BURNSIDE

Functional Servicing Report - The Village at Fairview Greens

883890 Ontario Limited c/o Fergus Development Inc
3190 Steeles Avenue East, Suite 300
Markham ON L3R 1G9

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3190 Steeles Avenue East, Suite 300
Markham ON L3R 1G9

R.J. Burnside & Associates Limited
292 Speedvale Avenue West Unit 20
Guelph ON N1H 1C4 CANADA

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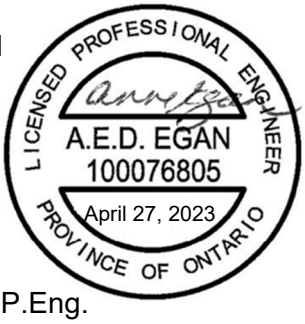
R.J. Burnside & Associates Limited

Report Prepared By:



Anne Egan, P.Eng.
Onsite Wastewater Specialist
AE:cv

Report Reviewed By:

Steven Roorda, P.Eng.
Vice President, Land Development
SR:cv

Table of Contents

1.0 Introduction and Background 1
1.1 Site Description and Context 1
1.2 Scope of Work 1
1.3 Background Studies and Documentations 2
1.4 Existing Site Conditions 3
1.4.1 Soil Conditions 3
1.4.2 Groundwater Conditions 3
1.4.3 Environmental Features 4
1.5 Proposed Site Concept 4
2.0 Grading and Storm Drainage 5
2.1 Site Grading 5
2.2 Existing Storm Drainage 5
2.3 Proposed Storm Drainage 5
2.4 Foundation Drain Collection 6
2.5 Minor System Conveyance 6
2.6 Major System Conveyance 6
2.7 External Drainage Conveyance 6
3.0 Water Distribution 8
3.1 Water Design Criteria 8
3.2 Existing Water Infrastructure 8
3.3 Proposed Water Distribution Layout 8
4.0 Wastewater Servicing 10
4.1 Proposed System 10
4.2 Consultation with MECP 10
4.3 Response to MECP 11
4.4 Contingency Plan 11
5.0 Utilities 13
6.0 Roadways 14
6.1 Private Road Sections 14
7.0 Erosion and Sediment Control 15
8.0 Conclusions and Recommendations 16

Figures

Figure 1: Site Location
Figure 2: Existing Conditions Plan
Figure 3: Proposed Concept Plan
Figure 4: Pre-Development Stormwater Drainage Area Plan
Figure 5: Post-Development Stormwater Drainage Area Plan
Figure 6: Sanitary Drainage Area Plan
Figure 7: Proposed Wastewater Treatment System Concept
Figure 8: Typical Cross Section of Proposed Street – 12.0 m Width
Figure 9: Typical Cross Section of Proposed Street – 14.0 m Width

Drawings

CUSP: Conceptual Underground Servicing Plan
WAT1: Preliminary Water Distribution Plan
SAN1: Preliminary Wastewater Distribution Plan
STM1: Preliminary Storm Servicing Plan
GRD1: Preliminary Grading Plan – South
GRD2: Preliminary Grading Plan – West
GRD3: Preliminary Grading Plan – North
GRD4: Preliminary Grading Sections and Details
P1: Plan and Profile – Wellington Road 19 Road Widening
W1: Water Servicing Alternative 2

Appendices

Appendix A – Wastewater Technical Memo
Appendix B – MECP Comments
Appendix C – Burnside Response to MECP Comments

Disclaimer

1.0 Introduction and Background

R.J. Burnside & Associates Limited (Burnside) has been retained by 883890 Ontario Limited c/o Fergus Development Inc. to prepare a Functional Servicing Report (FSR) for the proposed redevelopment of the Fergus Golf Club. A Stormwater Management Report will be submitted separately. This FSR has been prepared to accompany the applications for Plan of Subdivision, Plan of Condominium, Official Plan Amendment and Zoning By-law Amendment. It demonstrates that the subject lands can be provided with communal private servicing in accordance with applicable regulatory requirements and criteria.

1.1 Site Description and Context

The Fergus Golf Course is located along Wellington Road 19, east of Third Line, in the Township of Centre Wellington, Ontario.

The existing golf course (the “Site”) consists of two parcels; the northwest parcel, which is 42.35 ha, situated on the north side of Wellington Road 19, and the southeast parcel, which is 39.85 ha, situated on the south side of Wellington Road 19. The proposed residential redevelopment is located on the southeast parcel (the "SE Site") and the communal water and wastewater services are integrated into the existing Golf Course, which will remain on the northwest parcel (the "NW Site"). Refer to Figure 1 for the location of the site, located within the “Figures” Appendix at the back of this Report.

The existing SE Site includes wetlands through which the Black Drain flows from the north side (Wellington Road 19) downstream towards the south-west of the SE Site.

1.2 Scope of Work

The proposed scope of work for the Fergus Golf Course redevelopment FSR will include the following:

a) Overview of Existing Conditions

- Confirm storm drainage areas from detailed mapping; and
- Comprehensive Constraints Map to identify potential locations for SWM pond(s).

b) Servicing, Grading and Limits of Development

- Identify the water and sanitary servicing requirements for the development area;
- Prepare a functional servicing system to provide water services as well as sanitary services out letting into a proposed communal onsite wastewater

treatment facility with subsurface discharge located north of Wellington Road 19; and

- Prepare preliminary grading of roads, lots and / or blocks, and ponds with consideration for adjacent environmental features.

1.3 Background Studies and Documentations

The servicing concepts presented within this report have been developed to comply with the information contained in the following reports, which were established for this area. These following documents, studies, and reports have been incorporated unless otherwise noted:

Document Title	Prepared By	Date
Geotechnical Report on Fairview Golf Club – Lot 9 and 10, Concession 3 West Garafraxa Township, Ontario	R.J. Burnside & Associates Limited.	June 21, 1990
Hydro Geological Report on Fairview Golf Club – Lot 9 and 10, Concession 3 West Garafraxa Township, Ontario	R.J. Burnside & Associates Limited.	November 2, 1990
Revised Proposed Sewage Treatment and Disposal Plan Memo	C.C. Tatham & Associates Ltd. Consulting Engineers	February 15, 2018
Heritage Village Subdivision and Sarjeant Lands Proposed Wastewater Treatment Plant (WWTP)	Ainley Group Consulting Engineers Planners	March 1, 2018
Township of Centre Wellington – Water Supply Master Plan	AECOM Canada Ltd.	April 4, 2018
Preliminary Geotechnical Investigation Report, Proposed Residential Development – Fergus Golf Club	Golder Associates Limited	February 2022
Hydrogeological Assessment, Proposed Residential Development – Fergus Golf Club	Golder Associates Limited	April 2023
Environmental Impact Study	Beacon Environmental	April 2023
Preliminary Environmental Noise Report	Fergus Development Inc.	February 2022
Fergus Golf Club – Redevelopment – Water Servicing Study	TMIG & T.Y. Lin International Company	April 2023

Document Title	Prepared By	Date
Fergus Golf Club Proposed Residential Re-development Urban Transportation Considerations	BA Group	March 2023

1.4 Existing Site Conditions

Currently the NE Site and the SE Site are occupied by the Fergus Golf Course.

The Fergus Golf Club is currently serviced by existing wells throughout the site. There are two existing wells on the NW Site (North Irrigation Well and Clubhouse Well) and two existing wells (South Irrigation Well and Old Clubhouse Well) on the SE Site. Another well on the northern parcel, PW2-1, was installed as part of the site investigations for the proposed redevelopment.

The Clubhouse is located on the NW Site and is serviced by the Clubhouse Well for water supply and an onsite sewage treatment and dispersal bed system. There is no sanitary service within the SE Site. The existing house on the south side is assumed to be serviced by an on-site sanitary system as well as by an existing well for water supply.

A minor drain (Black Drain) runs through the middle of the SE Site from Wellington Road 19 south west, connecting existing wetlands on the site with each other. There are multiple woodlots and wetlands within the development area of the SE Site, portions of which are proposed to be retained as part of the development plan per the Environmental Impact Study done by Beacon Environmental.

Please refer to Figure 2 for Existing Site Conditions.

1.4.1 Soil Conditions

A preliminary geotechnical investigation for the study area was completed by Golder Associates Limited. Based upon the findings, the Site is covered by topsoil underlain by sandy silty sand, silty clay to clayey silt with sand to silt with sand and silty clay to clayey silt tilt. The topsoil thickness generally ranged from 150 mm to 300 mm underlying organic silt layer extending to depths of about 0.70 m and 0.90 m (Elev. 425.70 m and 434.10 m. In addition, cobbles and boulders in the till deposit were detected within the site. For any additional detail information, please refer to the Geotechnical Report by Golder Associates Limited.

1.4.2 Groundwater Conditions

Groundwater conditions were monitored, and it was found that the water tables varied from 0.60 m to 7.30 m below ground level. The shallower water table depths were

generally located in the southern portion of the south site, adjacent to the existing wetlands and Black Drain.

1.4.3 Environmental Features

A detailed description of the natural features and functions of the subject property is presented in the Environmental Impact Study by Beacon Environmental.

1.5 Proposed Site Concept

The proposed development will be on the 39.85 ha development site to the south of Wellington Road and will include 118 single family dwelling lots, two Open Space blocks totaling 6.71 ha, a new proposed sanitary pumping station (0.04 ha), and a Stormwater Management Pond for quality and quantity control.

Three entrances into the proposed SE portion of the subdivision are provided, with two accesses off Third Line and the other connecting to Wellington Road 19. The concept also proposes a new entrance to the existing golf club at the Wellington Road 19 entrance into the site. Due to the anticipated increase of activity at this intersection, left turn lanes are proposed along Wellington Road 19 in both directions and a minor road widening will be required. A proposed noise barrier wall will be introduced along specific section of Wellington Road 19. Where the noise barrier wall cannot provide a minimum height of 2.0 m for noise cancelation, a retaining wall will be incorporated to provide the minimum height requirement.

The SE Site will be serviced by a water and sanitary sewer system throughout, with a connection to the NE Site at the Street D and Wellington Road 19 intersection. Additional utilities such as hydro, gas and cable will also be provided from this specific connection point.

Please refer to Figure 3 for the proposed concept plan.

2.0 Grading and Storm Drainage

2.1 Site Grading

The conceptual site grading design for the SE Site provided in drawing GRD1, GRD2 and GRD3 of the FSR has been developed in consideration of the following requirements and constraints:

- Conformance with Centre Wellington grading and drainage criteria.
- Incorporating existing grades at road access points to Wellington Road 19 as well as Third Line.
- Matching of existing boundary grades at the property limits as well as existing wetland and wooded areas identified for protection.
- Optimization of earthworks (i.e., minimizing fill).
- Provision for adequate cover on proposed services.
- Provision for overland flow conveyance on the roadways to the proposed SWM ponds (i.e., major system storm drainage and emergency overland flow).
- Conveyance of stormwater within site and minimizing external runoff.
- Incorporating proposed noise barriers along Wellington Road 19.
- Ditch regrading as required for adequate drainage of Third Line and County Road 19 ditches.

The proposed road grades indicated allow for overland flow conveyance on the future ROWs in order to direct major storm drainage to the proposed SWM pond located south of the existing wetland.

2.2 Existing Storm Drainage

The existing site topography generally drains to the existing drainage feature on the site, the Black Drain. The Black Drain is a municipal drainage channel, which enters the SE Site from the north side of Wellington Road 19, flowing south through the existing wetland area and continuing south-west until eventually draining into Irvine Creek. Irvine Creek generally flows in a southwesterly direction connecting to the Grand River in Elora. For more details concerning the existing Storm Drainage, please refer to the SWM Report prepared by Burnside dated April 2023.

Please refer to Figure 4 for the Existing Stormwater Drainage Area Plan.

2.3 Proposed Storm Drainage

One Stormwater Management (SWM) Pond is proposed, located south of the existing wetland area, to meet the SWM criteria with respect to the Quantity, Quality, Erosion Control, Water Balance and Conveyance of storm drainage for this development site. For more details concerning the Proposed Drainage Area, please refer to the SWM Report prepared by Burnside dated April 2023.

The proposed Post Development Drainage Areas are shown on Figure 5.

2.4 Foundation Drain Collection

All proposed building within the development with foundations located within the groundwater table are to require a foundation drain connection to a separate sewer system within the road allowance. The extent of the foundation drain collector sewer will only be located where required, where proposed building foundations are within the groundwater table, generally in the southern portion of the SE Site. There are two proposed outlets to the Black Drain for this foundation drain collector system based on cover and grading constraints. As the water collected by this system is considered clean water, the outlets will discharge directly to the Black Drain.

Refer to drawings STM1 and CUSP for the layout of the foundation drain collector system.

2.5 Minor System Conveyance

As per Centre Wellington standards, the minor system flow will be conveyed through a series of storm sewers sized in combination with catch basins (CB) located within the private roadway to convey the 5-year return period storm. One Stormwater Management Pond is proposed to collect the storm discharge, located south of the existing wetland.

Drawing STM1 shows the overall layout for the preliminary storm sewer network for proposed drainage areas.

2.6 Major System Conveyance

The major system will convey the 100-year storm within the proposed private road allowance and direct the flow into the proposed SWM pond as overland flow. For more details regarding the Major System Conveyance, please refer to the SWM Report prepared by Burnside, dated April 2023.

2.7 External Drainage Conveyance

There are six external drainage areas that flow through the SE Site and ultimately reach the existing Black Drain.

EXT1 (7.93 ha) coming into the SE Site via roadside ditches and a culvert under Wellington Road 1, which forms the start of the Black Drain.

The second external drainage area EXT2 (0.34 ha) is located on the south side of Wellington Road 19 and includes the South half of Wellington Road 19 and the roadside ditch. This area spills to the site via a drainage ditch, east of the Black Drain.

The third of these drainage areas EXT3 (1.23 ha) is located on the south side of Wellington Road 19 and includes the South half of Wellington Road 19 and the roadside ditch. It also includes the west side of 3rd Line and the roadside ditch.

The fourth drainage area EXT4 (0.18 ha) is located on the west side of 3rd Line and the roadside ditch at the south end of the SE Site. It currently appears that this drainage is held in the ditch and ultimately spills into the site via a low point on the east side of the SE Site.

The fifth and sixth external drainage areas EXT5 (8.51 ha) and EXT6 (15.73 ha) sheet drains towards the SE Site from the lands to the south.

These existing drainage areas will be conveyed through the site using a bypass sewer and ultimately discharge to the same location as the pre-development condition. For more details regarding the external drainage conveyance, please refer to the SWM Report prepared by Burnside, dated April 2023.

3.0 Water Distribution

3.1 Water Design Criteria

The proposed water distribution within the property will be designed and constructed to current County of Wellington and MECP criteria and specifications, which are as follows:

- Peak hourly demand plus fire flow.
- Pressure in transmission watermains to be minimum 40 psi (275 kPa) during peak hour demands at hydrant elevation.
- Pressure in a transmission main under condition of simultaneous peak hour flow and fire flow demands is to be not less than 20 psi (140 kPa) at the point in the system where the fire flow is being drawn. Fire Flow shall be minimum 275 kPa (40psi).
- Preferred pressures ranges are:
  - Average Day and Maximum Day: 50psi (350kPa) to 80psi (550kPa).
  - Minimum Hour and Peak Hour: 40psi (275kPa) to 100psi (700kPa).

3.2 Existing Water Infrastructure

The existing Fergus Golf Club is currently supplied with water by the existing well (Old Clubhouse Well) on the NW Site. The existing house on the south side is assumed to be serviced by an existing well for water supply. No other water services are provided within the SE Site.

3.3 Proposed Water Distribution Layout

The proposed water supply for the proposed subdivision will be delivered by one of the existing wells on the north side of Wellington Road 19. The Water supply requirement is estimated to be 150 m^3/day for the Average Day Flow (AWD) and 250 m^3/day for the Maximum Day Flow (MAF). Please refer to the Hydrogeological Report prepared by Golder for the exact source of water supply.

The preliminary Water Distribution Plan (Drawing WAT1) of this report indicates the layout for the proposed 150 mm watermain within the SE Site as well as the connection to the water supply location in the NW Site. A minimum cover of 2.0 m will be ensured for the entire length of water services within the site.

The supply source on the NW Site will provide the minimum required pressure of 275 kPa (40 psi) for fire flow supply.

An alternative water servicing solution is also proposed where the SE Site would be supplied by water from a direct watermain connection along County Road 19 to the Town of Fergus. Refer to drawing W1 for this proposed alternative layout.

For any additional detailed information concerning required water infrastructure and upgrades, please reference Water Servicing Study by T.Y. Lin.

4.0 Wastewater Servicing

Municipal sanitary services are not available to the Site; therefore, onsite servicing is required. The existing golf course facility is serviced by a small Ecoflo peat biofilter and area bed with a capacity of approximately 5,500 L/day, located on the NW Site.

4.1 Proposed System

A new communal wastewater treatment facility is proposed to service the development. The facility would consist of a treatment plant, with the highly treated effluent discharging to the existing irrigation ponds on the golf course, for beneficial reuse as irrigation water. The wastewater treatment system would require an Environmental Compliance Approval (ECA) from the Ministry of the Environment Conservation and Parks (MECP). Regular operational oversight, as well as performance monitoring will be required. Since this would be a privately owned communal wastewater system, the owner will be required to enter into a Municipal Responsibility Agreement with the Township or provide Financial Assurance in accordance with MECP guidelines.

The residential lots within the SE Site will be serviced by a gravity sewer network that will convey flows to a proposed pumping station located across from the SWM block. A forcemain is then proposed to transfer flows up to the NE site where it will be processed through the proposed treatment facility. Please refer to Figure 6 for the proposed sanitary gravity sewer and forcemain layout within the SE Site.

Details of the proposed system are described in a Technical Memo contained with Appendix A. This memo explains the proposed design flows, the proposed treatment system and effluent targets, and presents quantity calculations of effluent volumes relative to pond storage and irrigation volumes. The wastewater from the development would be treated to a high-quality effluent that is suitable for discharge into the irrigation ponds to be used as irrigation for the remaining 18-hole golf course. Refer to Figure 7 for the layout of the proposed treatment system and effluent discharge locations.

4.2 Consultation with MECP

Pre-consultation discussions are in progress with MECP as part of the consultation for the ECA that will be required for this treatment system. This proposed system employing a high level of treatment and the beneficial reuse of effluent for irrigation has been implemented on sites elsewhere in Ontario for similar applications.

The Technical Memo has been reviewed by MECP technical staff (Hydrogeologist and Surface Water Specialist) who have provided two sets of comments, contained in Appendix B.

4.3 Response to MECP

In response to the MECP comments, Burnside submitted a comment response letter along with additional background documents. A copy of the response letter is included in Appendix C.

Further clarification was requested on the potential interaction with groundwater and surface water, and whether the proposed effluent irrigation system could potentially result in an unacceptable impact to local groundwater and surface water resources. In consultation with WSP/Golder, it was confirmed that the low-permeability soils would limit the potential interaction with the groundwater and that the highly treated effluent would be safe for human contact.

Further concern was raised about the potential for the ponds to overflow and connect with downstream surface waters. Burnside has confirmed that even under the most severe storm events (100-year storm), there is more than sufficient available storage within the ponds that would prevent them from overtopping. It is noted that there is a relatively small, localized area of surface drainage on the Site that is currently directed toward the existing irrigation ponds. The existing berm around the north end of the ponds will be raised to accommodate additional storage to further limit any potential overtopping. The golf course has confirmed that this additional height of berm is acceptable and could be worked into the topography of the golf course.

The response letter also contains additional detail regarding the proposed effluent objectives and limits for the wastewater treatment facility, as well as a monitoring program.

4.4 Contingency Plan

A contingency plan outlines the triggers and additional measures in place to ensure potential risks to the environment are minimized. A brief contingency plan for the wastewater solution is included in the response memo to the MECP comments. We have further enhanced the plan in the following paragraphs.

Monitoring of the water level within the irrigation pond is proposed. A float monitor with an alarm system would be installed with a connection to the treatment plant control and alarm system. The float level would be just above the highest normal operating water elevation in the pond (i.e. at the start of the freeboard elevation). Based on our analysis, the storm events contribute to a small volume of runoff to the pond as compared to the overall volume available in the ponds. Therefore, by maintaining appropriate freeboard in the ponds, capacity to accommodate multiple major storm events will be provided which will ultimately minimize the potential for pond overflow. The float level alarm would provide a notification to the operators that the pond level is operating above normal water levels and is within the allowable freeboard, which provides time for the operators to react as needed to prevent an overtopping event. As noted in Appendix C,

a comprehensive and site-specific contingency plan is continually being developed to provide additional details in this regard.

With an enhanced berm around the pond, the storage volume within the freeboard above normal operating levels would be in excess of 20,000 m^3, meaning that once the alarm is triggered, there is storage for two back-to-back 100-year storms, plus over 90 days of daily effluent flows.

Ongoing monitoring of the irrigation usage will also be completed to ensure that the average daily treated effluent volumes are utilized continually. During the winter months, the effluent will be stored within the pond. In our current discussions with the Golf Course, the ponds will be pumped down in the fall, toward the end of the irrigation season, to a level that will account for the average daily effluent volumes for 6 months. Again, sufficient freeboard will be available to accommodate any unusual rainfall/snowmelt events during these winter months.

