Results of the Value Management/ Value Engineering (VM/VE) Study of the HEWS Project

Council Meeting, Thursday, April 02, 2026

Mushtaq Rabbi CVS PVM PRINCE2

MEMAR Value Strategies Inc.

Agenda

Overview of VM/ VE

1942 **GE's (General Electric) War Time Challenge**

Engine production demand increased from 50/week to 1000/week! The supply of strategic materials was limited

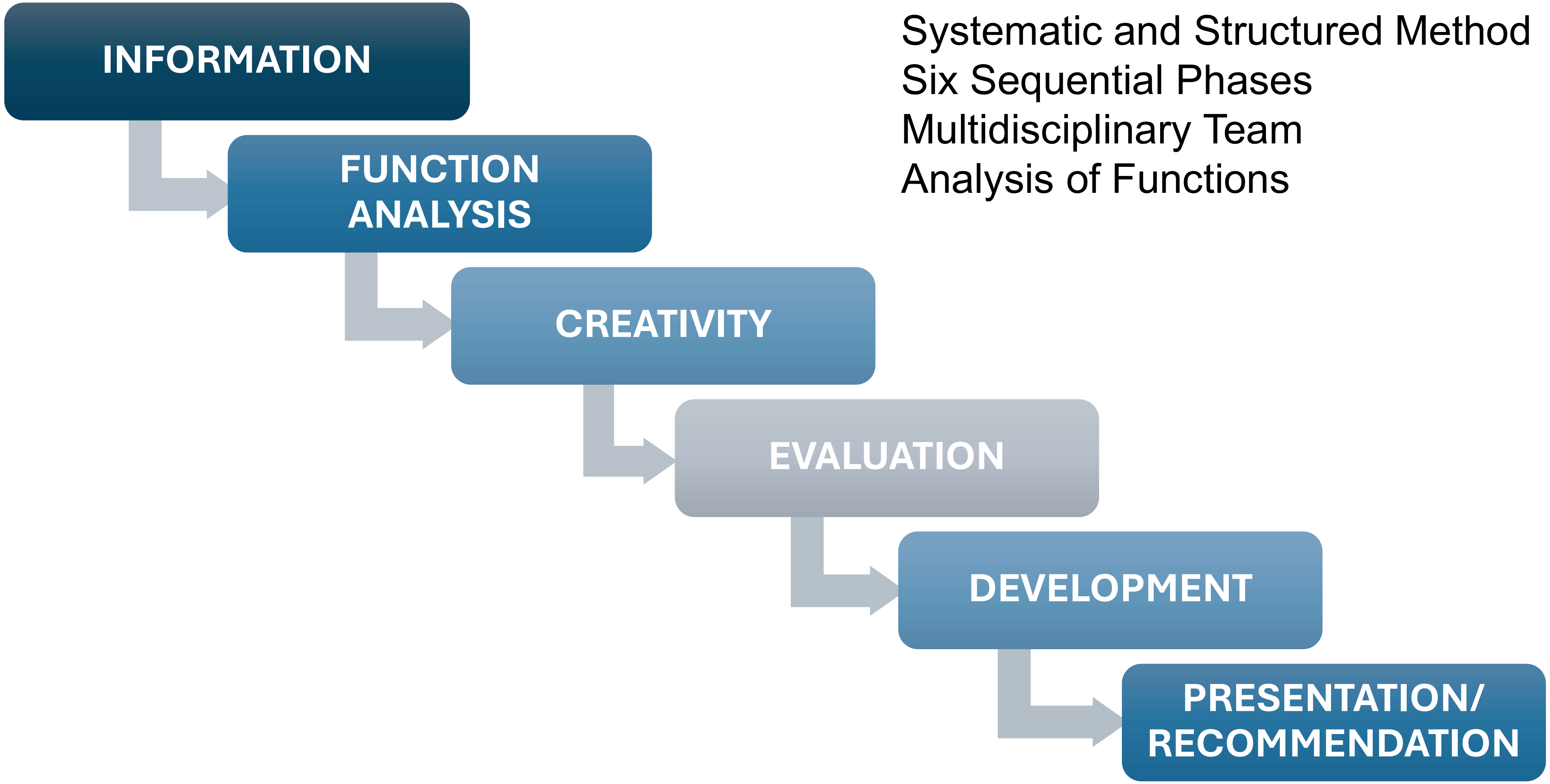
GE's Response

- Originally called "Value Analysis" (VA)
- Developed by Lawrence D. Miles (an electrical engineer)
- Analyzed the function of the materials to understand performance characteristics
- GE spent $1.0M on VA Studies

Result: Avoided $200.0M over 5 years

1947 **GE adopted VA** as a standard business practice!

VM Job Plan



Systematic and Structured Method
Six Sequential Phases
Multidisciplinary Team
Analysis of Functions

