration

PROPOSED DIAMETER:	600 mm
TOTAL LENGTH:	383 m

Tunnelled	0 m	0%
Open Cut	383 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

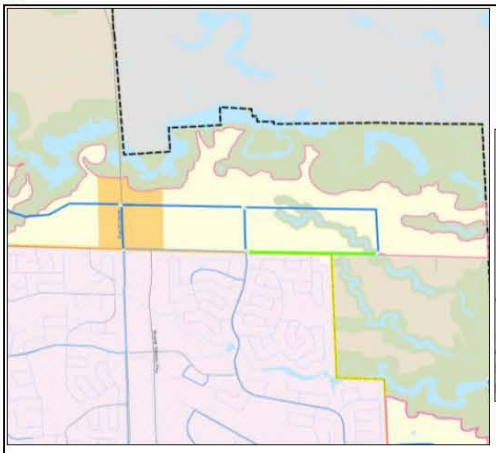
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	383 m	$1,977	$757,350	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$11,520	$0	
Minor Creek Crossings			ea.	0	$389,000	$0	
Major Creek Crossings			ea.	0	$1,886,000	$0	
Road Crossings			ea.	0	$850,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,886,000	$0	
Utility Crossings			ea.	0	$850,000	$0	
Valve and Chamber			ea.	2	$79,200	$158,400	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	10%					$75,735	
Additional Construction Costs	10%		ea.			$99,148	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$99,148	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$1,190,000	
Geotechnical / Hydrogeological / Materials	0.5%					$6,000	
Geotechnical Sub-Total Cost						$6,000	
Property Requirements	1.0%					$ 11,900	
Property Requirements Sub-Total						$11,900	
Consultant Engineering/Design	15%					$ 178,500	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$178,500	
In House Labour/Engineering/Wages/CA	8%					$ 95,200	
In-house Labour/Wages Sub-Total						$95,200	
Project Contingency	10%					$148,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$148,000	
Non-Refundable HST	1.76%					$27,000	
Non-Refundable HST Sub-Total						$27,000	
Total (2020 Dollars)						$1,657,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$1,657,000	2025 Estimate

PROJECT NO.: W-M-016
PROJECT NAME: Powerline Road Local Watermain
PROJECT OVERVIEW: New local watermain from Brantwood Park Road to East-West Collector Road

TIMELINE: 0-5 Years

MAP



PRESSURE DISTRICT: Pressure District 2/3
PROJECT DESCRIPTION:
New local watermain in Pressure District 2/3 along Powerline Road from Brantwood Park Road to East-West Collector Road eastern limit

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Low	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Suburban	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	300 mm
TOTAL LENGTH:	1027 m

Tunnelled	0 m	0%
Open Cut	1027 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

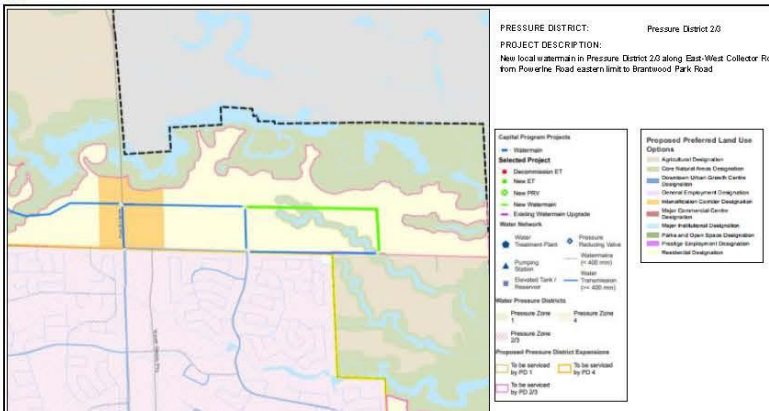
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	1027 m	$1,056	$1,084,917	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$2,089	$0	
Minor Creek Crossings			ea.	1	$68,000	$68,000	
Major Creek Crossings			ea.	0	$329,000	$0	
Road Crossings			ea.	0	$141,000	$0	
Major Road Crossings (Highway)			ea.	0	$329,000	$0	
Utility Crossings			ea.	0	$141,000	$0	
Valve and Chamber			ea.	2	$7,920	$15,840	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	10%					$114,292	
Additional Construction Costs	10%		ea.			$127,305	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding,insurance
Provisional & Allowance	10%		ea.			$127,305	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$1,528,000	
Geotechnical / Hydrogeological / Materials	0.5%					$7,600	
Geotechnical Sub-Total Cost						$7,600	
Property Requirements	1.0%					$ 15,300	
Property Requirements Sub-Total						$15,300	
Consultant Engineering/Design	15%					$ 229,200	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$229,200	
In House Labour/Engineering/Wages/CA	8%					$ 122,200	
In-house Labour/Wages Sub-Total						$122,200	
Project Contingency	10%					$190,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$190,000	
Non-Refundable HST	1.76%					$34,700	
Non-Refundable HST Sub-Total						$34,700	
Total (2020 Dollars)						$2,127,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$2,127,000	2025 Estimate

PROJECT NO.: W-M-017
PROJECT NAME: East-West Collector Road Local Watermain
PROJECT OVERVIEW: New local watermain from Powerline Road eastern limit to Brantwood Park Road

TIMELINE: 0-5 Years

MAP



PRESSURE DISTRICT: Pressure District 2/3
PROJECT DESCRIPTION:
New local watermain in Pressure District 2/3 along East-West Collector Road from Powerline Road eastern limit to Brantwood Park Road

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Low	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	300 mm
TOTAL LENGTH:	1401 m

Tunnelled	0 m	0%
Open Cut	1401 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

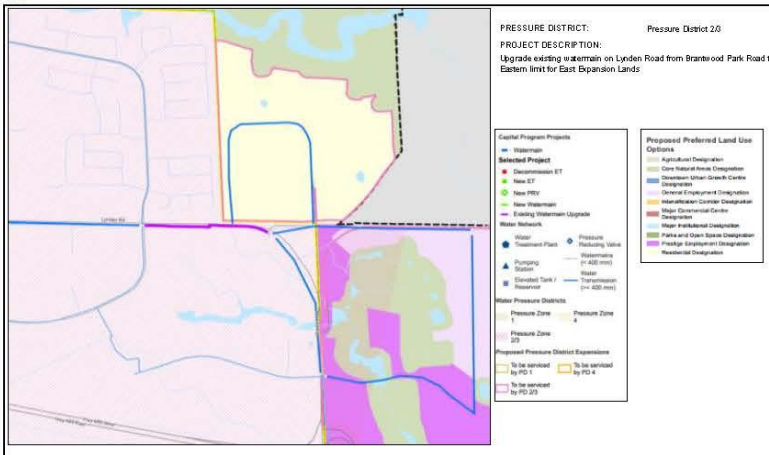
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	1401 m	$1,056	$1,480,008	Proposed Collector Road ROW
Pipe Construction - Tunneling			m	0 m	$2,088	$0	
Minor Creek Crossings			ea.	0	$58,000	$0	
Major Creek Crossings			ea.	0	$329,000	$0	
Road Crossings			ea.	0	$141,000	$0	
Major Road Crossings (Highway)			ea.	0	$329,000	$0	
Utility Crossings			ea.	0	$141,000	$0	
Valve and Chamber			ea.	2	$7,920	$15,840	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$149,585	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$149,585	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$1,795,000	
Geotechnical / Hydrogeological / Materials	0.5%					$9,000	
Geotechnical Sub-Total Cost						$9,000	
Property Requirements	1.0%					$ 18,000	
Property Requirements Sub-Total						$18,000	
Consultant Engineering/Design	15%					$ 269,300	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$269,300	
In House Labour/Engineering/Wages/CA	8%					$ 143,600	
In-house Labour/Wages Sub-Total						$143,600	
Project Contingency	10%					$223,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$223,000	
Non-Refundable HST	1.76%					$40,700	
Non-Refundable HST Sub-Total						$40,700	
Total (2020 Dollars)						$2,499,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$2,499,000	2025 Estimate

PROJECT NO.: W-M-018
PROJECT NAME: Lynden Road Trunk Watermain Upgrades (From Brantwood Park Road to Eastern limit of East Expansion Lands)
PROJECT OVERVIEW: Watermain upgrades on Lynden Road fom Brantwood Park Road to eastern limit

TIMELINE: 5-10 Years

MAP



PRESSURE DISTRICT: Pressure District 2/3

PROJECT DESCRIPTION:
Upgrade existing watermain on Lynden Road from Brantwood Park Road to Eastern limit for East Expansion Lands

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition splits out contained restoration

PROPOSED DIAMETER:	300 mm
TOTAL LENGTH:	599 m

Tunnelled	0 m	0%
Open Cut	599 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

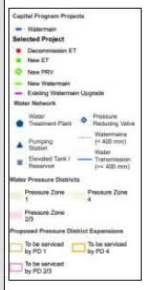
COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost						
Study	Feasibility Study				$0	
Study	EA				$0	
Sub-Total Study Costs					$0	
Construction Cost						
Pipe Construction - Open Cut		m	599 m	$1,056	$632,780	Existing road ROW
Pipe Construction - Tunneling		m	0 m	$2,088	$0	
Minor Creek Crossings		ea.	0	$58,000	$0	
Major Creek Crossings		ea.	0	$329,000	$0	
Road Crossings		ea.	0	$141,000	$0	
Major Road Crossings (Highway)		ea.	0	$329,000	$0	
Utility Crossings		ea.	0	$141,000	$0	
Valve and Chamber		ea.	2	$7,920	$15,840	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	10%				$63,278	
Additional Construction Costs	15%	ea.			$106,785	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%	ea.			$71,190	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs					$890,000	
Geotechnical / Hydrogeological / Materials	1.0%				$8,900	
Geotechnical Sub-Total Cost					$8,900	
Property Requirements	1.5%				$ 13,400	
Property Requirements Sub-Total					$13,400	
Consultant Engineering/Design	15%				$ 133,500	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total					$133,500	
In House Labour/Engineering/Wages/CA	8%				$ 71,200	
In-house Labour/Wages Sub-Total					$71,200	
Project Contingency	15%				$168,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total					$168,000	
Non-Refundable HST	1.76%				$21,400	
Non-Refundable HST Sub-Total					$21,400	
Total (2020 Dollars)					$1,306,000	Rounded to nearest $1,000
Other Estimate						
Chosen Estimate					$1,306,000	2025 Estimate

PROJECT NO.: W-M-019 TIMELINE: 0-5 Years
PROJECT NAME: Lynden Road Distribution Main Extension
PROJECT OVERVIEW: New watermain extension from existing Lynden Road trunk watermain to East Expansion Lands limit

MAP



PRESSURE DISTRICT: Pressure District 2/3
PROJECT DESCRIPTION:
New local watermain in Pressure District 2/3 along Lynden Road from Lynden Road trunk watermain to East Expansion Lands limit





REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	High	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition splits out contaminated restoration

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	925 m	
Tunnelled	0 m	0%
Open Cut	925 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

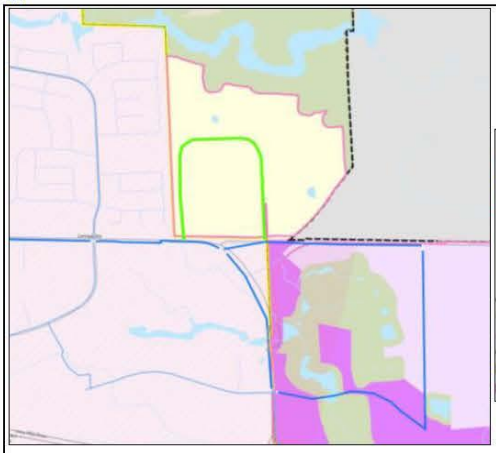
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	925 m	$1,056	$977,164	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$2,088	$0	
Minor Creek Crossings			ea.	0	$58,000	$0	
Major Creek Crossings			ea.	0	$329,000	$0	
Road Crossings			ea.	0	$141,000	$0	
Major Road Crossings (Highway)			ea.	2	$329,000	$658,000	Railway (two tracks)
Utility Crossings			ea.	0	$141,000	$0	
Valve and Chamber			ea.	2	$7,920	$15,840	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	10%					$163,516	
New PRV Chamber			ea.	1	$360,000	$360,000	
Additional Construction Costs	20%		ea.			$362,904	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$181,452	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$2,719,000	
Geotechnical / Hydrogeological / Materials	2.0%					$54,400	
Geotechnical Sub-Total Cost						$54,400	
Property Requirements	2.0%					$ 54,400	
Property Requirements Sub-Total						$54,400	
Consultant Engineering/Design	15%					$ 407,900	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$407,900	
In House Labour/Engineering/Wages/CA	8%					$ 217,500	
In-house Labour/Wages Sub-Total						$217,500	
Project Contingency	25%					$863,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$863,000	
Non-Refundable HST	1.76%					$72,100	
Non-Refundable HST Sub-Total						$72,100	
Total (2020 Dollars)						$4,388,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$4,388,000	2025 Estimate

PROJECT NO.: W-M-020
PROJECT NAME: East Expansion Lands Residential Loop
PROJECT OVERVIEW: New distribution watermain loop in residential lands north of Lynden Road

TIMELINE: 0-5 Years

MAP



PRESSURE DISTRICT: Pressure District 2/3

PROJECT DESCRIPTION:
New local watermain in East Expansion Lands along proposed Collector Road north of Lynden Road

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Low	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	1280 m	
Tunnelled	0 m	0%
Open Cut	1280 m	100%

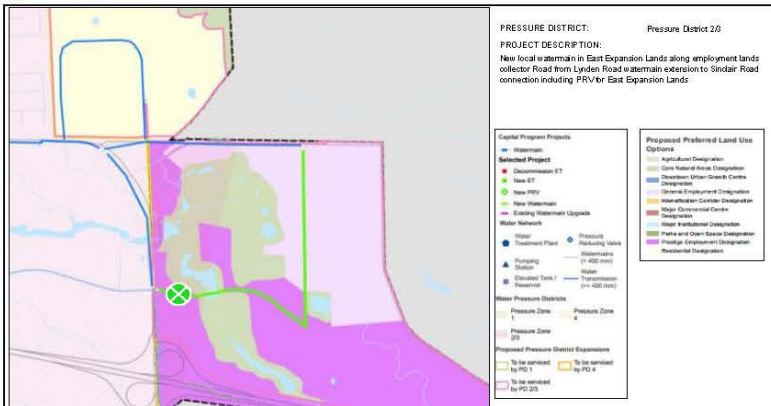
CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	1280 m	$1,056	$1,352,184	Proposed Collector Road ROW
Pipe Construction - Tunneling			m	0 m	$2,088	$0	
Minor Creek Crossings			ea.	0	$58,000	$0	
Major Creek Crossings			ea.	0	$329,000	$0	
Road Crossings			ea.	0	$141,000	$0	
Major Road Crossings (Highway)			ea.	0	$329,000	$0	
Utility Crossings			ea.	0	$141,000	$0	
Valve and Chamber			ea.	2	$7,920	$15,840	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$136,802	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding,insurance
Provisional & Allowance	10%		ea.			$136,802	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$1,642,000	
Geotechnical / Hydrogeological / Materials	0.5%					$8,200	
Geotechnical Sub-Total Cost						$8,200	
Property Requirements	1.0%					$ 16,400	
Property Requirements Sub-Total						$16,400	
Consultant Engineering/Design	15%					$ 246,300	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$246,300	
In House Labour/Engineering/Wages/CA	8%					$ 131,400	
In-house Labour/Wages Sub-Total						$131,400	
Project Contingency	10%					$204,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$204,000	
Non-Refundable HST	1.76%					$37,300	
Non-Refundable HST Sub-Total						$37,300	
Total (2020 Dollars)						$2,286,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$2,286,000	2025 Estimate

PROJECT NO.: W-M-021 TIMELINE: 5-10 Years
PROJECT NAME: East Expansion Lands Employment Loop
PROJECT OVERVIEW: New distribution watermain along employment lands collector road and Sinclair Road

MAP



PRESSURE DISTRICT: Pressure District 2/3

PROJECT DESCRIPTION:
New local watermain in East Expansion Lands along employment lands collector Road from Lynden Road watermain extension to Sinclair Road connection including PRV for East Expansion Lands

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Low	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	1608 m	
Tunnelled	0 m	0%
Open Cut	1608 m	100%

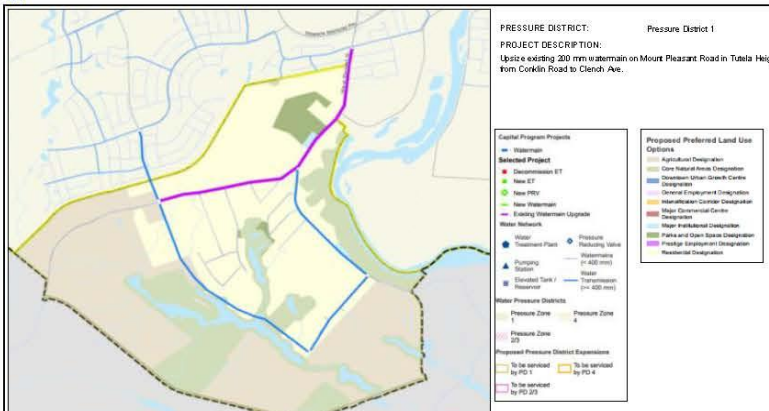
CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	1608 m	$1,056	$1,698,681	Proposed Collector Road ROW
Pipe Construction - Tunneling			m	0 m	$2,089	$0	
Minor Creek Crossings			ea.	1	$68,000	$68,000	
Major Creek Crossings			ea.	0	$329,000	$0	
Road Crossings			ea.	1	$141,000	$141,000	Garden Avenue
Major Road Crossings (Highway)			ea.	0	$329,000	$0	
Utility Crossings			ea.	0	$141,000	$0	
Valve and Chamber			ea.	2	$7,920	$15,840	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
New PRV Chamber			ea.	1	$360,000	$360,000	
Additional Construction Costs	10%		ea.			$191,352	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$191,352	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$2,656,000	
Geotechnical / Hydrogeological / Materials	0.5%					$13,300	
Geotechnical Sub-Total Cost						$13,300	
Property Requirements	1.0%					$ 26,600	
Property Requirements Sub-Total						$26,600	
Consultant Engineering/Design	15%					$ 398,400	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$398,400	
In House Labour/Engineering/Wages/CA	8%					$ 212,500	
In-house Labour/Wages Sub-Total						$212,500	
Project Contingency	10%					$331,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$331,000	
Non-Refundable HST	1.76%					$60,300	
Non-Refundable HST Sub-Total						$60,300	
Total (2020 Dollars)						$3,698,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$3,698,000	2025 Estimate

PROJECT NO.: W-M-022 TIMELINE: 0-5 Years
PROJECT NAME: Mount Pleasant Road Watermain Upgrades
PROJECT OVERVIEW: Upsize existing watermain on Mount Pleasant Road from Beckett Drive to new collector road

MAP



PRESSURE DISTRICT: Pressure District 1
PROJECT DESCRIPTION:
Upsize existing 200 mm watermain on Mount Pleasant Road in Tutela Heights from Conklin Road to Clench Ave.

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	2367 m	
Tunnelled	0 m	0%
Open Cut	2367 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

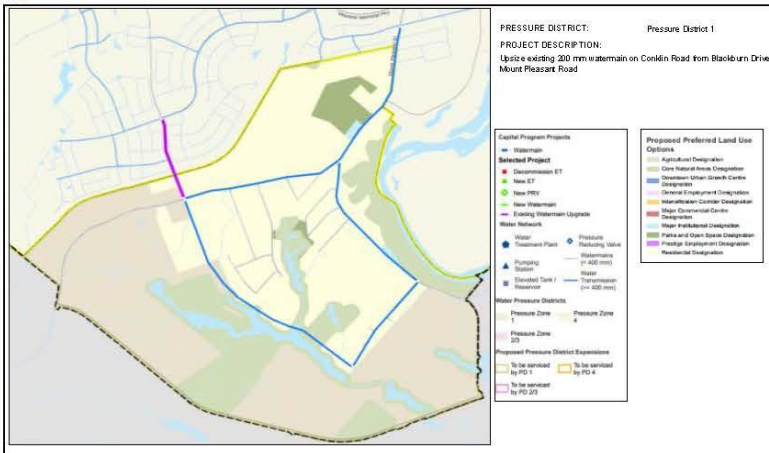
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	2367 m	$1,056	$2,500,484	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$2,088	$0	
Minor Creek Crossings			ea.	0	$58,000	$0	
Major Creek Crossings			ea.	0	$329,000	$0	
Road Crossings			ea.	0	$141,000	$0	
Major Road Crossings (Highway)			ea.	0	$329,000	$0	
Utility Crossings			ea.	0	$141,000	$0	
Valve and Chamber			ea.	3	$7,920	$23,760	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	10%					$250,048	
New PRV Chamber			ea.	0	$250,000	$0	
Additional Construction Costs	15%		ea.			$416,144	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$277,429	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$3,468,000	
Geotechnical / Hydrogeological / Materials	1.0%					$34,700	
Geotechnical Sub-Total Cost						$34,700	
Property Requirements	1.5%					$ 52,000	
Property Requirements Sub-Total						$52,000	
Consultant Engineering/Design	15%					$ 520,200	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$520,200	
In House Labour/Engineering/Wages/CA	8%					$ 277,400	
In-house Labour/Wages Sub-Total						$277,400	
Project Contingency	15%					$653,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$653,000	
Non-Refundable HST	1.76%					$83,200	
Non-Refundable HST Sub-Total						$83,200	
Total (2020 Dollars)						$5,089,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$5,089,000	2025 Estimate

PROJECT NO.: W-M-023
PROJECT NAME: Conklin Road Watermain Upgrades
PROJECT OVERVIEW: Upsize existing watermain on Conklin Road

TIMELINE: 0-5 Years

MAP



PRESSURE DISTRICT: Pressure District 1

PROJECT DESCRIPTION:
Upsize existing 200 mm watermain on Conklin Road from Blackburn Drive to Mount Pleasant Road

REQUIRED STUDIES: -
STUDY SCOPE: -

OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Low	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Suburban	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	300 mm
TOTAL LENGTH:	653 m

Tunnelled	0 m	0%
Open Cut	653 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

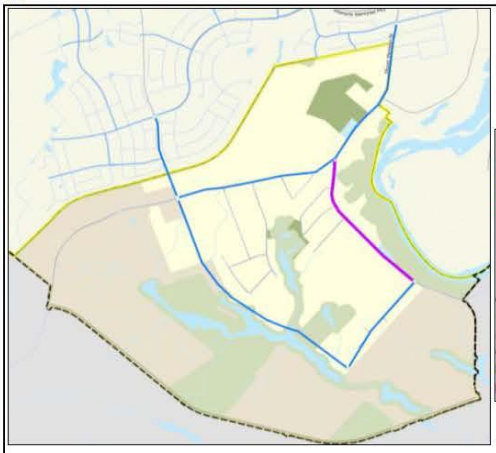
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	653 m	$1,056	$689,825	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$2,088	$0	
Minor Creek Crossings			ea.	0	$58,000	$0	
Major Creek Crossings			ea.	0	$329,000	$0	
Road Crossings			ea.	0	$141,000	$0	
Major Road Crossings (Highway)			ea.	0	$329,000	$0	
Utility Crossings			ea.	0	$141,000	$0	
Valve and Chamber			ea.	2	$7,920	$15,840	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	10%					$68,983	
New PRV Chamber			ea.	0	$250,000	$0	
Additional Construction Costs	10%		ea.			$77,465	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$77,465	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$930,000	
Geotechnical / Hydrogeological / Materials	0.5%					$4,700	
Geotechnical Sub-Total Cost						$4,700	
Property Requirements	1.0%					$ 9,300	
Property Requirements Sub-Total						$9,300	
Consultant Engineering/Design	15%					$ 139,500	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$139,500	
In House Labour/Engineering/Wages/CA	8%					$ 74,400	
In-house Labour/Wages Sub-Total						$74,400	
Project Contingency	10%					$116,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$116,000	
Non-Refundable HST	1.76%					$21,100	
Non-Refundable HST Sub-Total						$21,100	
Total (2020 Dollars)						$1,295,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$1,295,000	2020 Estimate

PROJECT NO.: W-M-024
PROJECT NAME: Tutela Heights Road Upgrades
PROJECT OVERVIEW: Upsize existing watermain on Tutela Heights

TIMELINE: 5-10 Years

MAP



PRESSURE DISTRICT: Pressure District 1

PROJECT DESCRIPTION:
Upsize existing 200 mm watermain on Tutela Heights from Mount Pleasant Road to Darwin Road

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	1180 m	
Tunnelled	0 m	0%
Open Cut	1180 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