For reference, the estimated design wastewater flow is approximately 175 m^3. The total available volume in the existing irrigation ponds below the normal water level are in excess of 64,000 m^3 (prior to any increase in berm height and additional freeboard). Based on the design flow, six months of the daily design flow would amount to 31,500 m^3 (i.e., 6 months x 30 days x 175 m^3/day), which is less than half of the total available pond volume. As noted previously, there is a small localized area of the Site from which the surface runoff drains into the ponds. The typical annual rainfall for the area draining to the ponds is 12,300 m^3, meaning that 6,150 m^3 would fall during the winter months. In total, the combined volume of treated effluent and precipitation to be directed to the ponds during the winter months would be 37,750 m^3. It is unlikely that the flows during this period would vary significantly, but considering the available storage volume within the pond, there is a safety factor of 1.7.

Currently the golf course only irrigates the tees and greens, which account for an area of approximately 0.81 ha (2 acres). As part of the Golf Course operations, the irrigation system is being expanded to encompass the entire fairway areas, such that the total potential area would be roughly 16.2 ha (40 acres) which is approximately 20 times the current irrigated area. Available data for the current irrigation operation (per 2019 and 2020 PTTW records) indicates a total volume of approximately 12,300 m^3/year. The PTTW allows for water taking from the well up to 211,809 m^3/year. At the full buildout of the proposed development, the annual volume of treated effluent would be approximately 63,875 m^3/year (i.e., 175 m^3/day x 365 days). We would recommend that the irrigation system should include at least half of the fairway areas in the routine irrigation operations. Half of the fairway areas would be approximately ten times the existing area being irrigated, resulting in a projected water usage of more than 120,000 m^3/year. This is double the projected annual volume and still within the PTTW limit. If all fairways are irrigated, this potential volume of water to be used is significantly greater than the projected annual volume of effluent and precipitation.

5.0 Utilities

Utilities will be installed in a joint utility trench. Design will be provided by the utility companies. It appears that there are connections for natural gas and electrical supply adjacent to the perimeter of the SE Site and during detailed design, consultation with Union Gas (natural gas) and Centre Wellington Hydro/ Hydro One (hydro), will be made to confirm adequate external utility supply will be confirmed.

6.0 Roadways

6.1 Private Road Sections

The majority of the roadways within the developed are proposed with a 12.0 m width as per Figure 8. The proposed road allowance will provide a 3.00 m traffic lane in each direction, 0.50 m wide curbs on both sides as well as a 2.50 m strip for planting and utilities on each side. The 12.0 m section will provide enough space for a typical storm, sanitary and water servicing. It will also provide space for one of the additional services which include the sanitary forcemain, black drain bypass sewer and foundation drain collection system.

A proposed 14.0 m section width between property lines is required in areas where both the black drain bypass sewer and sanitary forcemain are proposed. Refer to Figure 9 for the location of the services within the proposed 14.0 m section.

7.0 Erosion and Sediment Control

The erosion and sediment control plan for the Site will be developed in accordance with the Centre Wellington and Grand River Conservation Authority (GRCA) guidelines. The plan will be completed at detail design stage prior to the undertaking of any grading activity on Site.

Erosion and sediment control will be implemented for all construction activities including topsoil stripping, foundation excavation and stockpiling of material. The following erosion and sediment control measures will be implemented.

- A temporary sediment control fence will be placed around the perimeter of all areas to be disturbed prior to grading. Double row fencing may be appropriate adjacent to sensitive natural areas.
- Appropriate designed sediment control ponds will be provided.
- Catchbasin sediment traps will be provided on existing catchbasins being possible being affected by the construction as well as new installed catchbasins within the new development Site.
- Check dams, etc., for erosion / velocity control will be provided.
- Gravel mud mats will be provided at all construction access points to minimize off-site tracking of sediment.

All temporary erosion and sediment control measures will be routinely inspected and repaired if required during construction. Temporary controls will not be removed until the areas they served have been restored and stabilized.

Connection to LID measures will not be completed until the Site is stabilized with vegetation to minimize sediment accumulation and maintenance issue.

All reasonable measures will be taken to ensure that sediment loading is minimized both during and following construction. Additional details will be provided as part of the detailed design.

8.0 Conclusions and Recommendations

The report addressed the requirements for submission of a Functional Servicing Report to accompany the Draft Plan Application for the Fergus Golf Course Subdivision Redevelopment. This Functional Servicing Report demonstrates that the proposed development site can be developed on full private communal services as seen in the Conceptual Underground Servicing Plan Drawing (CUSP).

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[THE DIFFERENCE IS OUR PEOPLE]

Figures

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KEY MAP OF ONTARIO

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Client

FERGUS DEVELOPMENT INC.

Figure Title

THE VILLAGE AT FAIRVIEW GREENS

SITE LOCATION PLAN

Drawn	Checked	Date	Figure No.
BF	DN	23/03/16	1
Scale		Project No.	
N.T.S.		300052719	

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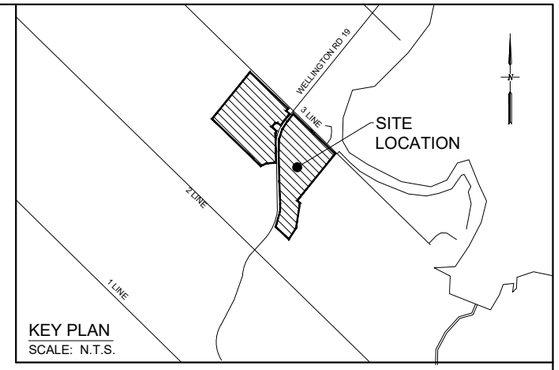

KEY PLAN
SCALE: N.T.S.

LEGEND

PROPERTY BOUNDARY

BH — BOREHOLE

N

0 100 200 400 600
Metres

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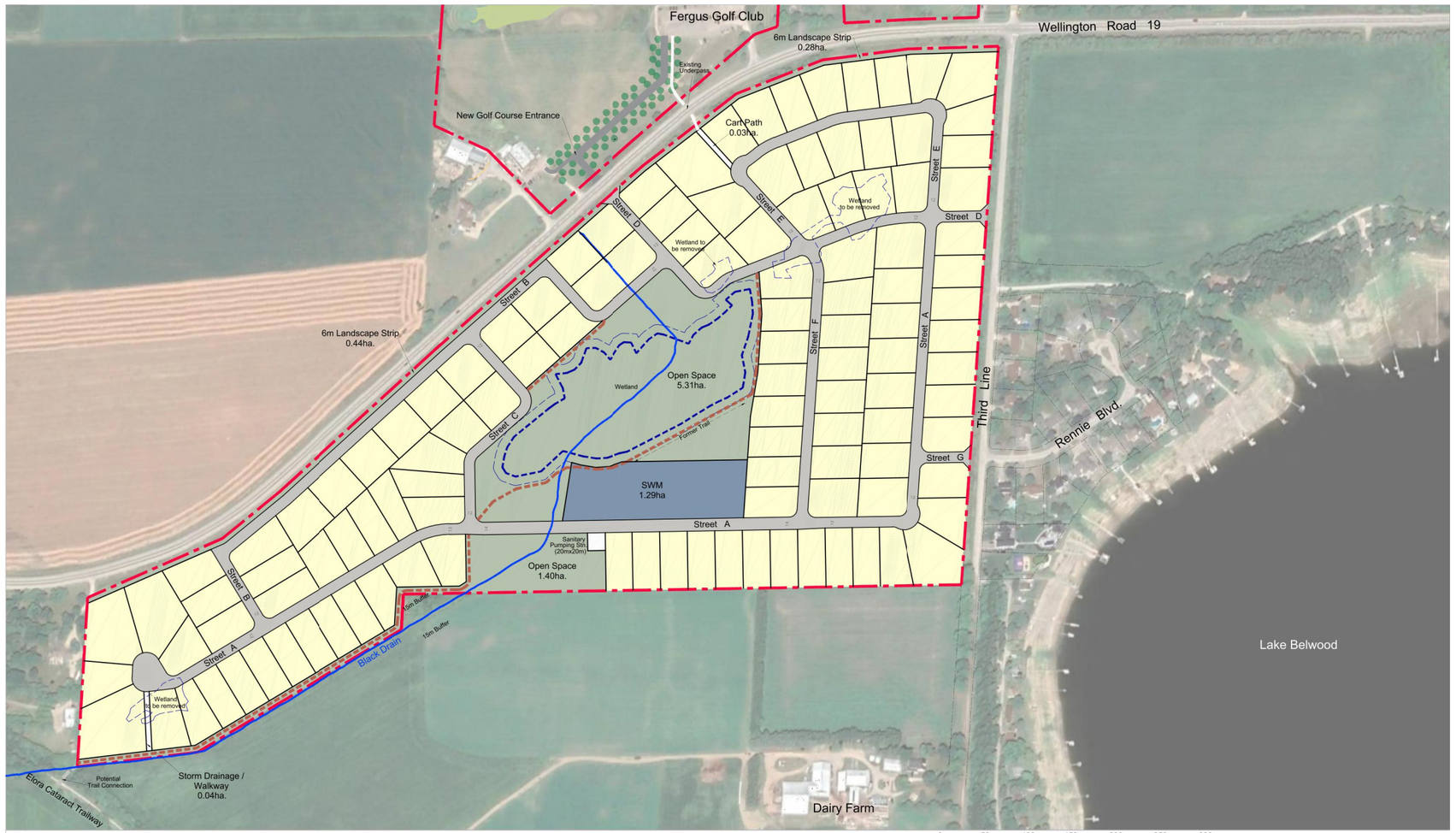
Figure Title

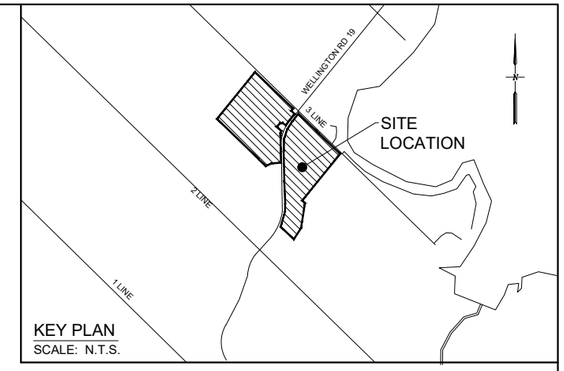
THE VILLAGE AT FAIRVIEW GREENS

EXISTING CONDITIONS

Drawn	Checked	Date	Figure No.
BF	DN	23/03/16	**2**
Scale		Project No.	
1:7500		300052719	

File: \\elmo\Shared Work Areas\052719 Fergus Golf Course\052719.05 FSR\07_Figures\FSR FIGURES\052719.05 FIG2_EXISTING CONDITIONS.dwg Date Plotted: March 16, 2023 - 10:35 AM





DEVELOPMENT CONCEPT

The Village At Fairview Greens

1/2 Acre Residential Lots
GRCA Wetland / OP Core Greenlands
10m Wetland Buffer
Potential Trails

Site Area: 39.85ha. (98.5ac.)
No. of Lots: 118
Area of wetlands to be removed: 7,076sq.m.

0 50 100 150 200 250 300
Metres

NOTE: This concept should be considered as a preliminary demonstration model that illustrates an 'order of magnitude' development scenario for the site. The number of lots are approximate and subject to more detailed design as well as municipal planning approvals.

Scale 1:4,000 | October 24, 2022 | Project No.: 21021 | Drawn By: SL

PROVIDED BY GSP GROUP
DATED: OCTOBER 26, 2022

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Figure Title

THE VILLAGE AT FAIRVIEW GREENS

PROPOSED CONCEPT PLAN

Drawn	Checked	Date	Figure No.
BF	DN	23/03/16	3
Scale		Project No.	
N.T.S.		300052719	

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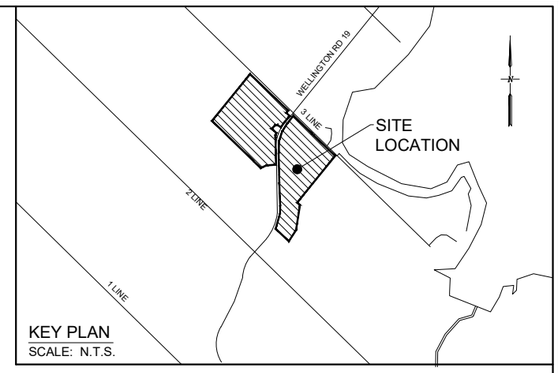


LEGEND

- STORM DRAINAGE AREA
- EXISTING OVERLAND FLOW DRAINAGE
- C1 / 1.0 ha — ID NUMBER / DRAINAGE AREA IN HECTARES

0 50 100 200 300 400
Metres

BURNSIDE

Client

FERGUS DEVELOPMENT INC.

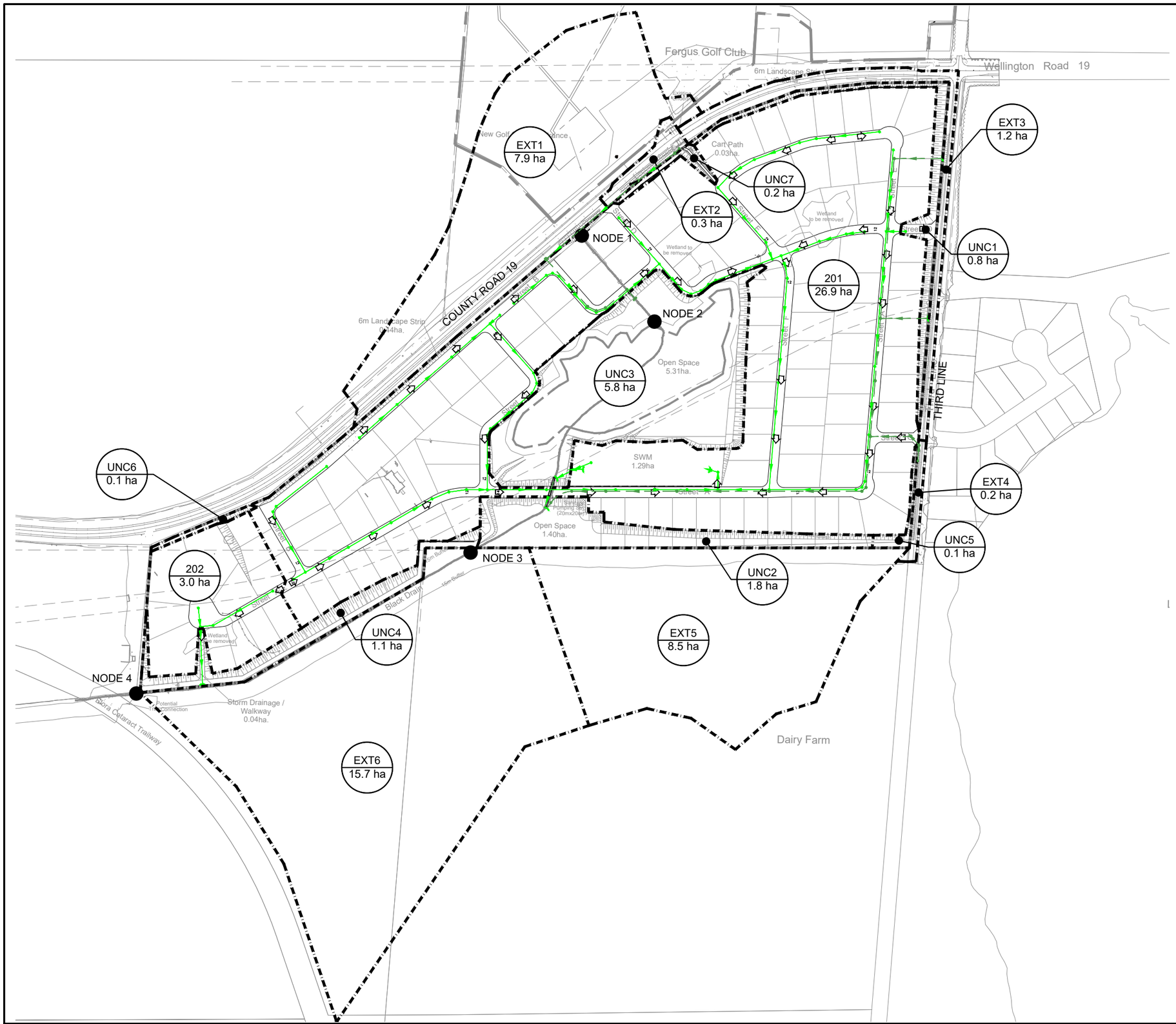
Figure Title

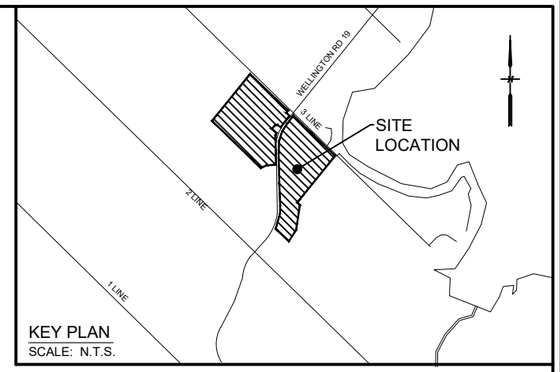
THE VILLAGE AT FAIRVIEW GREENS

PRE-DEVELOPMENT DRAINAGE PLAN

Drawn	Checked	Date	Figure No.
BF	DN	23/03/16	4
Scale		Project No.	
1:7500		300052719	

File: \\elmo\Shared\Work Areas\052719 Fergus Golf Course\052719.05 FSR\07_Figures\FSR FIGURES\052719.05 FIG4_PRE-DEV DRAINAGE.dwg Date Plotted: March 16, 2023 - 10:36 AM





LEGEND

- PROPERTY BOUNDARY
- STORM DRAINAGE AREA
- PROPOSED STORM SEWER
- PROPOSED STORM BYPASS SEWER

C1 / 1.0 ha — ID NUMBER / DRAINAGE AREA IN HECTARES

0 50 100 200 300 400
Metres

BURNSIDE

Client

FERGUS DEVELOPMENT INC.

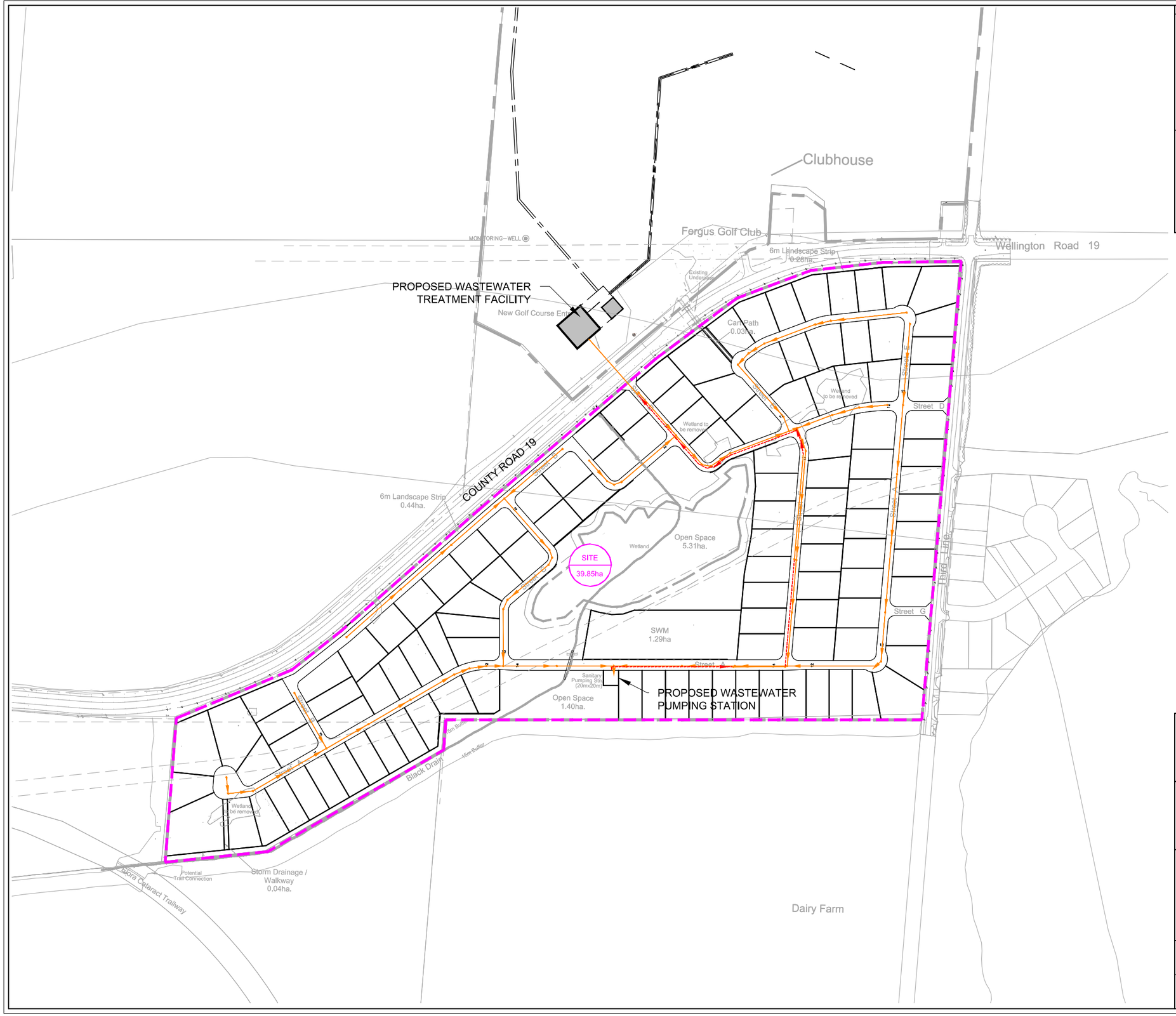
Figure Title

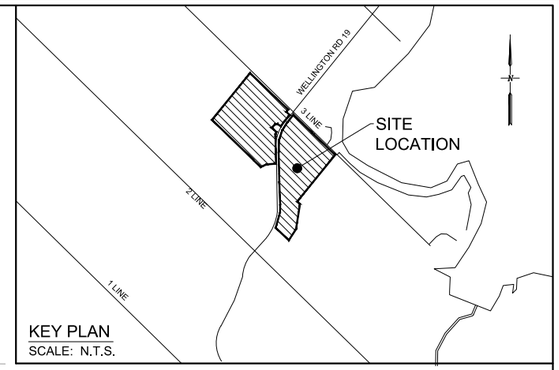
THE VILLAGE AT FAIRVIEW GREENS

POST-DEVELOPMENT DRAINAGE PLAN

Drawn	Checked	Date	Figure No.
BF	LG	23/03/16	5
Scale		Project No.	
1:5000		300052719	

File: \\elmo\Shared Work Areas\052719 Fergus Golf Course\052719.05 FSR\07_Figures\FSR FIGURES\052719.05 FIG5_POST-DEV DRAINAGE.dwg Date Plotted: March 16, 2023 - 10:37 AM





LEGEND

- PROPERTY BOUNDARY
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY FORCEMAIN
- SANITARY DRAINAGE BOUNDARY

EXT / 24.76 ha — CATCHMENT NAME / AREA

N

0 50 100 200 300 400

Metres

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Client

FERGUS DEVELOPMENT INC.