Multidisciplinary VM TEAM

(2026 February 23 - 26)

Starting Point for the VM Team – VM Baseline

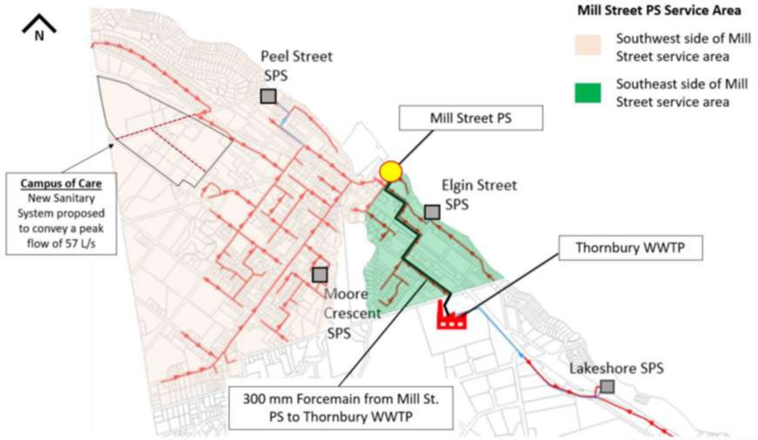
- VM offers a snapshot of the status of the Project in time
- VM can be considered a Project Health Check / Course Correction Approach
- VM Team is NOT the Design Consultant

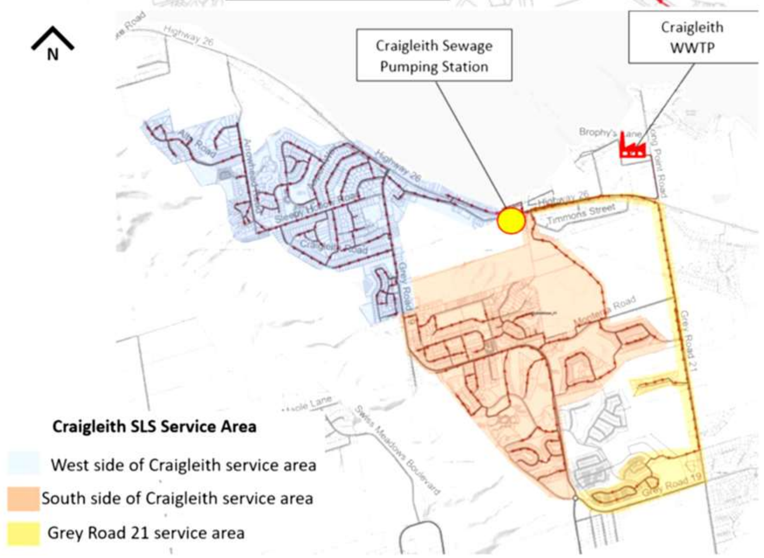
HEWS Project Component	Est. $	Revised Est. $ (Post Tender)	Baseline $	Status
Bay Str. Forcemain, Watermain, WW main, Storm Sewer	$12,472,703	**$20,695,949**	**$50,123,822**	**AWARDED**
Mill Street Pump Station	$7,517,100	**$20,291,962**		**DESIGN COMPLETED**
Contingency (25%)	$6,958,226	$6,958,226		
Craigleith Main Lift Station	$5,067,900	**$9,135,911**		**AWARDED**
Design Fees	$2,775,200	**$2,523,391**		
Utility Relocates		**$915,840**		
TOTAL	**$34,791,129**	**$60,521,279**		