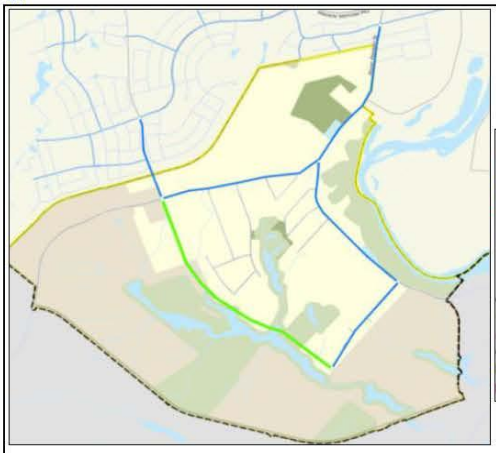
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	1180 m	$1,056	$1,246,545	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$2,088	$0	
Minor Creek Crossings			ea.	0	$58,000	$0	
Major Creek Crossings			ea.	0	$329,000	$0	
Road Crossings			ea.	0	$141,000	$0	
Major Road Crossings (Highway)			ea.	0	$329,000	$0	
Utility Crossings			ea.	0	$141,000	$0	
Valve and Chamber			ea.	2	$7,920	$15,840	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	10%					$124,654	
New PRV Chamber			ea.	0	$250,000	$0	
Additional Construction Costs	15%		ea.			$208,056	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$138,704	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$1,734,000	
Geotechnical / Hydrogeological / Materials	1.0%					$17,300	
Geotechnical Sub-Total Cost						$17,300	
Property Requirements	1.5%					$ 26,000	
Property Requirements Sub-Total						$26,000	
Consultant Engineering/Design	15%					$ 260,100	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$260,100	
In House Labour/Engineering/Wages/CA	8%					$ 138,700	
In-house Labour/Wages Sub-Total						$138,700	
Project Contingency	15%					$326,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$326,000	
Non-Refundable HST	1.76%					$41,600	
Non-Refundable HST Sub-Total						$41,600	
Total (2020 Dollars)						$2,544,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$2,544,000	2025 Estimate

PROJECT NO.: W-M-025
PROJECT NAME: Tutela Heights Collector Road Distribution Watermain
PROJECT OVERVIEW: New distribution watermain along Tutela Heights Collector Road

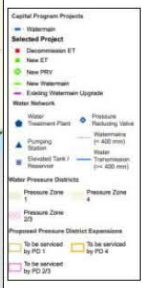
TIMELINE: 10-20 Years

MAP



PRESSURE DISTRICT: Pressure District 1

PROJECT DESCRIPTION:
New distribution watermain along Collector Road from Mount Pleasant Road to Phelps Road in Tutela Heights





REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Low	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	1883 m	
Tunnelled	0 m	0%
Open Cut	1883 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Watermain

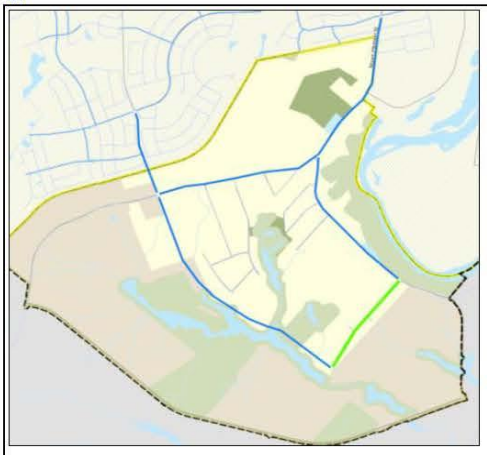
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	1883 m	$1,056	$1,989,190	Proposed Collector Road ROW
Pipe Construction - Tunneling			m	0 m	$2,088	$0	
Minor Creek Crossings			ea.	1	$68,000	$68,000	
Major Creek Crossings			ea.	0	$329,000	$0	
Road Crossings			ea.	0	$141,000	$0	
Major Road Crossings (Highway)			ea.	0	$329,000	$0	
Utility Crossings			ea.	0	$141,000	$0	
Valve and Chamber			ea.	2	$7,920	$15,840	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
New PRV Chamber			ea.	0	$250,000	$0	
Additional Construction Costs	10%		ea.			$206,303	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$206,303	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$2,476,000	
Geotechnical / Hydrogeological / Materials	0.5%					$12,400	
Geotechnical Sub-Total Cost						$12,400	
Property Requirements	1.0%					$ 24,800	
Property Requirements Sub-Total						$24,800	
Consultant Engineering/Design	15%					$ 371,400	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$371,400	
In House Labour/Engineering/Wages/CA	8%					$ 198,100	
In-house Labour/Wages Sub-Total						$198,100	
Project Contingency	10%					$308,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$308,000	
Non-Refundable HST	1.76%					$56,200	
Non-Refundable HST Sub-Total						$56,200	
Total (2020 Dollars)						$3,447,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$3,447,000	2025 Estimate

PROJECT NO.: W-M-026
PROJECT NAME: Davern Road Distribution Watermain
PROJECT OVERVIEW: New distribution watermain along Davern Road

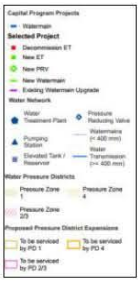
TIMELINE: 10-20 Years

MAP



PRESSURE DISTRICT: Pressure District 1

PROJECT DESCRIPTION:
New distribution watermain along Davern Road from Mount Pleasant Road southern limit to collector road





REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Low	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Suburban	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	836 m	
Tunnelled	0 m	0%
Open Cut	836 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

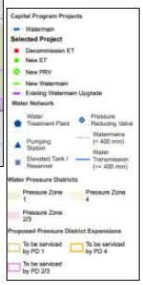
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	836 m	$1,056	$883,145	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$2,088	$0	
Minor Creek Crossings			ea.	0	$58,000	$0	
Major Creek Crossings			ea.	0	$329,000	$0	
Road Crossings			ea.	0	$141,000	$0	
Major Road Crossings (Highway)			ea.	0	$329,000	$0	
Utility Crossings			ea.	0	$141,000	$0	
Valve and Chamber			ea.	2	$7,920	$15,840	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	10%					$88,315	
New PRV Chamber			ea.	0	$250,000	$0	
Additional Construction Costs	10%		ea.			$98,730	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$98,730	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$1,185,000	
Geotechnical / Hydrogeological / Materials	0.5%					$5,900	
Geotechnical Sub-Total Cost						$5,900	
Property Requirements	1.0%					$ 11,800	
Property Requirements Sub-Total						$11,800	
Consultant Engineering/Design	15%					$ 177,800	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$177,800	
In House Labour/Engineering/Wages/CA	8%					$ 94,800	
In-house Labour/Wages Sub-Total						$94,800	
Project Contingency	10%					$148,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$148,000	
Non-Refundable HST	1.76%					$26,900	
Non-Refundable HST Sub-Total						$26,900	
Total (2020 Dollars)						$1,650,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$1,650,000	2025 Estimate

PROJECT NO.: W-M-027 TIMELINE: 0-5 Years
PROJECT NAME: Upsize Fairview Drive Trunk Watermain
PROJECT OVERVIEW: Watermain upgrades on Fairview Drive from King George Road to Park Road North

MAP







PRESSURE DISTRICT: Pressure District 2/3
PROJECT DESCRIPTION:
Watermain upgrades on Fairview Drive from King George Road to Park Road North to support growth in Pressure District 2/3

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	600 mm	
TOTAL LENGTH:	2497 m	
Tunnelled	0 m	0%
Open Cut	2497 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	2497 m	$1,977	$4,937,604	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$11,520	$0	
Minor Creek Crossings			ea.	0	$389,000	$0	
Major Creek Crossings			ea.	0	$1,886,000	$0	
Road Crossings			ea.	0	$850,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,886,000	$0	
Utility Crossings			ea.	0	$850,000	$0	
Valve and Chamber			ea.	7	$79,200	$554,400	
Pipe Construction Uplift (Based on Area Conditions)	10%					$493,760	
New PRV Chamber			ea.	0	$250,000	$0	
Additional Construction Costs	15%		ea.			$897,865	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$598,576	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$7,482,000	
Geotechnical / Hydrogeological / Materials	1.0%					$74,800	
Geotechnical Sub-Total Cost						$74,800	
Property Requirements	1.5%					$ 112,200	
Property Requirements Sub-Total						$112,200	
Consultant Engineering/Design	15%					$ 1,122,300	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$1,122,300	
In House Labour/Engineering/Wages/CA	8%					$ 598,600	
In-house Labour/Wages Sub-Total						$598,600	
Project Contingency	15%					$1,408,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$1,408,000	
Non-Refundable HST	1.76%					$179,500	
Non-Refundable HST Sub-Total						$179,500	
Total (2020 Dollars)						$10,977,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$10,977,000	2025 Estimate

PROJECT NO.: W-M-028 TIMELINE: 5-10 Years
PROJECT NAME: Downtown Trunk Watermain
PROJECT OVERVIEW: Upsize existing watermains in downtown to create trunk loop

MAP



PRESSURE DISTRICT: Pressure District 1
PROJECT DESCRIPTION:
Upsize existing watermain along Pearl Street from St. James Street to West Street

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Urban	Area Condition splits out contained restoration

PROPOSED DIAMETER:	400 mm	
TOTAL LENGTH:	860 m	
Tunnelled	0 m	0%
Open Cut	860 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

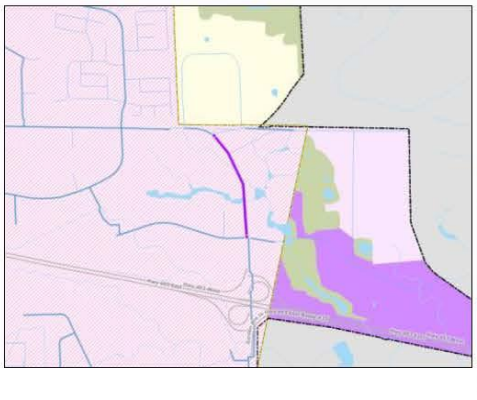
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	860 m	$1,291	$1,110,121	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$9,144	$0	
Minor Creek Crossings			ea.	0	$284,000	$0	
Major Creek Crossings			ea.	0	$1,472,000	$0	
Road Crossings			ea.	0	$649,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,472,000	$0	
Utility Crossings			ea.	0	$649,000	$0	
Valve and Chamber			ea.	2	$50,400	$100,800	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	20%					$222,024	
New PRV Chamber			ea.	0	$250,000	$0	
Additional Construction Costs	15%		ea.			$214,942	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$143,294	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$1,791,000	
Geotechnical / Hydrogeological / Materials	1.0%					$17,900	
Geotechnical Sub-Total Cost						$17,900	
Property Requirements	1.5%					$ 26,900	
Property Requirements Sub-Total						$26,900	
Consultant Engineering/Design	15%					$ 268,700	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$268,700	
In House Labour/Engineering/Wages/CA	8%					$ 143,300	
In-house Labour/Wages Sub-Total						$143,300	
Project Contingency	15%					$337,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$337,000	
Non-Refundable HST	1.76%					$43,000	
Non-Refundable HST Sub-Total						$43,000	
Total (2020 Dollars)						$2,628,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$2,628,000	2025 Estimate

PROJECT NO.: W-M-029
PROJECT NAME: Garden Avenue Watermain Upgrade
PROJECT OVERVIEW: Upsize existing watermains along Garden Avenue to create loop

TIMELINE: 5-10 Years

MAP



PRESSURE DISTRICT: Pressure District 2/3

PROJECT DESCRIPTION:
Upsize existing watermain along Garden Avenue from Lynden Road to Sinclair Boulevard to create loop within Presure District 2/3





REQUIRED STUDIES: -
STUDY SCOPE: -

OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Urban	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	719 m	
Tunnelled	0 m	0%
Open Cut	719 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

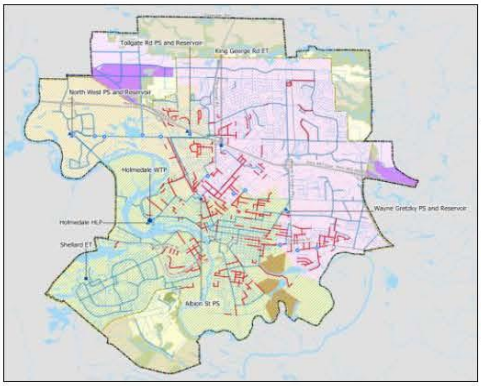
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	719 m	$1,056	$759,547	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$2,089	$0	
Minor Creek Crossings			ea.	0	$58,000	$0	
Major Creek Crossings			ea.	0	$329,000	$0	
Road Crossings			ea.	0	$141,000	$0	
Major Road Crossings (Highway)			ea.	0	$329,000	$0	
Utility Crossings			ea.	0	$141,000	$0	
Valve and Chamber			ea.	2	$7,920	$15,840	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	20%					$151,909	
New PRV Chamber			ea.	0	$250,000	$0	
Additional Construction Costs	15%		ea.			$139,095	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$92,730	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$1,159,000	
Geotechnical / Hydrogeological / Materials	1.0%					$11,600	
Geotechnical Sub-Total Cost						$11,600	
Property Requirements	1.5%					$ 17,400	
Property Requirements Sub-Total						$17,400	
Consultant Engineering/Design	15%					$ 173,900	includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$173,900	
In House Labour/Engineering/Wages/CA	8%					$ 92,700	
In-house Labour/Wages Sub-Total						$92,700	
Project Contingency	15%					$218,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$218,000	
Non-Refundable HST	1.76%					$27,800	
Non-Refundable HST Sub-Total						$27,800	
Total (2020 Dollars)						$1,700,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$1,700,000	2025 Estimate

PROJECT NO.: W-M-030
PROJECT NAME: Fire Flow Watermain Upgrades
PROJECT OVERVIEW: Replace watermains including upsizing and looping to strengthen local trunk network for fire flows.

TIMELINE: 0-5 Years

MAP







PRESSURE DISTRICT: All Pressure Districts

PROJECT DESCRIPTION:
Fire Flow program to include replacing watermains less than or equal to 100 mm, replacing CI watermains, replacing AC/DI watermains (installed before 1990), and upsizing and looping to strengthen local trunk network. Watermains will be replaced with PVC.

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Urban	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	0 m	
Tunnelled	0 m	#DIV/0!
Open Cut	0 m	#DIV/0!

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
150 mm Replacement			m	33304 m	$0	$0	Part of State of Good Repair
200 mm Replacement/Upsize			m	29426 m	$0	$0	Part of State of Good Repair
250 mm Replacement/Upsize			m	3549 m	$360	$1,277,640	Upsize cost
300 mm Replacement/Upsize			m	3625 m	$1,021	$3,700,980	Full Replacement Cost
400 mm Repalcement/Upsize				837	$1,291	$1,080,431	
500 mm Replacement/Upsize				59	$1,671	$98,603	
600 mm Replacement/Upsize				228	$1,977	$450,850	
Pipe Construction Uplift (Based on Area Conditions)	20%					$1,221,701	
New PRV Chamber			ea.	0	$250,000	$0	
Additional Construction Costs	15%		ea.			$1,189,531	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$793,021	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$9,913,000	
Geotechnical / Hydrogeological / Materials	1.0%					$99,100	
Geotechnical Sub-Total Cost						$99,100	
Property Requirements	1.5%					$ 148,700	
Property Requirements Sub-Total						$148,700	
Consultant Engineering/Design	15%					$ 1,487,000	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$1,487,000	
In House Labour/Engineering/Wages/CA	8%					$ 793,000	
In-house Labour/Wages Sub-Total						$793,000	
Project Contingency	15%					$1,866,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$1,866,000	
Non-Refundable HST	1.76%					$237,800	
Non-Refundable HST Sub-Total						$237,800	
Total (2020 Dollars)						$14,545,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$14,545,000	2025 Estimate

PROJECT NO.: W-M-031
PROJECT NAME: Shellard Lane Watermain Upgrade
PROJECT OVERVIEW: Upsize existing watermain on Shellard Lane

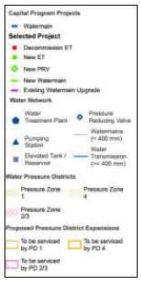
TIMELINE: 0-5 Years

MAP



PRESSURE DISTRICT: Pressure District 1

PROJECT DESCRIPTION:
Upsize existing 400 mm watermain on Shellard Lane from Spalding Drive to Diana Ave





REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Low	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Suburban	Area Condition splits out Contained Restoration

PROPOSED DIAMETER:	600 mm	
TOTAL LENGTH:	750 m	
Tunnelled	0 m	0%
Open Cut	750 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

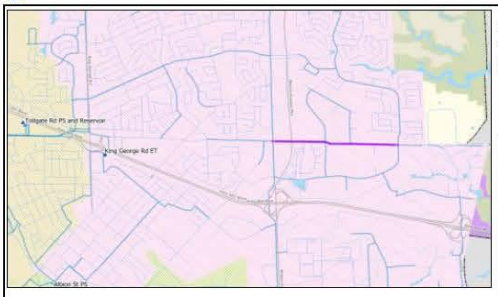
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	750 m	$1,977	$1,483,061	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$11,520	$0	
Minor Creek Crossings			ea.	1	$389,000	$389,000	
Major Creek Crossings			ea.	0	$1,886,000	$0	
Road Crossings			ea.	1	$850,000	$850,000	Colborne Street West
Major Road Crossings (Highway)			ea.	1	$1,886,000	$1,886,000	Veteran's Memorial
Utility Crossings			ea.	0	$850,000	$0	
Valve and Chamber			ea.	2	$79,200	$158,400	Major Connections
Pipe Construction Uplift (Based on Area Conditions)	10%					$460,806	
New PRV Chamber			ea.	0	$250,000	$0	
Additional Construction Costs	10%		ea.			$622,727	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$622,727	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$6,273,000	
Geotechnical / Hydrogeological / Materials	0.5%					$31,400	
Geotechnical Sub-Total Cost						$31,400	
Property Requirements	1.0%					$ 62,700	
Property Requirements Sub-Total						$62,700	
Consultant Engineering/Design	15%					$ 941,000	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$941,000	
In House Labour/Engineering/Wages/CA	8%					$ 501,800	
In-house Labour/Wages Sub-Total						$501,800	
Project Contingency	10%					$781,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$781,000	
Non-Refundable HST	1.76%					$142,400	
Non-Refundable HST Sub-Total						$142,400	
Total (2020 Dollars)						$8,733,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$8,733,000	2025 Estimate

PROJECT NO.: W-M-032
PROJECT NAME: Upsize Lynden Road Trunk Watermain (From Park Road North to Brantwood Park Road)
PROJECT OVERVIEW: Watermain upgrades on Lynden Road from Park Road North to Brantwood Park Road

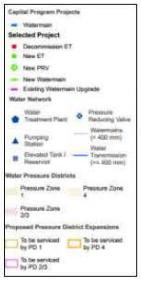
TIMELINE: 5-10 Years

MAP



PRESSURE DISTRICT: Pressure District 2/3

PROJECT DESCRIPTION:
Watermain upgrades on Lynden Road from Park Road North to Brantwood Park Road to support growth in Pressure District 2/3





REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity adjusted Construction Contingency, and specific accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	600 mm
TOTAL LENGTH:	1671 m

Tunnelled	0 m	0%
Open Cut	1671 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

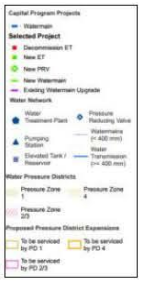
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	1671 m	$1,977	$3,304,259	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$11,520	$0	
Minor Creek Crossings			ea.	0	$389,000	$0	
Major Creek Crossings			ea.	0	$1,886,000	$0	
Road Crossings			ea.	0	$850,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,886,000	$0	
Utility Crossings			ea.	0	$850,000	$0	
Valve and Chamber			ea.	7	$79,200	$554,400	
Pipe Construction Uplift (Based on Area Conditions)	10%					$330,426	
New PRV Chamber			ea.	0	$250,000	$0	
Additional Construction Costs	15%		ea.			$828,263	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$418,909	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$5,236,000	
Geotechnical / Hydrogeological / Materials	1.0%					$52,400	
Geotechnical Sub-Total Cost						$52,400	
Property Requirements	1.5%					$ 78,500	
Property Requirements Sub-Total						$78,500	
Consultant Engineering/Design	15%					$ 785,400	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$785,400	
In House Labour/Engineering/Wages/CA	8%					$ 418,900	
In-house Labour/Wages Sub-Total						$418,900	
Project Contingency	15%					$986,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$986,000	
Non-Refundable HST	1.76%					$125,600	
Non-Refundable HST Sub-Total						$125,600	
Total (2020 Dollars)						$7,683,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$7,683,000	2025 Estimate

PROJECT NO.: W-M-034 TIMELINE: 0-10 Years
PROJECT NAME: Albion Street Trunk Watermain
PROJECT OVERVIEW: New trunk watermain in PD1 along Albion Street from Bedford Street to St. James Street.

MAP







PRESSURE DISTRICT: Pressure District 1
PROJECT DESCRIPTION:
New trunk watermain in PD1 along Albion Street from Bedford Street to St. James Street.

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition splits out contained restoration

PROPOSED DIAMETER:	400 mm
TOTAL LENGTH:	143 m

Tunnelled	0 m	0%
Open Cut	143 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

COST ESTIMATION SPREADSHEET

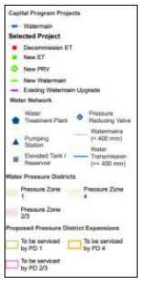
COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	143 m	$1,291	$184,590	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$9,144	$0	
Minor Creek Crossings			ea.	0	$284,000	$0	
Major Creek Crossings			ea.	0	$1,472,000	$0	
Road Crossings			ea.	0	$649,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,472,000	$0	
Utility Crossings			ea.	0	$649,000	$0	
Valve and Chamber			ea.	7	$50,400	$352,800	
Pipe Construction Uplift (Based on Area Conditions)	10%					$18,459	
New PRV Chamber			ea.	0	$250,000	$0	
Additional Construction Costs	15%		ea.			$83,377	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$55,585	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$695,000	
Geotechnical / Hydrogeological / Materials	1.0%					$7,000	
Geotechnical Sub-Total Cost						$7,000	
Property Requirements	1.5%					$ 10,400	
Property Requirements Sub-Total						$10,400	
Consultant Engineering/Design	15%					$ 104,300	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$104,300	
In House Labour/Engineering/Wages/CA	8%					$ 55,600	
In-house Labour/Wages Sub-Total						$55,600	
Project Contingency	15%					$131,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$131,000	
Non-Refundable HST	1.76%					$16,700	
Non-Refundable HST Sub-Total						$16,700	
Total (2020 Dollars)						$1,020,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$1,020,000	2025 Estimate

PROJECT NO.: W-M-035 TIMELINE: 0-10 Years
PROJECT NAME: McMurray Street Trunk Watermain
PROJECT OVERVIEW: New trunk watermain in PD1 from McMurray Street to the existing 600mm on Albion Street.

MAP



PRESSURE DISTRICT: Pressure District 1
PROJECT DESCRIPTION:
New trunk watermain in PD1 from McMurray Street to the existing 600mm on Albion Street.





REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusted Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity adjusted Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition splits out topsoil and restoration

PROPOSED DIAMETER:	300 mm	
TOTAL LENGTH:	48 m	
Tunnelled	0 m	0%
Open Cut	48 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Watermain

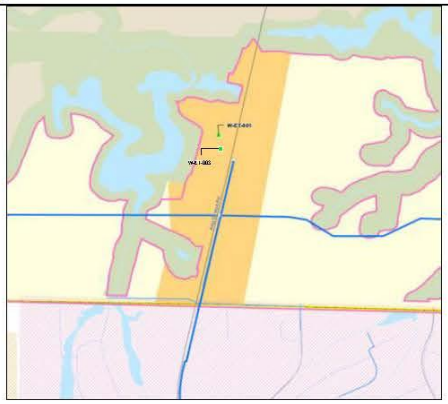
COST ESTIMATION SPREADSHEET

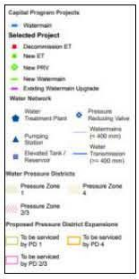
COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						$0	
Construction Cost							
Pipe Construction - Open Cut			m	48 m	$1,056	$50,707	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$2,088	$0	
Minor Creek Crossings			ea.	0	$58,000	$0	
Major Creek Crossings			ea.	0	$329,000	$0	
Road Crossings			ea.	0	$141,000	$0	
Major Road Crossings (Highway)			ea.	0	$329,000	$0	
Utility Crossings			ea.	0	$141,000	$0	
Valve and Chamber			ea.	7	$7,920	$55,440	
Pipe Construction Uplift (Based on Area Conditions)	10%					$5,071	
New PRV Chamber			ea.	0	$250,000	$0	
Additional Construction Costs	15%		ea.			$16,883	Includes Mob/Demob,connections,inspection, hydrants, signage, traffic management, bonding ,insurance
Provisional & Allowance	10%		ea.			$11,122	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$139,000	
Geotechnical / Hydrogeological / Materials	1.0%					$1,400	
Geotechnical Sub-Total Cost						$1,400	
Property Requirements	1.5%					$ 2,100	
Property Requirements Sub-Total						$2,100	
Consultant Engineering/Design	15%					$ 20,900	Includes planning, pre-design, detailed design,training, CA commissioning
Engineering/Design Sub-Total						$20,900	
In House Labour/Engineering/Wages/CA	8%					$ 11,100	
In-house Labour/Wages Sub-Total						$11,100	
Project Contingency	15%					$26,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$26,000	
Non-Refundable HST	1.76%					$3,300	
Non-Refundable HST Sub-Total						$3,300	
Total (2020 Dollars)						$204,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$204,000	2025 Estimate

PROJECT NO.: W-ET-001
PROJECT NAME: Pressure District 2/3 Elevated Tank (Phase 1)
PROJECT DESCRIPTION: New Elevated Tank along King George Road in North Expansion Lands (Twinned)

TIMELINE: 0-5 Years

MAP







PRESSURE DISTRICT: Pressure District 2/3

PROJECT DESCRIPTION:
New Elevated Tank in Pressure District 2/3. Sized to service Pressure District 2/3 and Pressure District 1 storage deficit including North Expansions Lands until 2051 and Pressure District 2/3 and Trigger Lands post 2051 with additional storage needed in Pressure District 1 post 2051. Allows King George Elevated Tank to be decommissioned. Twinned to W-ET-003.

