ONTARIO LAND TRIBUNAL

PROCEEDING COMMENCED UNDER subsection 22(7) of the *Planning Act*, R.S.O. 1990, c. P.13, as amended.

Applicant and Appellant: Caivan (Perth GC) Limited

Subject: Request to amend the Official Plan – Failure to adopt the re-

quested amendment

Description: To permit 940 single detached dwellings and townhomes, a

nine-hole golf course, park and open space areas

Reference Number: OPA-01-2023

Property Address: 141 Peter Street, Part of Lots 26 & 27, Concession 1, Part

Lots 25, 26 & 27, Concession 2, Geographic Township of Bathurst, and Part Lot 1 in Southeast Half Lot 1, Concession

1, Part Lot 1 in Southwest Half Lot 1, Concession 2, Geographic Township of Drummond, now in the Town of

Perth, County of Lanark

Municipality/UT: Town of Perth / County of Lanark

OLT Case No.: OLT-23-000939
OLT Lead Case No.: OLT-23-000534

PROCEEDING COMMENCED UNDER subsection 34(11) of the *Planning Act*, R.S.O. 1990, c. P.13, as amended.

Applicant and Appellant: Caivan (Perth GC) Limited

Subject: Application to amend the Zoning By-law – Refusal or neglect to

make a decision

Description: To permit 940 single detached dwellings and townhomes, a

nine-hole golf course, park and open space areas

Reference Number: ZBL-03-2023

Property Address: 141 Peter Street, Part of Lots 26 & 27, Concession 1, Part

Lots 25, 26 & 27, Concession 2, Geographic Township of Bathurst, and Part Lot 1 in Southeast Half Lot 1, Concession

1, Part Lot 1 in Southwest Half Lot 1, Concession 2, Geographic Township of Drummond, now in the Town of

Perth, County of Lanark

Municipality/UT: Town of Perth / County of Lanark

OLT Case No.: OLT-23-000940

PROCEEDING COMMENCED UNDER subsection 51(34) of the *Planning Act*, R.S.O. 1990, c. P.13, as amended.

Applicant and Appellant: Caivan (Perth GC) Limited

Subject: Proposed Plan of Subdivision – Failure of Approval Authority to

make a decision

Description: To permit 940 single detached dwellings and townhomes, a

nine-hole golf course, park and open space areas

Reference Number: 09-T-22001

Property Address: 141 Peter Street, Part of Lots 26 & 27, Concession 1, Part

Lots 25, 26 & 27, Concession 2, Geographic Township of Bathurst, and Part Lot 1 in Southeast Half Lot 1, Concession

1, Part Lot 1 in Southwest Half Lot 1, Concession 2, Geographic Township of Drummond, now in the Town of

Perth, County of Lanark

Municipality/UT: Town of Perth / County of Lanark

OLT Case No.: OLT-23-000534
OLT Lead Case No.: OLT-23-000534

OLT Case Name: Caivan (Perth GC) v Lanark County

Witness Statement of Adam Fobert

Professional Engineer

David Schaeffer Engineering Ltd.

Qualifications

- 1. I am a Team Leader at David Schaeffer Engineering Ltd ("DSEL").
- 2. I am a Professional Engineer and have practiced land development engineering since 2003.
- I was the prime civil engineer on the Lansdowne Park redevelopment project completed in 2015, which involved coordination with existing infrastructure, multiple stakeholders and all levels of government.
- 4. I was the prime civil engineer on Windmill / Dream's re-development of Chaudière and Albert Islands where I prepared a Master Servicing Plan and detailed engineering for Phases 1, 2, and 3 of the development. The project involved consultation with all level of government in addition to the Province of Quebec.
- 5. I prepared the Master Drainage Plan in support of the development of the Western Development Lands in Richmond, ON. I prepared numerous functional and detailed designs, including most recently Stirling Meadows in the City of Brockville.
- 6. My curriculum vitae is attached to this witness statement as Appendix "A". A copy of my Acknowledgement of Expert Duty is attached as Appendix "B".

Retainer

- 7. DSEL was retained by Caivan (Perth GC) Limited on December 7, 2021 to prepare functional engineering plans and reports in support of the subject applications for official plan amendment, zoning by-law amendment and draft plan of subdivision approval.
- 8. As part of this retainer, I gathered and reviewed available background information pertaining to the conditions and engineered structures present on the site. I coordinated additional surveys and inspections of existing civil infrastructure. I met with Town Staff on November 25, 2021, February 18, 2022, September 16, 2022, and November 25, 2022. DSEL regularly communicated with Town Staff via phone and emails. I presented the findings of DSEL's civil investigations to Town Staff including recommended deviations from the

Town's Infrastructure Master Plan (the "IMP"). DSEL also reviewed and offered layout recommendations to our client to optimize civil works.

9. DSEL prepared and submitted a Functional Servicing Study on Apil 2022. DSEL received comments from the Town on August 9, 2022. DSEL prepared and submitted an updated Functional Servicing Study on February 2023 (the "FSR"). The FSR is attached to this witness statement as Appendix "C". DSEL received comments on the February submission on April 21, 2023 and July 23, 2023 attached in Appendix "D".

Documents Reviewed

- 10. As part of this retainer and in preparation for my evidence, I reviewed the following documents:
 - a. Section 2, *Planning Act*, R.S.O. 1990, 2023, c. 24, Sched 2.
 - b. Provincial Policy Statement, 2020.
 - c. County of Lanark Sustainable Communities Official Plan, June 27, 2012.
 - d. Town of Perth Official Plan, April 16, 2019.
 - e. Ottawa Sewer Design Guidelines, City of Ottawa, October 2012.
 - f. Technical Bulletin ISDTB-2014-01, Revisions to Ottawa Design Guidelines Sewer, City of Ottawa, February 5, 2014.
 - g. Technical Bulletin PIEDTB-2016-01, Revisions to Ottawa Design Guidelines Sewer, City of Ottawa, September 6, 2016.
 - h. Technical Bulletin ISTB-2018-01, Revisions to Ottawa Design Guidelines Sewer, City of Ottawa, March 21, 2018.
 - Technical Bulletin ISTB-2018-03, Revisions to Ottawa Design Guidelines Sewer,
 City of Ottawa, March 21, 2018.

- j. Technical Bulletin ISTB-2019-01, Revisions to Ottawa Design Guidelines Sewer, City of Ottawa, January, 2019.
- k. Technical Bulletin ISTB-2019-02, Revisions to Ottawa Design Guidelines Sewer, City of Ottawa, July 8, 2019.
- I. Design Guidelines for Sewage Works, Ministry of the Environment, 2008.
- m. Stormwater Planning and Design Manual, Ministry of the Environment, March 2003.
- n. Ontario Building Code Compendium Ministry of Municipal Affairs and Housing Building Development Branch, January 1, 2010, Update.
- o. Mississippi-Rideau Source Water Protection Plan, MVCA & RVCA, August 2014.
- p. Erosion & Sediment Control Guidelines for Urban Construction, Greater Golden Horseshoe Area Conservation Authorities, December 2006.
- q. Infrastructure Master Plan for Area North of Highway 7Dillon Consulting, October 2013.
- r. Perth Potable Water Model Update, Stantec, October 12, 2016.
- s. Memo Reopen EA/Master Plan Area North of HWY 7 Water Review, Jp2G Consultants Inc, April 5, 2019.
- t. Infrastructure Master Plan, Western Annex in the Town of Perth, Jp2g Consultants Inc., November 2019.
- u. Perth Western Annex Lands 141 Peter Street: Potable Water Hydraulic Analysis,
 Stantec, February 2023.
- v. Caivan Perth Development Hydrologic and Hydraulic Conditions Report, JFSA, February 2023.
- w. Environmental Impact Study, Kilgour and Associates, February 2023.

- x. Geotechnical Investigation, Proposed Residential Development, 141 Peter Street, Perth, ON, Gemtech, February 3, 2023.
- y. Hydrogeological Investigation, Proposed Residential Development, 141 Peter Street, Perth ON, Gemtech, February 22, 2023.
- z. Town of Perth, letter to Julie Stewart Lanark County, August 8, 2022.
- aa. Lanark County Planning Department, letter to Nadia De Santi WSP, August 9, 2022.
- bb. Town of Perth, letter to Caivan, April 21, 2023.
- cc. Memorandum, to Grant Machan Town of Perth from Mark Bissett Novatech, July 2023.
- dd. Preliminary Functional Servicing Report for Caivan (Perth GC) Limited, Proposed Residential Subdivision, April 2022.
- ee. Functional Servicing Report for Caivan (Perth GC) Limited, Proposed Residential Subdivision, February 2023.

Issues

- 11. As a consulting professional engineer, my evidence in this proceeding will be limited to factual and opinion evidence related to the findings, conclusions and recommendations made by DSEL through its FSR. I defer to the opinions of the qualified land use planners and other expert witnesses being called in this proceeding with respect to how the findings, conclusions and recommendations of DSEL's FSR inform matters of conformity with Provincial, County and Town policies.
- 12. In addition to my review of the DSEL FSR, I intend to provide opinion evidence in response to the following issues on the current Issues List:
 - 1. Do the applications have appropriate regard for matters of provincial interest as enumerated in section 2 of the *Planning Act*? Specifically, subsections 2(e) ("the supply, efficient use and conservation of energy and water"), 2(f) ("the adequate

provision and efficient use of... sewage and water services"), 2(o) ("the protection of public health and safety") and 2(s) ("the mitigation of greenhouse gas emissions and adaptation to a changing climate").

- 2. Is it appropriate to introduce the proposed number of residential units without conducting a comprehensive review to assess? Specifically, issue (c) related to the demands on infrastructure and public service facilities that the development will create.
- 3. Is the Application consistent with the Provincial Policy Statement, 2020? Specifically, Policies 1.1.1(e), (g), (j), and 1.1.3.2(b).
- 4. Does the Application conform to the policies of the County of Lanark Sustainable Communities Official Plan ("SCOP")? Specifically, Policy 8.2.1.2.
- **5.** Does the Application conform to the policies, purpose and intent of the Town of Perth Official Plan (the "Official Plan")? Specifically, Policies 3.4(C), 5.2, 5.3, 5.10, and the engineering/servicing elements of 8.1.4
- 10. Can the proposed development be accommodated with appropriately sized and located stormwater infrastructure that avoids potential impacts on the Tay River and Grant's Creek floodplains?
- 14. Does the proposed draft plan of subdivision have appropriate regard for the matters and criteria to be addressed pursuant to s. 51(24) of the *Planning Act?* Specifically, subparagraphs 51(24)(h) ("flood control") and (i) ("municipal services").
- 13. Brief summaries of my intended responses to these issues are outlined below, though as noted above, I will primarily rely upon the contents of DSEL's FSR and the documents attached/referenced therein to provide my evidence to the Tribunal.

Summary Intended Expert Evidence

1. Do the applications have appropriate regard for matters of provincial interest as enumerated in section 2 of the Planning Act?

Specifically, subsections 2(e) ("the supply, efficient use and conservation of energy and water"), 2(f) ("the adequate provision and efficient use of... sewage and water services"), 2(o) ("the protection of public health and safety") and 2(s) ("the mitigation of greenhouse gas emissions and adaptation to a changing climate").

- 14. In my opinion, DSEL's FSR confirms that the proposed draft plan has been designed in a manner that has appropriate regard for the supply, efficient use and conservation of water as well as the adequate provision and efficient use of sewage and water services. Development engineering for the site has also been undertaken in a manner that ensures the protection of public health and safety and is mindful of the changing climate.
- 15. In support of my opinions, I will review relevant sections of Perth's IMP, which completed Phases 1 and 2 of the Municipal Class Environmental Assessment process and determined preferred servicing solutions for the future development of the site at issue. DSEL's review of the IMP and our proposed amendments to the preferred servicing solutions for the subject site in terms of water and wastewater servicing and stormwater management are outlined in our FSR in Section 1.5.
- 16. The proposed water supply servicing solution deviates from the IMP in alignment only. The water supply connections will be sufficient to support development at the population level proposed.
- 17. The proposed wastewater solution deviates from the IMP by reducing the number of sanitary pump stations that are required. Pump stations are expensive to install and operate. Each pump station requires a communication array, monitoring, power, and backup power, all of which add operational cost to municipalities. In my opinion, by reducing the number of sanitary pump stations, the proposal meets the efficiency objectives of the Province as expressed in section 2 of the *Planning Act*.

- 18. The proposed grading and stormwater management plan also deviates from the IMP. The IMP proposed stormwater quantity and quality controls through the use of three stormwater management facilities (see Figure 6-4 of the IMP). DSEL's proposed stormwater management plan includes three stormwater management facilities and two areas serviced by a combination of a treatment train and an end of pipe oil grit separator. In my opinion, servicing the lands with the addition of two oil grit separators promotes the retention of the natural drainage patterns. The two areas serviced by oil grit separators measure 1.76 ha and 1.93 ha. The MECP Stormwater Management Planning Design Manual suggests that wet ponds are designed to receive flow from areas 5 ha and greater, whereas oil grit separators are appropriate for areas less than 2 ha (see Table 4.1 of the MECP Stormwater Management Planning Design Manual).
- 19. The areas serviced by oil grit separators are also treated through a series of stormwater treatment processes including roof leaders to grassed areas, dry swales, Catch Basin Shields and perforated pipe systems. These systems provide quality treatment in excess of 80% total suspended solid removal. 80% total suspended solid removal is the highest level of treatment required by the MECP.
- 20. In my opinion, the modelling and projection assumptions relied upon for the design of the proposed subdivision were conservative and consistent with applicable design guidelines and standards. Consequently, servicing and stormwater management solutions have been designed for the site that are safe, appropriate and mindful of the effects of a changing climate.
- 2. Is it appropriate to introduce the proposed number of residential units without conducting a comprehensive review to assess...
- (c) the demands on infrastructure and public service facilities that the development will create?
- 21. DSEL coordinated with the consulting team to create an efficient design that maximizes opportunities for maintaining existing drainage patterns, locates stormwater management blocks at optimal locations and locates the proposed sanitary pump station in an optimal location.

22. In my opinion, the water, wastewater and stormwater servicing solutions outlined in DSEL's FSR will appropriately respond to the on-site demands created by the level of development proposed as well as downstream/off-site infrastructure impacts created by increased demand.

3. Is the Application consistent with the Provincial Policy Statement, 2020?

Specifically, Policies 1.1.1(e), (g), (j) and 1.1.3.2(b).

- 23. For the reasons noted above, I am of the opinion that the proposed design of infrastructure and facilities associated with the development of the site are appropriate, efficient and take into consideration the impacts of climate change.
- 24. I rely upon the evidence of Mr. Keleher in providing the Tribunal with evidence respecting the "costs" of servicing and development from a municipal finance perspective. However, in DSEL's experience, the infrastructure proposed to support development at the subject site is not exceptional, is typically deployed in greenfield development situations and is not expected to create any unusual engineering burdens/obligations on the municipal authority moving forward.

4. Does the Application conform to the policies of the County of Lanark Sustainable Communities Official Plan (SCOP)?

Specifically, Policy 8.2.1.2.

- 25. Appendix 2 to the SCOP suggests a population range between 6,579 to 7,615 for the Town of Perth by 2031. DSEL's work used an estimated a population of 7,620 by 2031. DSEL assumed a population at the upper end of the population growth range to ensure a conservative approach to future infrastructure requirements. This included the future availability and suitability of the proposed water and wastewater services.
- 26. DSEL's site work was informed and supplemented by water resource modelling undertaken by JFSA as well as hydrogeology and geotechnical evaluations undertaken by GEMTEC. Natural hazards and natural heritage features were also assessed by the foregoing

consultants as well as Kilgour. The result was a comprehensive suite of analyses considering the existing state of the site as well as the projected potential requirements and impacts of development on the site.

- 27. In my opinion DSEL's FSR provides a servicing option statement and confirms the availability of water and wastewater services.
- 5. Does the Application conform to the policies, purpose and intent of the Town of Perth Official Plan (the "Official Plan")?

Specifically, Policies 3.4(C), 5.2, 5.3, 5.10 and the engineering/servicing elements of 8.1.4

- 28. Policy 3.4(C) to the Official Plan speaks to the Town's sanitary treatment capacity, which was expanded in 2018 with the addition of a "Submerged Active Growth Reactor" or "SAGR". The SAGR is addressed in DSEL's FSR in Section 4.1 (Existing Wastewater Services). The Environmental Compliance Approval associated with the annual average daily sewage flow permitted with the SAGR (7,718 m³/day) is also included as Appendix C to the FSR.
- 29. As a result of the expansion, the Town has current treatment capacity within its existing lagoon system for a population equivalent of 8,100. Policy 3.4(C) further recognises that adding a fourth cell to the SAGR could further increase treatment capacity to a population equivalent of 10,500 persons.
- 30. Policy 3.4(C) directs that the Town must be "vigilant in removing stormwater from the sanitary collection system." Stormwater infiltration into the sanitary collection system is a fairly widespread issue in a number of municipalities, resulting in increased demands on treatment (and increased cost to taxpayers) where wastewater levels are unnecessarily increased by a lack of separation and/or controls over stormwater. Combined sewers and aged infrastructure are common examples of stormwater infiltration into the sanitary collection system.

- 31. The Town provided flow data to DSEL which revealed that the Town has been successful in removing extraneous flows from entering the sanitary collection system. Analysis of flow data is discussed in Section 4.4 of the FSR.
- 32. In my opinion, the design of the applicant's stormwater management system will ensure that stormwater is directed and conveyed in a manner that will not result in stormwater infiltration into the municipal wastewater treatment system. This will assist the Town in realizing the full rated capacity of its wastewater improvements.
- 33. Policy 5.2 indicates that the Town requires all new development to be serviced by municipal water and sewer and that sufficient plant capacity is available to accommodate new development without surcharging. Through its FSR, DSEL completed an independent analysis of the Town's servicing capacity and demonstrated that capacity is immediately available to support the level of growth proposed for the subject lands. To the best of my knowledge, the Town has not asserted that DSEL's analysis of existing capacity relative to the requirements of the proposed development was in error in any way.
- 34. I have reviewed the criteria listed in Policy 5.2(F) and it is my opinion that DSEL's FSR confirms conformity with the objectives/requirements of each of the civil engineering-related criteria, being 1 (residential treatment capacity), 2 (cost-effective and efficient provision of municipal services and 3 (integration of stormwater management facilities and drainage/grade controls).
- 35. With respect to Policy 5.2(H), I am not aware of the Town asserting that the water and wastewater capacity needs of the proposed development will result in the unequitable distribution of capacity to greenfield development within the Town. DSEL's lagoon capacity analysis is included in Appendix C of the FSR. That analysis included growth in the remainder of the Town concurrently with the subject application. The analysis showed that the lagoon will be at 82% capacity at the full buildout of the development. In my opinion, residual capacity can be generally allocated in accordance with the protocol set out in Appendix 7 of the Official Plan, though it is my understanding that Appendix 7 is provided by the Town for informational purposes and does not form part of the Official Plan (i.e. it can be revised by Council without a *Planning Act* process).

- 36. With respect to Policy 5.3 (Stormwater Management and Drainage), it is my opinion that the FSR outlines a proposed stormwater management system that is developed with a preventative approach. While Policy 5.3(A) appears to discourage "end-of-pipe" approaches to quality control, as noted earlier in this witness statement and as discussed in the FSR, the use of oil grit separators as part of a treatment train approach is justified for portions of the subject site in accordance with MECP recommended guidelines.
- 37. I have reviewed the criteria listed in Policy 5.3(C) and it is my opinion that DSEL's FSR confirms conformity with the objectives/requirements of each of these criteria.
- 38. The proposed stormwater management plan respects the natural drainage patterns to the extent possible through re-development. The stormwater management plan includes five separate discharge points, three into the Tay River and two into the Grants Creek Wetland.
- 39. It is my opinion that the IMP does not sufficiently achieve the objective identified in Policy 5.3(C)1. As illustrated on Figure 6-4 "Preferred Option: Storm Sewer Network" of the IMP, all three ponds are shown to discharge into the Grants Creek Wetland. As outlined in Section 5.1 of the FSR, 22.86ha and 22.01ha of the subject lands are tributary to the Tay River and Grant Creek wetland, respectively. In the post development condition, it is proposed to send 16.32ha to the Grant's Creek Wetland and 28.54ha to the Tay River. This, in my opinion, would better emulate the site's existing natural hydrological characteristics.
- 40. It is my opinion that the IMP does not sufficiently achieve the objective identified in Policy 5.3(C)2. While the IMP introduces a feature for allowing stormwater to slowly enter the Grant's Creek Wetland, the IMP does not provide recommendations for on site infiltration. DSEL's proposed stormwater management plan includes the following methods to encourage natural infiltration: roof leaders to grassed area, amended soils (as necessary), rain barrels, dry swales, and perforated pipe systems. These are discussed in Section 5.5 of the FSR as appropriate examples of low-impact development (LID) measures that can be deployed within the site development.
- 41. With respect to Source Water Protection (Policy 5.3(C)9), correspondence has been received from the relevant source water protection authority confirming that the proposed

development will not constitute a drinking water threat. I am not aware of any assertion by any other public authority that development on the subject site as proposed could create a drinking water threat.

- 42. With respect to the Official Plan's policies respecting source water protection (Policy 5.10), DSEL and JFSA met with Conservation Authority staff to review the source water protection area requirements for releasing stormwater to the Tay River upstream of the drinking water intake. This meeting occurred on November 18, 2022. The Conservation Authority provided a summary of where a stormwater management pond would be considered a threat. It was determined that the nature of the proposed land use and the area to be discharged into the Tay would not be considered a significant drinking water threat. Correspondence confirming this discussion has been included in the FSR and I am not aware of any contrary position taken by the County, the Town or the Conservation Authority.
- 43. With respect to Policy 8.1.4 of the Official Plan (New Residential Area Designation), my evidence is as follows:
 - a. The proposed development incorporates modern sewer, water and stormwater management approaches to treat, store and convey water in the new community.
 - b. DSEL has analysed the servicing solutions presented in the IMP and through the FSR, has proposed efficiency measures that support the economic sustainability of the Town. For example, the IMP contemplates two wastewater pump stations within the Western Annex Lands. The proposed servicing plan eliminates one facility, thereby reducing operational cost to the Town. Furthermore, the proposed outlet for the pump station deviates from the IMP as wastewater is directed to the nearest location with capacity to receive flow from the development. By comparison, the proposed outlet in the IMP is shown between two existing homes at 20 and 21 Inverness Avenue. Several large trees would need to be removed and a permanent easement established to facilitate strict compliance with this outlet location.
 - c. The proposed grading optimizes earth movement on-site and benefits the natural environment by maintaining existing drainage patterns.

- d. The new development will be serviced with piped infrastructure and the level of development achieved will accord with the Town's servicing capacity as the proposal integrates with planning for the Town's long-term growth.
- e. In my opinion, the proposed civil servicing solution is cost-effective and, as confirmed by Mr. Keleher, is fiscally sustainable in the long term. The proposed civil servicing solution does not result in excess cost being downloaded to future development or existing ratepayers.
- f. In my opinion, approval of the subject development would not result in capacity available for greenfield development throughout the Town being inequitably assigned to one area of the Town in a manner that precludes future greenfield development elsewhere. DSEL's lagoon capacity analysis is included in Appendix "C" of the FSR. That analysis included growth in the remainder of the Town concurrently with the subject application. The analysis showed that the lagoon will be at 82% capacity at full buildout of the development.
- 44. Given the costs associated with implementing municipal service connections throughout the subject lands, it would be most appropriate to have the subject lands approved for the proposed development now, so that the necessary capital commitments can be made and required subsurface infrastructure can be planned, designed, permitted and constructed. In my opinion, this infrastructure should not be planned or approved in a piecemeal fashion. While certain Holds or other approval conditions may be required to address other considerations, in my opinion, the ability to proceed with infrastructure improvements and deployment is key to unlocking the development potential of the subject lands.

Conclusion and Recommendation to the Tribunal

45. I am aware that the proposed draft plan of subdivision has been revised since the date of the FSR. The project was revised to add a second access across the Tay River. The boundaries of natural features on the site have also been adjusted to reflect further on-site determinations. I am also aware that permits from the Conservation Authority will be required to address existing floodplain overlays present on the site. While I support that lot creation (i.e. plan registration) should await the outcome of the Conservation Authority's process, I do support designating and zoning the subject site in a manner that permits the planning, designing, permitting and construction of the necessary infrastructure that will make greenfield development on the site a successful addition to the Town. DSEL's analysis, opinions and recommendations respecting the appropriate development of the site from a civil engineering perspective remain unchanged from what is expressed in our FSR.

- 46. As indicated in the FSR, DSEL's conclusions are as follows:
 - ➤ Water It is proposed to make two connections to the Town's existing water distribution system at North Street and Rogers Road. The revised draft plan of subdivision includes a second crossing that can be used to provide a redundant watermain connection to the Town's infrastructure. It is proposed to supply potable water to the development through a series of 150mm, 200mm, and 300mm diameter water mains. A minimum of 10,000L/min is available throughout the development. All system pressures are met during average day, peak hour, and fire flow scenarios. Recommend that further analysis and investigation to confirm triggers for establishing a new water tower.
 - ➤ Wastewater The subject property will be serviced by local sanitary sewers which will be serviced by a single pump station and forcemain outletting to existing trunk sewers on Rogers Road at Jessie Drive. The receiving sewers on Roger's Road at Jessie Drive have sufficient capacity to accept wastewater from the development. The Town's lagoon has sufficient capacity to accommodate the proposed development as well as future growth.
 - ➤ Stormwater The contemplated stormwater management system will outlet to the Tay River and the Grants Creek PSW with predevelopment peak flows maintained. Low Impact Development measures will be implemented upstream of end of pipe treatment facilities which will consist of wet ponds and oil grit separators that are to be designed to provide quality control treatment to achieve an enhanced level of protection in combination with the proposed LID measures. A detailed Hydraulic Grade Line (HGL) modelling analysis will be completed for the proposed system at the detailed design stage.
- 47. In my opinion, the applicant's consulting team has prepared analyses, reports and plans demonstrating that the Town's existing water, sanitary and storm services can

Witness Statement of Adam Fobert
Professional Engineer
David Schaeffer Engineering Ltd.

Page | 15

accommodate the contemplated development and that the subject site can be improved with DSEL's proposed servicing plan. In my opinion, the deployment of DSEL's proposed servicing plan as outlined in the FSR will not have unacceptable negative impacts on downstream lands, downstream infrastructure or the Town's overall ability to realize further appropriate growth.

48. I will be in attendance before the Tribunal to answer any relevant questions concerning DSEL's submitted material, this Witness Statement and the content of any other evidence filed by parties opposite.

Adam D. Fobert, P.Eng.

June 12, 2024





120 Iber Road, Suite 103 Stittsville, ON K2S 1E9 613-836-0856 dsel.ca

APPENDIX A



Adam D. Fobert, P.Eng.

Team Lead

OVERVIEW

Adam Fobert joined DSEL in December 2008 where he is now a Project Administrator Team Lead. Adam has successfully completed numerous development projects, both public and private. He has extensive experience in facilitating approvals and coordination with all levels of government. His project resume includes a diverse range civil scope including everything from a single home building expansion to infrastructure master planning and complex projects such as Windmill's ambitious redevelopment plans of the Domtar lands.

PROFESSIONAL BACKGROUND

2008 – Present | DSEL, Project Administrator Team Lead

- Responsible for the success of Ottawa land development projects.
- Senior level resource that participates in the development of the overall engineering solution and problem solving.
- ◆ Supervise, motivate, train, and mentor direct reports.

2003 - 2008 | Stantec Consulting Limited, Project Engineer

- Responsible for the design of commercial and residential subdivisions.
- Prepared site servicing and stormwater management studies in support of draft plan and site plan applications.
- Assisted senior team members in the preparation of master servicing studies.

PROFESSIONAL AFFILIATIONS

 Professional Engineers Ontario, Registered Member - 2003

EDUCATION

2003

Bachelor of Science (Environmental Engineering), University of Guelph

1997

Algonquin College, Fire Protection and Safety Technician.



PROJECT EXPERIENCE

Planning, Feasibility, Pre-Engineering, Environmental Studies and Assessments:

- ◆ Landsdowne Park Ottawa, ON Residential and Commercial Inter-Provincial Development
- ◆ EY Centre, Ottawa, ON Trade Show Space
- ♦ 125 Hickory Street, Ottawa, ON Multi-storey Residential
- ♦ 81 Norman Street, Ottawa, ON Three-storey residential building
- Phase 3 340 McLeod, Ottawa, ON Nine-storey residential building
- ♦ Herongate Mall Redevelopment, Ottawa, ON Commercial Plaza
- 300 Greenbank Road, Ottawa, ON Self Storage Facility
- ♦ 800 Montreal Road (Blocks D and E), Ottawa, ON Multiblock Residential
- ♦ 3010 Woodroffe Avenue, Ottawa, ON Multiblock Residential
- ♦ 460 St. Laurent Blvd, Ottawa, ON Thirteen-storey Residential Building
- ♦ 1554 Carling Avenue, Ottawa, ON Self Storage Facility
- ♦ 700 Hunt Club, Ottawa, ON Commercial Plaza
- ◆ 319 McRae Avenue, Ottawa, ON Mixed-Use Commercial, Office, Residential
- ♦ 560 Rideau Street, Ottawa, ON Multi-Storey Residential
- ♦ 1140 Wellington Avenue, Ottawa, ON Phased Mixed Use Development
- Brewers Park Fish Compensation Pond, Ottawa, ON
- Citigate Commercial Plaza (Strandherd Drive, Ottawa, ON)
- ◆ 151 Chapel Street, Ottawa ON Mixed Use High Rise
- ♦ 800 Montreal Road (Block A), Ottawa, ON Seniors Care Facility
- 45 Mann Avenue, Ottawa, ON Student Housing
- ◆ 141 Main Avenue, Ottawa, ON Multi-storey Residential
- 3143 Navan Road, Ottawa, ON Multi Block Residential
- ♦ 514-532 Rochester Street, Ottawa, ON Multi-storey residential
- ◆ Zibi Gatineau, Qc and Ottawa, ON Residential and Commercial Development
- Millennium Park Re-development, Ottawa, ON
- ♦ 1179 Hunt Club Road, Ottawa, ON Commercial Plaza
- ♦ 350 Cresthaven Drive, Ottawa, ON Commercial Plaza
- ◆ 1585 Merivale Road, Ottawa, ON Commercial Plaza Re-Development
- ◆ Elmvale Shopping Centre, Ottawa, ON OPA / ZLBA Re-Development
- ♦ Westgate Shopping Centre, Ottawa, ON OPA / ZLBA Re-Development
- ◆ The Ridge Subdivision, Ottawa, ON Plan of Subdivision, ZBLA
- ♦ Village of Richmond Western Expansion Lands, Ottawa, ON Secondary Plan, Plan of Subdivision, ZBLA

Design and Construction Services-Roads, Sewers, Watermain:

- ◆ Landsdowne Park Ottawa, ON Residential and Commercial Inter-Provincial Development
- ◆ EY Centre, Ottawa, ON Trade Show Space
- ♦ 125 Hickory Street, Ottawa, ON Multi-storey Residential
- ♦ 81 Norman Street, Ottawa, ON Three-storey residential building



- Phase 3 340 McLeod, Ottawa, ON Nine-storey residential building
- ♦ Herongate Mall Redevelopment, Ottawa, ON Commerical Plaza
- ♦ 300 Greenbank Road, Ottawa, ON Self Storage Facility
- ♦ 800 Montreal Road (Blocks D and E), Ottawa, ON Multiblock Residential
- ♦ 3010 Woodroffe Avenue, Ottawa, ON Multiblock Residential
- ♦ 460 St. Laurent Blvd, Ottawa, ON Thirteen-storey Residential Building
- ◆ 1554 Carling Avenue, Ottawa, ON Self Storage Facility
- ♦ 700 Hunt Club, Ottawa, ON Commercial Plaza
- ◆ 319 McRae Avenue, Ottawa, ON Mixed-Use Commercial, Office, Residential
- ♦ 560 Rideau Street, Ottawa, ON Multi-Storey Residential
- ◆ 1140 Wellington Avenue, Ottawa, ON Phased Mixed Use Development
- ◆ Brewers Park Fish Compensation Pond, Ottawa, ON
- ◆ Citigate Commercial Plaza (Strandherd Drive, Ottawa, ON)
- ◆ 151 Chapel Street, Ottawa ON Mixed Use High Rise
- ♦ 800 Montreal Road (Block A), Ottawa, ON Seniors Care Facility
- ◆ 45 Mann Avenue, Ottawa, ON Student Housing
- ◆ 141 Main Avenue, Ottawa, ON Multi-storey Residential
- ♦ 3143 Navan Road, Ottawa, ON Multi Block Residential
- ♦ 514-532 Rochester Street, Ottawa, ON Multi-storey residential
- ◆ Zibi Gatineau, Qc and Ottawa, ON Residential and Commercial Development
- ♦ Millennium Park Re-development, Ottawa, ON
- ♦ 1179 Hunt Club Road, Ottawa, ON Commercial Plaza
- ♦ Crownridge Park, Ottawa, ON
- ♦ 350 Cresthaven Drive, Ottawa, ON Commercial Plaza
- ◆ 1585 Merivale Road, Ottawa, ON Commerical Plaza Re-Development
- ♦ Elmvale Shopping Centre, Ottawa, ON OPA / ZLBA Re-Development
- ♦ Westgate Shopping Centre, Ottawa, ON OPA / ZLBA Re-Development
- ◆ The Ridge Subdivision Phases 1-4, Ottawa, ON Plan of Subdivision
- ♦ Fox Run Subdivision Phases 2-3, Ottawa, ON Plan of Subdivision



David Schaeffer Engineering Ltd.

120 Iber Road, Suite 103 Stittsville, ON K2S 1E9 613-836-0856 dsel.ca

APPENDIX B



Ontario Land Tribunal Tribunal ontarien de l'aménagement du territoire

Acknowledgment Of Expert's Duty

OLT Case Number	Municipality
OLT-23-000534	Town of Perth / County of Lanark

- 2. I have been engaged by or on behalf of Caivan (Perth GC) Limited to provide evidence in relation to the above-noted Ontario Land Tribunal (`Tribunal`) proceeding.
- 3. I acknowledge that it is my duty to provide evidence in relation to this proceeding as follows:
 - a. to provide opinion evidence that is fair, objective and non-partisan;
 - b. to provide opinion evidence that is related only to matters that are within my area of expertise;
 - c. to provide such additional assistance as the Tribunal may reasonably require, to determine a matter in issue; and
 - d. not to seek or receive assistance or communication, except technical support, while under cross examination, through any means including any electronic means, from any third party, including but not limited to legal counsel or client.
- 4. I acknowledge that the duty referred to above prevails over any obligation which I may owe to any party by whom or on whose behalf I am engaged.

