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South Fergus MESP & Secondary Plan

FUNCTIONAL SERVICING REPORT

South Fergus Landowners Group

File 120157 | March 5, 2024

Document Control

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Issue	**Date**	**Description**
1	March 10, 2023	Issued for TAC Submission
2	August 31, 2023	Resubmission to address comments
3	March 5, 2024	Resubmission to address comments

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1 Introduction

Tatham Engineering Limited has been retained by the South Fergus Landowners Group to provide engineering support in the development of a Master Environmental Servicing Study (MESP) and Secondary Plan outlining the objectives, constraints, design criteria, development concept and implementation plan for a proposed mixed-use development in the South Fergus Secondary Plan area within the Township of Centre Wellington.

1.1 SECONDARY PLAN AREA

The South Fergus Secondary Plan Area (Study Area) consists of approximately 147.5 ha of undeveloped land in the south end of Fergus, Township of Centre Wellington, County of Wellington. It is generally bound by Second Line to the south, Guelph Street to the west, McQueen Boulevard to the north and Scotland Street to the east, as illustrated on the Preferred Land Use Plan in Appendix A.

The Study Area consists of properties both east and west of Tower Street South (Highway 6) as follows:

- 925 and 935 Scotland Street;
- 200 McQueen Boulevard;
- 7856 and 7872 2nd Line;
- 963 and 1000 Tower Street South; and
- 936 Guelph Street.

1.2 PROPOSED DEVELOPMENT

The Study Area is proposed to be developed according to Preferred Land Use Plan (refer to Appendix A). The plan identifies various proposed land uses including:

- residential developments (low and medium density);
- employment areas (commercial, gateway and corridor);
- mixed use;
- a future school; and
- recreation areas including neighbourhood parks, trails and natural heritage lands.

1.3 STUDY PURPOSE

This Functional Servicing Report (FSR) aims to provide and assess various water, sanitary, stormwater and traffic servicing alternatives for the Study Area. A detailed stormwater management and transportation plan are provided under separate cover to be read in conjunction with the FSR.

2 Background

2.1 POPULATION DATA & PROJECTIONS

Land use and population criteria were agreed upon between the Township of Centre Wellington and MHBC (who prepared the preferred land use plan), as detailed below.

- Land use assumptions:
  - Study area 147.5 ha
  - Natural Heritage area 34.8 ha
  - Developable area 112.7 ha
  - Usable Land area 87.9 ha (Assuming 22% for roadways)
  - Usable Land area is 78% of the Developable Area
- Density assumptions:
  - Residential low 20 units/ha
  - Residential medium 43.5 units/ha
  - Residential corridor 75 units/ha
  - Jobs corridor 19 jobs/ha
  - Jobs gateway 95 jobs/ha
  - Mixed use 20% to 25% of area is first storey employment
- Occupancy criteria:
  - Residential low 3.094 persons per unit (ppu)
  - Residential medium 2.411 ppu
  - Corridor/Gateway 1.596 ppu

The above noted criteria were used with the Preferred Land Use plan to determine development populations and employment areas by land use, which are further summarized in Table 1. Detailed criteria and calculations for the projected populations are included in Appendix B.

Table 1: Proposed Population & Employment Area

LAND USE AREA	POPULATION	JOBS	ADJUSTED EMPLOYMENT AREAS (ha)
Residential – Low Density	2,949		-
Residential – Medium Density	2,100		-
Corridor	1,765	57	2.95
Gateway	252	60	0.63
Institutional	-	20	2.62
Total	**7,066**	**137**	**6.20**

2.2 PREVIOUS STUDIES, REPORTS & PLANNING DOCUMENTS

Tatham Engineering submitted the following documents to MHBC, detailing the existing servicing conditions:

- *Existing Water and Sanitary Servicing Summary* memo dated June 11, 2021;
- *Transportation Plan – Existing Conditions* report dated July 26, 2021; and
- *Surface Water Resources, Floodplain Hydraulics & Erosion Assessment – Existing Conditions* report dated July 26, 2021.

Tatham Engineering also provided preliminary servicing options to the Township's consultant Triton Engineering Services (Triton), who conducted modelling for both water and sanitary systems. Triton presented their findings in the *South Fergus Secondary Plan Municipal Servicing Assessment* memo dated September 9, 2022, which is provided in Appendix C.

Watson & Associates Economists (Watson) prepared the *Development Charges Background Study* dated December 23, 2020, that identifies planned water and sanitary infrastructure projects, several of which have direct impacts on the servicing of the Study Area.

3 Existing Site Conditions

The existing conditions in the South Fergus Study Area were established through a review of the available topographic mapping and aerial photos, topographic survey, site reconnaissance and a review of the available background information including the *Existing Conditions Report*[1]. This latter report provided a summary of existing conditions in the Study Area and the findings of the supporting reports/studies.

3.1 SOIL CONDITIONS

The Canada Department of Agriculture's 1963 *Soils Survey of Wellington County* report defines the soils in the Study Area as:

- Harriston Loam – well drained soils belonging to soils group BC;
- Listowel Loam – imperfectly drained soils belonging to soils group BC;
- Parkhill Loam – poorly drained soils belonging to soils group BC; and
- Muck – organic deposits accumulated in wet undrained depressions.

A geotechnical investigation conducted by Golder in support of the MESP and Secondary Plan identified the on-site soils, which range from sand and gravel to silty clay. The soils are generally sand, silty sand and till near the surface in the agricultural areas on-site and clayey silt to silty clay in the wetland areas. The geotechnical investigation is summarized in the *Interim Hydrogeological Investigation Results* submitted under separate cover (Appendix D of the *Existing Conditions Report*).

3.2 GROUNDWATER CONDITIONS

To characterize the regional geological setting, existing hydrogeological conditions and groundwater levels in the Study Area, a hydrogeological study was conducted, and the existing groundwater conditions are described in the *Hydrogeological Investigation*[2]. The initial findings of the investigation were considered in the preliminary design of servicing, grading and drainage in support of the Secondary Plan. In accordance with the Terms of Reference (ToR), a groundwater monitoring program tracked seasonal groundwater elevations; infiltration testing occurred on site to determine the suitability of infiltration-based low impact development (LID) measures; and groundwater recharge requirements were established within the Study Area.

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[1] *Existing Conditions Report.* MHBC, August 2021.
[2] *Hydrogeological Investigation Proposed Mixed-Use Development.* Golder Associates Ltd., August 4, 2022.

The Hydrogeological Investigation concluded that the seasonal high groundwater levels across the Study Area are at or within 1.2 m of existing grade. Infiltration rates range from 36 mm/hr to 71 mm/hr at the tested locations and water quality samples collected from BH20-3, BH20-4, and BH20-8 reported exceedances in Cobalt, Iron, Copper, Vanadium and Zinc.

3.3 ENVIRONMENTAL FEATURES

The lands within the Study Area are primarily active agricultural land and generally drain overland as sheet flow to Nichol Drain No. 2, which is a tributary to Swan Creek. The drain runs southwest through the Study Area, crossing Tower Street and Second Line.

The Technical Memorandum prepared by Fri Ecological Services for the *Existing Conditions Report* identified the area around the drain as the "Core Greenlands" within the Study Area. The memorandum investigated key natural heritage features including:

- Provincially Significant Wetlands (PSW);
- Significant Woodlands;
- Habitat of Endangered Species and Threatened Species;
- Significant Wildlife Habitat (SWH); and
- Fish Habitat.

The memorandum recommended a 30 m buffer for the entire Core Greenlands area. The intent is that this buffer will be evaluated and refined based on the adjacent land uses proposed through the Secondary Plan process. Within the Study Area, there are opportunities to improve natural heritage systems by creating naturalized buffers and natural spaces that will remain undeveloped.

4 Sanitary Servicing

4.1 EXISTING INFRASTRUCTURE

Fergus is serviced by the Fergus Wastewater Treatment Plant (WWTP), located at 350 Queen Street West. The WWTP has an average daily flow capacity of 8,000 m^3/day.

There are two sewage pumping stations (SPS) in South Fergus:

- Tower Street SPS located at 963 Tower Street South; and
- Union Street SPS at 535 Union Street West.

Tower Street SPS receives and pumps wastewater from a large area in South Fergus through a forcemain that discharges to a maintenance hole about 200 m south of the intersection of Tower Street and Elora Street. From there, the wastewater flows by gravity to the Fergus WWTP.

The Union Street SPS current service area is limited to the properties west of Tower Street and north of Wellington Street (except Albert Street). The Union Street SPS pumps wastewater through a forcemain that discharges to a maintenance hole at the intersection of Union Street and Anthol Street. From there, the wastewater flows by gravity to the Fergus WWTP.

There are no known constraints in the existing sanitary system to convey and treat the existing wastewater flows and allocation for any future developments has yet to be granted by the Township.

The existing sanitary infrastructure surrounding the Study Area is shown on Drawing SAN-1 in Appendix D.

4.2 DESIGN CRITERIA

Sanitary servicing criteria for the Study Area are based on the *Township of Centre Wellington Development Manual Draft, March 2018*, and the *Design Guidelines for Drinking-Water Systems, 2008* by the Ministry of the Environment, Conservation and Parks (MECP). They are outlined as follows:

- Residential per capita flow 350 L/person/day
- Industrial, commercial, institutional (ICI) flow 20,000 L/ha/day
- Inflow & infiltration (I&I) flow 0.15 L/s/ha
- Residential peaking factor 3.1
- ICI peaking factor 2

4.3 PROJECTED FLOWS

Projected sanitary flows for the Study Area were calculated based on the design criteria outlined above and the Preferred Land Use Plan and associated development targets. The projected total average daily flow (ADF) is 4,057 m^3/day and the peak flow (PF) is 109 L/s, as summarized by land use area in Table 2. Detailed calculations for the sanitary flows are included in Appendix B.

Table 2: Projected Sanitary Flows

LAND USE AREA	AVERAGE DAILY FLOW (m^3/day)	PEAK FLOW (L/s)
Residential – Low Density	1,825	46.2
Residential – Medium Density	1,068	30.2
Corridor	922	26.4
Gateway	147	4.0
Institutional	96	1.7
Total	**4,057**	**109**

4.4 PLANNED UPGRADES

The *Development Charges Background Study/Capital Plan* identifies eight planned sanitary system expansion projects around the Study Area in the following timeline:

- 2024: Union Street SPS upgrades
  New trunk sewers on Guelph Street from McQueen Boulevard to Second Line
  New trunk sewers on Second Line from Guelph Street to Highway 6
- 2025: New trunk sewers on McQueen Boulevard from Scotland Street to Guelph Street
- 2027: New trunk sewers on Guelph Street from Union Street to Elora Street
  New trunk sewers on Guelph Street from Elora Street to McQueen Boulevard
  New trunk sewers on Second Line from Highway 6 to Jones Baseline

The Tower Street SPS is proposed to be decommissioned in the future. The dates of the sanitary system upgrades identified above as noted in the Townships current Capital Plan are subject to significant date revisions and changes.

The WWTP is planned to be expanded from 2025 to 2027 with the additional capacity to be determined by the Township.

4.5 PROPOSED SANITARY SERVICING

4.5.1 Wastewater Treatment Plant

Triton references the *2021 Reserve Capacity Calculations* for Fergus and Elora that state the Fergus WWTP has an average daily flow capacity of 8,000 m^3/day. Considering the current average daily flow to the WWTP, the remaining available capacity is 1,566 m^3/day.

Therefore, the existing WWTP does not have sufficient capacity to treat the projected additional wastewater flow from the Study Area. A facility expansion to increase the capacity by an additional 2,491 m^3/day (i.e., total capacity of 10,491 m^3/day) will be required to accommodate development in the Study Area.

4.5.2 Interim Servicing

Triton confirmed the Tower Street SPS has sufficient residual capacity to accommodate wastewater flows from development Area P (Catchment 1). On an interim basis, wastewater from Area P will be directed to the existing maintenance hole at the intersection of McQueen Boulevard and Millburn Boulevard, from where it will be conveyed to the Tower Street SPS.

4.5.3 Internal and External Servicing

Six options were considered for servicing the Study Area and connecting to the Union Street SPS, from where the wastewater will be conveyed to the Fergus WWTP. The internal servicing routing for each option considered the existing sewer invert at the outlet from the Study Area along Union Street. A Sanitary Drainage Plan for each option is provided in Appendix D.

Two routes for an external sewer outlet were considered. The plan and profile of these routes are shown on Drawings P-1 and P-2 in Appendix D.

- Route 1: Guelph Road to Union Street
- Route 2: Guelph Road to the Nichol Drain No. 13 to Union Street

The servicing options are described below.

Option 1

The entire Study Area and the Tower Street SPS service area would drain by gravity to a new SPS located in the southwest corner of Catchment 2, as shown on Drawing SAN-1. Under this option, Barnett Crescent, Cummings Crescent and Chambers Crescent could drain south on Guelph Road by gravity to the new SPS in the future.

The new SPS would pump flows via a forcemain along Guelph Road to Union Street using Route 1, as it is the most direct route and in a public right-of-way.

Option 2

Option 2 is similar to Option 1, however, the new SPS forcemain would discharge to a proposed trunk gravity sewer on Guelph Road as shown on Drawing SAN-2, and from there, use Route 1 or Route 2 to connect to the Union Street SPS.

Under Option 2, only limited portions of Cummings Crescent and Chambers Crescent could drain by gravity to the new trunk sanitary sewer in the future.

Option 3

With Option 3, the entire Study Area and the Tower Street SPS service area would drain by gravity to a proposed deep trunk sanitary sewer on Guelph Road, as shown on Drawing SAN-3, and from there use Route 1 or 2 to connect to the Union Street SPS.

Option 4

Option 4 is identical to Option 3, with the exception that Catchment 3 (southwest corner of the Study Area) would drain by gravity to a proposed sanitary sewer on Guelph Road that would connect to the proposed deep trunk sanitary sewer on Guelph Road that would service the remainder of the Study Area, as shown on Drawing SAN-4. External Route 1 or 2 could be used to connect to the Union Street SPS.

Option 5

With Option 5, Catchment 4 and Catchment 5 would drain to a new SPS located near the intersection of Tower Street and Nichol Drain No. 2. This new SPS would convey flows under the drain and up to a shallow sewer on the west side of the drain. The west side of the study area would drain by gravity to a proposed trunk sanitary sewer on Guelph Road, as shown on Drawing SAN-5. External Route 1 or 2 could be used to connect to the Union Street SPS.

Option 5 reduces the flow pumped and provides shallower sewers west of Tower Street. The Route 1 or 2 gravity sewer would be 2 m deeper than for Option 2.

Option 6

With Option 6, the entire Study Area would drain by gravity to Guelph Road, as shown on Drawing SAN-6, and to the Union Street SPS using Route 1 or 2. Option 6 has the deepest sewer depths, with over 50% of the sewers within the Study Area constructed below 6 m and Route 1 depths exceeding 20 m.

Screening of Options

The six options were screened based on their constructability and feasibility. The main factors that impact constructability and feasibility are sewer depths and anticipated rock depth below existing ground. These factors along the servicing route are compared for each option in Table 3 with a cost estimate for each option included in Appendix D. The internal and external servicing scores were added for each option. The ranks were then assigned for all 11 options, with rank 1 scoring the highest and rank 11 scoring the lowest. Options with tied scores received the same average rank.

Table 3: Sanitary Servicing Options – Constructability and Feasibility Screening

FEASIBILITY FACTORS	SERVICING OPTIONS					
	1	2	3	4	5	6
Internal Servicing						
% of Internal Sewer Depths below 6 m	**3** 32%	**3** 32%	**4** 29%	**4** 29%	**5** 15%	**1** 50%
	Scoring system: <10% = 6; 10%-19% = 5; 20%-29% = 4; 30%-39% = 3; 40%-49% = 2; ≥50% = 1					
Upstream Sewer Depth at Guelph Rd. (m)	**5** 4	**5** 4	**3** 9	**3** 9	**4** 6	**1** 12
	Scoring system: <3 m = 6; 3-5.0 m = 5; 5.1–7.0 m = 4; 7.1–9.0 m = 3; 9.1–11 m = 2; >11 m = 1					
Internal Sewer Construction Cost (Including pump station, if required)	**2** $9.29M	**2** $9.31M	**5** $3.52M	**5** $3.45M	**2** $8.41M	**4** $4.35M
	Scoring system: $0-$2M = 6, $2.01M-$4M = 5, $4.01M-$6M = 4, $6.01M-$8M = 3, $8.01M-$10M = 2, >$10M= 1					
Route 1						
Maximum Sewer Depth (m)	**5** 3 m	**1** 15.5 m	**1** 18.5 m	**1** 18.5 m	**1** 16.5 m	**1** 22 m
	Scoring system: <3 m = 6; 3-5.9 m = 5; 6-8.9 m = 4; 9–11.9 m = 3; 12–14.9 m = 2; >15 m = 1					
Excavated Rock Volume (m^3) (From chainage 0+000 to 0+740; assume avg. width = 9 m)	**6** 0 m^3	**5** 9,135 m^3	**2** 21,060 m^3	**2** 21,060 m^3	**4** 11,835 m^3	**1** 41,895 m^3
	Scoring system: <5000 m^3 = 6; 5,000-9,999 m^3 = 5; 10,000-14,999 m^3 = 4; 15,000-19,999 m^3 = 3; 20,000-24,999 m^3 = 2; >25,000 m^3 = 1					

FEASIBILITY FACTORS	SERVICING OPTIONS					
	1	2	3	4	5	6
External Sewer Construction Cost (To Union Street SPS)	**6** $1.09M	**5** $3.90M	**3** $6.51M	**3** $7.30M	**4** $5.31M	**1** $11.97M
	Scoring system: $0-$2M = 6, $2.01M-$4M = 5, $4.01M-$6M = 4, $6.01M-$8M = 3, $8.01M-$10M = 2, >$10M = 1					
Total Score (Internal & External)	**27**	**21**	**18**	**18**	**20**	**9**
Rank	**1**	**5**	**7**	**7**	**6**	**11**
	Route 2					
Maximum Sewer Depth (m)	N/A	**5** 4.5 m	**3** 9 m	**3** 9 m	**4** 6 m	**2** 12.5 m
	Scoring system: <3 m = 6; 3-5.9 m = 5; 6-8.9 m = 4; 9–11.9 m = 3; 12–14.9 m = 2; >15 m = 1					
Excavated Rock Volume (m^3) (From chainage 0+000 to 1+020; assume avg. width = 9 m)	N/A	**6** 270 m^3	**6** 1,395 m^3	**6** 1,395 m^3	**6** 270 m^3	**3** 18,045 m^3
	Scoring system: <5000 m^3 = 6; 5,000-9,999 m^3 = 5; 10,000-14,999 m^3 = 4; 15,000-19,999 m^3 = 3; 20,000-24,999 m^3 = 2; >25,000 m^3 = 1					
External Sewer Construction Cost (To Union Street SPS)	N/A	**5** $2.87M	**5** $3.77M	**4** $4.36M	**5** $3.83M	**3** $7.03M
	Scoring system: $0-$2M = 6, $2.01M-$4M = 5, $4.01M-$6M = 4, $6.01M-$8M = 3, $8.01M-$10M = 2, $>10M = 1					
Total Score (Internal & External)		**26**	**26**	**25**	**26**	**15**
Rank		**2**	**2**	**3**	**2**	**8**

*Scores and rank are in **bold**

For Route 1, only Option 1 is considered feasible and constructable because of the anticipated sewer depths vs rock depths and ranking shown in Table 3. In addition, typical depths for sanitary truck sewers in accordance with various Municipal and Regional standards is 6.0 m. Options 2-6 for Route 1 would require sewers and maintenance holes with depths of 15-22 m which is not practical and may not comply with the Ministry of Health and Safety for maintenance and operation purposes. Micro tunneling was reviewed and screened out based on maintenance holes (required every 120 m) depths of 15-22 m with concerns of safety and accessibility as well as maintenance.