REQUIRED STUDIES: Municipal Class Environmental Assessment (EA)
STUDY SCOPE: The studywill be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment
OBJECTIVES: Determine the requirements for a new water tower, including preferred locations.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition splits out boostand restoration

PROPOSED CAPACITY:	6.0 ML

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	1	$720,000	$720,000	
Sub-Total Study Costs				$720,000	

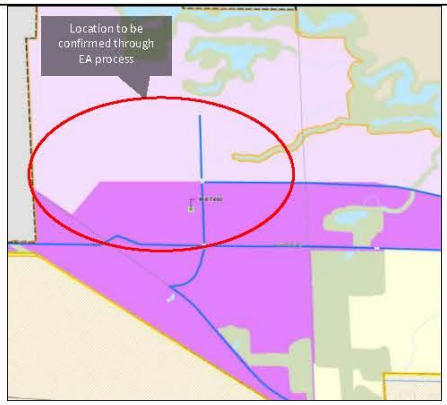
COST ESTIMATION SPREADSHEET

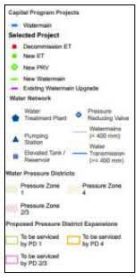
COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			ML	6 ML	$1,775,000	$13,950,000	
Watermain Contingency (750 mm)			m	1000 m	$2,267	$2,267,428	Existing road ROW
Additional Construction Costs	15%		ea.			$2,432,614	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$1,865,004	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$20,515,000	
Geotechnical / Hydrogeological / Materials	1.0%					$205,200	
Geotechnical Sub-Total Cost						$205,200	
Property Requirements	1.5%					$ 307,700	
Property Requirements Sub-Total						$307,700	
Consultant Engineering/Design	12%					$ 2,461,800	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$2,461,800	
In House Labour/Engineering/Wages/CA	6%					$ 1,230,900	
In-house Labour/Wages Sub-Total						$1,230,900	
Project Contingency	15%					$3,708,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$3,708,000	
Non-Refundable HST	1.76%					$478,700	
Non-Refundable HST Sub-Total						$478,700	
Total (2020 Dollars)						$29,627,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$29,627,000	2025 Estimate

PROJECT NO.: W-ET-002
PROJECT NAME: Pressure District 4 Elevated Tank
PROJECT DESCRIPTION: New Elevated Tank North of Highway 403 in North Expansion Lands

TIMELINE: 10-20 Years

MAP







PRESSURE DISTRICT: Pressure District 4
PROJECT DESCRIPTION:
New Elevated Tank in Pressure District 4 to service Pressure District 4 storage deficit including North Expansions Lands and Trigger Lands.

REQUIRED STUDIES: Municipal Class Environmental Assessment (EA)
STUDY SCOPE: The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment
OBJECTIVES: Determine the requirements for a new water tower, including preferred location

CONSTRUCTION

Class Estimate Type:	Class 4	Class as per Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity as per Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition spirits with contractor and estimation

PROPOSED CAPACITY:	9.0 ML

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	1	$720,000	$720,000	
Sub-Total Study Costs				$720,000	

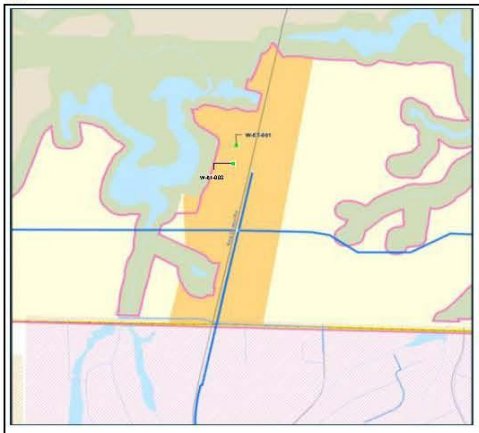
COST ESTIMATION SPREADSHEET

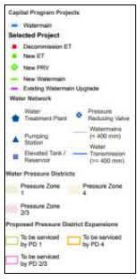
COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			ML	9 ML	$1,775,000	$19,275,000	
Watermain Contingency (750 mm)			m	500 m	$2,267	$1,133,714	Existing road ROW
Additional Construction Costs	15%		ea.			$3,061,207	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$2,047,002	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$25,817,000	
Geotechnical / Hydrogeological / Materials	1.0%					$258,200	
Geotechnical Sub-Total Cost						$258,200	
Property Requirements	1.5%					$ 387,300	
Property Requirements Sub-Total						$387,300	
Consultant Engineering/Design	12%					$ 3,098,000	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$3,098,000	
In House Labour/Engineering/Wages/CA	6%					$ 1,549,000	
In-house Labour/Wages Sub-Total						$1,549,000	
Project Contingency	15%					$4,666,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$4,666,000	
Non-Refundable HST	1.76%					$602,400	
Non-Refundable HST Sub-Total						$602,400	
Total (2020 Dollars)						$37,098,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$37,098,000	2025 Estimate

PROJECT NO.: W-ET-004
PROJECT NAME: Pressure District 2/3 Elevated Tank (Phase 2)
PROJECT DESCRIPTION: New Elevated Tank along King George Road in North Expansion Lands (Twinned)

TIMELINE: 5-10 Years

MAP





PRESSURE DISTRICT: Pressure District 2/3

PROJECT DESCRIPTION:
New Elevated Tank in Pressure District 2/3. Sized to service Pressure District 2/3 and Pressure District 1 storage deficit including North Expansions Lands until 2051 and Pressure District 2/3 and Trigger Lands post 2051 with additional storage needed in Pressure District 1 post 2051. Twinned to W-ET-001.

REQUIRED STUDIES: Municipal Class Environmental Assessment (EA)
STUDY SCOPE: This study will used the Schedule B Class EA from W-ET-001
OBJECTIVES: Determine the requirements for a new water tower, including preferred location

CONSTRUCTION

Class Estimate Type:	Class 4	Class action: Construction Contingency and expected accuracy
Project Complexity:	Low	Complexity action: Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Suburban	Area Condition spirits will cost and restoration

PROPOSED CAPACITY:	11.0 ML

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA		$720,000	$0	
Sub-Total Study Costs				$0	

COST ESTIMATION SPREADSHEET

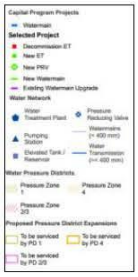
COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			ML	11 ML	$1,775,000	$22,825,000	
Watermain Contingency (750 mm)			m	500 m	$2,267	$1,133,714	Existing road ROW
Additional Construction Costs			ea.			$750,000	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance			ea.				Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$24,709,000	
Geotechnical / Hydrogeological / Materials						$200,000	
Geotechnical Sub-Total Cost						$200,000	
Property Requirements						$ -	
Property Requirements Sub-Total						$0	
Consultant Engineering/Design						$ 1,115,314	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$1,115,314	
In House Labour/Engineering/Wages/CA						$ -	
In-house Labour/Wages Sub-Total						$0	
Project Contingency						$1,000,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$1,000,000	
Non-Refundable HST						$0	
Non-Refundable HST Sub-Total						$0	
Total (2020 Dollars)						$27,025,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$27,025,000	2025 Estimate

PROJECT NO.: W-D-001 TIMELINE: 5-10 Years
PROJECT NAME: Decommissioning of King George ET
PROJECT DESCRIPTION: Decommissioning of King George ET to be replaced by new Pressure District 2/3 ET

MAP



PRESSURE DISTRICT: Pressure District 2/3
PROJECT DESCRIPTION:
Decommissioning of King George ET to be replaced by new Pressure District 2/3 ET



REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition splits out cost and restoration

PROPOSED CAPACITY:	N/A

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

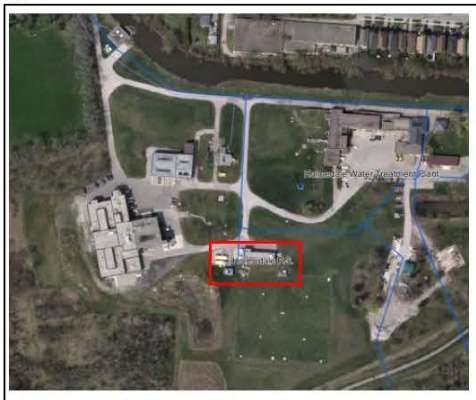
COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA			$0	
Sub-Total Study Costs				$0	

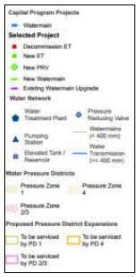
COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Decommissioning						$720,000	
Additional Construction Costs	15%		ea.			$108,000	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$82,000	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$911,000	
Geotechnical / Hydrogeological / Materials	1.0%					$9,100	
Geotechnical Sub-Total Cost						$9,100	
Property Requirements	1.5%					$ 13,700	
Property Requirements Sub-Total						$13,700	
Consultant Engineering/Design	15%					$ 136,700	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$136,700	
In House Labour/Engineering/Wages/CA	8%					$ 72,900	
In-house Labour/Wages Sub-Total						$72,900	
Project Contingency	15%					$172,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$172,000	
Non-Refundable HST	1.76%					$21,900	
Non-Refundable HST Sub-Total						$21,900	
Total (2020 Dollars)						$1,337,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$1,337,000	2025 Estimate

PROJECT NO.: W-P-001 TIMELINE: 0-5 Years
PROJECT NAME: Holmedale WTP High Lift Pump Upgrades
PROJECT DESCRIPTION: Install additional pump to supply elevated tank and reservoirs from reservoirs

MAP





PRESSURE DISTRICT: Pressure District 1
PROJECT DESCRIPTION:
Install additional pump to supply elevated tank and reservoirs in Pressure District 1.

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class as per AACE Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity as per AACE Construction Contingency and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition spirits will cost and restoration

PROPOSED CAPACITY:	948 L/s

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	0		$0	
Sub-Total Study Costs				$0	

COST ESTIMATION SPREADSHEET

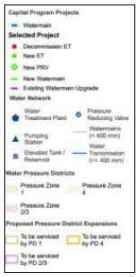
COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Number of Pumps (including well casing upgrades)			L/s	948 L/s	$1,300	$1,315,660	Additional Pump
Electrical and Process Piping			Lump Sum		$720,000	$720,000	Minor upgrade
Additional Construction Costs	15%		ea.			$305,349	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$234,101	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$2,575,000	
Geotechnical / Hydrogeological / Materials	1.0%					$25,800	
Geotechnical Sub-Total Cost						$25,800	
Property Requirements	1.5%					$ 38,600	
Property Requirements Sub-Total						$38,600	
Consultant Engineering/Design	15%					$ 386,300	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$386,300	
In House Labour/Engineering/Wages/CA	8%					$ 206,000	
In-house Labour/Wages Sub-Total						$206,000	
Project Contingency	15%					$485,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$485,000	
Non-Refundable HST	1.76%					$61,800	
Non-Refundable HST Sub-Total						$61,800	
Total (2020 Dollars)						$3,779,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$3,779,000	2025 Estimate

PROJECT NO.: W-P-002
PROJECT NAME: Wayne Gretzky Pump Upgrades
PROJECT DESCRIPTION: Pumping capacity upgrades at Wayne Gretzky PS.

TIMELINE: 5-10 Years

MAP





PRESSURE DISTRICT: Pressure District 2/3
PROJECT DESCRIPTION:
Install 3 new pumps at Wayne Gretzky Pump Station to improve operational capacity and suport new Pressure District HGL. Install new PRV to allow Pressure District 2/3 to backfeed Pressure District 1.

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class as per AACE Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity as per AACE Construction Contingency and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition spirits will cost and restoration

PROPOSED CAPACITY:	

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	0		$0	
Sub-Total Study Costs				$0	

COST ESTIMATION SPREADSHEET

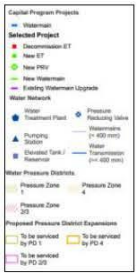
COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Number of Pumps (including well casing upgrades)			Pumps	3	$720,000	$2,160,000	Pump replacement and upgrades
Electrical and Other Facility Upgrades			Lump Sum		$1,440,000	$1,440,000	
Process Piping including PRV			Lump Sum		$1,440,000	$1,440,000	
Additional Construction Costs	15%		ea.			$756,000	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$679,600	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$6,376,000	
Geotechnical / Hydrogeological / Materials	1.0%					$63,800	
Geotechnical Sub-Total Cost						$63,800	
Property Requirements	1.5%					$ 95,600	
Property Requirements Sub-Total						$95,600	
Consultant Engineering/Design	15%					$ 956,400	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$956,400	
In House Labour/Engineering/Wages/CA	8%					$ 510,100	
In-house Labour/Wages Sub-Total						$510,100	
Project Contingency	15%					$1,200,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$1,200,000	
Non-Refundable HST	1.76%					$153,000	
Non-Refundable HST Sub-Total						$153,000	
Total (2020 Dollars)						$9,355,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$9,355,000	2025 Estimate

PROJECT NO.: W-P-003
PROJECT NAME: Tollgate Pump Upgrades
PROJECT DESCRIPTION: Pumping capacity upgrades at Tollgate PS

TIMELINE: 5-10 Years

MAP





PRESSURE DISTRICT: Pressure District 2/3

PROJECT DESCRIPTION:
Install 3 new pumps at Tollgate Pump Station to improve operational capacity and support new Pressure District HGL. Install new PRV to allow Pressure District 2/3 to backfeed Pressure District 1.

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

Install 3 new

CONSTRUCTION

Class Estimate Type:	Class 4	Class aditon Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity adjustr Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition spirits with cost and restoration

PROPOSED CAPACITY:	

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	0		$0	
Sub-Total Study Costs				$0	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Number of Pumps (including well casing upgrades)			Pumps	4	$720,000	$2,880,000	Pump replacement and upgrades
Electrical and Other Facility Upgrades			Lump Sum		$1,440,000	$1,440,000	
Process Piping including PRV			Lump Sum		$1,440,000	$1,440,000	
Additional Construction Costs	15%		ea.			$864,000	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$662,400	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$7,286,000	
Geotechnical / Hydrogeological / Materials	1.0%					$72,900	
Geotechnical Sub-Total Cost						$72,900	
Property Requirements	1.5%					$ 109,300	
Property Requirements Sub-Total						$109,300	
Consultant Engineering/Design	15%					$ 1,092,900	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$1,092,900	
In House Labour/Engineering/Wages/CA	8%					$ 582,900	
In-house Labour/Wages Sub-Total						$582,900	
Project Contingency	15%					$1,372,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$1,372,000	
Non-Refundable HST	1.76%					$174,800	
Non-Refundable HST Sub-Total						$174,800	
Total (2020 Dollars)						$10,691,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$10,691,000	2025 Estimate

PROJECT NO.:	W-P-004	TIMELINE:	0-5 Years
PROJECT NAME:	Colborne Street West Booster Pumping Station		
PROJECT DESCRIPTION:	New Booster Pumping Station to service development off of Colborne Street West at municipal boundary.		

MAP



PRESSURE DISTRICT: Pressure District 1

PROJECT DESCRIPTION:

Install new Booster Pumping station to be serviced off of Pressure District 1 to service existing properties on Colborne Street and development extending west to the municipal boundary. Pumping station includes single jockey pump and a fire pump.

REQUIRED STUDIES:	Municipal Class Environmental Assessment (EA)
STUDY SCOPE:	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment.
OBJECTIVES:	Determine the best construction methodology for the new pumping station including location of buildings.

CONSTRUCTION

Class Estimate Type:	Class 4	Class as defined: Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity as defined: Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition splits out boost and restoration

PROPOSED CAPACITY:	128 L/s

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	0	$144,000	$0	
Sub-Total Study Costs				$0	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	128 L/s	$25,000	$10,200,000	
Additional Construction Costs	15%		ea.			$1,530,000	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$1,173,000	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$12,903,000	
Geotechnical / Hydrogeological / Materials	1.0%					$129,000	
Geotechnical Sub-Total Cost						$129,000	
Property Requirements	1.5%					$ 193,500	
Property Requirements Sub-Total						$193,500	
Consultant Engineering/Design	12%					$ 1,548,400	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$1,548,400	
In House Labour/Engineering/Wages/CA	6%					$ 774,200	
In-house Labour/Wages Sub-Total						$774,200	
Project Contingency	15%					$2,332,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$2,332,000	
Non-Refundable HST	1.76%					$301,100	
Non-Refundable HST Sub-Total						$301,100	
Total (2020 Dollars)						$18,181,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$18,181,000	2025 Estimate

PROJECT NO.: W-P-005
TIMELINE: 10-20 Years
PROJECT NAME: Strawberry Hill Booster Pumping Station
PROJECT DESCRIPTION: New Booster Pumping Station to service development off of Colborne Street West at municipal boundary.

MAP



PRESSURE DISTRICT: Pressure District 1
PROJECT DESCRIPTION:
Install new Booster Pumping station to be serviced off of Pressure District 1 to service new sub-pressure districtto extend from Shetland Lane to Mount Pleasant Street. BPS required to service future development. Sized to provide MDD with fire flow provided via check valves.

REQUIRED STUDIES: Municipal Class Environmental Assessment (EA)
STUDY SCOPE:
The studywill be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment.
OBJECTIVES: Determine the best construction methodology for the new pumping station including location of buildings.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition splits out cost and restoration

PROPOSED CAPACITY:	10 L/s

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	1	$288,000	$288,000	
Sub-Total Study Costs				$288,000	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction				10 L/s	$25,000	$7,250,000	
Additional Construction Costs	15%		ea.			$1,087,500	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$833,750	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$9,171,000	
Geotechnical / Hydrogeological / Materials	1.0%					$91,700	
Geotechnical Sub-Total Cost						$91,700	
Property Requirements	1.5%					$ 137,600	
Property Requirements Sub-Total						$137,600	
Consultant Engineering/Design	15%					$ 1,375,700	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$1,375,700	
In House Labour/Engineering/Wages/CA	8%					$ 733,700	
In-house Labour/Wages Sub-Total						$733,700	
Project Contingency	15%					$1,726,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$1,726,000	
Non-Refundable HST	1.76%					$220,000	
Non-Refundable HST Sub-Total						$220,000	
Total (2020 Dollars)						$13,744,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$13,744,000	2025 Estimate

PROJECT NO.: W-P-006
PROJECT NAME: Albion Booster Pumping Station Upgrades
PROJECT DESCRIPTION: Pumping capacity upgrades at Albion BPS.

TIMELINE: 0-10 Years

MAP



PRESSURE DISTRICT: Pressure District 1
PROJECT DESCRIPTION:
Replace 3 pumps at Albion Booster Pump Station to improve operational capacity.

REQUIRED STUDIES: - - -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class as per AACE Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity as per AACE Construction Contingency and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition splits cost to Urban and Suburban

PROPOSED CAPACITY:	300 L/s

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA			$0	
Sub-Total Study Costs				$0	

COST ESTIMATION SPREADSHEET

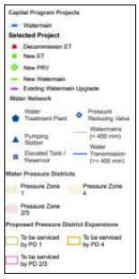
COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Division 11 - Equipment			Pumps	3	$250,000	$750,000	Three booster pumps (300 L/s), Potential hoist for monorail
Division 1 - General						$400,000	Insurance & Bonds, Mob & Demob, Testing & Disinfection, Commissioning & Training, Documentation
Division 2/3 - Site/Concrete Works						$100,000	Minor works expected for site restoration, Concrete maintenance pads, pipe supports
Division 5 - Miscellaneous Metals						$150,000	Pipe supports, Potential monorail installation
Division 6-8 - Architectural						$50,000	Potential door replacements and mods for new equipment
Division 9 - Finishes						$150,000	Floor coatings main floor and lower floor
Division 13 - Control & Instrumentation						$250,000	Three booster pumps (300 L/s), Potential hoist for monorail
Division 15 - Process Mechanical						$250,000	Pressure transmitters, Possible flow meters, PLC-I/O & HMI upgrades
Division 16 - Electrical						$750,000	New isolation valves, pipe modifications for booster pumps
Additional Construction Costs			ea.			$200,000	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance			ea.			$200,000	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$3,250,000	
Geotechnical / Hydrogeological / Materials	5.0%					$162,500	
Geotechnical Sub-Total Cost						$162,500	
Property Requirements	0.0%					$ -	
Property Requirements Sub-Total						$0	
Consultant Engineering/Design	15%					$ 510,000	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$510,000	
In House Labour/Engineering/Wages/CA	0%					$ -	
In-house Labour/Wages Sub-Total						$0	
Project Contingency	30%					$1,200,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$1,200,000	
Non-Refundable HST	1.76%					$90,200	
Non-Refundable HST Sub-Total						$90,200	
Total (2020 Dollars)						$5,213,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$5,213,000	2025 Estimate

PROJECT NO.: W-TP-001
PROJECT NAME: Water Treatment Plant Upgrades - 0-5 Years
PROJECT DESCRIPTION: Implementation of Reverse Osmosis System

TIMELINE: 0-5 Years

MAP





PRESSURE DISTRICT: Pressure District 1
PROJECT DESCRIPTION:
Implementation of Reverse Osmosis System

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class aligns Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity aligns Construction Contingency and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition spirits will consider and restoration

PROPOSED CAPACITY:	

CLASS EA REQUIREMENTS:	An
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	0		$0	
Sub-Total Study Costs				$0	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Reverse Osmosis				Lump Sum		$126,507,000	
Additional Construction Costs	15%		ea.			$18,976,050	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$14,548,305	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$160,031,000	
Geotechnical / Hydrogeological / Materials	1.0%					$1,600,300	
Geotechnical Sub-Total Cost						$1,600,300	
Property Requirements	1.5%					$ 2,400,500	
Property Requirements Sub-Total						$2,400,500	
Consultant Engineering/Design	10%					$ 16,003,100	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$16,003,100	
In House Labour/Engineering/Wages/CA	4%					$ 6,401,200	
In-house Labour/Wages Sub-Total						$6,401,200	
Project Contingency	15%					$27,965,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$27,965,000	
Non-Refundable HST	1.76%					$3,660,800	
Non-Refundable HST Sub-Total						$3,660,800	
Total (2025 Dollars)						$218,062,000	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$126,507,000	2025 Estimate

PROJECT NO.: W-TP-002 TIMELINE: 5-10 Years
PROJECT NAME: Water Treatment Plant Upgrades - 5-10 Years
PROJECT DESCRIPTION: Increase intake canal capacity and optimize existing Actiflo process

MAP



PRESSURE DISTRICT: Pressure District 1
PROJECT DESCRIPTION:
Increase intake canal capacity and optimize existing Actiflo process

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class as per AACE Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity as per AACE Construction Contingency and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition spirits will cost and restoration

PROPOSED CAPACITY:	

CLASS EA REQUIREMENTS:	An
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

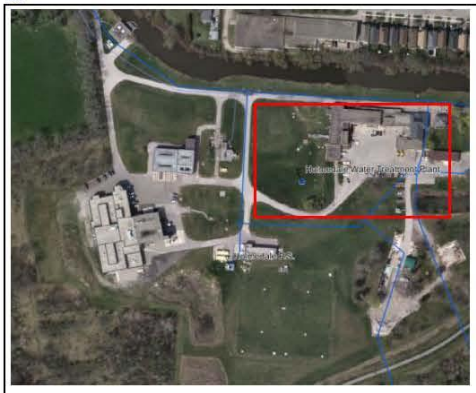
COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	0	$200,000	$0	
Sub-Total Study Costs				$0	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
				Lump Sum			
				Lump Sum			
				Lump Sum			
				Lump Sum			
Additional Construction Costs	15%		ea.			$0	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$0	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$0	
Geotechnical / Hydrogeological / Materials	1.0%					$0	
Geotechnical Sub-Total Cost						$0	
Property Requirements	1.5%					$ -	
Property Requirements Sub-Total						$0	
Consultant Engineering/Design	15%					$ -	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$0	
In House Labour/Engineering/Wages/CA	8%					$ -	
In-house Labour/Wages Sub-Total						$0	
Project Contingency	15%					$0	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$0	
Non-Refundable HST	1.76%					$0	
Non-Refundable HST Sub-Total						$0	
Total (2025 Dollars)						$0	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$8,840,000	2025 Estimate

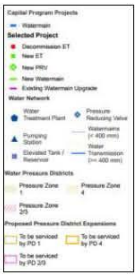
PROJECT NO.:	W-TP-003	TIMELINE:	10-20 Years
PROJECT NAME:	Water Treatment Plant Upgrades - 10-20 Years		
PROJECT DESCRIPTION:	Upgrades to low lift, Actiflo, filtration, RO, disinfection and residuals management to provide capacity for growth to 2051		

MAP



PRESSURE DISTRICT: Pressure District 1

PROJECT DESCRIPTION:
Upgrades to low lift, Actiflo, filtration, RO, disinfection and residuals management to provide capacity for growth to 2051



REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class as per AACE Construction Contingency and expected accuracy
Project Complexity:	Med	Complexity as per AACE Construction Contingency and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition splits out Coastal and Northern

PROPOSED CAPACITY:	

CLASS EA REQUIREMENTS:	As
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

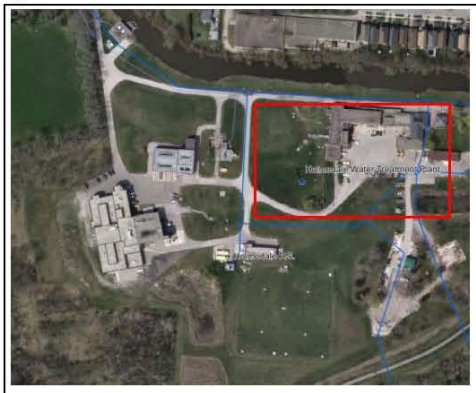
COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	0	$200,000	$0	
Sub-Total Study Costs				$0	

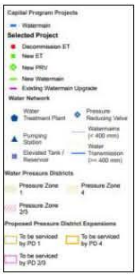
COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Additional Construction Costs	15%		ea.			$0	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$0	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$0	
Geotechnical / Hydrogeological / Materials	1.0%					$0	
Geotechnical Sub-Total Cost						$0	
Property Requirements	1.5%					$ -	
Property Requirements Sub-Total						$0	
Consultant Engineering/Design	15%					$ -	Includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$0	
In House Labour/Engineering/Wages/CA	8%					$ -	
In-house Labour/Wages Sub-Total						$0	
Project Contingency	15%					$0	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$0	
Non-Refundable HST	1.76%					$0	
Non-Refundable HST Sub-Total						$0	
Total (2025 Dollars)						$0	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$151,490,000	2025 Estimate

PROJECT NO.:	W-TP-004	TIMELINE:	10-20 Years
PROJECT NAME:	New Intake Canal to Holmedale WTP		
PROJECT DESCRIPTION:	Increase intake storage capacity to meet 48 hours of total system storage under future MDD in the long term.		