Date Signature





120 Iber Road, Suite 103 Stittsville, ON K2S 1E9 613-836-0856 dsel.ca

APPENDIX C



120 Iber Road, Suite 103 Stittsville, ON K2S 1E9 613-836-0856 dsel.ca

FUNCTIONAL SERVICING REPORT

FOR

CAIVAN (PERTH GC) LIMITED

PROPOSED RESIDENTIAL SUBDIVISION

TOWN OF PERTH

PROJECT NO.: 21-1278

FEBRUARY 2023
© DSEL

FUNCTIONAL SERVICING REPORT FOR PROPOSED RESIDENTIAL SUBDIVISION

CAIVAN (PERTH GC) LIMITED

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	Existing Conditions	1
1.2	Development Layout	2
1.3	Consultation Summary	2
1.4	Required Permits / Approvals	3
2.0	GUIDELINES, PREVIOUS STUDIES, AND REPORTS	з
2.1	Existing Studies, Guidelines, and Reports	7
3.0	WATER SUPPLY SERVICING	9
3.1	Existing Water Supply Services	9
3.2	Water Supply Servicing Design	9
3.3	Water Supply Conclusion	12
4.0	WASTEWATER SERVICING	13
4.1	Existing Wastewater Services	13
4.2	Wastewater Design	14
4.3	Wastewater Servicing Conclusions	18
5.0	STORMWATER MANAGEMENT	19
5.1	Existing Stormwater Services	19
5.2	Post-Development Stormwater Management Target	21
5.3	Proposed Minor System	22
5.4	Low Impact Development Measures	23
5.5	Stormwater Management Facilities	25
5.6	Hydraulic Grade Line Analysis	26
5.7	Major System Design	27
5.8	Grading and Drainage Design	27
5.9	Stormwater Servicing Conclusions	28
6.0	EROSION AND SEDIMENT CONTROL	29
7.0	CONCLUSION AND RECOMMENDATIONS	30

Table 11: Table 12:

FEBRUARY 2023

TOWN OF PERTH

TABLES

Table 1: Potential Required Permits/Approvals Water Supply Design Criteria Table 2: Table 3: Annual Average Lagoon Flow Table 4: Wastewater Design Criteria Estimated Infiltration and Inflow Table 5: Table 6: Rainfall Summary Pre-Development Drainage Conditions Table 7: Storm Sewer Design Criteria Table 8: Table 9: Lot Level Treatment Systems Considered Stormwater Management Ponds - Grants PSW Table 10:

APPENDICES

Stormwater Management Ponds – Tay River

Pre-Development Drainage Conditions

Appendix A General
Appendix B Water Supply
Appendix C Wastewater Collection
Appendix D Stormwater Management

FIGURES

F:	Cita La cation
Figure 1	Site Location
Figure 2	Subdivision Plan
Figure 3	Watermain Servicing Plan
Figure 4	Perth Wide Sanitary Plan
Figure 5	On-site Sanitary Servicing Plan
Figure 6	Off-site Sanitary Servicing Plan
Figure 7	Storm Servicing Plan
Figure 8A-F	Runoff Coefficient Figures
Figure 9	Standard Cross-sections
Figure 10	Grading Plan
Figure 11	Preliminary Earthworks
Figure 12	Preliminary Rock Cut
Figure 13	Preliminary Floodplain analysis
Figure 14	Sanitary Trunk Profiles
Figure 15	Storm Trunk Profiles

FUNCTIONAL SERVICING REPORT FOR PROPOSED RESIDENTIAL SUBDIVISION CAIVAN (PERTH GC) LIMITED

FEBRUARY 2023

TOWN OF PERTH PROJECT NO.: 21-1278

1.0 INTRODUCTION

David Schaeffer Engineering Limited (DSEL) has been retained by Caivan (Perth GC) Limited to prepare a Preliminary Functional Servicing Report in support of their application for draft plan of subdivision.

The subject property is located within the West Annex lands as defined in the **Town of Perth's Infrastructure Master Plan (IMP**). The western property is composed of two parcels of lands known as the 'Perth Golf Course' and the 'Tayview Property' (formerly in the Tay Valley Township), as shown in the Annexed Area Plan in **Appendix A**. The subject property is limited to the 'Perth Golf Course' only. The proposed concept plan prepared by Caivan (Perth GC) Limit is found in **Appendix A**. The contemplated development consists of standard townhomes, single family homes, parks, stormwater management facilities, and the retention of a 9-hole golf course.

DSEL submitted a Preliminary Functional Servicing Study to the Town of Perth and Lanark County in April 2022 and received comments in August 2022. The following report was updated in response to Town and County comments.

The objective of this report is to provide sufficient detail to demonstrate that the proposed development area can be supported by municipal services.

1.1 Existing Conditions

The subject property is located within the 300-hectare lands defined as the 'Golf Course Subdivision' in the *Town of Perth IMP* and is located south of Tay River and north of the Grant's Creek Provincially Significant Wetland (PSW). The Tay River is located along the north and eastern property limits of the Perth Golf Course Subdivision with Grant Creek located along the southeastern boundary. The land use for the subject property has been designated by the Town of Perth for parks, open space, residential lots, and special study areas. The subject property is surrounded by an Environmental Protected Area comprising of flood plain, a natural heritage feature, and the noted PSW. The 18-hole private golf course facility is located at 141 Peter Street where sole access to this facility is via a two-lane bridge crossing Tay River from Peter Street.

The Town's Water Treatment Plant is located across the Tay River from the northeast corner of the subject property. Any discharges upstream of this area is under the Mississippi-Rideau Source Protection Plan and is enforced by the Rideau Valley Conservation Authority (RVCA).

Gemtech completed a Geotechnical Investigation for the subject lands. The site contained top soil ranging in depth from 30 to 280 mm. Peat was encountered in pockets of the site

with thicknesses ranging from 70 to 560mm. The native soils are a combination of silty sand, silty clay and glacial till. Precambrian Bedrock was encountered at numerous boreholes and was observed at surface.

The existing elevations within the subject property ranged from the normal high-water mark of the Tay River at 134.5m to elevations of 142m.

1.2 Development Layout

The proposed multi-phase development consists of park blocks, residential blocks of townhouses and single detached units, a collector road with a 24.0m right-of-way (ROW) width, and a network of local roads of 16.75m and 18.5m ROW widths. The full buildout of the development will consist of 299 townhomes, and 640 single family homes.

Site access options presented for the subject property include the use of the existing Peter Street bridge and the construction of a new bridge across the Tay River as indicated per the proposed concept plan prepared by Caivan located in *Appendix A*.

1.3 Consultation Summary

Caivan (Perth GC) Limited and their consultant team met with Town of Perth staff on November 25, 2021 to discuss the development application. Meeting agenda is included in **Appendix A**. Subsequently, the development team met with the Town and County staff on January 14, 2022. Meeting minutes and consultant notes are included in **Appendix A**.

Representatives from DSEL and Stantec met with Grant Machan of the Town of Perth on February 18, 2022 to further review details related to water and wastewater servicing requirements. Email exchange and meeting notes are included in *Appendix A*. The Town provided an update on the progression of water infrastructure improvements, key items to include in future pump station design, and expressed their preference for infrastructure crossing the Tay River to be hung from the bridge, rather than directional drilled under the river.

Caivan (Perth GC) Limited and their consultant team met with Town staff to review application comments on September 16, 2022. Meeting minutes circulated to Town and County staff on October 12, 2022 are included in **Appendix A**.

DSEL and J.F. Sabourin and Associates (JFSA) met with RVCA staff to review the source water protection area requirements for releasing stormwater to the Tay River upstream of the drinking water intake on November 18, 2022. The RVCA provided a summary of where a stormwater management pond would be considered a threat. It was determined that the nature of the proposed land use and the area to be discharged into the Tay would not be considered a significant drinking water threat. DSEL worked with Caivan (Perth GC) Limited to optimize the development plan in an effort to balance the site's earthworks as well as to mimic existing drainage patterns.

DSEL and representatives from Caivan (Perth GC) Ltd. met with Town staff on November 25, 2022 to review DSEL lagoon analysis. DSEL presented a summary of their findings to Town staff demonstrating available capacity within the lagoon. Capacity analysis is discussed further in **Section 4.0**. DSEL prepared and delivered detailed calculations for Town review via email on November 30, 2022. Email correspondence is included in **Appendix A**.

1.4 Required Permits / Approvals

Once Draft Plan of Subdivision is obtained, the Town of Perth must approve detailed engineering design drawings and reports prior to construction of the municipal infrastructure identified in this report.

The following additional approvals and permits listed in **Table 1** are expected to be required prior to construction of the municipal infrastructure detailed herein. Other permits and approvals may be required, as detailed in other studies submitted as part of the Planning Act applications (e.g. *Tree Conservation Report, Phase 1 Environmental Site Assessment, etc.*).

Table 1: Potential Required Permits/Approvals

Agency	Permit/Approval Required	Trigger	Remarks
MECP / Town of Perth	Environmental Compliance Approval	Construction of new sanitary & storm sewers.	MECP is expected to review the stormwater collection system and wastewater collection system by direct submission once the Town approves the works.
MECP	Permit to Take Water	Construction of proposed land uses (e.g. basements for residential homes) and services.	Pumping of groundwater will be required during construction, given groundwater conditions and proposed land uses/ municipal infrastructure.
Town of Perth	MOE Form 1 – Record of Watermains Authorized as a Future Alteration	Construction of watermains.	The Town of Perth is expected to review the watermains on behalf of the MECP.
Rideau Valley Conservation Authority	Application for "Development, Interference with Wetlands and Alterations to Shorelines and Watercourse" Ont. Reg 174.06	Construction of storm outlets. Rationalization of Flood Plain	The RVCA is expected to review and approve the alterations to the shoreline and cutting and filling within the floodplain.

1.5 Municipal Class Environment Assessment (MCEA)

The Town of Perth Completed an Infrastructure Master Plan *(IMP)* in 2019 where servicing strategies for the subject lands were presented.

The **IMP** completed Phases 1 and 2 of the MCEA and selected preferred servicing solutions and indicated that "The Master Plan enables the Town to identify the needs for a specific study area and establish broader infrastructure alternatives to consider, which may lead to better solutions. The Master Plan would then be used in support of further work for specific Schedule 'B' projects, or further work in Phases 3 and 4 for Schedule 'C' projects."

Caivan and DSEL reviewed the \it{IMP} and coordinated additional field investigations and surveys as recommended in the \it{IMP} to refine the preferred alternatives. The following

summarizes the recommendations of the **IMP** along with a brief summary of the proposed modifications.

1.5.1 Amendment to IMP Water Supply Servicing

The **IMP** proposed two river crossings with connections to an upgraded watermain on Inverness Avenue and to the existing 300mm dia main on North Street. Methods of crossing the river were to be established at detailed design.

Figure 6-3 from the *IMP* is included in *Appendix A* along with DSEL's commentary and notes. The connection to North Street is shown through lands held in private ownership. While the map appears to indicate that a right-of-way exists at that location, a title search revealed that the lands are held in private ownership. See property index map included in *Appendix A*. The connection to Inverness Avenue proposed in the IMP involved replacing the existing 150mm diameter main on Inverness and constructing a new 300mm diameter main between two existing homes. As shown on the markup of Figure 6-3, the connection would involve the removal of several mature tree and disruption to existing residents.

As described in **Section 3.2**, it is proposed to have two river crossings at Peter Street and hang the proposed infrastructure from the existing and new bridges. The watermains will be maintained on separate structures and separate service trenches. One watermain will connect to the existing 300mm diameter main on North Street and the second to the existing 300mm diameter on Rogers Road.

The proposed servicing solution deviates from the IMP in alignment only. The preferred solution maintains the fundamental strategy to deliver potable water to the subject lands from the town's existing plant. The proposed solution falls within a Schedule A project as described in the Municipal Class Environment Assessment. The submission is being made under the Planning Act and no new lands are required to support the water supply servicing strategy.

Schedule A:

6. Establish, extend or enlarge water distribution system and all necessary works to connect the system to an existing system, where it is required as a condition of approval on a site plan, consent, plan of subdivision or plan of condominium which will come into effect under the Planning Act prior to the construction of the extension of the collection system.

1.5.2 Amendment to IMP Wastewater Servicing

The **IMP** evaluated wastewater servicing alternatives assuming that all existing sanitary sewers within the Town were in good repair and at minimum grade per MECP guidelines. Furthermore, the **IMP** did not review the capacity of existing receiving pump stations.

The *IMP* recommended two new pump stations to service the subject lands with sewage directed to Inverness Avenue and North Street. New pump stations were assumed to be \$300,000 each. The IMP indicated that the detailed design engineer would be responsible to review off-site as-builts. Figure 6-5 was extracted from the *IMP* and included in *Appendix A* along with DSEL's commentary. As indicated in *Section 1.5.1*, the proposed connection to Inverness Avenue would be disruptive to existing residents and would involve the removal

of several mature trees on private property. The alignment of the North Street connection is through privately held lands.

Caivan coordinated survey of off-site sewers and engaged Stantec Consulting to review available capacity within the existing Cockburn PS. It was discovered that several sewers sloped well below minimum grade and there is insufficient capacity from North Street to the Cockburn PS. Furthermore, several deficiencies were identified within the existing Cockburn Pump Station which is currently operating near maximum capacity. Lastly Stantec's opinion of cost for a new PS is ten times higher than assumed by the *IMP* (\$3,000,000).

An alternative wastewater solution was developed in light of the extensive upgrades required to the downstream system and recent costing on new pump stations.

The proposed wastewater servicing solution includes a single pump station to support the development reducing capital and future operating cost. The pump station will direct wastewater from the subject lands to the existing gravity sewer south of South Street at Jessie Drive via a new forcemain along Rogers Road. Refer to **Section 4.2** for additional details.

The proposed wastewater solution is fundamentally consistent with the *IMP*. Wastewater is to be collected through a series of gravity sewers to a local pump station and conveyed to existing infrastructure. No new lands are required to support the proposed solution and all works remain within existing municipal owned right-of-ways.

The proposed wastewater solution is a Municipal Class Environmental Assessment A/B project. Where:

Schedule A:

10. Establish, extend, or enlarge a sewage collection system and all necessary works to connect the system to an existing sewage outlet, where it is required as a condition of approval on a site plan, consent plan of subdivision or plan of condominium which will come into effect under the Planning Act prior to the construction of the collection system.

Schedule B:

7. Construct new pumping station or increase pumping station capacity by adding or replacing equipment and appurtenances, where new equipment is located in a new building or structure.

1.5.3 Amendment to IMP Stormwater Plan

The *IMP* recommended three stormwater management ponds that discharge all runoff to the Grants Creek Wetland with pond outlets and inlets above 100year floodplain elevation. Ponds were to discharge into a linear drainage channel prior to flowing into the wetland. The *IMP* stated "a Hydrologic Impact Study would have to be conducted to demonstrate that there are no negative impacts on hydrologic function of the PSW as a result of the development." Furthermore, the *IMP* indicated that "a water balance for the subdivision as a whole will be required prior to applying for draft plan of subdivision." The *IMP* did not complete a grading

plan to support the proposed stormwater servicing solution. **Appendix A** includes Figure 6-4 extracted from the **IMP** along with DSEL's commentary.

The *IMP's* direction to establish pond inlets and outlets above the existing 100-year floodplain level is inconsistent with the province's *SWMP Design Manual* and would result in starting road grades approximately 4.5m above the existing ground resulting in a significant amount of fill required to support development.

The IMP recommended a stormwater management pond located within an area identified as wetland in *EIS Report*.

Ponds appear to be undersized for controlling post development flow.

DSEL reviewed the ability to direct all post development runoff to the Grant's Creek Wetland and maintain no negative impacts on the hydraulic function of the provincially significant wetland. It was concluded that post development drainage areas that closely match the existing topography will aid in maintaining post development water balance and hydraulic function of both the wetland and the Tay River.

DSEL prepared a master grading plan for the community and delineated stormwater drainage areas. JFSA reviewed the pre-development flow patterns and estimated pond volumes based on post-development conditions. DSEL prepared preliminary pond layouts and estimated available storage volumes. Proposed solution includes three stormwater management ponds and two OGS outlets providing quality and quantity controls. Pond outlets are set in accordance with MECP design guidelines with outlets above the 2-year level. Site grading follows existing topography where possible. Proposed outlet to Tay River upstream of Water Treatment plant intake was reviewed with the RVCA and determined not to be a significant threat under the Source Water Protection plan. See **Section 5.2** for additional information.

The proposed stormwater solution is a Municipal Class Environmental Assessment A project. Where:

Schedule A:

17. Construction of stormwater management facilities which are required as a condition of approval on a consent, site plan, plan of subdivision or condominium which will come into effect under the Planning Act prior to the construction of the facility.

2.0 GUIDELINES, PREVIOUS STUDIES, AND REPORTS

2.1 Existing Studies, Guidelines, and Reports

The following documents were referenced in the preparation of this report:

Ottawa Sewer Design Guidelines, City of Ottawa, SDG002, October 2012. (City Standards)

> Technical Bulletin ISDTB-2014-01, Revisions to Ottawa Design Guidelines – Sewer,
> City of Ottawa, February 5, 2014.
> (ISDTB-2014-01)

 Technical Bulletin PIEDTB-2016-01, Revisions to Ottawa Design Guidelines – Sewer,
 City of Ottawa, September 6, 2016. (PIEDTB-2016-01)

 Technical Bulletin ISTB-2018-01, Revisions to Ottawa Design Guidelines – Sewer, City of Ottawa, March 21, 2018. (ISTB-2018-01)

 Technical Bulletin ISTB-2018-03, Revisions to Ottawa Design Guidelines – Sewer, City of Ottawa, March 21, 2018. (ISTB-2018-03)

 Technical Bulletin ISTB-2019-01, Revisions to Ottawa Design Guidelines – Sewer, City of Ottawa, January, 2019. (ISTB-2019-01)

Technical Bulletin ISTB-2019-02, Revisions to Ottawa Design Guidelines – Sewer,
City of Ottawa, July 8, 2019.
(ISTB-2019-02)

Design Guidelines for Sewage Works,
 Ministry of the Environment, 2008.
 (MOE Design Guidelines)

Stormwater Planning and Design Manual, Ministry of the Environment, March 2003. (SWMP Design Manual)

Ontario Building Code Compendium Ministry of Municipal Affairs and Housing Building Development Branch,

January 1, 2010, Update. *(OBC)*

- Mississippi-Rideau Source Water Protection Plan, MVCA & RVCA, August 2014.
- ➤ Erosion & Sediment Control Guidelines for Urban Construction, Greater Golden Horseshoe Area Conservation Authorities, December 2006.
- Infrastructure Master Plan for Area North of Highway 7 Dillon Consulting, October 2013 (HWY 7 IMP)
- 2016 Perth Potable Water Model Update Stantec, October 12, 2016 (Ex Water Conditions)
- Memo Reopen EA/Master Plan Area North of HWY 7 Water Review Jp2G Consultants Inc, April 5, 2019 (Jp2G Water Memo)
- Infrastructure Master Plan, Western Annex in the Town of Perth Jp2g Consultants Inc., November 2019. (IMP)
- Perth Western Annex Lands 141 Peter Street: Potable Water Hydraulic Analysis
 Stantec, February 2023
 (Hydraulic Analysis)
- Caivan Perth Development Hydrologic and Hydraulic Conditions Report, JFSA, February 2023 (SWM Report)
- Environmental Impact Study, Kilgour and Associates, February 2023 (EIS Report)
- Geotechnical Investigation, Proposed Residential Development, 141 Peter Street, Perth, ON Gemtech, February 3, 2023 (Geotechnical Report)
- Hydrogeological Investigation, Proposed Residential Development, 141 Peter Street, Perth ON Gemtech, February 22, 2023 (Hydro-G Report)

3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The proposed subdivision is located south of the Town's watermain network located in the Town of Perth. The existing watermains in proximity to the subject property are as follows:

- > 75 mm diameter watermain via the Peter Street bridge (currently carries municipal drinking water for the existing golf course)
- > 300 mm diameter watermain on North Street
- > 300 mm diameter watermain on Rogers Road
- > 300 mm diameter watermain on Sunset Boulevard
- > 150 mm diameter watermain on Inverness Avenue

Excerpt from the **Town of Perth IMP** is included in **Appendix B**.

DSEL obtained the existing conditions model of the water distribution system from the Town of Perth on May 20, 2021. The existing conditions model was prepared by Stantec Consulting Ltd in 2016.

According to the *Ex Water Conditions report*, water supply to the Town is Water supply to the Town is drawn from the Tay River where it is treated at the Water Treatment Plant (WTP) on Sunset Boulevard. There are three (3) high lift pumps at the treatment plant (2 domestic pumps each rated at 105L/s and 54.9m TDH and 1 standby fire pump rated at 158L/s and 54.9m TDH). Additionally, there are three (3) low lift pumps at the treatment plant (1 rated at 105 L/s and 2 rated at 53 L/s).

The underground reservoir at the WTP provides approximately 2800 m³ and the clearwell provides approximately 290 m³ of storage. Additionally, the service wells provide another 261 m³ of storage.

The elevated water storage tank located on Harvey Street has a volume of 945 m 3 with a useable volume of 800 m 3 . The 100% full water level has an approximate metric geodetic elevation of 180.5m. The storage area inside the elevated tank is approximately 8.1m in height. The corresponding 0% full water level is roughly 172m. The water levels in the storage tank are maintained manually by Town personnel by the operation of the high lift pumps at the water treatment plant.

The **IMP** indicated that the total storage volume available is 3,745m³

3.2 Water Supply Alternatives

DSEL reviewed the following alternatives to deliver potable water to the contemplated development.

As indicated in **Section 1.3**, Town staff indicated a preference to hang new infrastructure from a bridge as opposed to open cut or directional drilling below the Tay River. As such, the following alternatives assumed all river crossings would be hung from a bridge or structure. As identified in **Section 1.5.1**, watermain alignment to North Street is shown to take place

through privately held lands. Therefore, connections to North Street were assumed to take place via Peter Street / Lustre Lane.

Option 1 – Follow the preferred solution as recommended in the **IMP** with connections to Inverness Avenue and North Street. The Inverness connection involves crossing the Tay River with a 115m span, traversing County lands, establishing a servicing easement on County lands and between two existing homes, and replacing an existing watermain on Inverness Avenue. The proposed connection to Inverness Avenue is constrained by two existing homes and associated landscaping and mature trees. The span was measured as the narrowest distance across the Tay River's 100-year floodplain limit near the preferred alignment as identified in the **IMP**.

Option 2 – Provide connections to the existing 300mm diameter main on Sunset Boulevard and the 300mm diameter main on North Street. The Sunset connection involves crossing the Tay River with a 115m span, traversing and establishing easements on County lands. The span was measured as the narrowest distance across the Tay River's 100-year floodplain limit near the preferred alignment as identified in the **IMP**.

Option 3 – Recommended – Provide connections to the existing 300mm diameter main on North Street and the 300mm diameter main on Rogers Road. The mains are to be placed in separate trenches and hung from separate bridges crossing the Tay River. One main will be placed on the existing upgraded Peter Street Bridge. The second main to be placed on the new twin bridge at Peter Street. The recommended solution minimizes disruption to existing residents, does not require new lands or easements to be established, and avoids the need to construct and maintain a third Tay River water crossing.

3.3 Water Supply Servicing Design

The proposed subdivision will be serviced by a network of 150mm, 200mm and 300mm diameter watermains and a looped connection to the existing 300mm diameter main on North Street. **Table 2** summarizes the Water Supply Design Criteria used in preparation of the preliminary water demand estimates.

Table 2: Water Supply Design Criteria

Design Parameter	Value
Residential Single Family	3.8 P/unit
Residential Townhouse/Back-to-Back	3.5 P/unit
Residential Average Daily Demand	450 L/d/P
Residential Maximum Daily Demand	2 x Average Daily
Residential Maximum Hourly	2.2 x Maximum Daily
Minimum Watermain Size	150 mm diameter
Minimum Depth of Cover	2.1 m from top of watermain to finished grade
During normal operating conditions pressure must not drop below	275 kPa
During normal operating conditions pressure must not exceed	550 kPa
During fire flow operating pressure must not drop below	140 kPa

Required Fire Flow Single Family**	7,000 L/min	
Required Fire Flow Townhomes**	10,000 L/min	
*per Corporation of the Town of Perth – Engineering Design Guidelines ** Preliminary estimate to be reviewed at detailed design		

Town of Perth Engineering Design Guidelines stipulate that fire flow requirements are to be established in accordance with the latest version of the Fire Underwriter's Survey (FUS). Where fire flow cannot be met the municipality will consider the minimum flows outlined within the Ministry of Environment "Guidelines for the Design of Water Distribution Systems." Stantec estimated required fire flows for the contemplated development per the **FUS** guidelines. See **Appendix B** for a copy of the **Hydraulic Analysis**.

The proposed configuration of watermains for the subject property is shown in *Figure 3*.

The *Hydraulic Analysis* reviewed a preliminary water distribution system to support the contemplated development. The analysis contemplated demands for the subject lands, Tayview development, and area North of highway 7. System pressure requirements are met across the entire development during average day and peak hour demands. The system was shown to provide fire flow in excess of 10,000L/min throughout. See *Appendix B* for a copy of the *Hvdraulic Analysis*.

3.4 Water Tower Expansion

The *Hydraulic Analysis* estimated required water storage for the complete buildout the Town of Perth envisioned in the *IMP* including the Western Annex lands, Tayview Development, and North of HWY 7 area. The estimated total required storage was **6,557m³** based on Town of Perth Engineering Design Guidelines. Therefore, the estimated storage expansion required is **2,812m³**. Sizing of the storage facility is beyond the scope of this study.

Dillon Consulting Ltd was retained by the Town of Perth in 2010 to complete an Infrastructure Master Plan (HWY 7 IMP) for the area north of Highway 7 and east of Lanark Road. The Study was performed in accordance with the planning process defined in the Municipal Class Environmental Assessment. The Study concluded that a watermain network is needed throughout the study area including an elevated water storage tank to provide fire flow capacity in addition to balancing and contingency volume. The HWY 7 IMP recommended a new elevated storage tower with a capacity of 3,404m³ and located north of highway 7 within a planned park block.

The Town of Perth retained JP2G Consultants Inc in 2019 to provide a general review of the existing watermain network within the Town of Perth. JP2G specifically reviewed the contemplated water tower requirement and location recommended by the *HWY 7 IMP*. The HWY 7 IMP discounted the 2,800m3 available at the water treatment plan. JP2G indicated that the volume should be made available for use as fire water storage. JP2G reviewed two alternative locations for a new water tower; north of highway 7 and south of South Road. A water tower located north of highway 7 as planned in the HWY 7 IMP was anticipated to provide 139 L/s to 142 L/s (8,340 L/min to 8,520 L/min) of fire flow to the Golf Course lands. While a tower located south of the Town would provide 158 L/s to 163 L/s (9,480 L/min to 9,780 L/min) to the Golf Course lands. The JP2G report concluded that the current water tower and water plant is able to support the Town up to 7,230 people and recommended additional analysis to confirm plant upgrades and preferred tower location. Statistics Canada completed a census in 2021 and reported a population of 6,469, see *Appendix C*.

The Town of Perth commissioned Watson and Associates Economists Ltd in 2021 to complete a Financial Plan in accordance with Water Ontario Regulation 453/07. Watson's financial plan forecasted a \$4,750,700 expenditure in 2024 for a new elevated storage tank.

DSEL estimated population growth within the Town of Perth assuming 34 building permits per year from 2022 to 2025, increasing to 65 permits per year in 2025 (per permit data and forecasts provided by the Town). The Town's population could reach 7,191p by 2028. However, the Town's 2021 Drinking Water Summary report illustrates a reduction in water use from 2018 to 2021 (see *Appendix C*). Therefore, further investigation is recommended to support the trigger to expand the Town's storage requirements.

3.5 Water Supply Conclusion

It is proposed to make two connections to the Town's existing water distribution system at North Street and Rogers Road. It is proposed to supply potable water to the development through a series of 150mm, 200mm, and 300mm diameter water mains. Stantec analysis indicates a minimum of 10,000L/min is available throughout the development. All system pressures are met during average day, peak hour, and fire flow scenarios.

The Town of Perth commissioned an Infrastructure Master Plan for the Area North of Highway 7 (*HWY 7 IMP*, Dillon October 2013), updates to their water model (*Ex Water Conditions*, Stantec 2016), review of water tower locations (*Jp2G Water Memo*, Jp2G April 2019), and an Infrastructure Master Plan for the Western Annex Lands (*IMP*, Jp2G November 2019). The studies commissioned by the Town indicated a need to increase water storage to support future development. The *Jp2G Water Memo* indicated that the Town can currently support an estimated population of 7,230 people. Statistic Canada completed a census in 2021 and reported a population of 6,469. The Town's 2021 Drinking Water Summary report illustrates a reduction in water use from 2018 to 2021. Recommend that further analysis and investigation to confirm triggers for establishing a new water tower.

4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

The existing golf course facility is serviced through a small private pump station. The Peter Street bridge currently carries wastewater for the golf course through a 100 mm diameter sewer force main connected to Peter Street at Lustre Lane. Most of the Town of Perth, including the subject property, conveys wastewater to a pump station on Cockburn Street and Big Ben Trail, referred to as the Cockburn PS. This facility pumps wastewater to a 750mm diameter trunk sewer which ultimately discharges into the Perth Lagoon. Refer to **Figure 4** for an illustration of the Town's existing wastewater collection system.

Caivan engaged JD Barnes / OnSite Locates to complete an as-built survey of the existing sewers along Peter Street, Lewis Street, Beckwith Street East to the existing Cockburn PS. It was found that several sewers along the route to the existing Cockburn PS were installed below minimum grade and lack capacity to convey existing peak flows. Sewers along Ottawa Street, Rogers Road, and Jessie Street were also surveyed to review the as-built slopes and sizes. Sewer surveys are included in *Appendix C*. The minimum residual capacity along the outlet is 92.9L/s between MHs 22 and 23 east of Rogers Road. Refer to calculation sheet in *Appendix C*.

Stantec Consulting was retained to review the available capacity of the existing Cockburn PS. Limited information was made available to conduct their review. Their analysis was based on a site review conducted on June 14, 2021. Stantec found that the existing facility is at or near capacity. Should the contemplated development be directed to the Cockburn PS is was recommended to replace the two existing 30HP pumps with two new 45HP pumps and interconnecting the two 400mm forcemains to gain additional capacity to provide relief to existing flows. Refer to the technical memorandum included in *Appendix C* for additional information.

The Town of Perth is serviced by a sewage lagoon originally designed in 1961 for a population of 8,500 people (Proctor & Redfern, 1961). The system is comprised of three stabilization cells and a vacant dry cell, all covering an 80acre area. The Ministry of the Environment, Environmental Compliance Approval (ECA) 1045-6VTHH8 allows an annual average daily sewage flow of 7,718 m³/day. See *Appendix C* for a copy of the ECA. *Table 3* summarizes average annual flow, annual rain fall, and lagoon capacity as a percentage. Annual flow averages from 2011 to 2013 were extracted from the *IMP*. Town staff provided flow rates for the years 2018 to 2022 via email on November 25, 2022, see *Appendix A* for correspondence. Annual rainfall data was acquired from Environment Canada at Drummond Centre, approximately 14km from the Town of Perth. Lagoon capacity was taken as a percentage of the average daily flow over 7,718m³/d specified on the ECA.

Table 3: Annual Average Lagoon Flow

Design Parameter	2011	2012	2013	2018	2019	2020	2021	2022
Avg Daily Flow (m³/d)	6264	5042	5981	6639	6650	5454	4959	5085
Annual Rain (mm)	806	626.8	872.4	785	860.2	825.2	802.2	828.2
Lagoon Capacity (%)	80.5	64.8	76.9	85.3	85.5	70.1	63.7	65.4

The following was extracted from **Amendment No.16** to the **Official Plan of the Town of Perth.**

'In 2017, the Town of Perth initiated a major upgrade of its lagoon system with the construction of a "Submerged Attached Growth Reactor (SAGR) – Phase 1". This major capital investment resulted in the treatment capacity of the lagoon increasing from 6,100 persons to 8,100 persons. Phase 2 of the SAGR project, which is planned and designed but not constructed, will bring the capacity to 10,500 persons. Phase 1 was commissioned in the fourth quarter of 2018.

The Town has completed a servicing Master Plan to facilitate development in the northerly portion of the Town and has completed Phase I of the expansion of the sewage lagoon with a design population of 8,100. Phase II of the lagoon upgrade would establish a design population of 10,500, if needed.'

Official Plan Amendment No.16 speaks to the lagoon capacity as a function of population while the ECA provides a unitary flow rate.

Statics Canada gathered census data in 2011, 2016, and 2021 during the monitoring periods. The reported population of Perth was 5,840 in 2011, 5,930 in 2016, and 6,469 in 2021. See census profiles in *Appendix C*. As shown in *Table 3*, while the highest reported population is in 2021, the lagoon was at 63.7% capacity. Furthermore, in 2011 the lagoon was at 80.5% capacity with 629 fewer people.

As discussed in the *IMP*, the Town of Perth since 2007 has undergone an intensive wet weather flow reduction program. Town staff have indicated to DSEL that sewer rehabilitation projects in the Town have eliminated stretches of combined sewers. 2018 was the second driest in the monitored period it showed the lagoon at 85.3% capacity, 2019 was wetter than 2018, yet the capacity remained consistent. 2022 saw the third highest amount of annual rainfall in the monitored period while the lagoon was at third lowest capacity.

Town staff have indicated that industrial users of water have reduced since 2011 and may also explain the reduction in flows at the lagoon facility. Lagoon capacity analysis is further reviewed in **Section 4.3**.

4.2 Wastewater Design Alternatives

DSEL reviewed the following alternatives to support development of the Golf Course Lands.

Option 1 – Follow the recommendations in the *IMP*. The IMP recommended two wastewater pump stations with outlet to Inverness Avenue and North Street. It is Stantec's opinion that the cost of a new pump station was underestimated by a factor of 10. The connection to Inverness Avenue requires the establishment of a servicing easement between two existing homes along with upgrades to the existing local sanitary sewer. The second connection to North Street requires extensive upgrades to gravity sewers from the site to the Cockburn PS. Furthermore, upgrades to Cockburn PS would be required to accommodate additional flow. Option 1 was considered to be cost prohibitive and distributive to existing residents and was abandoned.

Option 2 – Single pump station directing wastewater to North Street per the *IMP*. A connection to North Street requires extensive upgrades to gravity sewers from the site to the Cockburn PS. Furthermore, upgrades to Cockburn PS would be required to accommodate additional flow. Option 2 was considered to be cost prohibitive and distributive to existing residents and was abandoned.

Option 3 – Recommended - Single pump station directing wastewater to Roger Road at Jessie Drive. A proposed forcemain route down Rogers Road avoids disruption to the core of the Town of Perth and avoids the need to upgrade the Cockburn PS. DSEL verified available capacity at the Jessie Drive sanitary sewer to support the contemplated development. The proposed design alternative is fundamentally in keeping with the **IMP** and minimizes capacity and future maintenance cost.

4.3 Wastewater Design

The proposed development will consist of a network of gravity sanitary mains tributary to a new wastewater pump station located within the development area. This proposed pump station will outlet to Rogers Road at Jessie Drive. Refer to *Figure 5* for an illustration of the conceptual sewer layout. *Figure 6* illustrates the off-site forcemain routing to Jessie Drive. *Figure 14* illustrates preliminary sewer profiles.

The contemplated pump station will operate using Float Control within the duplex pump control panel, i.e., with no Programmable Logic Controller (PLC) (no SCADA controls are included).

The pump station design will provide the Town with the ability to remotely monitor the PS alarms using a basic cellular communication system. Critical station statuses (including high wetwell level, pump failure, power failure, generator failure, and generator running) will be communicated to the Town's WIN-911 alarm notification system.

A pre-fabricated control panel kiosk set on a reinforced concrete pad will house all required services to accommodate the pumping station, including electrical distribution equipment, automatic transfer switch, and duplex pump control panel.

The standby power generator is anticipated to be fueled by natural gas and housed within a sound attenuating enclosure set on a reinforced concrete slab.

In the event of pump station failure, the facility will overflow to stormwater management facility 2 where overflow sewage can be isolated.

Table 4 summarizes the wastewater design criteria used to calculate the existing sanitary flows and populations, per the **Town of Perth IMP** in accordance with the **City of Ottawa Sewer Design Guidelines**. This study employs City of Ottawa design guidelines, including the latest technical memorandums for consistency with the **Town of Perth IMP**.

Table 4: Wastewater Design Criteria

Design Parameter	Value
Average Daily Demand	280 L/d/per day
Peak Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0
Infiltration and Inflow Allowance	0.33 L/s/ha
Park Flows	9300 L/ha/d
Park Peak Factor	X1
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$
Minimum Sewer Size	250 mm diameter

Minimum Manning's 'n'	0.013	
Minimum Depth of Cover	2.0 m from crown of sewer to grade	
Minimum Full Flowing Velocity	0.6 m/s	
Maximum Full Flowing Velocity	3.0 m/s	
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012, and recent residential		
subdivisions in City of Ottawa (including revisions per ISTB Sewer-2018-01)		

DSEL reviewed the available capacity of the receiving sewer at Rogers Road and Jessie Drive. The minimum residual capacity along the outlet is 92.9L/s. Refer to calculation sheet in **Appendix C**. The full build out of the development is estimated to produce a peak flow of **~42L/s** based on **City of Ottawa Sewer Design Guidelines**.