Key Questions in HEWS VM Study

- What is the purpose or intended purpose of this project?
- Is this design the best fit for the purpose?
- Are the assumptions well grounded?
- Is the money spent in the best possible way to achieve the purpose?

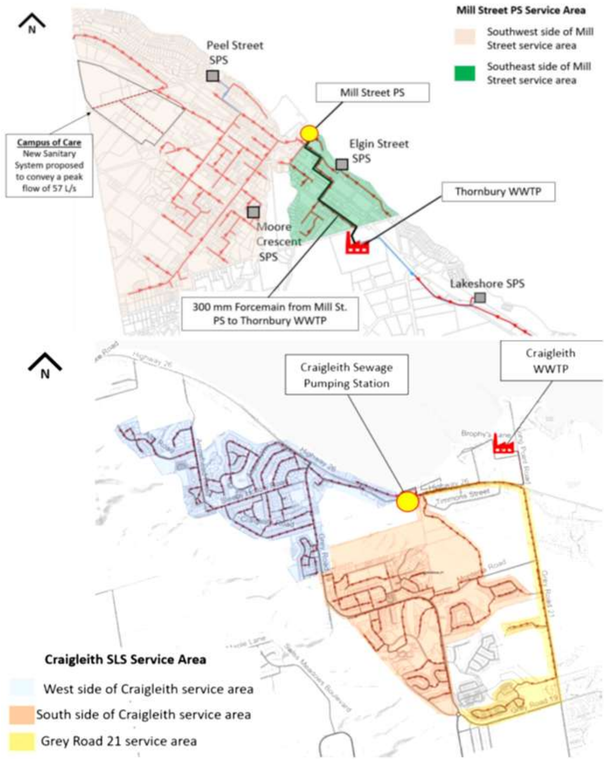
Scope of HEWS Project





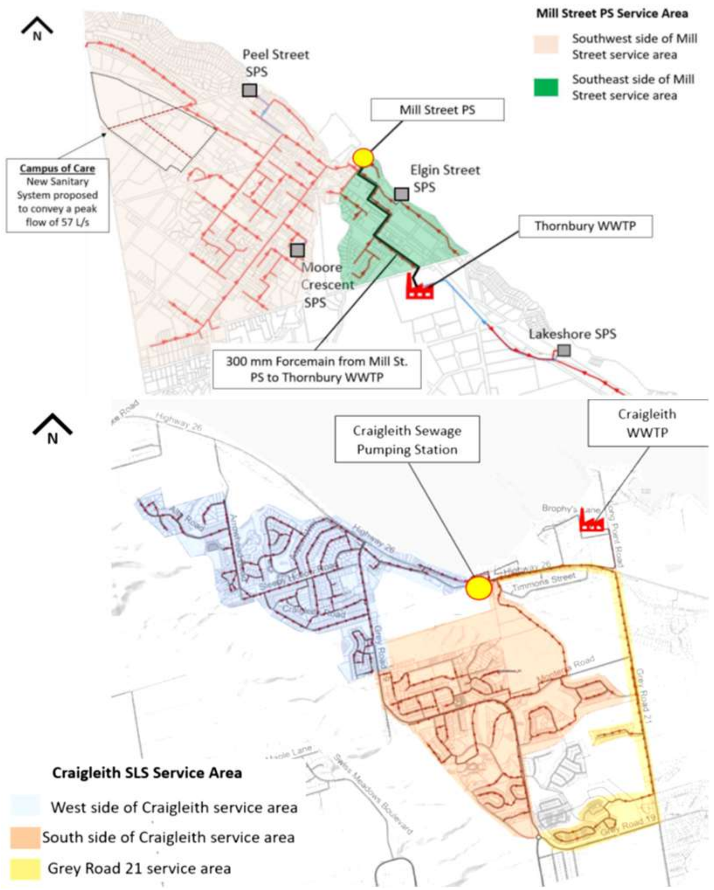
- Replacement of underground infrastructure on Bay Street that is at the end of its life.
- Upgrades and asset replacement of existing equipment at Craigleith Main Sewage Lift Station, which will increase its service capacity from 5,170 units to 8,168 units.
- Upgrades and asset replacement of existing equipment at Mill Street Sewage Pumping Station, which will increase its service capacity from 2,693 units to 4,942 units.
- Installation of a secondary sanitary sewer forcemain on Bay Street East and Grey Street between the Mill Street Sewage Pumping Station and the Thornbury Wastewater Treatment Plant.