Using Route 2, Options 2, 3 and 5 are considered feasible and constructable options because the external sewers can be constructed with only minor rock excavation and the ranking shown in Table 3.

Servicing Options 4 and 6 were screened out due to the maximum sewer and maintenance hole depths and Options 2, 3 and 5 ranking higher as per Table 3. The following options ranked higher and were assessed further:

- Route 1 Option 1
- Route 2 Option 2
- Route 2 Option 3
- Route 2 Option 5

A sanitary pump station is required in the Study Area for three of the four short-listed options.

Evaluation of Short-Listed Options

The three short-listed options were compared on the basis of parameters that capture the main differentiating criteria. The relative performance of the options against these criteria is presented numerically with 1 shown in red for worst to 4 in green for best, as shown in Table 4. The scores were summed to identify the option with the highest rank (preferred solution).

Table 4: Ranking of Short-Listed Sanitary Servicing Options

	ROUTE 1 OPTION 1	ROUTE 2 OPTION 2	ROUTE 2 OPTION 3	ROUTE 2 OPTION 5
Technical Considerations				
Internal sewer depths	**3** 32% of the internal sewer has a depth greater than 6 m.	**3** 32% of the internal sewer has a depth greater than 6 m.	**3** 29% of the internal sewer has a depth greater than 6 m.	**4** 15% of the internal sewer has a depth greater than 6 m.
	Scoring system: <20% = 4; 20-34% = 3; 35-49% = 2; ≥50% = 1			
External service area south of the study area	**4** The design can sufficiently service the entire external service area via gravity (100%).	**4** The design can sufficiently service the entire external service area via gravity (100%).	**4** The design can sufficiently service the entire external service area via gravity (100%).	**4** The design can sufficiently service the entire external service area via gravity (100%).
	Scoring system: 100% = 4; 99-75% = 3; 74-50% =2; <50% = 1			

	ROUTE 1 OPTION 1	ROUTE 2 OPTION 2	ROUTE 2 OPTION 3	ROUTE 2 OPTION 5
External service area north of the study area (Barnett, Chambers, and Cummings Cr)	**4** The design can sufficiently service the entire external service area via gravity (100%).	**4** The design can sufficiently service the entire external service area via gravity (100%).	**4** The design can sufficiently service the entire external service area via gravity (100%).	**2** The sewer outlet can service a portion of the external service area via gravity (50-74%).
	Scoring system: 100% = 4; 99-75% = 3; 74-50% = 2; <50% = 1			
External rock excavation	**4** External rock excavation volume = 0 m^3	**2** External rock excavation volume = 270 m^3	**1** External rock excavation volume = 1,395 m^3	**2** External rock excavation volume = 270 m^3
	Scoring system: 0 m^3 = 4; 1-250 m^3 = 3; 251-500 m^3 = 2; >500 m^3 = 1			
Pumping requirements	**1** SPS rated capacity = 149 L/s	**1** SPS rated capacity = 149 L/s	**4** No SPS required	**3** SPS rated capacity = 56 L/s
	Scoring system: 0-48 L/s = 4; 49-98 L/s = 3; 99-148 L/s = 2; ≥149 L/s = 1			
Environmental Impacts				
Disruption to watercourses	**2** Two gravity sewer crossings using open cut construction (moderate disruption).	**2** Two gravity sewer crossings using open cut construction (moderate disruption).	**2** Two gravity sewer crossings using open cut construction (moderate disruption).	**4** A single forcemain crossing using trenchless technology (no disruption to watercourses).
	Scoring system: no disruption = 4; minor disruption = 3; moderate disruption = 2; major disruption = 1			
Disruption to natural environment and vegetation	**3** Area of disturbance = 900 m^2	**2** Area of disturbance = 1,935 m^2	**2** Area of disturbance = 1,935 m^2	**2** Area of disturbance = 1,935 m^2
	Scoring system: no disturbance = 4; <1,000 m^2 = 3; 1,000-1,999 m^2 = 2; ≥2,000 m^2 = 1			
Social Impacts				
Archaeological impacts	**3** Construction in existing disturbed area with low potential for archaeological resources.	**2** Construction in undisturbed area with higher potential for archaeological resources.	**2** Construction in undisturbed area with higher potential for archaeological resources.	**2** Construction in undisturbed area with higher potential for archaeological resources.
	Scoring system: archaeological clearance available = 4; disturbed area / low potential for archaeological resources = 3; undisturbed area / higher potential for archaeological resources = 2; archaeological resources present = 1			

	ROUTE 1 OPTION 1	ROUTE 2 OPTION 2	ROUTE 2 OPTION 3	ROUTE 2 OPTION 5
Impacts to residents external to the study area (e.g. traffic interruptions)	**4** The forcemain construction is estimated to have an 8-week construction period.	**2** The gravity sanitary sewer is estimated to have a 29-week construction period.	**1** The gravity sanitary sewer is estimated to have a 47-week construction period.	**1** The gravity sanitary sewer is estimated to have a 35-week construction period.
	Scoring system: Estimated Construction Period <10 weeks = 4; 10-20 weeks = 3: 20-30 weeks = 2; >30 weeks = 1			
Economic Considerations				
Land acquisition costs	**4** No land acquisition required.	**1** Property acquisition required.	**1** Property acquisition required.	**1** Property acquisition required.
	Scoring system: no land acquisition required = 4; easement required = 2; property acquisition required =1			
Construction costs	**2** Total construction cost (internal & external) = $10.38M	**1** Total construction cost (internal & external) = $12.18M	**4** Total construction cost (internal & external) = $7.28M	**1** Total construction cost (internal & external) = $12.25M
	Scoring system: <$8M = 4, $8M-$10M = 3, $10M-$12M = 2, >$12M= 1			
Life cycle costs	**1** Major life cycle costs associated with SPS (rate capacity 149 L/s)	**1** Major life cycle costs associated with SPS (rate capacity 149 L/s)	**4** Minimal life cycle costs associated with gravity sanitary sewer	**2** Moderate life cycle costs associated with SPS (rate capacity 56 L/s)
	Scoring system: minimal cost = 4; minor cost = 3; moderate cost = 2; major cost = 1			
Total Score	**35**	**25**	**32**	**28**
Rank	**1**	**4**	**2**	**3**

*Scores and rank are in **bold**

The highest ranked option is Route 1 Option 1 as it provides a solution that can be constructed within the Town rights-of-way, that has the second lowest anticipated project costs, and has the potential to service areas beyond the Study Area.

Route 2 Option 2 and Route 2 Option 5 are not the preferred option as they have high anticipated project cost and require an outlet that is in part on private land. Similarly, Route 2 Option 3 is not the preferred option because of the extent of rock excavation, impacts on residents, and the reliance on a sanitary outlet that is outside of the municipal rights-of-way.

However, these four options are considered feasible and can service the Study Area.

4.5.4 Internal Servicing for Option 1

The internal sanitary servicing configuration, as presented for Option 1 on Drawing SAN-1 in Appendix D, involves conveying sanitary flows from the Study Area, Tower Street SPS service area to a future SPS (SPS 1) proposed to be constructed in Catchment 2 of the Study Area.

East of Tower Street, the development is proposed to have trunk sewers along the north-south collector road up to the intersection with Second Line that will convey the wastewater through a trunk main proposed along the east-west collector road from the intersection with Scotland Street to Tower Street. All wastewater will flow from the east half of the Study Area across Tower Street and north to proposed SPS 1. Smaller diameter sanitary sewers will be looped throughout the development parcels. The alignment and sizing of these sewers will be determined as part of the detailed development proposals.

4.6 SERVICING ASSESSMENT

4.6.1 Hydraulic Modelling

Triton conducted sanitary modelling using an existing average wastewater generation rate of 213 L/person/day, which resulted in existing sanitary peak flows close to the Tower Street SPS rated capacity of 40.5 L/s. Downstream of the Tower Street SPS, the model predicts the trunk sewers on Tower Street experience surcharging under current conditions because the calculated existing flows are near the rated capacity of the SPS. However, there have been no reported surcharging issues in the area that validate that model findings.

It was resolved that with the additional projected flows from Catchment 1, the pumps in the Tower Street SPS would cycle more frequently but at the same pumped flow rate, therefore, surcharging is not anticipated to occur. Flow monitoring is recommended to confirm if the SPS is operating near its capacity and if the sewers are experiencing surcharging to support the above reasoning.

It is noted that Triton's hydraulic modelling was completed with information from a previous iteration of the Preferred Land Use Plan, whose overall flow calculations are conservative compared to the calculations presented in Section 4.3. Triton's hydraulic modelling is considered sufficiently accurate at this stage of the Study Area's planning and design process. Hydraulic modelling should be checked when more details are known about the proposed developments. Details of the hydraulic assessment are found in Triton's hydraulic modelling results in Appendix C.

4.6.2 Preliminary Design of Preferred Option

The preliminary peak design flows and internal sewer routing are presented in Sections 4.3 and 4.5.4, respectively. The preliminary routing of the internal sewers and the design flows for the drainage areas are shown on Drawing SAN-1 in Appendix D.

The estimated total peak flow to be conveyed to the proposed SPS 1 is 149 L/s. This assumes the flows from Tower Street SPS will be directed to the proposed SPS-1 at its rated capacity of 40.5 L/s.

The maximum trunk sewer size to convey 149 L/s to SPS 1 was calculated to be a 525 mm diameter sewer. The calculations are provided in Appendix B. Smaller diameter sanitary sewers will be looped throughout the development parcels. The alignment and sizing of these sewers will be determined with detailed development proposals.

The required capacities and sizing of the gravity sewers receiving the discharge from SPS 1 will be subject to the design of SPS 1 and ultimate external routing.

4.7 PHASING IMPLICATIONS

The Study Area is proposed to be constructed in four phases (refer to Drawing PH-1 in Appendix E for the phasing limits).

Sanitary servicing of the development areas is dependent on the construction of additional capacity at the WWTP and expansion of the sewer network. The factors to consider when determining the overall phasing of the Study Area are as follows:

- Expansion of the WWTP is planned for 2025 to 2027. Once completed, there should be no restrictions on wastewater treatment to service the entire Study Area.
- Area P (Phase 1) is anticipated to discharge to an existing maintenance hole at the intersection of McQueen Boulevard and Millburn Boulevard. Flows from the area will be conveyed to the Tower Street SPS. The capacity at the Tower Street SPS and downstream sewers should be confirmed through flow monitoring as recommended in Section 4.6.1. There is sufficient capacity at the WWTP for treatment of wastewater from the area.
- As all sanitary flows from the Study Area are proposed to be pumped through SPS 1 to the Union Street SPS, the forcemain and SPS 1 must be constructed prior to servicing all areas except for Area P (Phase 1).
- Considering the addition of flows from Area P, the remaining capacity at the WWTP is 1,094 m^3/day. This is sufficient to connect all proposed development areas west of Tower Street except for Area C (i.e., Areas A, B, D, E and F) with a remaining capacity of 3 m^3/day.

It is recommended to check the provided comments when more details are known about the proposed developments and updated timelines of the planned upgrades.

5 Water Servicing

5.1 EXISTING INFRASTRUCTURE

The Centre Wellington Drinking Water System is supplied by nine groundwater wells (five in operation in Fergus and four in Elora). Chlorinated water from these wells supplies the combined Elora-Fergus water distribution system that is comprised of three pressure zones. The Study Area is within the Fergus South pressure zone. The closest production well to the Study Area is Fergus Well 5 (Well F5) located at 886 Scotland Street. The Elora-Fergus water distribution system is comprised of approximately 121 km of watermains and four elevated storage tanks. Water is pumped from Elora to Fergus by the Aboyne Booster Pumping Station (BPS).

There are no known existing constraints that currently limit the capacity of the existing water network to meet the water demands. The water distribution system is shown on Drawing WM-1 in Appendix D.

5.2 DESIGN CRITERIA

Water servicing criteria for the Study Area were developed based on the *Township of Centre Wellington Development Manual Draft*, the *Design Guidelines for Drinking-Water Systems* (MECP, 2008), and guidelines used in other municipalities. The criteria used for this FSR are as follows:

- Residential per capita average day demand — 300 L/person/day
- Industrial, commercial and institutional (ICI) demand — 20,000 L/ha/day
- Maximum day factor (MDF) — 1.9
- Suggested fire flows based on land use:
  - Low density residential — 100 L/s
  - Medium density residential — 120 L/s
  - Mixed use — 200 L/s
  - Industrial, commercial, institutional — 200 L/s

5.3 PROJECTED DEMANDS

Water demands for the Study Area were calculated using the design criteria outlined above and based on the Preferred Land Use Plan. The projected average day demand (ADD) is 2,244 m^3/day and the maximum day demand (MDD) is 4,263 m^3/day, as summarized by land use area in Table 5. Detailed calculations for the water demands are included in Appendix B.

Table 5: Proposed Water Demands

LAND USE AREA	AVERAGE DAY DEMAND (m^3/day)	MAXIMUM DAY DEMAND (m^3/day)
Residential – Low Density	885	1,681
Residential – Medium Density	630	1,197
Corridor	588	1,118
Gateway	88	168
Institutional	52	100
Total	**2,244**	**4,263**

5.4 PLANNED UPGRADES

5.4.1 Water Supply

In the *Draft Water Supply Master Plan*[3], four potential sites for new water supply wells (WA3, WA5, WA7 and WA8) were identified. The *Development Charges Background Study* identifies two planned projects in 2022 for the replacement and expansion of Wells F2 and F5.

Triton concluded that with the planned expansion of Wells F2 and F5 and the addition of new wells WA3 and WA5, the total supply capacity would be increased to 21,440 m^3/day with a firm capacity of 18,640 m^3/day (from the existing firm capacity of 12,658 m^3/day). This increased capacity could accommodate the entire Study Area.

5.4.2 Water Distribution

The *Development Charges Background Study/Capital Plan* identifies eight planned watermain extension projects near the Study Area in the following timelines:

- 2024: Guelph Street from Elora St to Union
  Guelph Street from McQueen Blvd to Elora St
  Guelph Street from Elora St to Second Line
- 2025: McQueen Boulevard from Scotland Street to Guelph Street
  Scotland St from existing dead end to Second Line

[3] *Draft Water Supply Master Plan. AECOM, July 2019.*

- 2027: Second Line from Highway 6 to Jones Baseline

  Highway 6 from existing dead end to Second Line

- 2029: Second Line from Highway 6 to Guelph Street

The dates of the watermain upgrades identified above as noted in the Townships current Capital Plan are subject to significant date revisions and changes.

5.5 PROPOSED WATER SERVICING

5.5.1 Connections to Water Distribution System

Four connection points to the existing water distribution system are proposed for the Study Area, as follows:

- Connection 1 at the west dead end of the 300 mm diameter watermain on McQueen Boulevard.
- Connection 2 at the south dead end of the 300 mm diameter watermain on Tower Street.
- Connection 3 at the intersection of the 200 mm and 250 mm diameter mains at McQueen Boulevard and McTavish Street.
- Connection 4 at the south dead end of the 300 mm diameter watermain on Scotland Street.

There is the potential for a future connection to Guelph Street when watermains are extended on Guelph Street to Second Line.

5.5.2 Internal Water Services

The Study Area is proposed to be serviced by 300 mm diameter trunk watermains along the north-south collector road until the intersection with the east-west collector road. A 300 mm diameter trunk watermain is proposed along this roadway from the intersection with Scotland Street and Tower Street.

Smaller diameter watermains will be looped throughout the development parcels. The alignment of these watermains will be determined with detailed development proposals.

Refer to Drawing WM-1 in Appendix D showing the proposed connections to the water distribution system and proposal internal trunk watermains.

5.6 SERVICING ASSESSMENT

5.6.1 Water Supply

Triton references the *2021 Reserve Capacity Calculations* for Fergus and Elora reports, which show that the current water supply wells have a total firm capacity of 12,658 m^3/day.

Considering the current total maximum day demand of the system is 7,423 m^3/day and there is 4,212 m^3/day committed, or under consideration for being committed, the remaining available capacity for the Fergus and Elora Drinking Water System is 1,023 m^3/day.

Therefore, the existing water supply infrastructure does not have sufficient capacity to supply water to the Study Area. At least an additional 3,240 m^3/day of firm capacity (i.e., total capacity of 15,898 m^3/day) is required to service the Study Area.

5.6.2 Hydraulic Modelling

Triton completed a hydraulic modelling analysis of the Study Area using preliminary grading, servicing and road layout information provided by Tatham Engineering in May 2022. Details of the hydraulic assessment are found in Triton's hydraulic modelling results in Appendix C.

Triton's water modelling shows that the operating pressures under ADD and MDD conditions in the development are expected to range from 307 kPa (45 psi) to 464 kPa (67 psi), which are within the preferred pressure ranges outlined in the Township's 2018 *Development Manual*. The modelling predicts available fire flows ranging from 65 L/s at the east end of Area M (low density residential) to over 300 L/s in Area G (corridor). Although the available fire flows in Area M meet the requirements of the Fire Underwriters Survey (FUS) for single detached homes spaced 3 m apart, they can be increased by upsizing the watermains from 150 mm to 200 mm in that area and/or with additional looping to the watermains on Scotland Street and Second Line.

It is noted that Triton's hydraulic modelling was completed with information from a previous iteration of the Preferred Land Use Plan, whose overall demand calculations are conservative compared against the calculations presented in Section 5.3. Triton's hydraulic modelling is considered valid at this stage of the Study Areas planning and design process. Hydraulic modelling is recommended to be checked when more details are known about the proposed developments.

5.7 PHASING IMPLICATIONS

The Study Area is proposed to be constructed in four phases as outlined in Drawing PH-1 in Appendix E.