MAP





PRESSURE DISTRICT: Pressure District 1

PROJECT DESCRIPTION:
Increase intake storage capacity to meet 48 hours of total system storage under future MDD in the long term.

REQUIRED STUDIES: -

STUDY SCOPE: -

OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class as per AACE International Recommended Practice No. 18R-97
Project Complexity:	Med	Complexity as per AACE International Recommended Practice No. 18R-97
Accuracy Range:	-40% / +60%	Accuracy as per AACE International Recommended Practice No. 18R-97
Area Condition:	Rural	Area Condition refers to the location where the project will be constructed

PROPOSED CAPACITY:	

CLASS EA REQUIREMENTS:	As
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	0	$200,000	$0	
Sub-Total Study Costs				$0	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Additional Construction Costs	15%		ea.			$0	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$0	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						$0	
Geotechnical / Hydrogeological / Materials	1.0%					$0	
Geotechnical Sub-Total Cost						$0	
Property Requirements	1.5%					$ -	
Property Requirements Sub-Total						$0	
Consultant Engineering/Design	15%					$ -	Includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						$0	
In House Labour/Engineering/Wages/CA	8%					$ -	
In-house Labour/Wages Sub-Total						$0	
Project Contingency	15%					$0	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						$0	
Non-Refundable HST	1.76%					$0	
Non-Refundable HST Sub-Total						$0	
Total (2025 Dollars)						$0	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						$80,250,000	2025 Estimate

APPENDIX G:
Treatment Capacity Technical Memorandum



GEI Consultants Canada

Master Servicing Plan – 2025 Development Charges Update

Technical Memorandum: Water and Wastewater Treatment Plant Capacity Review and Expansion Alternative Evaluation

Submitted to:
City of Brantford
58 Dalhousie Street
Brantford, ON N3T 2J2

Submitted by:
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650 Woodlawn Road W, Block C, Unit 2
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June 2026
Project No. 2404322



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Certification

PREPARED BY:
GEI Consultants Canada Limited



Alison Cox, B.Eng., M.A.Sc., EIT
Technical Specialist

REVIEWED BY:
GEI Consultants Canada Limited



Laura Verhaeghe, P.Eng., IRP
Senior Project Manager

1. Introduction

This technical memorandum (TM) reviews the operating and design capacity of the Holmedale Water Treatment Plant (WTP) and Brantford Wastewater Treatment Plant (WWTP) in the City of Brantford (the City). Further, it evaluates alternative strategies to increase capacity of the WTP and WWTP to service projected population growth to 2051 to inform the City's current Water and Wastewater Master Servicing Plan (MSP) 2025 Development Charges Update.

1.1. Data Sources

This section summarizes the various data sources and activities that were used to form the basis of understanding for the Treatment Plant Review:

- Holmedale Low Lift Pump Station Hydraulic Assessment, C3 Water Inc., 2019
- Final Strategic Report, Brantford WWTP Condition Assessment and Strategic Plan – CIMA, 2017
- Identification and Timing of Future Capital Upgrades for the Brantford WWTP – Tim Howarth, City of Brantford – 2019 (updated 2024)
- Capital Project Detail Sheet 2020-2029 – City of Brantford, 2019
- Brantford WPCP ECA – 2014
- Brantford Wastewater Treatment Plant Upgrade As-Builts - 2023
- Drinking Water Works Permit – 2022
- Holmedale Water Treatment Plant Upgrade As-Builts - 2011
- Water, Wastewater and Stormwater Master Servicing Plan Update – 2051 Amendment - GM BluePlan, 2021
- Wastewater System 2024 Annual Report - City of Brantford, 2024
- Treatment Plant Capacity Review – GM BluePlan, 2020
- Digester Gas Feasibility Study - Comcor, 2024
- WWTP UV System and Phosphorus Removal System 90% Design Report – AECOM, 2025
- City of Brantford Implementation of Full-scale Reverse Osmosis Tech Memo – CIMA+, 2025
- City of Brantford Development and Evaluation of Outfall Alternatives Tech Memo – CIMA+, 2024

2. Growth Projections to 2051

The existing population and employment numbers, along with projected population and employment growth to 2051 are provided in **Table 2-1** noting that revised population projections include lands outside the settlement boundary (LOSB).

Table 2-1: 2021 and 2051 Residential and Employment Population

	Population	Employment	Total
2021 (Census)	103,596	36,993	140,589
2051 (2020 MSP Projection)	164,736	83,362	248,098
2051 Low Growth Scenario	188,050	91,823	279, 873
2051 Medium Growth Scenario	208,822	98,662	307,484
2051 High Growth Scenario	228,094	109,150	337,244

There are three different growth scenarios considered, low, medium and high, to understand the range of servicing needs that could be anticipated by 2051. These growth projections supersede those used for the 2020 MSP update. Figure 2-1 below illustrates projected growth under the different scenarios, assuming linear growth, which may vary depending on the actual rate of development. The updated 2051 growth projections include north expansion lands, Tutela expansion lands and LOSB.

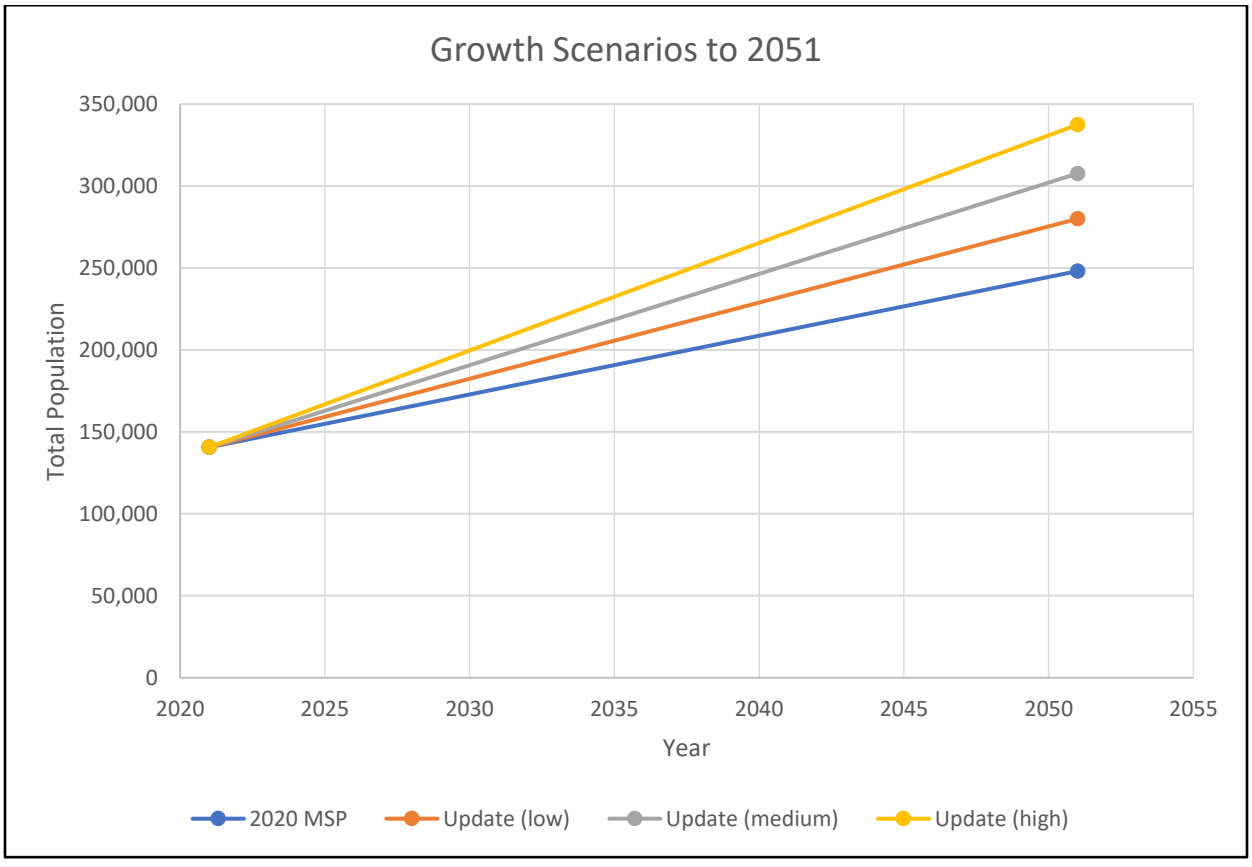


Figure 2-1: City of Brantford Growth Scenarios to 2051

3. Holmedale Water Treatment Plant

3.1. Facility Overview

The Holmedale Water Treatment Plant (WTP) is a Class IV facility designed to produce 100 megalitres per day (MLD) of drinking water. It is located at 324 Grand River Avenue, drawing surface water from the Grand River via the 1.5km Holmedale Canal under Permit to Take Water (PTTW) 2375-BLHMW5, Municipal Drinking Water License (MDLW) 063-101 Issue #9 (Oct. 2024) and Drinking Water Works Permit (DWWP) 063-201 Issue #7 (Oct. 2024). The WTP consists of an intake canal, low lift pumping station, ballasted flocculation and sedimentation (Actiflo system) with coagulant and polymer addition, ozonation for taste and odour control, biological dual media filtration, UV disinfection, and chlorine disinfection. Solid residuals removed during treatment are processed through sludge thickening and dewatering prior to offsite disposal. The WTP site also includes an in-ground reservoir and a high lift pump station.

To address elevated nitrate levels in the Grand River, a temporary reverse osmosis (RO) was installed in early 2025 and is being used to improve nitrate removal during winter and early spring. Design is currently underway for a permanent RO facility at the WTP with construction planned for 2028. The proposed permanent RO process will be capable of providing 50,000 m^3/day, in a building sized for an ultimate buildout of 200,000 m^3/day treatment capacity (approximately 80 m by 40 m) as described by City staff.

A hydrogen peroxide dosing system was previously utilized in conjunction with the ozonation system to improve taste and odour, although it was decommissioned. The City has considered bringing the hydrogen peroxide system back online, although the benefits of this will be reassessed after full scale RO is implemented, as it may no longer be required pending RO performance.

3.2. Water Demand Projections

To understand future capacity needs for the Holmedale WTP, growth projections and historical demand were used to calculate future average and maximum day demand. A summary of the historical average day demand (ADD) and max day demand (MDD) at the Holmedale WTP over the period of 2020 to 2024 is presented in **Table 3-1**.

Table 3-1: Existing Water Flows

	Average Day Demand (ADD) (m^3/day)	Maximum Day Demand (MDD) (m^3/day)
2020	33,300	49,500
2021	32,500	43,900
2022	33,500	50,900
2023	33,000	49,000
2024	33,400	43,600
Average	**33,200**	**47,400**
Max	**33,500**	**50,900**

To support the capacity assessment and determination of upgrade needs, the long-term demands were calculated based on projected population and employment growth described in Section 2**.** The 2051 Brantford Growth is based on an additional 84,579 to 124,706 people and 54,830 to 72,157 jobs growth. The design criteria used to estimate water demand is consistent with the MSP Update values used and is as follows:

- Growth related water demand per capita rate of 270 L/c/d (for both people and jobs)
- 5-year average of ADD used to establish baseline system average day demands
- MDD calculated using a peaking factor of 1.8

A summary of projected demand under different growth scenarios is provide in **Table 3-2** below.

Table 3-2: Existing and 2051 Water Demands

		ADD (m^3/day)	MDD (m^3/day)
Existing – 5 Year Historical Data		33,200 (Average)	50,900 (Maximum)
2051	**Low**	78,800	133,000
	Medium	88,400	151,000
	High	98,300	169,000

Finally, the projected change in demand over time is illustrated in **Figure 3-1** below, which indicates that a capacity upgrade will be triggered between 2035 and 2040 depending on the growth scenario, assuming linear growth.

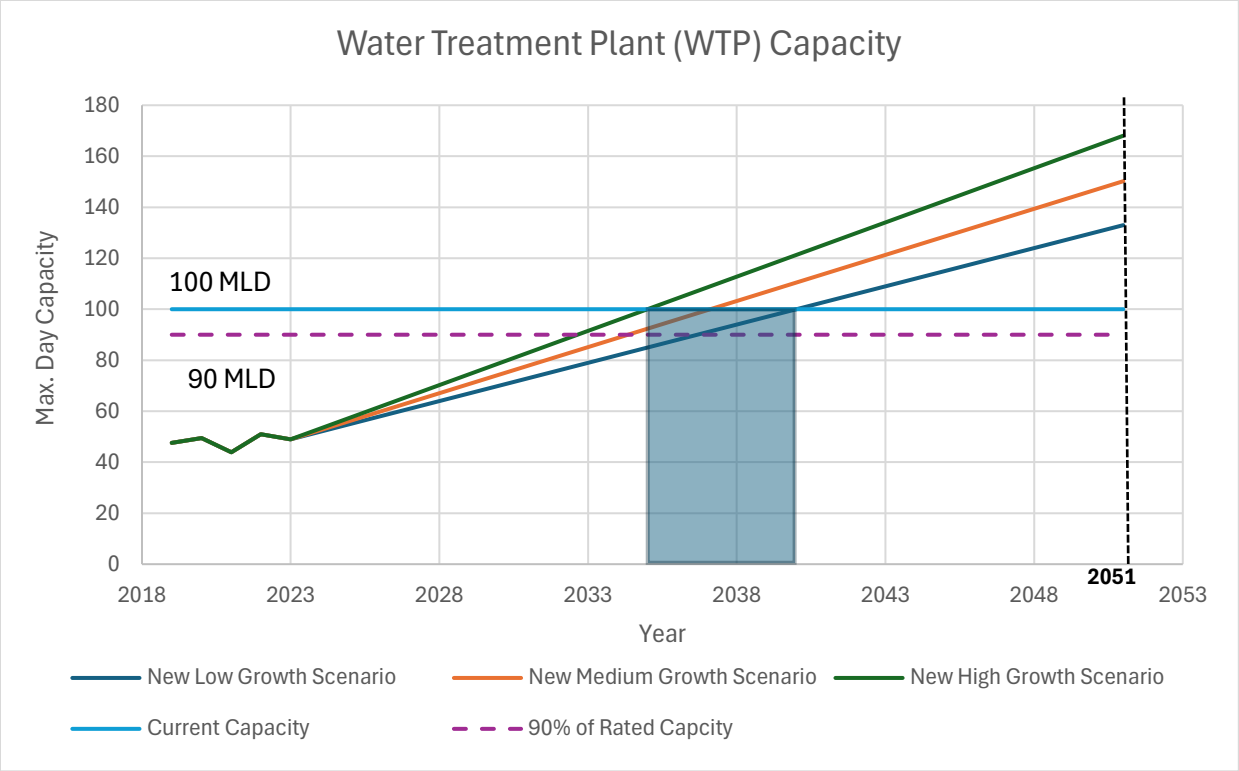


Figure 3-1: Holmedale WTP Capacity compared to Historical and Projected Maximum Day Demand

3.3. Process Capacity Overview

The WTP has a current rated treatment capacity of 100,000 m^3/day (100 MLD) based on the DWWP. The maximum allowable water-taking from the Grand River is 260,000 m^3/day per the PTTW. A review of the individual process unit capacities was conducted based on background reports, manual, drawings and workshops with City staff, as displayed in **Figure 3-2** and summarized in **Table 3-3**. A process flow diagram of the existing system is presented in **Figure 3-3**. The Total Capacity is the capacity when all process units are operational, whereas the Firm Capacity is the capacity when the largest process unit is offline. The Firm Capacity is a useful measure to understand available capacity when one of the units is out of service for maintenance.

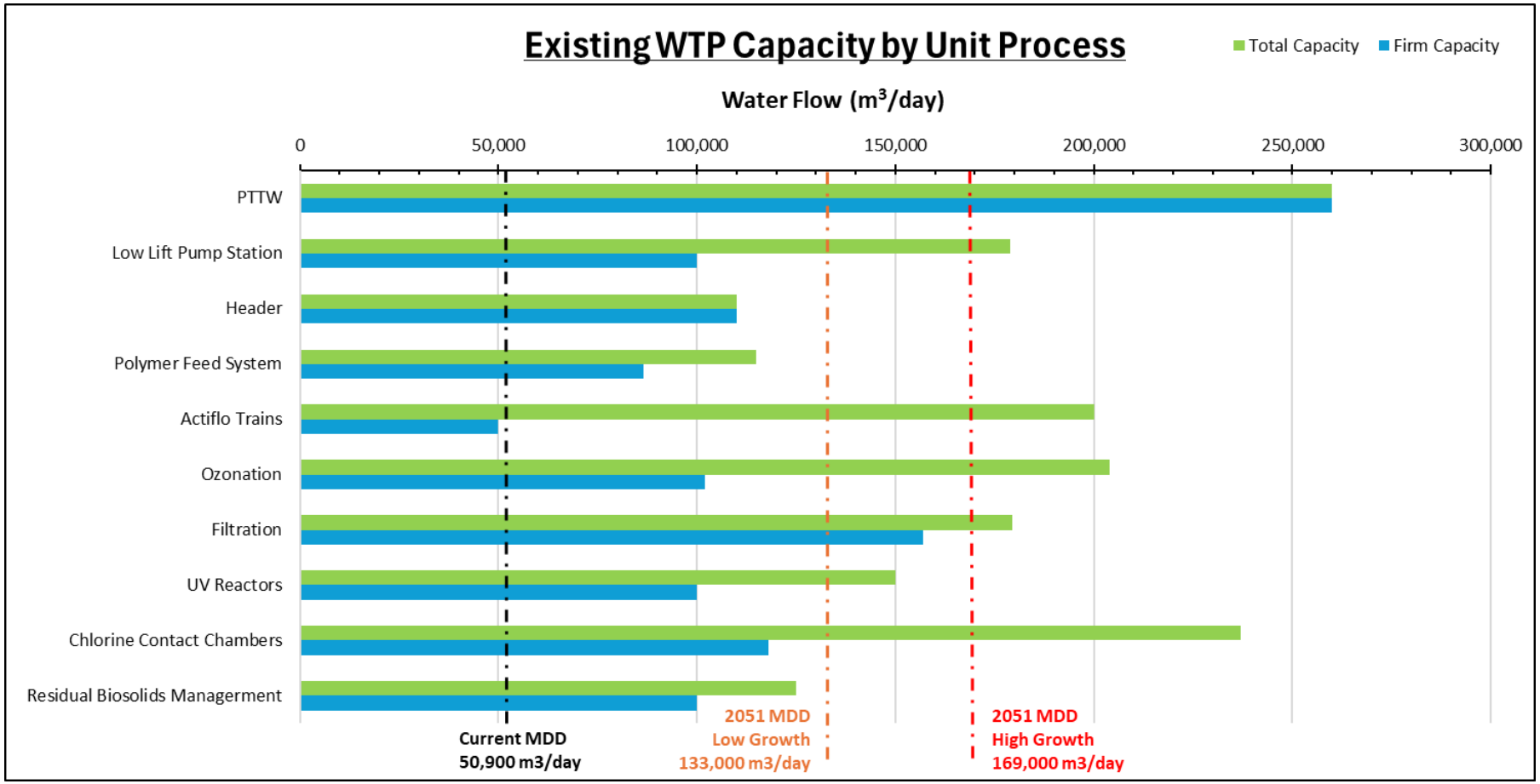


Figure 3-2: Capacity of each treatment unit at Holmedale WTP

Table 3-3: Water Treatment Plant Capacity Process Overview

Process	Elements	Total Design Capacity	Rated Firm Capacity (capacity with 1 unit offline)
Intake Canal		43,600 m^3 [1]	n/a
Low Lift Pumping Station[2]	(4) pumps rated @ 44,900 m^3/day (520 L/s), 3 duty, 1 stand-by	180,000 m^3/day (4 pumps running, high reservoir level)	100,000 m^3/day (3 pumps running, low reservoir level)
Header	(1) 900 mm dia. pipe	110,000 m^3/day	n/a
Polymer Feed System[3]	(4) pumps rated @ 11.5 L/min (0.15%) with dosing rate of 0.43 mg/L and (2) 2,839 L feed tanks	115,000 m^3/day	86,500 m^3/day
Actiflo Trains	(2) trains each rated @ 100,000m^3/day max flow[4]	200,000 m^3/day	<50,000 m^3/day
Ozonation	(2) generators and contact chambers rated @ 102,000 m^3/day	204,000 m^3/day	102,000 m^3/day
Filtration	(8) dual media filtration beds, (2) backwash wells and (2) backwash pumps	179,000 m^3/day	157,000 m^3/day
UV Reactors	(3) units rated @ 50,000 m^3/day [5]	150,000 m^3/day	100,000 m^3/day
Chlorine Contact Chambers	(2) chambers rated @ 118,000 m^3/day based on 30 min CT	236,000 m^3/day	118,000 m^3/day
High Lift Pumping Station[6]	(2) pumps rated @ 173 L/s, (2) pumps @ 405 L/s, 1 diesel pump @ 420 L/s, (2) pumps @ 421 L/s at 74m TDH	209,000 m^3/day	173,000 m^3/day
Residual Management Facility	(3) Gravity settler thickeners rated @ 52 L/s and (2) Belt Filter presses @ 9 L/s	125,000	100,000

1. The intake canal capacity is sized as a storage volume in m^3.
2. Pump capacities based on Holmedale Low Lift Pump Station Hydraulic Assessment TM#1 (C3 Water, 2019).
3. Polymer system capacity is based on the Polymer System Upgrade Preliminary Design Report (AECOM, 2019) and includes upgrades not captured in 2022 DWWP.
4. Although each train is designed for 100,000 m^3/day, with a max guaranteed flow of 68,000m^3/day per train, and a nominal flow of 50,000 m^3/day per train, operations staff note that current capacity per train is <50,000 m^3/day.
5. A fourth UV unit is planned; operations staff have noted that UV units must be operated under rated capacity of 50,000 m^3/day to protect the sleeves and bulbs.
6. Capacities are summation of individual pump capacities, based on the flat system curve as described in the P5/P6 High Lift Pumping Station Design Report (RVA, 2022). The pump capacities have been updated based on the April 30th, 2024 pump tests by HydraTek. No pump testing was completed for 5 or 6 pumps operating together so total and firm capacities are theoretical only.