Observations on HEWS



- **No overdesign or frills observed in the base design**
- **Well-rounded design based on the requirements given, reflects best practices**
- Designed for the ultimate built-out capacity of ~13,800 units
- Not many gravity mains in the HEWS project
- Expected service life: 50 years

VM Proposals Include

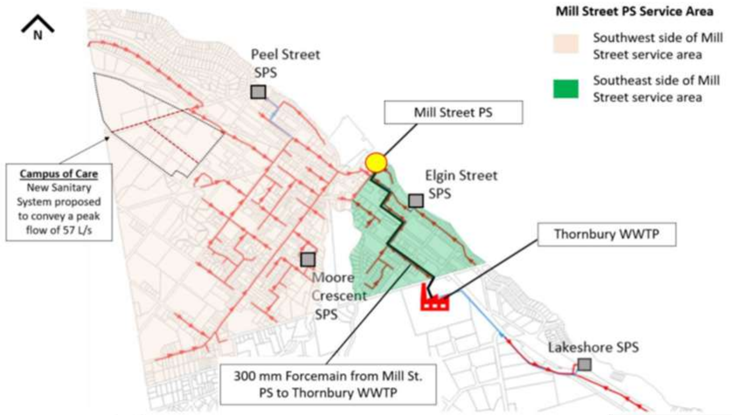


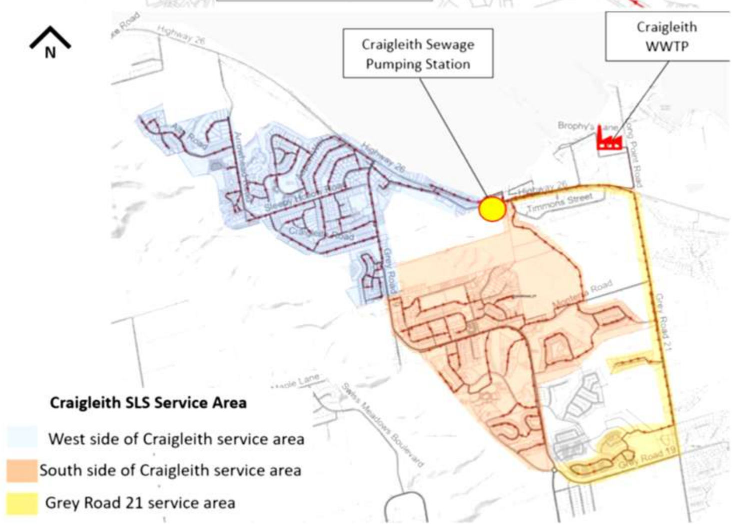
- Design for service life cycle rather than final built-out (pumps and forcemains have a service life of 25 years)
- Deferral/ avoidance of capital investment
- Avoid sedimentation and odour problems
- Infiltration and Inflow (I&I) reduction program