Water servicing of the development areas is dependent on the construction of additional water system infrastructure such as upgrades to the water supply system and expansion of the watermain network. The factors to consider when determining the overall phasing of the Study Area are outlined as follows:

- Wells F2 and F5 upgrades are planned for 2022 and the addition of new Well WA3 is planned for 2023 to 2026 and WA5 for 2028 to 2030. Once completed, there should be no restrictions on water supply to service the whole Study Area.
- Area P (Phase 1) is anticipated to connect to the planned watermain extension of McQueen Boulevard between McTavish Street and the east termination at Millburn Boulevard that is planned for 2025. It is also possible to connect to the existing watermain at the intersection of McQueen Boulevard and McTavish Street.
- Area A (Phase 2) can connect to the existing McQueen Boulevard west termination, however, the watermains may require looping with Area B watermains or the extension of McQueen Boulevard between the termination and Guelph Street (2025), depending on the requirements of the proposed developments.
- Area B (Phase 2) is anticipated to connect to McQueen Boulevard when the watermain is constructed between the west termination and Guelph Street (2025).
- Area C (Phase 2) is anticipated to connect to Tower Street when the watermain is extended from the existing termination to Second Line (2027).
- Areas G, H, J, L and O (Phase 3), which are anticipated to connect to the proposed trunk mains on the north-south and east-west internal collector roads, cannot be serviced until the Scotland Street watermains are extended to Second Line (2025) and the Tower Street watermains are extended to Second Line (2027). Then the internal collector roads can be constructed and connected to Scotland Street and Tower Street.
- Areas N and M (Phase 3) border the proposed internal collector roads and Scotland St and may be serviced through connection to either or both roadways. They cannot be serviced until the Scotland Street watermains are extended to Second Line (2025). Any looped connections to the internal collector roads cannot be made until the internal collector roads can be connected to Scotland Street and Tower Street (2027).
- Areas bordering Second Line such as Areas K and I (Phase 3), E and F (Phase 3) or D (Phase 4) cannot be serviced until the Second Line watermains are connected from Guelph Street to Scotland Street (2029). The Guelph Street extension will be constructed in 2024.
- The remaining capacity in the water supply system is 1,023 m^3/day. This is sufficient to connect Areas P, A, D and F with a remaining capacity of 57 m^3/day.

It is recommended to check the provided comments when more details are known about the proposed developments and updated timelines of the planned upgrades.

6 Grading

6.1 SITE SURVEYS

Northway/Photomap Remote Sensing Ltd. conducted a drone survey in the fall of 2020, capturing new aerial photography and topographic mapping of the Study Area. To supplement the drone survey data, Tatham Engineering conducted a topographic survey of Nichol Drain No. 2 and other key hydrologic features in the area. This topographic data was used to establish the existing drainage patterns, invert elevations of the drain at servicing crossings, and road elevations at anticipated connection points in the Study Area.

6.2 SITE GRADING

The anticipated site grading plan was developed considering the following:

- elevation of the lands bounding the study area;
- most recent land use plan;
- proposed sanitary and storm drainage patterns;
- proposed sewage pumping station location;
- location and preliminary design of stormwater management facilities;
- results of the natural hazard study;
- required cover on proposed storm and sanitary sewers; and
- roadway design standards.

The predominant design consideration that impacted the grading concept was the storm drainage patterns and preliminary stormwater management facilities locations/design. The resulting grading concept and preliminary design elevations are shown on Drawing SG-1 in Appendix D. Preliminary earthwork cut and fill calculations were completed as part of the grading analysis and the results are provided on Drawing SG-1. The preliminary analysis indicates the Study Area will require imported fill. The calculations assume that all topsoil will be re-used and does not account for the imported volume of road granular, pavement, sewers, and sewer bedding. An allowance was not made for the impact of house basements.

6.3 PHASING IMPLICATIONS

The grading concept was reviewed against the anticipated phasing of development as shown on Drawing PH-1 in Appendix E. The grading of the site does not impact the phasing order of the Study Area as none of the phases have surplus material that could be used in another phase.

7 Stormwater Management Plan

A *Preliminary Stormwater Management Plan* has been prepared by Tatham Engineering and submitted under separate cover. The report outlines the existing conditions of the Study Area and documents the proposed stormwater management strategy within the Study Area. Specifically, it outlines the proposed drainage patterns for development, the stormwater management criteria and strategy to provide water quality and quantity control, and the erosion and sediment control plan.

The plan maintains existing drainage conditions at the limits of the Study Area by restricting post development peak flow rates to pre-development levels and reduces the potential for adverse impacts resulting from changes to drainage because of the development.

The proposed stormwater management facilities provide the necessary primary water quantity control. The stormwater management plan provides the required Level 1 “Enhanced” water quality control for the site effluent at the site outlets.

Safe conveyance of the Regulatory Storm event peak flows through the site to the downstream drainage system is provided and the drainage from all external lands is accommodated within the proposed drainage design.

8 Transportation Plan

A *Transportation Plan* has been prepared by Tatham Engineering and submitted under separate cover. The report assesses the existing road network, the traffic volumes that result from the Study Area, and the impacts of such on the future road network.

9 Phasing Summary

The Study Area is proposed to be constructed in four phases, as shown on Drawing PH-1 in Appendix E. The phasing implications for each phase and Area are detailed in Table 6.

The following comments summarize the phasing plan for the Study Area:

- Phase 1 (Area P) can be built under the existing infrastructure since connections can be made to the existing sanitary collection and water distribution systems, and there is sufficient available capacity at the WWTP and the water supply systems to accommodate the flows and demands.
- SPS 1 should be constructed prior to the connection of further development within the Study Area. The construction of SPS 1 must follow the construction of the discharge forcemain along Guelph Street, upgrades of the Union Street SPS (2024) and upsize of its discharge forcemain to the WWTP (2024).
- Once SPS 1 is commissioned, the Tower Street SPS can be decommissioned and flows redirected to SPS 1 through the Study Area.
- The remainder of the developments can connect to the sanitary and water distribution systems in the order as follows:
  - Phase 2: Area A when SPS 1 is commissioned
    Area B from 2025 to 2030 (variable on water supply upgrades)
    Area C from 2027 to 2030 (variable on water supply upgrades)
  - Phase 3: Areas M and N from 2025 to 2030 (variable on water supply upgrades)
    Areas G, H, J, L and O from 2027 to 2030 (variable on water supply upgrades)
    Areas E, F, I and K from 2029 to 2030 (variable on water supply upgrades)
  - Phase 4: Area D in 2029

Within each timeline, the land use areas can be built out depending on the installation of the required downstream sanitary sewers and upstream watermains. Detailed alignment and connections to be resolved by others. Note that Phase 2 through 4 of the development are dependent on the WWTP upgrades, which are subject to significant date revisions and changes.

It is recommended to check the provided comments when more details are known about the proposed developments and updated timelines of the planned upgrades.

Table 6: Detailed Phasing Implications

PHASE	AREA ID	SANITARY	WATER
1	P	▪ Can connect to existing sanitary collection system ▪ Can be accommodated in existing WWTP capacity	▪ Can connect to existing water distribution system or wait for McQueen Blvd watermain extension (2025). ▪ Can be accommodated in existing water supply capacity.
2	A, B, C	▪ Sewage required to drain to future SPS 1 ▪ Areas A and B can be accommodated in existing WWTP treatment capacity ▪ Area C can be accommodated after WWTP expansion (2025-2027)	▪ Area A can connect to existing water distribution system or wait for McQueen Blvd watermain extension (2025). ▪ Area B can connect after McQueen Blvd watermain extension (2025) ▪ Area C can connect after Tower St watermain extension (2027). ▪ Area A can be accommodated in existing water supply capacity. ▪ Areas B and C can be accommodated after water supply expansion (2022-2030 variable).
3	E, F, G, H, I, J, K, L, M, N, O	▪ Sewage required to drain to future SPS 1 ▪ Areas E and F can be accommodated in existing WWTP treatment capacity ▪ Areas G, H, I, J, K, L, M, N and O can be accommodated after WWTP expansion (2025-2027)	▪ Areas G, H, J, L and O can connect after Scotland Street watermain extension (2025), Tower Street watermain extension (2027), and development of internal roads (post-2027). ▪ Areas N and M can connect after Scotland Street watermain extension (2025) and looped after internal roads developed (post-2027). ▪ Areas K, I, E and F can connect after Guelph Street watermain extension (2024) and Second Line watermain extension (2029). ▪ Can be accommodated after water supply expansion (2022-2030 variable).
4	D	▪ Sewage required to drain to future SPS 1 ▪ Can be accommodated in existing WWTP capacity	▪ Can connect after Guelph Street watermain extension (2024) and Second Line watermain extension (2029). ▪ Can be accommodated in existing water supply capacity.

Note: The water servicing of specific areas is dependent on the availability of water supply capacity considering the timelines of the upgrades at Wells F2 and F5 and the addition of new Wells WA3 and WA5, as described in Section 5.4.1.

10 Summary

The FSR has addressed the servicing options and potential impacts on the existing systems for the South Fergus Secondary Plan area.

The Study Area is 147.5 ha of currently undeveloped land at the south end of Fergus, Township of Centre Wellington. It is proposed to be developed into residential, commercial, mixed use, institutional and recreational properties totalling 7,066 people, 137 jobs and 6.2 ha of employment lands.

Sanitary Servicing

Area P can be serviced by the existing WWTP (with no upgrade) and the Tower Street SPS, however, the SPS is near its rated capacity. Flow monitoring is recommended to verify the flow to the SPS as well as confirm if surcharging is present in the downstream sewers.

A new SPS is proposed to be constructed within the Study Area. The future SPS will receive sanitary flows from the entire development area as well as the flows from Tower Street SPS when it is decommissioned. Wastewater will then be conveyed to the Union Street SPS. The two potential routes for conveying flows to the Union Street SPS involve either constructing a forcemain in the Guelph Street ROW to the SPS (Route 1), or constructing a gravity sewer along Nichol Drain No. 13 that will drain to the Union Street SPS (Route 2). Route 2 involves the acquisition of private property. Initial screening that considered project cost, maximizing service to external areas, constructability, minimizing rock excavation and constructing within municipally owned land suggests that the forcemain within the Guelph Street ROW to be the preferred outlet route.

The projected total ADF is 4,057 m^3/day and the PF is 109 L/s. The existing WWTP does not have sufficient capacity to treat the total projected flows from the Study Area. The existing WWTP can service Phase 1 (Area P) and has additional capacity to service portions (Areas A, B, D, E, and F) of Phases 2 through 4. However, upgrades to the WWTP are required to service the remainder of the Study Area (Areas C, G, H, I, J, K, L, M, N, and O).

Water Servicing

Area A can be serviced by connecting to the existing watermain on McQueen Boulevard, however, the pressures and flows should be checked in the hydraulic model once further details are known about the proposed developments.

The Study Area is proposed to make four connections to the existing water distribution system. Proposed trunk watermains within the Study Area can be looped with the future watermains

along Guelph Street, Second Line, Tower Street and Scotland Street. Servicing within the parcels will be determined when more details are known about the proposed developments.

The projected ADD is 2,244 m^3/day and the MDD is 4,263 m^3/day. No portion of the development has been given allocation for water supply. Hydraulic modelling completed by Triton shows that the development is expected to experience adequate pressures and flows. Hydraulic modelling is recommended to be checked when more details are known about the proposed developments.

Grading

The predominant design consideration that impacts the grading concept is the storm drainage patterns and preliminary stormwater management facility locations/design. The preliminary analysis indicates that the Study Area will require imported fill for construction.

Stormwater Management Plan

The *Preliminary Stormwater Management Plan* maintains existing drainage conditions at the limits of the Study Area. The proposed stormwater management facilities provide the necessary primary water quantity control. The Plan provides the required Level 1 "Enhanced" water quality control for the site effluent at the site outlets. Safe conveyance of the Regulatory Storm event peak flows through the site to the downstream drainage system is provided and the drainage from all external lands is accommodated within the proposed drainage design.

Transportation Plan

The *Transportation Plan* assesses the existing road network, the traffic volumes to result from the Study Area and the impacts of such on the future road network. It addresses the needs of the road network to accommodate the future conditions associated with the development of the Study Area.

Phasing

The phasing plan is shown on Drawing PH-1 in Appendix E. Except for Area P (Phase 1), the construction of proposed SPS 1 and associated outlet works is required for the development of all areas within the Study Area. Following the commissioning of SPS 1 the land use areas can be built out in the order as follows:

- Area A (Phase 2) immediately;
- Area B (Phase 2), M and N (Phase 3) from 2025 to 2030 (variable on water supply upgrades;
- Areas C (Phase 2), G, H, J, L and O (Phase 3) from 2027 to 2030 (variable on water supply upgrades);

- Area D (Phase 4) in 2029; and
- Areas E, F, I and K (Phase 3) from 2029 to 2030 (variable on water supply upgrades).

The considerations for the above timelines are found in Section 9.

Within each timeline, the land use areas can be built out depending on the installation of the required downstream sanitary sewers and upstream watermains. Detailed alignment and connections to be resolved by others.

Appendix A:
Preferred Land Use Plan

Figure #

Preferred Land Use Plan

South Fergus MESP and Secondary Plan
Town of Fergus
Township of Centre Wellington
County of Wellington

Legend

- South Fergus Planning Area
- Property Lines (Approximate)
- Natural Heritage Features
- 30 m Natural Heritage Feature Buffer
- Creek
- Natural Hazard Limit

Proposed Land Use

- Low Density Residential
- Medium Density Residential
- Mixed Use Corridor
- Gateway Commercial
- Natural Heritage
- Highway Commercial
- Future School Location
- Community Park Location
- Neighbourhood Park Locations
- Preliminary SWM Locations
- Trail Corridor
- Proposed Collector Roads
- Potential Roundabout
- Future Intersection Improvements
- Property of Cultural Heritage Value or Interest

DATE: February 13, 2023
SCALE: N.T.S
FILE: 19144A
DRAWN: JB

north

K:\19144A - South Fergus MESP and Secondary Plan\CP

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

FRICORP ECOLOGICAL SERVICES

TATHAM ENGINEERING

Appendix B:
Technical Calculations & Analyses

South Fergus Future Populations, Water Demands and Sanitary Flows

Last Updated 2023-02-22

Density Assumptions *Per MHBC*

Residential - Low Density	20 units/ha
Residential - Medium Density	43.50 units/ha
Residential - Corridor Density	75 units/ha
Residential - Gateway Area F	75 units
Residential - Gateway Area I	83 units
Job Density - Corridor	19 jobs/ha
Job Density - Gateway	95 jobs/ha
Jobs - School	20 jobs
Mixed Use Employment Area	20% to 25%

**Adjusted Area counts for a reduction of 22% of area

Fire Flow Criteria

Low Density	100 L/s
Medium Density	120 L/s
Mixed Use	200 L/s
ICI (Corridor, Gateway, Institutional)	200 L/s

Fire Flows determined by Tatham on an analysis of nearby municipalities' standards and experience with similar projects

Occupancy Criteria

Low Rise	3.094	*Per developer*
Medium Density	2.411	*Per developer*
Corridor & Gateway	1.596	*Per developer*

Demand Criteria (Water)

Residential Demand	300 L/p/day	*Conservatively based on 2020 per capita flows*
ICI Demand	20,000 L/ha/day	*Based on MOE guidelines and nearby municipalities*
MDF	1.9	*MOE, based on population of 21,000*

Demand criteria assumes no heavy industrial uses.

Flow Criteria (Sewage)

Residential (domestic + I&I)	350 L/p/day	*Township of Centre Wellington Development Manual, 2018*
ICI (domestic)	20,000 L/ha/day	*Based on MOE guidelines and nearby municipalities*
I&I	0.15 L/s/ha	*Township of Centre Wellington Development Manual, 2018*
Peaking Factor - Res	3.1	*Harmon for South Fergus area:*
Peaking Factor - ICI	2	*7,066 population*

$$M = 1 + \frac{14}{4+p^{0.5}}$$

where M = Harmon Peaking Factor
p = Population (in thousands)

Population and Jobs Analysis - Preferred Land Use Plan

								Max Water Demands (m^3/d)						Max Sewage Flows						
								Residential		ICI		Total Development		Residential		ICI			Total Development		
Area ID	Land Use	Area	Adjusted Area (ha)	Adjusted Empl. Area (ha)	Res. Units	Res. Pop.	Empl. Jobs	ADD	MDD	ADD	MDD	ADD	MDD	ADF (m^3/d)	PF (L/s)	ADF (m^3/d)	PF (L/s)	I&I (L/s)	ADF (m^3/d)	PF (L/s)	Sugges-ted Fire Flow (L/s)
A	Medium Density	2.79	2.18		95	228		68	130	0	0	68	130	80	2.9	0	0.0	0.4	116	3.3	120
B	Low Density	17.2	13.42		267	827		248	471	0	0	248	471	289	10.4	0	0.0	2.6	512	13.0	100
C	Corridor	12.32	9.61	1.92	721	1,150	37	345	656	38	73	384	729	403	14.5	38	0.9	1.8	601	17.2	200
D	Low Density	8.23	6.42		128	397		119	226	0	0	119	226	139	5.0	0	0.0	1.2	246	6.2	100
E	Medium Density	3.52	2.75		119	288		86	164	0	0	86	164	101	3.6	0	0.0	0.5	146	4.1	120
F	Gateway	1.71	1.33	0.33	75	120	32	36	68	7	13	43	81	42	1.5	7	0.2	0.3	71	1.9	200
G	Corridor	2.33	1.82	0.36	136	218	7	65	124	7	14	73	138	76	2.7	7	0.2	0.3	114	3.3	200
H	Corridor	4.25	3.32	0.66	249	397	13	119	226	13	25	132	251	139	5.0	13	0.3	0.6	207	5.9	200
I	Gateway	1.89	1.47	0.29	83	132	28	40	76	6	11	46	87	46	1.7	6	0.1	0.3	77	2.1	200
J	Medium Density	2.03	1.58		69	166		50	95	0	0	50	95	58	2.1	0	0.0	0.3	84	2.4	120
K	Low Density	14.9	11.62		232	719		216	410	0	0	216	410	252	9.0	0	0.0	2.2	445	11.3	100
L	Medium Density	5.99	4.67		203	490		147	279	0	0	147	279	172	6.2	0	0.0	0.9	249	7.1	120
M	Low Density	9.75	7.61		152	471		141	268	0	0	141	268	165	5.9	0	0.0	1.5	291	7.4	100
N	Low Density	11.08	8.64		173	535		160	305	0	0	160	305	187	6.7	0	0.0	1.7	331	8.4	100
O	Institutional (School)	3.36	2.62	2.62			20	0	0	52	100	52	100	0	0.0	52	1.2	0.5	96	1.7	200
P	Medium Density	11.34	8.85		385	928		278	529	0	0	278	529	325	11.7	0	0.0	1.7	472	13.4	120
Total		**112.7**	**87.90**	**6.2**	**3,088**	**7,066**	**137**	**2,120**	**4,027**	**124**	**236**	**2,244**	**4,263**	**2,473**	**88.8**	**124**	**2.9**	**16.9**	**4,057**	**109**	**-**

Preferred Land Use Plan dated February 13, 2023
Population and Job counts as of February 17, 2023
Note: Highway Commercial area is not included.