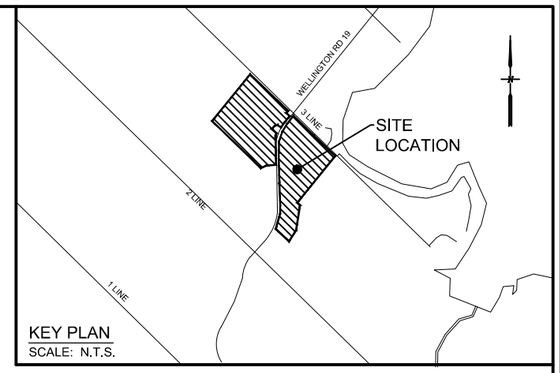
Figure Title

THE VILLAGE AT FAIRVIEW GREENS

SANITARY DRAINAGE AREA PLAN

Drawn	Checked	Date	Figure No.
BF	SR	23/03/16	6
Scale		Project No.	
1:5000		300052719	

File: \\elmo\Shared\Work Areas\052719 Fergus Golf Course\052719.05 FSR\07_Figures\FSR FIGURES\052719.05 SANITARY DRAINAGE PLAN.dwg Date Plotted: March 16, 2023 - 2:49 PM



LEGEND

- PROPERTY BOUNDARY
- BOREHOLE/WELL LOCATION (GOLDER)
- 320.5 — GROUNDWATER CONTOUR
- AREA TO BE IRRIGATED (TOTAL = 97,000 m²)
- INTERPRETED DIRECTION OF GROUNDWATER FLOW

N

0 40 80 160 240 320

Metres

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Client

FERGUS DEVELOPMENT INC.

Figure Title

THE VILLAGE AT FAIRVIEW GREENS

PROPOSED WASTEWATER TREATMENT SYSTEM CONCEPT

Drawn	Checked	Date	Figure No.
BF	AE	23/03/16	7
Scale		Project No.	
1:4000		300052719	

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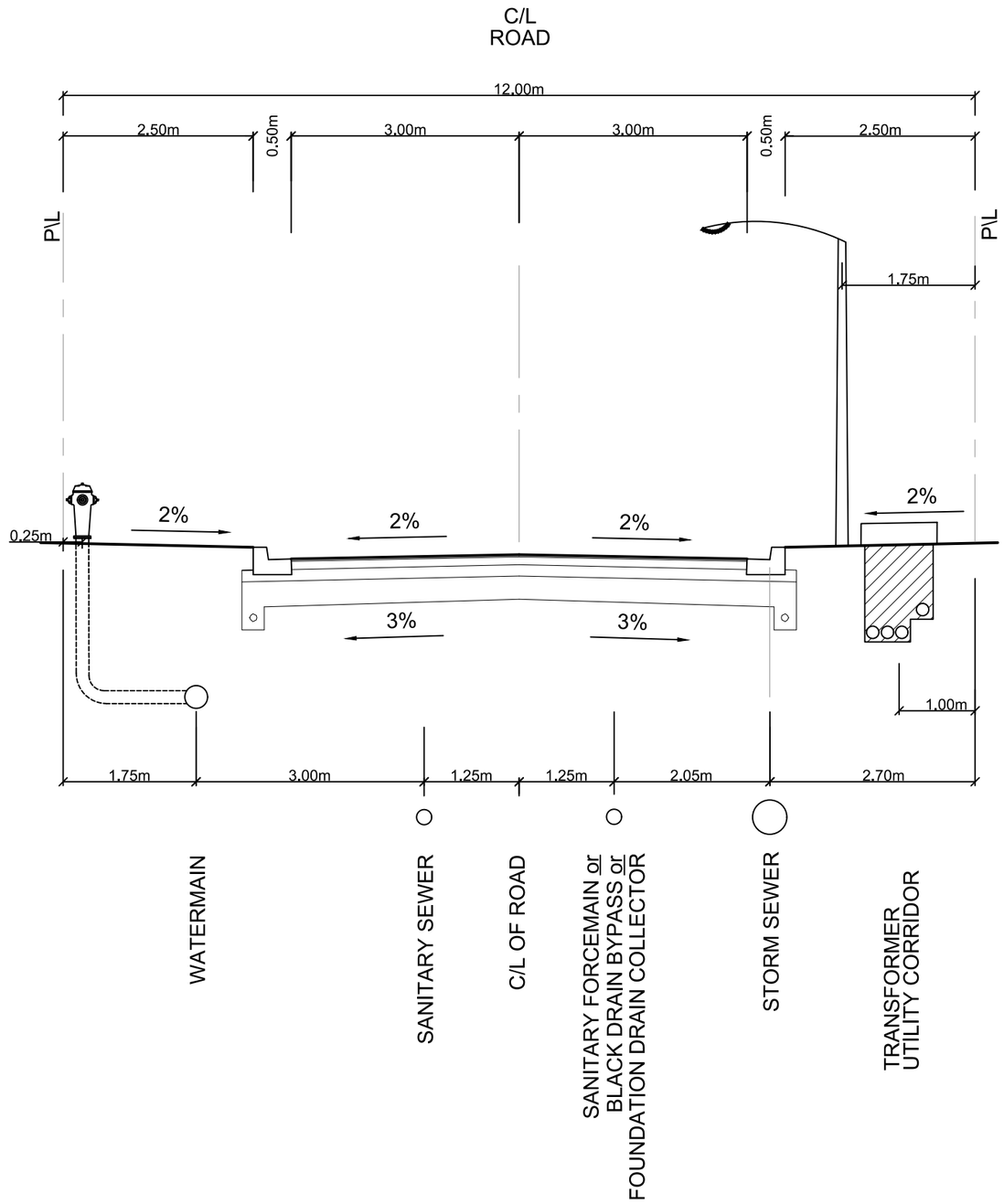


PROPOSED 12.0m PRIVATE ROAD WIDTH
N.T.S.

BURNSIDE

Client

FERGUS DEVELOPMENT INC.

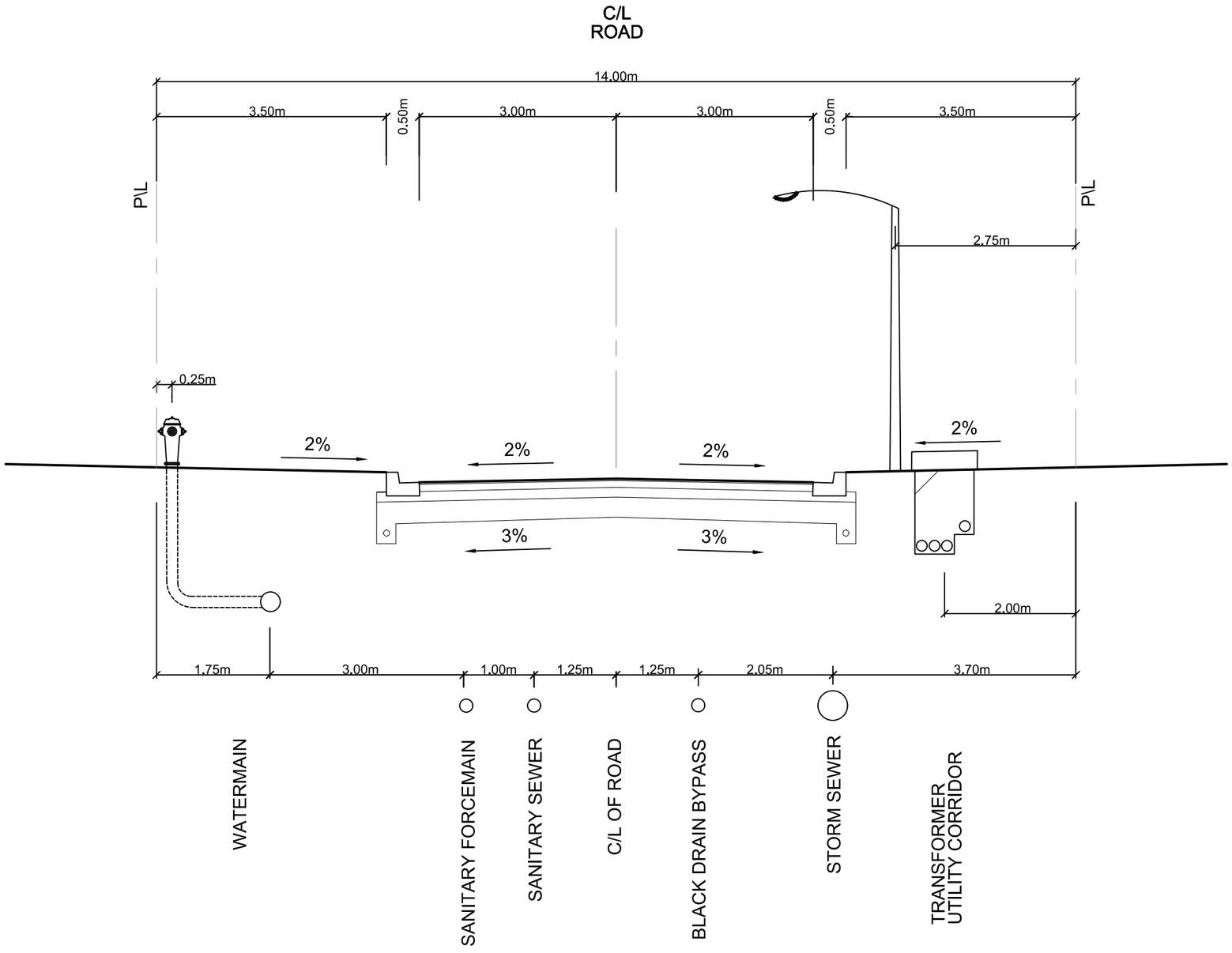
Figure Title

THE VILLAGE AT FAIRVIEW GREENS

TYPICAL CROSS SECTION OF PROPOSED STREET - 12.0m WIDTH

Drawn	Checked	Date	Figure No.
BF	DN	23/03/16	8
Scale		Project No.	
N.T.S.		300052719	

File: \\Elmo\Shared Work Areas\052719 Fergus Golf Course\052719.05 FSR\07_ Figures\FSR FIGURES\052719.05 PROPOSED ROW.dwg Date Plotted: March 16, 2023 - 2:50 PM



PROPOSED 14.0m PRIVATE ROAD WIDTH
N.T.S.

BURNSIDE

Client

FERGUS DEVELOPMENT INC.

Figure Title

THE VILLAGE AT FAIRVIEW GREENS

TYPICAL CROSS SECTION OF PROPOSED STREET - 14.0m WIDTH

Drawn	Checked	Date	Figure No.
BF	SR	23/03/16	9
Scale		Project No.	
N.T.S.		300052719	

File: \\Elmo\Shared Work Areas\052719 Fergus Golf Course\052719.05 FSR\07_ Figures\FSR FIGURES\052719.05 PROPOSED ROW.dwg Date Plotted: March 16, 2023 - 2:50 PM

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Appendix A

Wastewater Technical Memo

R.J. Burnside & Associates Limited 6990 Creditview Road, Unit 2 Mississauga ON L5N 8R9 CANADA
telephone (905) 821-1800 **fax** (519) 941-8120 **web** www.rjburnside.com

BURNSIDE
[THE DIFFERENCE IS OUR PEOPLE]

Technical Memorandum

Date: September 15, 2022 **Project No.:** 300052719.0000

Project Name: Fergus Golf Club Redevelopment

Client Name: Fergus Development Inc.

Submitted To: Ministry of the Environment, Conservation and Parks, Guelph District Office

Submitted By: Anne Egan, P.Eng.

1.0 Introduction

A portion of the existing Fergus Golf Club property located on County Road 19 in the Township of Centre Wellington is proposed to be redeveloped into a residential subdivision (the "proposed development"). The existing golf club property consists of an irregular-shaped parcel of approximately 39 ha, located on the south side of County Road 19 (the "SE Site"), as well as a parcel of approximately 42 ha on the north side of County Road 19 (the "NW Site"), which are collectively referred to as the Site. The proposed development will include 118 single family dwellings located on the SE Site, and the existing golf course would remain on the NW Site. Municipal sanitary services are not available to the Site; therefore, onsite servicing is required. The proposed development would be serviced with a communal well water supply and water treatment facility, and a communal wastewater treatment plant. The communal water and wastewater facilities would all be located on the NW Site, with appropriate access easements to these facilities.

The existing golf course facility is serviced by an onsite sewage system which was designed by Burnside and permitted in 2004, with a capacity of approximately 5,500 L/day, located on the NW Site. The proposed communal facility for the proposed development would have the capacity to accept the wastewater flows from the existing golf course clubhouse facility.

The proposed communal wastewater treatment facility would consist of a treatment plant, with the treated effluent discharging to the existing irrigation ponds on the golf course, for reuse as irrigation water. The wastewater treatment system will require an Environmental Compliance Approval (ECA) from the Ministry of the Environment Conservation and Parks (MECP). Regular operational oversight, as well as performance monitoring will be required, all to be administered by a condominium corporation. Since this would be a privately owned communal wastewater

system, the owner will be required to enter into a Municipal Responsibility Agreement with the Township or provide Financial Assurance in accordance with MECP guidelines.

The objective of this memo is to describe the proposed wastewater system for the redevelopment, for the purposes of MECP pre-consultation.

2.0 Site and Subsurface Conditions

The NW Site contains an existing 18-hole golf course which would be maintained. The NW Site includes a clubhouse building, and two large, constructed ponds that are used for irrigation of the golf course. These ponds were created as part of the golf course construction and are equipped with interconnecting piping between the two ponds (refer to the attached Figure 1). The ponds are considered off-line storage, as there is no outlet or overflow from the ponds to any surface water features on the NW Site. The ponds are primarily filled with water pumped from the existing irrigation well located on the NW Site. The ponds provide a total storage volume of approximately 64,250 m^3 and the stored water is used for irrigation over the golf season.

Geotechnical and hydrogeological investigations for the Site have been documented in the *Preliminary Geotechnical Investigation* (Golder Associates Ltd., February 4, 2022), the *Water Supply Investigation* (Golder Associates Ltd., January 2022) and the *Hydrogeological Investigation* (Golder Associates Ltd., February 2022). Eighteen (18) boreholes were dug to depths varying between 3 m-10 meters below ground surface (mbgs) across the Site. The subsurface conditions on the NW Site consist primarily of sandy silty clay and silty clay till, which are of low permeability.

Groundwater conditions were monitored, and it was found that the water tables varied from 0.60 m to 7.30 m below ground level. The shallower water table depths were generally located in the southern portion of the SE Site, adjacent to the existing wetlands. On the NW Site, the direction of groundwater flow is interpreted to be generally toward the north, toward Irvine Creek.

3.0 Wastewater Characteristics

3.1 Wastewater Quantity

The proposed wastewater treatment plant will service 118 proposed residential dwellings. Average daily wastewater flow rates have been calculated according to Township guidelines (Township of Centre Wellington Draft Engineering Guidelines 2018). For low density residential development, the Township of Centre Wellington Development Charges Background Study (Watson & Associates 2020) suggests and average density of 3.094 people per unit, which would give a total of 365 people. Based on a flow rate of 350 litres per capita daily (per Township guidelines), this results in a design flow of 127,782 L/day for the proposed development. The wastewater facility will service only the proposed development, with sufficient

additional capacity for the connection of the existing golf course clubhouse. Therefore, a nominal allowance for inflow and infiltration (I & I) into the sewer collection system has been added. The Township's Draft Design Guidelines suggest a value of 0.15 L/s/ha for typical urban sanitary collection networks. However, this value is not considered applicable to this type of development. For the relatively small and self-contained collection system associated with the proposed development, a value of 90 L/person per day is considered more representative, as recommended in MECP's Guidelines for the Design of Sanitary Sewers. The existing golf course clubhouse system is rated for a maximum daily sewage flow of 5,500 L/day. For this preliminary memo, an allowance of 10,000 L/day has been applied for connection of the golf facilities to the treatment plant.

Table 1: Wastewater Design Flows

	No. of Units	PPU	Total Population	Flow per Person (L/day)	Total Flow (L/day)
Single Family Units	118	3.094	365	350	127,782
Golf Clubhouse					10,000
Allowance for I&I			365	90	32,850
Total Flow					**170,632**
Total ADF (rounded)					**175,000**

To be conservative, the total design flow has been rounded up to 175 $m^{3/}$day. This is considered an Average Daily flow (ADF). Peak flows will be accommodated through the implementation of flow equalization facilities.

3.2 Impact Assessment and Proposed Effluent Objectives

As noted above, soil conditions on the NW Site are of low permeability and consist primarily of silty clay and clayey silt till. Subsurface disposal in these soil conditions would require a significant area of land for raised dispersal beds. Since the wastewater treatment facility will be located adjacent to an operating golf course, there is an opportunity to reuse the treated effluent for irrigation of the course, which provides an environmentally sustainable alternative and lessens the reliance on the existing irrigation well. The irrigation ponds are off-line, and do not have an overflow or outlet to local surface water resources; therefore, the potential for impacts to surface water is negligible, and a receiver impact study it not warranted.

Effluent will be treated to remove solids, organics, ammonia and pathogens. Denitrification and phosphorus removal will also be incorporated into the treatment plant. The point of compliance for the wastewater treatment plant would be the final effluent prior to discharging into the irrigation pond.

Since the final effluent will be irrigated over the golf course, it will disperse through the shallow soil to support turf growth. The shallow soils are of low permeability, and the groundwater wells in the immediate vicinity of the NW Site are deeper bedrock wells (with depths exceeding 30 m). Therefore, the potential for impacts to local groundwater quality are considered low. However, a

conservative approach has been implemented to ensure that no impacts to groundwater supplies would occur as a result of the effluent reuse on the golf course. As such, denitrification treatment will be incorporated as part of the wastewater treatment plant.

Effluent will be spread over the approximately 42 ha NW Site through the golf course irrigation system. The fairways, greens and tees cover approximately 9.7 ha of the site.

The application of water to the course would be done in a controlled manner by golf course staff, based on the amount of water needed for turf maintenance. A significant portion of the water will be used by the grass, which will prevent any significant migration of pond water, either overland or through the subsurface into the groundwater, considering the low permeability of the underlying soils, and the reliance on deep bedrock wells for water supply. According to the detailed geotechnical hydrogeological assessments (Golder 2022), the conceptual hydrostratigraphic model for the site consists of “an approximately 30 m thick overburden (till) aquitard overlying a bedrock aquifer”, which demonstrates that there is limited potential for impacts to groundwater wells.

The following are the proposed effluent objectives for the wastewater treatment system, which have been developed based on similar applications involving the reuse of treated effluent for irrigation of golf courses:

Table 2: Proposed Effluent Objectives

Design Parameter	Units	Effluent Objective
Total Biochemical Oxygen Demand – 5 Day (BOD5)	mg/L	10
Total Suspended Solids (TSS)	mg/L	10
Total Phosphorus (TP)	mg/L	< 0.5
Total Ammonia (TAN)	mg/L	< 1.0
Total Nitrogen	mg/L	< 10
pH		6.5 to 9.5
E. Coli	CFU/ 100 mL	< 100

3.3 Existing Groundwater Quality

As part of the Hydrogeological Investigation, groundwater quality samples were collected by Golder and Associates Ltd. in August 2021 and analyzed for general chemistry parameters and bacteria. This data provides a general indication of the existing quality in the deep bedrock well PW21-1 that was drilled in 2021 as a test well for the proposed development. The data supports the previously noted description of subsurface conditions, which includes an approximately 30 m thick till overburden to protect the bedrock aquifer. The existing groundwater quality has not been impacted by any existing surface activities associated with the golf course, such as application of fertilizers. No change to groundwater quality would be anticipated because of the proposed development.