4.4 Lagoon Capacity

As indicated in **Section 4.1**, the Town of Perth is serviced by an existing lagoon with a rated capacity of 7,718 $\rm m^3/day$ per Environmental Compliance Approval (ECA) 1045-6VTHH8. See **Appendix C** for a copy of the ECA.

DSEL delineated the service area to the Town's lagoons based on sewershed mapping provided by the Town and land use plan extracted from the Town's official plan. The estimated total area serviced by the lagoon is 771ha, including ROWs, industrial, park, residential, and commercial areas. See figure included in *Appendix C*. The total service area includes the subject lands, but excludes vacant unserviced areas, and the Town's Landfill site.

The Town of Perth published a 2021 drinking water summary report. The drinking water summary provided average daily treated water volumes, extracted pages are included in **Appendix C**. Town staff confirmed that there are no other significant contributors of drinking water other than the Town's water treatment plant. Therefore, it stands to reason that the delta between the measured flows at the lagoon and the treated water is from infiltration and inflow. **Table 5** summarizes the estimated infiltration and inflow contributions for the years 2018 to 2021.

Table 5: Estimated Infiltration and Inflow

Design Parameter	2018	2019	2020	2021
Avg Daily Flow (m³/d)	6,639	6,650	5,454	4,959
Annual Rain (mm)	785	860.2	825.2	802.2
Lagoon Capacity (%)	85.3	85.5	70.1	63.7
Water Plant Flow (m³/d)	3,072	3,011	2,896	2,787
I&I	3567	3639	2558	2172
Unit I&I (L/s/ha)	0.054	0.055	0.038	0.033

Table 6 summarizes a brief statistical analysis of the rainfall between the years 2018 and 2021.

Table 6: Rainfall Summary

Design Parameter	2018	2019	2020	2021
Total Annual	785	860.2	825.2	802.2
Max daily	58.4	50	49.2	47.8
Number of rain days	119	126	128	121
Rainfall greater than 5mm	43	46	46	43
Rainfall greater than 10mm	26	26	23	24

Rainfall greater than 20mm	9	11	8	12
Rainfall greater than 30mm	5	7	5	5

As discussed in **Section 4.1**, the Town has continued advancing projects to reduce the amount of wet weather flow into the sewage system. As seen in **Table 5**, there is a comparable amount of rainfall between the years 2019 and 2020. **Table 6** shows that the type of storm events is generally consistent between the years. However, there is a measurable drop in the estimated amount of extraneous flow. The reduction in extraneous flows continues to be observed in 2021. An average annual infiltration and inflow of 0.033L/s/ha was carried in the lagoon capacity analysis.

DSEL estimated the inflows to the lagoon using City of Ottawa design flows, 2022 census data to estimate population, service areas delineated from sewershed mapping and the Town's official plan, and the average annual infiltration rate indicated above. See Appendix C for detailed analysis. Note that 34.08ha of golf course lands are included in the existing service area. As such note the reduction in area in the existing Town of Perth is added to the Caivan (Perth CG) Ltd column. DSEL used monitored data collected in support of Caivan's development in the Village of Richmond to assess future contributions. The monitored data during Q3 of 2022 concluded that the average daily flow per person is $\sim 170 L/p/d$, and found that annual infiltration rates are approximately 0.025 L/s/ha.

The calculated flow for the existing Town of Perth is 5,864m³/d. The estimated flow is significantly higher than the monitored flow at the plant. It is expected that the unit flow rates used in the analysis are over-estimating actual flows. Furthermore, it is understood that high water users in the industrial area are not operational or operating at a lower capacity. It was assumed that capacity would remain earmarked for industrial areas and as such a higher than monitored rate was carried in the analysis.

Town growth was considered to take place as infill developments or within other greenfield areas. The analysis assumes that the Town will issue approximately 34 building permits per year (year average) based on permit data provided by the Town. Once the Caivan (Perth CG) Ltd., Community begins, it is expected that a total of 75 permits per year would be issued, with 15 permits to infill and 50 permits to Caivan (Perth CG) Ltd.

The analysis shows that should all existing serviced industrial lands become active and the subject lands were to fully build out by 2044, the lagoon would be at 82% capacity. The predicted capacity is less than the lagoons experienced in 2018 and 2019 due to the continued advancement of extraneous flow reductions programs. Assuming monitored rates for the existing Town contributions the lagoon would be at 72% in 2044. Therefore, the subject lands do not trigger the need for a lagoon expansion and sufficient capacity remains in the system for the full buildout of the development while maintaining residual capacity for other growth areas within the Town.

FEBRUARY 2023

TOWN OF PERTH

4.5 Wastewater Servicing Conclusions

The subject property will be serviced by local sanitary sewers which will be serviced by single pump station and forcemain outletting to existing trunk sewers on Rogers Road at Jessie Drive. The receiving sewers on Roger's Road at Jessie Drive have sufficient capacity to accept wastewater from the development.

The Town's lagoon has sufficient capacity to accommodate the proposed development as well as future growth.

5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Services

The existing Golf Course contains a series of ditches outletting to the Tay River. There is no specific end of pipe treatment facilities within the golf course lands. The remaining undeveloped portions of lands do not contain any existing stormwater management infrastructure.

Stormwater runoff of the subject property is directed overland to the Tay River to the north and the Grant's Creek PSW to the south. *Table 7* summarizes the drainage rates tributary to the Tay River and Grants Creek PSW within the subject property. See the *SWM Report* prepared by JFSA for additional information and modelling parameters used to estimate the predevelopment flow rates.

Table 7: Pre-Development Drainage Conditions

Event	Predevelopment Tay River 22.86ha (m³/s)	Predevelopment Grants Creek PSW 22.01ha (m³/s)
25mmCH3hr	0.126	0.125
2yr 3hr Chicago	0.150	0.149
5yr 3hr Chicago	0.285	0.288
10yr 3hr Chicago	0.393	0.399
25yr 3hr Chicago	0.546	0.559
50yr 3hr Chicago	0.669	0.688
100yr 3hr Chicago	0.804	0.830
2yrSCS24hr	0.444	0.463
5yrSCS24hr	0.750	0.790
10yrSCS24hr	0.986	1.044
25yrSCS24hr	1.298	1.382
50yrSCS24hr	1.545	1.653
100yrSCS24hr	1.800	1.932

The Grants Creek PSW receives drainage from approximately 9,302.5ha according to the Ministry of Natural Resources and Forestry Ontario Watershed Information Tool. The subject lands pre-development area represents 0.2% of the total tributary area. See *Image 1* illustrating the tributary area to the Grants Creek PSW.

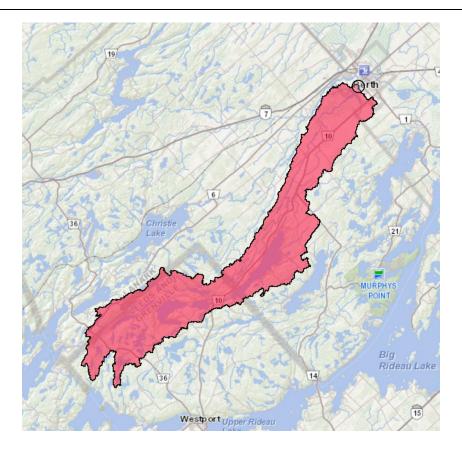


Image 1: OFAT Tributary Area of Grants Creek PSW

The ultimate receiver is the Tay River, capturing the stormwater flows immediately downstream of the study area. The total tributary area to the Tay River, immediately downstream of the development is 677.255km² (67,725.5ha). *Image 2* illustrates the tributary area to the Tay River downstream of the development. A small portion of the developed existing golf course facility drains to Grant Creek through ditch depressions with most of the facility draining to the Tay River. The subject lands contribute a total tributary area of 44.87ha at this location or 0.07%.

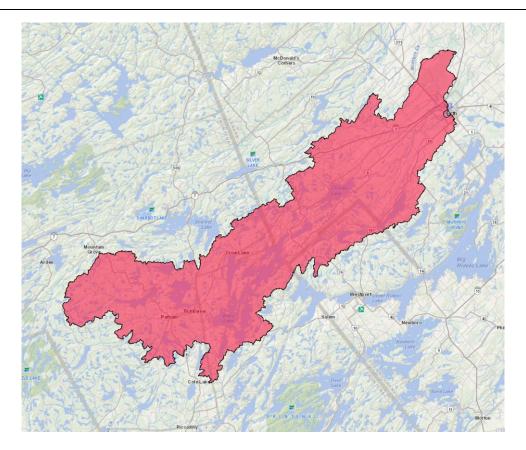


Image 2: OFAT Tributary Area to Tay River

A headwater drainage feature was identified within the western forested portion of the Golf Course lands which is the remains of a farm ditch that captures runoff from the adjacent farm property and from several on-site ditches.

5.2 Post-Development Stormwater Management Target

The Town of Perth and Rideau Valley Conservation Authority indicated that post-development flow rates cannot exceed pre-development flow rates, or demonstrate that the change in flow does not increase the risk of flooding. Therefore, the developed areas are to be assessed in both pre- and post- development conditions, and sufficient storage is provided to manage flows to the values indicated in **Table 7**.

MECP Enhanced total suspended solids removal or better is required for runoff directed to the Tay River and Grants Creek PSW.

Stormwater management must incorporate low impact development measures to promote a treatment train approach in accordance with MECP guidelines.

The **Town of Perth IMP** has indicated that the drainage from the farm field must be maintained or improved, and runoff from future roadways shall not be directed to the existing drainage feature.

5.3 Stormwater Design Alternatives

Option 1 - Follow the recommendations in the **IMP**. The IMP suggested pond operating water levels and inlets and outlets above the 100-year water level of Grants Creek Wetland. Therefore, active storage would take place 1m to 2m above the 100-year water level and road grades would be set 1.5m to 2.5m above the active storage level. Therefore, starting road grades would be up to 4.5m higher than existing ground elevations. Requiring a significant fill program with a rough estimate of \sim 1.5million cubic metres of fill to be imported. Furthermore, the **EIS** provided site constraints and defined wetland limits where the **IMP** ponds are located within areas identified as wetlands.

Option 2 – Recommended - Maintain the fundamental principles in the **IMP**, with modifications to pond locations and operating water levels. The MECP design guidelines recommend establishing pond outlets above the 2-year water level of the receiving water course. DSEL reviewed the site's constraints and opportunities to assess preferred pond locations to optimize earthworks.

5.4 Proposed Minor System

The subject property is expected to be serviced by an internal gravity storm sewer system that is to generally follow the local road network and servicing easements as required. It is recommended to equipe homes with sump pumps, where appropriate, to reduce fill requirements.

DSEL reviewed strategic pond placements to optimize earthworks. As illustrated on *Figure* 7, it is proposed to create two stormwater management ponds to discharge to the wetlands and one outletting directly to the Tay River downstream of the water plant. All ponds are contemplated as wet ponds per MECP design guidelines. Furthermore, it is recommended to service two smaller areas with a combination of low impact development measures and an end of pipe oil grit separator to optimize earthworks.

Runoff coefficients (C-values) are based on considering paved/roofed areas at C=0.90 and grassed areas at C=0.20. Summary figures of the imperviousness determinations are found in **Drawings**. The pervious areas are highlighted, and the resultant imperviousness and runoff coefficients are summarized. As detailed design progresses, the runoff coefficient will be refined to reflect the proposed residential layouts, driveways and other details.

The **Table 8** below summarizes the standard that will be employed in the detailed design of the storm sewer network.

Table 8: Storm Sewer Design Criteria

Design Parameter	Value
Minimum Minor System Design	2-Year (Local Streets), 5-Year (Collector
Return Period	Streets), 10-Year (Arterial Streets) –
	PIEDTB-2016-01
Major System Design Return Period	1:100 year
Intensity Duration Frequency Curve (IDF) 2-year storm event: A = 732.951; B = 6.199; C = 0.810	$i = \frac{A}{\left(t_c + B\right)^C}$

5-year storm event: A = 998.071; B = 6.053; C = 0.814	
Minimum Time of Concentration	10 minutes
Rational Method	Q = CiA
Storm sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$
Runoff coefficient for paved and roof areas	0.9
Runoff coefficient for landscaped areas	0.2
Minimum Sewer Size	250 mm diameter
Minimum Manning's `n' for pipe flow	0.013
Minimum Depth of Cover	2.0m from crown of sewer to grade (or 1.5m where USF freeboard to HGL is not a constraint, such as in slab-on-grade products)
Minimum Full Flowing Velocity	0.8 m/s
Maximum Full Flowing Velocity	6.0 m/s (where velocities in excess of 3.0 m/s are proposed, provision shall be made to protect against displacement of sewers by sudden movement)
Clearance from 100-Year Hydraulic Grade Line to Building Opening (USF)	0.30 m
Max. Allowable Flow Depth on Municipal Roads	35 cm above gutter (PIEDTB-2016-01)
Extent of Major System	To be contained within the municipal right- of-way or adjacent to the right-of-way provided that the water level must not touch any part of the building envelope and must remain below the lowest building opening during the stress test event (100- year + 20%) and 15cm vertical clearance is maintained between spill elevation on the street and the ground elevation at the nearest building envelope (PIEDTB-2016- 01)
Imperviousness	Based on runoff coefficient (C) where Percent Imperviousness = (C - 0.2) / 0.7 x 100%.
Extracted from City of Ottawa Sewer Design Guid	

5.5 Low Impact Development Measures

Gemtech was retained by Caivan to complete a Hydrogeological Investigation (Hydro-G Report) of the subject lands. They recommended, that in light of the high water tables and shallow bedrock across many portions of the site, modified Low Impact Development (LID) features should be considered (e.g., infiltration features with subdrains to allow for drainage during high groundwater conditions), increased soil thickness on lawns for increased storage/infiltration potential, LID features located in areas with proposed grade raises, etc.

Other examples of LIDs that can be incorporated into the development include catchbasins with infiltration trenches, rear-yard infiltration trenches, bioswales, direct roof runoff to lawns/parks, increasing thickness of topsoil (e.g., increase from the typical minimum of 15cm to 30cm to increase retention), rain gardens, permeable pavers, etc.

The Hydro-G Report noted that the potential reduction in infiltration or baseflow recharge post development will not impact the water volume contributions from groundwater currently sustaining the health or sustainability of the wetland. Noting that the water from the project Site is primarily being received by the wetland via overland processes or interflow pathways. Deeper groundwater pathways contributing to the wetland are likely limited by the clay base of the wetland and its low conductivity relative to its underlying materials.

Table 9 summarizes investigated lot level stormwater management practices. This includes methods that are applied at the individual lot level or form part of the conveyance system and can be for either storage or infiltration.

Table 9: Lot Level Treatment Systems Considered

Stormwater Management Practice	Description
Rain Barrel	Harvesting rainwater by capturing rooftop runoff by connecting roof leaders to 'barrels' for watering during periods of dry weather.
Cistern	Harvesting rainwater by capturing rooftop runoff and directing stormwater to an underground storage tank. Water is pumped for watering during dry periods.
Green Roof	Consist of a thin layer of vegetation and growing medium installed on top of a convention flat or sloped roof. Reduces the 'heat' island effect and reduces runoff volume.
Roof downspout disconnection	Roof downspouts are disconnected from the weeping tile and are directed to grass areas with options to include amended soils to promote runoff prevention.
Soakaway, infiltration trench or chamber	Rectangular or circular excavations lined with geotextile filter cloth and filled with clear stone designed to promote groundwater infiltration.
Bio-retention / Bio-filter	Consists of a filter bed consisting of a mixture of sand, soil, and organic material. Bioretention facilities are designed to capture small storm events to retain and filter stormwater runoff. Plantings promote evapotranspiration.
Permeable pavement	An alternative to traditional impervious pavement to allow stormwater to drain through into an aggregate reservoir and infiltrate into the ground water.
Enhanced grass swale	Vegetated open channels designed to convey, treat, and attenuate stormwater runoff. Check

	dams and vegetation in the swale promote attenuation and infiltration.
Dry Swale	A dry swale incorporates an engineered soil medium and a perforated pipe under drain.
Perforated pipe system	Underground stormwater conveyance systems usually incorporated into the right-of-way drainage system (i.e. Infiltration trenches at catchbasins).
Catch Basin Shields™	A catch basin insert to promote deposition of sediment in the sump.

Residential subdivisions typically consist of urban right-of-way cross-sections and residential homes with peaked roofs.

As such the following measures were not considered:

- > Cisterns Would increase the cost of each home. Home owner would be responsible for maintaining the cisterns.
- > Green Roofs Not standard practice in residential homes. Would increase the cost of the home. Concerns for maintaining green roofs.
- Bio-retention / Bio-filter not part of a typical right-of-way sections. Would increase right of way maintenance. Reduces space for utilities and would increase likelihood of conflicts.
- > Permeable Pavement not standard practice within municipal roads. Concerns with maintenance and pre-treatment of infiltrated water.
- > Enhanced Grass Swale Would have to take place in rear yards. It is anticipated that home owners will remove check dams.

It is recommended that the proposed subdivision will consist of the following:

- > Roof Leaders to Grassed Areas with potential for incorporation of amended soils in areas where supplemental infiltration is desirable (i.e. in areas of higher rock elevations).
- > Dry Swales.
- > An education program to promote rain barrels.
- > Perforated pipe system placement of an exfiltration system at catch basins where subsurface conditions are suitable, i.e. depth to rock and groundwater.
- > Catch Basin Shield pre-treatment within all catch basins as is currently the practice in the Town of Perth.

5.6 Stormwater Management Facilities

Stormwater runoff will be treated and attenuated within three Wet Ponds per **MECP Design Guidelines**. Two facilities will control and release stormwater to the Grant Creek PSW, while one facility will discharge to the Tay River. Two areas will be treated and controlled through

the use of LIDs and an end of pipe OGS. **Tables 10 and 11** summarize pond storage characteristics for outlets to the Grants Creek Wetland and the Tay River.

Table 10: Stormwater Management Ponds - Grants PSW

	OGS 2 1.754ha		SWMF 2 14.566ha		Total 16.32ha	
	Outflow (m³/s)	Storage (m³)	Outflow (m³/s)	Storage (m³)	Outflow (m³/s)	Storage (m³)
Permanent Pool	0.0002	70	0.002	583	0.002	653
25mmCH3hr	0.012	185	0.112	1,538	0.125	1,723
2yr 3hr Chicago	0.016	212	0.133	1,762	0.149	1,974
5yr 3hr Chicago	0.031	288	0.257	2,396	0.288	2,684
10yr 3hr Chicago	0.043	339	0.356	2,812	0.399	3,151
25yr 3hr Chicago	0.060	406	0.499	3,367	0.559	3,773
50yr 3hr Chicago	0.074	454	0.614	3,769	0.688	4,223
100yr 3hr Chicago	0.089	503	0.741	4,175	0.830	4,678
2yrSCS24hr	0.044	342	0.364	2,842	0.408	3,184
5yrSCS24hr	0.072	448	0.600	3,719	0.672	4,167
10yrSCS24hr	0.099	515	0.819	4,280	0.918	4,795
25yrSCS24hr	0.149	581	1.233	4,828	1.382	5,409
50yrSCS24hr	0.178	631	1.474	5,243	1.652	5,874
100yrSCS24hr	0.207	682	1.723	6,661	1.930	6,343

Table 11: Stormwater Management Ponds - Tay River

	OGS 1 1.353ha		SWMF 1 11.26ha		SWMF 2 15.931ha		Total 28.544ha	
	Outflow (m³/s)	Storage (m³)	Outflow (m³/s)	Storage (m³)	Outflow (m³/s)	Storage (m³)	Outflow (m³/s)	Storage (m³)
Permanent Pool	0.000	54	0.001	450	0.002	637	0.003	1,141
25mmCH3hr	0.006	158	0.050	1,319	0.070	1,866	0.126	3,343
2yr 3hr Chicago	0.007	185	0.059	1,540	0.084	2,178	0.150	3,903
5yr 3hr Chicago	0.014	251	0.112	2,088	0.159	2,954	0.285	5,293
10yr 3hr Chicago	0.019	294	0.155	2,451	0.219	3,466	0.393	6,211
25yr 3hr Chicago	0.026	354	0.215	2,943	0.305	4,156	0.546	7,453
50yr 3hr Chicago	0.032	400	0.264	3,325	0.373	4,698	0.669	8,423
100yr 3hr Chicago	0.038	444	0.317	3,697	0.449	5,221	0.804	9,362
2yrSCS24hr	0.021	301	0.175	2,504	0.248	3,528	0.444	6,333
5yrSCS24hr	0.036	402	0.296	3,343	0.419	4,713	0.749	8,458
10yrSCS24hr	0.047	466	0.389	3,875	0.550	5,462	0.986	9,803
25yrSCS24hr	0.062	539	0.512	4,487	0.724	6,326	1.298	11,352
50yrSCS24hr	0.073	594	0.609	4,944	0.862	6,962	1.545	12,500
100yrSCS24hr	0.085	649	0.710	5,402	1.005	7,610	1.800	13,661

Refer to the **SWM Report**, prepared by JFSA for additional information regarding the estimation of pond volumes.

DSEL reviewed the available storage volumes within each pond block. **Table 12** summarizes the available and required pond volumes.

Table 12: Pre-Development Drainage Conditions

Location	Required Volume (m³)	Available Volume (m³)
Pond 1	5,402	8,329
Pond 2	5,661	14,273
Pond 3	7,610	16,205

As indicated above, each pond block is sufficiently sized to accommodate the required volume.

5.7 Hydraulic Grade Line Analysis

A detailed hydraulic grade line (HGL) modelling analysis will be completed for the proposed system at the detailed design level, based on the 100-year 3-hour Chicago, 12-hour DCD, and 24-hour SCS design storms, including historical design storms and climate change stress test as required.

5.8 Major System Design

The major system flows will be conveyed through the internal road network where the 100-year event will be captured by required 100-year inlets prior to discharge to the proposed SWM Ponds where they are managed for quality/quantity control prior to release to the Tay River and Grant's Creek PSW. Major events in excess of the 100-year event will outlet to the Tay River or Grant's Creek PSW.

The major system will be designed in accordance with the amendment to the storm sewer and stormwater management elements of the **Ottawa Sewer Design Guidelines** (Technical Bulletin PIEDTB-2016-01).

5.9 Grading and Drainage Design

The conceptual grading design shown in *Figure 10* includes a saw-toothed-road design with 0.15% minimum grade from highpoint to highpoint in order to maximize available surface storage for management of flows up to the 100-year design event where possible. The proposed site grading has been developed to optimize earthworks and provide major system conveyance to the end-of-line facilities.

The **Geotechnical Report** indicated that the site is underlain by native deposits of weather silty clay crust, silty sand, and glacial till. Based on the borehole information there are no grade raise restrictions at the site.

DSEL completed preliminary earthworks and rock removal estimates. With consideration of top soil re-use as non-structural fill and rock bulking, the site is anticipated to generally balance. See *Figures 11* and *12* for details.

It is anticipated that rear yards abutting the Tay River and Grants Creek Wetland will drain into those features and will not be captured in the stormwater conveyance system.

5.10 Floodplain Compensation

The proposed development concept plan requires the rationalization of the existing floodplain boundary. The floodplain boundary illustrated on the attached figures was plotted by JFSA using the elevations established by the RVCA against the topography flown for the subject lands.

Figure 13 illustrates areas to be filled in shades of blue and compensation areas shown in shades of red. Note that some areas of filling are not represented in any colour, those areas have existing ground elevations are within 0.02m of the floodplain.

The area of cut was selected to avoid cutting into sensitive wetland areas.

5.11 Stormwater Servicing Conclusions

The contemplated stormwater management system will maintain predevelopment peak flows to the Tay River and Grants Creek PSW. A treatment train approach will be incorporated where Low Impact Development measures will be implemented upstream of end of pipe treatment facilities. The end of pipe treatment facilities will consist of wet ponds designed to achieve Enhanced quality control removal of suspended solids per **MECP Design Guidelines**.

6.0 EROSION AND SEDIMENT CONTROL

Soil erosion occurs naturally and is a function of soil type, climate and topography. The extent of erosion losses is exaggerated during construction where vegetation has been removed and the top layer of soil becomes agitated. Prior to topsoil stripping, earthworks or construction, erosion and sediment controls will be implemented and will be maintained throughout construction.

Silt fencing will be installed around the perimeter of the active part of the site (and headwater features) and will be cleaned and maintained throughout construction. The silt fence will remain in place until the working areas have been stabilized and re-vegetated.

Catchbasins will have catchbasin inserts installed during construction to protect from silt entering the storm sewer system.

A mud mat will be installed at the construction access to prevent mud tracking onto adjacent roads.

The following additional recommendations to the contractor will be included in contract documents:

- Limit extent of exposed soils at any given time.
- Re-vegetate exposed areas as soon as possible.
- Minimize the area to be cleared and grubbed.
- Protect exposed slopes with plastic or synthetic mulches.
- > Install silt fence to prevent sediment from entering any existing ditches.
- No refueling or cleaning of equipment near existing watercourses.
- Provide sediment traps and basins during dewatering.

The contractor will be required to complete regular inspections and guarantee proper performance. The inspection is to include:

- Verification that water is not flowing under silt barriers.
- Clean and change inserts at catch basins.

7.0 CONCLUSION AND RECOMMENDATIONS

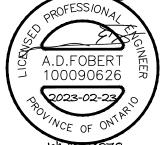
David Schaeffer Engineering Ltd. (DSEL) has been retained by Caivan (Perth GC) Limited to prepare a Preliminary Functional Servicing Report in support of the application for draft plan of subdivision in the Town of Perth. The preceding report outlines the following:

- ➤ Water It is proposed to make two connections to the Town's existing water distribution system at North Street and Rogers Road. It is proposed to supply potable water to the development through a series of 150mm, 200mm, and 300mm diameter water mains. A minimum of 10,000L/min is available throughout the development. All system pressures are met during average day, peak hour, and fire flow scenarios. Recommend that further analysis and investigation to confirm triggers for establishing a new water tower.
- ➤ **Wastewater** The subject property will be serviced by local sanitary sewers which will be serviced by single pump station and forcemain outletting to existing trunk sewers on Rogers Road at Jessie Drive. The receiving sewers on Roger's Road at Jessie Drive have sufficient capacity to accept wastewater from the development. The Town's lagoon has sufficient capacity to accommodate the proposed development as well as future growth.
- > **Stormwater** The contemplated stormwater management system will outlet to the Tay River and the Grants Creek PSW with predevelopment peak flows maintained. Low Impact Development measures will be implemented upstream of end of pipe treatment facilities which will consist of wet ponds that are to be designed to provide quality control treatment to achieve an enhanced level of protection. A detailed Hydraulic Grade Line (HGL) modelling analysis will be completed for the proposed system at the detailed design stage.

The submitted materials demonstrate that the existing water, sanitary, and storm services can accommodate the contemplated development.

Prepared by,

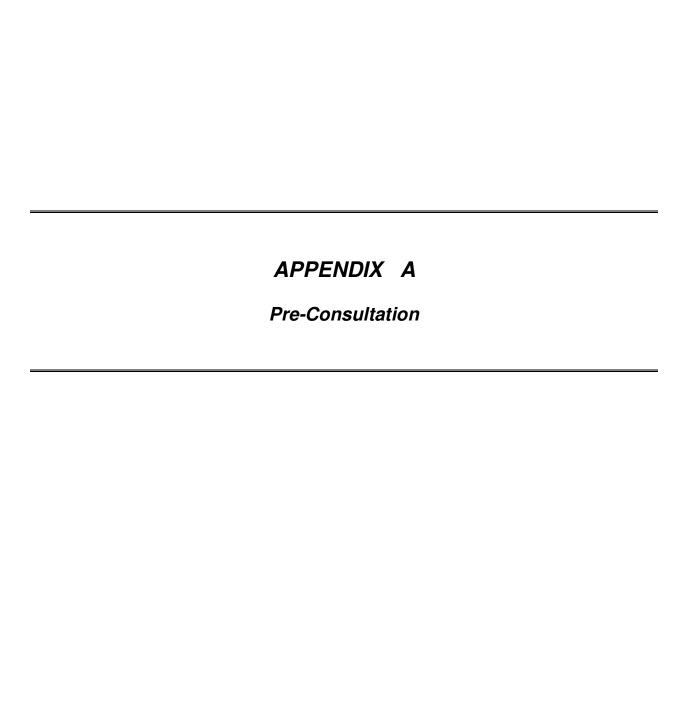
David Schaeffer-Engineering Ltd.

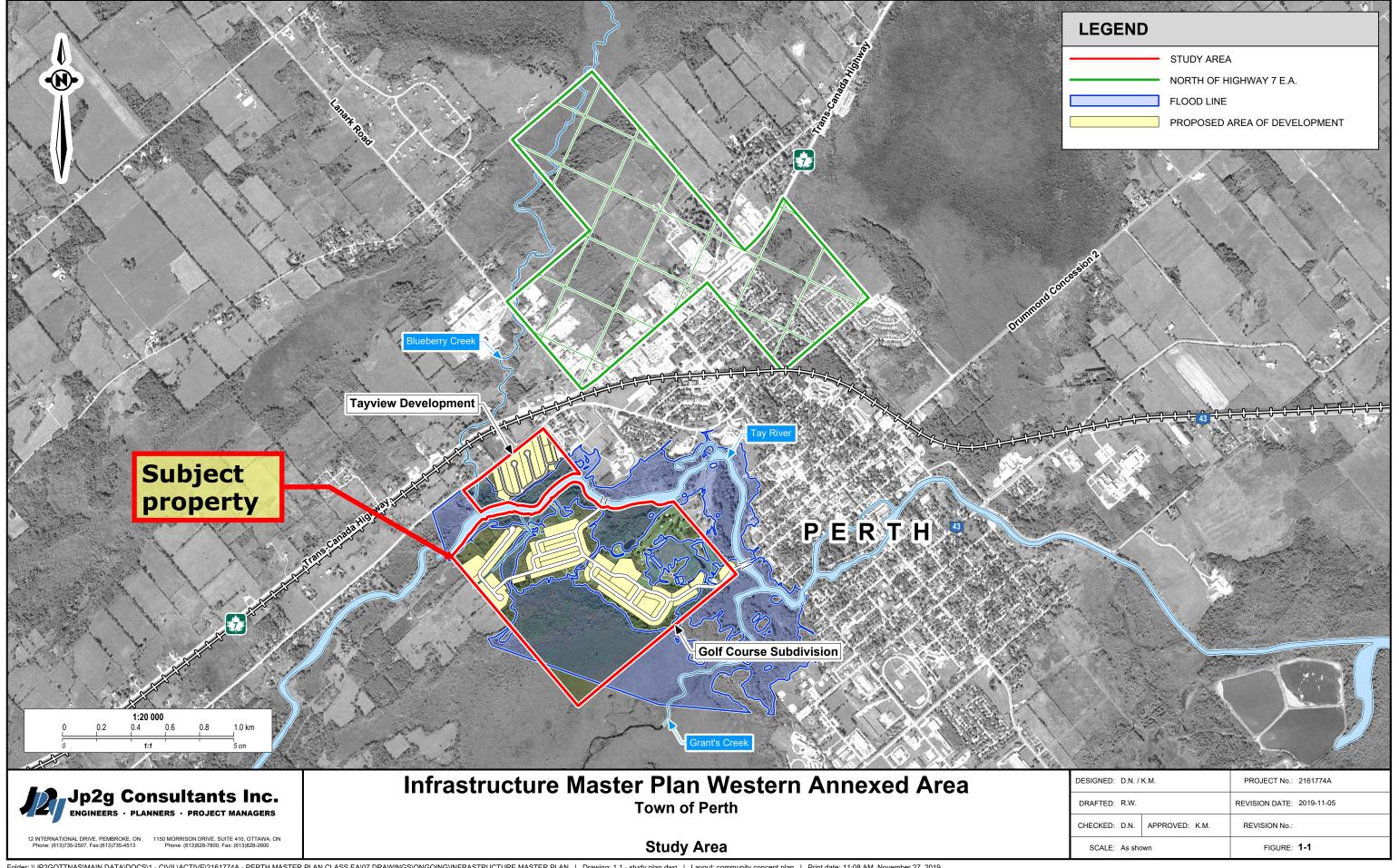


Per: Adam D. Fobert, P.Eng.

© DSEL

z:\projects\21-1278_caivan-perth\b_design\b3_reports\b3-2_servicing (dsel)\02_fsr_subm2\2023-02-22_1278_caivan_perth_fsr.docx







PERTH

TOWN OF PERTH

AGENDA

DEVELOPMENT DISCUSSION TEAM (DDT) MEETING

Held: 10:30 a.m., Thursday, November 25, 2021

Location: Virtual/Zoom

 $\underline{https://us06web.zoom.us/j/82631800479?pwd=NnN4K2tkRjRYM1dzK1pEelhCV2Indz09}$

First Meeting of the DDT Regarding the Golf Course Lands - Development

- 1 Call meeting to order Director of Development Services
- 2 Introductions Director of Development Services
- 3 Presentation CAIVAN Team
- 4 Planning Director of Development Services
- **5 Engineering –** Director Environmental Services

Traffic/Roads:

Services:

- 6 **Building –** Chief Building Official
- 7 Fire Fire Chief
- **8** Community Services Director of Community Services
- 9 Rideau Valley Conservation Authority Planner RVCA
- **Lanark County –** County Planner
- 11 Approval Strategy and Process for Offsite Infrastructure
- 12 Perth Golf Capital Projects and Upcoming DC By-Law update
- 13 Closing Comments

Adam Fobert

From: Julie Stewart <jstewart@lanarkcounty.ca>

Sent: February 11, 2022 3:56 PM

To: 'De Santi, Nadia'; Hugo Lalonde; Marc Pichette;

christopher.gordon@cghtransportation.com; john.kingsley@cghtransportation.com; Adam Fobert; Jocelyn Chandler; alex.meacoe@gemtec.ca; shaun.pelkey@gemtec.ca;

Anthony Francis

Cc: tracy@zanderplan.com; gmachan@perth.ca; Trevor Choffe; Shannon Baillon; Michael

Touw; Phil Mosher; Terry McCann; Sean Derouin; Kurt Greaves; Jasmin Ralph; Michelle

Mahon

Subject: Perth Golf Course Lands Proposed Development - Caivan

Attachments: Minutes of Meeting January 14, 2022.pdf; Pre-consultation Subdivision Checklist Perth

Golf Course January 2022.pdf; Compiled list of Other Information - Studies - Reports

Perth Golf Course January 2022 .pdf

EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hi Nadia, Kyle and Hugo

Please find the following attached:

- Pre-Consultation Meeting Minute Notes - January 14, 2022

- Pre-Consultation Checklist

 Compiled list of Other Information / Studies / Report Requirements (from County of Lanark, Town of Perth, RVCA)

Please feel free to forward to the members of your team whom I may have missed.

Thank you, Julie

Julie Stewart, MCIP RPP County Planner 99 Christie Lake Road Perth, ON K7H 3C6 (613)267-4200 ext. 1520 jstewart@lanarkcounty.ca www.lanarkcounty.ca



Pre-Consultation Meeting Notes - Perth Golf Course - Caivan

Virtual zoom meeting - January 14, 2022

In Attendance

Julie Stewart, Lanark County Michelle Mahon, Lanark County Terry McCann, Lanark County Adam Fobert, David Schaeffer Engineering Ltd Kyle Larmour, WSP Christopher Gordon, CGH- Transport John Kingsley, CGH Transport Marc Pichette, DSEL Civil Phil Mosher, RVCA Sarah Macloed-Neilson, RVCA Jocelyn Chandler, DSEL Nadia De Santi, WSP Grant Machan, Town of Perth Trevor Choffe. Town of Perth Michael Touw. Town of Perth Brian Gass, Town of Perth Tracy Zander, Representing Perth Hugo Lalonde, Caivan

Hugo introduced the project, in summary:

- Potential of re-purposing existing clubhouse.
- Recognize the 9 hole golf course and the original 3 holes.
- A mix of single-family homes, townhouses and back to back townhouses are proposed.
- 650-800 units will be phased.
- Referred to current studies underway.
- Phase 1 within OP residential designation.