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Jan 25 2023

SAN TRUNK ENTERING SPS1

Circular

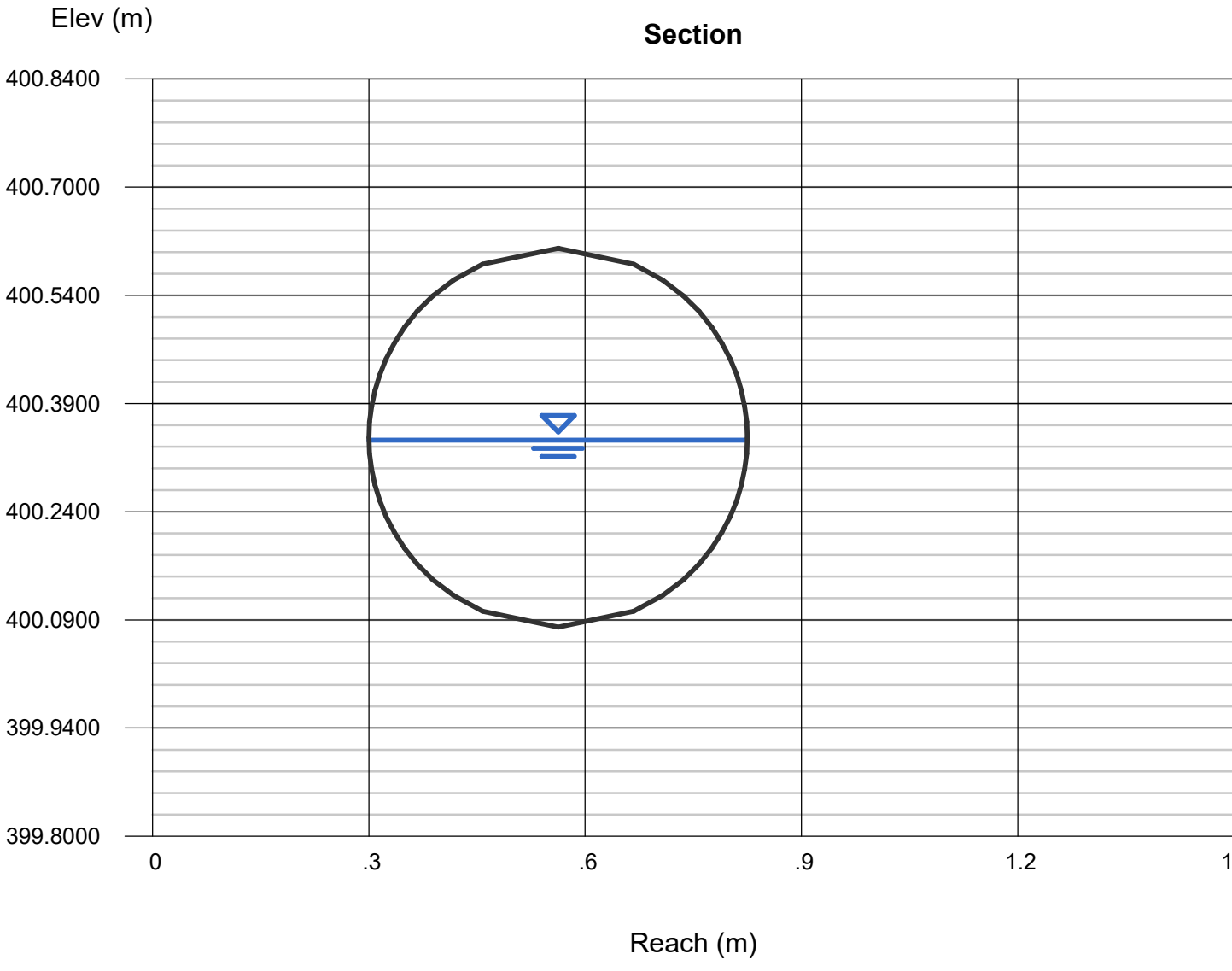
Diameter (m)	= 0.5250
Invert Elev (m)	= 400.0900
Slope (%)	= 0.5000
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cms)	= 0.1490

Highlighted

Depth (m)	= 0.2591
Q (cms)	= 0.149
Area (sqm)	= 0.1067
Velocity (m/s)	= 1.3958
Wetted Perim (m)	= 0.8190
Crit Depth, Yc (m)	= 0.2591
Top Width (m)	= 0.5250
EGL (m)	= 0.3585



Appendix C:
Servicing Assessment Memo

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

Memorandum

DATE:	September 9, 2022
TO:	Colin Baker
FROM:	Dustin Lyttle & Ray Kirtz
RE:	South Fergus Secondary Plan Municipal Servicing Assessment
FILE:	A6652A

Introduction:

The following is intended to provide preliminary insight on the servicing strategy of the South Fergus Secondary Plan development including the sanitary collection and treatment, stormwater management, water supply and distribution systems.

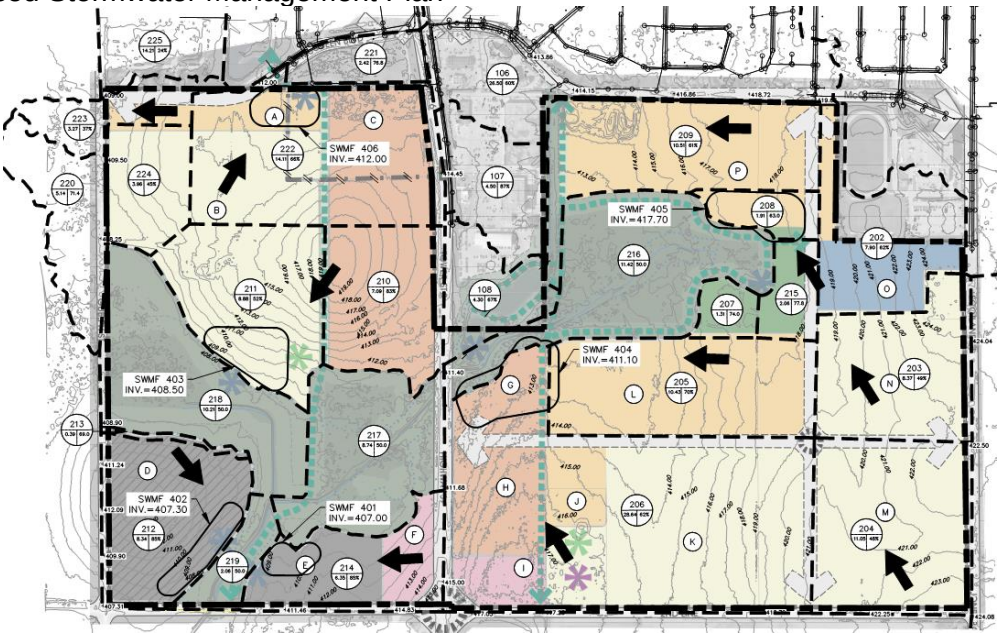
This assessment has considered the expected impact on available servicing under the proposed conditions which include the development of 375 acres of land, comprising of low, medium, corridor and gateway density residential areas, as well as employment and industrial development, servicing a total of 9,061 residents, and providing 1,457 jobs. This assessment only considers the subject development in the context of the existing development and infrastructure, it does not account for other potential development or infrastructure upgrades which may occur in the future unless noted.

Existing Services and Proposed Servicing Strategy:

Stormwater:

Currently, stormwater is conveyed via roads ditches and watercourses to various outlets. It is proposed that a total of six (6) stormwater management facilities (SWMF) be constructed to service the development. It will need to be confirmed if SWMF 405 and SWMF 406 are necessary as part of this development, or if the existing SWMF at Catchment 108 and the Westminster Subdivision are capable of handling these flows. Refer to the following figure as presented by the proponent's engineer (Tatham) for reference.

Figure 1 - Proposed Stormwater Management Plan



Portions of these lands are within the GRCA Regulation Limit, indicating that GRCA review/approval of the development will be required, including the stormwater management design. Nichol Drain #2 is the primary watercourse receiver for the developments area. As such, the adequacy and potential impacts to this watercourse will need to be identified. The GRCA and Township will need to confirm the terms of reference/scope of this study.

Water:

The 300mm diameter watermain that exists along McQueen Blvd. connects to the existing 300mm watermains on Highway 6/Tower St., Scotland St. and McTavish St.; however, watermain does not exist on McQueen between Millburn and McTavish. The existing watermain on Highway 6 extends to the northern limit of the Reliable Ford site, roughly 375m south of the Highway 6 and McQueen Blvd. intersection. The existing 300mm diameter watermain on Scotland St. extends roughly 375m south of McQueen Blvd. intersection.

It is proposed that several connections to the existing watermains will be made in order to service the development. These connections will be made at the west end of McQueen Blvd., the south end of Highway 6, the intersection of McQueen Blvd and McTavish St., and the south end of Scotland St.

The 2021 Reserve Capacity Calculations (RCC) for Fergus and Elora reported that the current system has an average density of 3.09 persons/unit, a maximum day water demand of 0.92 m^3/day/unit.

Sanitary:

There is an existing sanitary pumping station (SPS) located on Highway 6, south of McQueen Blvd. Existing 200mm diameter sanitary sewers are located along McQueen Blvd, as well both Highway 6 and Scotland St.

At this time, a number of servicing options are being explored. Majority of these options will require a SPS to be constructed to service a portion of the development. In all scenarios, sewers will ultimately discharge to a trunk sewer in the Guelph St. ROW which will outlet to the existing SPS on Union St.

The 2021 Reserve Capacity Calculations (RCC) for Fergus reported that the current system has an average density of 3.09 persons/unit, and an average daily sewage flow of 0.76 m^3/day/unit (246 L/d/capita).

Proposed Development:

The proposed lands will include **4,539 ERUs** or **9,061 people** and **16.39 hectares** of employment areas, equating to **1,457** jobs. The development will be serviced by extensions to the existing municipal water and sanitary sewage systems.

Table 1 – Proposed Densities, Population, and ERU's

Density	Population	PPU	ERUs
Low[1]	2,662	3.094	860
Medium[1]	3,598	2.411	1,492
Corridor[1]	2,353	1.596	1,474
Gateway[1]	448	1.596	281
Employment[2]	-	-	432
Total	**9,061**	**-**	**4,539**

[1] Population has been calculated based on the noted residential units proposed.

[2] ERU has been calculated by dividing the total estimated employment ADF (328m^3/day) by 0.76 m^3/day/unit.

Water Servicing:

Water Supply Reserve Capacity

The 2021 Reserve Capacity Calculations (RCC) for Fergus and Elora reported that the current water system has a Firm capacity of 12,658 m^3/day. Currently, there are 4,262 units (3,921 m^3/day) committed for capacity, with 316 units (291 m^3/day) under consideration for capacity. The maximum day flow (3-year average) is 7,423 m^3/day. This indicates that the remaining available capacity for Fergus and Elora is 1,113 units (1,024 m^3/day).

The proposed development will require 4,539 units of capacity (5,788 m^3/day). In terms of RCC values, this is 3,426 units (4,764 m^3/day) greater than what is currently available within the existing water system. To service this development in addition to the current population and allocated units, a total maximum day firm capacity of at least 17,422m^3/day will be required.

In 2019, AECOM completed a Water Supply Master Plan on behalf of the Township of Centre Wellington (CW) to identify constraints and opportunities within the Fergus-Elora water system. This report forecasted that with all wells in CW operating, the Township will reach capacity in 2026, with an expected population of 26,632 people and maximum day demand of 12,434 m^3/day. To accommodate future developments, AECOM identified four sites with potential for new wells (WA3, WA5, WA7, WA8). With wells WA3, WA5, and WA8 added to the system the total capacity of the system will be 23,610 m^3/day. The firm capacity (WA5 offline) of this scenario results in a system firm capacity of 20,810 m^3/day.

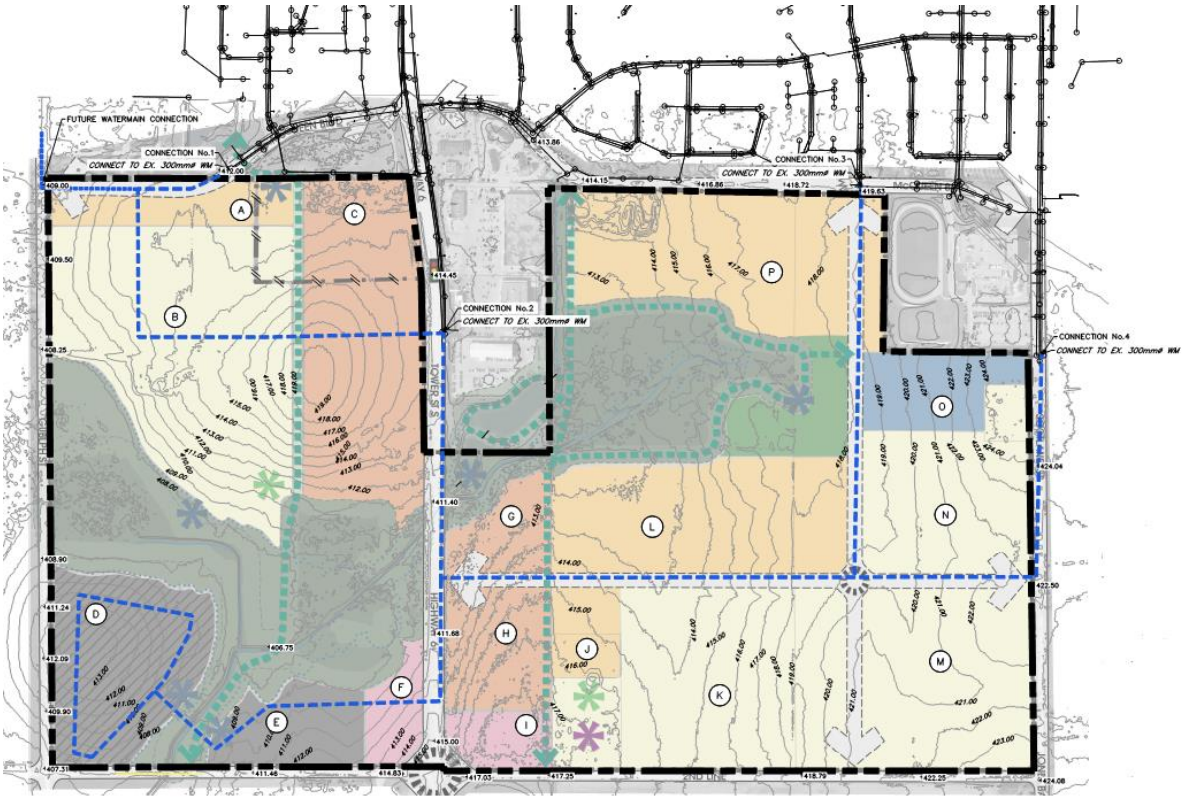
At a minimum, wells WA3 and WA5 will need to be commissioned alongside the existing wells to service the proposed development. This scenario results in a total system capacity of 21,440 m^3/day (firm capacity of 18,640 m^3/day) which results in a small surplus of 1,218 m^3/day based on proposed development. All of these scenarios assume that existing Wells F2 and F5 will be rehabilitated.

Available Water Service

Based on the above parameters, the expected available water system operating conditions are presented below. All pressures and available rates noted are at the proposed road centre line elevation. Watermain placement and sizing has been assumed based on preliminary road fabric. Modelling indicates that operating pressures within the development area are expected to be acceptable, ranging from 306.8 kPa (44.5 PSI) to 464.0 kPa (67.3 PSI). Further that the minimum fire flow will be 65.5 L/s at Area M, and that the maximum fire flow will be 303.0 L/s at Area G. However, additional main looping into future trunk main along Scotland will improve fire flows in area M, this is to be considered as part detailed design.

The configuration of the watermains is shown below in Figure 2 provided by Tatham. This figure only indicates the trunk mains throughout the development. Additionally, 150mm watermains have been modelled throughout to simulate a more realistic interconnectivity and looping of the watermains that will be available, including watermain long bounding roads.

Figure 2 - South Fergus Secondary Plan Watermain Layout



The proponent will be responsible for confirming that the modelled available fire flows are sufficient for servicing the proposed development. Additionally, system storage assessment will be completed based on this development proposal, findings will be provided separately.

Sanitary Servicing:

As presented by Tatham and based on the expected populations of the proposed development, the per person flow rate recommended by the Centre Wellington Development Manual (350 L/cap/d), and the peaking factors for residential (2.5) and ICI (2) flows, the total expected peak sanitary sewage flow will be **116.1 L/s**. This peak flow accounts for infiltration occurring at a rate of 0.15 L/ha/s. However, the peaking factor (PF=2.5) is based on the entire Fergus population, whereas it should be based on the development population which results in a PF of 3.0. This revised PF produces an expected peak flow of **164.28 L/s**.

Refer to the following table which highlights the proposed condition flows.

Table 3 – Proposed Flow Conditions

Parameter	Proposed Condition
Population	9,061
Residential Average Day Flow (L/s)[1]	36.7
ICI Average Day Flow (L/s)	3.80
Infiltration & Inflow (L/s)[2]	16.8
Total Average Day Flow (m^3/day)	**4,949**
Peak Design Flow (L/s)[3]	164.28
Peak Design Flow (m^3/day)[3]	14,193.4

[1] Uses 350 L/capita/day per Centre Wellington Development Manual
[2] Based on 0.15 L/s/ha
[3] Uses a peaking factor of 3.0 for residential and 2 for ICI

Reserve Capacity

The 2021 RCC for Fergus reported that the current wastewater treatment system has a capacity of 10,526 units (8,000 m^3/day). Each existing unit connected to the system contributes an average of 0.76 m^3/day, or 246 L/day/capita. There are currently 2,543 units committed, with an additional 238 units being considered. The average day flow (3-year average) for Fergus is equivalent to 5,682 units, therefore, the remaining available capacity for the Fergus treatment system is 2,060 units (1,566 m^3/day).

In terms of RCC values, the proposed development will require 4,539 units (4,949m^3/day) of capacity. This is 2,479 units (3,383 m^3/day) greater than what is available within the current treatment system. To service this development the system would need to be increased to a total average day capacity of at least 13,005 units (11,383 m^3/day).

Table 4 – Existing and Proposed Sanitary Flows

	Flow (m^3/d)	**ERUs**
Current System Capacity	8,000	10,526
Current Consumed/Reserved	6,434	8,466
Current Available	1,566	2,060
Proposed Development	4,949	4,539
Available Capacity	-3,383	-2,479
Minimum Required System Capacity	11,383	13,005

Proposed Collection System Options

Tower St. SPS Outlet

An interim servicing scenario has been considered for the development Area P (i.e., sanitary Catchment One), shown in the figure below, which would allow this area to be serviced prior to completion of the Guelph Street trunk sanitary sewer and Union SPS upgrades. To assess the impact of the Development Area P on the existing system, the existing per person average day demand of 213Litres/day/person, peaked using the Harmon Formula, is applied to the sewers both up and downstream of the existing Tower Street SPS. An allowance for infiltration is then further applied based on the expected total area.

Flows from the 1,599 people and associated infiltration proposed within Area P will be directed to the existing SPS on Tower Street via sewers on McQueen Blvd. These sewers were analysed and found to have sufficient capacity to accommodate the additional loading from Area P. This results in a peak expected flow at the Tower Street SPS of 39.8L/s which is slightly less than the current rated capacity of 40.5L/s.

The Tower St. SPS currently discharges to the Tower Street trunk sewer, and as such, these sewers were also assessed for capacity as these increased flows are expected to be conveyed by the SPS at a similar rate. Our analysis results for these sewers are summarized in Table 5.