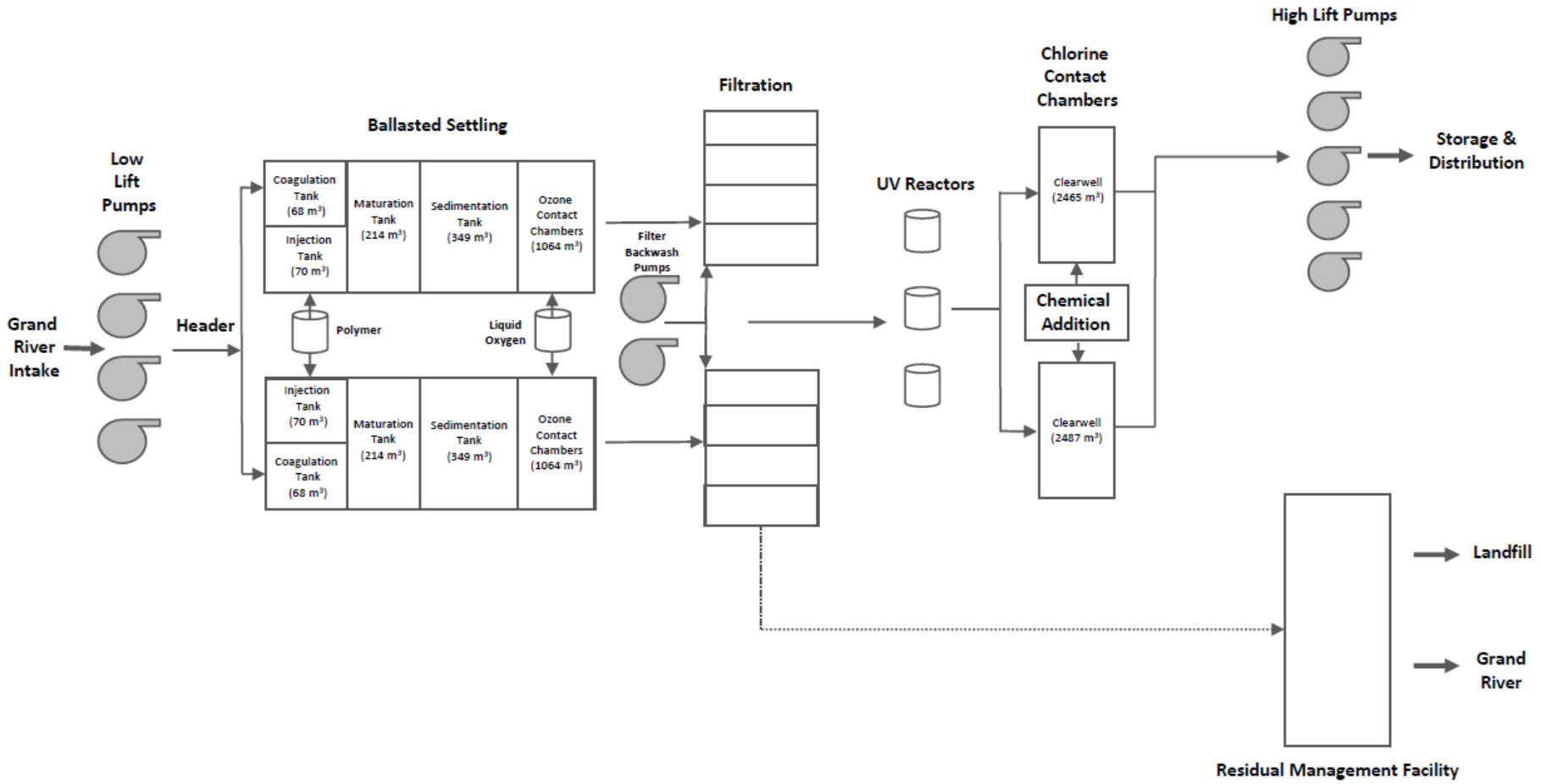


Figure 3-3: Holmedale Water Treatment Plant in Brantford Process Flow Diagram

3.4. Brantford WTP Processes

3.4.1. Intake Canal

Raw water is obtained from the Grand River through a 1.5 km canal. Flow is controlled by sluice gates that manage the flow through three (3) 1,200 mm culverts. The PTTW for the intake is 260,000 m^3/day. Per the Holmedale Canal Monitoring Report (AECOM, 2021), the City has set a requirement that if the gate from the Grand River into the canal is closed, the canal and downstream water system should have a combined storage capacity of at least 48 hours to ensure drinking water supply is available if quality issues arise in the Grand River. Given the current volume of the canal and expected seepage into the ground, the effective storage of the Holmedale Canal was 43,610 m^3 as of 2021, which could be increased to 62,193 m^3 by dredging; the City noted this dredging project is planned for 2027. The table below illustrates the total system storage capacity under current and 2051 conditions, assuming canal dredging is completed before 2051.

Table 3-4: Emergency Water Storage Capacity

Condition	MDD	Canal Storage Volume	Treated Water Storage Volume	Total Storage Volume	Total Storage Time at MDD	Required Storage for 48-hours @ MDD
Existing	50.9 MLD	43.6 ML	64.4 ML[2]	108.0 ML	50.9 hr	101.8 ML
Low Growth	133 MLD	62.2 ML[1]	90.4 ML[3]	152.6 ML	27.5 hr	266 ML
Medium Growth	151 MLD				24.2 hr	302 ML
High Growth	169 MLD				21.6 hr	338 ML

1. Assumes canal dredging is completed ahead of 2051
2. Based on all maximum treated storage volume in reservoirs and elevated tanks as of 2025.
3. Storage volume based on existing plus additional distribution system recommendations through the Master Servicing Plan.

Although the existing total system emergency storage volume exceeds 48 hours, the storage under future conditions, even with dredging will fall short of 48 hours, ranging from 21 to 28 hours, depending on the growth scenario.

3.4.2. Low Lift Pumping Station

The low lift pumps deliver water from the intake canal to the pre-treatment building. The low lift pump building houses four (4) vertical turbine pumps that draw from a dual-cell well. All processes downstream of the low lift pumping station header flow by gravity which puts a high dependence on these pumps. In the case of a failure at the low lift station, an alternate pumping and piping setup could take 24 hours to mobilize.

A hydraulic analysis memo was completed in 2019 by C3 Water to determine the performance of the low lift pumping station. Based on this assessment, the individual pumps were rated for 520 L/s (44,900 m^3/day) at 12.4m TDH. When three pumps are running, based on the system curves which are dependent on the levels in the reservoirs and head losses between the two reservoirs, the pumping

station can achieve a rated capacity of 100,000 m^3/day at low reservoir levels and 125,000 m^3/day at high reservoir levels (Holmedale Low Lift Pump Station Hydraulic Assessment TM#1, C3 Water 2019). The pump station is limited in its ability to operate at low flow rates without throttling a valve to raise the system curve so that it intersects the pump curve. Standby power is limited to a maximum of 3 pumps.

3.4.3. Header/Watermain

The low lift pumps discharge to a common 900 mm diameter concrete pressure pipe (CPP) watermain that outlets to the preliminary treatment facility. As there is only one pipe from the low lift to the preliminary treatment, security of supply is a concern. The capacity was calculated using a velocity of 2 m/s to be 110,000 m^3/day.

3.4.4. Preliminary Treatment

The preliminary treatment building contains a high-rate ballasted sand flocculation and sedimentation process known as Actiflo®. Each of the two (2) Actiflo® trains consist of a flash mix chamber for coagulant addition, a polymer and micro-sand injection chamber, a maturation tank, and sedimentation/clarifier tank. Ozonation is used as a final step of preliminary treatment to treat odour and taste.

Coagulant and Polymer Feed Systems

Coagulant and polymer are added to the Actiflo process, along with micro-sand to initiate floc formation in the preliminary treatment process. Polyaluminum chloride (PAC) is added as the coagulant ahead of the coagulation tank through a feed system consisting of four (4) chemical feed pumps which each can deliver 416 L/hr of PAC and two feed tanks each with a volume of 90 m^3. The polymer feed system consists of four (4) chemical feed pumps and two (2) batching/feed tanks to feed the injection chamber with a firm capacity of 86,500 m^3/day or total capacity of 115,000 m^3/day, based on each 11.5 L/min dosing pump being sufficient to supply 28,800 m^3/day of plant flow given the maximum historical polymer dosage of 0.43 mg/L with polymer prepared at a dilution ratio of 0.15%. The polymer values were taken from the 2019 Holmedale WTP Polymer System Upgrades Final Pre-Design Report by AECOM.

Actiflo Trains

Based on the manufacturer's Veolia Actiflo design capacity letter, the total nominal flow with two trains in operation is 100,000 m3/day and a maximum hydraulic flow of 100,000 m3/day in each train. Through operation of the system, it has been found that there is not enough settling time if the flow exceeds 50,000 m^3/day. This plant process cannot be bypassed, so if one Actiflo train is down the entire WTP has to run at half capacity. After the separation, the waste sludge is discharged to the Backwash Equalization Tank located in the Residue Management Facility and the clarified water is discharged to the ozone contact chambers.

Ozonation

The ozone system consists of two (2) generators and two (2) contact chambers with a capacity of 102,000 m^3/day each and total capacity of 204,000 m^3/day, based on a 15-minute exposure. The generators each have a capacity of 90 kg ozone per day and each tank having a volume of 1,064 m^3. The ozone system is used to treat taste and odour and is not used as part of the system's disinfection contact time (CT) calculations. Ozone contact chambers are a limiting factor in the process for future growth. Regular maintenance is required to keep the system operational.

3.4.5. Filtration

Flow from the Actiflo trains is directed to eight (8) filtration beds within the Disinfection and Filtration Building. Each filtration cell is equipped with piping to backwash equalization and piping to discharge. The filters are designed for one to be out of service with a firm capacity of 157,000 m^3/day at a maximum filtration rate of 12.4 m/hour and an operating capacity of 105,000 m^3/day with a normal filtration rate of 8 m/hr. There are restrictions in process piping that prevent the filtration process from operating at its full rated capacity. The backwash wells are another limiting factor in the filtration process supporting future growth as the process is limited to wash one filter every 3-4 hours based on a gravity feed system.

3.4.6. UV Reactors

Flow from the filtration beds is directed to UV light disinfection reactors for primary disinfection. There are three (3) units each with a capacity of 50,000 m^3/day; however, sleeve and bulb issues arise when operating at full capacity. The UV reactors are part of a multibarrier approach used for cryptosporidium and are not included in the CT calculation. The installation of a fourth UV reactor (also with a capacity of 50,000 m^3/day) is currently underway, which will bring the rated capacity to 150,000 m^3/day with one unit offline.

3.4.7. Chlorine Contact Chambers

Flow from the UV reactors is directed to two (2) Chlorine Contact Chambers (CCC) or clearwells for primary disinfection. The two clearwells have a capacity of 2,465 m^3 in the north and 2,487 m^3 in the south. Three (3) chlorinators provide chemical addition, including chlorine and sulphur dioxide, to the clearwells. The two (2) CCCs discharge to a single combined effluent pipe where ammonia and Fluorosilic Acid are added. Based on a chlorine contact time of 30 minutes, the rated with the largest unit off-line is 118,000 m^3/day, and the total design capacity is 236,000 m^3/day. Baffling in the chambers for better mixing may be required for future increased flows.

3.4.8. High Lift Pump Station

The high lift pump station consists of two (2) high lift pumps rated at 173 L/s, two (2) high lift pumps rated at 405 L/s, two (2) high lift pumps rated at 421 L/s and a diesel pump rated at 420 L/s that deliver treated water to the distribution system.

3.4.9. Residual Management Facility

The residual management facility collects pretreatment sludge and residuals from filter backwash water and treats it prior to disposal. The facility includes a backwash equalization/thickener feed tank, three (3) thickeners, sludge storage tank and pumps, two (2) belt filter presses, sludge storage lagoon and a sanitary waste pumping station. The residual management facility is designed for a typical waste stream when the plant is running at 100,000 m^3/day; however, flows through the facility depend on the loading on the filters and raw water quality (turbidity). The filter backwash equalization tank is only able to hold one (1) backwash cycle and would need to be upsized to increase capacity at the facility.

3.5. Process Capacity Constraints and Opportunities

3.5.1. Overview of Existing Constraints and Opportunities

The WTP processes were reviewed to determine limiting capacities and potential opportunities at the existing facility, as summarized in **Table 3-5**. These opportunities were further evaluated to determine alternative solutions for system upgrades as presented in **Section 3.6**.

3.5.2. Constraints and Opportunities to Maintain 100 MLD Capacity

The WTP is currently designed for a capacity of 100,000 m^3/day (100 MLD), although constraints exist that limit the WTP's capacity to operate at this level, specifically:

- Actiflo trains are each limited to 50,000 m^3/day rated capacity; 100,000 m3/day can only be achieved when both trains are online.

In addition to increasing the capacity of the process above, there is an opportunity to twin the existing 900 mm header with a pipe of equal or smaller diameter to provide redundancy from the low lift pumping station to the preliminary treatment. Upgrading the existing processes to provide the existing rated capacity of 100,000 m^3/day with improved redundancy will allow the WTP to service more growth before needing to increase the rated capacity of the WTP. These upgrades are not sufficient to handle the projected growth to 2051, but could extend the time until the growth upgrades are required.

Table 3-5: WTP Process Capacity Opportunities and Limitations

Process	Firm Capacity (m^3/day)	Limitations	Opportunities
PTTW	260,000	Existing capacity is sufficient	Existing capacity is sufficient

Intake Channel	43,600 m^3*	- Existing storage capacity of canal plus all treated water storage provides >48hours total storage volume at current MDD.
		- Under future MDD conditions to 2051, existing plus proposed treated water storage increases are insufficient to maintain at least 48 hours of storage.
			- To increase storage capacity
			  ○ Dredging of the canal will increase storage capacity, but not enough to meet 48 hours total storage
			  ○ Additional raw or treated water storage should be considered to maintain 48hours of total system storage.

Low Lift Pumping Station	100,000	- Standby power is limited to a maximum of 3 pumps
		- Hydraulic restriction due to common 900 mm header if all 3 pumps running
		- Pump station is limited in its ability to operate at low flow rates without throttling a valve to raise the system curve so that it intersects the pump curve
			- To increase operating capacity
			  ○ Increase existing pumps' capacity
			- Construct additional low lift station with intake structure
			  ○ Provide additional security of supply
			  ○ Increase number of pumps to allow for better low flow controls and add additional capacity
			  ○ Facilitate header twinning
			  ○ Facilitate increased standby power capacity

Header	110,000	- Limited opportunity to take header offline to complete condition assessment and existing condition is unknown - Security of supply concern with one pipe from low lift pumping station to preliminary treatment	- Twin header with equal size 900 mm diameter pipe or smaller diameter pipe to provide excess capacity and security of supply
Chemical Feed System	86,500	- Existing coagulant and polymer systems are rated for a firm capacity of 86,500 m^3/day or total capacity of 115,000 m^3/day based on recent upgrades described in Polymer System Upgrades Predesign Report (AECOM, 2019) - Additional pumping capacity and tankage would be required to support growth	- Increase pumping capacity to meet future capacity needs - Process piping upgrades to support pump capacity upgrades

Actiflo Trains	< 50,000	- Actiflo trains do not have enough settling time if exceeding 70,000 m^3/day per train
		- No redundancy provided with only two trains (i.e., Both trains required to meet WTP rated capacity of 100,000 m3/day)
		- Cannot bypass process if Actiflo goes down causing entire WTP to run at half capacity
			- Increase flow rate to maximize available capacity
			- Construct additional Actiflo train of equal or smaller capacity
			  ○ There is existing space on site beside existing second Actiflo train.
			  ○ Would require a new building for the train
			  ○ Additional upgrades to other preliminary treatment processes and associated piping.

Ozonation	102,000	- Existing ozone equipment is difficult to service as it is obsolete
		- Generator and contact chamber size are limiting factors
		- Regular maintenance is required to keep system operational
			- Increase operating capacity
			  ○ Space in existing building to add third ozone generator to increase capacity to 150,000 m^3/day.
			  ○ Additional contact chamber cannot be accommodated within the existing building
			- Eliminate ozone process
			  ○ Currently only used for taste and odour
			  ○ Would increase treatment throughout other processes in the system
			  ○ Proposed RO system may also address some odour and taste concerns

Filtration	157,000	- Existing process pipe restriction - Backwash wells are the limiting factor in the filtration process as it takes too long to re-fill backwash well using existing gravity fed system. Currently limited to wash one filter every 3-4 hours	- Add additional filter bed. There is existing space on site to expand - Increase backwash well pump capacity to increase flowrate - Upsize or twin backwash wastewater piping to eliminate process pipe restrictions
UV Reactors	150,000	- Existing hydraulic limitations with flow splitting between three units - A 4th UV unit is currently being installed. Rated capacity is based on construction being complete and one unit offline (3 units)	- Additional UV unit should be considered to support additional demand to 2051
Chlorine Contact Chambers	118,000	- Three existing chlorinators that provide chemical addition are 20 years old and require upgrades	- Upgrade or replace existing chlorinators for chemical addition - Utilize reservoir for contact time
Residual Management Facility	100,000	- Flows through the facility are dependent on filter loading; designed for a typical waste stream when plant is running at 100,000 m^3/day. Filter loading could cause decrease in facility capacity - Filter backwash equalization tank is limiting process as it is only able to hold one backwash cycle	- Upsize or construct additional backwash equalization tank to increase backwash cycle time - Space to accommodate increase in capacity

*The intake canal capacity is storage volume not a flow, so uses units of m^3.

3.6. Brantford WTP Upgrade Alternatives

Three alternative approaches were considered to increase the WTP capacity to service growth to 2051. Each alternative considers general upgrade requirements for the range of potential future WTP design capacities (i.e., MDD) for the three growth scenarios: Low (119 MLD), Medium (133 MLD) and High (147 MLD). Process Flow Diagrams to illustrate the general high-level scope of each alternative are provided in **Appendix A**.

3.6.1. Alternative 1: Upgrading Existing Processes

Under this alternative, the proposed upgrades to service 2051 growth will be completed by maintaining the existing treatment approach, and upsizing unit processes as required to meet future needs:

- **Intake Channel:** dredge channel to maximize available storage volume in short term. In long term, increase intake storage capacity to meet 48 hours of total system storage under future MDD. Cost is based on installing a new channel to the WTP. As this would involve substantial constructability challenges, land acquisition and cost, the City may also consider alternate means to mitigate risk to the water supply. This may include increasing the quality threshold that would necessitate closure of the Grand River supply to the intake channel, thereby reducing the likelihood of needing to rely on emergency storage. This may be feasible after the RO treatment system is added, which will allow for a higher level of treatment. However, this approach would require further study to confirm technological limitations.
- **Low Lift Pumping Station:** The maximum flow rate is 100,000 m^3/day for the existing pump combination, with one pump out of service. To increase the capacity, the following options should be reviewed:
    - Option A: Add one to three additional pumps or add one additional pump and/or upsize the capacity of the existing four pumps
    - Option B: Construct a second low lift pumping station with intake structure to provide redundancy and additional capacity if insufficient space is available to increase capacity within existing station (there is insufficient space to add more than one new pump)
- **Header:** To provide security of supply, upsize or twin the existing 900 mm header pipe.
- **Polymer System:** Additionally, the existing polymer dosing has a rated capacity able to treat up to 86,500 m^3 of water per day. Additional polymer dosing capacity is required to meet future plant flow of 133,000 to 169,000 m^3/day. Polymer feed tanks were just replaced and can be used going forward. The opportunity to increase tankage should be reviewed during the design phase.
- **Actiflo System:** The Actiflo system consists of two trains, with a design capacity of 75,000 m^3/day each though it was indicated that they are currently operating at 50,000 m^3/day.
    - Optimize existing trains to bring them back to design capacity
    - Consider one to two additional trains in the existing space beside the second train to increase redundancy under all growth scenarios and provide needed future capacity under high growth scenario; this would require a new building or building expansion. All process piping for the preliminary treatment will need to be upgraded to allow capacity upgrades.

- **Ozonation:** The existing ozonation system has a rated capacity of 102,000 m^3/day with two generators and contact chambers. To increase the capacity, one additional generator and contact chamber is required. There is room in the existing building for one additional generator; however external accommodation will be required for the additional contact chamber.
- **Filtration:** The backwash well and pumps will need to be assessed and upgraded to increase backwash process time to meet new capacity. A new filter will also be required under the high flow scenario, if they are sized to match the existing filters this would increase the rated capacity from 157,000 m^3/day to 176,000 m^3/day.
- **Chlorine Contact Chambers:** An additional chamber and chemical pumping capacity is required for all growth scenarios.
- **Residual Management:** The residual management facility has been designed for a typical waste stream when plant is running at 100,000 m^3/day with 125,000 m^3/day being the upper limit. The capacity would need to be increased to accommodate proposed increase in plant capacity.

Increasing the capacity through upgrades to the intake channel, low lift pumps, header, polymer system, Actiflo system, ozonation, filter beds, chlorine contact chamber and residual biosolids management in addition to other process upgrades will allow for growth servicing to 2051. The specific scope of required upgrade varies for the low, medium or high growth scenarios. The addition of these major processes will provide the WTP with an additional security of supply as major components can be offline for maintenance or cleaning while maintaining the required design capacity.

3.6.2. Alternative 2: Decommission Ozonation System

Alternative 2 is very similar to Alternative 1 with the following exception: rather than increasing ozonation capacity, Alternative 2 includes decommissioning the existing ozonation system and repurposing the tanks as additional Actiflo treatment capacity. This will delay the need to add a third Actiflo treatment train and the associated required building expansion to post 2051. Additional investigation of retrofit approach and to confirm additional capacity that could be obtained through this retrofit is a recommended next step.

3.6.3. Alternative 3: Use Reservoir for Disinfection Contact Time

Alternative 3 is very similar to Alternative 1 with the following exception: the existing reservoir will be used for additional chlorine disinfection contact time, eliminating the need to construct an additional clearwell and chemical dosing system for chlorine disinfection. This also reduces the available storage in the reservoir and will require more complex management of storage time in the reservoir to ensure sufficient contact time. It will also require consideration for alternative storage capacity in the water system to maintain total required storage for equalization and fire flow.

3.7. Alternatives, Evaluation and Implementation

The evaluation process is summarized in **Table 3-6**. Alternative 2 is recommended as it is cost effective while still providing a high quality of treatment and makes best use of existing infrastructure. The costs for upgrade alternatives were given as ranges to account for the three growth scenarios. A more detailed cost estimate table for each alternative and growth scenario can be found in **Appendix C**.

Implementation of Alternative 2 should consider the following phasing of upgrades:

Short Term (<5 Years):

1. Design, construct and commission permanent Reverse Osmosis system and monitor performance, with special consideration for treatment of odour and taste
2. Confirm preferred method for treatment of odour and taste through additional study to compare RO, ozonation and hydrogen peroxide

Mid Term (5 – 10 Years):

1. Evaluate the feasibility of optimizing/retrofitting the existing Actiflo process for the possibility of regaining design capacity or alternatively, replace existing system as required.
2. Dredge Holmedale canal to increase capacity. Review feasibility of twinning or upsizing canal.

Long Term (10+ Years, before 2051):

1. Increase WTP capacity, potentially in phases, to include:
    - Intake canal capacity increase
    - Low Lift Pump Station Upgrade
    - Twin 900mm header
    - Convert Ozonation to additional Actiflo treatment if RO is deemed sufficient for taste and odour treatment; otherwise, maintain ozonation and add third Actiflo treatment train in building extension.
    - Filtration upgrades
    - Clearwell and chlorine dosing upgrades
    - Residual Management Upgrades
2. Increase supply intake storage capacity.

Very Long Term (post-2051):

1. Review opportunities to construct a new WTP with a new intake location, once the existing site has been built out to capacity, with a location to consider future projected growth allocations. This will also provide an opportunity to increase system storage in case of an emergency.

We note that the implementation plan does not explicitly list implementation of full-scale reverse osmosis (RO). The City is already planning to implement RO, so this is excluded from the costing comparison included in **Table 3-6**. However, the cost of RO is considered in development charge calculations.