KEY FUNCTIONS OR PURPOSE OF HEWS PROJECT

- **Convey Sewage**
- Increase Capacity
- Improve Asset Performance
- Protect Infrastructure
- Collect Sewage
- Operate System

Key Value Alternatives to Consider





51 Value Alternatives

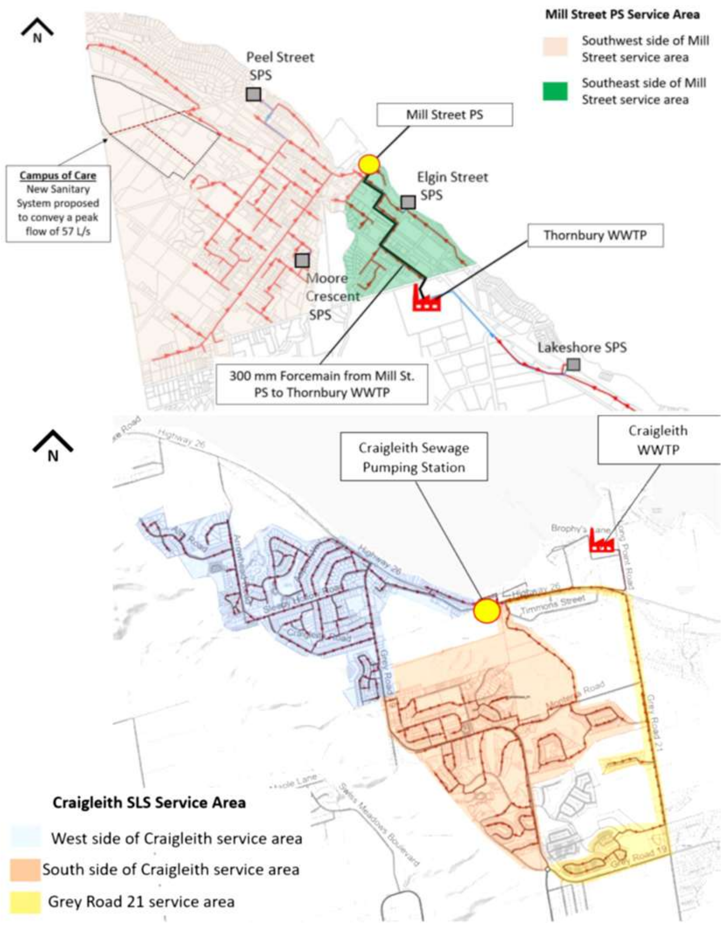
21 Selected after Evaluation (~41%)

- 15 Quantitative
- 6 Design/ Project/ Program Suggestions

PERFORMANCE CRITERIA APPLIED TO EVALUATE VALUE ALTERNATIVES

1. FUNCTIONALLY SUITABLE
2. TECHNICALLY FEASIBLE
3. FINANCIALLY VIABLE
4. EASE OF OPERATIONS & MAINTENANCE
5. FUTURE ADAPTABILITY OR FLEXIBILITY

Key Value Alternatives to Consider



51 Value Alternatives
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Project/ Design Specific:

1. **CS-01 - INTRODUCE CAISSON SUBMERSIBLE PUMP FOR ADDITIONAL CAPACITY**
2. **IC-05 - MAXIMIZE EXISTING PUMPING OPERATIONS**

Long Term/ Strategic:

1. **IC-02 - REVISIT PEAK FLOW AT CRAIGLEITH PS**
2. **IC-03 - REVISIT PEAK FLOW AT MILL STREET**

3. **IP-06 - REDUCE I&I IN THORNBURY TO 0.28L/SEC/HA**
4. **IP-11 - REDUCE SANITARY LOS TO MATCH DRAINAGE SYSTEM LOS**

Key Value Alternatives to Consider

PLEASE NOTE:

- All the developed Value Alternatives are not peer-reviewed, and may not reflect the Town's current design standards, and are meant to be demonstrative proof of concepts - offering value improvement opportunities in this project and for the Town, rather than prescriptive solutions.