Julie Stewart added the County is proposing to initiate the review of population projections later in 2022, as per County Council's commitment to review in 5 years.

Tracy Zander asked if the studies and reports are for the whole site as a Master Plan?

Hugo stated that the reports will address the site as a whole.

Town and County staff will coordinate the list of required studies/reports for submission and will provide the compiled list.

Christopher Gordon, looking for the previous traffic study.

Grant noted that he will see if he can obtain a copy and provide to CGH.

Terry McCann mentioned design work would be required where the road reaches the County property because of the existing buildings and parking lot. Setbacks to be addressed.

The road is also located within Tay Valley so coordination would have to happen with the Town, County and Tay Valley. Terry McCann is the main contact.

Hugo noted that the locations on the concept plan were derived from the Infrastructure Master Plan. They can revisit alignment as part of the traffic impact study

Shannon Baillon will forward the proposed extension of the Tay River trail system as pedestrian crossing which will have to be incorporated into the road design.

Nadia proposed bi-weekly meetings with the hope of submission in February, which Town and County staff will discuss availability

Adam Fober provided an update on the engineering work and that they are working with Stantec to update the IMP. In summary, proposing 3 stormwater management ponds, examining capacity and a water model.

Grant noted the need for a conversation around contributions required for an elevated water tower as well as the Town's plan for an expansion of the lagoon with the 5th SAGR system. Town staff can work with the civil engineers.

Nadia mentioned some discrepancies with the OP mapping.

Julie will coordinate a meeting with the Planners to discuss the Official Plan mapping and policies.



PLANS OF SUBDIVISION

PRE-CONSULTATION - checklist - Perth Golf Course

Report	Comments	Required Yes/No
Planning Rationale	Include justification	Yes
riaming nationale	Must have regard for PPS	Yes
	Lanark County Official Plan compatibility	Yes
	Local Official Plan compatibility	Yes
	Address OPA # 16	Yes
Hydrogeological Study,	Availability and suitability of water and	Public
Terrain Analysis	waste water	Yes
,	MOE – D-5-4 Guidelines	
	MOE – D-5-5 Guidelines	
	ODWSOG	
	Checklist Summary & Sign-off	
	Integrated Hydrologic Impact Assessment	Yes
Environment Impact	SAR & Significant Habitat	Yes
Study	Wetlands	Yes
	Organic Soils	Yes
	Natural Heritage Features & Systems	Yes
	Significant Wetlands	Yes
	Significant Woodlands	Yes
	Significant Valleylands	Yes
	Significant Wildlife	Yes
	ANSI	Yes
	Fish Habitat	Yes
	Headwater Drainage Feature Assessment	Yes
Servicing Options	Guidelines – MOE D-5-3	Yes
Statement		
Stormwater Drainage	Guidelines - MOE-2003 / MNR-2001	Yes
Plan	Checklist Summary & Sign-off	
Grading Plan	Sloping land within lot to direct flow of surface water away from foundations & abutting properties.	Yes



PLANS OF SUBDIVISION

PRE-CONSULTATION - checklist - Perth Golf Course

Report	Comments	Required Yes/No
Sediment and Erosion	Flooding, erosion hazard	Yes
Control	Slope and Soil Stability	Yes
Hazardous Sites	Organic Soils	Yes
	Karst Topography	
Archeological	Standards & Guidelines	Yes
Investigation		
Tree Preservation Plan or	Check with local municipality	
Tree Conservation Plan		
Other	SEE ATTACHED Compiled List of Other	
	Information / Study / Report	
	Requirements	
Draft Plan	To include:	Yes
	Planning Act 50(17)	
	Ont. Reg. 544/06	
	Lot and block configuration	
	Compatibility with adjacent uses	
	Road access, street layout & Pedestrian amenities	
	Parks & Open Space amenities	
	Easement and right-of-way requirements	

Compiled list of Other Information / Study / Report Requirements for the Perth Golf Course Lands

(Refer to the Standard County of Lanark Pre-Consultation Checklist as well) Prepared By: County of Lanark and Town of Perth and RVCA

January 2022

Master Plan for the entire development.

Master Plan should include phasing plans and details of phases.

Bridge Assessment / Capacity Study

- impacts and review of capacity for existing Peter St bridge.
- consideration of alternate bridge on North St with traffic flows off of Peter Street, migration of lights from Foster St or potentially west into Tay Valley connecting to Ernest Way.
- triggers for 2nd bridge
- access to Tay Valley lands.
- Location, design and setbacks on County lands and use of existing County driveway and parking area.
- Developer to evaluate the crossing and determine when such would be required.
- Any proposed hydraulic analysis on a potential bridge will include demonstration of no impact to upstream water levels or the creation of adverse impacts. This would include, but not be limited to, not affecting the function of the Haggart flow split as well as the WSC gauge at Perth.

Water Supply (Provision of water supply)

- triggers and requirements for new elevated water tank
- improvements to pumping capacity at WTP

Stormwater design

- confirmation of minimal ponds
- outfalls downstream of WTP Intake Protection Zone
- Demonstrate low impact development measures which prioritize a treatment train approach in accordance with the MECP Stormwater Manual
- Confirmation of enhanced water quality treatment or better

Sanitary

- upfront installation
- triggers for capacity at wastewater treatment facility (when to construct 5th cell)

Cultural Heritage Assessment for the Golf Course.

Geotechnical Study

Integrated Hydrological Impact Assessment

- to provide a water budget and runoff volume and water quality control targets
 - maintain all aspects of the site's natural hydrological functions (storage, retention, infiltration, evapotranspiration, filtration, flow to wetland, etc.)
 - This approach should result in a LID / Green Infrastructure approach to stormwater servicing resulting in a distributed treatment train approach.
 - Legitimate constraints (shallow bedrock, contaminated areas, natural features, etc.) should be documented
 - Runoff volume retention method is recommended

-

Environmental

A constraints map, using information derived from relevant reports/studies, should be one of the first things produced.

Floodplain

 All development is to be located outside the floodplain as per provincial policy. If the proposed work would question the accuracy or validity of the floodline, further discussion should occur regarding appropriate approach to be used.

Wetlands

Fish Habitat

EIS

Hydrological Impact Statement or hydrological investigations Water budget

- all environmental studies should be integrated in a holistic manner

Headwater Drainage Features Assessment
Significance of woodland should be considered and evaluated
The Infrastructure Master Plan made specific mention of a tree preservation plan

Reference to the meeting minutes from the Town of Perth and the County of Lanark and the Standard County of Lanark Checklist is required.

Adam Fobert

From: Grant Machan <gmachan@perth.ca>

Sent: March 14, 2022 2:23 PM

To: Adam Fobert

Subject: Re: 1278 Caivan - Perth: Western Lands

EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

My superintendent will be giving you call about these items. re-lit fire on topic.

Grant Machan CET

Director of Environmental Services gmachan@perth.ca 613-267-3311 ex2233

From: Adam Fobert < AFobert@dsel.ca>

Sent: March 14, 2022 12:04

To: Grant Machan <gmachan@perth.ca>

Cc: Chochlinski, Gregory <gregory.chochlinski@stantec.com>; Mineault-Guitard, Alexandre <Alexandre.Mineault-

Guitard@stantec.com>

Subject: RE: 1278 Caivan - Perth: Western Lands

Hello Grant,

Just following up on the email below and our meeting. You had mentioned during our meeting that one of your staff was working on assembling some of the background information. Has that been sent over? Perhaps it hasn't been forwarded to me on our end.

In particular Stantec are looking for:

- Which firm is the Town using for SCADA programming/development.
- Excerpt's from an existing pump station owner's manual.
- Identify town's preference for backup power generator supplier.

Also, we discussed that our report is to identify triggers for lagoon expansion. We've come across two sets of population densities in previously published works. The IMP appears to be using City of Ottawa guidelines for p/unit, while OPA 16 used 1.87p/unit for all unit types. Can you please confirm which we should be using?

Feel free to call to discuss.

Adam Fobert, P.Eng.

DSEL

david schaeffer engineering ltd.

120 Iber Road, Unit 103 Stittsville, ON K2S 1E9

office: (613) 836-0856 direct: (613) 836-0626

cell: (613) 222-9493 **email**: <u>afobert@DSEL.ca</u>

This email, including any attachments, is for the sole use of the intended recipient(s) and may contain private, confidential, and privileged information. Any unauthorized review, use, disclosure, or distribution is prohibited. If you are not the intended recipient or if this information has been inappropriately forwarded to you, please contact the sender by reply email and destroy all copies of the original.

From: Adam Fobert

Sent: March 1, 2022 11:55 AM

To: 'Grant Machan' <gmachan@perth.ca>

Cc: 'Chochlinski, Gregory' <gregory.chochlinski@stantec.com>; 'Mineault-Guitard, Alexandre' <Alexandre.Mineault-

Guitard@stantec.com>

Subject: RE: 1278 Caivan - Perth: Western Lands

Hello Grant,

Thank you for meeting with us on Feb 18. We prepared some meeting notes for both our files.

Let me know if you have any comments on the notes.

Note that there are a few items that Stantec are looking to obtain from you.

Adam Fobert, P.Eng.

DSEL

david schaeffer engineering ltd.

120 Iber Road, Unit 103 Stittsville, ON K2S 1E9

office: (613) 836-0856 direct: (613) 836-0626 cell: (613) 222-9493 email: afobert@DSEL.ca

This email, including any attachments, is for the sole use of the intended recipient(s) and may contain private, confidential, and privileged information. Any unauthorized review, use, disclosure, or distribution is prohibited. If you are not the intended recipient or if this information has been inappropriately forwarded to you, please contact the sender by reply email and destroy all copies of the original.

----Original Appointment----

From: Grant Machan <gmachan@perth.ca>

Sent: February 18, 2022 10:44 AM

To: Adam Fobert

Subject: Accepted: 1278 Caivan - Perth: Western Lands

When: February 18, 2022 1:30 PM-2:30 PM (UTC-05:00) Eastern Time (US & Canada).

Where: Zoom

EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Are you able to send graphics/concepts to support the discussion?





120 Iber Road, Suite 103 Stittsville, ON K2S 1E9 613-836-0856 dsel.ca

MEETING NOTES

DATE: 2022-02-18

1:30 PM - Zoom Meeting

SUBJECT: 21-1278 Caivan - Perth

IN ATTENDANCE:	Adam Fobert (AF)	DSEL
	Gregory Chochlinski (GC)	Stantec
	Alexandre Mineault-Guitard (AMG)	Stantec
	Grant Machan (GM)	Town of Perth

Note: The following meeting notes represent the writer's interpretation of the meeting. As such, any errors or omissions must be reported to this office immediately. All comments are to be provided within 5 business days; otherwise, they are deemed acceptable by all.

ITEM	DESCRIPTION
1.	GM – Town of Perth advancing with the upgrades to Highway 7, which will include improvements to the water and sanitary. The town will be identifying a site for the Highway 7 water tower as part of that process but will not be sizing a facility. This work has been awarded to Mac Perry.
2.	 Information provided regarding the Pump Station: The facility will include a control building to house the electrical panel. There will be no washroom in the building. Building will tie into surrounding architecture and will be equipped with an exterior alarm light. Facility to have both SCADA system and automatic cellular dialer. There will be no staff 24/7 monitoring SCADA. GM to confirm which firm is used for SCADA programming/development. GM to provide Stantec with an excerpt from the owner's manual of an existing facility that in their opinion runs well. Preference is to have the pump selection be interchangeable with the other facilities. Facility will be designed with a by-pass chamber to facilitate future maintenance. Permanent Natural Gas stand-by generator will be used. GM to confirm if they have a preferred backup generator.

	 GM – Roger Road Crossing tender was awarded last week. The town wants to investigate hanging the forcemain from the bridge. Stantec to send preliminary information for coordination of Roger's Road / Tay River Crossing.
	The overflow from the pump station will be to the proposed stormwater pond.
3.	Information provided regarding the water services:
	 Existing conditions model was completed in 2016.
	 No significant changes or improvement have been made to the system since 2016. Design can start with the 2016 model as the base.
	 160 Bed Retirement Home planned at Sunset Blvd. and Lanark County Admin Building to be added.

Prepared by,

David Schaeffer Engineering Ltd.

Per: Adam Fobert, P. Eng.

Adam Fobert

From: De Santi, Nadia < Nadia.De-Santi@wsp.com>

Sent: October 12, 2022 4:11 PM

To: jbowes@perth.ca; mtouw@perth.ca; gmachan@perth.ca; Julie Stewart;

glen.mcdonald@rvca.ca

Cc: Susan Murphy; Hugo Lalonde; Colin Haskin; Erik Derks; Ferguson, Erin; Christopher

Gordon; John Kingsley; Adam Fobert; 'Jocelyn Chandler'

Subject: Meeting Minutes - Caivan - 141 Peter St. - Draft Plan of Subdivision

Attachments: Meeting Minutes Town of Perth September 16 2022.pdf

EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hello everyone,

Thank you again for meeting with us on September 16, 2022.

Please find attached the Meeting Minutes. If there are any errors or omissions, please advise by end of day, Wednesday, Oct. 19, 2022.

Thank you.

Regards,



Nadia De Santi, MCIP, RPP

Practice Lead
Urban and Community Planning

T +1 (613) 690-1114 M +1 (613) 816-0664 WSP Canada Inc. 2611 Queensview Drive, Suite 300 Ottawa, Ontario, K2B 8K2

NOTICE: This communication and any attachments ("this message") may contain information which is privileged, confidential, proprietary or otherwise subject to restricted disclosure under applicable law. This message is for the sole use of the intended recipient(s). Any unauthorized use, disclosure, viewing, copying, alteration, dissemination or distribution of, or reliance on, this message is strictly prohibited. If you have received this message in error, or you are not an authorized or intended recipient, please notify the sender immediately by replying to this message, delete this message and all copies from your e-mail system and destroy any printed copies. You are receiving this communication because you are listed as a current WSP contact. Should you have any questions regarding WSP's electronic communications policy, please consult our Anti-Spam Commitment at www.wsp.com/casl. For any concern or if you believe you should not be receiving this message, please forward this message to caslcompliance@wsp.com so that we can promptly address your request. Note that not all messages sent by WSP qualify as commercial electronic messages.

AVIS : Ce message, incluant tout fichier l'accompagnant (« le message »), peut contenir des renseignements ou de l'information privilégiés, confidentiels, propriétaires ou à divulgation restreinte en vertu de la loi. Ce message est destiné à l'usage exclusif du/des destinataire(s) voulu(s). Toute utilisation non permise, divulgation, lecture, reproduction, modification, diffusion ou distribution est interdite. Si vous avez reçu ce message par erreur, ou que vous n'êtes pas un destinataire autorisé ou voulu, veuillez en aviser l'expéditeur immédiatement et détruire le message et toute copie électronique ou imprimée. Vous recevez cette communication car vous faites partie des contacts de WSP. Si vous avez des questions concernant la politique de communications électroniques de WSP, veuillez consulter notre Engagement anti-pourriel au www.wsp.com/lcap. Pour toute question ou si vous croyez que vous ne devriez pas recevoir ce message, prière de le transférer au conformitelcap@wsp.com afin que nous puissions rapidement traiter votre demande. Notez que ce ne sont pas tous les messages transmis par WSP qui constituent des messages electroniques commerciaux.



Meeting Minutes

	Review Comments & Resubmission Requirements Re: Application for Draft Plan of Subdivision Approval for Perth Golf Course Lands, County of Lanark File No. 09-T-22001					
Date of Meeting	September 16, 2022 Time 10:00 am to 12:00 pm					
Location	Sunshine Room, Town of Perth Municipal Office at 80 Gore Street East and virtual via Zoom					
Minutes Prepared By	Erin Ferguson (WSP). Minutes Reviewed by Hugo Lalonde and Colin Haskin (Caivan).					

Attendees

Town of Perth: Michael Touw (Chief Administrative Officer), Joanna Bowes (Director of Development Services), Grant Machan (Director of Environmental Services)

Lanark County: Julie Stewart (County Planner)

Rideau Valley Conservation Authority: Glen McDonald (Director of Science and Planning) via Zoom

Caivan: Susan Murphy (Vice President of Land Development), Hugo Lalonde (Director of Land Development), Colin Haskin (Manager of Land Development), Erik Derks (Land Development Coordinator) via Zoom

Consulting Team: Adam Fobert (Senior Design Engineer with David Schaeffer Engineering Ltd), Christopher Gordon (Engineer with CGH Transportation), John Kingsley (EIT with CGH Transportation) via Zoom, Jocelyn Chandler (Land and Water Resource Planner with J.F. Sabourin and Associates Inc.) via Zoom, Nadia De Santi (Practice Lead with WSP), Erin Ferguson (Senior Planner with WSP) via Zoom

Agenda Items, Discussion, Actions

Topic	Discussion						
1. Introductions	Nadia De Santi opened the meeting and round table introductions were made. It was noted						
	that Colin is the main contact at Caivan for day-to-day project coordination.						
2. Overview of Draft	Hugo Lalonde gave a brief overview of the draft plan of subdivision and development						
Plan of Subdivision	master plan including the project rationale, pre-application discussions, design features, and						
and Project Design	key issues.						
Brief	 Draft Plan of Subdivision is 30 acres of residential, parks, roadways, pump station consistent with OP policies 						
	 There are 30 acres on Town's OP is designated as Residential, largely consistent with draft subdivision plan area but slight differences in the boundaries 						
	 Development is outside of environmentally sensitive wetlands and floodplain 						
	 At this point the plan is to retain a 9 hole golf course and renovate the clubhouse, potentially expanding commercial uses 						

- High quality parks as shown on the plan and connected through trail network, and there will also be connection to the Tay River Trail. Park in Phase 1 is seen as a gateway feature. Caivan would build the parks
- Proposed blocks and lots are reflective of Caivan's approach in Ottawa with a 21 m lot depth and 3 m front yard setback
- Street cross-sections are 24 m, 18.5 m and 16.75 m following the policy direction of Town's OP
- Peter St bridge will service Phase 1 with later phases triggering a second crossing that will likely tie into the County property as identified in the IMP

Working Strategy Going Forward

- Caivan's approach has been to complete pre-consultation and extensive due diligence to inform the development of this site. Town of Perth has provided commitments during these discussions. Caivan is acting on the Town's planning and engineering work done through the past OPA and IMP to present a plan that provides residential growth and sustains the historic downtown and the local businesses. This was presented to and received buy-in from Council.
- Caivan acknowledged that is a difficult site to develop due to existing environmental constraints, and considerable offsite and external work to be done but that Caivan is committed to working together with the Town to move forward. Caivan is excited to be in Perth.
- Agreement from those in attendance that this is a cooperative exercise. Today is about gaining clarity, need to set up some smaller working sessions related to different components of the plan going forward, but the group needs to reconvene prior to next submission as an integrated planned approach is required

Floodplain Mapping Clarification

- o Glen asked about the Tay River floodplain mapping.
- Jocelyn explained that LIDAR data was collected and it was run through RVCA's model to generate the new floodplain boundary
- Glen stated some pinch points with floodplain line and roads were identified on the draft plan of subdivision – the dotted line. Jocelyn advised that these will be addressed through a volumetric cut and fill approach and it is anticipated that this will be minor.
- Julie asked if the floodplain line was surveyed. Jocelyn replied it was not, but ground survey work will be done as part of the application for cut and fill. LIDAR is very accurate so the difference between that and ground survey will be minimal

JFSA (Jocelyn) to resend map showing minor floodplain boundary changes to the RVCA, County, and Town by Sept. 30, 2022

3. Questions on Review Comments

Servicing

Adam requested clarification on one of the Town's circulation comments on the downtown intensification infrastructure work. Town indicated that there is no update on the infrastructure master plan. Michael advised that this work hasn't begun but it is still in the works under the current 2022-2026 Strategic Plan, which was recently approved by Council. Grant confirmed that it is the Town's intention to do a full IMP for the Town owned, infill, and brownfield sites.

- Adam gave an overview of servicing plans and reported that the work done to date indicates there is sufficient capacity available and is consistent with the past discussions with the Town regarding the servicing of the Western Annex Lands. Currently, DSEL is working with Caivan on identifying a metric to indicate when expansion would be triggered, and they are looking at historical population and permit data. Asked which metric the Town wants to see (eg. population, units, flow).
- Town indicated that they do not have a specified metric. Grant uses a volumetric metric. Town wants to see phases for servicing requirements to look at the capacity of the Town lands overall and want to see this information ahead of time for infrastructure planning purposes but indicated that an onsite system is an option that wouldn't affect the Town's infrastructure planning/timeline.
- Relating to the suggestion that an on-site sanitary treatment system should be explored, Adam noted that based on his exploration of these systems in other projects, the operational costs are quite high and the approval logistics are challenging as it triggers a Schedule C project, discharging upstream likely not great for residents. He suggested that additional offsite improvements would likely be more financially viable for the Town rather than an onsite system.
- Grant clarified that the on-site system was simply a brainstorming idea and does not reflect what is recommended in the IMP, nor is it the desired strategy from the Town's perspective for the Western Annex Lands. Grant further acknowledged that Caivan requires allocation commitments from the Town for Phase 1 and beyond before proceeding with the development.
- Hugo indicated that DSEL has been tasked to do the technical work on phasing and lagoon capacity. Caivan anticipates starting construction in 2025/26 with the first building permits and then occupancy. Hugo stated that Caivan and the Town can work out an appropriate allocation that works for the Town and gives Caivan the security to move forward. Caivan and the Town of Perth could look at a flow monitoring program as part of the allocation strategy.
- Grant commented on how to maximize the 5th cell. Council didn't approve the 5th cell.
- Hugo stated that with DSEL, they will look at an appropriate allocation for Phase 1 with the Town so that some development can occur and keep capacity for others too. There are tools that can be explored through the draft subdivision conditions.
- Adam Fobert expressed concern with connection to Inverness in IMP as it would run between two homes and significantly impact these properties. Alternate solution is preferred and would potentially benefit seniors home and wouldn't affect water pressure. Town not opposed to the proposed alternate solution and acknowledged the limitations of the connection shown in IMP.
- Grant Machan shared that planned redesign and improvements for Highway 7 will be oversized.
- DSEL confirmed that no additional fire flow is needed for Phase 1. Town asked to confirm trigger point for tank and contingency plan.
- Town noted that looping will be required to resolve bottleneck between Phase 1 and
 WM looping strategy will need to be defined and reflected on the Draft Plan.

Transportation

 Chris Gordon reported that transportation planning has followed the IMP and noted that traffic volume is not a constraint for Phase 1. The Peter Street Bridge has adequate capacity to handle the anticipated traffic volume for initial development

- phases but later phases will trigger the need for an additional crossing. Monitoring, including changes in travel patterns, following occupancy will give a better indication of the appropriate timing for the second bridge.
- Chris advised that HP Engineering has been retained and has confirmed that the bridge structure can support construction and emergency vehicle traffic. The Memo also outlines potential Bridge enhancements for 10 to 20 years. HP's Memo will be included in the resubmission. Additionally, Caivan is exploring options to address active transportation/pedestrian connections and will bring this forward in the next submission.

Caivan/WSP to provide Town with bridge structural capacity information and will present options for providing pedestrian connection to the development at the Peter Street crossing.

- Joanna expressed that they have major concerns with the single bridge particularly related to emergency response access. There are also concerns about the timeframe or trigger for second bridge should the next phases of development not proceed. The Town is firm that a second bridge crossing is needed to support this development and stated that there are Official Plan policies related to this requirement and that more detail on the second access needs to be provided upfront with this application to ensure the health and safety of future residents. Joanna also confirmed that Peter Street is a truck route.
- o In relation to the proposed location of the second crossing, the Town noted that the road is used by the County but it is a private road and that although it appears in IMP, other jurisdictions may not have reviewed the proposed crossing. The adjacent Townships didn't participate in the Town's IMP even though the second crossing is proposed to run through multiple municipalities.

Julie said that she can reach out to the Township contacts and County.

- Hugo acknowledged that they are aware it isn't a public ROW and more coordinated work will need to be done to determine how this will work. Caivan followed guidance of the IMP re: second bridge location.
- Town confirmed that the second crossing is not included in their 4-year infrastructure plans
- Julie stated that the second access needs to be thought out more clearly.
- Sue asked if the Town has plans to do the EA for the second bridge crossing.
- Grant confirmed that the Town is not currently planning for an EA for the second bridge.

Parks and Open Space

- Town indicated that they need to do more work to determine the parks and open space needs for the community.
- Grant would like to see the stormwater ponds designed to be incorporated in parks and openspace network, no fences. Caivan confirmed that this is part of their plans to integrate the ponds into the parks and trails network.
- It was confirmed that the Town does not have a Parks and Open Space Master Plan.

Minutes	
	 Grant also would like to see where the onsite parking would be located for the parks and open space.
	Town to involve Community Services in review/working sessions on parks and open space needs. Caivan and Town to work cooperatively with cost effective designs to minimize maintenance and to not overload Town resources.
	Caivan to include Blocks for pathways on the draft plan of subdivision for the resubmission.
Update on EIS and Integrated Hydrological Assessment	 It was acknowledged that the environmental studies were not complete given the time of year when Caivan submitted. Once the field monitoring program is finished and the data is analyzed, the studies will be completed and provided as part of the next submissions.
	 Jocelyn acknowledged that more work needs to be done on EIS and they are waiting until ground and surface water monitoring is done to complete EIS.
	 Integrated Hydrological Assessment will help Caivan determine if LIDs are appropriate or not in terms of ensuring water balance model will sustain wetlands
	Caivan/WSP to submit completed EIS and Integrated Hydrological Assessment with next submission
Heritage Impact Assessment Update	Town has not yet initiated the peer review
Application Status	 County deemed the application complete but Joanna said more information was required to properly review the application.
Boundary Adjustment Interpretation	 Nadia presented the rationale that the draft plan of subdivision is largely consistent with the Residential designation boundary in the OP, that the OP boundaries do not appear to reflect specific features and that the adjustment results in no net gain of residential lands therefore our planning opinion is that this can be done without OPA as per policy statement
	Julie and Joanna indicated that they don't share this opinion and OPA is required. The Residential designation boundary is tied to previous OPAs, it is not considered to be a minor boundary adjustment. Stated that other lands designated as a Special Study Area not Future Development and that there are other components in OP that guide development of these lands.
	Nadia sought direction on policies that would prevent development from moving forward. Joanna referred to servicing allocation and land use policies. Joanna indicated that she hasn't done a boundary adjustment before and that an OPA has to be done. Hugo indicated that Caivan is not opposed to doing an OPA. Nadia also said that the more detailed studies will be provided in the next submission and this will also help with the PPS policies and other comments that were provided by the Town. Hugo suggested having a separate meeting on the OPA and this was agreed upon as the best way to move forward before filing an OPA application.
	 Joanna confirmed that a zoning by-law amendment should be done in advance not as a condition of subdivision approval as there is no indication of density, unit mix, or affordable housing. Town requested further information on proposed uses and density to be able to understand the development and determine if it is appropriate. Joanna also

 indicated that affordable housing will need to be discussed. Caivan are exploring the affordable housing comments. Caivan indicated that there will be a variety of housing to meet different needs, and there will be a range of small to large lot singles. Joanna stated that she didn't think Perth will be accepting of Ottawa housing types. Sue indicated that Caivan has developed a farmhouse style single design that can be shared with the Town. Sue offered a tour of the Ottawa Caivan sites for Town staff. Joanna would like to see the sites in person. Sue also indicated that Caivan can present their architectural package to the Town to show the different housing styles, materials, etc.
 Town acknowledges that the proposed road cross-sections are consistent with OP and that they do not have additional street specifications, but they have concerns with the functionality of the proposed 16.75 m and 18.5 m ROW in relation to parking and snow clearing
Town noted that as shown in the cross-sections in the Urban Design Brief, with a 3 m front setback a car will not fit in the driveway and will be parked within the ROW, across the sidewalk or trying to park in the space between the sidewalk and curb. Hugo confirmed that it is not Caivan's intention to have easements in the public r-o-w, and that the cross-sections don't reflect this properly.
 Joanna commented that the 16.75 m is in the OP and the Town can't challenge Caivan on this. However, the Town will be looking to change this r-o-w in the new OP review.
 Grant advised that this is pickup truck land. Hugo said that there would be housing options with double car garages and double driveway widths.
 Caivan indicated that they can provide a parking plan to demonstrate how parking with driveway widths and on-street parking can work.
 Caivan to provide street cross-sections for reduced width ROWs approved for Ottawa showing that parking, snow clearing, and emergency vehicle manoeuvring can work for Town's review.
 Town suggested alternating on-street parking locations for traffic calming.
 Joanna mentioned that there is no public transit. People are commuting out too.
 Grant advised that the Town would like to see alternate parking on driveways and streets.
 Cavian is seeking clarification on the additional studies requested by the Town. Town indicated that study requirements can be discussed further and that some of the previously listed studies might not be required.
Caivan to draft an expanded table of contents for the revised FSR for the Town's review to see if it addresses the Town's requirements.
 Nadia mentioned that the Neighbourhood-Servicing Use Study and the Public Services Capacity Study are not applicable since the OP policies for these studies refer to institutional type of development which isn't being proposed by Caivan. Grant wasn't aware of these studies. Joanna will confirm whether these are needed by Oct. 5, 2022.
o Grant to follow-up with Adam re servicing

- Hugo requested clarity on process requirements for draft subdivision approval, registration and servicing but Town indicated that these are being developed and are not yet in place. Julie advised that the County's process will be shared.
- Chris reiterated that they have relied on the IMP which indicated that a North Street crossing was not considered due to perceived traffic impacts but asked if Town would consider exploration of this option. Town confirmed that they are open to Caivan exploring this option but that it would likely require lights and could have a domino effect.
- John asked where the R-O-Ws are as it isn't clear from the County maps. Julie advised that the County lands are in Tay Valley Township. The County's Administrative Office share lands with Tay Valley and with the Township of Drummond. Julie can provide Chris and John with the County's Public Works Department contact.
- Nadia asked who should be the primary point of contact as we move forward. Joanna confirmed that she should be the contact for the smaller working group meetings, including discussions on the OPA where the County would be invited to. Julie should be the point of contact to coordinate the larger group meetings with the Town and the RVCA.

Adam Fobert

From: Marika Livingston <marika.livingston@mrsourcewater.ca>

Sent: November 18, 2022 10:04 AM

To: Jocelyn Chandler; Brian Stratton; Adam Fobert

Subject: RE: SWP Perth

EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hi there,

Great to meet you both this morning.

I know I committed to only touching base if something changes, but here is just a quick summary email.

The circumstances for a stormwater pond or outlet to be a significant drinking water threat are:

Click here to view chemical list

Circumstance 1 (Circumstance Summary)

The system is a storm water management facility designed to discharge storm water to land or surface water.

The system is a storm water management facility designed to discharge

The policy that applies if the threat (SWM) meets the circumstances is:

Policy: SEW-10-LB-PI-MC

Future Stormwater Management Facility in Welli Protection Zone Scored 8 to 9 — Prescribed Instr

A future stormwater management facility that would b Appendix B is permitted in the:

- Intake Protection Zone with a vulnerability score of
- Wellhead Protection Area "A" (under the exemption
- Wallhoad Protection Area "R" with a vulnerability c

However, I don't think the development meets the circumstances since I don't believe the development is over 100 hectares, in which case the Ministry shouldn't put any Source Water components in the ECA.

Thanks.

Marika

From: Jocelyn Chandler < jchandler@jfsa.com> Sent: Friday, November 18, 2022 9:27 AM

Adam Fobert < AFobert@dsel.ca>

Subject: RE: SWP Perth

Hi Marika, I just sent you and invite for 930. We can chat and see if we can get what we need without Brian and then follow up later. J

Jocelyn Chandler, M.Pl., RPP, MCIP (she/her)

Land and Water Resource Planner / Project Manager

Cell.: 613-371-5242 | Email: jchandler@jfsa.com

From: Marika Livingston < marika.livingston@mrsourcewater.ca >

Sent: November 18, 2022 9:23 AM

To: Jocelyn Chandler < ichandler@jfsa.com >; Brian Stratton < brian.stratton@mrsourcewater.ca >; Adam Fobert

<<u>AFobert@dsel.ca</u>> **Subject:** RE: SWP Perth

Hello Jocelyn,

Can you please update me on this meeting. I have just returned from Holidays. Also, please be advised that Brian is away today.

Thanks, Marika

----Original Appointment----

From: Jocelyn Chandler < ichandler@jfsa.com Sent: Friday, November 18, 2022 9:22 AM

To: Brian Stratton; Adam Fobert; Marika Livingston

Subject: SWP Perth

When: Friday, November 18, 2022 9:30 AM-10:00 AM (UTC-05:00) Eastern Time (US & Canada).

Where: Microsoft Teams Meeting

Microsoft Teams meeting

Join on your computer, mobile app or room device

Click here to join the meeting

Meeting ID: 235 715 214 65

Passcode: tJFBnL

Download Teams | Join on the web

Learn More | Meeting options

** Caution : External Email /// Attention : Courriel externe **

Adam Fobert

From: Adam Fobert

Sent: November 30, 2022 2:13 PM

To: 'Grant Machan'

Cc: Hugo Lalonde; 'Colin Haskin'

Subject: RE: rough format- actual flow numbers san-2022-11-30_1278_projections.xlsx

Hello Grant,

Thank you for the additional flow data below.

I downloaded and reviewed the rain fall data from Environment Canada. Nearest station to Perth is Drummond, which is 14km away from the town Centre. Interestingly enough, 2018 experienced less rain than in 2021, however more wastewater flow was observed. I've highlighted 2022 since we have an incomplete rainfall data set.

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Avg Daily Flow (m3/d)	6264	5042	5981					6639	6650	5454
Annual Rain (mm)	806	626.8	872.4					785	860.2	825.2
Lagoon Capacity	80.5	64.8	76.9					85.3	85.5	70.1

While 2019 was significantly wetter than 2018, there was only a small increase in lagoon flow.

We reviewed the rainfall data sets for the years between 2018 and 2021 to better understand the flow monitoring results.

Rainfall Analysis

	2018	2019	2020	2021
Total Annual	785	860.2	825.2	802.2
Max daily	58.4	50	49.2	47.8
Number of rain days	119	126	128	121
Rainfall greater than 5mm	43	46	46	43
Rainfall greater than 10mm	26	26	23	24
Rainfall greater than 20mm	9	11	8	12
Rainfall greater than 30mm	5	7	5	5

2019 had the highest annual rainfall, most number of rainy days, and more significant rain events than 2018, 2020, and 2021. Rain events between 2019 and 2020 are comparable, while the lagoon saw a 1,196m3/d drop in daily average flow. This could be attributed to change in water use at the outset of COVID.

Has the Town continued its efforts to reduce wastewater inflows to the lagoons between 2018 and 2021?

Do you have data for 2014 to 2017?

I've attached our projection analysis as well as the rain analysis I've described above. Let me know if you would like to discuss.

Adam Fobert, P.Eng.

DSEL

david schaeffer engineering ltd.

120 Iber Road, Unit 103 Stittsville, ON K2S 1E9

direct: (613) 845-2105 cell: (613) 222-9493 email: afobert@DSEL.ca

This email, including any attachments, is for the sole use of the intended recipient(s) and may contain private, confidential, and privileged information. Any unauthorized review, use, disclosure, or distribution is prohibited. If you are not the intended recipient or if this information has been inappropriately forwarded to you, please contact the sender by reply email and destroy all copies of the original.