Table 3-6: Evaluation of WTP Upgrade Alternatives

	Alternative 1	Alternative 2	Alternative 3
Description	Maintain all existing processes and upsize existing equipment to meet future capacity needs	Decommission Ozonation and retrofit to expand Actiflo	Utilize portion of reservoir for chlorine contact time and maintain existing clearwells
Advantages	• Processes are familiar to operations staff • Level of treatment is maintained and consistent between trains	• Reduced cost and construction time compared to Alternative 1 • Less operational complexity with one less process to run ahead of RO commissioning	• Moderate cost and construction time
Disadvantages	• Most costly option which will require the most additional infrastructure • Space restrictions could be encountered on the site	• Potential decline in odour and taste treatment, pending effectiveness of RO system • Potential challenges retrofitting existing structures/equipment, depending on condition. Added complexity of design	• Increased operational complexity • Reduced disinfection redundancy
Environmental Impacts	• Some potential for moderate impacts during construction	• Lower impacts during construction	• Lower impacts during construction
Social/Cultural Impacts	• Highest potential construction impacts	• Lower construction impacts	• Lower construction impacts
Upgrade Costs	~ $103 - 163 M	~ $85 - 141 M	~ $96 - 156 M
Four-Point Criteria Evaluation	 Technical  Environ-mental  Social & Cultural  Financial	 Technical  Environ-mental  Social & Cultural  Financial	 Technical  Environ-mental  Social & Cultural  Financial
Recommendations	Alternative 1 could be considered if RO is not effective at treating odour/taste and ozonation is deemed necessary to maintain.	**Alternative 2 is recommended** due to reduced construction requirements, cost savings, and better use of existing assets while maintaining the required level of treatment.	Alternative 3 is not recommended as using the reservoir for disinfection contact time increases operational complexity and reduces system storage and redundancy.

4. Brantford Wastewater Treatment Plant

4.1. Facility Overview

The Brantford Wastewater Treatment Plant (WWTP) is located at 385 Mohawk Street adjacent to the Grand River in southeast Brantford. The WWTP is a Class IV conventional activated sludge (CAS) facility rated for 81,800 m^3/day per ECA 1860-9Q7LK9. Influent is conveyed by gravity to a single raw sewage pump station, followed by preliminary treatment using mechanical bar screens and vortex grit removal. Flow is then distributed to two Process Modules (PMs) for primary clarification, aeration and secondary clarification, followed by chlorine disinfection and de-chlorination ahead of effluent discharge to the Grand River via a 2km outfall sewer. Primary and secondary sludge is digested anaerobically before being transferred to onsite storage tanks for subsequent land application. Biogas is used to heat boilers with excess gas flared.

Several projects at the WWTP are currently planned or in design or construction that do not increase the WWTP capacity, but should be considered when developing recommended upgrades to service growth. These projects are summarized below:

- On-going rehabilitation work is underway for the digesters, primary clarifiers, and secondary clarifiers.
- The chlorine disinfection at the plant is being currently replaced with UV disinfection which will include three UV reactors with a capacity of 86,000 m^3/day each.
- A new effluent pumping station is currently in design; these pumps could also be used for raw sewage pumping when river levels are low and they are not needed for effluent pumping. Conceptual design has been completed for a new plant outfall.
- A study has been completed that recommended combining anaerobic digester biogas with landfill gas at a central gas utilization facility northwest of the WWTP property on the adjacent landfill property, also owned by the City.
- It is assumed that all treatment units currently out of service for maintenance will be put back into service before additional space is used to construct new units. This includes the clarifiers currently requiring mechanical upgrades.
- Once the WWTP reaches 80% of its current capacity, the City is also considering adding waste activated sludge (WAS) thickening, and biosolids storage upgrades or biosolids dewatering to reduce storage requirements.

4.2. Influent Flow Projections

To understand future capacity needs for Brantford WWTP, flows associated with growth were added to historical average day flows. A summary of the historical average day flow (ADF), the maximum monthly ADF and maximum day flow (MDF) at the Brantford WWTP over the period of 2019 to 2023 is presented in **Table 4-1**.

Table 4-1: Historical Wastewater Flows

	ADF (m^3/day)	Max Month ADF (m^3/day)	MDF (m^3/day)
2020	32,500	38,900	72,600
2021	32,500	37,800	49,200
2022	36,200	42,500	59,400
2023	41,900	58,200	78,500
2024	42,500	49,400	82,400
Average	**37,200**	**45,400**	**68,500**
Maximum	**42,500**	**58,200**	**82,400**

Table 4-2 summarizes the range of projected 2051 influent flows to the WWTP for different growth scenarios. The design criteria used to calculate wastewater flows is based on the same criteria used for the ongoing MSP Update as follows:

- Growth related dry weather flow: 245 L/capita/day (residential) and 270 L/capita/day (employment)
- Harmon's Peaking Factor
- Peak Extraneous flow rate for new greenfield and infill development of 0.3 L/s/ha

The rated capacity of the WWTP is based on anticipated average day influent flow, while individual process units are sized for different flows as indicated in **Table 4-2** below, which also indicates projected 2051 flows under different growth scenarios.

Table 4-2: Historical and 2051 Wastewater Flows

		Average Day Flow (m^3/day)	Max Month ADF (m^3/day)	Max Day Flow (m^3/day)	Max Hour Flow (m^3/day)	Peak Instantaneous Flow (m^3/day), 1-in-10 year storm
Historical (2019-2023)		37,200	45,700	82,400	156,000	159,000
2051	**Low**	72,700	88,800	202,000	265,000	311,000
	Medium	79,600	97,300	213,000	271,000	319,000
	High	87,200	107,000	225,000	275,000	324,000

Table 4-3: Design Basis for Wastewater Treatment Process Units

Process Unit	MECP Design Guidelines for Sewage Works, 2016 (Table 8-2)	Wastewater Engineering Treatment and Resource Recovery, Metcalf and Eddy, 5th Ed	Current Process Design Basis to be used as Future Design Basis for Capacity Review
Raw Sewage Pumping	Peak Instantaneous Flow	Peak Hourly Flow	Peak Instantaneous Flow
Forcemain	Peak Instantaneous Flow	Peak Hourly Flow	Peak Instantaneous Flow
Screening	Peak Instantaneous Flow	Peak Hourly Flow	Peak Instantaneous Flow
Grit Loading	Peak Hourly Flow	Peak Hourly Flow	Peak Hourly Flow
Primary Clarification	Peak Daily Flow	Peak Hourly Flow (effluent trough and weirs for Peak Daily Flow)	Peak Daily Flow
Aeration Tanks	Average Daily Flow		Average Daily Flow
Secondary Clarifiers	Peak Hourly Flow	Peak Hourly Flow (effluent trough and weirs for Peak Daily Flow)	Peak Hourly Flow
Chlorine Contact Chamber	Peak Hourly Flow	Peak Hour/Day Flow	Peak Hourly Flow
UV Disinfection	Peak Hourly Flow		Peak Hourly Flow
Anerobic Digestion	Max Month Average Day Flow	Sludge Pumps (Peak Daily Flow) Peak 15-day Mass Loading	Max Month Average Day Flow
Biosolids Storage	Max Month Average Day Flow (providing 150 days of storage)	Peak Month Mass Loading	Max Month Average Day Flow (providing 150 days of storage)

Finally, the projected change in influent flow to the WWTP over time is illustrated in **Figure 4-1** below, which indicates that a capacity upgrade will be triggered between 2044 and 2051 depending on the growth scenario, assuming linear growth.

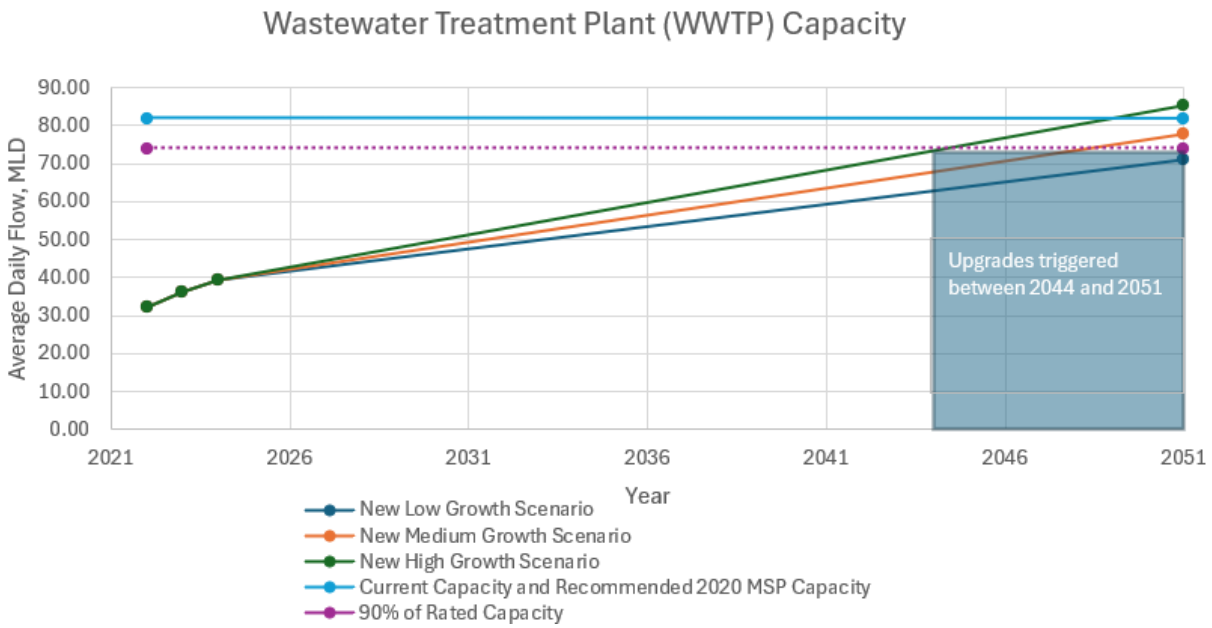


Figure 4-1: Projected Average Day Flow to Brantford WWTP

4.3. Process Capacity Overview

The WWTP has a current rated treatment capacity of 81,800 m^3/day based on the ECA. Using the existing ADF of 37,200 m^3/day, some processes are undersized for the existing flows; and all processes fall short of the design basis for 2051 projected flows. **Figure 4-2** and **Table 4-4** summarize the WWTP processes and corresponding capacities. A process flow diagram for the existing WWTP is provided in **Figure 4-3**.

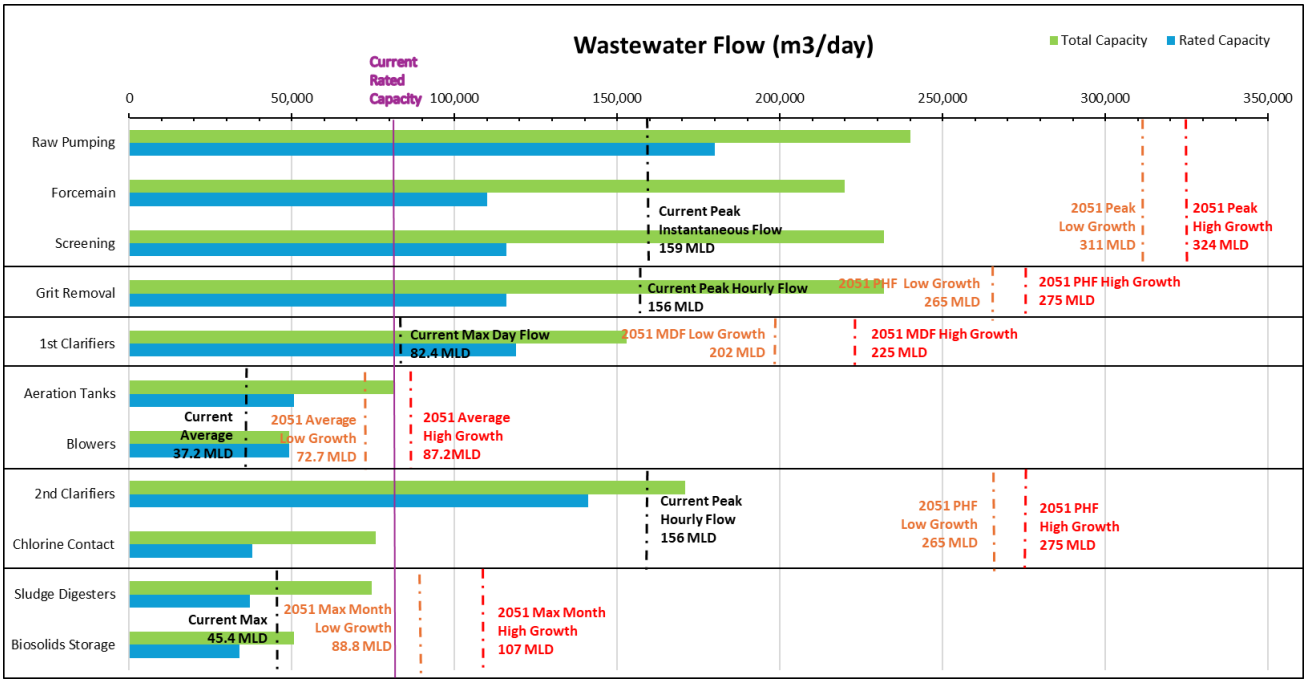


Figure 4-2: WWTP Unit Capacity Summary

Table 4-4: Brantford WWTP Capacity Process Overview

Process	Elements	Total Design Capacity		Rated Capacity (Actual capacity with 1 unit offline), m^3/day	Required Capacity by 2051, m^3/day
		PM1 Capacity, (m^3/day)	PM2 Capacity, (m^3/day)		
Raw Sewage Pumping	(4) pumps rated @ 60,000 m^3/day	240,000		180,000	311,000 – 324,000
Forcemain	(2) 900 mm forcemains	220,000		110,000	311,000 – 324,000
Preliminary Treatment – Screening	(2) trains at 116,000 m^3/day	232,000		116,000	311,000 – 324,000
Preliminary Treatment – Grit Chambers	(2) trains at 116,000 m^3/day	232,000		116,000	265,000 –275,000
Primary Clarifiers	(4) clarifiers for PM1 and (2) clarifiers for PM2	85,900	67,600	119,000	202,000 – 225,000
		153,000 (total)			
Aeration Tanks	(2) tanks for PM1, (2) tanks for PM2	61,500	19,800	50,500	72,700 – 87,200
		81,300			
O_2 Availability	(2) new 300 HP turbo and (1) 200 HP turbo and (1) 300 HP centrifugal blower	65,500		49,100	72,700 – 87,200
Secondary Clarifiers	(2) clarifiers in service and (4) clarifiers out of service at PM1 and (2) clarifiers at PM2	59,400	59,400	89,000 (141,000)[1]	265,000 – 275,000
		118,800			
Chlorine Contact Chamber[2]	(1) Tank and pipe based on 30 min CT	37,900 (30 min CT at ADF) 75,800 (15 min CT at PHF)		--	N/A
Dechlorination Facilities[2]	(4) 3,100 L Chemical Tanks and (2) pumps at 50 L/hour	44,000 (30 min CT at ADF) 58,700 (15 min CT at PHF)		29,300--	N/A
UV Disinfection	*(3) 85,500 m^3/day reactors planned*	*256,500*		*171,000*	265,000 – 275,000
Sludge Digesters	(2) primary digesters and (1) secondary digester with (2) pumps at 15 day HRT	74,400		37,200	88,800 – 107,000
Biosolids Storage	(3) tanks at 150 days HRT	50,700		33,800	88,800 – 107,000

1. Anticipated capacity with all clarifiers back in service
2. City plans to decommission chlorine disinfection and de-chlorination and replace with UV disinfection

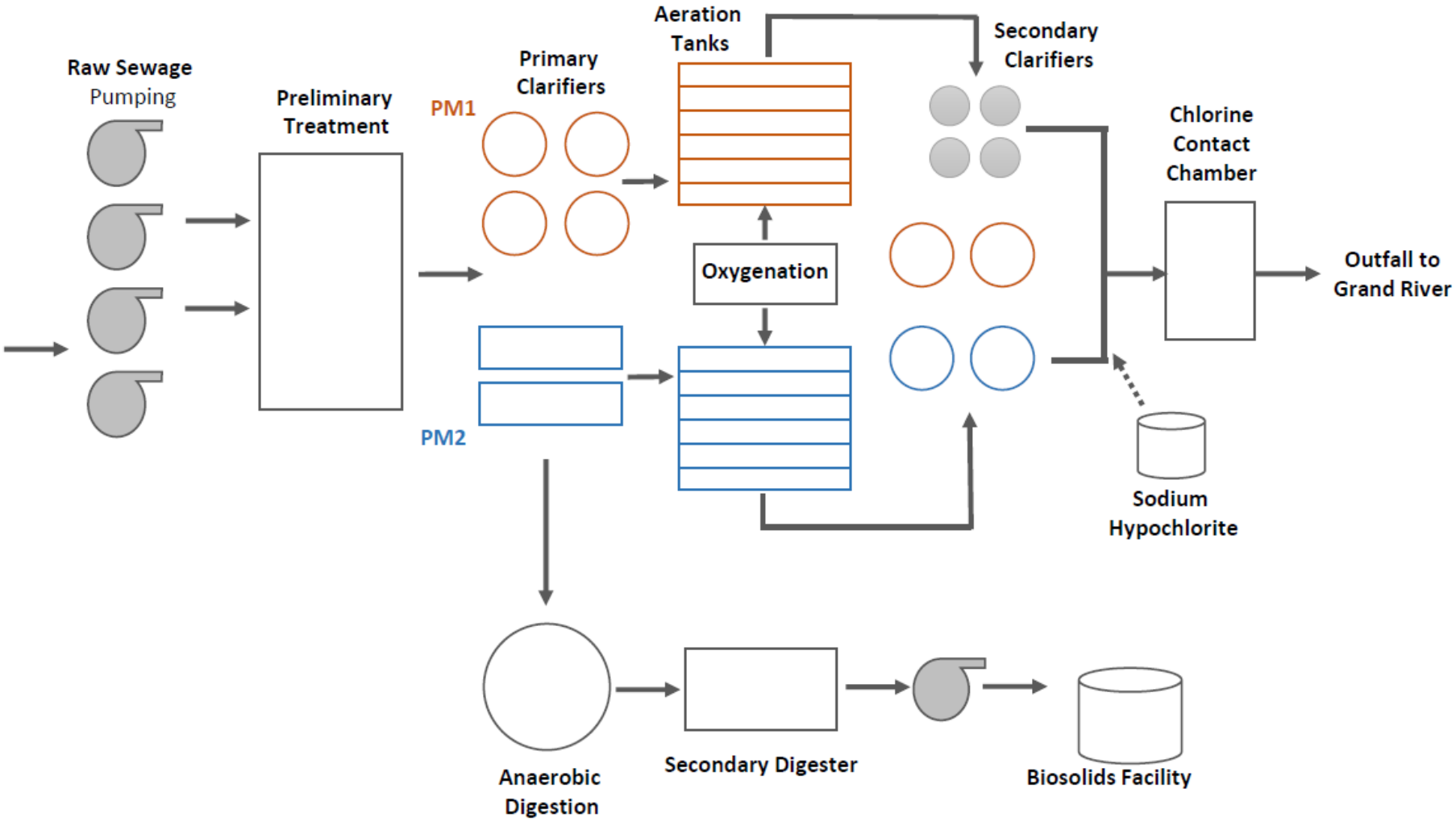


Figure 4-3: WWTP Process Flow Diagram

4.4. Brantford WWTP Processes

4.4.1. Raw Sewage Pumping

Wastewater is collected in two (2) main trunk sewers, one (1) 1,200 mm diameter and one (1) 1,350 mm diameter and enters the raw sewage pumping station through two influent channels. The pumping station contains a two-cell wet well, and a dry well with four (4) centrifugal pumps each rated at 60,000 m^3/day at 15.8 m TDH with a combined rated (operating) capacity of 180,000 m^3/day with three (3) pumps in operation. The pumps direct wastewater to the preliminary treatment building through two (2) 900 mm forcemains. There is one (1) 750 mm forcemain that sends wastewater directly to the PM2 primary clarifiers to perform maintenance on the preliminary treatment building; however, it is closed under normal conditions. The operation of the pumping station is greatly impacted by the lack of adequate wet well storage. A new wet well is proposed for any pump additions.

4.4.2. Preliminary Treatment

The preliminary treatment building receives raw sewage discharge from the raw sewage pumps. There are two (2) screening channels with mechanically raked bar screens with 12 mm clear spacing with a peak capacity of 116,000 m^3/day that outlet to a combined downstream channel. The building also contains two (2) grit chambers with two (2) blowers for air scour and lift, with a peak capacity of 116,000 m^3/day each.

4.4.3. Primary Clarifiers

Effluent from the preliminary treatment building is distributed to two (2) activated sludge facilities: Process Module #1 (PM1) and Process Module #2 (PM2). Primary clarification for PM1 consists of four (4) circular primary clarifiers and primary clarification for PM2 consists of two (2) rectangular primary clarifiers. The current flow split is 67% through PM1 and 33% through PM2. MECP design guidelines dictate that a surface overflow rate of 25 to 30 m^3/m^2/day is maintained under average day conditions, and a surface overflow rate of 50 to 60m^3/m^2/day (double the average day guideline) is maintained on flows during the peak day. Based on these guidelines the current clarifiers have an average day rated capacity of 59,800 m^3/day and a peak day rated capacity of 119,000 m^3/day. These rated capacities exceed the average and peak day flow currently seen at the plant.

Given the current daily flow peaking factor of 2.2, the peak day surface overflow guidelines are more restrictive than the average day surface overflow requirements. With the assumption that peaking factors will remain similar in 2051, the peak day flow and surface overflow rate of 60m^3/m^2/day was used to size the clarifier upgrade requirements for future growth.

4.4.4. Aeration Tanks

Effluent from the primary clarifiers is directed to the aeration tanks. Aeration for PM1 consists of two (2) three-pass flow tanks with a capacity of 61,500 m^3/day based on a 6-hour HRT. Aeration for PM2 consists of two (2) three-pass flow tanks with a capacity of 19,800 m^3/day based on a 6-hour HRT. The PM2 aeration tank limits the flow through the primary clarifiers and secondary clarifiers as it provides lower

capacity than the other two (2) unit processes. PM2 also provides significantly less capacity compared to PM1 and therefore does not provide adequate redundancy.

4.4.5. Oxygenation

Process air is provided by blowers contained in a shared building for PM1 and PM2. There are two (2) new 300 HP turbo blowers, one (1) 200 HP turbo blower and one (1) 300 HP centrifugal blower. Typically, a combination of the blower types are in service with one (1) of the turbo blowers on standby. Using a criteria of 1.0 kg O_2/kg BOD_5 rem/day and 4.6 kg O_2/kg TKN rem/day, the blowers have a capacity of 49,158 m^3/day, with two (2) 300 HP blowers and one (1) 200 HP blower in service and the 300 HP centrifugal blower in standby.

4.4.6. Secondary Clarifiers

The secondary clarifiers receive flow from the aeration tanks. Secondary clarification for PM1 consists of four (4) small circular clarifiers and two (2) large clarifiers with four (4) return activated sludge pumps. The four (4) small clarifiers are not currently in service; however, they could be placed into service with minor maintenance. Secondary clarification for PM2 consists of two (2) large circular secondary clarifiers with two (2) Archimedes screw return activated sludge pumps. One (1) of the large secondary clarifiers from PM2 is out service but could be placed into service with mechanism replacement. A solid loading rate (SLR) of 170 kg/m^2/day and surface overflow rate (SOR) of 37 m^3/m^2/d were used to size future process requirements at peak hourly flow, as per the MECP design guideline when the upstream activated sludge process incorporates chemical addition for phosphorus removal. PM1 and PM2 have a peak hourly flow capacity of 59,340 and 29,670 m^3/day respectively. With the four small clarifiers back in service at PM1, the capacity is 112,000 m^3/day and with the return of the second large clarifier at PM2, the capacity is 59,300 m^3/day. This gives a total plant peak hour capacity of 171,300 m^3/day and rated peak hour capacity of 141,700 m^3/day. The estimate of the current peak hour flow in the case of a modelled 10-year storm event is 156,000 m^3/day, which can be accommodated only with the total capacity of all clarifiers back in service

The PHF was used to determine future capacity needs as per MECP recommendations, though the operating conditions under average conditions was also evaluated to ensure the plant operates well under the most common conditions. Using the historical average flow of the last five years, and the three clarifiers currently in service, the average SOR at the plant is 15.38 m^3/m^2/d. The plant is likely operating withing the Metcalf and Eddy recommended range of 16 to 28 m^3/m^2/d given that not all clarifiers were operating for the entire five years. With all clarifiers back in service, the rated SOR (with one unit offline) of the clarifiers under average flows would be 18.9 to 22.7 m^3/m^2/d depending on the growth scenario, which is within the recommended range per Metcalf and Eddy.