- Each Value Alternative presented indicates the estimated capital (and life-cycle cost) avoidance, or deferral, or addition (detailed in the VM Report) as of the time of this Value Management Study. Any of these Value Alternatives selected for implementation shall require further analysis, investigation, and a detailed estimate based on market data at the time of implementation. THEY ARE INDICATIVE and SHOULD NOT BE CONSIDERED CONCLUSIVE!

HEWS Project Specific Value Alternatives to Consider

Key Value Alternatives to Consider

CS-01	INTRODUCE CAISSON SUBMERSIBLE PUMP FOR ADDITIONAL CAPACITY	
CS-01	**Est Investment: $10.9M** Provide a new caisson wet well with an operating volume of 300 m3 adjacent to Mill Street PS. The Caisson will have an internal diameter of 10 m. Assume a 1-meter wall thickness with a shotcrete lining. Total Diameter: 12.0 m. The caisson will be set at a level to receive flow from the newly installed inlet sewer. The floor level will be 169 m. Within the casing will be two 135-l/s, 150-HP submersible pumps. These pumps will be equipped with VFD drives and will provide primary service. The existing Mill Street PS will be maintained, and the caisson will be tied to the existing Mill Street higher wet well floor level by a 500 mm Concrete Pipe. The existing station will provide wet-weather flows.	**Potential Cost Avoidance: $8.8M**
Base Case	Full scale upgrade to Mill Street PS	Est. Investment: $19.7M
	BENEFITS	**DISBENEFITS**
	Lower capital investment	Some maintenance challenges
	More operational flexibility (existing Station used for wet weather flows)	Estimated two picks per year at $5000 per event
	Offers redundancy	Requires MECP approval
	More planning flexibility (additional pumps can be added to pace flow needs)	

Key Value Alternatives to Consider

IC-05	MAXIMIZE EXISTING PUMPING OPERATIONS	
IC-05	**Est Investment: $5.3M** The alternative concept would be to create additional wet well capacity, in combination with the new 600 FM and upgrades to 300 mm FM, to maximize the output/capacity of the existing pumps. This option would add wet well capacity through secant pile construction and a deep piping connection to the existing wet well (not deepening the existing wet well but rather expanding it to provide additional buffer capacity).	**Potential Cost Deferral: $14.4M**
Base Case	Removed the existing wet well from service, created a new, deeper wet well, and removed the existing pumps from service.	Est. Investment: $19.7M
	BENEFITS	**DISBENEFITS**
	Capital deferral for 15-20 years	Due to the inlet sewer's deepening, there is limited capacity to reuse the existing inlet and wet well.
	Reuse of the existing pumping and electrical infrastructure.	Lowering the existing wet well would not be useful without lowering the dry well as the existing pumps require submergence.
	Utilize of the existing wet well.	This uses the new sewer as the active wet well volume; there is no capacity at the pumping station.
		May not be approved by the MECP or would require significant modelling to justify the lack of a wet well.
		Does not address the rating issues of the electrical room/operational issues/washroom/pump maintenance and access