*** NOTE UPDATED PHONE NUMBER ***

From: Grant Machan <gmachan@perth.ca>

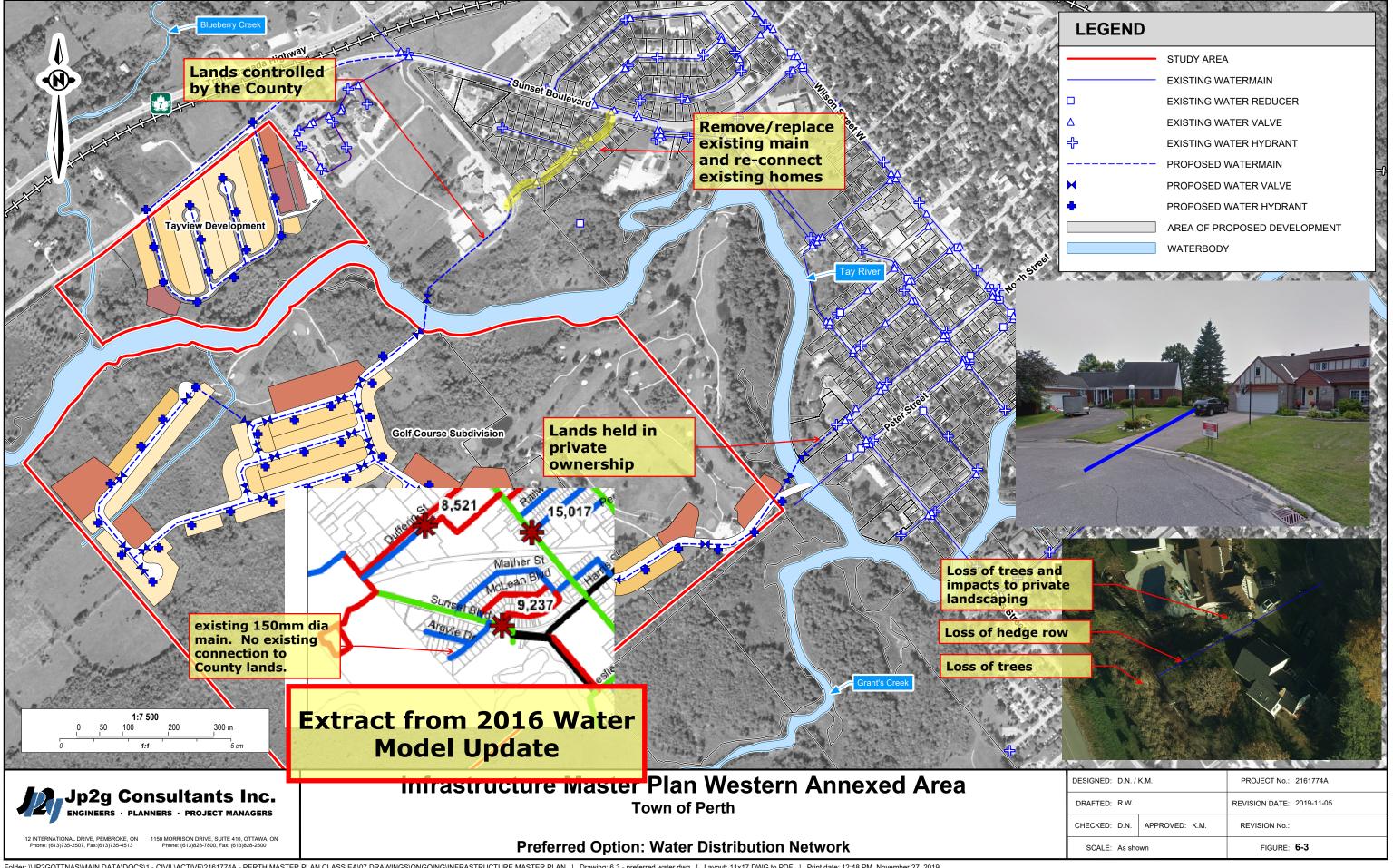
Sent: November 25, 2022 11:41 AM **To:** Adam Fobert <AFobert@dsel.ca>

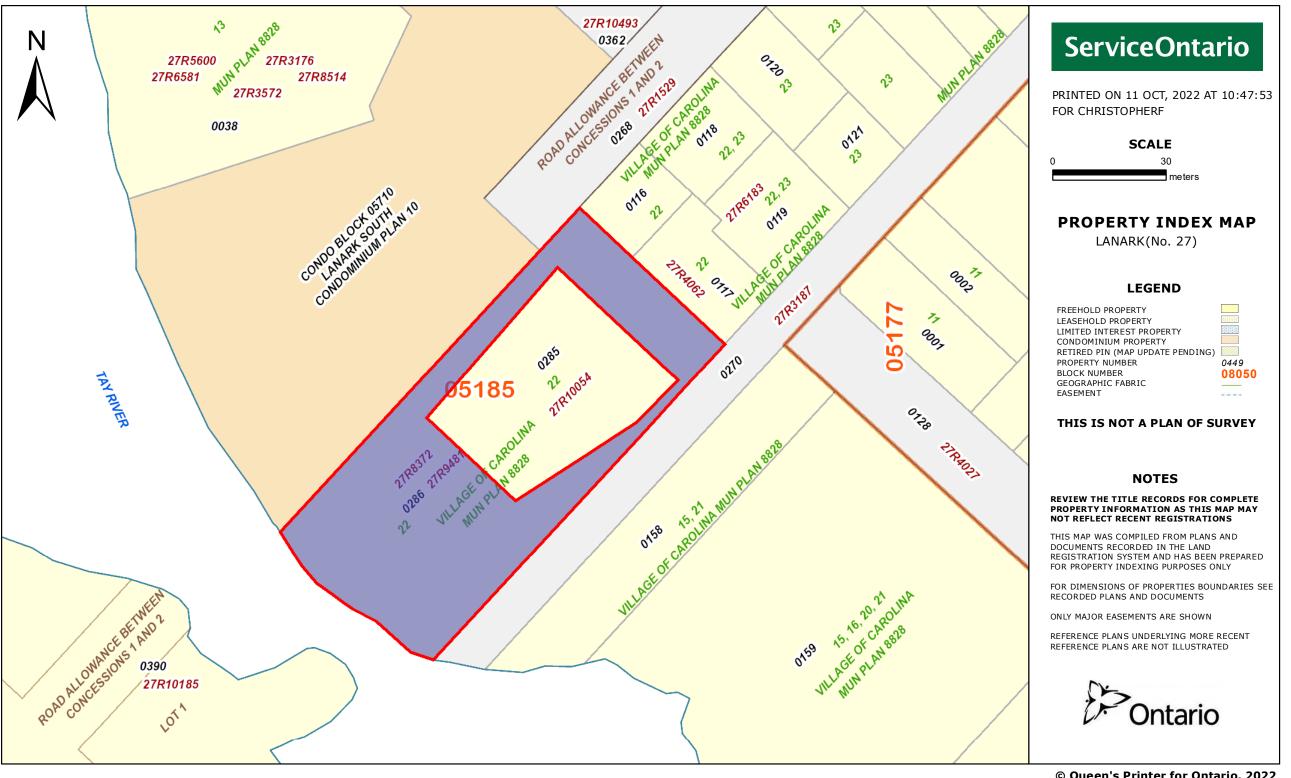
Subject: rough format- actual flow numbers

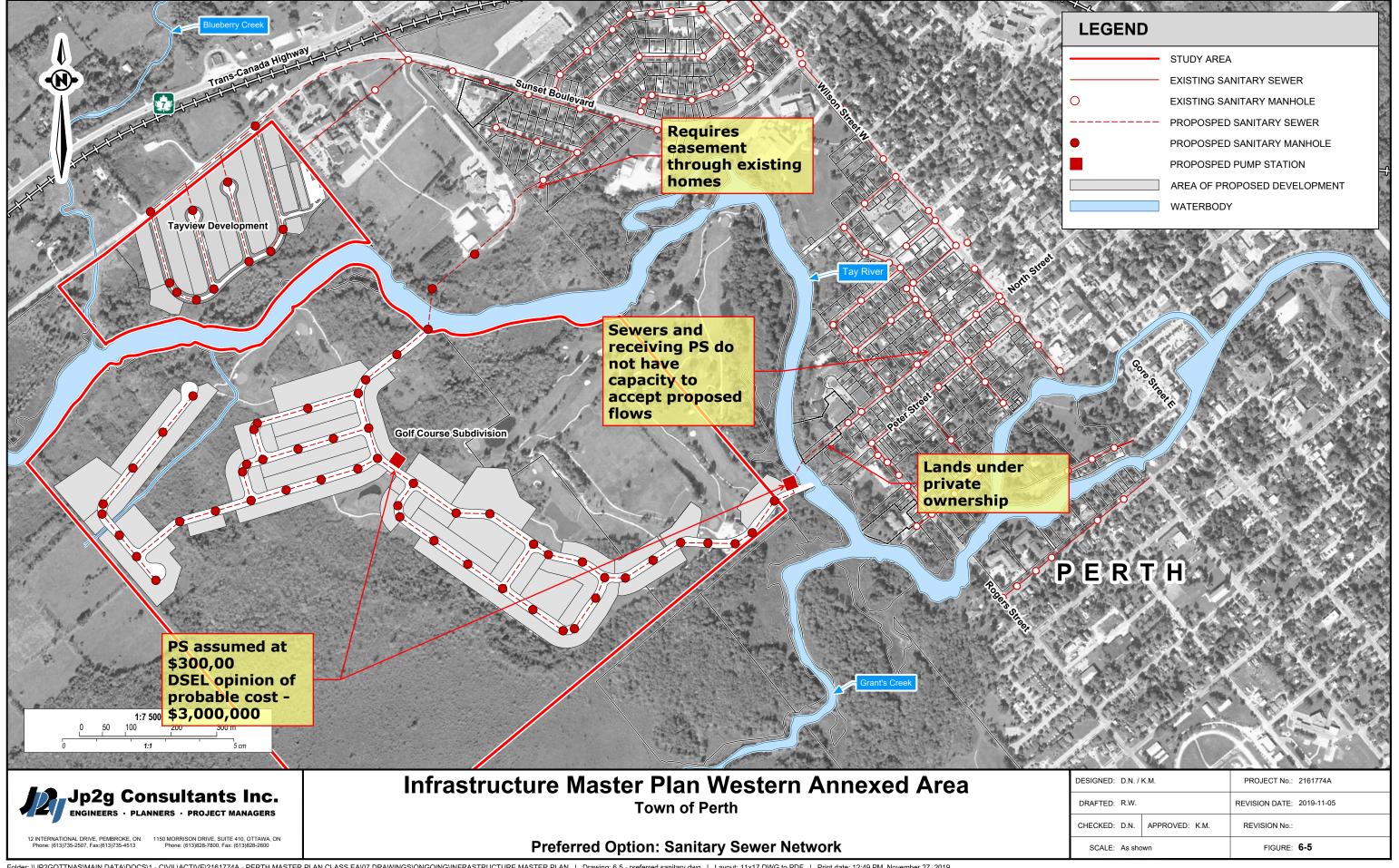
EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

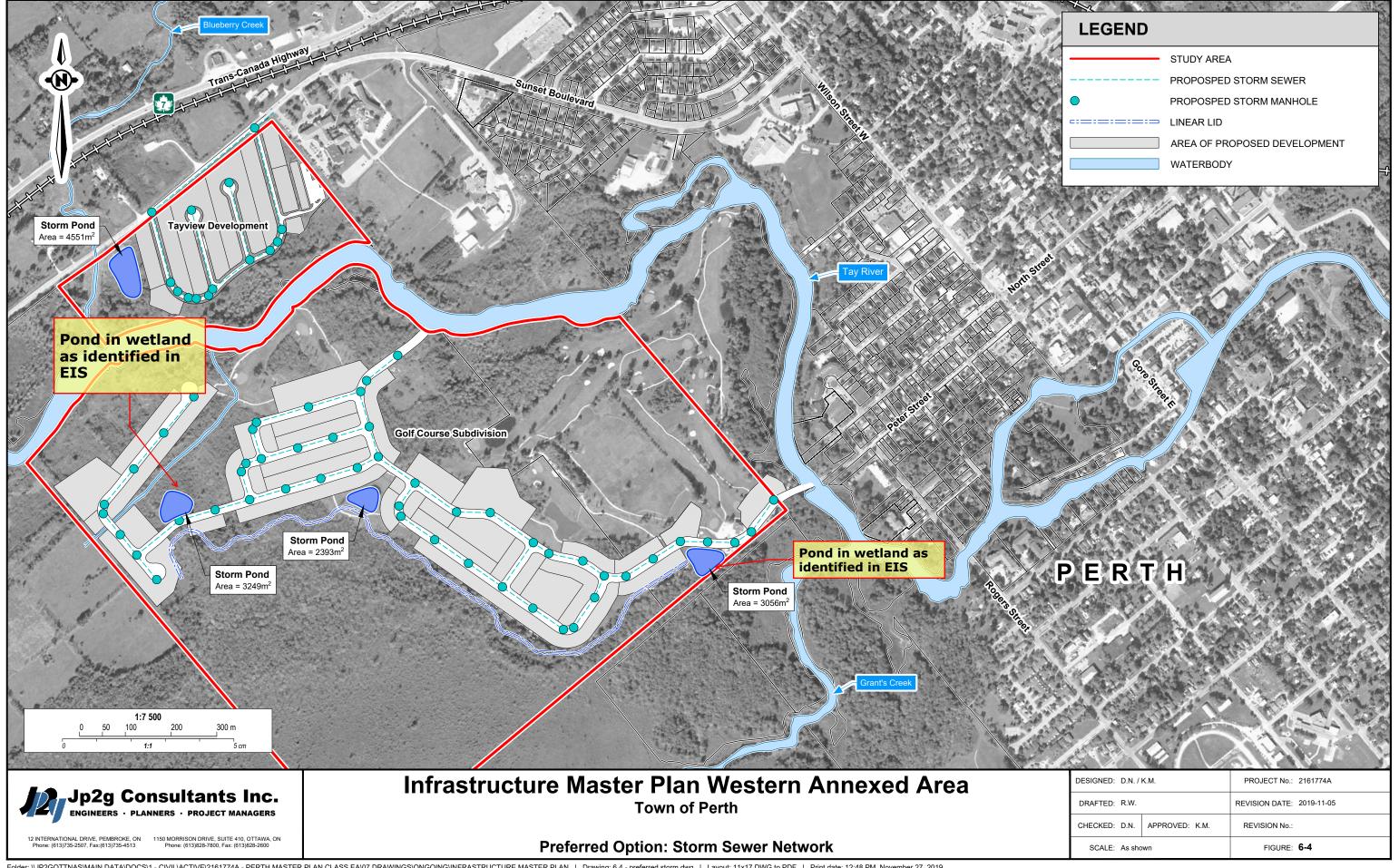
<u>Year</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>
Avg Daily Flow (m3)	6639	6650	5454
% Capacity	86%	86%	71%

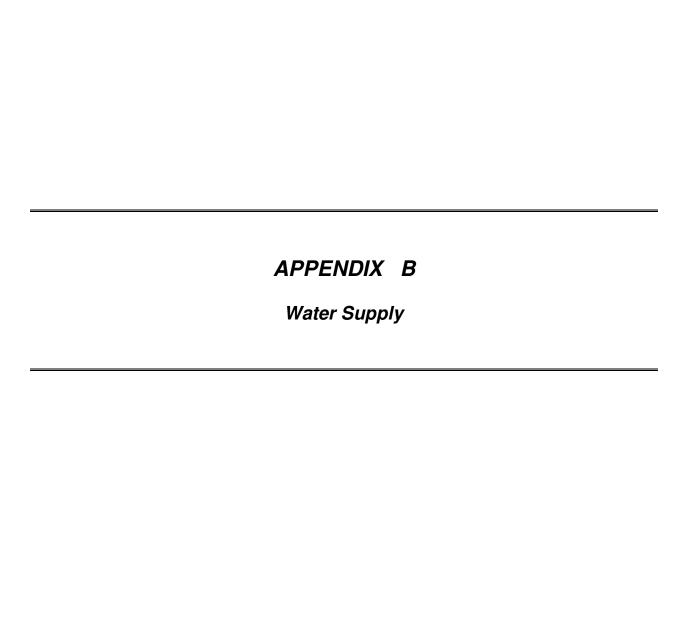
Grant Machan CET Director of Environmental Services gmachan@perth.ca 613-267-3311 ex2233

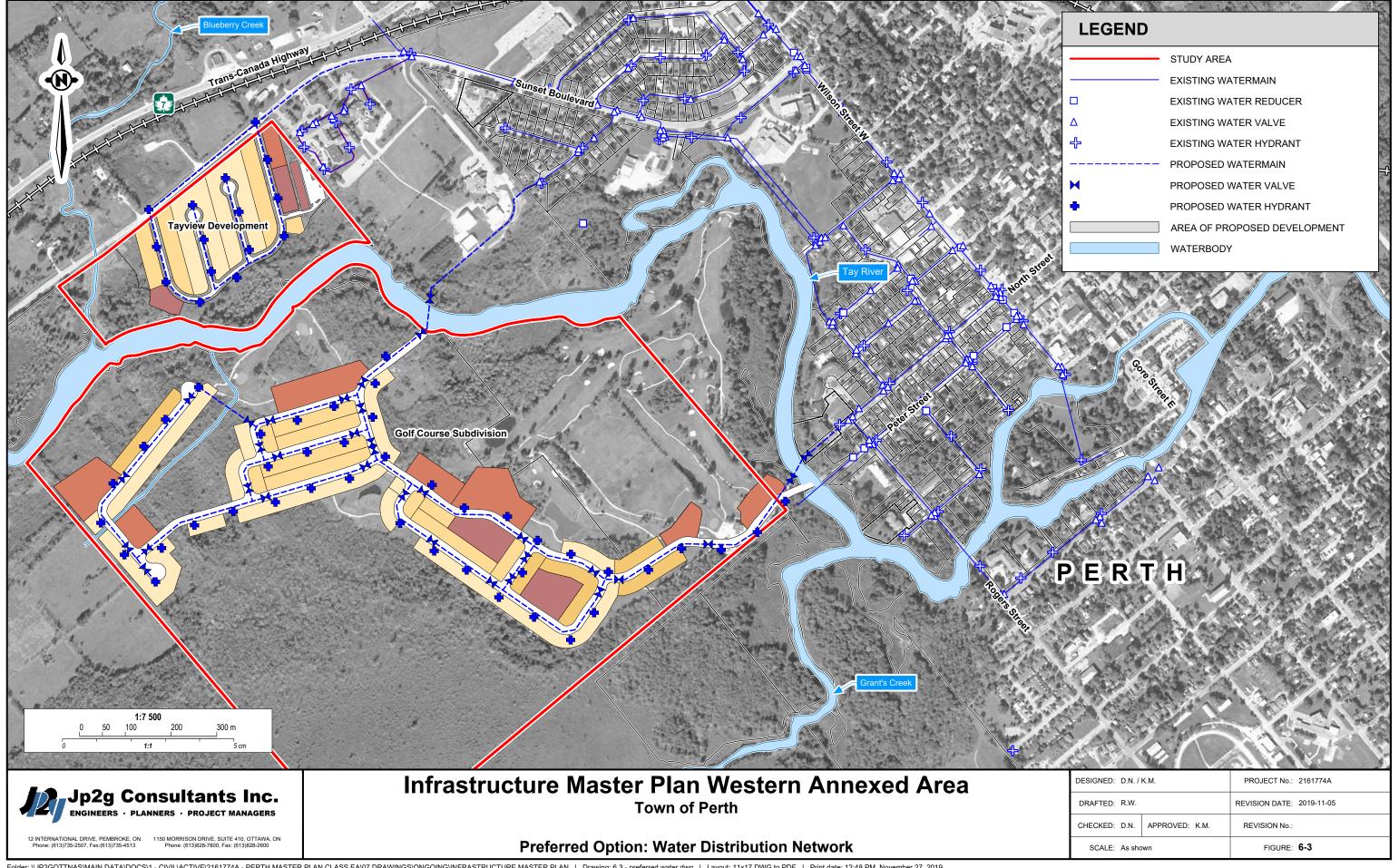


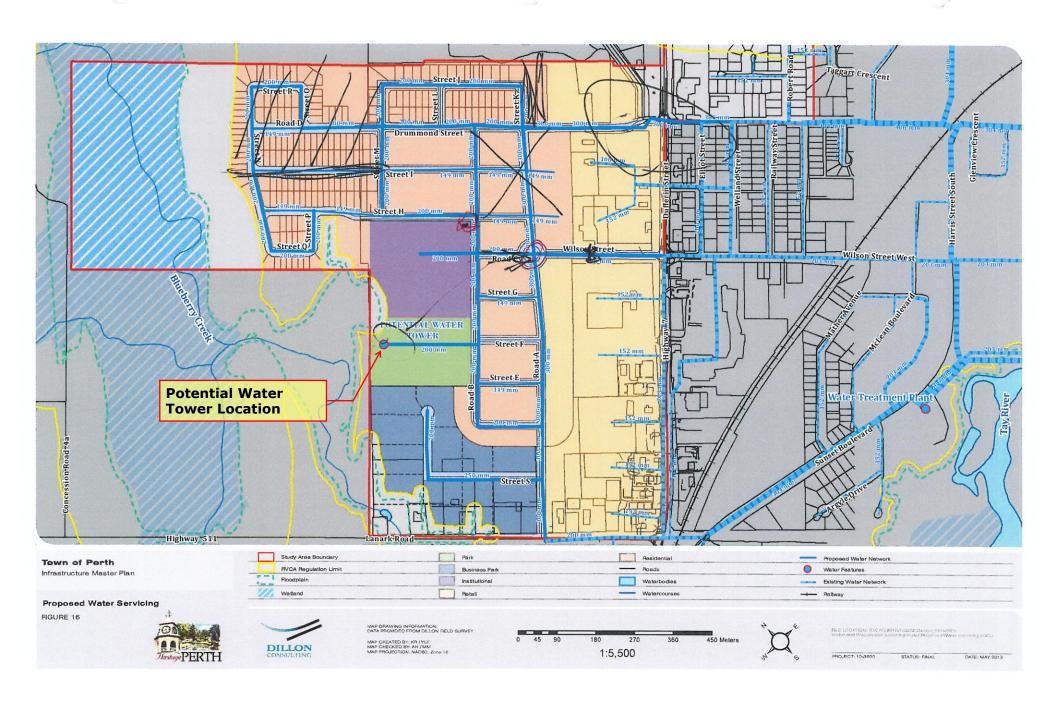














Perth Western Annex Lands - 141 Peter Street: Potable Water Hydraulic Analysis

Final Report

February 22, 2023

Prepared for:

Caivan (Perth GC) Limited

Prepared by:

Stantec Consulting Ltd.

Revision	Description	Author		Quality Check		Independent Review	
0	Draft	AM	20230208	KA	20230208	JS	20230208
1	Final	AM	20230222	KA	20230222	JS	20230222



This document entitled **Perth Western Annex Lands - 141 Peter Street: Potable Water Hydraulic Analysis** was prepared by Stantec Consulting Ltd. ("Stantec") for the account of David Schaeffer Engineering Ltd. (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by						
· ·	(signature)					
Alexandre Mineault-Guitard, M.A.Sc., ing., P.Eng.						
Paylowed by						
Reviewed by	(signature)					
	(signature)					
Jasmin Sidhu, P.Eng.						
Approved by						
	(signature)					
Kevin Alemany, M.A.Sc., P.E	ing.					



February 22, 2023

Table of Contents

1.0	INTRODUCTION	
1.1	STUDY AREA	1.1
1.2	EXISTING HYDRAULIC MODEL	
2.0	HYDRAULIC ASSESSMENT	2.1
2.1	SERVICEABILITY	2.1
	2.1.1 System Pressures	2.1
	2.1.2 Fire Flows	2.1
2.2	GROWTH AND POPULATION	2.3
	2.2.1 Western Annex Development	2.3
	2.2.2 Other Developments	2.3
2.3	DEMAND PROJECTIONS	2.4
2.4	MODEL DEVELOPMENT	2.6
	2.4.1 Proposed Watermain Sizing & Layout	2.8
3.0	PRELIMINARY HYDRAULIC MODELLING RESULTS	3.1
3.1	AVERAGE DAY & PEAK HOUR DEMANDS	3.1
3.2	MAXIMUM DAY PLUS FIRE FLOW	3.1
3.3	RELIABILITY	3.1
4.0	PRELIMINARY COST ESTIMATE	4.1
5.0	CONCLUSION AND RECOMMENDATIONS	5.1
6.0	REFERENCES	6.1



i

February 22, 2023

ı	.IST	ΩF	TΛ	RI	FS
_	.I O I	UГ	1 🖴	DL	.⊏ാ

Table 2-1: Estim	nated Unit Counts and Populations (Western Annex)	2.3
Table 2-2: Estim	nated Demand Projections – Proposed Developments	2.4
	n-Williams Coefficients by Watermain Size	
	nated Population at Under Ultimate Build-Out Conditions	
	r Storage Requirement (Existing Conditions)	
	r Storage Requirement (Ultimate Built-Out Conditions)	
Table 4-1: Prelii	minary Cost Estimates ¹	4.1
LIST OF FIGUR	RES	
Figure 1-1: Prop	posed Development Location	1.2
	ly Area Elevation	
	er Developments within the Town's Limit	
	posed Watermain Sizing & Layout	
Figure 3-1: Relia	ability Analysis Watermain Break Locations	3.3
LIST OF APPE	NDICES	
APPENDIX A	FUS FIRE FLOW CALCULATIONS	A.1
APPENDIX B	JUNCTION IDS	B.1
APPENDIX C	MODEL RESULTS	C.1



Introduction February 22, 2023

1.0 INTRODUCTION

To support Caivan (Perth GC) Limited (Caivan) with their draft plan submission for the Western Annex Lands development (Western Annex), Stantec Consulting Ltd (Stantec) was requested to provide engineering services to complete a water distribution system analysis for this proposed subdivision. The purpose of the analysis is to confirm associated watermain sizing and redundancy needs.

For this assignment, Stantec's scope of work included the following tasks:

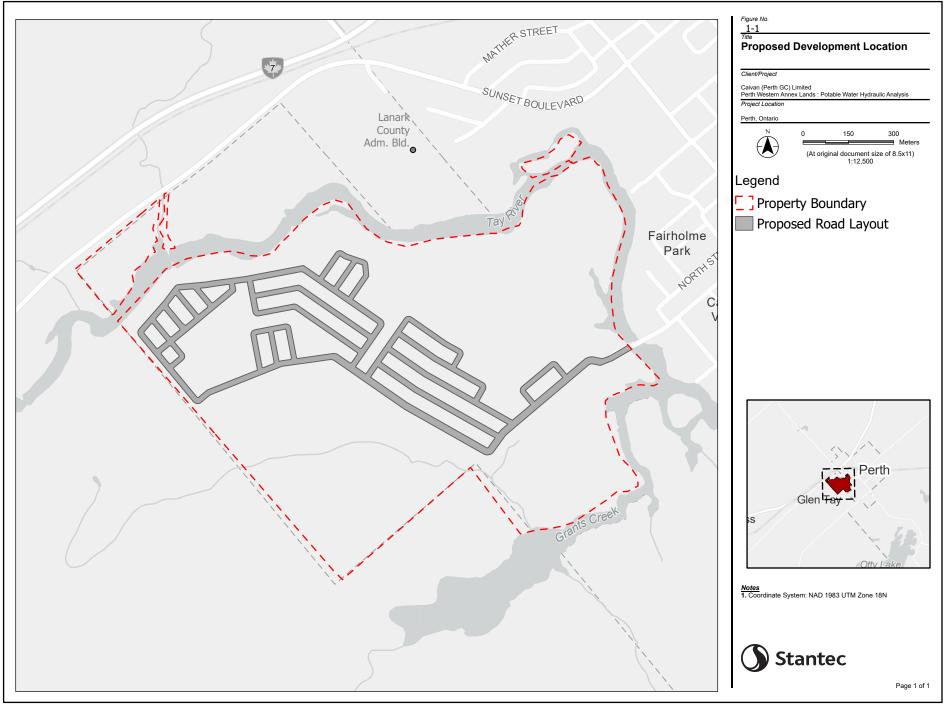
- 1. Review and update of the existing water distribution model;
- 2. Review of past studies, including the Western Annex Lands IMP (Jp2g, 2019), and the Area North of Highway 7 IMP (Dillon, 2013);
- 3. Analysis of Caivan's concept plan to develop water supply demands and Fire Underwriters Survey (FUS) Fire flow requirements;
- 4. Set up and run model simulations for average day (AVDY), peak hour (PKHR), and maximum day (MXDY) plus fire flow demands;
- 5. Assess the Town of Perth's (the Town) distribution system needs and upgrades to service Caivan's development and meet design criteria within the development lands;
- 6. Prepare a preliminary cost estimate (Class D) related to the upgrades to service Caivan's development; and,
- 7. Documenting the approach used, findings and recommendations from the analysis.

1.1 STUDY AREA

The study area is located along the western banks of the Tay River in the Town of Perth (Ontario). The proposed development location is on the Perth Golf Course property. Based on the updated site plan provided by Caivan (dated January 2023), the property is approximately 148 ha, where about 44 ha is proposed urban development. The proposed development is composed of townhouse units and single house units. For this analysis, the new development is considered as a single phase (ultimate build-out conditions).

Ultimately, these development lands are proposed to be serviced by a dual connection to the existing distribution network across the Tay River, along Peter Street. The proposed development location is shown in **Figure 1-1**. Note that further discussion related to the dual connection is provided in **Section 2.4.1**.





Introduction February 22, 2023

1.2 EXISTING HYDRAULIC MODEL

As part of a previous study in 2016, Stantec developed a hydraulic model of the Town's water distribution system. Based on communications with the Town's staff, no major upgrades to the distribution system have been made since the development of the hydraulic model. Thus, the 2016 model is assumed to be representative of the current state of the Town's water distribution system and water demands and was used as the basis for the serviceability analysis for the proposed Western Annex development.

It is noted that other new developments are also being planned in Perth and will be connected to the Town's distribution system. Further details of those developments are discussed in **Section 2.2.2**.



Hydraulic Assessment February 22, 2023

2.0 HYDRAULIC ASSESSMENT

For this analysis, the Town's recently adopted Engineering Design Guidelines (herein referred to as the "Town's Design Guidelines") and the Ontario Ministry of Environment, Conservation and Parks (MECP) Design Guidelines for Drinking Water Systems (2019) were used to establish water demands and design criteria. As per the Town's Design Guidelines, the potable water servicing shall meet the requirements of the Fire Underwriters Survey (FUS). However, in areas where such flow cannot be achieved, the Town will consider the minimum fire flows as per the MECP Design Guidelines. It is to note that the City of Ottawa Water Design Guidelines (herein referred to as "Ottawa's Design Guidelines") are also considered for specific applications (ex.: hydrant coverage and reliability analysis).

2.1 SERVICEABILITY

2.1.1 System Pressures

As per the Town's Design Guidelines, the static pressure at any point in the distribution system shall not exceed 550 kPa (80 psi) and no less than 275 kPa (40 psi) at ground elevation (i.e., at street level). The maximum pressure at any point in the water distribution system should not exceed 552 kPa (80 psi). For areas where pressures greater than 552 kPa (80 psi) are anticipated, pressure reducing measures are required. Under emergency fire conditions, a residual pressure of 140 kPa (20 psi) must be maintained in the distribution system while the appropriate fire flow is provided. **Figure 2-1** shows the elevations throughout the study area, based on the site's proposed grading. As shown, the elevations range from 135.38 m to 138.13 m.

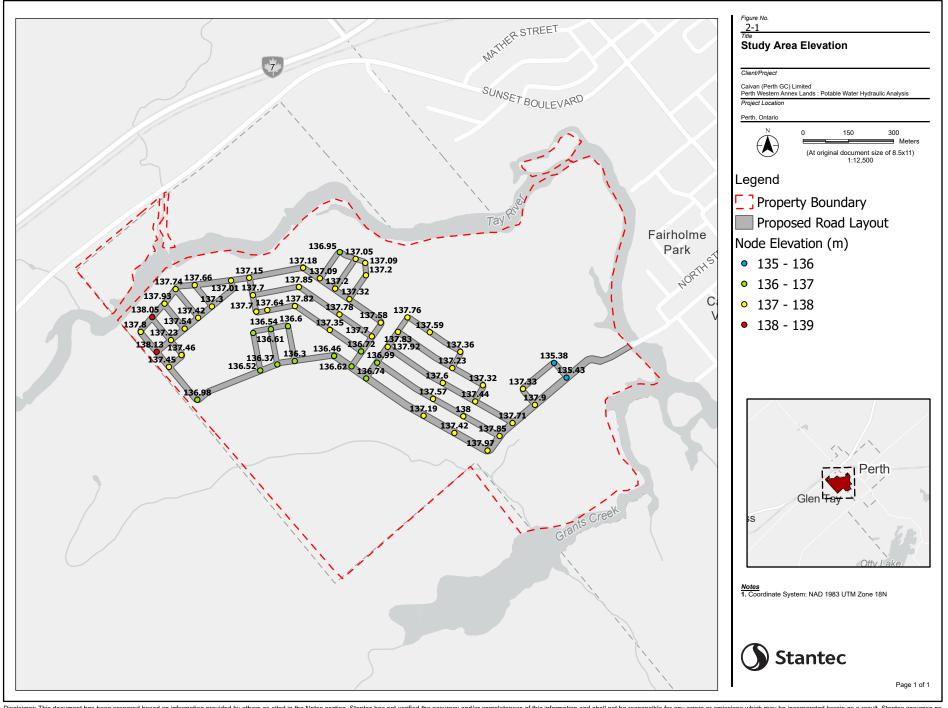
2.1.2 Fire Flows

The MECP Design Guidelines require a fire flow assessment to be completed to demonstrate that local watermains can provide the objective fire flows. The detailed FUS Guidelines (long method) can be used to calculate the objective fire flows, based on site plan information. The proposed layouts for both unit types (single house and townhouse) were provided to Stantec (see **Appendix A**) and were used to estimate the fire flow requirements.

Layout and unit information yielded a governing required fire flow (RFF) of 7,000 L/min (117 L/s) for single house units, and a RFF of 10,000 L/min (167 L/s) for townhouse units, based on the assumptions listed below. Detailed FUS calculations are provided in **Appendix A**. It is to note that those calculations are to be revisited at the detailed design stage, based on the characteristics of the proposed buildings.

- Two storeys building, with the basement more than 50% below grade;
- Typical construction (e.g., wood frame, limited combustible building contents); and
- · Buildings are not sprinklered.





Hydraulic Assessment February 22, 2023

On the other hand, the FUS Guidelines (simple method, 2020 Version) suggest a fire flow of 8,000 L/min (133 L/s) for one- or two-family dwellings up to 450 m² with less than 3 m of exposure distance; and 8,000 L/min (133 L/s) for row housing with exposure distances between 3 and 10 m.

For this analysis, the required fire flow defined using the FUS Guidelines "long method" will be used, as the "simple method" yields more of an average suggested value. Indeed, the "simple method" does not consider factors such as actual total effective area, combustibility of building contents, or separation distances on all four sides of the structure. Therefore, the RFF for the row housing units defined using the "long method" (10,000 L/min or 167 L/s) will be analyzed as part of the local watermain sizing.

2.2 GROWTH AND POPULATION

2.2.1 Western Annex Development

The residential population for the Western Annex Development was estimated based on projected household sizes as per population densities (or persons per unit, PPU) specified in the Town's Design Guidelines.

The proposed development consists of single house and townhouse units. Based on the proposed site layout, 640 single house units, and 299 townhouse units are considered for this analysis. **Table 2-1** shows the estimated number of units in these development lands and the projected population based on the distribution of residential unit types. The total estimated population is 3,479 persons.

Unit Type	Unit Count	PPU	Population
Singles	640	3.8	2,432
Townhouses	299	3.5	1,047
Total	939		3,479

Table 2-1: Estimated Unit Counts and Populations (Western Annex)

2.2.2 Other Developments

Other developments, as shown in **Figure 2-2**, are being considered within the Town's limits, and those will be connected to the existing water distribution network. As such, the estimations of residential population are needed to account for the projected increase in water demands.

First, the Tayview Developments (Tayview), described in the Jp2g 2019 IMP study, is located just north of the study site. As part of that development, a new retirement home (total of 160 beds, 1.3 PPU) is being planned close to the Lanark County Administration Building. Additionally, 57 single houses (3.8 PPU), 16 townhouses (3.5 PPU), 60 condos (2.0 PPU), and a commercial centre are also considered. As such, a population of 601 (excluding the commercial centre) is expected under the ultimate build-out conditions.