The existing groundwater quality results for the parameters of interest are summarized below:

Table 3: Background Water Quality Results

Design Parameter	Units	Groundwater Quality (Well PW21-1)
Total Biochemical Oxygen Demand – 5 Day (BOD5)	mg/L	N/A
Total Suspended Solids (TSS)	mg/L	N/A
Total Phosphorus (TP)	mg/L	<0.1
Total Ammonia (TAN)	mg/L	0.19
Total Nitrogen	mg/L	<0.10
pH		7.93
E. Coli	CFU/ 100 mL	0
Nitrate	mg/L	<0.10
Nitrite	mg/L	<0.01

4.0 Proposed Wastewater Treatment System

A new communal wastewater treatment plant on the NW Site is proposed to service the proposed development on the SE Site. Sewage will be collected in a sanitary sewer collection network, and a pumping station located on the south side of County Road 19 will pump sewage to the location of the treatment plant on the north side of the road. The plant will be designed to treat an ADF of 175 m^3/day and will incorporate flow equalization to accommodate peak flows over this amount.

There are several available technologies that can meet the proposed effluent targets outlined in Table 3. At this time, the preliminary proposal is to use a Waterloo Biofilter treatment system, which would generally consist of the following components:

- Raw sewage pumping station (by others).
- Influent screening and equalization tank.
- Primary settling/ pre-treatment tanks.
- Aerobic trickling filter, consisting of Waterloo Biofilter's synthetic foam media.
- Submerged anoxic filter for enhanced denitrification.
- Chemical addition for phosphorus removal.
- UV disinfection.
- Final effluent pumping station to discharge to the irrigation ponds.

The plant will consist of a combination of buried tanks, as well as an above grade treatment equipment building. Odour mitigation would be incorporated into the design as appropriate. Further details will be confirmed during detailed design.

4.1 Pond Water Balance

The effluent would be discharged into the irrigation ponds for reuse. A typical 18-hole golf course can use approximately 400 to 1500 m^3/day for irrigation. During the golf course's operational months, the irrigation system draws water from the existing irrigation ponds which are filled by the groundwater wells. During the off-season, treated effluent will continue to be

discharged into the ponds, where the water is stored until it can be used in the following golf season.

The existing ponds have a total storage volume of approximately 64,250 m^3. At an average daily flow of 175m^3/day, the total annual volume of effluent would be approximately 63,875 m^3. During the off-season when the golf course is not actively irrigating, the ponds would be required to store the effluent. Assuming irrigation does not occur from October to the end of April, the ponds would require approximately 215 days of storage volume for the ADF of 175 m^3/day, or a total volume of 37,625 m^3. Since the ponds have approximately 1.7 times this volume, there is adequate capacity in the existing ponds to store the off-season effluent volumes. It is our understanding that existing operational practices typically include drawing down the water level in the ponds at the end of the golf season. This practice would need to be continued to ensure that adequate storage volume is available for the off-season.

4.2 Examples of Similar Systems

The reuse of treated effluent for golf course irrigation has been implemented successfully on many projects in different parts of Ontario, as outlined in the examples shown in Table 4. These include examples that were compiled from information in our files and through a basic search of the MECP's publicly available database. Table 4 does not necessarily capture all of the available examples but provides a good representation that this approach has been used successfully for many other applications. The Effluent Targets that are shown in Table 2 above are consistent with the range of effluent targets summarized in Table 4.

5.0 Operation, Maintenance and Management

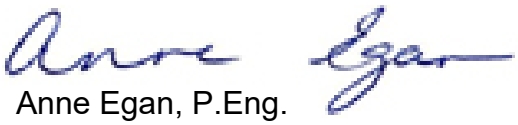
The wastewater treatment plant will require regular operational oversight and maintenance, as well as regular sampling of treated effluent to ensure the treatment objectives are being met. Through the proposed development, a condominium corporation is proposed to be established, which will provide the necessary management structure to ensure the facility is maintained, and that appropriate reserve funds are in place for future maintenance and replacement activities at the Site. Further to this, the condominium corporation would enter into a Municipal Responsibility Agreement to ensure appropriate contingencies are in place for the continued operation and maintenance of the wastewater treatment facility.

6.0 Summary

- The proposed 118-unit residential development can be serviced with a communal wastewater treatment plant.
- The treatment plant will be located on the NW Site, which is located on the north side of County Road 19, adjacent to the existing 18-hole golf course, which will be maintained.
- The average daily wastewater flow is 175 m^3/day
- Effluent will be treated a high level of effluent quality, suitable for discharge to the existing onsite irrigation ponds.

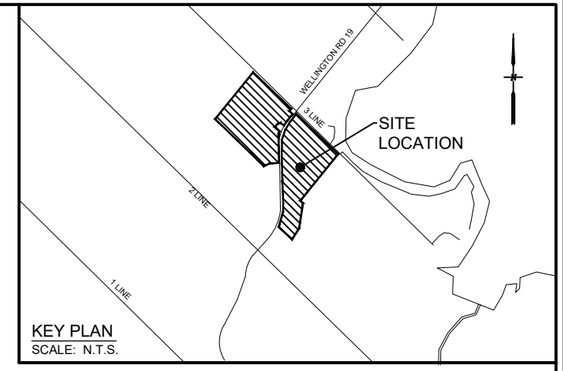
- Treated effluent can be reused to supplement irrigation water volumes for the golf course.
- The treatment plant will generally consist of primary treatment, aerobic biological treatment, anoxic treatment for enhanced nitrogen removal, phosphorus removal and disinfection.
- The existing irrigation ponds have sufficient storage volume to store treated effluent during the off-season (October to April)
- A condominium corporation and appropriate reserve funds will be established for ongoing operation and maintenance of the facility.

R.J. Burnside & Associates Limited



Anne Egan, P.Eng.
Manager, Onsite Wastewater

Enclosure(s) Figure 1
Table 4



LEGEND

- PROPERTY BOUNDARY
- BOREHOLE/WELL LOCATION (GOLDER)
- 320.5 — GROUNDWATER CONTOUR
- AREA TO BE IRRIGATED (TOTAL = 97,000 m²)
- INTERPRETED DIRECTION OF GROUNDWATER FLOW

N

0 50 100 200 300 400
Metres

BURNSIDE

Client

FERGUS DEVELOPMENT INC.

Figure Title

FERGUS GOLF COURSE

PROPOSED WASTEWATER TREATMENT SYSTEM

Drawn	Checked	Date	Figure No.
MC	AE	25/08/2022	1
Scale		Project No.	
1:4000		300052719	

File: \\elmo\Shared Work Areas\052719 Fergus Golf Course\052719.05 FSR\07_Figures\FSR FIGURES\052719.05 WWTP DISCHARGE TO IRRIGATION PONDS.dwg Date Plotted: September 6, 2022 - 3:32 PM

Table 4: Example ECAs for Similar Treatment & Irrigation Systems

Site Name	ECA No.	Date of Issue	Type of Treatment System	Design Flow (L/day)	Facilities Serviced	Effluent Limits							Effluent Objectives						
						cBOD5 (mg/L)	TSS (mg/L)	TP (mg/L)	TAN (mg/L)	Nitrate-N (mg/L)	Total Nitrogen (mg/L)	E. Coli (CFU/100 mL)	cBOD5 (mg/L)	TSS (mg/L)	TP (mg/L)	TAN (mg/L)	Nitrate-N (mg/L)	Total Nitrogen (mg/L)	E. Coli (CFU/100 mL)
Pipers Heath	4839-C3TGZV	2022	SBR Treatment Plant	25,500	Golf Course Clubhouse & Maintenance Shop	15	25	2.5	2.5			100	5.0	5.0	2.5	2.5			100
			Filtration & Disinfection																
Craigowan Golf Club	9093-CDFKQD	2022	Whitewater Treatment Unit	25,500	Golf Course Clubhouse								10	10					200
			UV Disinfection																
Greens at Renton		2022	Whitewater Treatment Unit	17,830	Golf Course Clubhouse	10	10	1.0	5.0	5.0		200							
Osprey Valley Resorts Inc.	3421-C7WPBN	2021	SBR Treatment Plant	165,000	Two Golf Course Clubhouses	10	10	0.3	2.5			200	5	5	0.1	1.5	10		100
			Phosphorus Removal		Golf Academy/ Training Centre														
			Tertiary filtration		Event Barn														
			UV Disinfection																
			Pond overflow to river		Hotel Accommodation Units														
Ballantrae	4050-AWKJQK	2018	SBR Treatment Plant	1,045,000	Golf Course Clubhouse	10	10	1.0	1.0	3.6	5.6	14	5.0	5.0	0.5	0.5	2.0	3.5	10
			Phosphorus Removal		988 Residential Units														
			Tertiary filtration		School														
			UV disinfection		Community Centre														
Blue Springs Golf Club	1945-AFXRPL	2017	Waterloo Biofilter	31,000	Golf Course Clubhouse	30	30	2.5	2.5			100	25	25	2.0	2.0			
			Phosphorus Removal																
			UV Disinfection																
Oslerbrook Golf & Country Club	4492-A8KU3G	2016	Waterloo Biofilter	23,650	Golf Course Clubhouse & Maintenance Shop	10	10						10	5.0					
			Phosphorus Removal																
			UV Disinfection																
Whitevale Golf Club	6423-9JTNUJ	2014	SBR Treatment	30,000	Golf Course Clubhouse	30	30				22	100							
			UV disinfection																
Wildwood Golf & RV Resort	2647-9D9MG7	2013	RBC Treatment Unit	100,000	Golf Course Clubhouse	10	10	0.5	3.0 - 5.0			100							
			Phosphorus Removal		380 site RV Park														
			Tertiary Filtration		Restaurant														
			UV Disinfection																
Century Pines Golf Course Ltd.	6989-8M7KCZ	2011	Whitewater Treatment Unit	40,000	Golf Course Clubhouse	30	30					200							
			UV Disinfection																
Vespra Hills Golf Club	6053-86FTXH	2011	RBC Treatment Unit	25,000	Golf Course Clubhouse	20	20	1.0	10			100							
			Phosphorus Removal																
			Tertiary Filtration																
			UV Disinfection																
Granite Golf Club	5337-7U6KGL	2009	Waterloo Biofilter	40,000	Golf Course Clubhouse & Maintenance Shop	10 - 15	5.0	0.3 - 0.5	2.0 - 5.0			100							
			Phosphorus Removal																
			Tertiary Filtration																
			Disinfection																
Copetown Woods Golf Club	4579-5EXTVJ	2002	Whitewater Treatment Unit	15,000	Golf Course Clubhouse	30	30					100							
			UV Disinfection																

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Appendix B

MECP Comments

Ministry of the Environment, Conservation and Parks
Drinking Water and Environmental Compliance Division
West Central Region

119 King Street West, 12th Floor
Hamilton, Ontario L8P 4Y7
Tel.: 905 521-7640
Fax: 905 521-7820

Ministère de l'Environnement de la Protection de la nature et des Parcs
Division de la conformité en matière d'eau potable et d'environnement
Direction régionale du Centre-Ouest

119 rue King Ouest, 12e étage
Hamilton (Ontario) L8P 4Y7
Tél.: 905 521-7640
Téléc.: 905 521-7820

Memorandum

Date: January 25th, 2023

To: Lynnette Armour – Sr. Environmental Officer – Guelph District Officer

From: Gloria Suarez – Hydrogeologist– Technical Support Section – West Central Region

Re: **Review of the Fergus Golf Club Redevelopment, Fergus, Wellington County, Ontario**

Groundwater Technical Review Request, Reference Number: 1-132140905

In preparation of this memorandum, I have reviewed the following report:

1. The Memorandum dated September 15th, 2022, from A. Egan, P. Eng of the R. J. Burnside & Associates Limited to the Minister of Environment, Conservation, and Parks - Guelph District Officer RE: the Fergus Golf Club Redevelopment, Fergus, Wellington County, Ontario.

Background

Fergus Development Inc. and Golf North (the Owners) plan a residential development of 118 dwellings at 8282 Wellington 19, Fergus, Wellington County, Ontario (Site). It is proposed that the existing 18-hole golf course on the N Site will remain. The residential development with ~ 81ha would be serviced by privately owned communal water and wastewater treatment systems, located on the NW Site. The site is situated on the west of Lake Belwood.

The NW Site includes a clubhouse building, and two interconnecting on-site man-made ponds that are used for irrigation of the golf course with a total storage volume of ~ 64.250.000 L. The ponds are considered offline storage, as there is no outlet or overflow from the ponds to any surface water features. The ponds are filled with water pumped from the existing irrigation well located on the NW Site.

Comments

The purpose of the review is to comment on the preliminary results of the geotechnical and the hydrogeological investigation completed to satisfy an eventual application for Environmental Compliance Approval for the sewage works. The adequacy of hydrogeological investigation was the primary focus of my review.

This section presents a list of groundwater-related comments outlined in the report:

The conceptual hydrostratigraphic model for the Site consists of a ~ 30 m thick overburden (till) aquitard overlying a bedrock aquifer (Golder, 2022).

As part of the geotechnical and hydrogeological investigation for the Site, eighteen (18) boreholes were dug to depths between 3 to 10 mbgs across the Site. Based on boreholes, the NW site subsurface consists of sandy silty clay and silty clay till. Groundwater was measured between 0.6 to 7.3 mbgs. On the NW Site, the direction of groundwater flow is interpreted to be toward the north, toward Irvine Creek.

Average daily wastewater flow rates for 118 dwellings were calculated based on 365 people (3.094 people per unit plus 118 units), 350 L/day/person with a total design flow of 127,182 L/day. The proposed communal wastewater treatment facility would have the capacity to accept the maximum daily sewage flow from the existing golf course house (10,000 L/day).

350 L/day/person x 365 person = 127,750 L/day

The treatment plant will be designed to treat 175 m^3/day with flow equalization for peak flows. Effluent will be treated to meet the proposed effluent targets, suitable for discharge to the existing onsite irrigation ponds, and be reused as irrigation water for the golf course of ~ 42 ha NW Site.

Table 2: Proposed Effluent Objectives

Design Parameter	Units	Effluent Objective
Total Biochemical Oxygen Demand – 5 Day (BOD5)	mg/L	10
Total Suspended Solids (TSS)	mg/L	10
Total Phosphorus (TP)	mg/L	< 0.5
Total Ammonia (TAN)	mg/L	< 1.0
Total Nitrogen	mg/L	< 10
pH		6.5 to 9.5
E. Coli	CFU/ 100 mL	< 100

Conclusions and Recommendations

The Guelph District Office has requested comments be provided on the adequacy of the proposed works and whether there are any groundwater concerns. The adequacy of the proposed works is evaluated by the Approvals; therefore, I defer to the Approvals Engineer. I focused my review on whether there is potential for offsite groundwater impacts and whether the groundwater impact assessment was completed in accordance with Chapter 22 - Large Subsurface Sewage Disposal Systems of the MOE 2008 Design Guidelines for Sewage Works. The following review comments may be forwarded to the technical consultant.

The stratigraphy in the area consists of diamicton glacial deposits of sandy silt to silty sand (Port Stanley Till) with low-medium permeability and glaciofluvial outwash sand deposits with high permeability overlying bedrock Guelph Formation sandstone, shale, dolostone, and siltstone.

Based on five (5) downgradient borehole records in the Site (W-6708706, W-6708770, W-6711152, W-7389178, & W-7389317) the overburden consists of silt, sand, and gravel (3 to 11 m thick) over clay with sand/gravel (18 to 30 m thick), sand (3 m thick), and bedrock (limestone). A thick layer of sand (3 m) is between the clay and bedrock at NE of the ponds (W-6708706). Depth to bedrock, indicated on water well records within 29.9 to 33.9 mbgs, thus indicating that the site is not a shallow bedrock environment.

There is no robust and factual hydrogeological information to consider that the Site meets the criteria for a Low Permeable Environment as; groundwater flow direction, impermeable overburden (T-time > 50 min/cm), no potential pathways, the low potential for sewage-impacted groundwater and no groundwater receptors downgradient of the pounds.

The following items are required to support the adequacy of the proposed works:

1. Even though the shallow soils are low permeability, the wells in the immediate vicinity of the NW Site are deeper bedrock wells (> 30 mbgs). A door-to-door water well survey results within 500 m of the Site to determine water well use and characteristics are required to support that potential for impacts on local groundwater quality is considered low.

2. Topographical and hydrological conditions: the present and future directions of surface drainage and groundwater movement from the spray irrigation.

3. Potentiometric maps with indications of groundwater flow directions to determine hydraulic gradient and groundwater velocity.

4. Cross-sections across the site and site vicinity both parallel and transverse to the main groundwater flow direction.

5. Soil sampling and grain size analysis. Soils testing should determine the limiting permeability of the soils at the proposed application (infiltration-percolation capacity).

6. Prediction of future boundary concentrations (nitrate). Estimation of the degree of dilution of the effluent based on factors such as effluent loading, estimated infiltration, underflow, plume dispersion characteristics, and distance to downgradient property boundary in accordance with Chapter 22 – Large Subsurface Sewage Disposal Systems of the MOE 2008 Design Guidelines for Sewage Works – Section 22.5.8 Prediction of Contaminant Attenuation. Prediction of Contaminant Attenuation for an exfiltration lagoon, are obtained from the footprint of the exfiltration area and the downgradient area. For a spray irrigation system, it is the dimensions of the area of spray application and the downgradient area.

7. The ministry Guideline B-7, Incorporation of the Reasonable Use Concept into Groundwater Management provides the framework for determining acceptable off-property impacts on groundwater resources. Section 22.5 – Assessment of Impact on Water will support the proposed effluent objectives and/or limits.

8. In accordance with Large Subsurface Sewage Disposal Systems of the MOE 2008 Design Guidelines for Sewage Works – Section 15.9 – Land and Application of Treated Effluent, an effluent irrigation system will require:

    - Suitable soils (infiltration capacity): A soils report should be prepared to demonstrate the acceptability of the infiltration capacity and permeability of the soil to proposed final effluent application rates.
    - Suitable topography: The spray area should be designed in such a way to minimize runoff (slopes of 3 to 4%).
    - Hydrological conditions: The report should establish drainage characteristics and the expected depth to the water table during the irrigation season.
    - Suitable site isolation from conflicting land uses and water users.
    - Adequate sewage treatment prior to irrigation: The effluent to be sprayed should be disinfected (chlorination).
    - Adequate effluent holding capacity for non-irrigation periods.

9. Based on the available information, it is my understanding that the daily design flow is 175,000 L/day. However, it is not clear how this estimation was calculated for each dwelling, under Ontario Building Code – Sewage System Design Flows Tables 8.2.1.3.A & B, a three-bedroom dwelling requires 1,600 L/day (3 to 4 people per unit) versus 350 L/day/person (3.094 people per unit plus 118 units) proposed.

    An average daily flow of 175 m^3/day will be an annual volume of 63,875 m^3/day. The existing ponds have a total storage volume of~ 64,250 m^3. During the off-season (October to April ~ 215 days) and frost ground, the ponds will require to store ~ 37,625 m^3 or 58.5% of the total volume stored available. The ponds' water storage capacity will depend on the total sewage daily design flow. The peak flow sewage data and peak day calculations for the proper operation of the proposed sewage need to be reviewed. The Ministry's review engineer will ensure these during the review and approval of the sewage work.

10. The wastewater treatment plant will require regular operations and maintenance to ensure adequate storage volume available in the ponds to confirm that they are not overflowing (spill prevention control and contingency plans), as well as regular sampling of the treated effluent to ensure the treatment effluent objectives/limits are being met.

11. Irrigation pond water quality monitoring and sampling to ensure that the effluent discharged from the Works to the existing ponds meets the Ministry's effluent quality requirements thus minimizing environmental impact on the water quality.

12. If there are potential groundwater quality impacts (water users), a groundwater monitoring and a contingency plan may be required.

I trust that this hydrogeological review is sufficient for your purposes. If you have any further comments or questions, please feel free to contact me by phone at (289)-659-4007 or by e-mail at gloria.suarez@ontario.ca.

Limitations:

The purpose of the preceding review is to provide advice to the Ministry of the Environment regarding subsurface conditions based on the information provided in the above referenced documents. The conclusions, opinions and recommendations of the reviewer are based on information provided by others, except where otherwise specifically noted. The Ministry cannot guarantee that the information that has been provided by others is accurate or complete. A lack of specific comment by the reviewer is not to be construed as endorsing the content or views expressed in the reviewed material.