4.4.7. Disinfection & De-chlorination

Disinfection of the effluent is achieved via sodium hypochlorite as the two streams from PM1 and PM2 merge before discharging to the Grand River. The disinfection facility consists of seven (7) chemical storage tanks, three (3) chemical metering pumps and one chlorine contact chamber (CCC). The CCC has an area of 554 m^3 with a combined pipe and tank volume of 790 m^3. The CCC is based on a 30-minute CT for average day flow and 15-minute contact time for a peak hour flow with a total capacity of 37,920

m^3/day and 75,840 m^3/day, respectively. As there is only one CCC there is no redundancy and no rated capacity.

The effluent is de-chlorinated by sodium bisulphite, which has theoretical dosage of 1.46 mg/L required by the MECP (10% additional chemical is required to account for non-ideal mixing). The de-chlorination facility consists of four (4) tanks with a capacity of 3,100 litres each and two (2) pumps (1 duty and 1 standby). The pumps have a capacity of 50 L/hour each.

4.4.8. Anaerobic Sludge Digesters

Two primary anaerobic digesters collect co-thickened raw sludge from the primary clarifiers that is a mixture of waste activated sludge and primary activated sludge. Digested sludge overflows by gravity to a secondary digester before it is pumped to the biosolids storage facility. The sludge digesters have a capacity of 74,464 m^3/day based on an HRT of 15 days.

4.4.9. Biosolids Storage

The biosolids handling facility is located on the west side of Mohawk St across the road from the WWTP and is comprised of three (3) tanks with a total volume of 24,000 m^3 and four (4) mixers per tank. The biosolids storage tanks have a capacity to service a WWTP with a capacity in the liquid train of 50,785 m^3/day. The capacity is based on 150 days of storage and the ability to decant approximately 3,000 m^3 per tank during the storage period of December to April. Operations staff have noted that the tanks could be decanted up to two times over the course of the winter, which would add additional storage capacity; however, for sizing purposes, it is assumed that each tank is only decanted once. It was noted that even using the average flow from the maximum month, 150 days does not provide a lot of flexibility and designing for an additional month (180 days) should be considered.

4.5. Process Capacity Constraints and Opportunities

The WWTP processes were reviewed to determine limiting capacities and potential opportunities at the existing facility. These opportunities were further evaluated to determine alternative solutions for system upgrades as presented in **Section 4.6**.

Table 4-5: WWTP Process Assessment

Process	Rated Capacity (Actual capacity with 1 unit offline), m^3/day	Limitations	Opportunities
Raw Sewage Pumping	Raw Sewage Pumps: 180,000 Forcemain: 110,000	- Raw sewage pumping station already a concern at the current flow rates due to limited storage within the wet well. - There were overflow events in July 2024 and April 2025. - High river levels cause water to enter pumping station through the overflow channel, isolating the overflow from the pump station. This occurs regularly every spring and fall even without significant flow.	- There is no room for an additional pump in the existing building; however, opportunity to expand wet well to improve operation of the wet well. - Pumping capacity cannot be upgraded until upsizing of the downstream units and channels are complete. Additional flows pumped into the current configuration have been observed to cause flooding in the Preliminary Treatment Building (PTB).
Preliminary Treatment	116,000	- Combined downstream channel for screens adds a flow restriction despite the hydraulic capacity of the screens. - No automation in bypass of screening or grit removal processes.	- Project completed to automate valves for the main sluice gates out of preliminary treatment and into PM1 and PM2 for better isolation - Rehabilitation of clarifiers in PM 1 and PM 2 is underway or planned to improve capacity.

Primary Clarifiers	119,000	- Flow is maintained manually between the Process Modules; however, flow split can be limiting factor.
		- Based on previous assessments and success on clarifiers #1, #2 and #4, the clarifier mechanisms (for sludge and scum collection) including gearboxes and motors, effluent weirs, flow distribution gate valves and other associated items are being replaced for primary clarifiers #3, #5 and #6.
			- To increase clarifier capacity,
			  o Construct a separate waste activated sludge (WAS) thickening facility which would increase capacity to range of 76,500 – 102,000 m^3/day
			  o There is existing space on site to add additional clarifiers

Aeration Tanks	50,500	- Process Module split is current limitation as PM2 aeration tanks limit flow through other PM2 processes.
		- Redundancy is important as when the tank is cleaned it needs to be taken offline for two months to complete.
		- Current process cannot handle peak flows. These flows will bypass aeration tanks to secondary clarifiers.
			- Redistribute flows after primary clarifiers
			  o Currently it can be done manually but may consider automating the splitting valve.
			- Treat higher flows
			  o Add step-feed system – PM1 had an existing system that is being removed due to poor condition. A new system could be added to PM1 and PM2.
			- Increase capacity of PM2 from 19,808 m^3/day to 28,150 m^3/day to be in line with primary clarifiers. This will have a larger impact on meeting capacity need than a step-feed system.

Oxygenation	49,158	- Two (2) of the existing 300 HP blowers were replaced with energy efficient blowers in 2019. - There is a fourth blower that provides redundancy in the event of failure	- There is room in the existing building for an additional blower or upsizing of existing blowers - Consider smaller blowers as opposed to one large blower to reduce overall lifecycle costs
Secondary Clarifiers	141,000	- Some of the original secondary clarifiers are still in service today and at the end of their useful life.	- Construction has been initiated for upgrades to secondary clarifiers #3, #4, #5, #6 and #8. Rated capacity is assuming all clarifiers are back online.
Disinfection & De-chlorination (Future UV Disinfection)	37,900 (future UV 171,000)	- Chlorine contact tank volume is a limiting factor; the piping before and after the contact chamber prior to the addition of sodium bisulfite is used to calculate contact time. - Issues when river level is high as water has come close to backing up into the contact chamber and up to the overflow channel from the raw sewage pumping station - Currently super-chlorinating of the effluent is completed when flows exceed 37,000 m^3/day because the contact time is not being achieved	- There is a current project in place to transition to UV disinfection. This cost was not included in the evaluations as it is already planned o The project will consist of 3 reactors, each with a capacity of 85,500 m^3/day. This covers the current capacity requirements and the requirements of future growth - New effluent pumping station is being planned to allow discharge during high river levels
Anaerobic Sludge Digesters	Sludge Digesters: 37,200 Biosolids Storage: 33,800	- Additional storage is needed for flexibility. More than five months of storage is preferred, and it should be considered that the tank is never fully emptied so not all tank volume is usable storage.	- Decant system in storage tanks was replaced with a system that allows the removal of supernatant at various levels regardless of the volume of biosolids in the storage tanks, increasing storage capacity - Construct WAS thickening facility (as indicated in the Primary Clarifier row) to lower capacity needed by concentrating the solids and reducing the volume

4.6. Brantford WWTP Upgrade Alternatives

Four alternative approaches to upgrade the WWTP were developed and evaluated. The process flow diagrams for a general high-level scope of each alternative are provided in Appendix B.

4.6.1. Alternative 1: Increase Capacity Using Existing Treatment Process

Under this alternative, the WWTP would be upgraded to increase capacity sufficiently to service 2051 flows under the low, medium and high growth scenario by installing additional capacity using existing treatment technologies. All system processes requiring upgrades are indicated below:

- Raw Sewage Pumping: Additional pumps would be required at the current size to increase the total capacity to the peak instantaneous flow (PIF) of 311,000 – 324,000 m^3/day. The current pump station does not have enough space for additional pumps and therefore an additional building and wet well would be required. The pumping capacity cannot be increased beyond the current design capacity of the downstream processes (grit and screening) or it will cause flooding in the PTB, unless these downstream processes are also upsized. Pump station upgrades shall be phased to ensure adequate capacity is available downstream.
- Forcemain: One additional 900 mm forcemains would bring the total capacity to 330,000 m^3/day.
- Preliminary Treatment: One additional screening channel with mechanical bar screen and one additional grit chamber with associated aeration would bring the total capacity to 348,000 m^3/day, exceeding the 2051 requirements.
- Primary Clarifiers: The existing primary clarifiers, with all put back into service, have a rated capacity of 119,000 m^3/day. The primary clarification capacity would need to almost double to bring the capacity to 202,000 to 224,000 m^3/day which accommodates the 2051 maximum day flow projections. Design basis for primary clarifiers should be confirmed based on anticipated operation (i.e., will primary clarifiers remain operational during a secondary by-pass?).
- Aeration Tanks: The aeration tanks have sufficient combined total capacity to accommodate 81,300 m^3/day; however, PM2 is inadequate and there would be no redundancy. An increase to PM2 aeration tank volume from 19,800 m^3 would also allow the aeration tanks to accommodate 72,700 to 87,200 m^3/day. Two to three additional blowers would be required to service these tanks.
- Secondary Clarifiers: The secondary clarifiers would have a rated capacity of up to 141,000 m^3/day if all existing clarifiers are brought back into service. The existing and additional clarifiers will require upgrading the hydraulic cross connection pipe between PM1, and PM2 to utilize existing process capacity. To increase the total secondary clarification capacity to the 2051 peak hour flow, the 5 secondary clarifier modules currently out of service would be required to be brought back into service and four additional clarifiers would be required.
    - The City is currently using average flow to determine capacity of the secondary clarifiers. Continuing to use this approach would be reasonable as peak hour flows will generally not reach the secondary clarifiers considering the upstream aeration tanks are designed for

average day flow and there is no bypass for the aeration tanks. Furthermore, Wastewater Engineering Treatment and Resource Recovery (Metcalf & Eddy, 5th edition) suggests that average day flows are appropriate for sizing secondary clarifiers granted that peak flows to the secondary clarifiers are of short duration. If this approach is used, no additional tanks will be required.

- UV Reactors**:** The current project to convert disinfection from chlorine to UV is sufficient for existing PHF but two additional reactors will be required for the 2051 PHF.
- Anaerobic Digestion: The existing anaerobic digesters have a total capacity of 74,464 m^3/day. To increase the total capacity, one additional digester would be required. The plant already has space for an additional digester between primary clarifier #5 and secondary clarifier #3.
- Biosolids Storage Tank: The existing biosolids storage has a total capacity of 50,785 m^3/day with all tanks utilized. The storage capacity needs to be increased by a volume equal to four to five of the existing solids storage tanks depending on the growth scenario. This requirement should be reevaluated given the effectiveness of the new decant system and the additional level of supernatant removal is reviewed to indicate the new rated capacity that the existing system can service.

There is also the opportunity to redistribute flows between process modules before the aeration tanks as the aeration PM2 is the limiting process. There is an existing cross connection pipe before the aeration process modules that can be altered to allow flow from the primary clarifiers to go from PM2 to PM1, allowing better flow balance between these units. Additionally, there is an existing cross connection pipe after the aeration tanks that can be altered to allow flow from PM1 to PM2 to utilize existing capacity throughout the processes.

Increasing the capacity as indicated above will service the existing population and growth in the City to 2051. The City should confirm the design flow basis and level of redundancy for each unit process early in the design process.

4.6.2. Alternative 2: Sludge Thickening

Alternative 2 is very similar to Alternative 1 with all upgrades carrying over except for the following modification: a WAS thickening facility will be installed upstream of the anaerobic digesters to improve digester performance and avoid the need to install more digesters to accommodate an increase in WWTP capacity. This will also better utilize the existing primary clarifiers, and sludge storage tanks, as the digested sludge will have a higher solids content to reduce volumes of sludge to be stored compared to the existing un-thickened sludge.

4.6.3. Alternative 3: Advanced Secondary Treatment

Alternative 3 is very similar to Alternative 1 with all upgrades carrying over except for the following modification: rather than expanding the existing secondary treatment system, the aeration tanks and potentially the secondary clarifiers would be replaced with an advanced biological treatment technology that would allow a larger flow to be treated within the existing area. Advanced treatment technologies that may be considered are membrane or fixed film bioreactors.

4.6.4. Alternative 4: Sludge Thickening and Advanced Secondary Treatment

Alternative 4 is similar to Alternative 1 with all upgrades carrying over except for the combined modifications of Alternatives 2 and 3. It incorporates both WAS thickening to reduce the need for digester and sludge storage upgrades, as well as incorporating advanced biological treatment.

4.7. Alternatives, Evaluation and Implementation

The evaluation process is summarized in **Table 4-6**. **Alternative 2** is recommended as it is cost effective, and makes best use of existing infrastructure, removing or delaying the need to install new digesters and reducing storage volumes. Furthermore, WAS thickening is expected to improve digester performance, and potential for biogas production, which will further support a centralized biogas utilization facility to capture as much energy value as possible from this renewable resource. The costs for upgrade alternatives were given as ranges to account for the three growth scenarios. A more detailed cost estimate table for each alternative and growth scenario can be found in **Appendix C**.

Implementation of Alternative 2 should involve construction of a new raw sewage pumping station in the short term to address the current wet well capacity issues that will be made worse by growth. This new raw sewage pumping station will be sized to match the current capacity of the downstream screening and grit removal process. In the mid-term, WAS thickening is recommended to regain capacity in the anaerobic digesters and biosolids storage. It is then recommended to continue flow monitoring as growth comes online and beginning to plan for capacity expansion to 2051 flows once WWTP reaches 80% of current rated capacity, expected within the 10 – 20 years. The current implementation strategy is detailed below:

Short Term (<5 Years):

1. Construct a new raw sewage pumping station with new forcemain to bring the pumping capacity to 230 MLD to match the current preliminary treatment capacity. Forcemain and wet well to be sized to the full build out capacity with provisions for future pumping and electrical capacity upgrades.

Mid Term (5 – 10 Years):

1. As wastewater flows increase over time, bring existing secondary clarifiers back online to meet operational needs.
2. Implement sludge thickening in the biosolids management infrastructure. Monitor the impact to the primary treatment, digesters and biosolids storage to determine the need for future upgrades to support full buildout capacity.

Long Term (10+ Years, before 2051):

1. Increase preliminary treatment capacity
    - Raw sewage pumping capacity increase to 2051 flows
    - Screening capacity increase to 2051 flows.
    - Grit Removal capacity increase to 2051 flows

- Primary clarifier capacity increase to 2051 flows

2. Increase secondary treatment capacity
   - Increase aeration tank and blower capacity for 2051 flows
   - Increase secondary clarification capacity for 2051 flows
3. Increase disinfection capacity
   - Increase UV reactor capacity for 2051 flows

Table 4-6: WWTP Alternative Evaluation

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Description	Increase plant capacity by upsizing existing equipment to meet future capacity needs	Increase plant capacity with addition of sludge thickening	Increase plant capacity and convert to Advanced Secondary Treatment	Combination of Alt 2 and 3: Add sludge thickening and advanced secondary treatment
Advantages	• Processes are familiar to operations staff • Level of treatment is maintained and consistent between trains	• Reduced cost and construction time compared to Alternative 1 • Reduced volume of sludge to be handled in digesters, storage and hauling	• Reduced cost and construction time compared to Alternative 1 • Reduced footprint for secondary treatment and clarification	• Most cost-effective alternative • Least construction time • Reduced volume of sludge to be handled in digesters, storage and hauling • Reduced footprint for secondary treatment and clarification
Disadvantages	• Marginally higher costly option which will require the most additional infrastructure • Space restrictions could be encountered on the site	• Increased operation complexity due to a WAS thickening process; less biosolids to be managing	• Increased design and operational complexity due to new secondary treatment process	• Increased operation complexity due to thickening process and new secondary treatment process • Increased design complexity
Environmental Impacts	• Highest impact during construction	• Moderate impacts during construction • Reduction in solids hauling	• Moderate impacts during construction	• Least impact during construction • Reduction in solids hauling
Social/Cultural Impacts	• Highest construction impacts	• Moderate construction impacts	• Moderate construction impacts	• Less construction impacts
Upgrade Costs	~ $101 - 118 M	~ $88 - 104 M	~ $93 - 109 M	~ $80 – 95 M
Four-Point Criteria Evaluation	Technical (yellow) | Enviro (yellow, red) | Social & Cultural (green, red) | Financial (yellow)	Technical (green) | Enviro (green, yellow) | Social & Cultural (yellow) | Financial (green)	Technical (red) | Enviro (green, yellow) | Social & Cultural (green, yellow) | Financial (yellow)	Technical (yellow, red) | Enviro (yellow, green) | Social & Cultural (green) | Financial (green)
Recommendations	Alternative 1 is not recommended as it is not the most effective way to service the growth	**Alternative 2 is recommended** as sludge thickening can reduce the need for digester and sludge storage upgrades and improve digester and primary clarify performance.	Alternative 3 is not recommended at this time due to its increased design and operational complexity, although may be considered post 2051	Alternative 4 is not recommended as Alternative 3 is not recommended

5. Recommendations and Next Steps

The projects identified in this memo will be considered as part the capital estimate under the 2025 MSP update. These costs will be further developed and refined during the design and implementation phase.

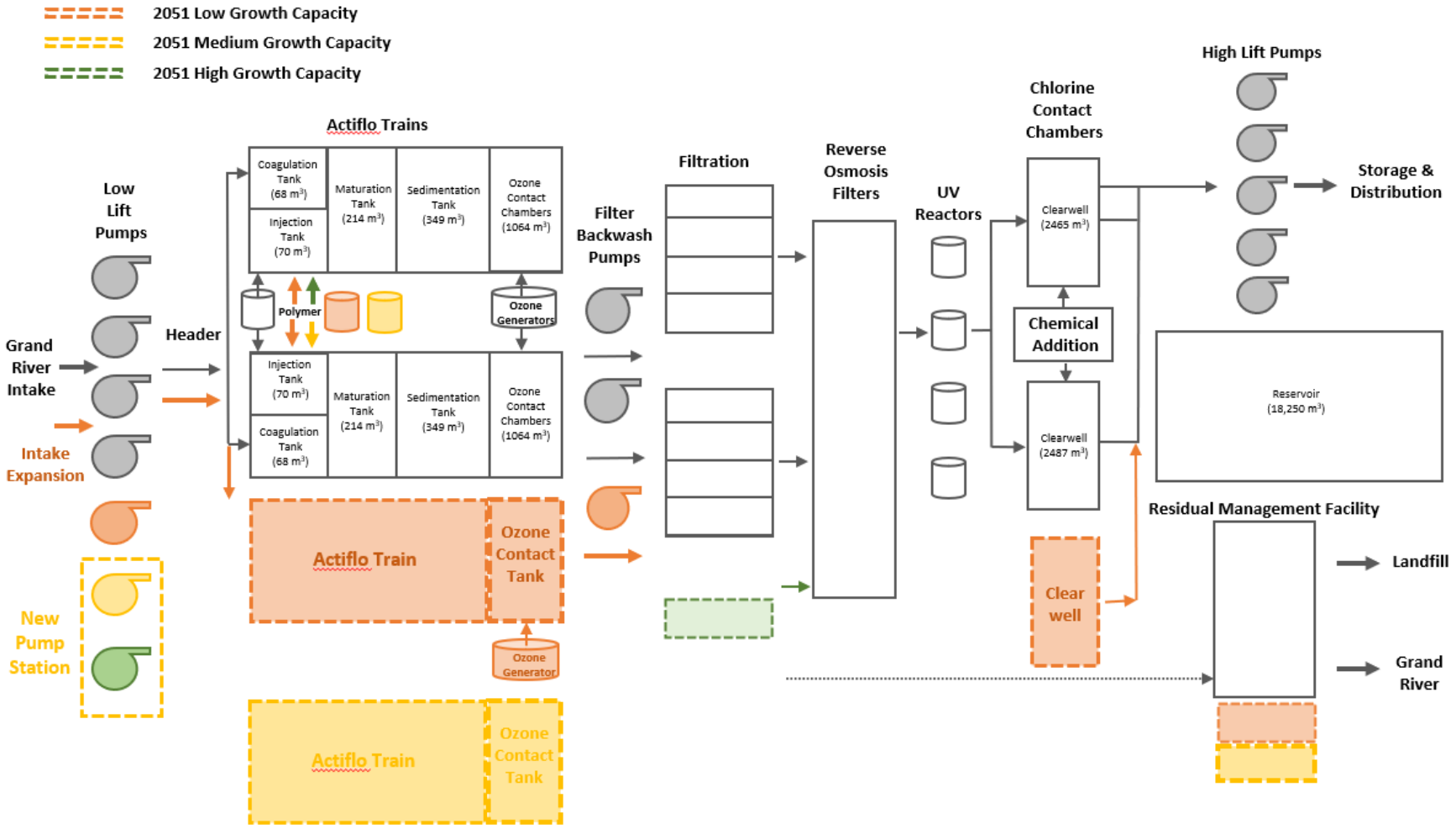
For the Holmedale WTP, Alternative 2 is recommended to service 2051 growth. This alternative involves decommissioning the ozonation system pending performance testing of the proposed RO system, resulting in significant cost and footprint savings when compared to keeping and expanding all the existing processes.

For the Brantford WWTP, Alternative 2 is recommended to service 2051 growth. This alternative involves introducing WAS thickening to reduce required capacity for anaerobic digestion, solids storage and solids disposal. Alternative 3 of utilizing an advanced secondary treatment technology may be considered post 2051.

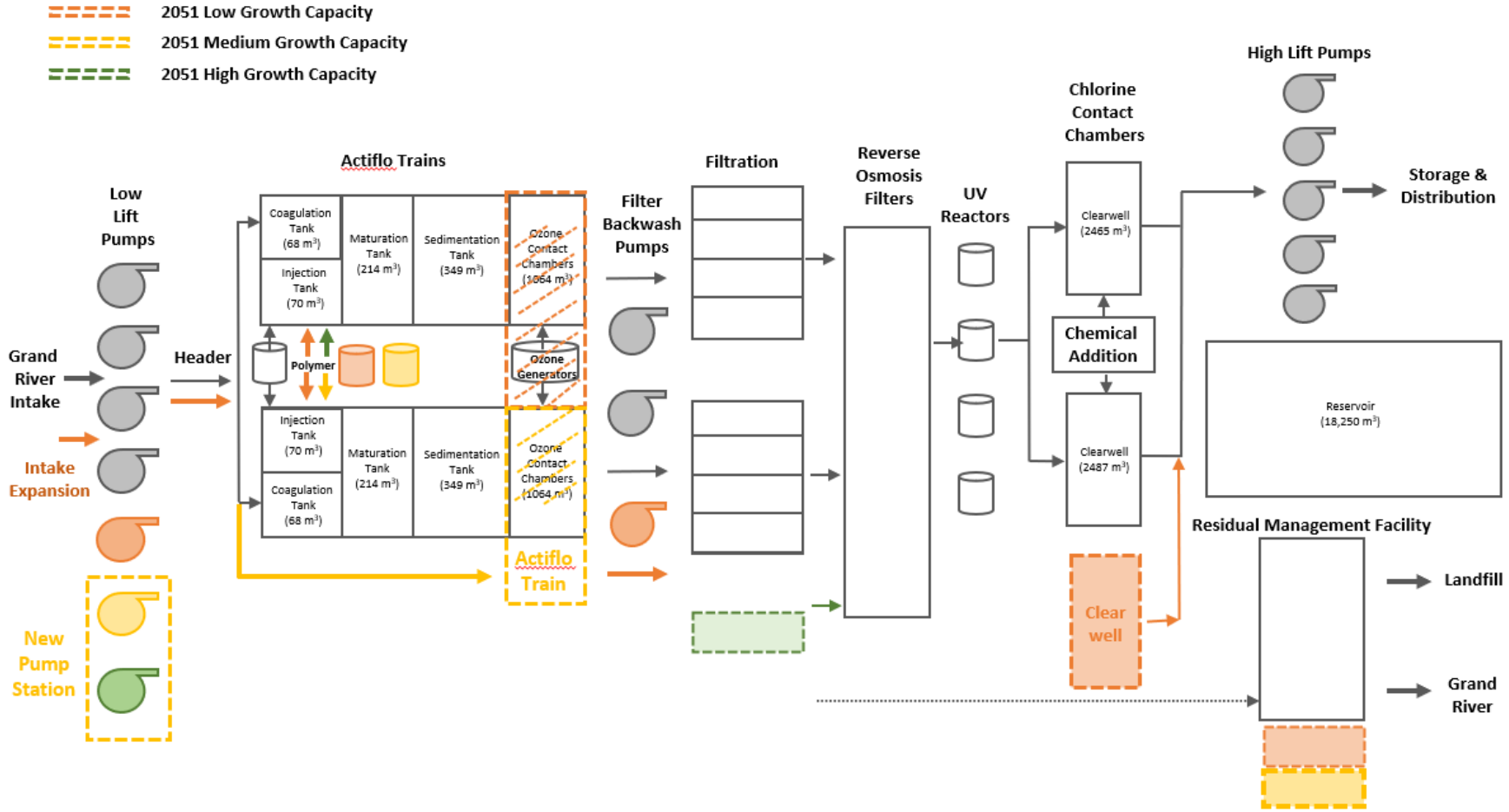
Ahead of any design work for expansion to the rated capacity of the WTP or WWTP, a Schedule C Class EA is required.