Figure 3 – Sanitary Catchment Areas

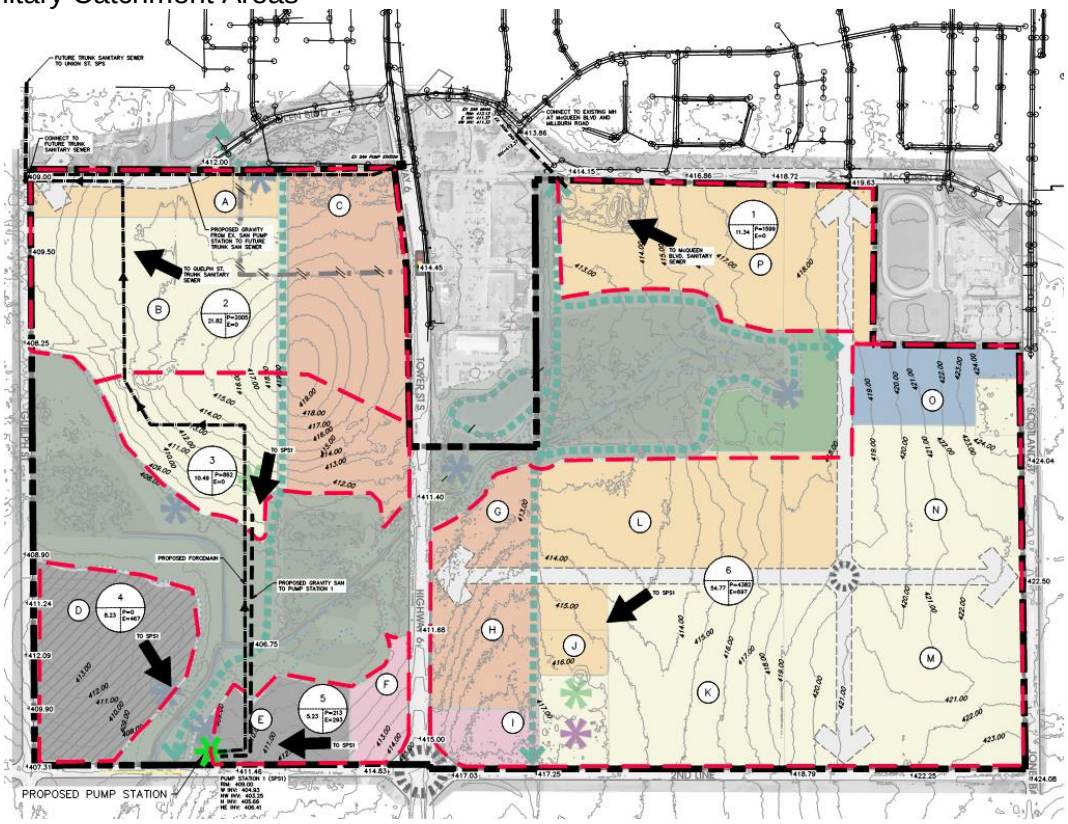


Table 5 – Sewer Capacity Analysis (Downstream of Tower SPS)

	Existing Condition % Full	Slope (%)	Diameter (mm)	Length (m)	Proposed Condition % Full
MH-2S to MH 7S on HWY 6	88.0%	0.76	200	100.5	134.0%
MH 7S to MH 8S on HWY 6	88.9%	0.78	200	90.0	134.2%
MH 8S to MH 9S on HWY 6	94.5%	0.72	200	13.0	141.5%
MH 9S to MH 9AS on HWY 6	118.6%	0.28	225	91.4	175.4%

As indicated above, there are multiple locations of potential surcharge condition based on theoretical flows. However, flows in these sewers are largely a result of the Tower St. SPS discharge which is dependent upon the pumping rate which needs to be confirmed and examined with Township staff.

Currently, these sewers have not been reported to have experienced capacity issues. Therefore, if the SPS discharge is currently at the rated capacity, the flow rates conveyed to these sewers will not increase with the addition of Area P, the pumps will just cycle more frequently. If current pump rates are not at rated capacity, a staged approach for development including flow monitoring as development comes on-line maybe required to ensure existing sewers can accommodate the increased flows from the SPS. Typically, actual flows from new development are lower than assumed theoretical flows, so flows directed to these sewers may be lower. Typically, a sewer can accommodate some surcharge without impacting the system/users.

Based on the above assessment, a more detailed assessment of this system should be completed to confirm existing discharge rates from the SPS which will provide a better indication of actually loading on these sewers.

Guelph St. Trunk Sewer Options 1-4

Four (4) sanitary servicing options have been proposed by Tatham for consideration. All options involve flows from the development being directed to a trunk sewer within the Guelph ROW eventually discharging to the Union St. SPS. In all options the Union St. SPS will require significant upgrades to accommodate the proposed development. Further, regardless of the Guelph trunk sewer configuration, the Tower St. SPS would be decommissioned, and the existing flows draining to it would be redirected to a manhole on McQueen just west of Aberdeen. This McQueen sewer will eventually be extended to Guelph to connect to this future trunk sewer. This will allow for Catchments 1 and 2, as well as existing flows from the Tower St. SPS to be conveyed to Guelph St. trunk via gravity sewer.

Under Option 1, the remaining area will drain to a future SPS in the southwest corner of the South Fergus Secondary Plan area. This option allows for the shallowest sewer installation which may cause issues in the future if existing Cummings Cr. and Chambers Cr. are to be connected to the system since this trunk sewer may be too shallow to accommodate them by gravity sewer. Similarly, other potential development area adjacent to Guelph St. may require a deeper sewer.

Option 2 is similar to Option 1, with the difference being that the trunk sewer is 2m lower in order for Catchment 3 to drain to the trunk main via gravity sewers. This servicing option also allows for the Crescents along Guelph St. to drain to the trunk sewer, but still requires Catchment 4, 5, and 6 to be serviced by the future SPS.

Under Option 3, the entire South Fergus Secondary Plan area, as well as the existing flows from the Tower St. SPS, can be conveyed to the Guelph St. trunk sewer via gravity sewers. This requires the invert of the manhole at Guelph St. and McQueen Blvd. to be 13m below grade. The trunk sewer will be a minimum of 3.0m deep and a maximum of 24.5m deep. This servicing option is the only one that doesn't require a SPS which is preferrable from a long-term O&M perspective, however, it will be difficult and expensive to construct sewers to this depth.

Under Option 4, the Secondary Plan area, the Tower St. SPS, and the Crescents along Guelph St. will drain via gravity sewer to a future SPS at an unknown location. The flows will be directed to the Union St. SPS via a forcemain running within the Guelph St. ROW. This servicing option reduces construction costs for the Guelph Street section as the forcemain can be installed at a much shallower depth than the gravity sewer and provides for servicing of the Guelph St. development area. However, long-term O&M costs increase since the Secondary Plan area, the Guelph St. development area and the Tower SPS service area will all needs to be double pumped to reach the WWTP.

Alternative Option 5

Triton is proposing a fifth (5^{th}) option to service the proposed development area. As shown in red in Figure 4 below, the gravity sewer will follow Nichol Drain 13 (ND13) rather than going down the Guelph Street ROW to the Union Street SPS. This servicing option allows for the entire South Fergus Secondary Plan area to be serviced by gravity sewer (similar to Option 3), but reduces the depth of sewer over the Guelph St. Outlet portion by up to 10m as compared to Option 3. Currently the property that ND13 is located on is privately owned but it may have development potential which would accommodate this servicing strategy.

Figure 4 – Alternative Servicing Option Configuration

Conclusion:

Stormwater Management:

At this time, preliminary stormwater modelling should be completed to assess the necessity of SWMF 405 and 406. Utilizing the existing SWMF's at Catchment 108 and the Westminister Highlands subdivision has the potential to reduce costs and increase lands available for other uses.

Water Servicing

Based on the preliminary watermain layout and development configuration, the existing water system will provide sufficient pressures and adequate fire flow based on typical residential development. However, if other types of development are proposed (i.e., multi-storey, ICI) their water needs will need to be assessed individually.

In order to service the proposed development, capacity of the existing water supply system will need to be increased to a minimum of 18,640 m^3/day. To meet this requirement, it is recommended that the Township continue with the on-going Well exploration program in an effort to establish additional wells (WA3 and WA5) as outlined in the 2019 Master Servicing Plan.

Additionally, the water system storage requirements are being investigated, findings will be presented under separate report.

Sanitary Servicing

Several configurations (Options1-4) were presented for the future Guelph trunk sewer which will provide a sanitary outlet for this development. However, an alternative "Option 5" should be also be considered for this development. This option allows for the entire development area to be serviced by gravity sewer, while reducing sewer depth and allowing for future servicing of existing developments.

In addition, they may be other options that would consider a combination of servicing strategies that need to be considered such as pumping a small low area (i.e. #5) if it means that the rest of the sewers can be raised significantly. **An evaluation of each servicing option will need to be completed that considers all criteria (i.e., costs both capital and O&M, potential service area, constructability, impacts), after which a preferred alternative can be selected for further investigation/detailing.**

The current sanitary treatment system does not have capacity to support the proposed development. The capacity of the system will need to be increased to a minimum ADF of 11,383 m^3/day to support this proposed development. Options such as optimizing or expanding the wastewater treatment system will need to be considered by the Township as part of a separate study.

In order to allow for a portion of this development to proceed in advance of establishing the Guelph trunk sewer and Union Street SPS upgrade, an interim servicing strategy has been considered for the development Area P (i.e., sanitary Catchment One, 663 ERU) which utilizes existing infrastructure. This strategy would allow this area to be serviced by the existing McQueen sewer to the Tower SPS which discharges to the Tower Street trunk sewer. Based on this assessment, the existing McQueen sewers have capacity, and the existing Tower SPS will be at capacity, however sections of the Tower sewers are overcapacity based on theoretical flows. It is recommended that a more detailed assessment of this system be completed to confirm existing flows to the sewers. Further, a staged approach to bringing the future development Area P on-line is recommended including flow monitoring.

If you have any questions or concerns, please contact us.

J-1193

J-779

MCQUEEN BOULEVARD

J-827

I-008

I-009

I-020

I-001

I-021

I-002

I-005

I-006

J-018

HIGHWAY 6

GUELPH ROAD

MCTAVISH (EXTENSION)

2ND LINE

2ND LINE

Area A

Area B

Area C

Area D

Area E

Area F

Area G

Area H

Area I

Area J

Area K

Area L

Area M

Area N

Area O

Area P

SWM POND 406
TOP OF POND = 412.75

SWM POND 405
TOP OF POND = 419.70

SWM POND 403
TOP OF POND = 410.50

SWM POND 404
TOP OF POND = 413.30

SWM POND 402
TOP OF POND = 408.50

SWM POND 401
TOP OF POND = 409.00

I-012

I-011

I-010

I-024

I-017

I-018

I-022

I-019

I-023

I-015

I-004

I-013

I-014

I-016

Note: All watermain sizes, junctions, elevations, lot fabric and general layout is for discussion purposes only, preliminary and based on information provided by Tatham Engineering.

Pressure and Fire Flow Results are approximate estimates only. Hydrant flow testing will be required to very results.

SCALE: 1:1500

		ADD		MDD	
Label	Elevation (m)	Pressure (psi)	Fire Flow (L/s)	Pressure (psi)	Fire Flow (L/s)
Area A	412.00	62.60	187.29	61.70	180.39
Area B	412.50	61.90	174.87	60.90	166.99
Area C	416.00	56.70	106.11	55.60	100.36
Area D	409.00	66.90	308.96	65.90	269.90
Area E	410.50	64.70	159.05	63.80	154.40
Area F	412.00	62.60	138.09	61.70	133.87
Area G	413.00	61.20	211.65	60.30	203.46
Area H	415.00	58.30	116.64	57.40	112.42
Area I	416.00	56.90	172.00	56.00	165.43
Area J	415.50	57.70	134.17	56.80	129.76
Area K	417.01	55.50	185.76	54.60	178.02
Area L	415.00	58.30	143.18	57.40	137.41
Area M	421.76	48.80	96.59	47.90	92.46
Area N	420.04	51.20	176.90	50.40	169.25
Area O	420.00	51.30	102.58	50.40	99.34
Area P	416.50	56.20	119.89	55.20	114.58
I-001	408.35	67.80	305.99	66.90	267.34
I-002	407.00	69.70	309.05	68.80	269.98
I-003	423.50	46.30	293.56	45.50	273.44
I-004	421.01	49.90	187.04	49.00	178.27
I-005	415.00	58.30	346.50	57.40	305.25
I-006	415.50	57.60	316.07	56.70	275.91
I-007	422.95	47.10	336.24	46.30	293.36
I-008	409.00	66.90	304.31	65.90	265.81
I-009	411.00	64.00	304.15	63.10	265.67
I-010	420.50	50.60	326.01	49.70	284.92
I-011	415.10	58.20	323.37	57.40	282.25
I-012	417.54	54.70	321.31	53.90	280.39
I-013	419.45	52.10	322.79	51.20	282.30
I-014	419.64	51.80	191.07	51.00	182.35
I-015	421.37	49.30	165.98	48.50	157.20
I-016	420.38	50.80	183.60	49.90	174.04
I-017	414.64	58.90	249.40	58.00	238.13
I-018	415.02	58.30	223.33	57.50	214.16
I-019	419.00	52.70	178.41	51.80	170.75
I-020	412.00	62.60	181.75	61.70	173.35
I-021	413.00	61.20	167.51	60.20	160.14
I-022	415.40	57.80	251.74	56.90	240.35
I-023	420.95	49.90	236.31	49.10	223.53
I-024	420.80	50.20	327.91	49.30	286.64
J-018	415.00	58.30	307.43	57.40	268.51
J-779	415.00	58.40	337.83	57.50	298.02
J-827	418.70	53.20	351.55	52.30	310.88
J-830	422.60	47.80	435.40	47.30	388.83

Note: All watermain sizes, junctions, elevations, lot fabric and general layout is for discussion purposes only, preliminary and based on information provided by Tatham Engineering.

Pressure and Fire Flow Results are approximate estimates only. Hydrant flow testing will be required to very results.

J-1193	411.00	64.00	303.53	63.10	265.14

Appendix D:
Servicing & Grading Drawings – Cost Estimates

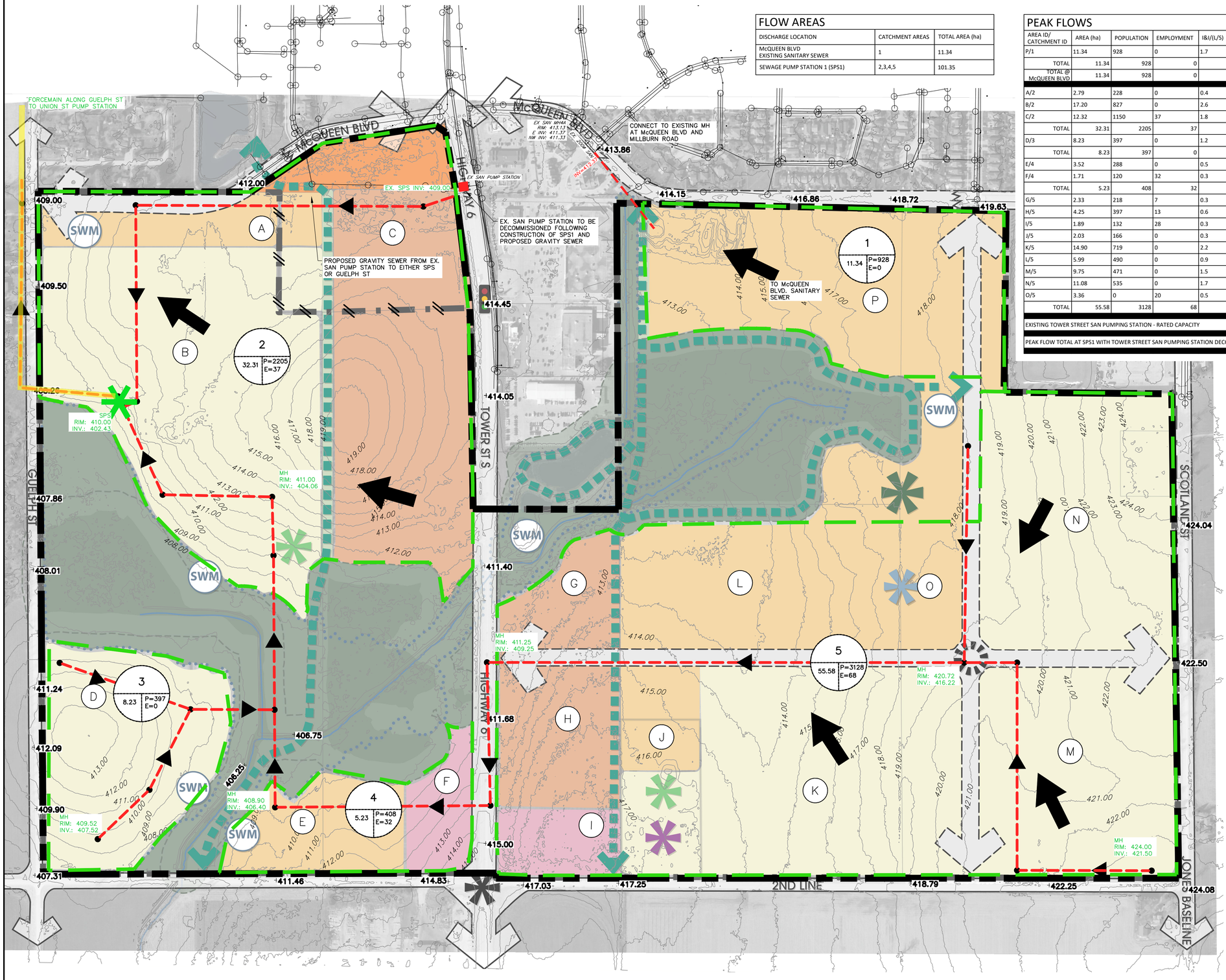
SAN-1

SANITARY DRAINAGE PLAN OPTION 1

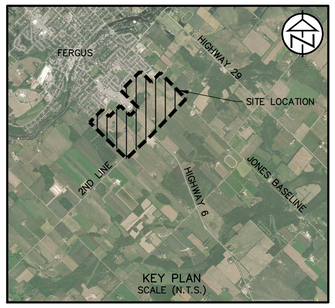
South Fergus MESP and Secondary Plan
Town of Fergus
Township of Centre Wellington
County of Wellington

FLOW AREAS		
DISCHARGE LOCATION	CATCHMENT AREAS	TOTAL AREA (ha)
McQUEEN BLVD EXISTING SANITARY SEWER	1	11.34
SEWAGE PUMP STATION 1 (SPS1)	2,3,4,5	101.35

PEAK FLOWS						
AREA ID/ CATCHMENT ID	AREA (ha)	POPULATION	EMPLOYMENT	I&I/(L/S)	ADF/(m³/d)	PF/(L/S)
P/1	11.34	928	0	1.7	472	13.4
TOTAL	11.34	928	0	1.7	472	13.4
TOTAL @ McQUEEN BLVD	11.34	928	0	1.7	472	13.4
A/2	2.79	228	0	0.4	116	3.3
B/2	17.20	827	0	2.6	512	13.0
C/2	12.32	1150	37	1.8	601	17.2
TOTAL	32.31	2205	37	4.8	1229	33.5
D/3	8.23	397	0	1.2	246	6.2
TOTAL	8.23	397	0	1.2	246	6.2
E/4	3.52	288	0	0.5	146	4.1
F/4	1.71	120	32	0.3	71	1.9
TOTAL	5.23	408	32	0.8	217	6.0
G/5	2.33	218	7	0.3	114	3.3
H/5	4.25	397	13	0.6	207	5.9
I/5	1.89	132	28	0.3	77	2.1
J/5	2.03	166	0	0.3	84	2.4
K/5	14.90	719	0	2.2	445	11.3
L/5	5.99	490	0	0.9	249	7.1
M/5	9.75	471	0	1.5	291	7.4
N/5	11.08	535	0	1.7	331	8.4
O/5	3.36	0	20	0.5	96	1.7
TOTAL	55.58	3128	68	8.3	1894	49.6
EXISTING TOWER STREET SAN PUMPING STATION - RATED CAPACITY						40.5
PEAK FLOW TOTAL AT SPS1 WITH TOWER STREET SAN PUMPING STATION DECOMMISIONED						149



OPTION 1: SEWAGE PUMPING STATION PRIMARY LOCATION – ALL SANITARY CATCHMENT AREAS AND EXISTING TOWER STREET SEWAGE PUMPING STATION SERVICING AREA TO DRAIN VIA GRAVITY TO SPS. FORCEMAIN TO EXISTING UNION STREET PUMP STATION (MAINTAIN 3m DEPTH ALONG ROUTE)



LEGEND

- SITE BOUNDARY
- CATCHMENT BOUNDARY
- AREA ID (M)
- SANITARY MAIN
- FORCEMAIN
- DRAINAGE DIRECTION
- AREA IN HECTARES (ha) — CATCHMENT (##), POPULATION (P=), EMPLOYMENT (E=)

Base Map Source: TOPOGRAPHIC SURVEY (TATHAM) COMBINED WITH TOPOGRAPHIC MAPPING (NORTHWAY/PHOTOMAP REMOTE SENSING LTD.)