Gloria Suarez, M.Sc., P.Geo.
Hydrogeologist – TSS – WCR
cc: S. Day

Ministry of the Environment, Conservation and Parks
Drinking Water and Environmental Compliance Division
West Central Region

119 King Street West, 12th Floor
Hamilton, Ontario L8P 4Y7
Tel.: 905 521-7640
Fax: 905 521-7820

Ministère de l'Environnement de la Protection de la nature et des Parcs
Division de la conformité en matière d'eau potable et d'environnement
Direction régionale du Centre-Ouest

119 rue King Ouest, 12e étage
Hamilton (Ontario) L8P 4Y7
Tél.: 905 521-7640
Téléc.: 905 521-7820

January 30, 2023

MEMORANDUM

To: Lynnette Armour
Environmental Officer
Guelph District Office

From: Maisa Fumagalli
Surface Water Specialist
Technical Support Section

RE: Fergus Golf Course Redevelopment Project
County Road 19, Centre Wellington
Surface Water Technical Review Request, Reference Number: 1-132234034

In preparation of this memorandum, I have reviewed the following report:

1. Technical Memorandum, Fergus Golf Club Redevelopment, dated September 15, 2022, Project No.: 300052719.0000, Submitted By: Anne Egan, P.Eng. R.J. Burnside & Associates Limited

Background

The Fergus Golf Club Redevelopment project aims to convert a portion of the golf club to a 188 dwelling residential development. The 39 ha parcel (SE Site) is located south of County Road 19, Centre Wellington, while the northern (NW Site) 42 ha will remain operational as the 18-hole golf course.

The site is located in the Upper Grand watershed. The Living Springs Wetland Complex is a Provincially Significant Swamp Wetland located just beyond the northwest site boundary. Irvine Creek flows southwest through this wetland.

The NW Site includes the clubhouse, on-site sewage system, and 2 interconnecting constructed ponds that are used for irrigation of the golf course. The ponds are off-line storage with no outlet or overflow. An irrigation well is also on the NW Site and used to fill the ponds. This area has primarily low permeability soils.

The proposed development includes a communal well water supply and treatment facility, and a new wastewater treatment plant discharging treated effluent to the ponds to irrigate the golf course. The proposed wastewater treatment facility is also to accept flows from the existing golf course clubhouse. The memo notes an ECA was issued in 2004 for the existing system.

Wastewater Treatment and Capacity

Effluent will be treated to remove solids, organics, ammonia, and pathogens. Treatment will include denitrification, phosphorus removal, and disinfection. Treated effluent will discharge to the irrigation pond, which will be the point of compliance. Effluent will be spread over the 42 ha NW Site through the golf course irrigation system. The final treatment plant design is yet to be confirmed. Effluent objects are proposed based on similar operations in Ontario and on groundwater sampling.

Based on Township and MECP guidelines, the development capacity is calculated for 365 people, with a conservative total wastewater design average daily flow of 175 m3/day. This includes 127,782 L/day for the proposed development, 10,000L for the golf clubhouse (current system has a maximum of 5,500L/day), and inflow and infiltration allowance.

The Memo notes that the pond would be required to store ~37,625 m3 of effluent during the off season of October-April, or 215 days at the average daily flow of 175 m3/day. The ponds capacity is 64,250 m3 which is reportedly 1.7 times the above noted required volume. The Memo also notes the golf course typically draws down the water level in the ponds at the end of the golf season, and that this should continue in future to ensure adequate storage.

Comments and Conclusion

1. The assessment does not account for precipitation and overland flow in calculations of storage capacity of the ponds. Water balance calculations or estimates should be provided to ensure the amount irrigated and used by the grass will be sufficient to prevent overland flow. This is given that the deeper soils on the NW site are noted to be of low permeability and that flow is likely to neighbouring Living Springs Wetland and Irvine Creek.

2. A monitoring and contingency plan should be prepared in case of severe precipitation that would require the prevention from the pond overtopping (i.e., pumping the pond and disposing of the waste effluent).

3. A review of the reported water taking data under the PTTW (No. 5817-8JQN3B) indicates the maximum water taking volumes are not often and regularly reached, even with the current, expanded golf course. The calculations and contingency plan should consider storage capacity in situations where the ponds are not drawn down at the end of the irrigation season (from use or from additional precipitation).

4. The existing ECA issued in 2004 should be quoted or provided in future submissions. The fate of the systems described in the ECA are not clear and should be described in the final submission.

It is recommended the above comments be addressed before the Fergus Golf Course Redevelopment project proceeds with submitting an ECA application.

If there are any questions or comments, please do not hesitate to contact me.

Maisa Fumagalli
Surface Water Specialist
Technical Support Section

cc: Sarah Day, TSS Supervisor
Michael Spencer, Surface Water Group Leader

File: E-07-IR-36

Limitations: The purpose of the preceding review is to provide advice to the Ministry of the Environment, Conservation and Parks regarding surface water impacts based on a review of the information provided in the above referenced documents. The conclusions, opinions and recommendations of the reviewer are based on information provided by others, except where otherwise noted. The Ministry cannot guarantee that the information that is provided by others is accurate or complete. A lack of specific comment by the reviewer is not to be construed as endorsing the content or views expressed in the reviewed material.

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Appendix C

Burnside Response to MECP Comments

R.J. Burnside & Associates Limited 6990 Creditview Road, Unit 2 Mississauga ON L5N 8R9 CANADA
telephone (905) 821-1800 **fax** (519) 941-8120 **web** www.rjburnside.com

BURNSIDE
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March 13, 2023

Via: Email,

Ms. Lynnette Armour
Environmental Officer
MECP Guelph District Office
1 Stone Road W,
Guelph ON N1G 4Y2

Dear Ms. Armour:

Re: Fergus Golf Course Redevelopment Project
Pre-submission Consultation Document for ECA Application
Response to MECP Comments
Project No.: 300052719.0000

On behalf of Fergus Development Inc., R.J. Burnside & Associates Limited (Burnside) has received and reviewed comments provided by the Ministry of Environment Conservation and Parks (MECP) West Central Region Technical Support Section. The comments were provided in response to a submitted Technical Memorandum (Burnside, September 15, 2022) describing a proposal for a wastewater treatment facility with treated effluent reuse for irrigation, to service the proposed Fergus Golf Club redevelopment.

MECP comments were detailed in the following documents:

- Memorandum prepared by Gloria Suarez, Hydrogeologist, January 25, 2023.
- Memorandum prepared by Maisa Fumagalli, Surface Water Specialist, January 30, 2023.

We provide herein our responses to MECP's comments and questions, as well as some additional information to support the review.

There are several additional studies that have been completed in support of the proposed development and we have relied upon these studies as part of our analysis. Of relevance are the geotechnical and hydrogeological studies completed by Golder. We have referenced these studies in our responses below, and we have included copies of these reports to assist MECP staff with their technical review.

The proposed servicing solution provides a high degree of treatment such that the effluent will be disinfected and safe for human contact, with a similar water quality to the existing surface water in the pond for typical wastewater parameters such as organics, solids, and pathogens. As such, we believe the proposed beneficial reuse of highly treated effluent cannot be compared to historical requirements for spray irrigation of secondary quality lagoon effluent on which current MECP guidelines are based. The management of the irrigation system is ultimately a function of golf course operations and incorporates the beneficial reuse as an environmentally sustainable initiative for the development. Additional comments in this regard are provided in the below responses.

For clarity, MECP comments are listed in the order they appear in the original letter and in italics, followed by Burnside's response to each comment.

1.0 Groundwater Comments and Responses

Comments:

> *"The stratigraphy in the area consists of diamicton glacial deposits of sandy silt to silty sand (Port Stanley Till) with low-medium permeability and glaciofluvial outwash sand deposits with high permeability overlying bedrock Guelph Formation sandstone, shale, dolostone, and siltstone.*
>
> *Based on five(5) downgradient borehole records in the Site (W-6708706, W-6708770, W-6711152, W-7389178, & W-7389317)the overburden consists of silt, sand, and gravel (3to 11m thick) over clay with sand/gravel(18 to 30m thick), sand (3 m thick), and bedrock (limestone). A thick layer of sand (3m) is between the clay and bedrock at NE of the ponds (W-6708706). Depth to bedrock, indicated on water well records within 29.9to 33.9mbgs, thus indicating that the site is not a shallow bedrock environment."*
>
> *"There is no robust and factual hydrogeological information to consider that the Site meets the criteria for a Low Permeable Environment as; groundwater flow direction, impermeable overburden (T-time > 50 min/cm), no potential pathways, the low potential for sewage-impacted groundwater and no groundwater receptors downgradient of the pounds."*

The following items are required to support the adequacy of the proposed works:

1. *Even though the shallow soils are low permeability, the wells in the immediate vicinity of the NW site are deeper bedrock wells (>30mbgs). A door-to-door water well survey results within 500m of the Site to determine water well use and characteristics are required to support that potential for impacts on local groundwater quality is considered low.*

Response:

Golder (now WSP) completed Geotechnical and Hydrogeological studies of the site and surrounding area in support of the draft plan submission. These reports provide additional site-specific documentation and information. To assist the MECP in the review of this proposal, we have enclosed copies of these reports:

- Water Supply Investigation, Proposed Residential Redevelopment, 8243 and 8282 Wellington Road 19, Golder, January 2022.
- Preliminary Geotechnical Investigation, Proposed Residential Redevelopment, 8243 and 8282 Wellington Road 19, Golder, February 2022.
- Hydrogeological Investigation, Proposed Residential Redevelopment, 8243 and 8282 Wellington Road 19, Golder, February 2022 (this report focuses primarily on the portion of the site south of Wellington Road 19, the "SE" site).

As part of the Water Supply Evaluation, a review of the MECP Water Well Records database indicates that there are 30 well records nominally within 1 km of PW21-1 (as shown on Figure 5 of the Water Supply Evaluation, enclosed). Of the 30 well records, 29 have water supply (e.g., domestic or stock watering) as their designated use. The remaining well has an unknown use listed. Of the 29 water supply wells, 28 (97%) are completed in the bedrock and 1 (3%) is completed in the deep overburden. Analysis of the well records indicates that bedrock well use dominates around the Site.

The review of the water well records provided an estimate that most of the wells within 1 km of the production well are completed in the bedrock. The aquifer testing indicated that the zone of influence is relatively small and drawdown (interference) at the closest well would be less than 1 m. As such, no further investigation of private wells (i.e., a door-to-door survey) was conducted as part of the water supply investigation. In addition, based on the thick, low permeable overburden present above the bedrock aquifer, it was determined that surficial contamination would not impact the bedrock water quality and the study concluded that PW21-1 was a viable water supply option.

Burnside has relied on Golder's findings to inform our understanding of the site conditions. Based on the information already available, it is our opinion that this supports our determination that the potential for impacts to groundwater quality is low, and a door-to-door well survey is not warranted.

2. *Topographical and hydrological conditions: the present and future directions of surface drainage and groundwater movement from the spray irrigation.*

Response:

Our submitted Figure 1 provides topographic contours and the interpreted direction of groundwater flow, which is generally to the north/northeast. Shallow groundwater conditions were investigated at 16 monitoring wells that were installed by Golder. Groundwater level data were evaluated along with the topographic information to determine shallow groundwater flow direction. As shown on Figure 5 of the Golder Hydrogeological Investigation, shallow groundwater flow is controlled by topography and is generally to the north/ northeast on the golf course portion of the property. There is a groundwater divide in the southwest area of the property; however, this area of the site contains only a small portion of the playable golf course area (i.e., tees and greens associated with two holes, and a small portion of fairway amounting to approximately 7% of the total area). Therefore, 93% of the area over which effluent will be irrigated is to the northeast side of the groundwater divide, where the direction of groundwater flow is toward the north/northeast. We have therefore focused our assessment of potential impacts on this portion of the site.

3. *Potentiometric maps with indications of groundwater flow directions to determine hydraulic gradient and groundwater velocity.*

Response:

Water table conditions in the shallow surficial sediments have been determined by Golder using 16 monitoring wells and groundwater contours and flow direction have been provided in Figure 5 in the Golder Hydrogeological Investigation report. This information is sufficient to determine hydraulic gradient and groundwater velocity. Additionally, the Golder reports contain geological cross-sections (Figure 6 and 7 in the Hydrogeological Investigation and Figures 6, 7, and 8 in the Water Supply Investigation) that show the groundwater potentiometric elevations in bedrock wells. The cross-sections indicate that the bedrock aquifer is located 20-30 m below grade and is separated from the surficial sediments by low permeability sediments. Burnside

interprets the Golder Hydrogeological Investigation to indicate that the potentiometric surface in the bedrock will not be encountered by the proposed activities.

4. *Cross-sections across the site and site vicinity both parallel and transverse to the main groundwater flow direction.*

Response:

The enclosed Golder Hydrogeological report provides two regional cross-sections as Figures 6 and 7. These cross-sections satisfy the requirement to be parallel and traverse to the main groundwater flow direction in the shallow overburden. These cross-sections provide adequate interpretation of the subsurface conditions across the site and supports our assessment that the proposed development does not pose a risk to groundwater quality.

5. *Soil sampling and grain size analysis. Soils testing should determine the limiting permeability of the soils at the proposed application (infiltration-percolation capacity).*

Response:

Soil sampling and analysis was completed by Golder and is documented in the Preliminary Geotechnical Investigation Report (enclosed). Six boreholes were advanced on the north side of Wellington Road 19. Soils generally consist of a layer of topsoil (sandy to silty) ranging from 150 mm to 300 mm in thickness, underlain by sandy silty clay extending to depths of approximately 1.3 to 3.1 m below grade, and an underlying silty clay to clayey silt till deposit to depths of 8.3 m. Borehole logs and grain size analysis are appended to Golder's report (refer to Appendices B and C of the Preliminary Geotechnical Investigation report) and were relied upon during our evaluation of site conditions. It should be noted that the Golder reports also include areas on the south side of Wellington Road 19. The following boreholes are located on the north side of the road and are therefore most relevant to the proposed irrigation system: BH21-9, 21-10, 21-12, 21-13, 21-14 and 21-15.

According to Golder's report, the shallow soils generally consist of sand/silt topsoil, underlain by sandy silty clay and can be classified as CL according to the Unified Soil Classification System (USCS). The estimated coefficient of permeability for CL soils is 10^{-6} cm/s or less. The Golder Hydrogeological Investigation indicates that single well response tests were conducted in select wells. For wells that were screened in consolidated sediments (classified as CL or ML) hydraulic conductivity was calculated between 10^{-5} cm/s and 10^{-7} cm/s; these values are consistent with the estimated range noted above and if converted to infiltration (using Toronto Region Conservation Authority Stormwater Management Criteria) represent infiltration rates of between 12 – 30 mm/hr.

6. *Prediction of future boundary concentrations (nitrate). Estimation of the degree of dilution of the effluent based on factors such as effluent loading, estimated infiltration, underflow, plume dispersion characteristics, and distance to downgradient property boundary in accordance with Chapter 22–Large Subsurface Sewage Disposal Systems of the MOE 2008 Design Guidelines for Sewage Works–Section 22.5.8 Prediction of Contaminant Attenuation. Prediction of Contaminant Attenuation for an exfiltration lagoon, are obtained from the footprint of the exfiltration area and the downgradient area. For a spray irrigation system, it is the dimensions of the area of spray application and the downgradient area.*

Response:

Section 22.5.14 of the Design Guidelines for Sewage Works indicates that in low permeability environments where it can be demonstrated that the vertical hydraulic conductivity is 10^{5} cm/sec or less, is at least 10 m thick and extends for at least 100 m downgradient of the infiltration area, attenuation calculations may not be required. Based on the data provided by Golder, Burnside concludes that the surficial materials are generally less than 10^{-5} cm/sec in hydraulic conductivity, are between 20 m to 30 m thick, and extend more than 100 m down gradient.

Golf course irrigation is expected to occur according to industry best practices which includes providing water at the rate that the turf will use it. Excess runoff or infiltration past the root zone is not common in this setting. Notwithstanding this assertion, it is again noted that the low permeability of the environment will preclude contaminant migration as recognized by the MECP guidance. It is therefore our opinion that attenuation calculations are not applicable.

7. *The ministry Guideline B-7, Incorporation of the Reasonable Use Concept into Groundwater Management provides the framework for determining acceptable off-property impacts on groundwater resources. Section 22.5 –Assessment of Impact on Water will support the proposed effluent objectives and/or limits.*

Response:

As noted in the above responses, it is our interpretation that the low permeability environment, combined with the use of the irrigation water by the golf course vegetation, will preclude any contaminant migration to the north/northeast or to the south in the small area that lies south of the groundwater divide. It is our opinion that there is no potential for off-site groundwater impacts because of the application of highly treated effluent to the golf course. Therefore, the methodology for predicting down-gradient impacts is not applicable in this case. We also note that the existing ponds are excavated into the native soils and therefore the potential for groundwater impacts because of exfiltration from the pond is also not applicable.

8. *In accordance with Large Subsurface Sewage Disposal Systems of the MOE 2008 Design Guidelines for Sewage Works–Section 15.9–Land and Application of Treated Effluent, an effluent irrigation system will require:*

    - *Suitable soils (infiltration capacity): A soils report should be prepared to demonstrate the acceptability of the infiltration capacity and permeability of the soil to proposed final effluent application rates.*
    - *Suitable topography: The spray area should be designed in such a way to minimize runoff (slopes of 3 to 4%).*
    - *Hydrological conditions: The report should establish drainage characteristics and the expected depth to the water table during the irrigation season.*
    - *Suitable site isolation from conflicting land uses and water users.*
    - *Adequate sewage treatment prior to irrigation: The effluent to be sprayed should be disinfected (chlorination).*
    - *Adequate effluent holding capacity for non-irrigation periods.*

Response:

The irrigation of the golf course should not be reviewed under the same lens as a Land Application as described in Section 15.9 of the 2008 MECP Guidelines for the Design of Sewage Works. Section 15.9 of the 2008 guidelines is based on information contained in the predecessor guideline (MOE Guidelines for the Design of Sewage Treatment Works, 1984) and developed based on the use of sewage lagoons and spray irrigation of lagoon effluent. The design proposal for this development includes a full wastewater treatment plant with nutrient removal and disinfection, and a beneficial reuse of treated effluent. The proposed effluent quality (refer to Table 2 in our submitted technical memorandum) would be significantly better than typical spray irrigation applications on which these guidelines were developed.

Further, the irrigation system is part of the golf course operations. Golf course irrigation is carefully managed by golf course operations staff to ensure that the course receives an appropriate amount of water and nutrients, but is not over watered. In this context very little percolation past the root zone is expected as golf courses seek always to provide only enough water to meet the turf grass requirements. The site has been an active golf course for many years and the operator has acquired extensive experience regarding the quantities of water required for irrigation without any noted concerns about the site's ability to accommodate the volume of water applied to the lands. It is therefore reasonable to assume that the golf course irrigation system would continue to operate in a similar manner.

9. *Based on the available information, it is my understanding that the daily design flow is 175,000L/day. However, it is not clear how this estimation was calculated for each dwelling, under Ontario Building Code –Sewage System Design Flows Tables 8.2.1.3.A & B, a three-bedroom dwelling requires 1,600 L/day (3 to 4 people per unit) versus 350 L/day/person (3.094 people per unit plus 118 units) proposed.*

   An average daily flow of 175 m3/day will be an annual volume of 63,875 m3/day. The existing ponds have a total storage volume of~ 64,250 m3. During the off-season (October to April ~ 215 days) and frost ground, the ponds will require to store ~ 37,625 m3or 58.5% of the total volume stored available. The ponds' water storage capacity will depend on the total sewage daily design flow. The peak flow sewage data and peak day calculations for the proper operation of the proposed sewage need to be reviewed. The Ministry's review engineer will ensure these during the review and approval of the sewage work.

Response:

As noted in Section 3.1 of the submitted technical memorandum, design flows were derived using the Township of Centre Wellington design criteria which are considered more appropriate for this type of communal wastewater system. The OBC design flows are maximum daily flows applicable to stand-alone residential onsite sewage systems. Based on the Township's recommended design criteria, we have used a design flow rate of 350 L/person per day, at a density of 3.094 people per unit (per Township recommendations), for the proposed 118 units. An allowance for inflow and infiltration was also included. Design flows can be reviewed and verified during detailed design but are not expected to vary significantly from what has been proposed.

10. *The wastewater treatment plant will require regular operations and maintenance to ensure adequate storage volume available in the ponds to confirm that they are not overflowing (spill prevention control and contingency plans), as well as*

regular sampling of the treated effluent to ensure the treatment effluent objectives/limits are being met.

Response:

Comment noted. The conditions of the ECA are expected to require regular operation and maintenance activities and oversight, as well as monitoring and contingency plans, similar to other ECAs of this nature.

11. *Irrigation pond water quality monitoring and sampling to ensure that the effluent discharged from the Works to the existing ponds meets the Ministry's effluent quality requirements thus minimizing environmental impact on the water quality.*

Response:

We agree with MECP that effluent and pond water quality monitoring should be a condition of the ECA.

12. *If there are potential groundwater quality impacts (water users), a groundwater monitoring and a contingency plan may be required.*

Response:

The site-specific subsurface conditions have been well studied and documented in Golder's reports. Based on our review and analysis of this information, it is our opinion that the proposed wastewater treatment system with effluent reuse for irrigation would not have an impact on local groundwater resources.

We note that as outlined in the MECP 2008 Guidelines Section 22.5.19 a post construction monitoring and contingency program is required when there are:

- High groundwater flow velocities.
- Low Attenuation capabilities.
- Specific effluent quality requirements.
- Proximal Receptors.

The work completed by Golder indicates that none of these conditions are present at the site; therefore, a groundwater monitoring and contingency program is not warranted for this site. There will be an overall contingency plan developed for the wastewater treatment facility that will identify contingency plans associated with the wastewater system. This is anticipated to include contingency actions associated with general plant operation and maintenance, treatment system performance and the golf course irrigation system.