Hydraulic Assessment February 22, 2023

Secondly, the area north of Highway 7 (North HWY 7), studied in Dillon's 2013 IMP study, was also included in this serviceability analysis. Based on the mixed-density residential planning projections, 1,340 residents are expected in this area. Furthermore, provision for a new school, with 700 students and 35 staff members, was also accounted for. As such, the projected population for this area consists of 2,075 (1,340 residential, and 735 institutional). Additionally, 35 ha of commercial properties are planned for the area.

2.3 DEMAND PROJECTIONS

The criteria outlined in the Town's Design Guidelines and the MECP Design Guidelines for Drinking Water Systems (specifically Table 3-3) were followed to establish water demands for the new developments. Subsequently, the average day (AVDY) consumption rates were applied to align with revised water rates identified by the Town's Design Guidelines. As such, a residential consumption rate of 450 L/cap/d was used, as well as consumption rates of 28,000 L/ha/d and 70 L/cap/d for commercial and institutional areas, respectively.

For residential consumption, a maximum day (MXDY) peaking factor of 2 was then applied to the AVDY demand to provide a MXDY demand. A peak hour (PKHR) peaking factor of 2.2 was then applied to the MXDY demand to provide a PKHR demand. For commercial and institutional water demands, MXDY demands were calculated by multiplying the AVDY demands by a peaking factor of 1.5, while PKHR demands were calculated by multiplying MXDY demands by a peaking factor of 1.8. Estimated AVDY, MXDY and PKHR demand projections are summarized in **Table 2-2**.

Table 2-2: Estimated Demand Projections - Proposed Developments

Development	AVDY (L/S)	MXDY (L/s)	PKHR (L/s)
Western Annex	18.12	36.23	79.72
Tayview	3.17	6.32	13.88
North HWY 7	18.91	31.85	69.71
Total	40.20	74.41	163.31

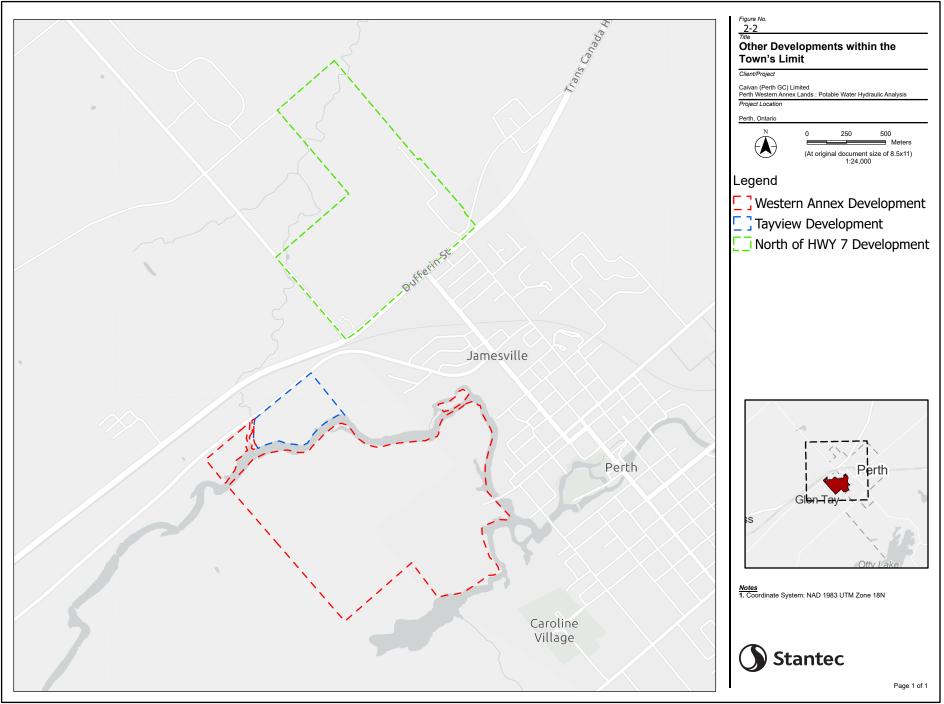
For this analysis, the total population from all developments (Western Annex, Tayview and North of HWY 7) will be considered as the "ultimate build-out conditions". The demands presented in **Table 2-2** were added to the hydraulic model, in addition to the existing water demands in the distribution models. Those demands were developed by Stantec (2016) based on water meter records, and data from the Water treatment Plant (WTP). The total water demands for the existing system are listed below. It is to note that under PKHR conditions, the total demand (269.5 L/s) exceeds the capacity of the two (2) domestic high lift pumps at the WTP (each rated at 105 L/s).

AVDY: 35.4 L/s;

MXDY: 70.8 L/s; and

PKHR: 106.2 L/s.





Hydraulic Assessment February 22, 2023

2.4 MODEL DEVELOPMENT

The existing water model (Innovyze's H2OMap Water) was imported into Innovyze's InfoWater Pro (Suite 3.5, Update #3). Then new development demands were incorporated in the model.

The model was developed to reflect the most current site plan, including the proposed watermain layout (based on proposed road alignment) and water demands. Watermains added to the model were assigned Hazen-Williams coefficients ("C-Factors") in accordance with the Town's Design Guidelines. These factors are listed in **Table 2-3**.

Table 2-3: Hazen-Williams Coefficients by Watermain Size

Watermain Diameter (mm)	Coefficient
150	100
200 - 250	110
300 and over	120

Analysis of the distribution network was completed by adjusting the controls at the WTP pumping station to fill and draw the existing elevated tank between levels of 60% and 100 % full.

A new elevated storage tank was recommended to support new developments within the Town, as discussed in both the Dillon and Jp2g IMP studies. At this time, the characteristics of the future elevated tank are unknown, and the design of the elevated tank is not part of this study. For this analysis, an elevated tank was sized based on MECP Design Guidelines, as per the Town's population expected under the ultimate build-out conditions. This includes all envisioned developments, namely Western Annex, Tayview and North HWY 7. The new elevated tank will be considered only under the ultimate build-out conditions. **Table 2-4** shows the population expected under the ultimate build-out conditions, including the existing Town's population of 6,360 (Jp2g, 2019).

Table 2-4: Estimated Population at Under Ultimate Build-Out Conditions

Item	Population
Existing population	6,360
Western Annex	3,479
Tayview	601
North HWY 7	2,075
Total	12,515

Hydraulic Assessment February 22, 2023

MECP Design Guidelines specifies that treated water storage should be composed of Fire Storage (A), Equalization Storage (B), and Emergency Storage (C). Each storage component is defined as follows:

- Fire Storage (A) is defined based on population;
- Equalization Storage (B) corresponds to 25% of the MXDY demand; and
- Emergency Storage (C) corresponds to 25% of the sum of A and B components.

Under the existing conditions, a population of 6,360 (Jp2g, 2019) yields a fire flow of 162 L/s, as per the MECP Design Guidelines. It is noted that the existing pumping reserve capacity of the WTP accounts for 19.72 L/s (1,669 m³/d), which could be reduced from the Fire Storage (A) requirement. Furthermore, the existing MXDY demand is 6,117 m³/d (or 70.8 L/s as listed in **Section 2.3**). **Table 2-4** shows the total storage requirement as per the MECP under existing conditions. As shown, the storage requirement exceeds the existing elevated storage of 945 m³. Note that the capacity of the high lift pumps at the WTP exceeds the existing MXDY demand, which addresses the storage deficiency.

Table 2-5: Water Storage Requirement (Existing Conditions)

	Description	Value	Unit
А	Fire Storage (Fire + Duration) ¹	1,533	m^3
В	Equalization Storage (25% of MXDY)	1,529	m³
С	Emergency Storage (25% of A+B)	766	m³
Total Water Storage	A+B+C	3,828	m³

¹ Reduced based on pumping reserve capacity.

For a future population of 12,515, the MECP Design Guidelines yield a recommended fire flow of 215 L/s. Furthermore, the expected MXDY demand under ultimate build-out conditions is 12,546 m³/d or 145.2 L/s (i.e., 70.8 L/s for existing demands, plus 74.4 L/s for the proposed developments). **Table 2-6** shows the total water storage requirement for the ultimate build-out conditions, as per the population presented in **Table 2-4**. The required elevated storage volume at ultimate built-out conditions exceeds the existing elevated storage of 945 m³.

Table 2-6: Water Storage Requirement (Ultimate Built-Out Conditions)

	Description	Value	Unit
А	Fire Storage (Fire + Duration) ¹	2,109	m³
В	Equalization Storage (25% of MXDY)	3,136	m^3
С	Emergency Storage (25% of A+B)	1,311	m ³
Total Water Storage	A+B+C	6,557	m³

¹ Reduced based on pumping reserve capacity.



Hydraulic Assessment February 22, 2023

Considering the configuration of the existing distribution network (i.e., a single elevated tank, as well as a single feed leaving the WTP), it is recommended to provide additional storage to improve the network's resiliency, as per both the Dillon and Jp2g IMP studies. As such, 5,612 m³ of additional storage was considered as part of this analysis, and the new elevated tank was assumed to be positioned within the North HWY 7 development. Note that the high-water level (HWL) of the new elevated tank is the same as the existing tank (i.e., 180.52 m), as per the 2013 Dillon Study.

2.4.1 Proposed Watermain Sizing & Layout

Based on the design requirements for pressure and fire protection, preliminary modelling indicates the need for a mix of 150 and 200 mm diameter watermains, as well as a 300 mm diameter feedermain, as shown in **Figure 2-3**. This layout was identified to provide sufficient flow to achieve the objective fire flow of 10,000 L/min, as well as domestic water demands.

As introduced, a dual connection is planned to the existing distribution network. There are two (2) options for the proposed connection: 1) connection to the existing 300 mm watermain at the corner of North Street and Lustre Lane via a new watermain; or 2) connection to the existing 75 mm watermain along Peter Street, on the west bank of the Tay River. Option 2 would require the replacement of the existing 75 mm (167 m) and 150 mm (45 m) watermains along Peter Street, up to the 300 mm watermain at the corner of Peter Street and Rogers Road. This is needed such that the objective fire flows are achieved within the proposed development. Both options are presented in **Figure 2-3**.

It is recommended to have two independent connections to the Town's network, to provide better resiliency. As reference, updated Section 4.3.1 of the Ottawa Water Distribution Systems Design Guidelines (ISTB-2021-03) states that "Industrial, commercial, institutional service areas with a basic day demand greater than 50 m³/d and *residential areas serving 50 or more dwellings shall be connected with a minimum of two watermains*, separated by an isolation valve, to avoid the creation of a vulnerable service area." As a connection is planned at only one location (i.e., across the Tay River along Peter Street), the proposed development could be considered a vulnerable service area under the Ottawa's Design Guidelines, depending on the characteristics of the connections.

As such, two individual connections should be implemented, so that if one of the connections is interrupted (e.g., watermain break), the other can still service the proposed development. This would require the installation of a line valve along each connection point, so that the feed from the existing system can be isolated when needed. In that sense, it is recommended that connections to the Town's network are implemented at both options listed above, for better resiliency. However, note that for this hydraulic analysis, both connections to the Town's network were assumed as Option 1.

Furthermore, it is necessary that the watermains are separated from each other (i.e., installed in separate trenches). If a watermain break occurs along one of the feedermain, and that both pipes are installed one next to the other, the second pipe could be affected (either by being "washed out" or being hit by crews during repairs).

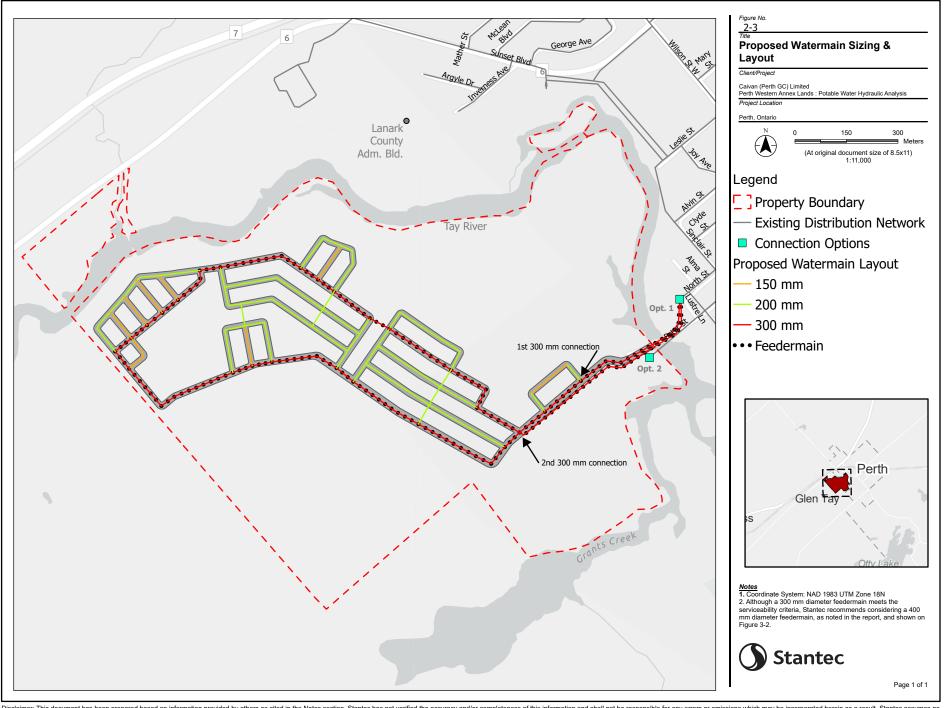


Hydraulic Assessment February 22, 2023

Similarly, there is a risk factor to consider regarding the crossings of the Tay River. It is not recommended that both feedermains cross the Tay River along the Peter Street bridge. If the bridge fails (e.g., major flooding) and that both lines are running along the bridge, it will interrupt the water servicing to the proposed development. As such, some considerations (e.g., trenchless crossing below the river) are to be taken regarding the crossings to mitigate the risks.

As such, it is recommended to have two independent connections to the existing network, as described above. This would avoid the creation of a vulnerable service area, increase resiliency against a major failure and minimize the risks for customers, as discussed in **Section 3.3**.





Preliminary Hydraulic Modelling Results February 22, 2023

3.0 PRELIMINARY HYDRAULIC MODELLING RESULTS

Preliminary hydraulic modelling was completed to assess the network's performance under different demand scenarios. The following subsections present the preliminary modelling results under AVDY, PKHR, and MXDY+FF demands for the proposed development. Note that for this analysis, a new elevated tank, sized based on MECP Design Guidelines, was assumed under ultimate build-out conditions.

All junction IDs are shown in **Appendix B**, with detailed modelling results for all scenarios provided in **Appendix C**.

3.1 AVERAGE DAY & PEAK HOUR DEMANDS

Under AVDY demands, maximum modelled pressures are between 55 and 64 psi, which falls within the desired pressure range of 40 to 80 psi based on the Town's Design Guidelines. As such, pressures are within the desired pressure range of 40 to 80 psi, and no pressure reducing measures are required within the proposed development.

For PKHR conditions, modelling results show that minimum pressures range between 48 psi and 58 psi. Note that under PKHR conditions, all three high lift pumps at the WTP are assumed to be in operations at the WTP, as PKHR demands exceed the rated capacity of the two (2) domestic pumps (refer to **Section 2.3**). The domestic pumps should be upsized before all developments are fully constructed.

3.2 MAXIMUM DAY PLUS FIRE FLOW

In this demand scenario, available fire flows across the proposed development must meet or exceed the RFF of 10,000 L/min (167 L/s) as described in **Section 2.1.2**.

Under MXDY+FF demands, assuming that the elevated tank is a 60% full and all high lift pumps running at the treatment plant, modelling shows that the RFF is exceeded across all nodes with a residual pressure of 20 psi. The minimum available fire flow within the new development is estimated at 10,600 L/min (177 L/s) at node J87.

3.3 RELIABILITY

It is good practice to assess the serviceability of the system under failure scenarios. As per the Ottawa's Design Guidelines, the system must be able to provide average day demand plus fire flow (AVDY + FF) while meeting serviceability requirements during a major failure (i.e., watermain break).

As such, four (4) reliability scenarios (shown in **Figure 3-1**) were reviewed to confirm sufficient pressure and flow can be achieved during a major failure. These break scenarios are described below. Note that



Preliminary Hydraulic Modelling Results February 22, 2023

the reliability scenarios assume that both feedermains connecting to the Town's existing network are independent from each other, as described in **Section 2.4.1**.

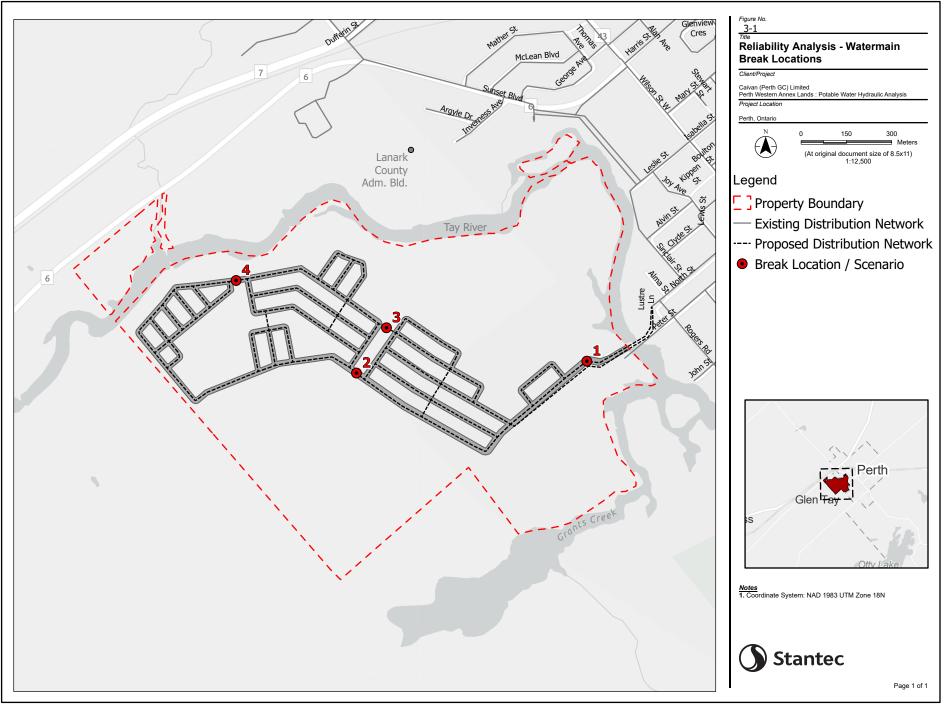
- 1. Break Scenario 1: Break in the one of the 300 mm feedermain connecting to the existing network;
- 2. Break Scenario 2: Break in the southern 300 mm feedermain connection to the western portion of the study area;
- 3. Break Scenario 3: Break in the northern 300 mm feedermain connection to the western portion of the study area.
- 4. Break Scenario 4: Break along the 300 mm feedermain in the western portion of the study area.

Model results (see **Appendix C**) show that a few junctions do not meet the RFF of 10,000 L/min (167 L/s), as discussed below:

- Under Break Scenario 1, the RFF is not met at node J87 (8,800 L/min) and node J121 (9,900 L/min).
- Under Break Scenarios 2 to 4, the RFF is met at all locations, except at node J87 (varying from 9,000 to 9,700 L/min).

Although modelling results suggest that portions of the local network may be vulnerable under a major break scenario, sufficient fire flow coverage could be provided if hydrant spacing is planned as per Ottawa's ISDTB-2018-02. Planning for hydrant spacing such that two (2) Class AA hydrants (rated at 5,700 L/min each) are placed within 75 m of all buildings would yield a cumulative available fire flow that would exceed the 10,000 L/min RFF, under all break scenarios. It is thus recommended to plan hydrant spacing as per Ottawa's ISDTB-2018-02, rather than the Town's Design Guidelines maximum hydrant spacing of 90 m for high density residential areas, to avoid oversizing local watermains.





Preliminary Cost Estimate February 22, 2023

4.0 PRELIMINARY COST ESTIMATE

A preliminary cost estimate was completed regarding the necessary upgrades to the existing network to service the Western Annex development. As previously discussed, a new elevated tank is required to support new developments within the Town. Furthermore, the domestic high lift pumps at the WTP will have to be upsized before all planned developments within Perth are constructed. As discussed in **Section 2.3**, the PKHR demand (269.5 L/s) exceeds the rated capacity of the two (2) domestic pumps (each rated at 105 L/s). The design of the elevated tank, as well as upgrades at the WTP pumping station are not part of Stantec's mandate related to the serviceability of the Western Annex development. As such, these were not included in the cost estimate analysis. The required upgrades are linked to the proposed connections to the Town's existing water distribution network. As discussed in **Section 2.4**, there are two (2) options at the proposed connection, as presented below.

- Option 1: connection to the 300 mm watermain at the corner of North Street and Lustre Lane.
- Option 2: connection to 75 mm watermain along Peter Street, on the west bank of the Tay River.

Option 1 would be completed via new watermains, whereas Option 2 would require upgrades to the existing water distribution network (watermain replacement/upsizing), in addition to new watermains.

The preliminary cost estimate for the supply and installation of new watermain was based on a unit cost of \$900 / linear m for 300 mm watermains. The unit costs include supply, labour, administration, and contractor's profits, but excludes applicable taxes.

However, the items listed below were not considered as part of the cost estimate analysis. As such, the cost estimates, presented in **Table 4-1**, will have to be re-evaluated as part the detailed design phase. Note that the cost analysis considered only the water infrastructure outside of the Western Annex development boundary.

- Removal and reinstatement of watermain, paving and street infrastructure;
- Removal or supply of fire hydrants, valve boxes, and water service connections;
- Supply and installation of a temporary water supply;
- Temporary traffic maintenance and road signs; and
- Cost associated with water infrastructure crossing the Tay River and/or rock breaking and removal.

Table 4-1: Preliminary Cost Estimates¹

Option	Description	Quantity	Unit	Unit Price (\$)	Cost (\$)
1	Supply and installation of new dual 300 mm watermains	352	m	900	325,800
2	Supply and installation of new dual 300 mm watermains	366	m	900	329,400

¹ Preliminary cost estimate based on the assumption listed in **Section 4.0**, without applicable taxes.



Conclusion and Recommendations February 22, 2023

5.0 CONCLUSION AND RECOMMENDATIONS

A preliminary water distribution system hydraulic analysis was completed for the Western Annex development. The purpose of this analysis was to confirm associated watermain sizing and redundancy needs for the proposed development.

Based on the hydraulic analysis, the following conclusions and recommendations were made:

- Based on the current site plan layout, the estimated AVDY, MXDY and PKHR demands for the proposed development are 18.12 L/s, 36.23 L/s, and 79.72 L/s, respectively.
- Under the ultimate build-out conditions, the estimated AVDY, MXDY and PKHR demands for all envisioned developments in Perth (Western Annex, Tayview, and North of HWY 7) are 40.20 L/s, 74.41 L/s, and 163.31 L/s, respectively. This results in AVDY, MXDY and PKHR demands for the whole Town of 75.6 L/s, 145.2 L/s, and 269.5 L/s, respectively.
- Note that PKHR demands exceed the rated capacity of the two (2) existing domestic pumps at
 the WTP (refer to Section 2.3). As such, the domestic pumps should be upsized before all
 developments are fully constructed. Furthermore, additional storage is needed to support new
 developments within the Town. However, the design of the elevated tank, and any upgrades at
 the WTP pumping station are not part of Stantec's mandate.
- Governing required fire flows (RFF) of 7,000 L/min (117 L/s) for single house units, and a RFF of 10,000 L/min (167 L/s) for townhouse units were identified based on the assumptions listed in Section 2.1.2. The RRF calculations should be reviewed or updated as needed as part of subsequent design stages, based on available building information.
- Preliminary modelling indicates the need for a 300 mm feedermain to adequately service the
 proposed development. Local watermains are proposed to be 150 and 200 mm watermains. As
 noted in Section 2.4.1, it is recommended that both feedermains connecting to the existing
 network are fully independent from each other, even if they both cross the Tay River along Perter
 Street. This would avoid the creation of a vulnerable service area, increase resiliency against a
 major failure and minimize the risks for customers.
- With the proposed watermain layout, system pressure requirements are met under AVDY and PKHR demands. Furthermore, the RFF (10,000 L/min or 167 L/s) is exceeded across all nodes under MXDY+FF demands.
- To assess reliability and resiliency against major failures, a number of reliability scenarios were completed under AVDY+FF demand conditions to confirm sufficient pressure and flow can be achieved during a major failure. Under all break scenarios, some locations do not meet the RRF. However, sufficient fire flow coverage could be provided if hydrant spacing is planned as per Ottawa's ISDTB-2018-02. As such, it is recommended to plan for hydrant spacing such that all buildings are located within 75 m of two (2) class AA fire hydrants (as per ISTB-2018-02, Appendix I). This will provide sufficient fire protection and avoid oversizing local watermains.



Conclusion and Recommendations February 22, 2023

• A preliminary cost estimate was completed for the necessary upgrades to the existing network to service the Western Annex development. Note that upgrades at the WTP and any new storage were not included in the cost estimate analysis. The cost for the supply and installation of new dual 300 mm diameter watermains is estimated at \$325,800 for Option 1 (connection to the existing 300 mm diameter watermain at North Street and Lustre Lane), and \$329,400 for Option 2 (connection to 75 mm watermain along Peter Street, on the west bank of the Tay River). Preliminary cost estimates are based on the assumption listed in Section 4.0, and only consider water infrastructure outside of the Western Annex development boundary.



References February 22, 2023

6.0 REFERENCES

City of Ottawa. (2010). Ottawa Design Guidelines - Water Distribution. Ottawa.

City of Ottawa. (2018). Technical Bulletin ISTB-2018-02. Ottawa.

City of Ottawa. (2021). Technical Bulletin ISTB-2021-03. Ottawa.

Corporation of the Town of Perth (2022). Engineering Design Guidelines. Perth.

Dillon Consulting Ltd. (2013). *Infrastructure Master Plan for Area North of Highway 7*. October 2013. Ontario.

Fire Underwriters Survey (2020). *Water Supply For Public Fire Protection – A Guide to Recommended Practice In Canada*. 2020 Version.

Jp2g Consultants Inc. (2019). *Infrastructure Master Plan – Western Annex in the Town of Perth*. November 2019. Ontario.

Ministry of the Environment, Conservation and Parks. (2008). *Design Guidelines for Drinking Water Systems*. Ontario.

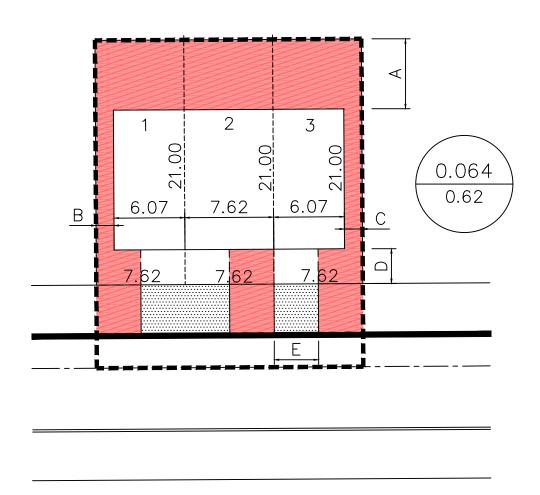
Stantec Consulting Ltd. (2016). 2016 Perth Potable Water Model Update. October 12, 2016. Ottawa.



PERTH WESTERN ANNEX LANDS -	141 PETER STREET	: POTABLE WATER	HYDRAULIC
ANALYSIS			

Appendix A FUS FIRE FLOW CALCULATIONS





DIMENSIONS:

A = 6.00 m

B = 1.55 m

C = 1.55 m

D = 3.00 m

E = 3.80 m

ENVELOPE LENGTH: 12.00 m

LOT: 22.86x21.00 m

NOTE:

TOTAL AREA: 643.00 m2 TOTAL IMP AREA: 386.36 m2

IMP %: 60% RC: 0.62

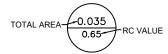
16.75 m ROW TH RC FIGURE



120 Iber Road, Unit 203 Stittsville, Ontario, K2S 1E9 Tel. (613) 836-0856 Fax. (613) 836-7183 www.DSEL.ca

LEGENDS



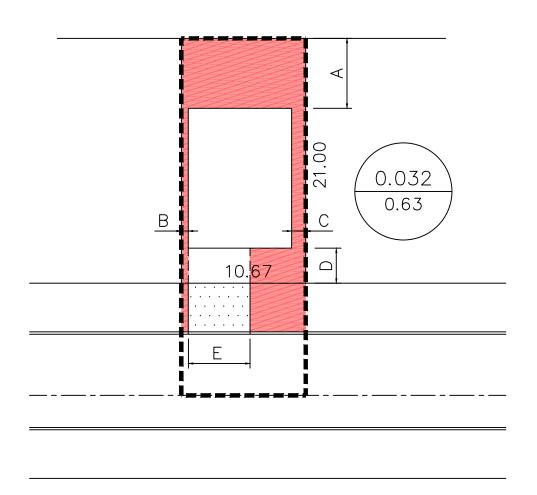


■■■ STM TRIB LINE

7.62 LOT DIMENSION

 SCALE:
 NTS
 PROJECT No.:
 19-1092

 DATE:
 FEB 2022
 FIGURE:



DIMENSIONS:

A = 6.00 m

B = 0.60 m

C = 1.20 m

D = 3.00 m

E = 5.30 m

ENVELOPE: 8.87x12.00 m

LOT: 10.67x21.00 m

NOTE:

TOTAL AREA: 326.82 m2 TOTAL IMP AREA: 202.64 m2

IMP %: 62% RC: 0.63

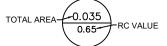
16.75 m ROW SINGLE UNIT RC FIGURE



120 Iber Road, Unit 203 Stittsville, Ontario, K2S 1E9 Tel. (613) 836-0856 Fax. (613) 836-7183 www.DSEL.ca

LEGENDS





■■■ STM TRIB LINE

10.67 LOT DIMENSION

SCALE:	NTS	PROJECT No.:	19-1092
DATE:	FEB 2022	FIGURE:	



FUS Fire Flow Calculation - Long Method

Calculations based on: "Water Supply for Public Fire Protection" by Fire Underwriters' Survey, 2020

Fire Flow Calculation #: 1

Building Type/Description/Name: Residential

Stantec Project #: 163401476

Project Name: Perth Western Annex Lands

Date: January 30, 2023

Data inputted by: Alexandre Mineault-Guitard, ing., P.Eng Data reviewed by: Kevin Alemany, M.A.Sc., P.Eng.

Notes: Townhouse unit

		Fire U	nderwriters Survey Determination o	of Required Fire Flo	ow - Long Method								
Step	Task	Term	Options	Multiplier Associated with Option	Choose:	Value Used	Unit	Total Fire Flow (L/min)					
			Framing Material										
			Type V - Wood Frame	1.5									
			Type IV-A - Mass Timber	0.8									
_	Choose Frame Used		Type IV-B - Mass Timber	0.9									
1	for Construction of Unit	Coefficient related to type	Type IV-C - Mass Timber	1	Type V - Wood Frame	1.5	m						
	Oille	of construction (C)	Type IV-D - Mass Timber	1.5	Type v - wood Frame	1.5							
			Type III - Ordinary construction	1									
			Type II - Non-combustible construction	0.8									
			Type I - Fire resistive construction	0.6									
	Choose Type of			Floor Space Area	a								
2	Housing (if TH, Enter		Single Family	0									
	Number of Units Per TH Block)	Type of Housing	Townhouse - indicate # of units	1	Townhouse - indicate # of units	1	Units						
	TH Block)		Other (Comm, Ind, Apt etc.)	0	Of dring								
2.2	# of Storeys	Number of Floo	rs/Storeys in the Unit (do not include baseme	nt if 50% below grade):	2	2	Storeys						
	Fator Casuad Floor	A Floor Area //	A) based on total floor area of all floors for one	it / fisti	237								
3	Enter Ground Floor Area of One Unit	Average Floor Area (A	A) based on total floor area of all floors for one	construction):	Course Materia (m2)	237							
3.1	Obtain Total Effective	Total Effective Bu	ilding Area (# of Storeys x # of Units (if single	family or townhouse) x	Square Metres (m2) 474	474	Area in Square Metres (m ²)						
	Building Area Obtain Required Fire		Required Fire Flow (without reducti	Average Floor Area):		414		7,000					
4	Flow without Reductions		Round to nearest 1,000 L/min										
5	Apply Factors Affecting Burning		Reductions/Increa	ases Due to Factor	rs Affecting Burning								
			Non-combustible	-0.25									
	Choose	Occupancy Content	Limited combustible	-0.15									
5.1	Combustibility of	Hazard Reduction or Surcharge	Combustible	0	Limited combustible	-0.15	N/A	5,950					
	Building Contents	Surcharge	Free burning	0.15									
			Rapid burning	0.25									
		Sprinkler Reduction	Adequate Sprinkler conforms to NFPA13	-0.3	None	0	N/A	0					
			None	0									
5.2	Choose Reduction Due to Presence of	Water Supply Credit	Water supply is standard for sprinkler and fire dept. hose line	-0.1	Water supply is not	0	N/A	0					
J.2	Sprinklers	Water Supply Credit	Water supply is not standard or N/A	0	standard or N/A	U	IVA						
	•	Sprinkler Supervision	Sprinkler system is fully supervised	-0.1	Sprinkler not fully	_		_					
		Credit	Sprinkler not fully supervised or N/A	0	supervised or N/A	0	N/A	0					
		Sprinkler Conforms to	Adequate sprinkler for exposures conforms	to NFPA13									
		NFPA13	None for exposures		None for exposures		N/A						
	Choose Presence of		Water supply is standard for sprinkler and fir exposures	e dept. hose line of	Water supply is not								
5.3	Sprinklers for Exposures within	Water Supply	exposures		standard or N/A for	0	N/A	0					
	30m		Water supply is not standard or N/A for expo	sures	exposures								
		Sprinkler Supervision	Sprinkler system of exposures is fully superv	rised	Sprinkler not fully supervised or N/A for		N/A						
		opining capervision	Sprinkler not fully supervised or N/A for expo	osures	exposures		1071						
			North Side	10.1 to 20.0m	0.15								
E #	Choose Separation	Exposure Distance	East Side	3.1 to 10.0m	0.2	0.65		2 000					
5.4	Distance Between Units	Between Units	South Side	20.1 to 30.1m	0.1	0.65	m	3,868					
	Cinto		West Side	3.1 to 10.0m									
			Total Required Fire Flor			max/min li	mits applied:	10,000					
	Obtain Required Fire												
		Required Duration of Fire Flow (hrs)											
6	Flow, Duration & Volume							2.00					



FUS Fire Flow Calculation - Long Method

Calculations based on: "Water Supply for Public Fire Protection" by Fire Underwriters' Survey, 2020

Fire Flow Calculation #: 2

Building Type/Description/Name: Residential

Stantec Project #: 163401476

Project Name: Perth Western Annex Lands

Date: January 30, 2023

Data inputted by: Alexandre Mineault-Guitard, ing., P.Eng **Data reviewed by:** Kevin Alemany, M.A.Sc., P.Eng.