DATE:	JUNE 14, 2021
SCALE:	1:2500
FILE:	120157
DRAWN:	KH

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MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

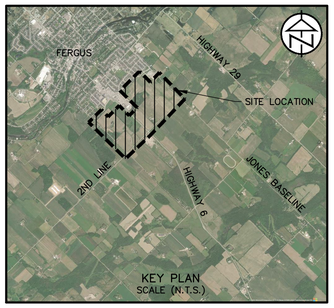
FRICORP ECOLOGICAL SERVICES

TATHAM ENGINEERING

SAN-2

SANITARY DRAINAGE PLAN
OPTION 2

South Fergus MESP and Secondary Plan
Town of Fergus
Township of Centre Wellington
County of Wellington



LEGEND

- SITE BOUNDARY
- CATCHMENT BOUNDARY
- AREA ID (M)
- SANITARY MAIN
- FORCEMAIN
- DRAINAGE DIRECTION
- AREA IN HECTARES (ha) — CATCHMENT ## — POPULATION P= — EMPLOYMENT E=

OPTION 2: SEWAGE PUMPING STATION PRIMARY LOCATION – ALL SANITARY CATCHMENT AREAS AND EXISTING TOWER STREET SEWAGE PUMPING STATION SERVICING AREA TO DRAIN VIA GRAVITY TO SPS. FORCEMAIN TO MH AT GUELPH STREET THEN TO DRAIN VIA GRAVITY TO UNION STREET PUMP STATION. SANITARY SEWER INV. ≈ 405.10

Base Map Source: TOPOGRAPHIC SURVEY (TATHAM) COMBINED WITH TOPOGRAPHIC MAPPING (NORTHWAY/PHOTOMAP REMOTE SENSING LTD.)

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MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

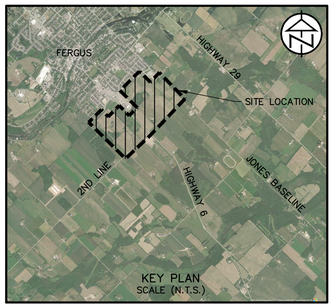
FRICORP ECOLOGICAL SERVICES

TATHAM ENGINEERING

SAN-3

SANITARY DRAINAGE PLAN
OPTION 3

South Fergus MESP and Secondary Plan
Town of Fergus
Township of Centre Wellington
County of Wellington



LEGEND

- SITE BOUNDARY
- CATCHMENT BOUNDARY
- AREA ID (M)
- SANITARY MAIN
- DRAINAGE DIRECTION
- AREA IN HECTARES (ha) — ## CATCHMENT; P= POPULATION; E= EMPLOYMENT

OPTION 3: GRAVITY SANITARY SEWER SERVICES – SOUTH FERGUS SECONDARY PLAN AREA AND EXISTING TOWER STREET SEWAGE PUMPING STATION SERVICING AREA. SANITARY SEWER INV. ≈ 400.10m

Base Map Source: TOPOGRAPHIC SURVEY (TATHAM) COMBINED WITH TOPOGRAPHIC MAPPING (NORTHWAY/PHOTOMAP REMOTE SENSING LTD.)

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MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

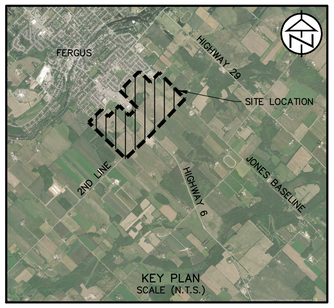
FRICORP ECOLOGICAL SERVICES

TATHAM ENGINEERING

SAN-4

SANITARY DRAINAGE PLAN
OPTION 4

South Fergus MESP and Secondary Plan
Town of Fergus
Township of Centre Wellington
County of Wellington



LEGEND

- SITE BOUNDARY
- CATCHMENT BOUNDARY
- AREA ID (M)
- SANITARY MAIN
- DRAINAGE DIRECTION
- AREA IN HECTARES (ha) — CATCHMENT (##), POPULATION (P=), EMPLOYMENT (E=)

OPTION 4: GRAVITY SANITARY SEWER SERVICES – SOUTH FERGUS SECONDARY PLAN AREA AND EXISTING TOWER STREET SEWAGE PUMPING STATION SERVICING AREA (ALTERNATIVE ROUTE FOR CATCHMENT 3). SANITARY SEWER INV. ≈ 400.10

Base Map Source: TOPOGRAPHIC SURVEY (TATHAM) COMBINED WITH TOPOGRAPHIC MAPPING (NORTHWAY/PHOTOMAP REMOTE SENSING LTD.)

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MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

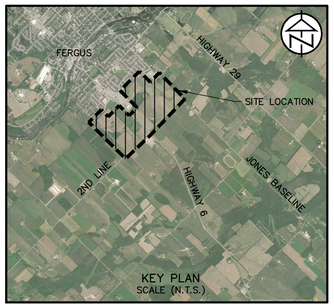
FRICORP ECOLOGICAL SERVICES

TATHAM ENGINEERING

SAN-5

SANITARY DRAINAGE PLAN OPTION 5

South Fergus MESP and Secondary Plan
Town of Fergus
Township of Centre Wellington
County of Wellington



LEGEND

- SITE BOUNDARY
- CATCHMENT BOUNDARY
- AREA ID (M)
- SANITARY MAIN
- FORCEMAIN
- DRAINAGE DIRECTION
- AREA IN HECTARES (ha) — ## CATCHMENT; P= POPULATION; E= EMPLOYMENT

OPTION 5: SEWAGE PUMPING STATION ALTERNATE LOCATION – SANITARY CATCHMENT 4&5 TO DRAIN VIA GRAVITY TO SPS. FORCEMAIN TO CATCHMENT 2 VIA TOWER STREET. CATCHMENT 1,2,3 AND EXISTING TOWER STREET PUMPING STATION SERVICE AREA TO DRAIN VIA GRAVITY TO MH AT INTERSECTION OF GUELPH STREET AND McQUEEN BOULEVARD. SANITARY SEWER INV. ≈ 403.30m

Base Map Source: TOPOGRAPHIC SURVEY (TATHAM) COMBINED WITH TOPOGRAPHIC MAPPING (NORTHWAY/PHOTOMAP REMOTE SENSING LTD.)

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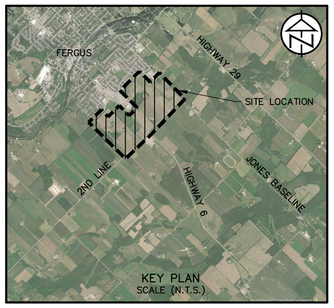
FRICORP ECOLOGICAL SERVICES

TATHAM ENGINEERING

SAN-6

SANITARY DRAINAGE PLAN
OPTION 6

South Fergus MESP and Secondary Plan
Town of Fergus
Township of Centre Wellington
County of Wellington



LEGEND

- SITE BOUNDARY
- CATCHMENT BOUNDARY
- AREA ID (M)
- SANITARY MAIN
- DRAINAGE DIRECTION
- AREA IN HECTARES (ha) — CATCHMENT # — POPULATION P= — EMPLOYMENT E=

OPTION 6: GRAVITY SANITARY SEWER SERVICES – ALL SANITARY CATCHMENT AREAS AND EXISTING TOWER STREET SEWAGE PUMPING STATION SERVICING AREA (ALTERNATIVE ROUTE TO OPTION 3). SANITARY SEWER INV. ≈ 396.84m

Base Map Source: TOPOGRAPHIC SURVEY (TATHAM) COMBINED WITH TOPOGRAPHIC MAPPING (NORTHWAY/PHOTOMAP REMOTE SENSING LTD.)

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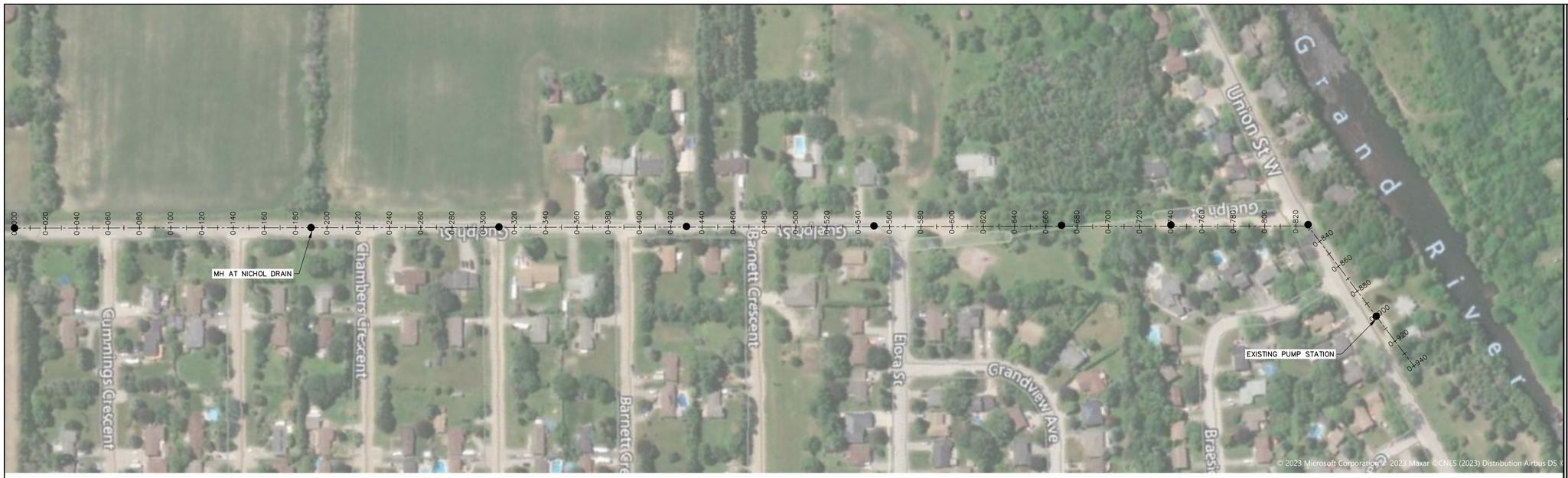
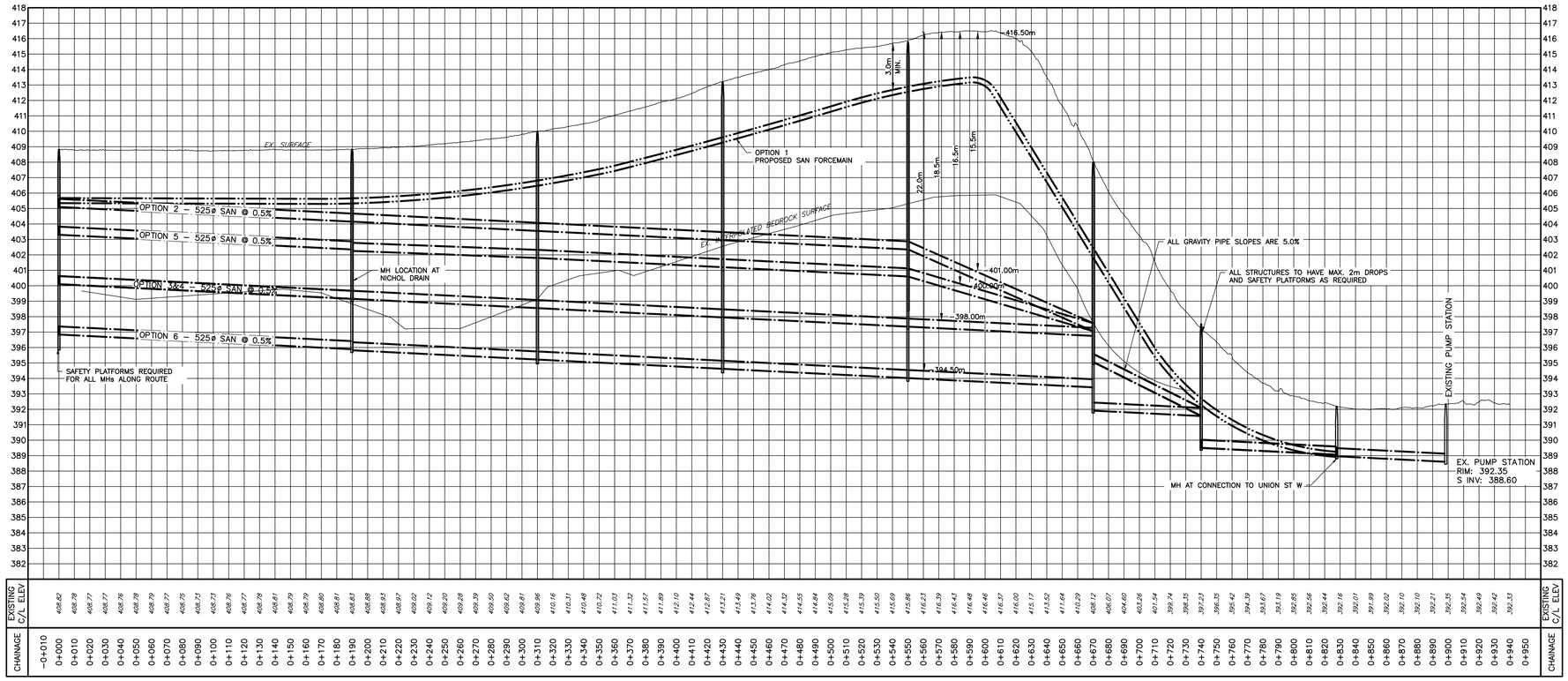
FRICORP ECOLOGICAL SERVICES

TATHAM ENGINEERING





CHAINAGE	EXISTING C/L ELEV
-0+010	408.82
0+000	408.78
0+010	408.77
0+020	408.77
0+030	408.77
0+040	408.76
0+050	408.78
0+060	408.79
0+070	408.77
0+080	408.75
0+090	408.73
0+100	408.73
0+110	408.76
0+120	408.77
0+130	408.78
0+140	408.81
0+150	408.79
0+160	408.79
0+170	408.80
0+180	408.81
0+190	408.83
0+200	408.88
0+210	408.93
0+220	408.97
0+230	409.02
0+240	409.12
0+250	409.20
0+260	409.28
0+270	409.39
0+280	409.50
0+290	409.62
0+300	409.81
0+310	409.96
0+320	410.16
0+330	410.51
0+340	410.48
0+350	410.72
0+360	411.03
0+370	411.32
0+380	411.57
0+390	411.69
0+400	412.10
0+410	412.44
0+420	412.87
0+430	413.21
0+440	413.49
0+450	413.76
0+460	414.02
0+470	414.32
0+480	414.55
0+490	414.84
0+500	415.09
0+510	415.28
0+520	415.39
0+530	415.50
0+540	415.69
0+550	415.86
0+560	416.23
0+570	416.39
0+580	416.43
0+590	416.48
0+600	416.46
0+610	416.37
0+620	416.00
0+630	415.77
0+640	415.52
0+650	411.64
0+660	410.29
0+670	408.12
0+680	406.07
0+690	404.60
0+700	403.26
0+710	401.54
0+720	399.74
0+730	398.15
0+740	397.23
0+750	396.35
0+760	395.42
0+770	394.19
0+780	393.67
0+790	393.19
0+800	392.85
0+810	392.56
0+820	392.44
0+830	392.16
0+840	392.01
0+850	391.99
0+860	392.02
0+870	392.10
0+880	392.10
0+890	392.21
0+900	392.35
0+910	392.54
0+920	392.49
0+930	392.42
0+940	392.33
0+950	EXISTING C/L ELEV

OPTION 1: SEWAGE PUMPING STATION PRIMARY LOCATION – ALL SANITARY CATCHMENT AREAS AND EXISTING TOWER STREET SEWAGE PUMPING STATION SERVICING AREA TO DRAIN VIA GRAVITY TO SPS. FORCEMAIN TO EXISTING UNION STREET TRANSFER STATION (MAINTAINS 3m DEPTH ALONG ROUTE).

OPTION 2: SEWAGE PUMPING STATION PRIMARY LOCATION – ALL SANITARY CATCHMENT AREAS AND EXISTING TOWER STREET SEWAGE PUMPING STATION SERVICING AREA TO DRAIN VIA GRAVITY TO SPS. FORCEMAIN TO MH AT GUELPH STREET THEN TO DRAIN VIA GRAVITY TO UNION STREET TRANSFER STATION. SANITARY SEWER INV. ≈ 405.10

OPTION 3: GRAVITY SANITARY SEWER SERVICES – SOUTH FERGUS SECONDARY PLAN AREA AND EXISTING TOWER STREET SEWAGE PUMPING STATION SERVICING AREA. SANITARY SEWER INV. ≈ 400.10m

OPTION 4: GRAVITY SANITARY SEWER SERVICES – SOUTH FERGUS SECONDARY PLAN AREA AND EXISTING TOWER STREET SEWAGE PUMPING STATION SERVICING AREA (ALTERNATIVE ROUTE FOR CATCHMENT 3). SANITARY SEWER INV. ≈ 400.10

OPTION 5: SEWAGE PUMPING STATION ALTERNATE LOCATION – SANITARY CATCHMENT 4&5 TO DRAIN VIA GRAVITY TO SPS. FORCEMAIN TO CATCHMENT 2 VIA TOWER STREET. CATCHMENT 1,2,3 AND EXISTING TOWER STREET PUMPING STATION SERVICE AREA TO DRAIN VIA GRAVITY TO MH AT INTERSECTION OF GUELPH STREET AND McQUEEN BOULEVARD. SANITARY SEWER INV. ≈ 403.30m

OPTION 6: GRAVITY SANITARY SEWER SERVICES – ALL SANITARY CATCHMENT AREAS AND EXISTING TOWER STREET SEWAGE PUMPING STATION SERVICING AREA (ALTERNATIVE ROUTE TO OPTION 3). SANITARY SEWER INV. ≈ 396.84m

P-1

SANITARY TRUNK PROFILES
ROUTE 1

South Fergus MESP and Secondary Plan
Town of Fergus
Township of Centre Wellington
County of Wellington

Base Map Source: TOPOGRAPHIC SURVEY (TATHAM) COMBINED WITH TOPOGRAPHIC MAPPING (NORTHWAY/PHOTOMAP REMOTE SENSING LTD.)