2.0 Surface Water Comments and Responses

The following should be clarified:

1. *The assessment does not account for precipitation and overland flow in calculations of storage capacity of the ponds. Water balance calculations or estimates should be provided to ensure the amount irrigated and used by the grass will be sufficient to prevent overland flow. This is given that the deeper soils on the NW site are noted to be of lower permeability and that flow is likely to neighboring Living Springs Wetland and Irvine Creek.*

2. *A monitoring and contingency plan should be prepared in case of severe precipitation that would require the prevention from the pond overtopping (i.e. pumping the pond and disposing of the waste effluent)*

Response:

Burnside has completed two analyses for rainfall, a single event analysis and the typical annual rainfall amount. A sketch of the existing contours for the two ponds, showing the contributing areas and pond volumes is attached. We are also proposing an increase in berm height around the pond for an additional safety factor. Pond volumes (above the current water level) are shown of the increased berm height.

a) The 100-year storm event was analyzed to ensure that no single rainfall event would overtop the edges of the pond. Utilizing very conservative values, the total expected volume of flow from the 100-year storm event is 1,881 m^3. A pond level monitoring plan (noted below) will ensure this capacity is available for these uncommon storm events.

b) In addition, we have prepared an annual water balance analysis for these two pond areas. As discussed, a summary below of the water balance, and the Water Balance calculation (refer to Table D-1 attached):

Pond 1
Total Area = 2.86 ha
Impervious Area (water) = 0.805 ha x 804 mm (precipitation less evaporation) = 6472 m^3 (annually)
Pervious Area = 2.055 ha x 113 mm (runoff from pervious surface) = 2314 m^3
Total Annual Volume = **8786** m^3

Pond 2
Area = 1.15 ha
Impervious Area (water) = 0.322 ha x 804 mm (precipitation less evaporation) = 2589 m^3 (annually)
Pervious Area = 0.828 ha x 113 mm (runoff from pervious surface) = 932 m^3
Total Annual Volume = **3521** m^3

c) Please refer to Section 5 for Monitoring and Contingency plan.

3. *A review of the reported water taking data under the PTTW (No. 5817-8JQN3B) indicates the maximum water taking volumes are not often and regularly reached, even with the current, expanded golf course. The calculations and contingency plan should consider storage capacity in situations where the ponds are not drawn down at the end of the irrigation season (from use or additional precipitation).*

Response:

Irrigation practices for this golf course have historically included irrigation of tees and greens only, and fairways have not been irrigated. The historical data is therefore not representative of future operations, as it is proposed to irrigate the tees, greens, and fairways in the future.
A typical 18-hole golf course irrigating tees, greens, and fairways could apply 400 to 1,500 m^3/day (100,000 to 400,000 gallons/day) of irrigation water.

The operating procedures for the golf course would include drawing down the level in the ponds to ensure sufficient winter storage is available. As described in the preceding responses, the precipitation events have been calculated to be a very small portion of the overall volume available in the pond, and in comparison to the effluent volumes. Monitoring and contingency plans are outlined in Section 5.

4. *The existing ECA issued in 2004 should be quoted or provided in future submissions. The fate of the systems described in the ECA are not clear and should be described in the final submission.*

Response:

There is no existing ECA for the property. The existing golf clubhouse sewage system has a capacity of 5,500 L/day which is less than 10,000 L/day and was permitted under the Ontario Building Code. The proposed wastewater treatment plant has included flow capacity to allow the existing sewage system to be decommissioned, and the flows redirected from the existing clubhouse into the new treatment plant. To be conservative, an allowance for modest expansion of clubhouse operations has also been included (up to 10,000 L/day). The exact timing of this connection has not been confirmed at this time. If it is determined that the clubhouse is not going to be connected to the new treatment plant immediately, the existing sewage system would be incorporated into the ECA application and would remain operational until such time as it is decommissioned and the flows are redirected to the new treatment plant.

3.0 Proposed Effluent Limits and Objectives

As described in our submitted technical memorandum, a set of preliminary effluent objectives were proposed. These effluent objectives were derived based on similar applications that implement beneficial reuse of treated effluent as irrigation water. We have reasonably assumed that the small amount of residual nitrogen and phosphorus remaining in the effluent would be used by the golf course vegetation in place of typical commercial fertilizers that are normally applied to the course.

Given some of the concerns noted in MECP's comments, we would propose that the wastewater system be subject to effluent limits as well as design objectives, which are outlined in the following Table. These objectives and limits are intended to be applied at the outlet of the treatment plant, prior to discharge into the irrigation pond. The pond water can be monitored in conjunction with treated effluent, but for the purposes of compliance limits, the treatment plant outlet is the appropriate location to measure effluent quality given the potential for other natural inputs to the pond that could impact water quality but may not be directly attributable to the wastewater treatment system (e.g., pathogens from waterfowl activity in the pond).

Table 1: Proposed Effluent Objectives

Design Parameter	Units	Effluent Objective	Effluent Limit	Compliance Based On
Total Biochemical Oxygen Demand – 5 Day (BOD5)	mg/L	5.0	10	Monthly Average
Total Suspended Solids (TSS)	mg/L	5.0	10	Monthly Average
Total Phosphorus (TP)	mg/L	< 0.3	< 0.5	Monthly Average
Total Ammonia (TAN)	mg/L	< 1.0	< 2.0 (summer) < 3.0 (winter)	Monthly Average
Total Inorganic Nitrogen	mg/L	< 5.0	< 10	Monthly Average
pH		6.5 to 9.5	6.5 to 9.5	Single Sample Result

Design Parameter	Units	Effluent Objective	Effluent Limit	Compliance Based On
E. Coli	CFU/ 100 mL	< 100	< 200	Monthly Geometric Mean Density

4.0 Water Quality Monitoring Plan

We concur with MECP that a Monitoring Program is required for the wastewater system. As described in the above responses, the potential for impacts to groundwater is negligible; therefore, the monitoring conditions of the ECA should focus on the wastewater influent and effluent quality, and the irrigation pond water quality. The following outlines our recommendations for a monitoring program:

Table 2: Wastewater Influent Monitoring

Sample Location	Treatment plant influent
Sample Type	Grab
Sample Frequency	Quarterly
Parameters	BOD5 TSS Total Phosphorus Total Kjeldahl Nitrogen Total Ammonia Nitrogen

Table 3: Treated Effluent Monitoring

Sample Location	Final Treatment Plant Effluent Prior to Discharge to Pond
Sample Type	Grab
Sample Frequency	Weekly
Parameters	cBOD5 TSS Total Phosphorus Total Ammonia Nitrogen Nitrate as Nitrogen Nitrite as Nitrogen E. Coli pH Temperature

Table 4: Irrigation Pond Monitoring

Sample Location	Irrigation Pond
Sample Type	Grab
Sample Frequency	Monthly During the Irrigation Season (May to October)
Parameters	cBOD5 TSS Total Phosphorus Total Ammonia Nitrogen Nitrate as Nitrogen Nitrite as Nitrogen

Sample Location	Irrigation Pond
	E. Coli Field pH Field Temperature Un-ionized Ammonia (calculated)

5.0 Pond Level Monitoring and Contingency Plan

Monitoring of the water level within the irrigation pond is proposed. A float monitor with an alarm system would be installed with a connection to the treatment plant control and alarm system. The float level would be at an elevation that would allow a minimum of two consecutive 100-year storm events. Based on our analysis, the storm events generate a relatively small volume of liquid as compared to the overall volume available in the ponds. Therefore, by maintaining appropriate freeboard in the ponds, capacity to accommodate storm events will be provided. As noted above, a comprehensive and site-specific contingency plan is being developed to provide additional details in the is regard.

6.0 Closing

We trust this information addresses the comments and questions from MECP technical staff. Should you require further information, please do not hesitate to contact us.

Yours truly,

R.J. Burnside & Associates Limited

Anne Egan, P.Eng.
Manager, Onsite Wastewater

Dwight Smikle, M.Sc., P.Geo.
Senior Hydrogeologist

Steve Roorda, P.Eng.
Vice President, Land Development

AE:lam

Enclosure(s)
- Water Supply Investigation, Proposed Residential Redevelopment, 8243 and 8282 Wellington Road 19, Golder, January 2022 (**under separate cover**)
- Preliminary Geotechnical Investigation, Proposed Residential Redevelopment, 8243 and 8282 Wellington Road 19, Golder, February 2022 (**under separate cover**)
- Hydrogeological Investigation, Proposed Residential Redevelopment, 8243 and 8282 Wellington Road 19, Golder, February 2022 (this report focuses primarily on the portion of the site south of Wellington Road 19, the “SE” site) **(under separate cover**)
- Irrigation Pond Volumes
- Table D-1 Water Balance

	POND 1	
	ELEV	VOL
WL	428.75	0
SPILL	429	2220
+0.5m	429.5	6670
+1.0m	430	11110

	POND 2	
	ELEV	VOL
WL	428.75	0
SPILL	429.5	3930
+0.5m	430	6550
+1.0m	430.5	9170

POND1
2.86 ha

POND2
1.16 ha

LEGEND

EXISTING DRAINAGE BOUNDARY

0.5m HIGH BERM

1.0m HIGH BERM

LOCATION AND EXTENT OF BERMS TO BE CONFIRMED DURING DETAILED DESIGN STAGE

N

0 25 50 75 100

Metres

BURNSIDE

Client

FERGUS DEVELOPMENT INC.

Figure Title

THE VILLAGE AT FAIRVIEW GREENS

NORTH IRRIGATION PONDS

Drawn	Checked	Date	Figure No.
BF	SR	23/02/17	**FIG**
Scale		Project No.	
1:1250		300052719	

File: \\elmo\Shared Work Areas\0522719 Fergus Golf Course\0522719.05 FSR\06_MiscDwg\0522719.05 - IRRIGATION POND VOLUMES.dwg Date Plotted: February 17, 2023 - 1:53 PM

WATER BALANCE CALCULATIONS
Fergus Golf Club - Irrigation Pond Review
Fergus, Ontario
Project #: 300052719

TABLE D-1

Pre- and Post-Development Monthly Water Balance Components

Based on Thornthwaite's Soil Moisture Balance Approach with a Soil Moisture Retention of 75 mm (Fine Sandy Loam in urban lawns)

Climate data from FERGUS SHAND DAM Climate Station (1981 - 2010)

Potential Evapotranspiration Calculation	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Average Temperature (Degree C)	**-7.4**	**-6.3**	**-1.9**	**5.7**	**12.2**	**17.5**	**20**	**19**	**14.9**	**8.3**	**2.1**	**-3.9**	**6.7**
Heat index: $i = (t/5)^{1.514}$	0.00	0.00	0.00	1.22	3.86	6.66	8.16	7.55	5.22	2.15	0.27	0.00	**35.1**
Unadjusted Daily Potential Evapotranspiration U (mm)	0.00	0.00	0.00	26.65	59.36	86.76	99.85	94.61	73.26	39.58	9.32	0.00	**489**
Adjusting Factor for U (Latitude 43° 44' N)	0.81	0.82	1.02	1.12	1.26	1.28	1.29	1.2	1.04	0.95	0.81	0.77	
Adjusted Potential Evapotranspiration PET (mm)	0	0	0	30	75	111	129	114	76	38	8	0	**579**
COMPONENTS	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Precipitation (P)	**68**	**56**	**60**	**74**	**87**	**84**	**89**	**97**	**93**	**77**	**93**	**69**	**946**
Potential Evapotranspiration (PET)	0	0	0	30	75	111	129	114	76	38	8	0	**579**
P - PET	68	56	60	44	12	-27	-40	-17	17	40	85	69	**367**
Change in Soil Moisture Storage	0	0	0	0	0	-27	-40	-8	17	40	18	0	**0**
Soil Moisture Storage max 75 mm	75	75	75	75	75	48	8	0	17	57	75	75	
Actual Evapotranspiration (AET)	0	0	0	30	75	111	129	105	76	38	8	0	**571**
Soil Moisture Deficit max 75 mm	0	0	0	0	0	27	67	75	58	18	0	0	
Water Surplus - available for infiltration or runoff	68	56	60	44	12	0	0	0	0	0	67	69	**375**
Potential Infiltration (based on MOE metholodogy*; independent of temperature)	48	39	42	31	8	0	0	0	0	0	47	48	**263**
Potential Direct Surface Water Runoff (independent of temperature)	20	17	18	13	4	0	0	0	0	0	20	21	**113**
IMPERVIOUS AREA WATER SURPLUS													
Precipitation (P)	946	mm/year											
Potential Evaporation (PE) from impervious areas (assume 15%)	142	mm/year											
P-PE (surplus available for runoff from impervious areas)	804	mm/year											

Assume January storage is 100% of Soil Moisture Storage
Soil Moisture Storage **75** mm <-- See "Water Holding Capacity" values in Table 3.1, MOE SWMPDM, 2003

*MOE SWM infiltration calculations

topography - Rolling Land	**0.2**	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
soils - Open Sandy Loam	**0.4**	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
cover - cultivated land	**0.1**	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
Infiltration factor	**0.7**	

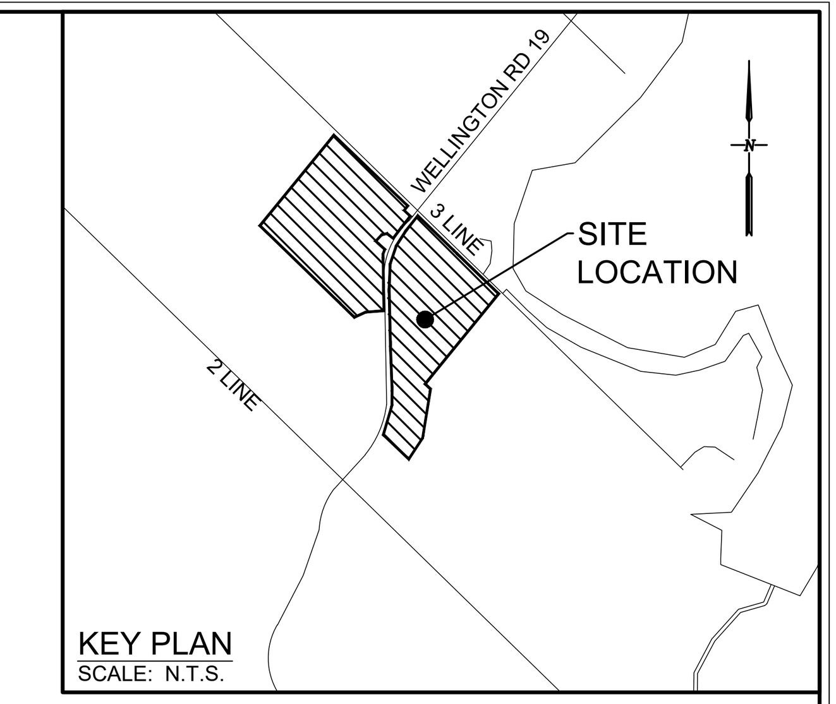
Latitude of site (or climate station) **43** ° N.

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Drawings

CUSP: Conceptual Underground Servicing Plan
WAT1: Preliminary Water Distribution Plan
SAN1: Preliminary Wastewater Distribution Plan
STM1: Preliminary Storm Servicing Plan
GRD1: Preliminary Grading Plan – South
GRD2: Preliminary Grading Plan – West
GRD3: Preliminary Grading Plan – North
GRD4: Preliminary Grading Sections and Details
P1: Plan and Profile – Wellington Road 19 Road Widening
W1: Water Servicing Alternative 2



LEGEND

- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CONTOUR
- EXISTING ELEVATION (× 319.36 EX)
- PROPOSED ELEVATION (326.26)
- PROPOSED SLOPE (2.00%)
- PROPOSED OVERLAND FLOW DIRECTION
- MAX. 3:1 SIDE SLOPES
- PROPOSED RETAINING WALL
- PROPOSED NOISE WALL (BY OTHERS)
- PROPOSED SWALE

LOT TYPES:

- F — FRONT DRAINAGE
- S — SPLIT DRAINAGE
- WO — WALK OUT LOT
- LO — LOOK OUT LOT

0 20 40 60 80
Metres

BURNSIDE

Client
FERGUS DEVELOPMENT INC.

Figure Title
THE VILLAGE AT FAIRVIEW GREENS

GRADING PLAN

Drawn	Checked	Date	Figure No.
BF	SR	23/03/16	G1
Scale		Project No.	
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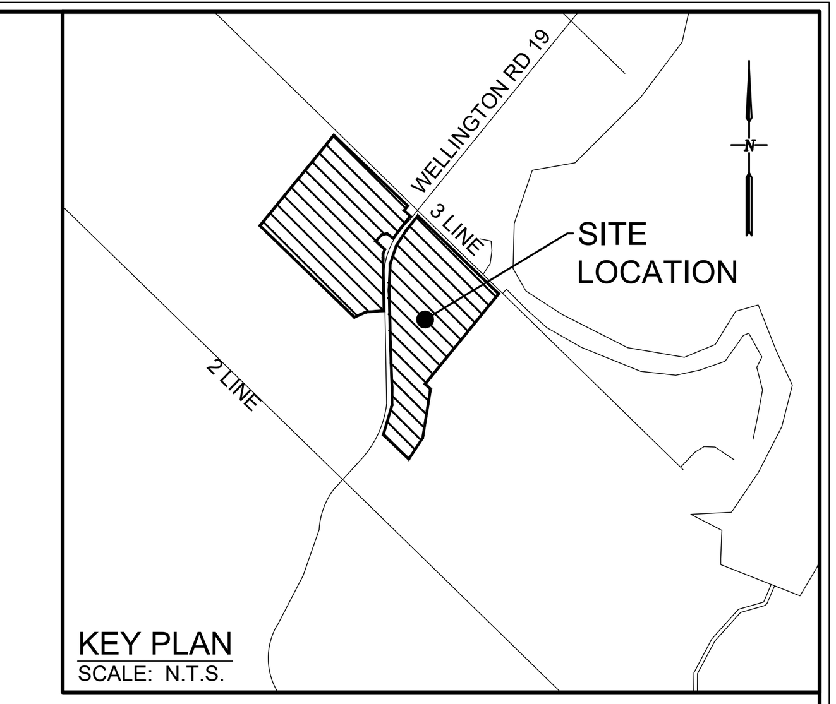
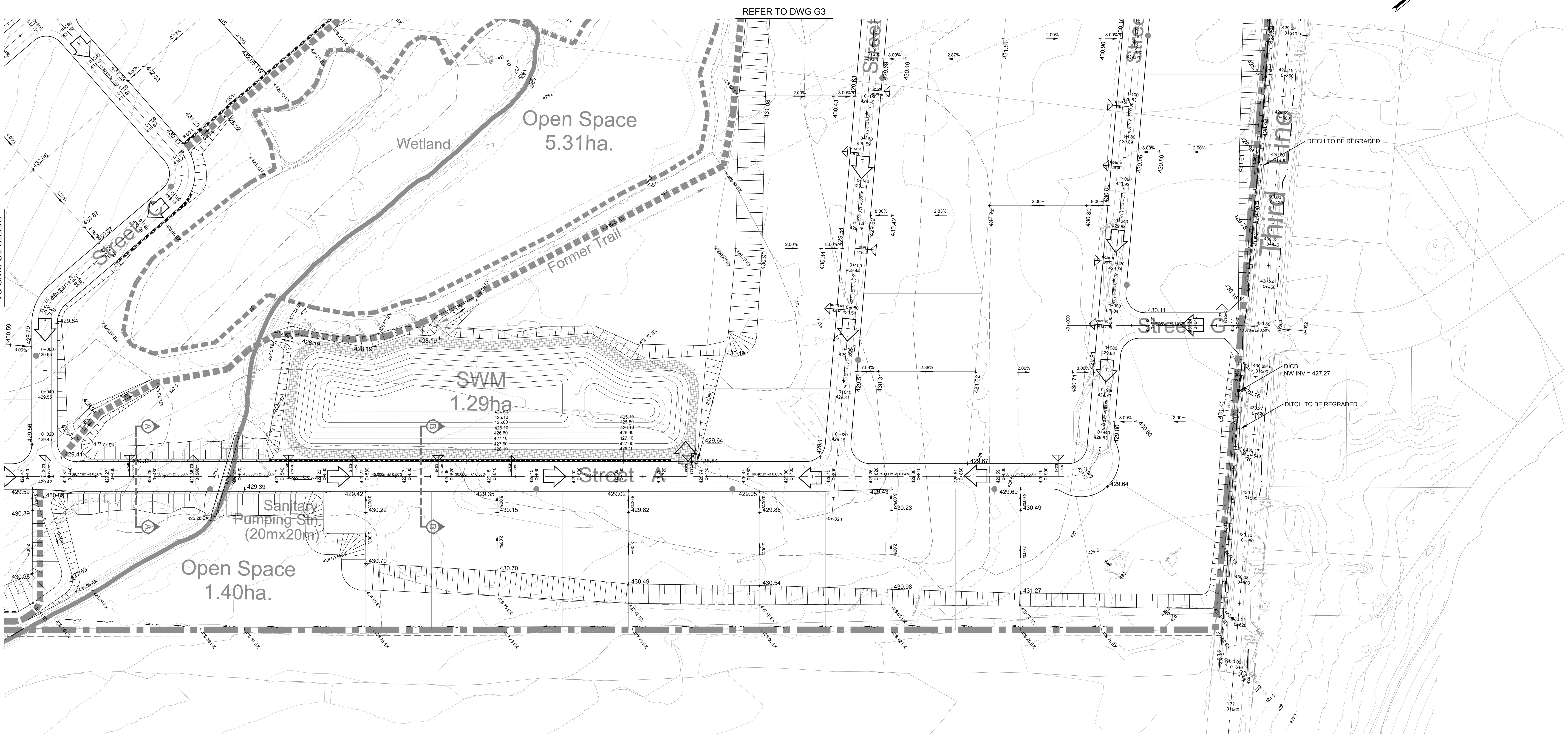


KEY PLAN
SCALE: N.T.S.