Long Term Strategic
Value Alternatives to Consider

Key Value Alternatives to Consider

IC-02	**REVISIT PEAK FLOW AT CRAIGLEITH PS**	
DS	This concept uses a flow analysis that breaks down the individual flow components. The alternative concept removes the "Factor-of-Safety" (FOS) in the City's design criteria for the early years and develops interim design flows at various planning-year horizons. This helps to accurately match design flows with design life since there are multiple design lives of various facility and collection system components (i.e. mechanical/pumps = 20 to 25 years, gravity sewers = 100 to 125 years, etc.).	
Base Case	The original concept uses design flows based on the Town's design criteria and development build-out (2050-2075). Existing dry-weather flow unit rates for existing and future populations both use 350 L/ha/d. Existing I&I rates are based on return-period predictions from calibrated PC-SWMM computer models. Future I&I rates are based on the Town's 0.28 L/s/ha criteria. The proposed Craigleith Pump Station design is based on these flows for the ultimate build-out.	
IC-03	**REVISIT PEAK FLOW AT MILL STREET**	
DS	The alternative concept uses a flow analysis that breaks down the individual components of the flow. The alternative concept removes the "Factor-of-Safety" (FOS) in the City's design criteria for the early years and develops interim design flows at various planning-year horizons. This helps accurately match design flows to design life, since there are multiple design lives for various facility and collection system components (e.g., mechanical/pumps = 20 to 25 years, gravity sewers = 100 to 125 years, etc.). The alternative component allows the existing Mill Street PS to remain in operation for another 20-years with some moderate improvements. **This Value alternative is matched with either the IC-05 Expand Existing Wet-Well or CS-01 Construct New Wet-Well for the cost and benefit analysis.**	
Base Case	The original concept uses design flows based on the Town's design criteria and development build-out (2050-2075). Existing dry-weather flow unit rates for existing and future populations both use 350 L/ha/d. Existing I&I rates are based on return-period predictions from calibrated PC-SWMM computer models. Future I&I rates are based on the Town's 0.28 L/s/ha criteria. The proposed Mill Street Pump Station design is based on these flows for the ultimate build-out.	
	BENEFITS	**DISBENEFITS (IC-03)**
	Allows a more reasonable 20-year design flow to be estimated	Due to the inlet sewer's deepening, there is limited capacity to reuse the existing inlet and wet well.
	Defers the construction of the proposed Mill Street PS for at least 20 years.	Lowering the existing wet well would not be useful without lowering the dry well as the existing pumps require submergence.
	Allows sufficient time for an Inflow and Infiltration Program to be implemented in the Thornbury sewer collection system.	This uses the new sewer as the active wet well volume; there is no capacity at the pumping station.
		Not likely to be approved by the MECP or would require significant modelling to justify the lack of a wet well.
		Does not address the rating issues of the electrical room/operational issues/washroom/pump maintenance and access

Key Value Alternatives to Consider

IP-06	REDUCE I&I IN THORNBURY TO 0.28L/SEC/HA	
IP-06	**Est Investment: $8.0M** Over 20-25 years	Develop an **annual investment program** to reduce I&I across the WWC (Wastewater Collection) system in order to reach the target of (0.28L/s/ha). Includes inspection of infrastructure, assessing asset conditions, prioritizing repairs and capital projects. Will also include resident incentive programs (e.g., toilet rebates) to reduce sewer use. Inspection includes annual CCTV, with rotation over 4 years. Can include smoke testing on target areas.
Base Case	**NOT a part of this project, long-term strategy**	
	BENEFITS	**DISBENEFITS**
	Deferral of major capital investment/ expenditure	None
	Pinpointing areas for repairs and replacement on an annual basis.	
	Reducing I&I increases the available capacity of the WWC and WWT systems, which takes pressure off the long-term design/planning requirements	

Key Value Alternatives to Consider

IP-11	REDUCE SANITARY LOS (Level of Service) TO MATCH DRAINAGE SYSTEM LOS (Level of Service)	
DS	The concept here is to NOT push the LOS of the sanitary system too far ahead of the LOS of the drainage system. Otherwise, flow from deficiencies in the drainage system may enter the sanitary system. As additional sanitary capacity is created, additional storm flows may enter the sanitary sewer and appear as increased I&I.	
Base Case	The original concept raises the level of service (LOS) in the sanitary sewer system from roughly a 2-year storm to a 10-year storm with firm capacity (standby pumps, redundancy), and a 100-year storm with station capacity (no redundancy).	
	BENEFITS	**DISBENEFITS**
	By increasing the LOS of both the storm and sanitary sewer systems at the same time, predictions of future flows become more reliable.	None

Questions?
Comments?

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