TOPOGRAPHIC MAPPING ALONG GUELPH ST AND NICHOL DRAIN IS LIDAR, TAKEN FROM GIS.

DATE:	2023-05-30
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FILE:	120157
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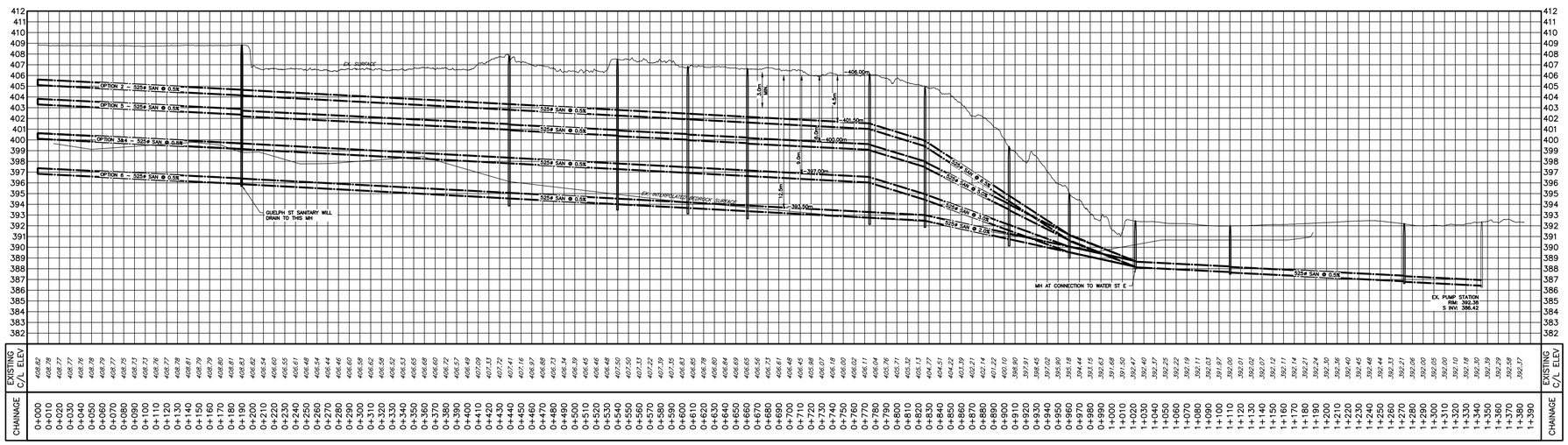
FRICORP ECOLOGICAL SERVICES

TATHAM ENGINEERING



CHAINAGE	EXISTING C/L ELEV	CHAINAGE	EXISTING C/L ELEV	CHAINAGE	EXISTING C/L ELEV	CHAINAGE	EXISTING C/L ELEV
0+000	408.62	0+540	407.50	1+080	392.19	1+320	392.18
0+010	408.78	0+550	407.33	1+090	392.03	1+330	392.30
0+020	408.77	0+560	407.23	1+100	391.97	1+340	392.39
0+030	408.77	0+570	407.19	1+110	392.00	1+350	392.39
0+040	408.76	0+580	407.35	1+120	392.01	1+360	392.37
0+050	408.78	0+590	406.83	1+130	392.03	1+370	392.37
0+060	408.79	0+600	406.78	1+140	392.12	1+380	392.37
0+070	408.77	0+610	406.80	1+150	392.11	1+390	
0+080	408.75	0+620	406.84	1+160	392.14		
0+090	408.73	0+630	406.85	1+170	392.21		
0+100	408.73	0+640	406.65	1+180	392.24		
0+110	408.76	0+650	406.65	1+190	392.24		
0+120	408.77	0+660	406.56	1+200	392.30		
0+130	408.78	0+670	406.73	1+210	392.39		
0+140	408.81	0+680	406.61	1+220	392.40		
0+150	408.79	0+690	406.48	1+230	392.45		
0+160	408.79	0+700	406.45	1+240	392.48		
0+170	408.81	0+710	405.98	1+250	392.44		
0+180	408.81	0+720	406.30	1+260	392.13		
0+190	408.83	0+730	406.18	1+270	392.21		
0+200	406.82	0+740	406.00	1+280	392.06		
0+210	406.54	0+750	406.02	1+290	392.05		
0+220	406.60	0+760	406.11	1+300	392.05		
0+230	406.55	0+770	406.04	1+310	392.00		
0+240	406.61	0+780	405.76	1+320	392.10		
0+250	406.64	0+790	405.71	1+330	392.18		
0+260	406.64	0+800	405.51	1+340	392.30		
0+270	406.44	0+810	405.13	1+350	392.39		
0+280	406.46	0+820	404.77	1+360	392.39		
0+290	406.60	0+830	404.51	1+370	392.37		
0+300	406.58	0+840	404.22	1+380	392.37		
0+310	406.62	0+850	403.39	1+390			
0+320	406.58	0+860	403.21				
0+330	406.53	0+870	402.14				
0+340	406.53	0+880	402.23				
0+350	406.65	0+890	402.10				
0+360	406.68	0+900	398.90				
0+370	406.60	0+910	397.91				
0+380	406.72	0+920	398.45				
0+390	406.57	0+930	397.02				
0+400	406.49	0+940	395.90				
0+410	407.03	0+950	395.18				
0+420	407.13	0+960	394.14				
0+430	407.72	0+970	393.15				
0+440	407.41	0+980	392.63				
0+450	407.16	0+990	391.68				
0+460	406.97	1+000	391.50				
0+470	406.88	1+010	392.47				
0+480	406.73	1+020	392.40				
0+490	406.74	1+030	392.37				
0+500	406.39	1+040	392.25				
0+510	406.45	1+050	392.22				
0+520	406.46	1+060	392.19				
0+530	406.48	1+070	392.11				

OPTION 2: SEWAGE PUMPING STATION PRIMARY LOCATION – ALL SANITARY CATCHMENT AREAS AND EXISTING TOWER STREET SEWAGE PUMPING STATION SERVICING AREA TO DRAIN VIA GRAVITY TO SPS. FORCEMAIN TO MH AT GUELPH STREET THEN TO DRAIN VIA GRAVITY TO UNION STREET TRANSFER STATION. SANITARY SEWER INV. ≈ 405.10

OPTION 3: GRAVITY SANITARY SEWER SERVICES – SOUTH FERGUS SECONDARY PLAN AREA AND EXISTING TOWER STREET SEWAGE PUMPING STATION SERVICING AREA. SANITARY SEWER INV. ≈ 400.10m

OPTION 4: GRAVITY SANITARY SEWER SERVICES – SOUTH FERGUS SECONDARY PLAN AREA AND EXISTING TOWER STREET SEWAGE PUMPING STATION SERVICING AREA (ALTERNATIVE ROUTE FOR CATCHMENT 3). SANITARY SEWER INV. ≈ 400.10

OPTION 5: SEWAGE PUMPING STATION ALTERNATE LOCATION – SANITARY CATCHMENT 4&5 TO DRAIN VIA GRAVITY TO SPS. FORCEMAIN TO CATCHMENT 2 VIA TOWER STREET. CATCHMENT 1,2,3 AND EXISTING TOWER STREET PUMPING STATION SERVICE AREA TO DRAIN VIA GRAVITY TO MH AT INTERSECTION OF GUELPH STREET AND McQUEEN BOULEVARD. SANITARY SEWER INV. ≈ 403.30m

OPTION 6: GRAVITY SANITARY SEWER SERVICES – ALL SANITARY CATCHMENT AREAS AND EXISTING TOWER STREET SEWAGE PUMPING STATION SERVICING AREA (ALTERNATIVE ROUTE TO OPTION 3). SANITARY SEWER INV. ≈ 396.84m

P-2

SANITARY TRUNK PROFILES
ROUTE 2

South Fergus MESP and Secondary Plan
Town of Fergus
Township of Centre Wellington
County of Wellington

Base Map Source: TOPOGRAPHIC SURVEY (TATHAM) COMBINED WITH TOPOGRAPHIC MAPPING (NORTHWAY/PHOTOMAP REMOTE SENSING LTD.)

TOPOGRAPHIC MAPPING ALONG GUELPH ST AND NICHOL DRAIN IS LIDAR, TAKEN FROM GIS.

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FILE:	120157
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FRICORP ECOLOGICAL SERVICES

TATHAM ENGINEERING

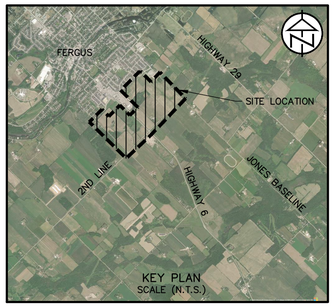
WM-1

WATERMAIN LAYOUT

South Fergus MESP and Secondary Plan
Town of Fergus
Township of Centre Wellington
County of Wellington

WATER DEMANDS

AREA ID	AREA (ha)	POPULATION	EMPLOYMENT	DEMAND (m^3/d)		SUGGESTED FIRE FLOW (L/s)
				ADD	MDD	
A	2.79	228	0	68	130	120
B	17.20	827	0	248	471	100
C	12.32	1150	37	384	729	200
D	8.23	397	0	119	226	100
E	3.52	288	0	86	164	120
F	1.71	120	32	43	81	200
G	2.33	218	7	73	138	200
H	4.25	397	13	132	251	200
I	1.89	132	28	46	87	200
J	2.03	166	0	50	95	120
K	14.90	719	0	216	410	100
L	5.99	490	0	147	279	120
M	9.75	471	0	141	268	100
N	11.08	535	0	160	305	100
O	3.36	0	20	52	100	200
P	11.34	928	0	278	529	120
TOTAL	112.69	7066	137	2243	4263	



LEGEND

- SITE BOUNDARY
- PROPOSED 300mmø TRUNK WATERMAIN
- AREA ID (M)

Base Map Source: TOPOGRAPHIC SURVEY (TATHAM) COMBINED WITH TOPOGRAPHIC MAPPING (NORTHWAY/PHOTOMAP REMOTE SENSING LTD.)

DATE:	JUNE 14, 2021
SCALE:	1:2500
FILE:	120157
DRAWN:	KH

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MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

FRICORP ECOLOGICAL SERVICES

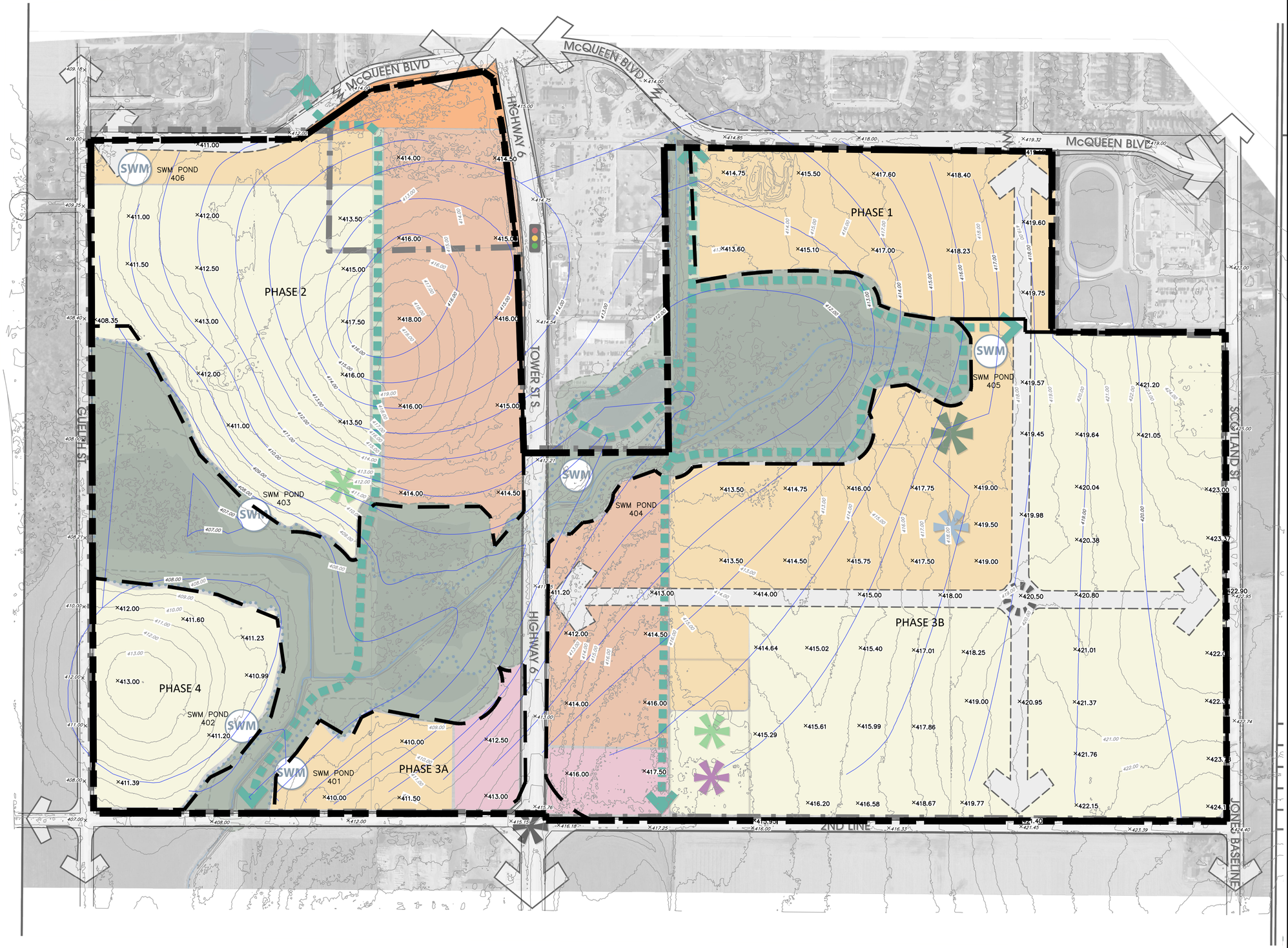
TATHAM ENGINEERING

SG-1

PRELIMINARY GRADING

South Fergus MESP and Secondary Plan
Town of Fergus
Township of Centre Wellington
County of Wellington

CUT/FILL TABLE			
AREA	CUT (m^3)	FILL (m^3)	NET (m^3)
PHASE 1	40000	60000	20000 <FILL>
PHASE 2	140000	180000	40000 <FILL>
PHASE 3A	15000	15000	0
PHASE 3B	190000	340000	150000 <FILL>
PHASE 4	30000	30000	0
TOTAL	415000	625000	210000 <FILL>



LEGEND

- SITE BOUNDARY
- PHASE BOUNDARY
- EXISTING CONTOURS 420.00
- EXISTING GROUNDWATER CONTOURS 420.00
- EXISTING ELEVATION ×425.00
- PROPOSED ELEVATION ×423.90

Base Map Source: TOPOGRAPHIC SURVEY (TATHAM) COMBINED WITH TOPOGRAPHIC MAPPING (NORTHWAY/PHOTOMAP REMOTE SENSING LTD.)

DATE:	JUNE 14, 2021
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MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

FRICORP ECOLOGICAL SERVICES

TATHAM ENGINEERING

South Fergus MESP and Secondary Plan
Centre Wellington
120157

Civil Servicing Estimate
1-Feb-24

ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
	INTERNAL SANITARY SERVICING				
1.0	**Option 1**				
1.01	Sewage Pumping Station	Ea.	1	$6,000,000	$6,000,000
1.02	Length of forcemain	m	128	$500	$64,000
1.03	Length of sewer with depth ranging 0-5 m	m	3,492	$700	$2,444,400
1.04	Length of sewer with depth ranging 5-10 m	m	278	$1,200	$333,600
1.05	Length of sewer with depth ranging 10-15 m	m	0	$2,000	$0
1.06	Sanitary Maintenance Holes (Depth: 0-5 m)	Ea.	30	$12,500	$375,000
1.07	Sanitary Maintenance Holes (Depth: 5-10 m)	Ea.	3	$25,000	$75,000
1.08	Sanitary Maintenance Holes (Depth: 10-15 m)	Ea.	0	$35,000	$0
	Subtotal: Option 1				**$9,292,000**
2.0	**Option 2**				
2.01	Sewage Pumping Station	Ea.	1	$6,000,000	$6,000,000
2.02	Length of forcemain	m	128	$500	$64,000
2.03	Length of sewer with depth ranging 0-5 m	m	3,523	$700	$2,466,100
2.04	Length of sewer with depth ranging 5-10 m	m	278	$1,200	$333,600
2.05	Length of sewer with depth ranging 10-15 m	m	0	$2,000	$0
2.06	Sanitary Maintenance Holes (Depth: 0-5 m)	Ea.	30	$12,500	$375,000
2.07	Sanitary Maintenance Holes (Depth: 5-10 m)	Ea.	3	$25,000	$75,000
2.08	Sanitary Maintenance Holes (Depth: 10-15 m)	Ea.	0	$35,000	$0
	Subtotal: Option 2				**$9,313,700**
3.0	**Option 3**				
3.01	Sewage Pumping Station	Ea.	0	$6,000,000	$0
3.02	Length of forcemain	m	0	$500	$0
3.03	Length of sewer with depth ranging 0-5 m	m	3,157	$700	$2,209,900
3.04	Length of sewer with depth ranging 5-10 m	m	682	$1,200	$818,400
3.05	Length of sewer with depth ranging 10-15 m	m	0	$2,000	$0
3.06	Sanitary Maintenance Holes (Depth: 0-5 m)	Ea.	27	$12,500	$337,500
3.07	Sanitary Maintenance Holes (Depth: 5-10 m)	Ea.	6	$25,000	$150,000
3.08	Sanitary Maintenance Holes (Depth: 10-15 m)	Ea.	0	$35,000	$0
	Subtotal: Option 3				**$3,515,800**
4.0	**Option 4**				
4.01	Sewage Pumping Station	Ea.	0	$6,000,000	$0
4.02	Length of forcemain	m	0	$500	$0
4.03	Length of sewer with depth ranging 0-5 m	m	3,077	$700	$2,153,900
4.04	Length of sewer with depth ranging 5-10 m	m	684	$1,200	$820,800
4.05	Length of sewer with depth ranging 10-15 m	m	0	$2,000	$0
4.06	Sanitary Maintenance Holes (Depth: 0-5 m)	Ea.	26	$12,500	$325,000
4.07	Sanitary Maintenance Holes (Depth: 5-10 m)	Ea.	6	$25,000	$150,000
4.08	Sanitary Maintenance Holes (Depth: 10-15 m)	Ea.	0	$35,000	$0
	Subtotal: Option 4				**$3,449,700**