LEGEND

- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CONTOUR
- EXISTING ELEVATION (319.36 EX)
- PROPOSED ELEVATION (326.26)
- PROPOSED SLOPE (2.00%)
- PROPOSED OVERLAND FLOW DIRECTION
- MAX. 3:1 SIDE SLOPES
- PROPOSED RETAINING WALL
- PROPOSED NOISE WALL (BY OTHERS)
- PROPOSED SWALE

LOT TYPES:

- F — FRONT DRAINAGE
- S — SPLIT DRAINAGE
- WO — WALK OUT LOT
- LO — LOOK OUT LOT

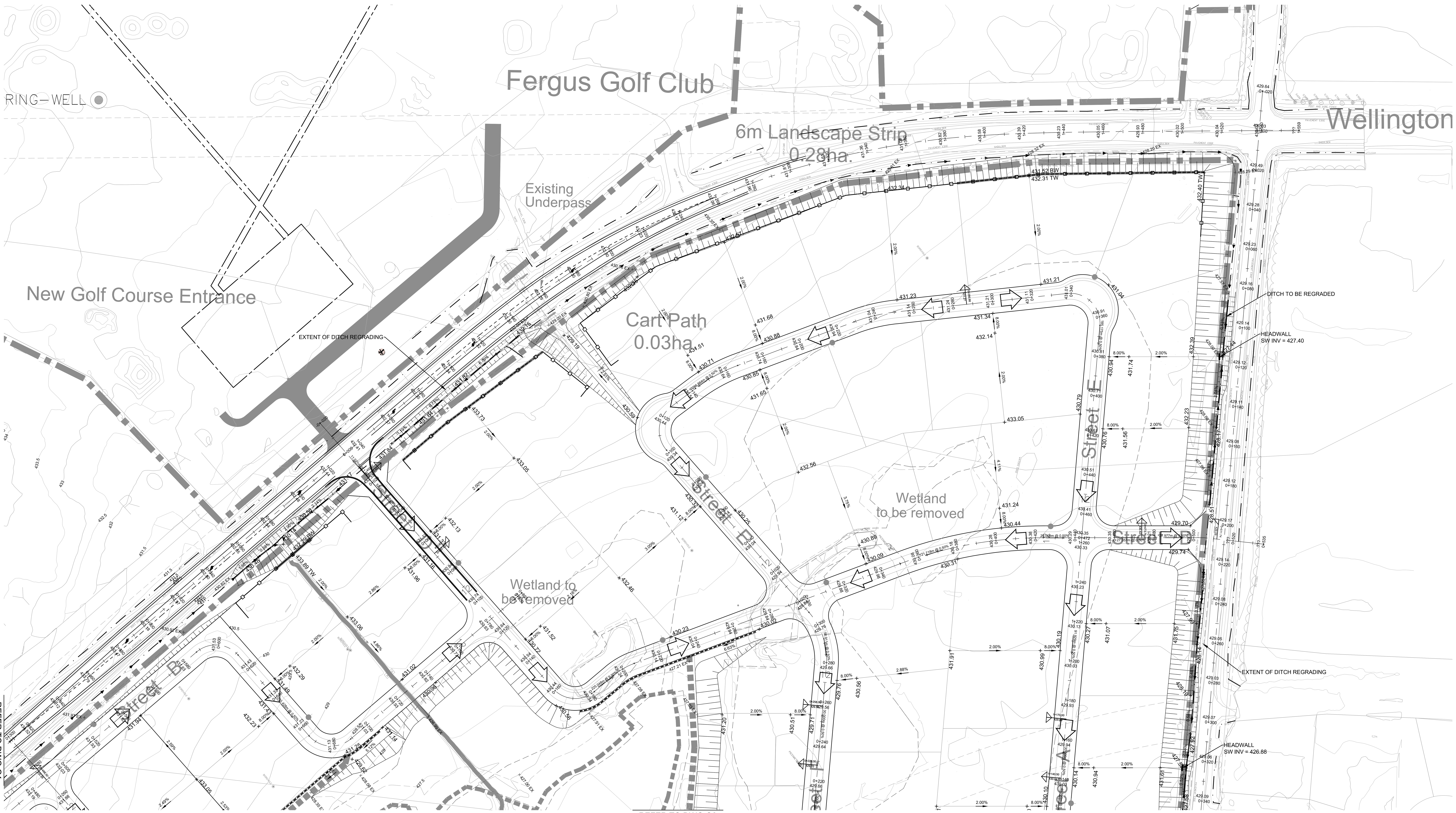
0 20 40 60 80
Metres

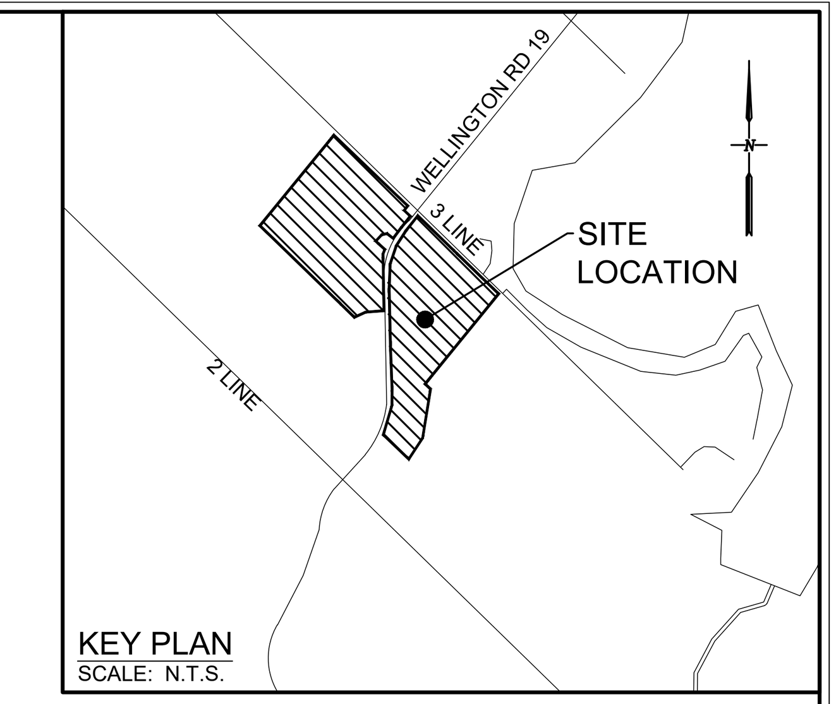
BURNSIDE

Client
FERGUS DEVELOPMENT INC.

Figure Title
THE VILLAGE AT FAIRVIEW GREENS
GRADING PLAN

Drawn	Checked	Date	Figure No.
BF	SR	23/03/16	G2
Scale		Project No.	
1:1000		300052719	





LEGEND

- PROPERTY BOUNDARY
- EASEMENT
- 320.5 EXISTING CONTOUR
- ×319.36 EX EXISTING ELEVATION
- ×326.26 PROPOSED ELEVATION
- 2.00% PROPOSED SLOPE
- PROPOSED OVERLAND FLOW DIRECTION
- MAX. 3:1 SIDE SLOPES
- PROPOSED RETAINING WALL
- PROPOSED NOISE WALL (BY OTHERS)
- PROPOSED SWALE

LOT TYPES:

- F FRONT DRAINAGE
- S SPLIT DRAINAGE
- WO WALK OUT LOT
- LO LOOK OUT LOT

0 20 40 60 80
Metres

BURNSIDE

Client

FERGUS DEVELOPMENT INC.

Figure Title

THE VILLAGE AT FAIRVIEW GREENS

GRADING PLAN

Drawn	Checked	Date	Figure No.
BF	SR	23/03/16	G3
Scale		Project No.	
1:1000		300052719	

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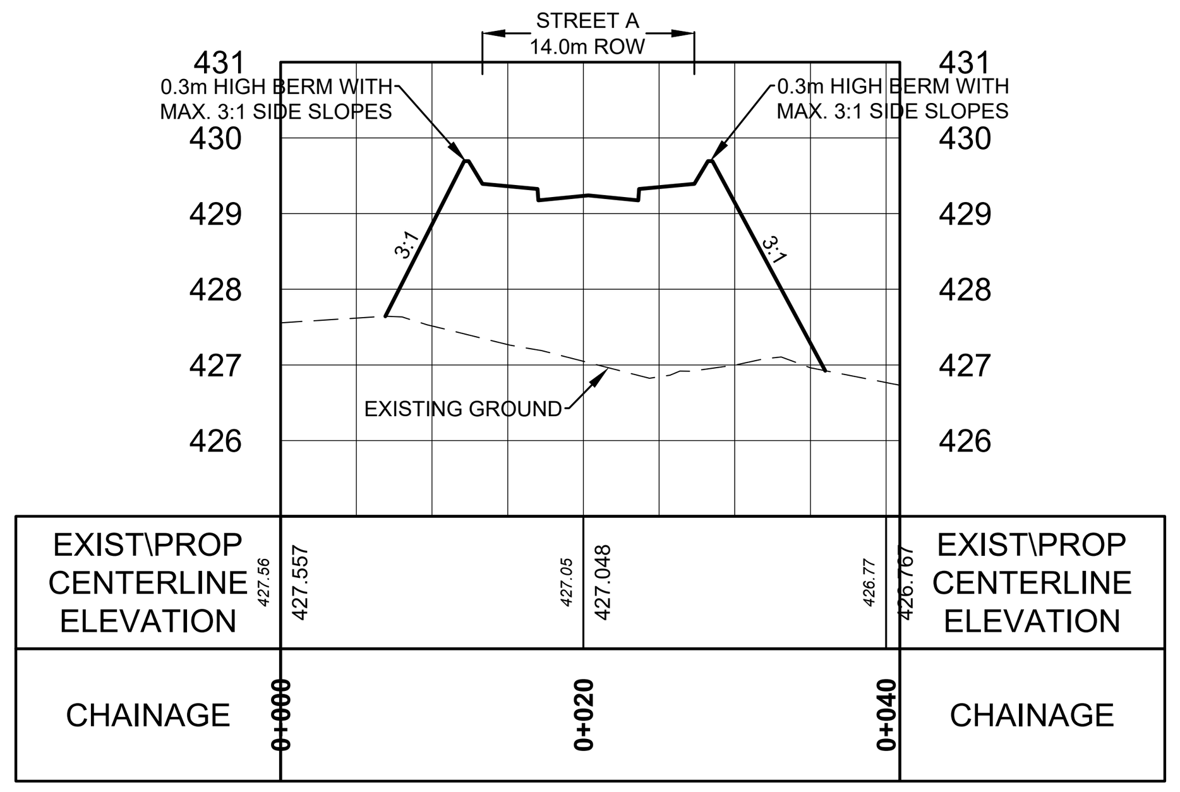
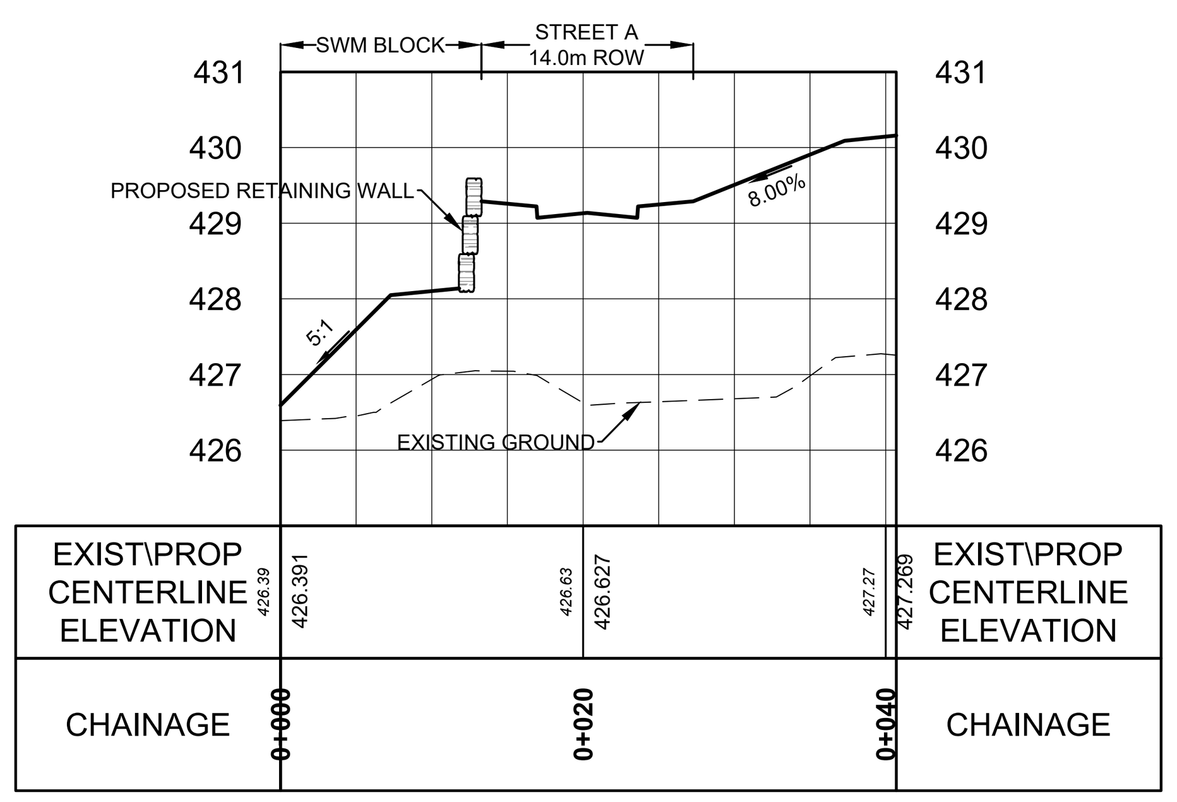


A-A G2 SECTION

SCALE H1:500 V1:100



B-B G2 SECTION

SCALE H1:500 V1:100

BURNSIDE

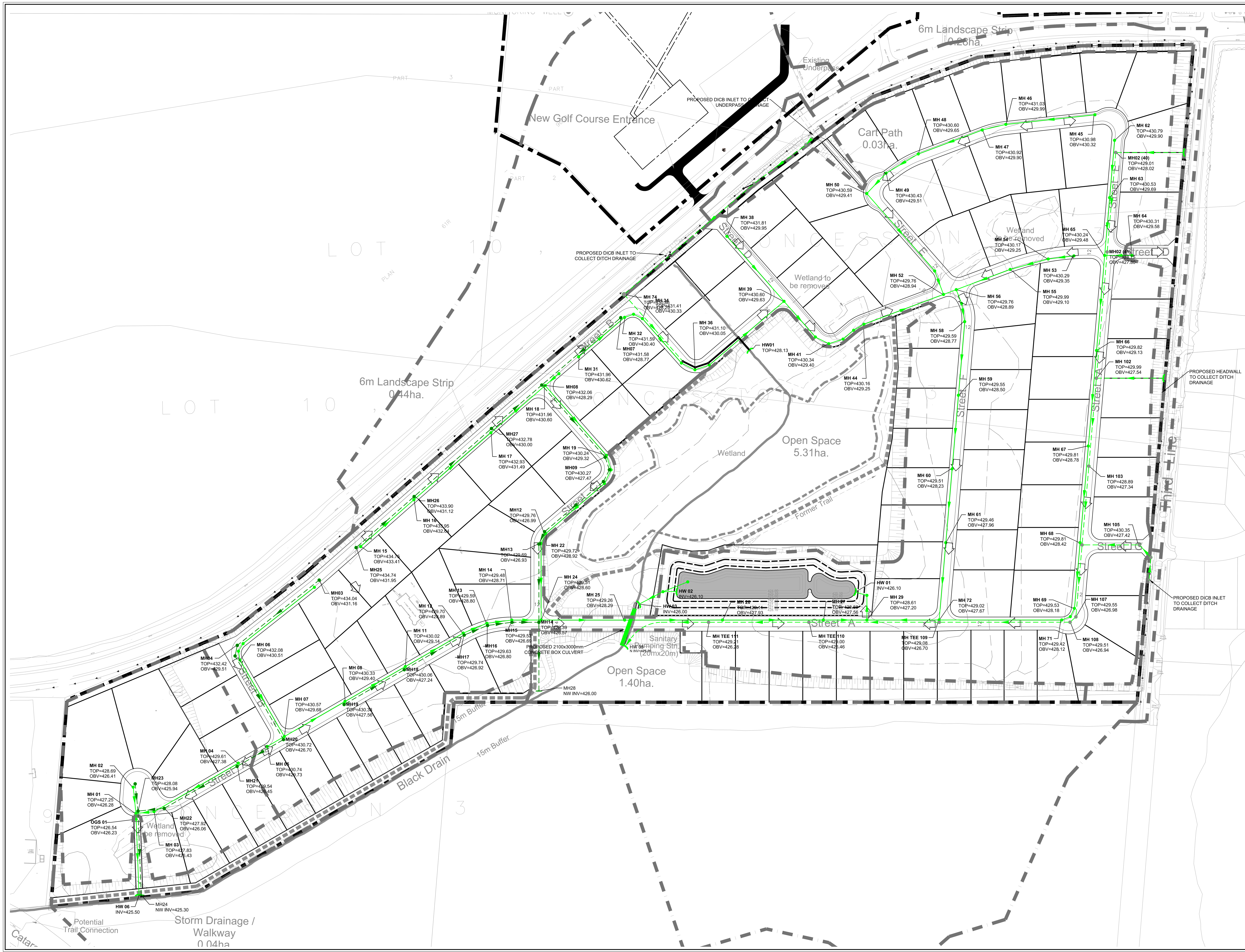
Client: FERGUS DEVELOPMENT INC.

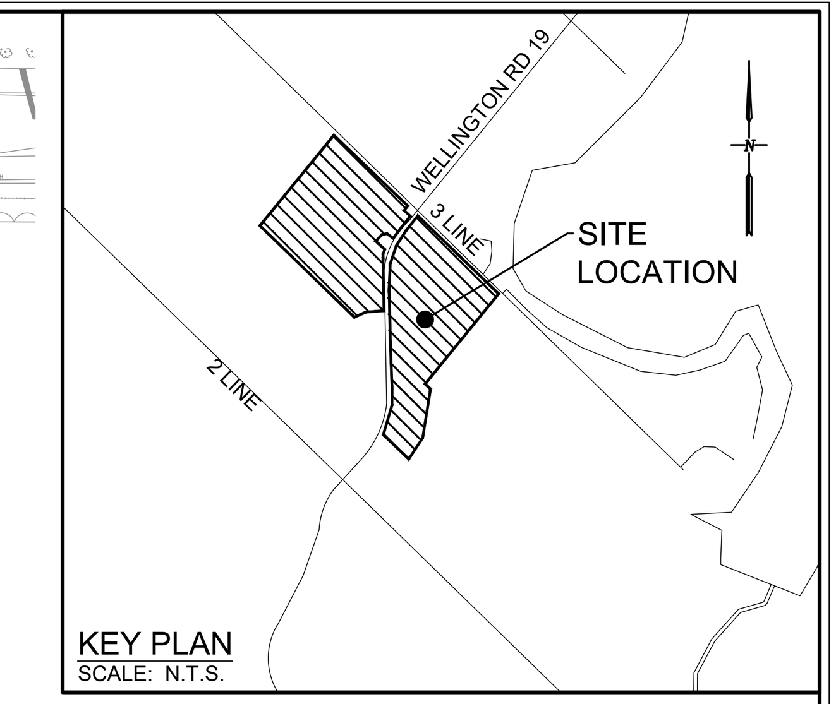
Figure Title: THE VILLAGE AT FAIRVIEW GREENS

GRADING SECTIONS AND DETAILS

Drawn	Checked	Date	Figure No.
BF	SR	23/03/16	G4
Scale		Project No.	
AS NOTED		300052719	

PROPOSED WASTEWATER
TREATMENT FACILITY
New Golf Course Ent
6m Landscape Strip
0.28ha.
Existing
Underpass
6m Landscape Strip
0.44ha.
WELLINGTON COUNTY ROAD 19
Wetland
to be removed
Street D
Street E
Street F
Street A
Street B
Street C
Street G
Third Line
Wetland
Open Space
5.31ha.
Former Trail
Sanitary
Pumping Stn.
(20mx20m)
Open Space
1.40ha.
15m Buffer
Black Drain
Wetland
to be removed
Potential
Trail Connection
Storm Drainage /
Walkway
0.04ha
KEY PLAN
SCALE: N.T.S.
WELLINGTON RD 19
3 LINE
2 LINE
SITE
LOCATION
LEGEND
PROPERTY BOUNDARY
PROPOSED SANITARY FORCEMAIN
PROPOSED SANITARY SEWER
PROPOSED STORM BYPASS SEWER
PROPOSED STORM SEWER
PROPOSED FOUNDATION DRAIN COLLECTOR
EXISTING WATERMAIN
PROPOSED WATERMAIN
PIPE OBVERT
ROAD GRADE
PIPE COVER
OBV. COVER
R.G. 428.63
SAN 424.30 3.0
SAN FM 425.30 2.0
STM 427.48 1.8
BYPASS 426.56 1.8
FDC 425.54 2.7
N
0 30 60 90 120
Metres
BURNSIDE
Client
FERGUS DEVELOPMENT INC.
Figure Title
THE VILLAGE AT FAIRVIEW GREENS
CONCEPTUAL UNDERGROUND SERVICING PLAN
Drawn BF
Checked SR
Date 23/03/16
Figure No. CUSP
Scale 1:1500
Project No. 300052719
File: \\elmo\Shared Work Areas\052719 Fergus Golf Course\052719.05 FSR\07_Figures\DESIGN FIGURES\052719.05 CONCEPTUAL UNDERGROUND SERVICING.dwg Date Plotted: March 16, 2023 - 11:11 AM





LEGEND

- PROPERTY BOUNDARY
- PROPOSED DRAINAGE BOUNDARY
- PROPOSED STORM BYPASS SEWER
- PROPOSED STORM SEWER
- PROPOSED FOUNDATION DRAIN COLLECTOR
- PROPOSED OVERLAND FLOW ROUTE

0 30 60 90 120
Metres

BURNSIDE

Client
FERGUS DEVELOPMENT INC.