Appendix A Water Treatment Plant Upgrade Alternatives Diagrams

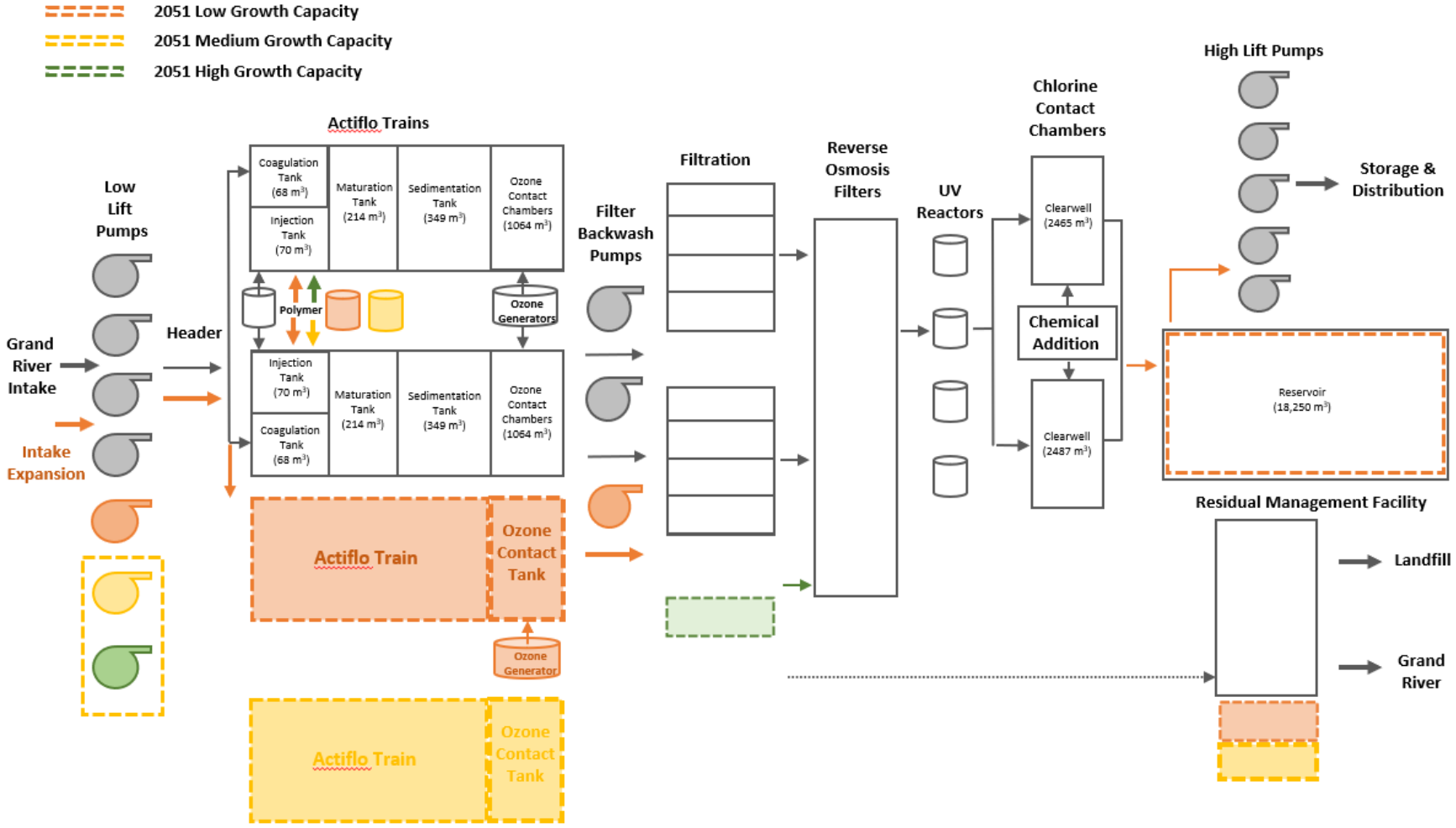
Alternative 1 – Utilize Existing Processes



Alternative 2 – Decommission Ozone

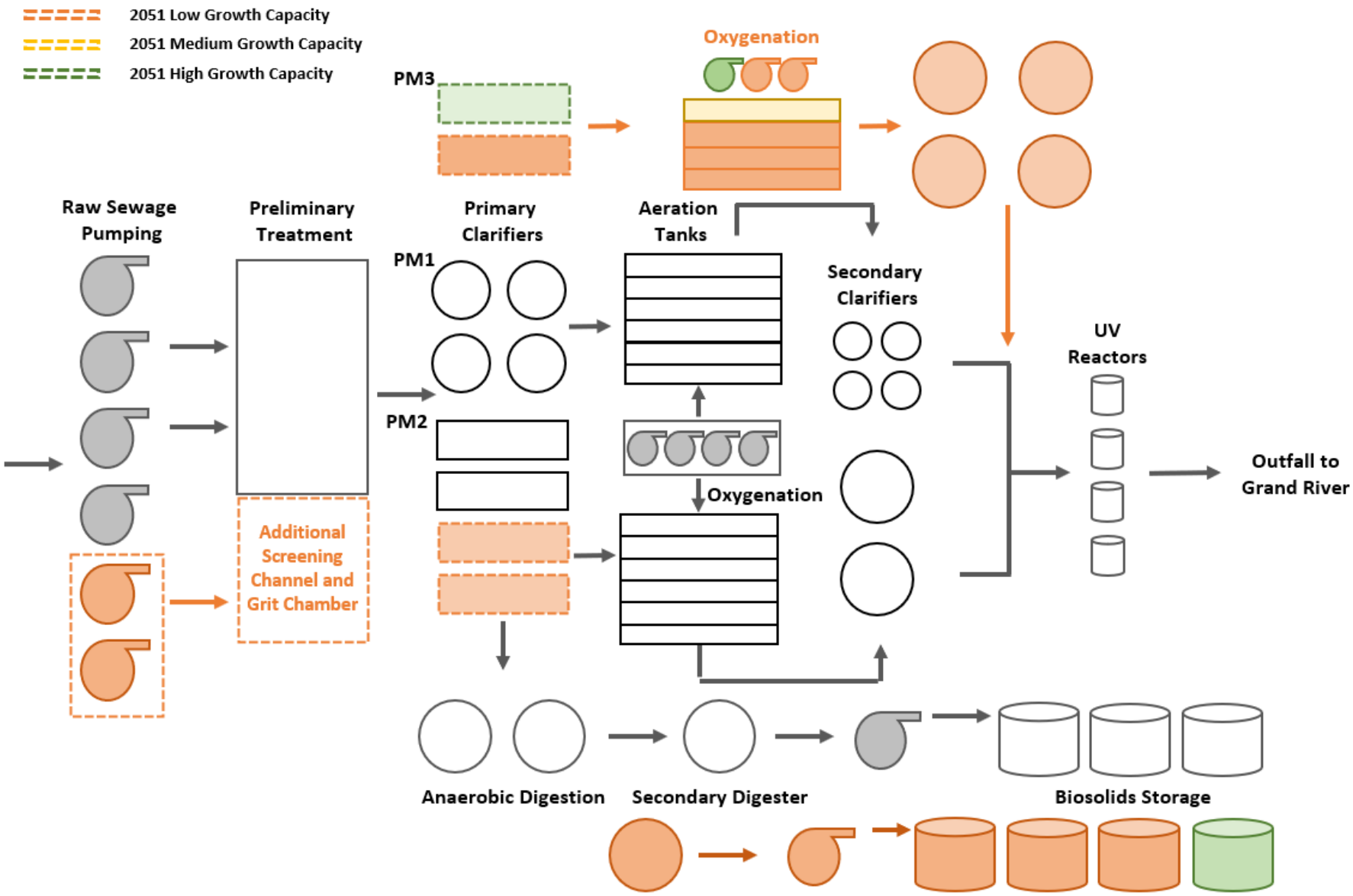


Alternative 3 – Utilize Reservoir for Chlorine Contact Time

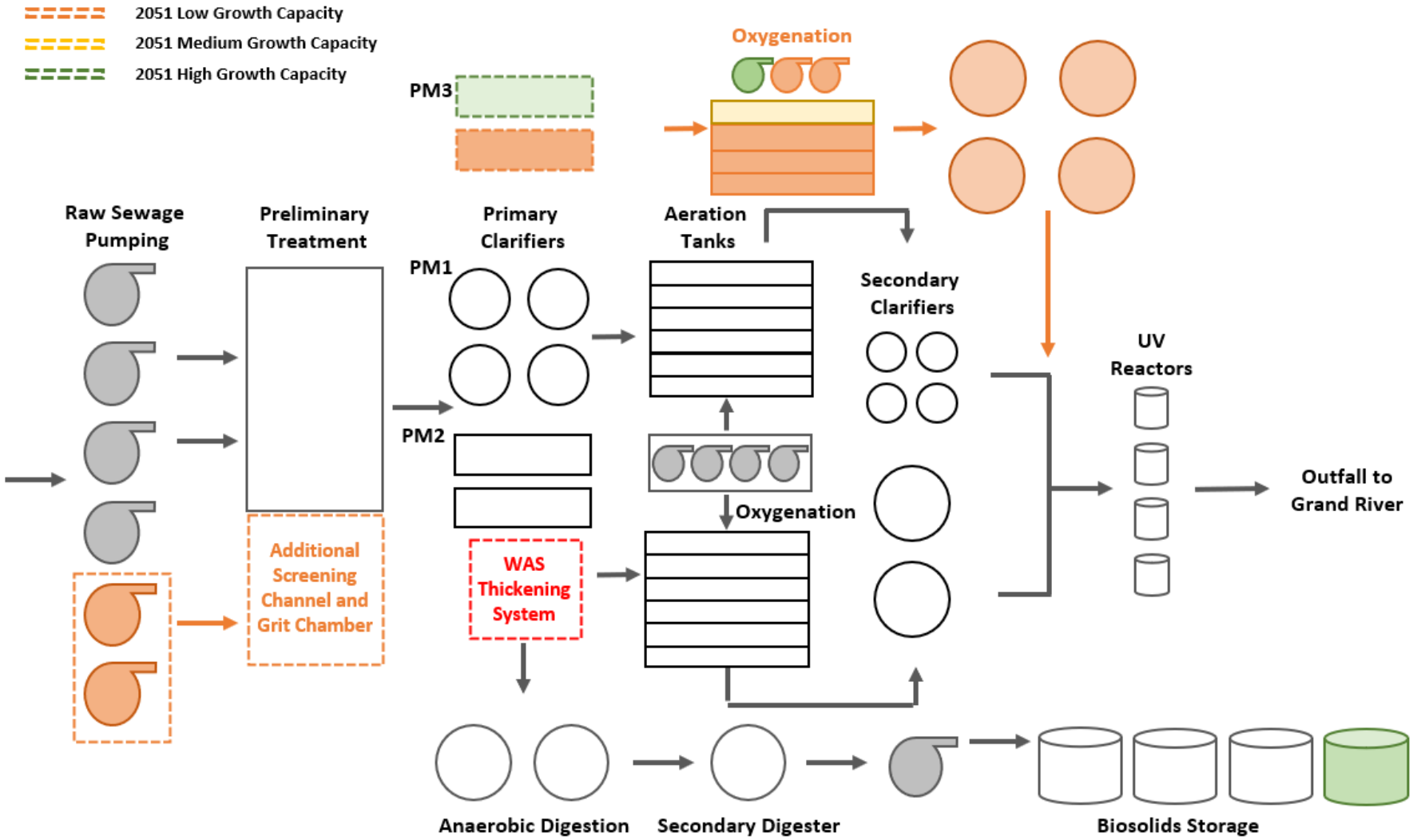


Appendix B Wastewater Treatment Plant Upgrade Alternative Diagrams

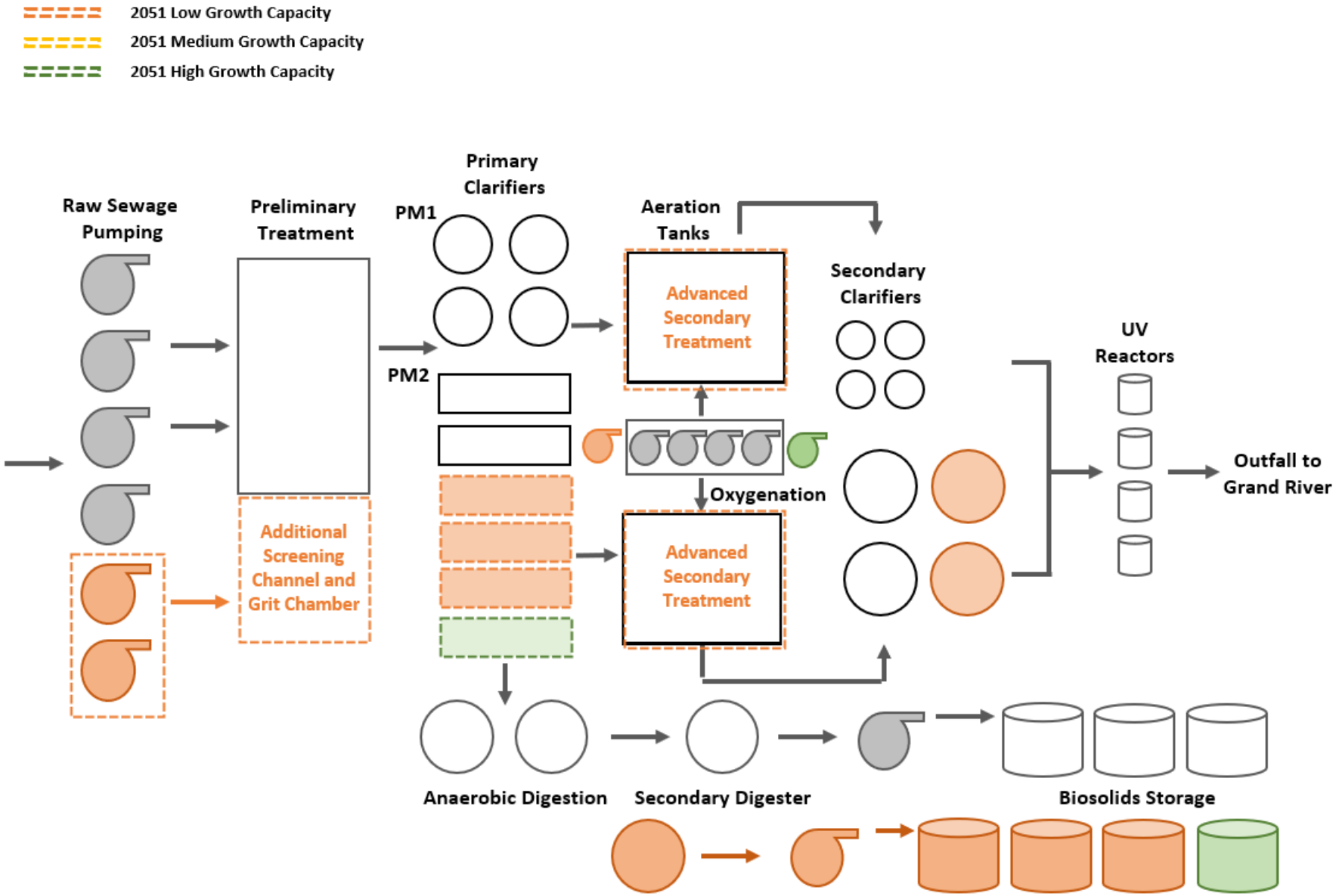
Alternative 1 – Utilize Existing Processes



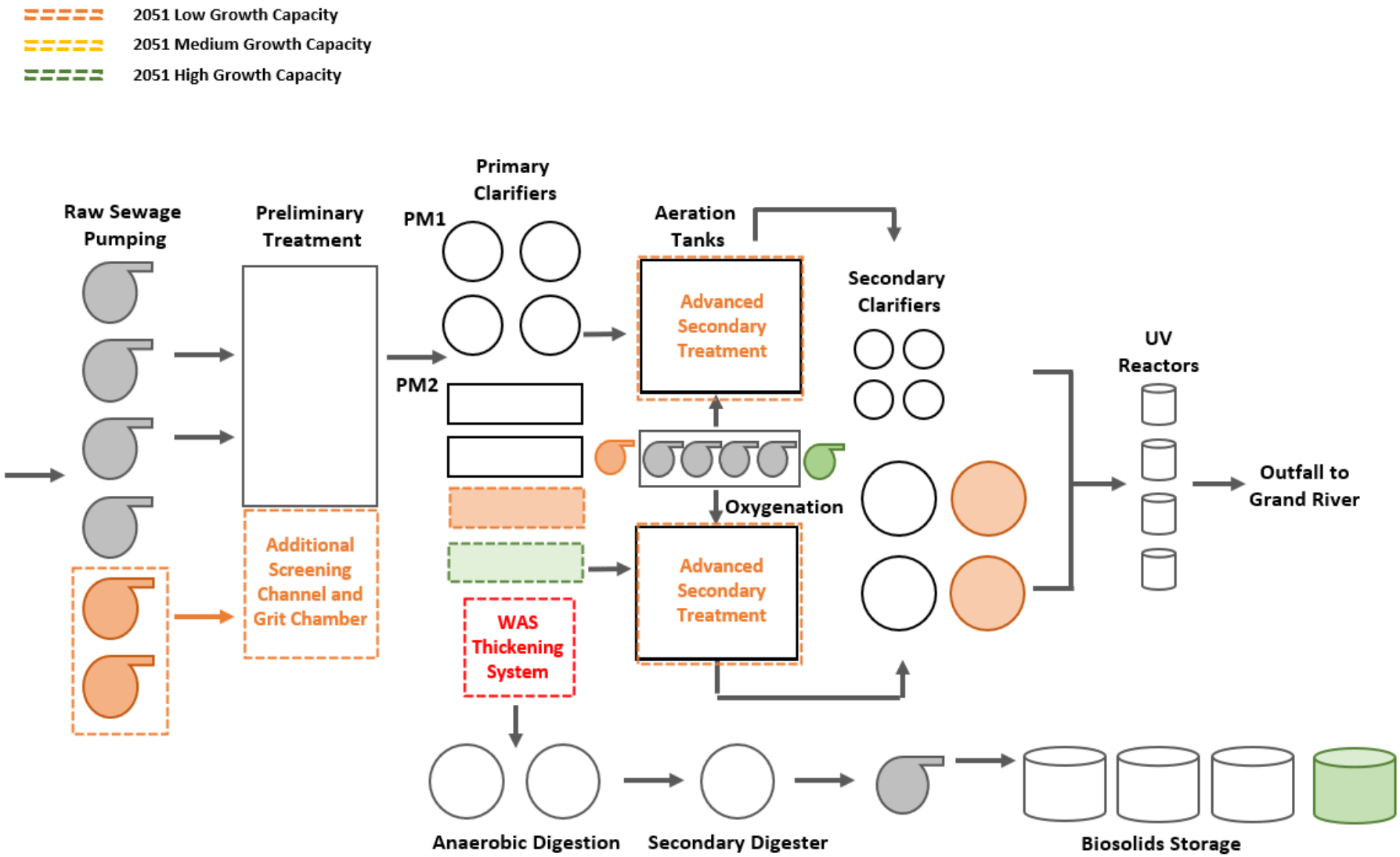
Alternative 2 – Sludge Thickening



Alternative 3 – Advanced Secondary Treatment



Alternative 4 – Sludge Thickening and Advanced Secondary Treatment



Appendix C Opinion of Cost Breakdown

WTP Upgrade Alternatives - Opinion of Cost[1]

	Alternative 1 (Existing Processes)		Alternative 2 (Decommission Ozone)		Alternative 3 (Use Reservoir Contact Time)	
	Assumption	**Cost**	**Assumption**	**Cost**	**Assumption**	**Cost**
Intake Channel / Low Lift Pumps	Dredge and expand intake channel, construct second low lift pump station including a new intake and 1-3 low lift pumps	$60 M – $101 M	Dredge and expand intake channel, Construct second low lift pump station including a new intake and 1-3 low lift pumps	$60 M – $101 M	Dredge and expand intake channel, Construct second low lift pump station including a new intake and 1-3 low lift pumps	$60 M – $101 M
Header	Twin header	$2 M	Twin header	$2 M	Twin header	$2 M
Polymer Systems	Add pumping capacity and an additional polymer feed tank	$3 M - $6 M	Add pumping capacity and two polymer feed tanks	$3 M - $6 M	Add pumping capacity and two feed tanks	$3 M - $6 M
Actiflo Trains	Optimize existing trains and add 1-2 new train(s) outside the existing building footprint	$9 M - $17 M	Optimize existing trains and add 1-2 new train(s) in the location of the existing ozone system utilizing existing tanks	$7 M - $11 M	Optimize existing trains and add 1-2 new train(s) outside the existing building footprint	$9 M - $17 M
Ozonation	Install an additional generator and contact chamber. A new building will be required	$15 M	Decommission existing ozone system	-	Install an additional generator and contact chamber. A new building will be required	$15 M
Filtration	Upsize filtration well & backwash pumps and install a new filtration cell if necessary	$2 M - $10 M	Upsize filtration well & backwash pumps and install a new filtration cell if necessary	$2 M - $10 M	Upsize filtration well & backwash pumps and install a new filtration cell if necessary	$2 M - $10 M
Chlorine Contact	Install an additional chlorine contact chamber	$6.5 M	Install an additional chlorine contact chamber	$6.5 M	Piping upgrades to allow for the reservoir to be used for disinfection contact time	$1 M
Residual Management	Upsize existing facility	$4 M	Upsize existing facility	$4 M	Upsize existing facility	$4 M
Low Growth	**~$103 M**		**~$85 M**		**~$96 M**	
Medium Growth	**~$138 M**		**~$114 M**		**~$130 M**	
High Growth	**~$163 M**		**~$141 M**		**~$156 M**	

1. Costing excludes Reverse Osmosis system that is already planned and will be the same cost for all alternatives above.

WWTP Upgrade Alternatives - Opinion of Cost

	Alternative 1 (Existing Processes)		Alternative 2 (Sludge Thickening)		Alternative 3 (Advanced Secondary Treatment)		Alternative 4 (Alt 2 + 3)	
	Assumption	**Cost**	**Cost**	**Cost**	**Assumption**	**Cost**	**Assumption**	**Cost**
Raw Sewage Pumping Station	Install additional pumps.	$16 M - $18 M	Install additional pumps.	$16 M - $18 M	Install additional pumps.	$16 M - $18 M	Install additional pumps.	$16 M - $18 M
Forcemain	Construct additional forcemain.	$2 M	Construct additional forcemain.	$2 M	Construct additional forcemain.	$2 M	Construct additional forcemain.	$2 M
Screening	Construct additional screening channel with bar screens.	$2 M	Construct additional screening channel with bar screens.	$2 M	Construct additional screening channel with bar screens.	$2 M	Construct additional screening channel with bar screens.	$2 M
Grit Removal	Construct additional grit chamber with blowers for scour.	$3 M	Construct additional grit chamber with blowers for scour.	$3 M	Construct additional grit chamber with blowers for scour.	$3 M	Construct additional grit chamber with blowers for scour.	$3 M
Primary Clarifiers	Additional capacity between PM1 and PM2.	$9 M - $12 M	Additional capacity between PM1 and PM2.	$9 M - $12 M	Additional capacity between PM1 and PM2.	$9 M - $12 M	Additional capacity between PM1 and PM2.	$9 M - $12 M
Aeration Tanks	New biological treatment process module including aeration tanks, blowers and process piping upgrades.	$29 M - $38 M	New biological treatment process module including aeration tanks, blowers and process piping upgrades.	$29 M - $38 M	Replace existing activated sludge process with advanced secondary treatment technology and use this technology for an additional process module.	$27 M - $34 M	Replace existing activated sludge process with advanced secondary treatment technology and use this technology for an additional process module.	$27 M - $34 M
Secondary Clarifiers	Get existing clarifiers back in service and increase capacity.	$13 M	Get existing clarifiers back in service and increase capacity.	$13 M	Get existing clarifiers back in service and increase capacity.	$7 M	Get existing clarifiers back in service and increase capacity.	$7 M
UV Reactors	Planned UV project not included in costing. Cost is for future reactors to accommodate future growth.	$7 M	Planned UV project not included in costing. Cost is for future reactors to accommodate future growth.	$7 M	Planned UV project not included in costing. Cost is for future reactors to accommodate future growth.	$7 M	Planned UV project not included in costing. Cost is for future reactors to accommodate future growth.	$7 M
Biosolids Management	Install one additional digesters, a new decant system, upsize storage capacity.	$20 M - $23 M	WAS thickening, minor storage upgrades.	$8 M - $9 M	Install one additional digesters, a new decant system, upsize storage tank.	$20 M - $23 M	WAS thickening, minor storage upgrades.	$7 M - $9 M
Low Growth	**~$101 M**		**~$88 M**		**~$93 M**		**~$80 M**	
Medium Growth	**~$109 M**		**~$97 M**		**~$97 M**		**~$85 M**	
High Growth	**~$118 M**		**~$104 M**		**~$109 M**		**~$95 M**	