South Fergus MESP and Secondary Plan
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ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
	INTERNAL SANITARY SERVICING				
5.0	**Option 5**				
5.01	Sewage Pumping Station	Ea.	1	$5,500,000	$5,500,000
5.02	Length of forcemain	m	138	$500	$69,000
5.03	Length of sewer with depth ranging 0-5 m	m	3,528	$700	$2,469,600
5.04	Length of sewer with depth ranging 5-10 m	m	0	$1,200	$0
5.05	Length of sewer with depth ranging 10-15 m	m	0	$2,000	$0
5.06	Sanitary Maintenance Holes (Depth: 0-5 m)	Ea.	30	$12,500	$375,000
5.07	Sanitary Maintenance Holes (Depth: 5-10 m)	Ea.	0	$25,000	$0
5.08	Sanitary Maintenance Holes (Depth: 10-15 m)	Ea.	0	$35,000	$0
	Subtotal: Option 5				**$8,413,600**
6.0	**Option 6**				
6.01	Sewage Pumping Station	Ea.	0	$6,000,000	$0
6.02	Length of forcemain	m	0	$500	$0
6.03	Length of sewer with depth ranging 0-5 m	m	2,667	$700	$1,866,900
6.04	Length of sewer with depth ranging 5-10 m	m	440	$1,200	$528,000
6.05	Length of sewer with depth ranging 10-15 m	m	680	$2,000	$1,360,000
6.06	Sanitary Maintenance Holes (Depth: 0-5 m)	Ea.	23	$12,500	$287,500
6.07	Sanitary Maintenance Holes (Depth: 5-10 m)	Ea.	4	$25,000	$100,000
6.08	Sanitary Maintenance Holes (Depth: 10-15 m)	Ea.	6	$35,000	$210,000
	Subtotal: Option 6				**$4,352,400**
	EXTERNAL SANITARY SERVICING				
7.0	**Route 1 Option 1**				
7.01	Rock excavation volume (Depth: 0-5 m)	m^3	0	$125	$0
7.02	Rock excavation volume (Depth: 5-10 m)	m^3	0	$250	$0
7.03	Rock excavation volume (Depth: 10-15 m)	m^3	0	$375	$0
7.04	Length of forcemain	m	1,060	$500	$530,000
7.05	Length of sewer with depth ranging 0-5 m	m	70	$700	$49,000
7.06	Length of sewer with depth ranging 5-10 m	m	0	$1,200	$0
7.07	Length of sewer with depth ranging 10-15 m	m	0	$2,000	$0
7.08	Length of sewer with depth ranging 15-20 m	m	0	$3,000	$0
7.09	Length of sewer with depth ranging 20-25 m	m	0	$4,000	$0
7.10	Road reinstatement	m	1,025	$500	$512,500
	Subtotal: Route 1 Option 1				**$1,091,500**
8.0	**Route 1 Option 2**				
8.01	Rock excavation volume (Depth: 0-5 m)	m^3	8,010	$125	$1,001,250
8.02	Rock excavation volume (Depth: 5-10 m)	m^3	1,125	$250	$281,250
8.03	Rock excavation volume (Depth: 10-15 m)	m^3	0	$375	$0
8.04	Sanitary Maintenance Holes (Depth: 0-5 m)	Ea.	5	$12,500	$62,500
8.05	Sanitary Maintenance Holes (Depth: 5-10 m)	Ea.	3	$25,000	$75,000
8.06	Sanitary Maintenance Holes (Depth: 10-15 m)	Ea.	2	$35,000	$70,000
8.07	Sanitary Maintenance Holes (Depth: 15-20 m)	Ea.	0	$45,000	$0
8.08	Length of sewer with depth ranging 0-5 m	m	630	$700	$441,000
8.09	Length of sewer with depth ranging 5-10 m	m	200	$1,200	$240,000
8.10	Length of sewer with depth ranging 10-15 m	m	200	$2,000	$400,000
8.11	Length of sewer with depth ranging 15-20 m	m	100	$3,000	$300,000
8.12	Length of sewer with depth ranging 20-25 m	m	0	$4,000	$0
8.13	Road reinstatement	m	1,025	$1,000	$1,025,000
	Subtotal: Route 1 Option 2				**$3,896,000**

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Centre Wellington
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ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
	EXTERNAL SANITARY SERVICING				
9.0	**Route 1 Option 3**				
9.01	Rock excavation volume (Depth: 0-5 m)	m^3	16,335	$125	$2,041,875
9.02	Rock excavation volume (Depth: 5-10 m)	m^3	4,725	$250	$1,181,250
9.03	Rock excavation volume (Depth: 10-15 m)	m^3	0	$375	$0
9.04	Sanitary Maintenance Holes (Depth: 0-5 m)	Ea.	1	$12,500	$12,500
9.05	Sanitary Maintenance Holes (Depth: 5-10 m)	Ea.	4	$25,000	$100,000
9.06	Sanitary Maintenance Holes (Depth: 10-15 m)	Ea.	4	$35,000	$140,000
9.07	Sanitary Maintenance Holes (Depth: 15-20 m)	Ea.	1	$45,000	$45,000
9.08	Length of sewer with depth ranging 0-5 m	m	0	$700	$0
9.09	Length of sewer with depth ranging 5-10 m	m	680	$1,200	$816,000
9.10	Length of sewer with depth ranging 10-15 m	m	200	$2,000	$400,000
9.11	Length of sewer with depth ranging 15-20 m	m	250	$3,000	$750,000
9.12	Length of sewer with depth ranging 20-25 m	m	0	$4,000	$0
9.13	Road reinstatement	m	1,025	$1,000	$1,025,000
	Subtotal: Route 1 Option 3				**$6,511,625**
10.0	**Route 1 Option 4**				
10.01	Rock excavation volume (Depth: 0-5 m)	m^3	16,335	$125	$2,041,875
10.02	Rock excavation volume (Depth: 5-10 m)	m^3	4,725	$250	$1,181,250
10.03	Rock excavation volume (Depth: 10-15 m)	m^3	0	$375	$0
10.04	Sanitary Maintenance Holes (Depth: 0-5 m)	Ea.	2	$12,500	$25,000
10.05	Sanitary Maintenance Holes (Depth: 5-10 m)	Ea.	5	$25,000	$125,000
10.06	Sanitary Maintenance Holes (Depth: 10-15 m)	Ea.	4	$35,000	$140,000
10.07	Sanitary Maintenance Holes (Depth: 15-20 m)	Ea.	1	$45,000	$45,000
10.08	Length of sewer with depth ranging 0-5 m	m	0	$700	$0
10.09	Length of sewer with depth ranging 5-10 m	m	1,025	$1,200	$1,230,000
10.10	Length of sewer with depth ranging 10-15 m	m	200	$2,000	$400,000
10.11	Length of sewer with depth ranging 15-20 m	m	250	$3,000	$750,000
10.12	Length of sewer with depth ranging 20-25 m	m	0	$4,000	$0
10.13	Road reinstatement	m	1,365	$1,000	$1,365,000
	Subtotal: Route 1 Option 4				**$7,303,125**
11.0	**Route 1 Option 5**				
11.01	Rock excavation volume (Depth: 0-5 m)	m^3	10,260	$125	$1,282,500
11.02	Rock excavation volume (Depth: 5-10 m)	m^3	1,575	$250	$393,750
11.03	Rock excavation volume (Depth: 10-15 m)	m^3	0	$375	$0
11.04	Sanitary Maintenance Holes (Depth: 0-5 m)	Ea.	4	$12,500	$50,000
11.05	Sanitary Maintenance Holes (Depth: 5-10 m)	Ea.	5	$25,000	$125,000
11.06	Sanitary Maintenance Holes (Depth: 10-15 m)	Ea.	3	$35,000	$105,000
11.07	Sanitary Maintenance Holes (Depth: 15-20 m)	Ea.	0	$45,000	$0
11.08	Length of sewer with depth ranging 0-5 m	m	330	$700	$231,000
11.09	Length of sewer with depth ranging 5-10 m	m	795	$1,200	$954,000
11.10	Length of sewer with depth ranging 10-15 m	m	250	$2,000	$500,000
11.11	Length of sewer with depth ranging 15-20 m	m	100	$3,000	$300,000
11.12	Length of sewer with depth ranging 20-25 m	m	0	$4,000	$0
11.13	Road reinstatement	m	1,365	$1,000	$1,365,000
	Subtotal: Route 1 Option 5				**$5,306,250**

South Fergus MESP and Secondary Plan
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Civil Servicing Estimate
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ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
	EXTERNAL SANITARY SERVICING				
12.0	**Route 1 Option 6**				
12.01	Rock excavation volume (Depth: 0-5 m)	m^3	27,945	$125	$3,493,125
12.02	Rock excavation volume (Depth: 5-10 m)	m^3	11,700	$250	$2,925,000
12.03	Rock excavation volume (Depth: 10-15 m)	m^3	2,250	$375	$843,750
12.04	Sanitary Maintenance Holes (Depth: 0-5 m)	Ea.	2	$12,500	$25,000
12.05	Sanitary Maintenance Holes (Depth: 5-10 m)	Ea.	2	$25,000	$50,000
12.06	Sanitary Maintenance Holes (Depth: 10-15 m)	Ea.	4	$35,000	$140,000
12.07	Sanitary Maintenance Holes (Depth: 15-20 m)	Ea.	4	$45,000	$180,000
12.08	Length of sewer with depth ranging 0-5 m	m	0	$700	$0
12.09	Length of sewer with depth ranging 5-10 m	m	685	$1,200	$822,000
12.10	Length of sewer with depth ranging 10-15 m	m	390	$2,000	$780,000
12.11	Length of sewer with depth ranging 15-20 m	m	250	$3,000	$750,000
12.12	Length of sewer with depth ranging 20-25 m	m	150	$4,000	$600,000
12.13	Road reinstatement	m	1,365	$1,000	$1,365,000
	Subtotal: Route 1 Option 6				**$11,973,875**
13.0	**Route 2 Option 2**				
13.01	Rock excavation volume (Depth: 0-5 m)	m^3	270	$125	$33,750
13.02	Rock excavation volume (Depth: 5-10 m)	m^3	0	$250	$0
13.03	Rock excavation volume (Depth: 10-15 m)	m^3	0	$375	$0
13.04	Sanitary Maintenance Holes (Depth: 0-5 m)	Ea.	15	$12,500	$187,500
13.05	Sanitary Maintenance Holes (Depth: 5-10 m)	Ea.	0	$25,000	$0
13.06	Sanitary Maintenance Holes (Depth: 10-15 m)	Ea.	0	$35,000	$0
13.07	Sanitary Maintenance Holes (Depth: 15-20 m)	Ea.	0	$45,000	$0
13.08	Length of sewer with depth ranging 0-5 m	m	1,225	$700	$857,500
13.09	Length of sewer with depth ranging 5-10 m	m	350	$1,200	$420,000
13.10	Length of sewer with depth ranging 10-15 m	m	0	$2,000	$0
13.11	Length of sewer with depth ranging 15-20 m	m	0	$3,000	$0
13.12	Length of sewer with depth ranging 20-25 m	m	0	$4,000	$0
13.13	Property Acquisition	ha	1.50	$87,000	$130,500
13.14	6.0m maintenance access road	m^2	4,920.00	$100	$492,000
13.15	Road reinstatement	m	745	$1,000	$745,000
	Subtotal: Route 2 Option 2				**$2,866,250**
14.0	**Route 2 Option 3**				
14.01	Rock excavation volume (Depth: 0-5 m)	m^3	1,395	$125	$174,375
14.02	Rock excavation volume (Depth: 5-10 m)	m^3	0	$250	$0
14.03	Rock excavation volume (Depth: 10-15 m)	m^3	0	$375	$0
14.04	Sanitary Maintenance Holes (Depth: 0-5 m)	Ea.	3	$12,500	$37,500
14.05	Sanitary Maintenance Holes (Depth: 5-10 m)	Ea.	12	$25,000	$300,000
14.06	Sanitary Maintenance Holes (Depth: 10-15 m)	Ea.	0	$35,000	$0
14.07	Sanitary Maintenance Holes (Depth: 15-20 m)	Ea.	0	$45,000	$0
14.08	Length of sewer with depth ranging 0-5 m	m	575	$700	$402,500
14.09	Length of sewer with depth ranging 5-10 m	m	750	$1,200	$900,000
14.10	Length of sewer with depth ranging 10-15 m	m	250	$2,000	$500,000
14.11	Length of sewer with depth ranging 15-20 m	m	0	$3,000	$0
14.12	Length of sewer with depth ranging 20-25 m	m	0	$4,000	$0
14.13	Property Acquisition	ha	2.50	$87,000	$217,500
14.14	6.0m maintenance access road	m^2	4,920	$100	$492,000
14.15	Road reinstatement	m	745	$1,000	$745,000
	Subtotal: Route 2 Option 3				**$3,768,875**

South Fergus MESP and Secondary Plan
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Civil Servicing Estimate
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ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
	EXTERNAL SANITARY SERVICING				
15.0	**Route 2 Option 4**				
15.01	Rock excavation volume (Depth: 0-5 m)	m^3	1,395	$125	$174,375
15.02	Rock excavation volume (Depth: 5-10 m)	m^3	0	$250	$0
15.03	Rock excavation volume (Depth: 10-15 m)	m^3	0	$375	$0
15.04	Sanitary Maintenance Holes (Depth: 0-5 m)	Ea.	6	$12,500	$75,000
15.05	Sanitary Maintenance Holes (Depth: 5-10 m)	Ea.	11	$25,000	$275,000
15.06	Sanitary Maintenance Holes (Depth: 10-15 m)	Ea.	0	$35,000	$0
15.07	Sanitary Maintenance Holes (Depth: 15-20 m)	Ea.	0	$45,000	$0
15.08	Length of sewer with depth ranging 0-5 m	m	915	$700	$640,500
15.09	Length of sewer with depth ranging 5-10 m	m	750	$1,200	$900,000
15.10	Length of sewer with depth ranging 10-15 m	m	250	$2,000	$500,000
15.11	Length of sewer with depth ranging 15-20 m	m	0	$3,000	$0
15.12	Length of sewer with depth ranging 20-25 m	m	0	$4,000	$0
15.13	Property Acquisition	ha	2.50	$87,000	$217,500
15.14	6.0m maintenance access road	m^2	4,920	$100	$492,000
15.15	Road reinstatement	m	1,085	$1,000	$1,085,000
	Subtotal: Route 2 Option 4				**$4,359,375**
16.0	**Route 2 Option 5**				
16.01	Rock excavation volume (Depth: 0-5 m)	m^3	270	$125	$33,750
16.02	Rock excavation volume (Depth: 0-5 m)	m^3	0	$250	$0
16.03	Rock excavation volume (Depth: 0-5 m)	m^3	0	$375	$0
16.04	Sanitary Maintenance Holes (Depth: 0-5 m)	Ea.	6	$12,500	$75,000
16.05	Sanitary Maintenance Holes (Depth: 5-10 m)	Ea.	11	$25,000	$275,000
16.06	Sanitary Maintenance Holes (Depth: 10-15 m)	Ea.	0	$35,000	$0
16.07	Sanitary Maintenance Holes (Depth: 15-20 m)	Ea.	0	$45,000	$0
16.08	Length of sewer with depth ranging 0-5 m	m	1,115	$700	$780,500
16.09	Length of sewer with depth ranging 5-10 m	m	800	$1,200	$960,000
16.10	Length of sewer with depth ranging 10-15 m	m	0	$2,000	$0
16.11	Length of sewer with depth ranging 15-20 m	m	0	$3,000	$0
16.12	Length of sewer with depth ranging 20-25 m	m	0	$4,000	$0
16.13	Property Acquisition	ha	1.50	$87,000	$130,500
16.14	6.0m maintenance access road	m^2	4,920	$100	$492,000
16.15	Road reinstatement	m	1,085	$1,000	$1,085,000
	Subtotal: Route 2 Option 5				**$3,831,750**
17.0	**Route 2 Option 6**				
17.01	Rock excavation volume (Depth: 0-5 m)	m^3	18,045	$125	$2,255,625
17.02	Rock excavation volume (Depth: 5-10 m)	m^3	0	$250	$0
17.03	Rock excavation volume (Depth: 10-15 m)	m^3	0	$375	$0
17.04	Sanitary Maintenance Holes (Depth: 0-5 m)	Ea.	6	$12,500	$75,000
17.05	Sanitary Maintenance Holes (Depth: 5-10 m)	Ea.	4	$25,000	$100,000
17.06	Sanitary Maintenance Holes (Depth: 10-15 m)	Ea.	7	$35,000	$245,000
17.07	Sanitary Maintenance Holes (Depth: 15-20 m)	Ea.	0	$45,000	$0
17.08	Length of sewer with depth ranging 0-5 m	m	915	$700	$640,500
17.09	Length of sewer with depth ranging 5-10 m	m	100	$1,200	$120,000
17.10	Length of sewer with depth ranging 10-15 m	m	900	$2,000	$1,800,000
17.11	Length of sewer with depth ranging 15-20 m	m	0	$3,000	$0
17.12	Length of sewer with depth ranging 20-25 m	m	0	$4,000	$0
17.13	Property Acquisition	ha	2.50	$87,000	$217,500
17.14	6.0m maintenance access road	m^2	4,920	$100	$492,000
17.15	Road reinstatement	m	1,085	$1,000	$1,085,000
	Subtotal: Route 2 Option 6				**$7,030,625**

South Fergus MESP and Secondary Plan
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Civil Servicing Estimate
1-Feb-24

ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
	INTERNAL + EXTERNAL				
	Route 1 Option 1				$10,383,500
	Route 1 Option 2				$13,209,700
	Route 1 Option 3				$10,027,425
	Route 1 Option 4				$10,752,825
	Route 1 Option 5				$13,719,850
	Route 1 Option 6				$16,326,275
	Route 2 Option 2				$12,179,950
	Route 2 Option 3				$7,284,675
	Route 2 Option 4				$7,809,075
	Route 2 Option 5				$12,245,350
	Route 2 Option 6				$11,383,025

Notes & Assumptions:

1) Assumed land value for Items 13 to 17 = $35,000/acre or $87,000 / ha

2) Total length of sewer along Nichol Drain = 820 m

3) Cost of internal sanitary services are excluded from the cost estimates (same cost across all alternatives)

4) Dewatering costs included in the unit prices for the maintenance holes and gravity sewers

5) Unit prices based on recent tender pricing

6) For comparative purposes only

7) Does not include contingencies, permitting costs, cost of further studies, design costs and other soft costs

8) Based on design concepts and are subject to change

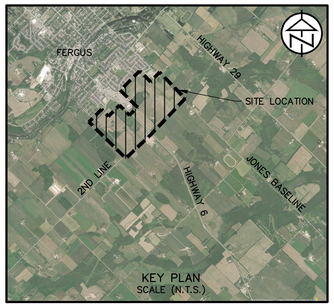
9) Does not consider inflation or changes in the construction market

Appendix E:
Phasing Plan

PH-1

PHASING PLAN

South Fergus MESP and Secondary Plan
Town of Fergus
Township of Centre Wellington
County of Wellington



LEGEND

- SITE BOUNDARY
- PHASE BOUNDARY
- PROPOSED DIRECTION OF CONSTRUCTION

Base Map Source: TOPOGRAPHIC SURVEY (TATHAM) COMBINED WITH TOPOGRAPHIC MAPPING (NORTHWAY/PHOTOMAP REMOTE SENSING LTD.)

DATE:	JUNE 14, 2021
SCALE:	1:2500
FILE:	120157
DRAWN:	KH

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MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

FRICORP ECOLOGICAL SERVICES

TATHAM ENGINEERING