Figure Title
THE VILLAGE AT FAIRVIEW GREENS

PRELIMINARY STORM SERVICING PLAN

Drawn	Checked	Date	Figure No.
BF	SR	23/03/16	**STM1**
Scale		Project No.	
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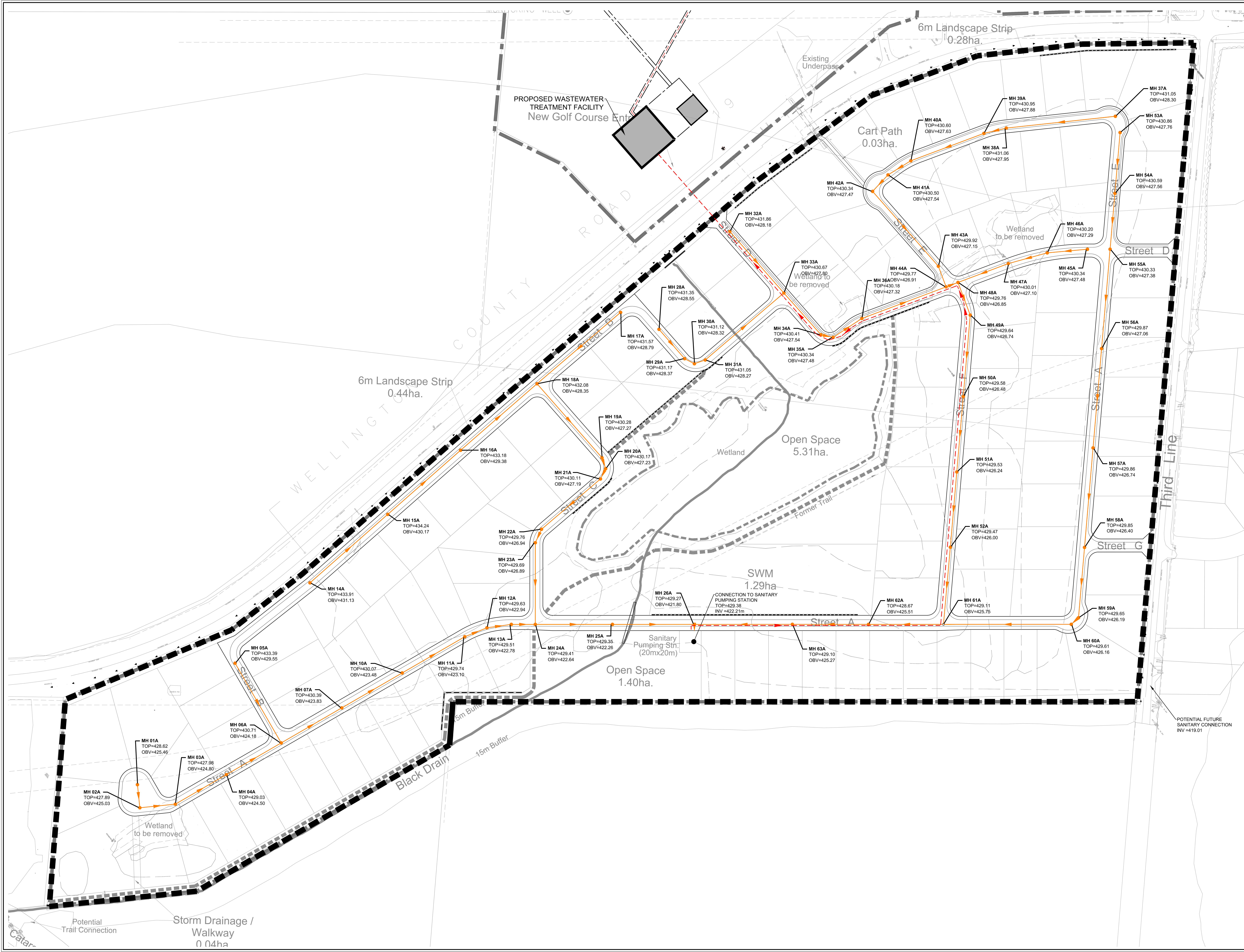
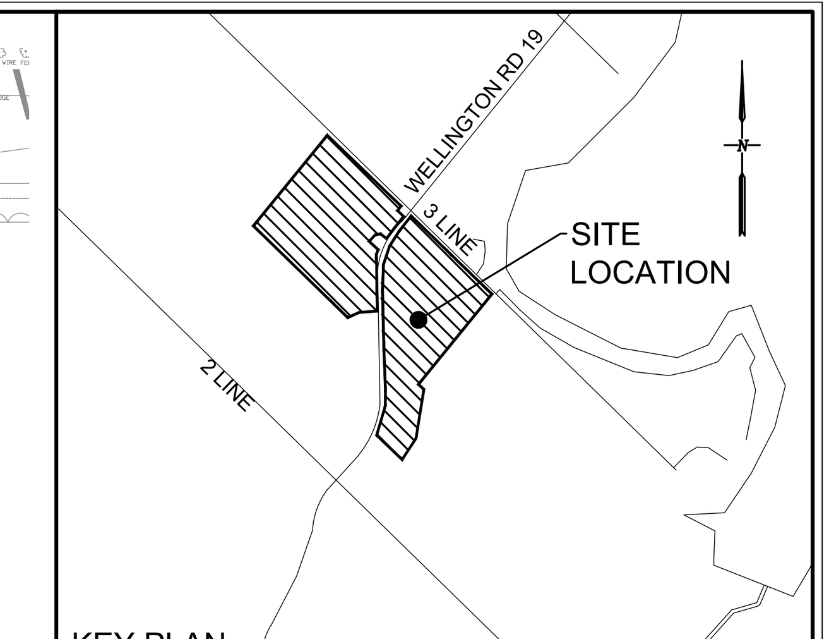


6m Landscape Strip
0.28ha.
Existing
Underpass
PROPOSED WASTEWATER
TREATMENT FACILITY
Cart Path
0.03ha.
WELLINGTON COUNTY ROAD
6m Landscape Strip
0.44ha.
Wetland
to be removed
Wetland to
be removed
Open Space
5.31ha.
Wetland
Former Trail
SWM
1.29ha
Sanitary
Pumping Stn.
(20mx20m)
Open Space
1.40ha.
Black Drain
15m Buffer
Potential
Trail Connection
Storm Drainage /
Walkway
0.04ha
Wetland
to be removed
Third Line
Street A
Street B
Street C
Street D
Street E
Street F
Street G
CONNECTION TO SANITARY
PUMPING STATION
TOP=429.38
INV =422.21m
POTENTIAL FUTURE
SANITARY CONNECTION
INV =419.01
MH 01A TOP=428.62 OBV=425.46
MH 02A TOP=427.89 OBV=425.03
MH 03A TOP=427.98 OBV=424.80
MH 04A TOP=429.03 OBV=424.50
MH 05A TOP=433.39 OBV=429.55
MH 06A TOP=430.71 OBV=424.18
MH 07A TOP=430.39 OBV=423.83
MH 10A TOP=430.07 OBV=423.48
MH 11A TOP=429.74 OBV=423.10
MH 12A TOP=429.63 OBV=422.94
MH 13A TOP=429.51 OBV=422.78
MH 14A TOP=433.91 OBV=431.13
MH 15A TOP=434.24 OBV=430.17
MH 16A TOP=433.18 OBV=429.38
MH 17A TOP=431.57 OBV=428.79
MH 18A TOP=432.08 OBV=428.35
MH 19A TOP=430.28 OBV=427.27
MH 20A TOP=430.17 OBV=427.23
MH 21A TOP=430.11 OBV=427.19
MH 22A TOP=429.76 OBV=426.94
MH 23A TOP=429.69 OBV=426.89
MH 24A TOP=429.41 OBV=422.64
MH 25A TOP=429.35 OBV=422.26
MH 26A TOP=429.27 OBV=421.80
MH 28A TOP=431.35 OBV=428.55
MH 29A TOP=431.17 OBV=428.37
MH 30A TOP=431.12 OBV=428.32
MH 31A TOP=431.05 OBV=428.27
MH 32A TOP=431.86 OBV=428.18
MH 33A TOP=430.67 OBV=427.80
MH 34A TOP=430.41 OBV=427.54
MH 35A TOP=430.34 OBV=427.48
MH 36A TOP=430.18 OBV=427.32
MH 37A TOP=431.05 OBV=428.30
MH 38A TOP=431.06 OBV=427.95
MH 39A TOP=430.95 OBV=427.88
MH 40A TOP=430.60 OBV=427.63
MH 41A TOP=430.50 OBV=427.54
MH 42A TOP=430.34 OBV=427.47
MH 43A TOP=429.92 OBV=427.15
MH 44A TOP=429.77 OBV=426.91
MH 45A TOP=430.34 OBV=427.48
MH 46A TOP=430.20 OBV=427.29
MH 47A TOP=430.01 OBV=427.10
MH 48A TOP=429.76 OBV=426.85
MH 49A TOP=429.64 OBV=426.74
MH 50A TOP=429.58 OBV=426.48
MH 51A TOP=429.53 OBV=426.24
MH 52A TOP=429.47 OBV=426.00
MH 53A TOP=430.86 OBV=427.76
MH 54A TOP=430.59 OBV=427.56
MH 55A TOP=430.33 OBV=427.38
MH 56A TOP=429.87 OBV=427.06
MH 57A TOP=429.86 OBV=426.74
MH 58A TOP=429.85 OBV=426.40
MH 59A TOP=429.65 OBV=426.19
MH 60A TOP=429.61 OBV=426.16
MH 61A TOP=429.11 OBV=425.75
MH 62A TOP=428.67 OBV=425.51
MH 63A TOP=429.10 OBV=425.27



KEY PLAN
SCALE: N.T.S.

LEGEND

- PROPERTY BOUNDARY
- PROPOSED LOCAL SANITARY SEWER
- PROPOSED SANITARY FORCEMAIN
- SANITARY DRAINAGE BOUNDARY

0 30 60 90 120
Metres

BURNSIDE

Client
FERGUS DEVELOPMENT INC.

Figure Title
THE VILLAGE AT FAIRVIEW GREENS

PRELIMINARY SANITARY SERVICING PLAN

Drawn	Checked	Date	Figure No.
BF	SR	23/03/16	SAN1
Scale		Project No.	
1:1500		300052719	

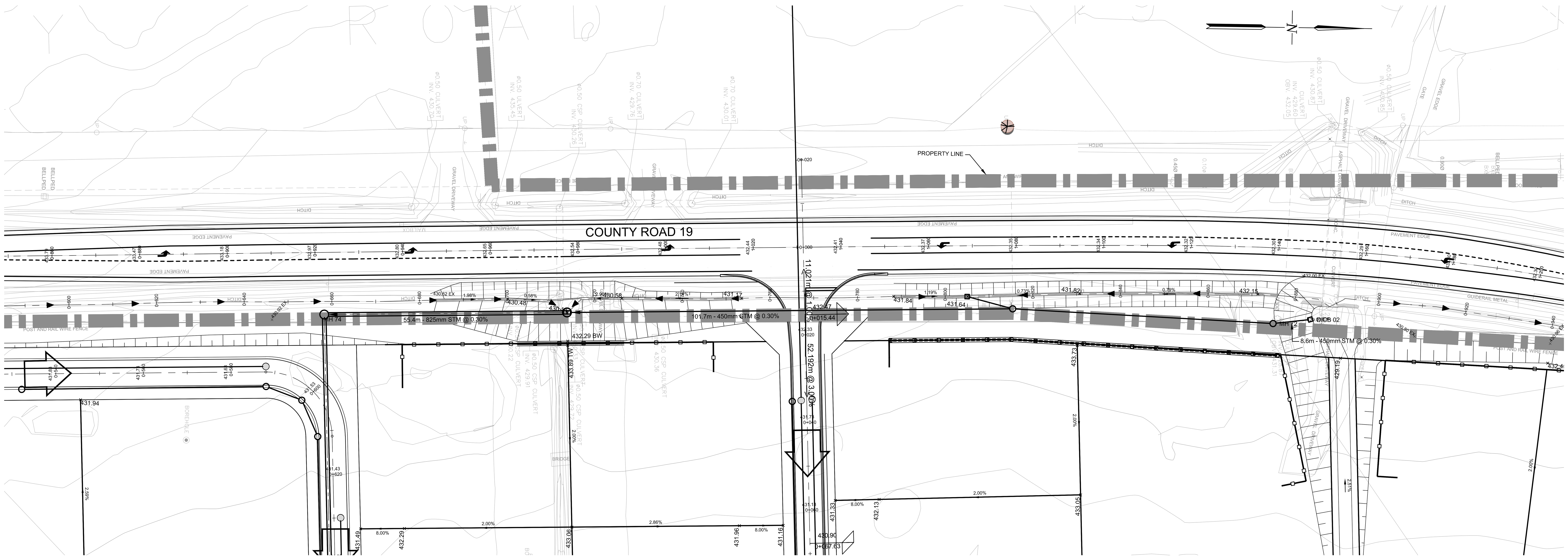
BURNSIDE

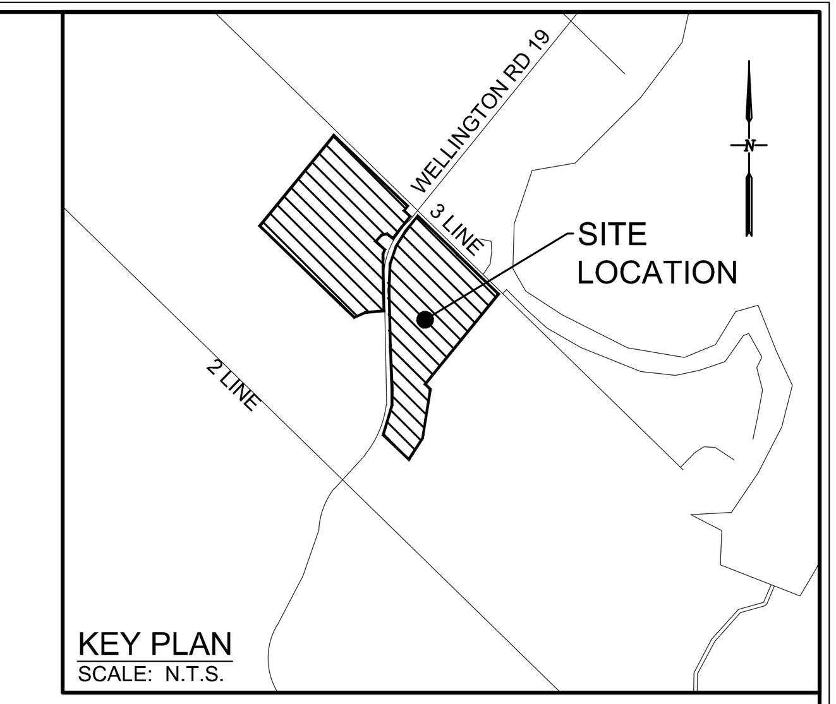
Client
FERGUS DEVELOPMENT INC.

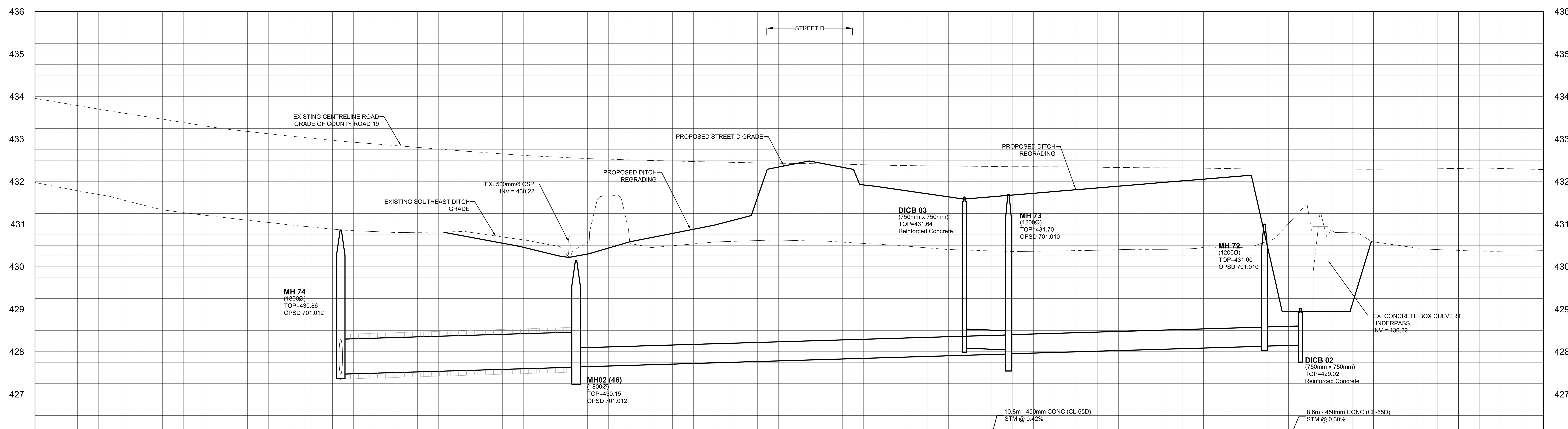
Figure Title
THE VILLAGE AT FAIRVIEW GREENS

PRELIMINARY WATER SERVICING PLAN

Drawn	Checked	Date	Figure No.
BF	SR	23/03/16	WAT1
Scale		Project No.	
1:1500		300052719	







PROPOSED STORM				N 427.47 E 427.47 — 55.4m - 825mm CONC (CL-65D) STM @ 0.30%			S 427.64 N 427.64 — 101.7m - 450mm CONC (CL-65D) STM @ 0.30%				N 428.08 / N 427.95 S 427.95 S 428.04 — 59.5m - 450mm CONC (CL-65D) STM @ 0.30%				N 428.13 S 428.13 / S 428.16			
PROPOSED SANITARY																		
EXIST\PROP CENTERLINE ELEVATION	433.79 431.786	433.47 431.337	433.18 431.092	432.97 430.883	432.80 430.807	432.65 430.699	432.54 430.566	432.48 430.490	432.44 430.614	432.41 430.576	432.37 430.442	432.35 430.357	432.34 430.386	432.32 430.418	432.30 430.596	432.29 430.808	432.30 430.402	432.30 430.369	432.28 430.376
CHAINAGE	0+860	0+880	0+900	0+920	0+940	0+960	0+980	1+000	1+020	1+040	1+060	1+080	1+100	1+120	1+140	1+160	1+180	1+200	

0 5.0 10.0 20.0 30.0 40.0
Metres

BURNSIDE

Client
FERGUS DEVELOPMENT INC.

Figure Title
THE VILLAGE AT FAIRVIEW GREENS

PLAN AND PROFILE - WELLINGTON ROAD 19 ROAD WIDENING

Drawn	Checked	Date	Figure No.
LW	RS	23/03/16	P1
Scale H 1:500 V 1:50		Project No. 300052719	

LEGEND

PROPOSED WATERMAIN

APPROXIMATE CONNECTION POINT TO EXISTING MUNICIPAL WATER SUPPLY

N

0 200 400 600 800

Metres

BURNSIDE

Client

FERGUS DEVELOPMENT INC.

Figure Title

THE VILLAGE AT FAIRVIEW GREENS

WATER SYSTEM ALTERNATIVE SOLUTION 2

Drawn	Checked	Date	Figure No.
BF	SR	23/04/21	W1
Scale		Project No.	
1:10,000		300052719	

File: \\elmo\Shared Work Areas\052719 Fergus Golf Course\052719.05 FSR\06_MiscDwg\052719 SERVICING CONNECTIONS.dwg Date Plotted: April 21, 2023 - 11:20 AM

R.J. Burnside & Associates Limited