Notes: Single house unit

		Fire U	nderwriters Survey Determination o	of Required Fire Flo	ow - Long Method							
Step	Task	Term	Options	Multiplier Associated with Option	Choose:	Value Used	Unit	Total Fire Flow (L/min)				
			Type V - Wood Frame	1.5	•							
			Type IV-A - Mass Timber	0.8								
1	Choose Frame Used for Construction of		Type IV-B - Mass Timber	0.9								
•	Unit	Coefficient related to type of construction (C)	Type IV-C - Mass Timber	1	Type V - Wood Frame	1.5	m					
		or construction (C)	Type IV-D - Mass Timber	1.5								
			Type III - Ordinary construction Type II - Non-combustible construction	0.8								
			Type I - Fire resistive construction	0.6								
			Type 1 - 1 lie resistive constituction	Floor Space Area								
	Choose Type of Housing (if TH, Enter		Cinada Familio		- 							
2	Number of Units Per	Type of Housing	Single Family Townhouse - indicate # of units	1 0	Single Family	1	Linite					
	TH Block)	Type of Flousing	Other (Comm, Ind, Apt etc.)	0	Siligie i allilly	'	Office					
2.2	# of Storeys	Number of Floo	rs/Storeys in the Unit (do not include baseme		2	2	Storevs					
2.2	•		· ·	,	106		Otoreys					
3	Enter Ground Floor Area of One Unit	Average Floor Area (A	A) based on total floor area of all floors for one		106							
	Area of One Unit			construction):	Square Metres (m2)		Area in Square					
3.1	Obtain Total Effective Building Area	Total Effective Bu	ilding Area (# of Storeys x # of Units (if single	family or townhouse) x Average Floor Area):	213	213	Metres (m ²)					
4	Obtain Required Fire Flow without Reductions		Required Fire Flow (without reducti Round to	ons or increases per FU nearest 1,000 L/min	JS) (F = 220 * C * √A)			5,000				
5	Apply Factors Affecting Burning		Reductions/Incre	ases Due to Factor	rs Affecting Burning							
	Anecting Burning		Non-combustible	-0.25								
	Choose	Occupancy Content	Limited combustible	-0.15								
5.1	Combustibility of	Hazard Reduction or	Combustible	0	Limited combustible	-0.15	N/A	4,250				
	Building Contents		Surcharge	Free burning	0.15			Units Storeys Area in Square Metres (m²)				
			Rapid burning	0.25								
		Sprinkler Reduction	Adequate Sprinkler conforms to NFPA13	-0.3	None	0	N/A	0				
		'	None	0								
5.2	Choose Reduction Due to Presence of	Water Supply Credit	Water supply is standard for sprinkler and fire dept. hose line	-0.1	Water supply is not	0	N/A	0				
5.2	Sprinklers	Water Supply Credit	Water supply is not standard or N/A	0	standard or N/A	U	IN/A					
		Sprinkler Supervision	Sprinkler system is fully supervised	-0.1	Sprinkler not fully	_		_				
		Credit	Sprinkler not fully supervised or N/A	0		0	N/A	0				
		Sprinkler Conforms to	Adequate sprinkler for exposures conforms	to NFPA13								
		NFPA13	None for exposures		None for exposures		N/A					
	Choose Presence of		Water supply is standard for sprinkler and fir	e dept. hose line of	Water cupply is not							
5.3	Sprinklers for	Water Supply	exposures		Water supply is not standard or N/A for	0	N/A	0				
5.5	Exposures within 30m		Water supply is not standard or N/A for expo	sures	exposures	O		•				
			Sprinkler system of exposures is fully superv	rised	Sprinkler not fully							
		Sprinkler Supervision	Sprinkler not fully supervised or N/A for expo		 supervised or N/A for exposures 		N/A					
			North Side	10.1 to 20.0m	0.15							
_	Choose Separation	Exposure Distance	East Side	3.1 to 10.0m	0.2	0.7		2075				
5.4	Distance Between Units	Between Units	South Side	20.1 to 30.1m	0.1	0.7	m	2,975				
	- Into		West Side	0 to 3.0m	0.25							
			Total Required Fire Flow, rounded to nearest 1,000 L/min, with max/min limits applied:									
	Obtain Required Fire		,		Total Required			7,000				
6	Flow, Duration &				· · · · · · · · · · · · · · · · · · ·	•						
	Volume				Required Du	iration of Fi	ire Flow (hrs)	2.00				
					Required V	olume of F	ire Flow (m ³)	840				

Appendix B JUNCTION IDS





Appendix C MODEL RESULTS



AVDY Conditions

Junction ID	Domand (L/a)	Elevation (m)	Hood (m)	Pressure (psi)
Junction ID J7	Demand (L/s) 0.29	135.4	Head (m) 179.0	62
J9	0.29	137.9	179.0	58
J11	0.29	138.0	178.9	58
J13	0.29	137.4	178.9	59
J15	0.29	138.0	178.9	58
J17	0.29	137.2	178.9	59
J19	0.29	137.6	178.9	59
J21	0.29	137.6	178.9	59
J23	0.29	137.4	178.9	59
J25	0.29	137.3	178.9	59
J27	0.29	137.2	178.9	59
J33	0.29	137.0	178.9	59
J35	0.29	137.6	178.9	59
J37	0.29	137.8	178.9	58
J39	0.29	137.8	178.9	58
J41	0.29	137.6	178.9	59
J43	0.29	136.7	178.9	60
J45	0.29	136.7	178.9	60
J47	0.29	137.4	178.9	59
J49	0.29	137.7	178.9	58
J51	0.29	137.9	178.9	58
J57	0.29	136.3	178.9	60
J59	0.29	136.4	178.9	60
J61	0.29	136.5	178.9	60
J63	0.29	136.5	178.9	60
J65	0.29	137.2	178.9	59
J67	0.29	137.3	178.9	59
J69	0.29	137.4	178.9	59
J71	0.29	137.5	178.9	59
J73	0.29	137.2	178.9	59
J75	0.29	138.1	178.9	58
J77	0.29	138.1	178.9	58
J79	0.29	137.9	178.9	58
J81	0.29	137.7	178.9	58
J83	0.29	137.5	178.9	59
J85	0.29	137.0	178.9	59
J87	0.29	137.5	178.9	59
J89	0.29	137.8	178.9	58
J91	0.29	137.7	178.9	59
J93	0.29	136.6	178.9	60
J95	0.29	136.6	178.9	60
J97	0.29	137.7	178.9	58
J99	0.29	137.0	178.9	60
J103	0.29	137.3	179.0	59
J105	0.29	135.4	179.0	62
J109	0.29	137.1	178.9	59
J111	0.29	137.3	178.9	59
J113	0.29	137.1	178.9	59
J115	0.29	137.2	178.9	59
J117	0.29	137.1	178.9	59
J119	0.29	136.5	178.9	60
J121	0.29	137.9	178.9	58
J123	0.29	137.2	178.9	59
J125	0.29	137.2	178.9	59
J131	0.29	137.9	178.9	58
J133	0.29	137.7	178.9	59
J135	0.29	136.6	178.9	60
J137	0.29	137.8	178.9	58
J139	0.29	137.7	178.9	58
J141 J143	0.29 0.29	137.0 137.6	178.9 178.9	59 59
J143 J145	0.29	137.8	178.9	58
	0.29	137.8	178.9	58
J147	0.29	137.4	170.9	ე ეყ



PKHR Conditions

Junction ID	Domand (I /s)	Elevation (m)	Head (m)	Drossuro (nei)
Junction ID J7	Demand (L/s) 1.27	135.4	178.3	Pressure (psi) 61
J9	1.27	137.9	178.2	57
J11	1.27	138.0	178.0	57
J13	1.27	137.4	178.0	58
J15	1.27	138.0	178.0	57
J17	1.27	137.2	177.9	58
J19	1.27	137.6	177.9	57
J21	1.27	137.6	177.9	57
J23	1.27	137.4	177.9	57
J25	1.27	137.3	177.9	58
J27	1.27	137.2	177.9	58
J33	1.27	137.0	177.8	58
J35	1.27	137.6	177.8	57
J37	1.27	137.8	177.8	57
J39	1.27	137.8	177.8	57
J41	1.27	137.6	177.8	57
J43	1.27	136.7	177.8	58
J45	1.27	136.7	177.8	58
J47	1.27	137.4	177.9	57
J49	1.27	137.7	177.8	57
J51	1.27	137.7	177.8	57
J57	1.27	136.3	177.7	59
J59	1.27	136.4	177.7	59
J61	1.27	136.5	177.7	58
J63	1.27	136.5	177.7	58
J65	1.27	137.2	177.7	58
J67	1.27	137.3	177.7	57
J69	1.27	137.4	177.7	57
J71	1.27	137.5	177.7	57
J73	1.27	137.2	177.7	57
J75	1.27	138.1	177.7	56
J77	1.27	138.1	177.7	56
J79	1.27	137.9	177.7	56
J81	1.27	137.7	177.7	57
J83	1.27	137.5	177.7	57
J85	1.27	137.0	177.7	58
J87	1.27	137.5	177.7	57
J89	1.27	137.8	177.7	57
J91	1.27	137.7	177.7	57
J93	1.27	136.6	177.7	58
J95	1.27	136.6	177.7	58
J97	1.27	137.7	177.7	57
J99	1.27	137.0	177.7	58
J103	1.27	137.3	178.2	58
J105	1.27	135.4	178.3	61
J109	1.27	137.1	177.7	58
J111	1.27	137.3	177.7	57
J113	1.27	137.1	177.7	58
J115	1.27	137.2	177.7	57
J117	1.27	137.1	177.7	58
J119	1.27	136.5	177.8	59
J121	1.27	137.9	177.7	57
J123	1.27	137.2	177.7	57
J125	1.27	137.2	177.7	57
J131	1.27	137.9	178.1	57
J133	1.27	137.7	178.1	57
J135	1.27	136.6	177.8	58
J137	1.27	137.8	177.7	57
J139	1.27	137.7	177.7	57
J141	1.27	137.0	177.7	58
J143	1.27	137.6	177.7	57
J145	1.27	137.8	177.7	57
J147	1.27	137.4	177.7	57



MXDY + FF Conditions

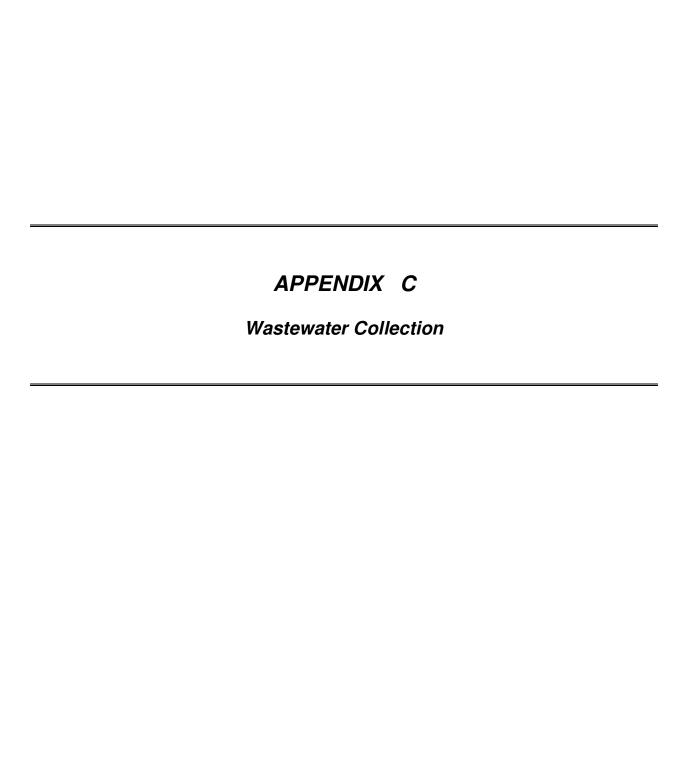
Junction ID	Demand (L/s)	Static Pressure (psi)	Static Head (m)	Hydrant Available Flow at 20 psi (L/s
J7	0.58	66	182.2	382
J9	0.58	63	182.2	355
J11	0.58	63	182.2	247
J13	0.58	63	182.2	313
J15	0.58	63	182.2	320
J17	0.58	64	182.1	313
J19	0.58	63	182.1	302
J21	0.58	63	182.1	313
J23	0.58	63	182.2	323
J25	0.58	64	182.1	315
J27	0.58	64	182.1	312
J33	0.58	64	182.1	284
J35	0.58	63	182.1	227
J37	0.58	63	182.1	300
J39	0.58	63	182.1	246
J41	0.58	63	182.1	295
J43	0.58	64	182.1	277
J45	0.58	64	182.1	305
J47	0.58	64	182.1	248
J49	0.58	63	182.1	272
J51	0.58	63	182.1	280
J57	0.58	65	182.1	284
J59	0.58	65	182.1	280
J61	0.58	65	182.1	261
J63	0.58	65	182.1	276
J65	0.58	64	182.1	273
J67	0.58	64	182.1	262
J69	0.58	63	182.1	260
J71	0.58	63	182.1	258
		64		
J73	0.58		182.1	259
J75	0.58	62	182.1	254
J77	0.58	63	182.1	224
J79	0.58	63	182.1	227
J81	0.58	63	182.1	228
J83	0.58	63	182.1	258
J85	0.58	64	182.1	262
J87	0.58	63	182.1	177
J89	0.58	63	182.1	221
J91	0.58	63	182.1	231
J93	0.58	65	182.1	240
J95	0.58	65	182.1	238
J97	0.58	63	182.1	254
J99	0.58	64	182.1	230
J103	0.58	64	182.2	253
J105	0.58	66	182.2	266
J109	0.58	64	182.1	279
J111	0.58	64	182.1	286
J113	0.58	64	182.1	234
J115	0.58	64	182.1	230
J117	0.58	64	182.1	229
J119	0.58	65	182.1	292
J121	0.58	63	182.1	213
J123	0.58	64	182.1	281
J125	0.58	64	182.1	275
J131	0.58	63	182.2	333
J133	0.58	63	182.2	352
J135	0.58	65	182.1	300
J137	0.58	63	182.1	224
J139	0.58	63	182.1	245
J141	0.58	64	182.1	269
J143	0.58	63	182.1	253
J145	0.58	63	182.1	271
0.70	0.58	64	182.1	259



Reliability Analysis (AVDY + FF Conditions)

	Hydrant Available Flow at 20 psi (L/s)											
Junction ID	Break Scenario 1	Break Scenario 2	Break Scenario 3	Break Scenario 4								
J7	273	380	380	380								
J9	235	353	353	353								
J11	182	244	244	244								
J13	209	309	308	312								
J15	210	317	317	319								
J17	209	307	305	312								
J19	205	300	300	301								
J21	208	311	312	313								
J23	212	320	321	323								
J25	209	310	311	314								
J27	209	304	306	311								
J33 J35	199	282 220	281	283								
J35	173 204	283	221 285	224 299								
J39	182	237	238	244								
J41	202	267	215	293								
J43	197	230	232	276								
	208	286	283	304								
	184	241	242	246								
J49	193	237	217	270								
J51	196	278	278	279								
J57	201	227	245	273								
J59	199	227	241	265								
J61	191	219	225	256								
J63	197	226	237	257								
J65	195	234	223	254								
J67	190	224	219	180								
J69	189	222	218	183								
J71	188	220	217	185								
J73	189	221	219	190								
J75	185	216	215	189								
J77	172	197	195	172								
J79	173	199	196	172								
J81	174	200	197	170								
J83	188	219	219	197								
J85	191	220	224	216								
J87	147	162	161	151								
J89	170	194	192	172								
J91	175	202	198	169								
J93	181	204	212	234								
J95	180	202	209	230								
J97	186	219	212	249								
J99	176	208	191	225								
J103	198	249	249	249								
J105	215	262	262	262								
J109	197	243	220	271								
J111	200	251	220	282								
J113	178	211	193	229								
J115	176	209	190	226								
J117	175	208	190	225								
J119	204	223	257	287								
J121	166	190	183	209								
J123	198	246	220	276								
J125	196	239	220	265								
J131	214	332	331	332								
J133	220	352	352	352								
J135	206	222	267	298								
J137	172	196	193	222								
J139	182	211	208	243								
J141	193	230	222	176								
J143	186	216	215	252								
J145	193	235	218	269								
J147	189	223	215	257								





Content Copy Of Original

Ministry of the Environment Ministère de l'Environnement

AMENDMENT TO ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 1045-6VTHH8 Notice No. 1

Issue Date: November 15, 2012

The Corporation of the Town of Perth 80 Gore Street East Perth, Ontario K7H 1H9

Site Location: Perth Sewage Treatment Lagoons

390 Wild Life Road

Township of Drummond-North Elmsley, County of Lanark, Ontario

You are hereby notified that I have amended Approval No. 1045-6VTHH8 issued on March 26, 2007 for a three cell waste stabilization lagoon system having a rated capacity of 7,718 cubic metres per day, located in the east half of Lots 23,24, and 25, Concession X (Township of Elmsley North), in the Town of Perth, as follows:

temporary installation of two (2) Submerged Attached Growth Reactor (SAGR) cell systems, one (1) SAGR cell with dimensions of 9.0 metres wide by 15.0 metres long by 2.0 meters water depth and the other SAGR cell with dimensions of 9.0 metres wide by 10.5 metres long by 2.0 meters water depth, each system has a design flow capacity of 100 cubic metres per day, receiving lagoon effluent from existing transfer structure between lagoon Cells #2 and #3 and discharging back to lagoon Cells #3, including all controls, electrical equipment, instrumentation, aeration system, influent chambers and splitting tank, effluent chambers, piping, pumps, flow meter, valves and appurtenances essential for the proper operation of the SAGR cell systems;

all in accordance with the following submitted supporting documents:

- 1. Application for Approval of Sewage Works dated October 22, 2012 and submitted by Grant Machan, Director of Environmental Services, The Corporation of the Town of Perth;
- 2. a design brief dated October 12, 2012 and a water quality monitoring program dated October 25, 2012, prepared by Nelson Environmental Inc.;
- 3. all other supporting information and documentation provided by R.V. Anderson Associates Limited.

For the purpose of this environmental compliance approval, the following definitions apply:

- " Approval" means this entire document and any schedules attached to it, and the application;
- " *Director*" means a person appointed by the Minister pursuant to section 5 of the *EPA* for the purposes of Part II.1 of the *EPA*;
- "District Manager" means the District Manager of Ottawa District Office;

- " EPA" means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended;
- " *Ministry*" means the ministry of the government of Ontario responsible for the *EPA* and *OWRA* and includes all officials, employees or other persons acting on its behalf;
- "Owner" means the The Corporation of the Town of Perth and includes its successors and assignees;
- "OWRA" means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;
- " Works" means the sewage works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the special terms and conditions outlined below:

SPECIAL TERMS AND CONDITIONS

1. EXPIRY OF APPROVAL

This temporary *Approval* shall expire and become null and void **two (2) years** after the issuance date of this temporary *Approval*.

2. MONITORING AND RECORDING

The *Owner* shall, upon commencement of operation of the *Works*, carry out the following monitoring program:

(1) Samples shall be collected at the following sampling points, at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

Table 1 -	Table 1 - Influent and Effluent Monitoring										
Sampling Locations	A: influent at splitter structure										
	B: SAGR Cell #1 effluent										
	C: SAGR Cell #2 effluent										
Sample Type	Grab										
Frequency	Weekly (except Chlorophyll-a)										
Parameters	CBOD5, Total Suspended Solids, Total Kjeldahl										
	Nitrogen, Total Ammonia Nitrogen, Nitrates and										
	Nitrites, Total Phosphorus, Alkalinity, <i>E. Coli,</i>										
	Total Coliform, Chlorophyll-a (monthly),										
	Temperature (on field), Dissolved Oxygen (on										
	field), and pH (on field)										

- (2) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:
 - (a) the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;
 - (b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more

recently published editions; and

- (c) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition), as amended from time to time by more recently published editions.
- (3) The *Owner* shall install and maintain a continuous flow measuring device, to measure the flowrate of the influent to the *Works* with an accuracy to within plus or minus 15 per cent (+/- 15%) of the actual flowrate for the entire design range of the flow measuring device, and record the flowrate at weekly frequency.

3. REPORTING

- (1) The *Owner* shall prepare, and submit to the *District Manager* and Technical Support Unit of Kingston Regional Office of the *Ministry*, a monitoring result report, within **thirty (30) days** following a **one (1) year** pilot study. The reports shall contain, but shall not be limited to, the following information:
 - (a) a summary and interpretation of all monitoring data collected pursuant to Condition 2, and a comparison to the effluent objectives outlined in the design brief dated October 12, 2012 prepared by Nelson Environmental Inc., including an overview of the success and adequacy of the *Works*;
 - (b) a description of any operating problems encountered and corrective actions taken; and
 - (c) If necessary, the *Owner* may want to obtain a written permission from the *District Manager* for extending the pilot study duration within the time frame set in Condition 1.

The reason for the imposition of the special condition is as follows:

- 1. Condition 1 is included to ensure that the *Works* are constructed in a timely manner
- 2. Condition 2 is included to enable the *Owner* to evaluate and demonstrate the performance of the *Works*, on a continual basis.
- 3. Condition 3 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this *Certificate*, so that the *Ministry* can work with the *Owner* in resolving any problems in a timely manner.

This Notice shall constitute part of the approval issued under Approval No. 1045-6VTHH8 dated March 26, 2007.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the

environmental compliance approval in respect of which the hearing is required, and;

2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

- 3. The name of the appellant;
- 4. The address of the appellant;
- 5. The environmental compliance approval number:
- 6. The date of the environmental compliance approval;
- 7. The name of the Director, and;
- 8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act Ministry of the Environment 2 St. Clair Avenue West, Floor 12A Toronto, Ontario M4V 1L5

* Further information on the Environmental Review Tribunal 's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 314-4506 or www.ert.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 15th day of November, 2012

Mansoor Mahmood, P.Eng.
Director
appointed for the purposes of Part II.1 of
the Environmental Protection Act

NH/

c: District Manager, MOE Ottawa District Office Grant Machan, The Corporation of the Town of Perth > Census of Population > Data products, 2021 Census > Census Profile, 2021 Census of Population

Search results for "perth"

Census Profile, 2021 Census of Population

Data table

	Perth, Town (T) ① Ontario [Census subdivision]
	Counts
Characteristic	Total
Population and dwellings	
Population, 2021 ¹	6,469
Population, 2016 ¹	5,930
Population percentage change, 2016 to 2021	9.1
Total private dwellings ²	3,395
Private dwellings occupied by usual residents $\frac{3}{2}$	3,271
Population density per square kilometre	529.8
Land area in square kilometres	12.21

Source: Statistics Canada, 2021 Census of Population.

How to cite: Statistics Canada. 2022. (table). Census Profile. 2021 Census. Statistics Canada Catalogue no. (number) 98-316-X2021001. Ottawa. Released February 9, 2022. https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/index.cfm?Lang=E (accessed April 13, 2022).

Note(s):

Footnote 1

2021 and 2016 population

Statistics Canada is committed to protect the privacy of all Canadians and the confidentiality of the data they provide to us. As part of this commitment, some population counts of geographic areas are adjusted in order to ensure confidentiality.

The adjustment to counts of the total population for any dissemination block is controlled to ensure that the population counts for dissemination areas will always be within 5 of the actual values. The adjustment has no impact on the population counts of census divisions and large census subdivisions.

Footnote 2

Total private dwellings

Private dwelling refers to a separate set of living quarters with a private entrance either from outside the building or from a common hall, lobby, vestibule or stairway inside the building. The entrance to the dwelling must be one that can be used without passing through the living quarters of some other person or group of persons.

Footnote 3

Private dwellings occupied by usual residents

A private dwelling occupied by usual residents refers to a private dwelling in which a person or a group of persons is permanently residing. Also included are private dwellings whose usual residents are temporarily absent on May 11, 2021.

Date modified: 2022-01-30



140 RENFREW DRIVE, SUITE 100, MARKHAM, ON L3R 6B3 T: 1-800-805-6155 www.onsitelocates.ca

AWN BY: CHECKED BY: REFERENCE NO.:

VC ZK 21-46-31298 FILE: S: \ONSITE\21-46-31298\Drawing\21-46-31298.dgr DATED: 2021-06-14

PLOTTED: 6/15/2021



Memo



To: Adam Fobert From: Gregory Chochlinski, Ben Morrison

DSEL Stantec, Ottawa

File: Cockburn PS in Perth – Capacity Date: June 17, 2021

Review

Reference: Cockburn PS in Perth - Capacity Review Memo

Introduction

Stantec was retained by DSEL to perform a review of the existing Cockburn sanitary pumping station (PS) that presently services the Town of Perth. Cockburn PS is the larger of two sanitary pumping stations in the Town of Perth.

The proposed new development by Caivan will discharge into the gravity sanitary system that conveys sewage to the Cockburn PS. This increased flowrate would need to be handled by Cockburn PS. The purpose of this Memo is to review the present condition, and capacity of the Cockburn pumping station and provide a high-level discussion on potential upgrades, if required.

Site Investigation

Stantec visited the Cockburn PS on June 14, 2021 and met with the Town's operator. The basic elements of the PS are as follows:

- The PS has three pumps, two pumps are in the dry well and one pump is submersible. The wet well/dry
 well were originally constructed around 1982, and the wet well was expanded later to allow the
 installation of the third pump (submersible).
- 2. The two original old pumps in the dry well are 30 HP with reported flowrate capacity of about 90 L/s. The new submersible pump #3 is 45 HP (less than 2 years old) and the available documentation indicates a duty point of 140 L/s at 16.8 m head.
- 3. The concrete wet well, as originally constructed, is rectangular, with dimensions of 4.9 x 3.0 m. The additional wet well was constructed beside the original one and is about 1.2 m wide. An opening was provided in the common wall to interconnect the two wells. The wells are about 6.6 m deep and the top of wells is at a ground level.
- 4. A trash screen is installed in front of the sewer inlet. The operators have to enter a confined space to clean the screen manually. This is not a desirable arrangement.
- 5. The 45 HP submersible pump discharges to the dedicated 400 mm forcemain. The two 30 HP pumps discharge to another 400 mm FM. Both FMs discharge to the sewage lagoon about 1.0 km away.
- 6. There is a gravity overflow from the wet well directly to the river.
- 7. There are no flowmeters on the forcemains. The incoming and pumped flowrates could be calculated based on the sewage levels rate of drop (or increase) over time.
- 8. A standby 125 kW Diesel Generator is installed on site. It has an Automatic Transfer Switch and is capable of supplying power to all pumps and other equipment. The Generator is about 16 years old.

Reference: Cockburn PS in Perth – Capacity Review Memo

- 9. The electrical and control equipment is housed in a Control Building that was installed years after the initial construction.
- 10. Pumps have soft starts, housed in the Control Building.
- 11. Alarms are communicated to the operator's cell phones. The alarms include power failure, Generator On, and high-level alarms.
- 12. At the time of inspection (early afternoon, June 14, 2021) the sewage level in the wet well was going up by 0.6 m in about 3 minutes, triggering the pumping cycle. It took about 2 min of pumping by Pump 1 or 2 and about 1 min of pumping by pump #3 to lower the sewage level by 0.6 m. This indicates that the incoming flow was around 50 L/s and pumping rate was about 130 L/s (for Pumps 1 and 2) and about 210 L/s for pump #3. These are approximate numbers and should be verified by more precise and longer-term measurements.

The facility operator provided the following comments:

- Generally the PS operates well. Only one time (spring 2019) all three pumps had to operate at once to keep up with an incoming flow. Since then, a larger submersible pump was added (45HP). The diesel generator operates well.
- 2. Some concrete deficiencies and rusty access hatches were noticed and should be considered for replacement.
- 3. The two forcemains operate well.
- 4. There is no bypass chamber that would allow bypassing the wet well if needed for repairs or new construction. Pumper trucks are used to handle the flow in situations like this.
- 5. The sanitary system in the Town is in reality a combined system as there are numerous storm connections to the sanitary pipes.
- 6. The existing sewage treatment lagoon where forcemains discharge to was recently expanded and there should be no capacity problem.

Discussion

The Certificate of Approval was not available at the time of the site visit to confirm the firm rated capacity of the pumping station and other information. We requested the information from the Town and we will review as soon as the information becomes available.

1. Pump #3 is much larger than pumps #1 and #2. The firm capacity of the pumping station is calculated based on the largest pump being out of service. In this case, the flowrate generated by Pumps #1 and #2 pumping at the same time through a common forcemain would be the "firm capacity" of the station. Two smaller pumps pumping at the same time through a common forcemain would have a flowrate similar to one larger pump pumping through an independent forcemain (the same diameter). Therefore, the replacement of two old pumps #1 and #2 with two new identical 45 HP pumps would essentially

Reference: Cockburn PS in Perth – Capacity Review Memo

<u>double the firm capacity</u> of the pumping station. The two forcemains should be interconnected near the PS to allow using two pumps with two FMs at the same time to maximize the flowrate.

- 2. The wet well currently fills up too quickly because the active storage band is very narrow (0.60 m approx.), causing the pumps to start too often (every 3 minutes). Expansion of the wet well could be considered to provide more storage and to extend the time between pumping cycles to at least 5 minutes (preferably 10 minutes).
- 3. With the present configuration of the suction at the two existing dry well pumps, the stop command for the lead pump is at 127.40 m (the wet well bottom is at elev. 125.95), as per the available drawings. If these two pumps were replaced with submersible pumps, the suction configuration would change and the stop command could be lowered by 0.50 0.60m. This would provide 80% to 100% more active storage in the wet well and require less frequent pump cycles. This may be just enough to resolve the issue of too frequent pump starts.
- 4. The arrangement for cleaning the existing trash screens requires confined space entry by the operator, which is very inconvenient and unsafe. A new arrangement would be recommended (removable trash basket with opening right above to allow removal by working on the surface).
- 5. An isolation valve on the incoming sewer (inside the wet well) should be installed to eliminate the need for inflatable balloons to be used each time the wet well must be isolated.
- 6. A permanent Bypass Chamber should be considered to allow any works inside the wet well to be done without an extensive mobilization of pumper trucks.
- 7. Electrical review would be needed to confirm if the existing 125 kW generator would be sufficient to support three 45 HP pumps and other essential equipment. The same applies to the evaluation of the Hydro power service. If insufficient, an upgrade/replacement would be required to accommodate larger pumps.
- 8. Replacement of the existing Control Building with a larger, sturdier one, should be considered. There is sufficient area on the site to accommodate this.
- 9. Improving the alarm communication system could be considered. However, the existing cell phone alarm system appears to be satisfactory.

Conclusion

The proposed new development by Caivan is expected to generate about 31.5 L/s of additional flow (at peak). The existing Cockburn PS is performing well, however it is operating close to it's maximum was operating capacity. When the largest pump is out of service the pumping station may not be able to handle the peak flow during rainy days or the spring conditions and could overflow. The additional 31.5 L/s coming from the new development would make the situation worse.

The pumping station could significantly increase its capacity by:

1. Replacing the existing 30 HP dry well pumps with two new 45 HP submersible pumps, the same as the existing Pump #3.

June 17, 2021 Adam Fobert Page 4 of 6

Reference: Cockburn PS in Perth – Capacity Review Memo

2. Interconnecting the two 400 mm forcemain to allow pumping through both of the forcemains at the same time under all pumping configurations.

Additional improvements could be done as discussed in the Discussion section of this Memo.

Please contact us if you have any questions or comments.

Sincerely,

Stantec Consulting Ltd.

Gregory Chochlinski P. Eng., M. Eng.

Senior Associate, Water

Direct: 613 724-4407 Mobile: 613 290-2322 Fax: 613 722-2799

gregory.chochlinski@stantec.com

Ben Morrison

Co-op Student, Water Mobile: 613 325-2687

benjamin.morrison@stantec.com

Attachement:

1. Pictures

Reference: Cockburn PS in Perth – Capacity Review Memo

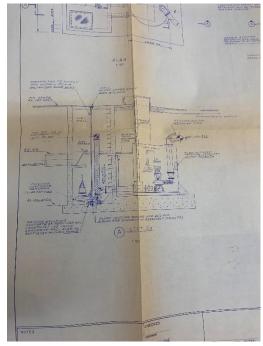
Pictures





Reference: Cockburn PS in Perth – Capacity Review Memo





SANITARY SEWER CALCULATION SHEET - EXISTING CONDITIONS

PROJECT:

Caivan

Existing Town of Perth LOCATION: FILE REF: 19-1092A7

DATE: 15-Jun-21 DESIGN PARAMETERS

Avg. Daily Flow Indust.

Ex. Population Per Hectare*

Avg. Daily Flow Res. 280 L/p/d Avg. Daily Flow Comm. 28,000 L/ha/d Avg. Daily Flow Instit. 28,000 L/ha/d

*Based on an average from Areas 2, 12 and 10.

35,000 L/ha/d

69 Pop/Ha

Peak Fact Res. Per Harmons: Min = 2.0, Max =4.0 Harmon Correction Factor 0.8 1 (< 20% ICI) Peak Fact. Comm.

Peak Fact. Instit. 1 (< 20% ICI) Peak Fact. Indust. per MOE graph

Infiltration / Inflow Min. Pipe Velocity

> 3.00 m/s full flowing Max. Pipe Velocity 0.013

0.33 L/s/ha

0.60 m/s full flowing

Mannings N



	Locatio	n		R	esidential A	Area and	Population	n	Cor	nmercial	Institut	tional	Indu	strial			Infiltratio	n						Pipe	Data					
Area ID	Up	Down	Area	Pop.	Cumu	lative	Peak.	Q _{res}	Area	Accu.	Area	Accu.	Area	Accu.	$\mathbf{Q}_{\text{C+I+I}}$	Total	Accu.	Infiltration	Total	DIA	Upstream	Downstream	Length	Slope	A hydraulic	R	Velocity	Q cap	Q / Q full	Qresidual
					Area	Pop.	Fact.			Area		Area		Area		Area	Area	Flow	Flow		Invert	Invert			,					
			(ha)		(ha)		(-)	(L/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(mm)	(m)	(m)	(m)	(%)	(m ²)	(m)	(m/s)	(L/s)	(-)	(L/s)
Rogers Road	21	22			0.00	0	3.80	0.00		0.00	2.14	2.14	56.34	56.34	46.3	58.480	58.480	19.298	65.64	525	136.59	136.37	91.1	0.24	0.216	0.131	0.98	211.4	0.31	145.7
Rogers Road	22	23			0.00	0	3.80	0.00		0.00		2.14		56.34	46.3	0.000	58.480	19.298	65.64	525	136.35	136.21	103.0	0.14	0.216	0.131	0.73	158.5	0.41	92.9
Rogers Road	23	24			0.00	0	3.80	0.00		0.00		2.14		56.34	46.3	0.000	58.480	19.298	65.64	525	136.20	136.02	99.1	0.18	0.216	0.131	0.85	183.3	0.36	117.6
Rogers Road	24	25			0.00	0	3.80	0.00		0.00		2.14	9.80	66.14	54.3	9.800	68.280	22.532	76.81	525	135.98	135.63	91.5	0.38	0.216	0.131	1.23	266.0	0.29	189.2
Rogers Road	25	26			0.00	0	3.80	0.00		0.00		2.14		66.14	54.3	0.000	68.280	22.532	76.81	600	135.52	135.39	79.8	0.16	0.283	0.150	0.88	247.9	0.31	171.1
Rogers Road	26	27			0.00	0	3.80	0.00		0.00		2.14		66.14	54.3	0.000	68.280	22.532	76.81	600	135.37	135.24	72.4	0.18	0.283	0.150	0.92	260.2	0.30	183.4
Rogers Road	27	28			0.00	0	3.80	0.00		0.00		2.14		66.14	54.3	0.000	68.280	22.532	76.81	600	135.23	135.13	83.0	0.12	0.283	0.150	0.75	213.1	0.36	136.3
Rogers Road	28	29			0.00	0	3.80	0.00		0.00		2.14		66.14	54.3	0.000	68.280	22.532	76.81	600	135.10	134.93	72.9	0.23	0.283	0.150	1.05	296.4	0.26	219.6
Rogers Road	29	30			0.00	0	3.80	0.00		0.00		2.14		66.14	54.3	0.000	68.280	22.532	76.81	600	134.92	134.63	124.0	0.23	0.283	0.150	1.05	297.0	0.26	220.2
Rogers Road	30	31			0.00	0	3.80	0.00		0.00		2.14		66.14	54.3	0.000	68.280	22.532	76.81	600	134.59	134.03	145.9	0.38	0.283	0.150	1.35	380.4	0.20	303.6
Rogers Road	31	32			0.00	0	3.80	0.00		0.00		2.14		66 14	54.3	0.000	68 280	22.532	76.81	600	134.02	133.81	117.0	0.18	0.283	0.150	0.92	260.2	0.30	183.3

Perth Water Treatment Plant

	2021	2020	2019	2018	2017	2016	2015	
JAN.	2491	2762	2972	2982	2,381	2,502	2,872	
FEB.	2670	2750	3036	2890	2,454	2,571	3,290	
MARCH	2630	2704	3047	2961	2,491	2,455	3,298	
APRIL	2409	2555	3038	2983	2,586	2,471	3,157	
MAY	3030	2938	3049	3363	2,495	2,931	3,392	
JUNE	3154	3347	3062	3268	3268 2,836 2,996		3,002	
JULY	2993	3635	3469	3602	2,796	2,954	3,048	
AUG.	3498	3223	3228	3269	2,837	3,024	3,015	
SEPT.	2890	2981	2902	2947	2,886	2,694	2,979	
ост.	2774	2805	2912	2982	2,830	2,603	2,998	
NOV.	2486	2513	2707	2840	2,568	2,372	2,852	
DEC.	2417	2534	2711	2776	2,681	2,300	2,784	
MAXIMUM	3,498	3,635	3,469	3,602	2,886	3,024	3,392	
MINIMUM	2,409	2,513	2,707	2,776	2,381	2,300	2,784	
AVERAGE	2,787	2,896	3,011	3,072	2,654	2,656	3,057	

4.2 Appendix Table 2 – Historical Average Daily Treated Water Flow (m³)

Caivan (Perth GC) Limited Town of Perth

Wastewater Design Flows per Unit Count City of Ottawa Sewer Design Guidelines, 2004



Site Area 41.100 ha

Extraneous Flow Allowances

Infiltration / Inflow 13.56 L/s

Domestic Contributions

Unit Type	Unit Rate	Units	Pop
Single Family	3.4	640	2176
Semi-detached and duplex	2.7	299	808
Townhouse	2.7		0
Stacked Townhouse	2.3		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0

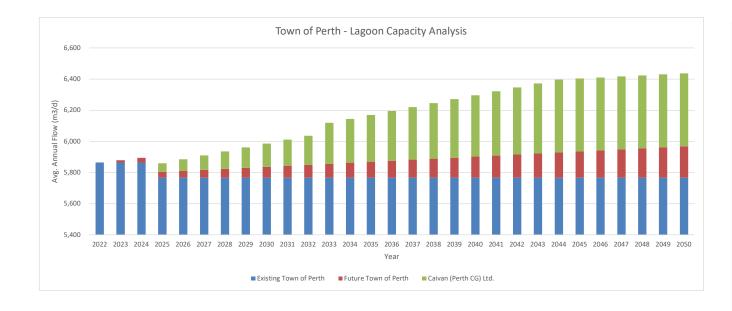
Total Pop	2984	
Average Domestic Flow	9.67	L/s
Peaking Factor	2.96	
Peak Domestic Flow	28.58	L/s

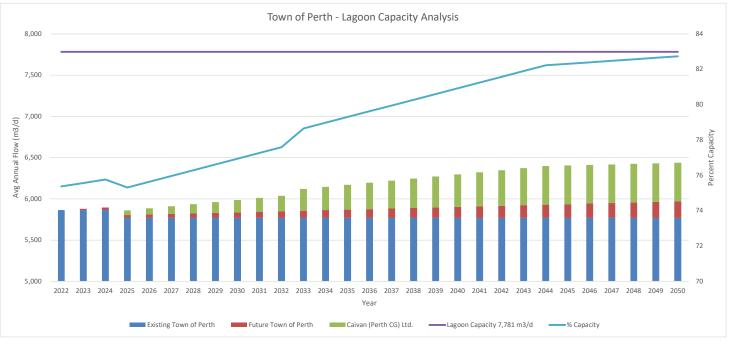
Total Estimated Average Dry Weather Flow Rate	9.67 L/s
Total Estimated Peak Dry Weather Flow Rate	28.58 L/s
Total Estimated Peak Wet Weather Flow Rate	42.14 L/s

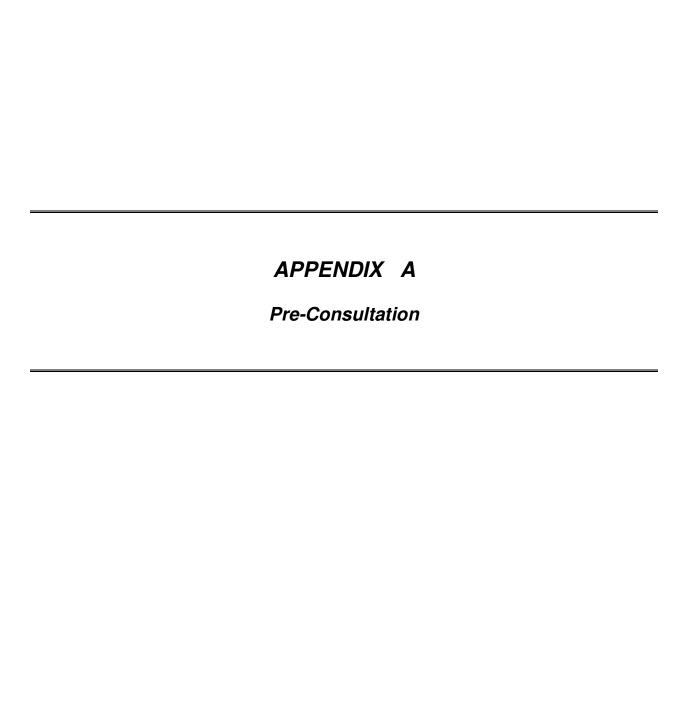
		Unit Occ	2.20 p/unit	Unit Oc	c 2.20 p/unit
Residential	200 L/p/d	Residential	200 L/p/d	Reside	ntial 170 L/p/d
Commercial	17,000 L/d/ha	Commercial	17,000 L/d/ha	Comme	ercial 17,000 L/d/ha
Institutional	17,000 L/d/ha	Institutional	17,000 L/d/ha	Institution	onal 17,000 L/d/ha
Industrial	10,000 L/d/ha	Industrial	10,000 L/d/ha	Industri	ial 10,000 L/d/ha
1&1	0.033 L/s/ha	1&1	0.054 L/s/ha	I&I	0.025 L/s/ha
		New units to 2024	34		
		New units beyond 2024	15		

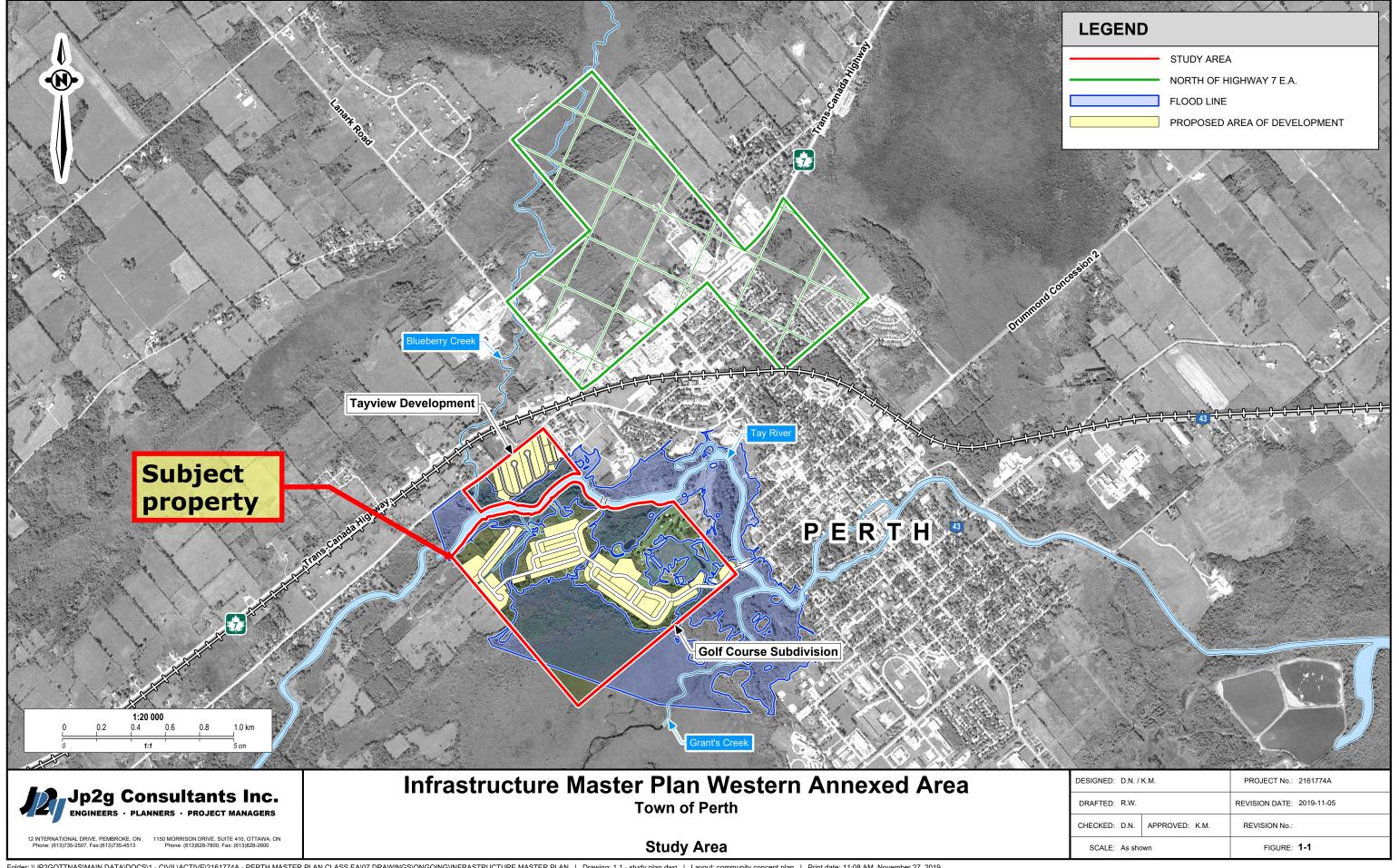
				Existing	Town of Pert	h							Future	Town of Pert	h				Caivan (Perth CG) Ltd.											Total		Lagoon Ca	apacity 7,781 m ³ /d	
Year	Area	Units	Pop	Commercial	Institutional	Industrial	Q _{I&I}	Q _{dry}	Q _{wet}	Area	Units	Pop	Commercial	Institutiona	Industrial	Q _{I&I}	Q _{dry}	Q _{wet}	Area	rea Units Pop Commercial Institutional Industrial Q _{i&i} Q _{dry}					Q _{wet}	Units	Pop	Q _{i&i}	Q _{dry}	Q _{wet}	Qcap	% Capacity		
	(ha)		(-)	(ha)	(ha)	(ha)	(m ³ /d)	(m ³ /d)	(m ³ /d)	(ha)		(-)	(ha)	(ha)	(ha)	(m ³ /d)	(m ³ /d)	(m ³ /d)	(ha)		(-)	(ha)	(ha)	(ha)	(m ³ /d)	(m ³ /d)	(m ³ /d)		(-)	(m ³ /d)	(m ³ /d)	(m ³ /d)	(m ³ /d)	
2022	548.67	3,270	6469	111.44		111.18	1,564	4,300	5,864							-	-								-	-		3,270	6,469	1,564	4,300	5,864	7,781	75
2023	548.67	3,270	6469	111.44		111.18	1,564	4,300	5,864		34	75	5			-	15	15							-	-	-	3,304	6,544	1,564	4,315	5,879	7,781	76
2024	548.67	3,270	6469	111.44		111.18	1,564	4,300	5,864		68	150)			-	30	30							-	-	-	3,338	6,619	1,564	4,330	5,894	7,781	76
2025	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		83	183	3			-	37	37	17.118	50	110)			37	19	56	3,403	6,762	1,504	4,355	5,860	7,781	75
2026	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		98	216	6			-	43	43	17.118	100	220	0			37	37	74	3,468	6,905	1,504	4,381	5,885	7,781	76
2027	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		113	249	9			-	50	50	17.118	150	330	O			37	56	93	3,533	7,048	1,504	4,406	5,910	7,781	76
2028	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		128	282	2			-	56	56	17.118	200	440	D			37	75	112	3,598	7,191	1,504	4,431	5,935	7,781	76
2029	514.58	3,270	6469	111.44		111.18	1,467	4,300			143					-	63	63	17.118	250	550	O			37	94	130	3,663	7,334	1,504	4,457	5,961	7,781	77
2030	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		158	348	3			-	70	70	17.118	300	660	D			37	112	149	3,728	7,477	1,504	4,482	5,986	7,781	77
2031	514.58	3,270	6469	111.44		111.18	1,467	4,300			173	381	1			-	76	76	17.118	350	770	ו			37	131	168	3,793	7,620	1,504	4,507	6,011	7,781	77
2032	514.58	3,270	6469	111.44		111.18	1,467	4,300	-,		188	414	1			-	83	83	17.118	400	000	-			37	150	187	3,858	7,763	1,504	4,532	6,037	7,781	78
2033	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		203	447	7			-	89	89	43.648	450	990	ו			94	168	263	3,923	7,906	1,561	4,558	6,119	7,781	79
2034	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		218	480)			-	96	96	43.648	500	1.00				94	187	281	3,988	8,049	1,561	4,583	6,145	7,781	79
2035	514.58	3,270	6469	111.44		111.18	1,467	4,300	- 7		233	513	2			-	103	103	43.648	550		-			94	206	300	4,053	8,192	1,561	4,608	6,170	7,781	79
2036	514.58	3,270	6469	111.44		111.18	1,467	4,300	-,		248	546	3			-	109	109	43.648	600		-			94	224	319	4,118	8,335	1,561	4,634	6,195	7,781	80
2037	514.58	3,270	6469	111.44		111.18	1,467	4,300			263	579	9			-	116	116	43.648	650					94	243	337	4,183	8,478	1,561	4,659	6,220	7,781	80
2038	514.58	3,270	6469	111.44		111.18	1,467	4,300			278	612	-			-	122	122	43.648	700	1540	-			94	262	356	4,248	8,621	1,561	4,684	6,246	7,781	80
2039	514.58	3,270	6469	111.44		111.18	1,467	4,300	-,		293	0.10	<u> </u>			-	129	129	43.648	750		-			94	281	375	4,313	8,764	1,561	4,710	6,271	7,781	81
2040	514.58	3,270	6469	111.44		111.18	1,467	4,300			308	678	3			-	136	136	43.648	800	1100	-			94	299	393	4,378	8,907	1,561	4,735	6,296	7,781	81
2041	514.58	3,270	6469	111.44		111.18	1,467	4,300			323	711	1			-	142	142	43.648	850		-			94	318	412	4,443	9,050	1,561	4,760	6,322	7,781	81
2042	514.58	3,270	6469	111.44		111.18	1,467	4,300			338		1			-	149	149	43.648	900		-			94	337	431	4,508	9,193	1,561	4,785	6,347	7,781	82
2043	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		353	777	7			-	155	155	43.648	950	2000	-			94	355	450	4,573	9,336	1,561	4,811	6,372	7,781	82
2044	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		368	810)			-	162	162	43.648	1000	2200				94	374	468	4,638	9,479	1,561	4,836	6,398	7,781	82
2045	514.58	3,270	6469	111.44		111.18	1,467	4,300			383	843			<u> </u>	-	169	169	43.648	1000	2200				94	374	468	4,653	9,512	1,561	4,843	6,404	7,781	82
2046	514.58	3,270	6469	111.44		111.18	1,467	4,300			398	876	<u> </u>			-	175	175	43.648	1000					94	374	468	4,668	9,545	1,561	4,849	6,411	7,781	82
2047	514.58	3,270	6469	111.44	ļ	111.18	1,467	4,300			413	909	1		ļļ	-	182	182	43.648	1000		-			94	374	468	4,683	9,578	1,561	4,856	6,417	7,781	82
2048	514.58	3,270	6469	111.44		111.18	1,467	4,300	-,		428	942	-			-	188	188	43.648	1000					94	374	468	4,698	9,611	1,561	4,862	6,424	7,781	83
2049	514.58	3,270	6469	111.44	ļ	111.18	1,467	4,300	5,767		443				1	-	195	195	43.648	1000				1	94	374	468	4,713	9,644	1,561	4,869	6,431	7,781	83
2050	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		458	1008	3			-	202	202	43.648	1000	2200	וי			94	374	468	4,728	9,677	1,561	4,876	6,437	7,781	83

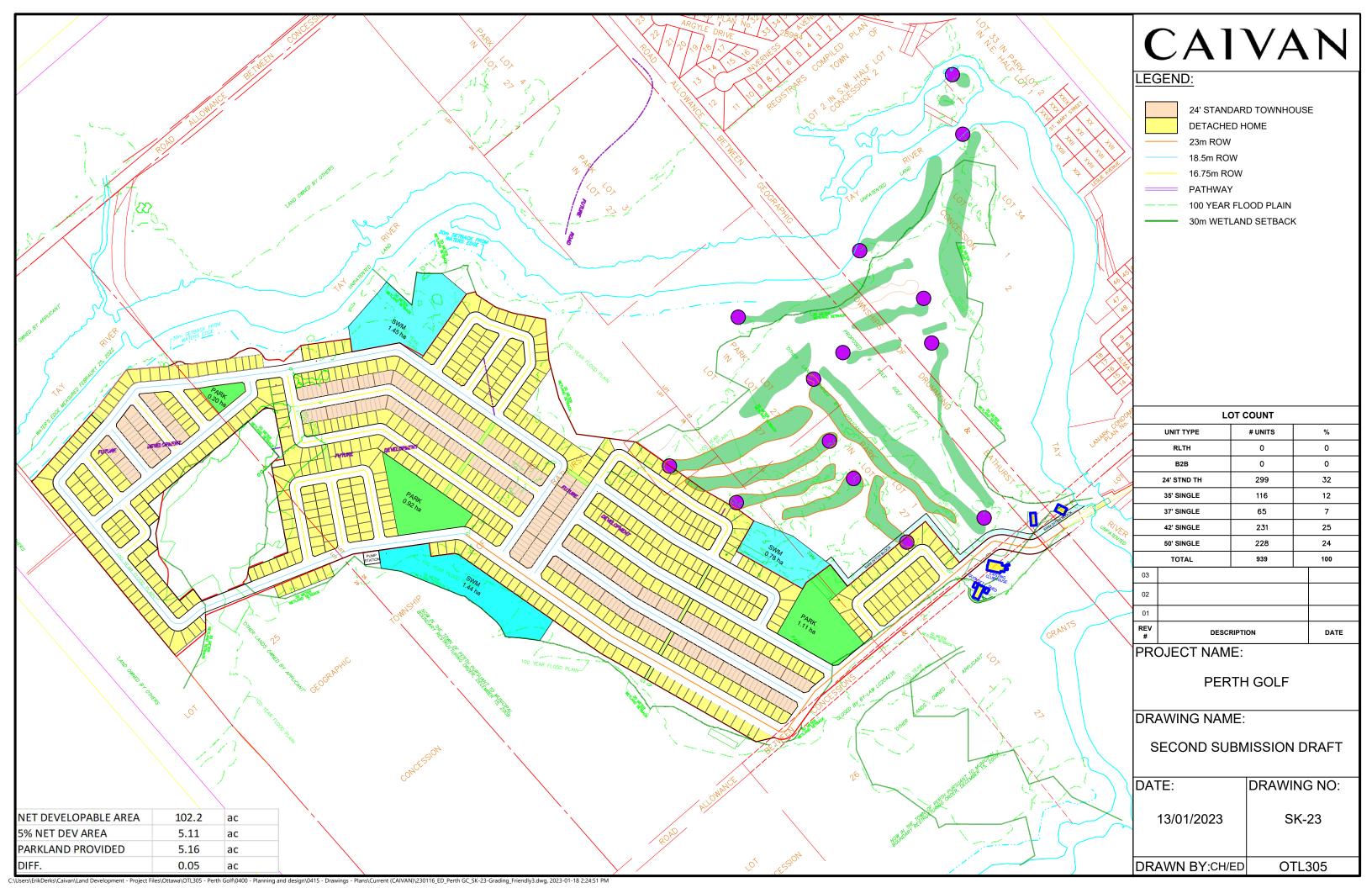
- 1. Lagoon Capacity per ECA 7,781m³/d
 2. 2022 population and number of units from 2021 census collected by StatsCAN (https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/details/page.cfm?Lang=E&SearchText=Perth&DGUIDlist=2021A00053509021&GENDERlist=1,2,3&STATISTIClist=1&HEADERlist=0)
 3. 2021 StatsCAN census indicates average unit occupany at 1.9p/unit.
 4. Caivan Community annual dry weather l&I per City of Ottawa technical buletin 2018-01.
 5. Existing l&I estimated from water use and monitored lagoon flows in 2021.











PERTH

TOWN OF PERTH

AGENDA

DEVELOPMENT DISCUSSION TEAM (DDT) MEETING

Held: 10:30 a.m., Thursday, November 25, 2021

Location: Virtual/Zoom

 $\underline{https://us06web.zoom.us/j/82631800479?pwd=NnN4K2tkRjRYM1dzK1pEelhCV2Indz09}$

First Meeting of the DDT Regarding the Golf Course Lands - Development

- 1 Call meeting to order Director of Development Services
- 2 Introductions Director of Development Services
- 3 Presentation CAIVAN Team
- 4 Planning Director of Development Services
- **5 Engineering –** Director Environmental Services

Traffic/Roads:

Services:

- 6 **Building –** Chief Building Official
- 7 Fire Fire Chief
- **8** Community Services Director of Community Services
- 9 Rideau Valley Conservation Authority Planner RVCA
- **Lanark County –** County Planner
- 11 Approval Strategy and Process for Offsite Infrastructure
- 12 Perth Golf Capital Projects and Upcoming DC By-Law update
- 13 Closing Comments

Adam Fobert

From: Julie Stewart <jstewart@lanarkcounty.ca>

Sent: February 11, 2022 3:56 PM

To: 'De Santi, Nadia'; Hugo Lalonde; Marc Pichette;

christopher.gordon@cghtransportation.com; john.kingsley@cghtransportation.com; Adam Fobert; Jocelyn Chandler; alex.meacoe@gemtec.ca; shaun.pelkey@gemtec.ca;

Anthony Francis

Cc: tracy@zanderplan.com; gmachan@perth.ca; Trevor Choffe; Shannon Baillon; Michael

Touw; Phil Mosher; Terry McCann; Sean Derouin; Kurt Greaves; Jasmin Ralph; Michelle

Mahon

Subject: Perth Golf Course Lands Proposed Development - Caivan

Attachments: Minutes of Meeting January 14, 2022.pdf; Pre-consultation Subdivision Checklist Perth

Golf Course January 2022.pdf; Compiled list of Other Information - Studies - Reports

Perth Golf Course January 2022 .pdf

EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hi Nadia, Kyle and Hugo

Please find the following attached:

- Pre-Consultation Meeting Minute Notes - January 14, 2022

- Pre-Consultation Checklist

 Compiled list of Other Information / Studies / Report Requirements (from County of Lanark, Town of Perth, RVCA)

Please feel free to forward to the members of your team whom I may have missed.

Thank you, Julie

Julie Stewart, MCIP RPP County Planner 99 Christie Lake Road Perth, ON K7H 3C6 (613)267-4200 ext. 1520 jstewart@lanarkcounty.ca www.lanarkcounty.ca



Pre-Consultation Meeting Notes - Perth Golf Course - Caivan

Virtual zoom meeting - January 14, 2022

In Attendance

Julie Stewart, Lanark County Michelle Mahon, Lanark County Terry McCann, Lanark County Adam Fobert, David Schaeffer Engineering Ltd Kyle Larmour, WSP Christopher Gordon, CGH- Transport John Kingsley, CGH Transport Marc Pichette, DSEL Civil Phil Mosher, RVCA Sarah Macloed-Neilson, RVCA Jocelyn Chandler, DSEL Nadia De Santi, WSP Grant Machan, Town of Perth Trevor Choffe. Town of Perth Michael Touw. Town of Perth Brian Gass, Town of Perth Tracy Zander, Representing Perth Hugo Lalonde, Caivan

Hugo introduced the project, in summary:

- Potential of re-purposing existing clubhouse.
- Recognize the 9 hole golf course and the original 3 holes.
- A mix of single-family homes, townhouses and back to back townhouses are proposed.
- 650-800 units will be phased.
- Referred to current studies underway.
- Phase 1 within OP residential designation.

Julie Stewart added the County is proposing to initiate the review of population projections later in 2022, as per County Council's commitment to review in 5 years.

Tracy Zander asked if the studies and reports are for the whole site as a Master Plan?

Hugo stated that the reports will address the site as a whole.

Town and County staff will coordinate the list of required studies/reports for submission and will provide the compiled list.

Christopher Gordon, looking for the previous traffic study.

Grant noted that he will see if he can obtain a copy and provide to CGH.

Terry McCann mentioned design work would be required where the road reaches the County property because of the existing buildings and parking lot. Setbacks to be addressed.

The road is also located within Tay Valley so coordination would have to happen with the Town, County and Tay Valley. Terry McCann is the main contact.

Hugo noted that the locations on the concept plan were derived from the Infrastructure Master Plan. They can revisit alignment as part of the traffic impact study

Shannon Baillon will forward the proposed extension of the Tay River trail system as pedestrian crossing which will have to be incorporated into the road design.

Nadia proposed bi-weekly meetings with the hope of submission in February, which Town and County staff will discuss availability

Adam Fober provided an update on the engineering work and that they are working with Stantec to update the IMP. In summary, proposing 3 stormwater management ponds, examining capacity and a water model.

Grant noted the need for a conversation around contributions required for an elevated water tower as well as the Town's plan for an expansion of the lagoon with the 5th SAGR system. Town staff can work with the civil engineers.

Nadia mentioned some discrepancies with the OP mapping.

Julie will coordinate a meeting with the Planners to discuss the Official Plan mapping and policies.



PLANS OF SUBDIVISION

PRE-CONSULTATION - checklist - Perth Golf Course

Report	Comments	Required Yes/No
Planning Rationale	Include justification	Yes
riaming nationale	Must have regard for PPS	Yes
	Lanark County Official Plan compatibility	Yes
	Local Official Plan compatibility	Yes
	Address OPA # 16	Yes
Hydrogeological Study,	Availability and suitability of water and	Public
Terrain Analysis	waste water	Yes
,	MOE – D-5-4 Guidelines	
	MOE – D-5-5 Guidelines	
	ODWSOG	
	Checklist Summary & Sign-off	
	Integrated Hydrologic Impact Assessment	Yes
Environment Impact	SAR & Significant Habitat	Yes
Study	Wetlands	Yes
	Organic Soils	Yes
	Natural Heritage Features & Systems	Yes
	Significant Wetlands	Yes
	Significant Woodlands	Yes
	Significant Valleylands	Yes
	Significant Wildlife	Yes
	ANSI	Yes
	Fish Habitat	Yes
	Headwater Drainage Feature Assessment	Yes
Servicing Options	Guidelines – MOE D-5-3	Yes
Statement		
Stormwater Drainage	Guidelines - MOE-2003 / MNR-2001	Yes
Plan	Checklist Summary & Sign-off	
Grading Plan	Sloping land within lot to direct flow of surface water away from foundations & abutting properties.	Yes



PLANS OF SUBDIVISION

PRE-CONSULTATION - checklist - Perth Golf Course

Report	Comments	Required Yes/No
Sediment and Erosion	Flooding, erosion hazard	Yes
Control	Slope and Soil Stability	Yes
Hazardous Sites	Organic Soils	Yes
	Karst Topography	
Archeological	Standards & Guidelines	Yes
Investigation		
Tree Preservation Plan or	Check with local municipality	
Tree Conservation Plan		
Other	SEE ATTACHED Compiled List of Other	
	Information / Study / Report	
	Requirements	
Draft Plan	To include:	Yes
	Planning Act 50(17)	
	Ont. Reg. 544/06	
	Lot and block configuration	
	Compatibility with adjacent uses	
	Road access, street layout & Pedestrian amenities	
	Parks & Open Space amenities	
	Easement and right-of-way requirements	

Compiled list of Other Information / Study / Report Requirements for the Perth Golf Course Lands

(Refer to the Standard County of Lanark Pre-Consultation Checklist as well) Prepared By: County of Lanark and Town of Perth and RVCA

January 2022

Master Plan for the entire development.

Master Plan should include phasing plans and details of phases.

Bridge Assessment / Capacity Study

- impacts and review of capacity for existing Peter St bridge.
- consideration of alternate bridge on North St with traffic flows off of Peter Street, migration of lights from Foster St or potentially west into Tay Valley connecting to Ernest Way.
- triggers for 2nd bridge
- access to Tay Valley lands.
- Location, design and setbacks on County lands and use of existing County driveway and parking area.
- Developer to evaluate the crossing and determine when such would be required.
- Any proposed hydraulic analysis on a potential bridge will include demonstration of no impact to upstream water levels or the creation of adverse impacts. This would include, but not be limited to, not affecting the function of the Haggart flow split as well as the WSC gauge at Perth.

Water Supply (Provision of water supply)

- triggers and requirements for new elevated water tank
- improvements to pumping capacity at WTP

Stormwater design

- confirmation of minimal ponds
- outfalls downstream of WTP Intake Protection Zone
- Demonstrate low impact development measures which prioritize a treatment train approach in accordance with the MECP Stormwater Manual
- Confirmation of enhanced water quality treatment or better

Sanitary

- upfront installation
- triggers for capacity at wastewater treatment facility (when to construct 5th cell)

Cultural Heritage Assessment for the Golf Course.

Geotechnical Study

Integrated Hydrological Impact Assessment

- to provide a water budget and runoff volume and water quality control targets
 - maintain all aspects of the site's natural hydrological functions (storage, retention, infiltration, evapotranspiration, filtration, flow to wetland, etc.)
 - This approach should result in a LID / Green Infrastructure approach to stormwater servicing resulting in a distributed treatment train approach.
 - Legitimate constraints (shallow bedrock, contaminated areas, natural features, etc.) should be documented
 - Runoff volume retention method is recommended

-

Environmental

A constraints map, using information derived from relevant reports/studies, should be one of the first things produced.

Floodplain

 All development is to be located outside the floodplain as per provincial policy. If the proposed work would question the accuracy or validity of the floodline, further discussion should occur regarding appropriate approach to be used.

Wetlands

Fish Habitat

EIS

Hydrological Impact Statement or hydrological investigations Water budget

- all environmental studies should be integrated in a holistic manner

Headwater Drainage Features Assessment
Significance of woodland should be considered and evaluated
The Infrastructure Master Plan made specific mention of a tree preservation plan

Reference to the meeting minutes from the Town of Perth and the County of Lanark and the Standard County of Lanark Checklist is required.

Adam Fobert

From: Grant Machan <gmachan@perth.ca>

Sent: March 14, 2022 2:23 PM

To: Adam Fobert

Subject: Re: 1278 Caivan - Perth: Western Lands

EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

My superintendent will be giving you call about these items. re-lit fire on topic.

Grant Machan CET

Director of Environmental Services gmachan@perth.ca 613-267-3311 ex2233

From: Adam Fobert < AFobert@dsel.ca>

Sent: March 14, 2022 12:04

To: Grant Machan <gmachan@perth.ca>

Cc: Chochlinski, Gregory <gregory.chochlinski@stantec.com>; Mineault-Guitard, Alexandre <Alexandre.Mineault-

Guitard@stantec.com>

Subject: RE: 1278 Caivan - Perth: Western Lands

Hello Grant,

Just following up on the email below and our meeting. You had mentioned during our meeting that one of your staff was working on assembling some of the background information. Has that been sent over? Perhaps it hasn't been forwarded to me on our end.

In particular Stantec are looking for:

- Which firm is the Town using for SCADA programming/development.
- Excerpt's from an existing pump station owner's manual.
- Identify town's preference for backup power generator supplier.

Also, we discussed that our report is to identify triggers for lagoon expansion. We've come across two sets of population densities in previously published works. The IMP appears to be using City of Ottawa guidelines for p/unit, while OPA 16 used 1.87p/unit for all unit types. Can you please confirm which we should be using?

Feel free to call to discuss.

Adam Fobert, P.Eng.

DSEL

david schaeffer engineering ltd.

120 Iber Road, Unit 103 Stittsville, ON K2S 1E9

office: (613) 836-0856 direct: (613) 836-0626

cell: (613) 222-9493 **email**: <u>afobert@DSEL.ca</u>

This email, including any attachments, is for the sole use of the intended recipient(s) and may contain private, confidential, and privileged information. Any unauthorized review, use, disclosure, or distribution is prohibited. If you are not the intended recipient or if this information has been inappropriately forwarded to you, please contact the sender by reply email and destroy all copies of the original.

From: Adam Fobert

Sent: March 1, 2022 11:55 AM

To: 'Grant Machan' <gmachan@perth.ca>

Cc: 'Chochlinski, Gregory' <gregory.chochlinski@stantec.com>; 'Mineault-Guitard, Alexandre' <Alexandre.Mineault-

Guitard@stantec.com>

Subject: RE: 1278 Caivan - Perth: Western Lands

Hello Grant,

Thank you for meeting with us on Feb 18. We prepared some meeting notes for both our files.

Let me know if you have any comments on the notes.

Note that there are a few items that Stantec are looking to obtain from you.

Adam Fobert, P.Eng.

DSEL

david schaeffer engineering ltd.

120 Iber Road, Unit 103 Stittsville, ON K2S 1E9

office: (613) 836-0856 direct: (613) 836-0626 cell: (613) 222-9493 email: afobert@DSEL.ca

This email, including any attachments, is for the sole use of the intended recipient(s) and may contain private, confidential, and privileged information. Any unauthorized review, use, disclosure, or distribution is prohibited. If you are not the intended recipient or if this information has been inappropriately forwarded to you, please contact the sender by reply email and destroy all copies of the original.

----Original Appointment----

From: Grant Machan <gmachan@perth.ca>

Sent: February 18, 2022 10:44 AM

To: Adam Fobert

Subject: Accepted: 1278 Caivan - Perth: Western Lands

When: February 18, 2022 1:30 PM-2:30 PM (UTC-05:00) Eastern Time (US & Canada).

Where: Zoom

EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Are you able to send graphics/concepts to support the discussion?





120 Iber Road, Suite 103 Stittsville, ON K2S 1E9 613-836-0856 dsel.ca

MEETING NOTES

DATE: 2022-02-18

1:30 PM - Zoom Meeting

SUBJECT: 21-1278 Caivan - Perth

IN ATTENDANCE:	Adam Fobert (AF)	DSEL
	Gregory Chochlinski (GC)	Stantec
	Alexandre Mineault-Guitard (AMG)	Stantec
	Grant Machan (GM)	Town of Perth

Note: The following meeting notes represent the writer's interpretation of the meeting. As such, any errors or omissions must be reported to this office immediately. All comments are to be provided within 5 business days; otherwise, they are deemed acceptable by all.

ITEM	DESCRIPTION								
1.	GM – Town of Perth advancing with the upgrades to Highway 7, which will include improvements to the water and sanitary. The town will be identifying a site for the Highway 7 water tower as part of that process but will not be sizing a facility. This work has been awarded to Mac Perry.								
2.	 Information provided regarding the Pump Station: The facility will include a control building to house the electrical panel. There will be no washroom in the building. Building will tie into surrounding architecture and will be equipped with an exterior alarm light. Facility to have both SCADA system and automatic cellular dialer. There will be no staff 24/7 monitoring SCADA. GM to confirm which firm is used for SCADA programming/development. GM to provide Stantec with an excerpt from the owner's manual of an existing facility that in their opinion runs well. Preference is to have the pump selection be interchangeable with the other facilities. Facility will be designed with a by-pass chamber to facilitate future maintenance. Permanent Natural Gas stand-by generator will be used. GM to confirm if they have a preferred backup generator. 								

	 GM – Roger Road Crossing tender was awarded last week. The town wants to investigate hanging the forcemain from the bridge. Stantec to send preliminary information for coordination of Roger's Road / Tay River Crossing.
	The overflow from the pump station will be to the proposed stormwater pond.
3.	Information provided regarding the water services:
	 Existing conditions model was completed in 2016.
	 No significant changes or improvement have been made to the system since 2016. Design can start with the 2016 model as the base.
	 160 Bed Retirement Home planned at Sunset Blvd. and Lanark County Admin Building to be added.

Prepared by,

David Schaeffer Engineering Ltd.

Per: Adam Fobert, P. Eng.

Adam Fobert

From: De Santi, Nadia < Nadia.De-Santi@wsp.com>

Sent: October 12, 2022 4:11 PM

To: jbowes@perth.ca; mtouw@perth.ca; gmachan@perth.ca; Julie Stewart;

glen.mcdonald@rvca.ca

Cc: Susan Murphy; Hugo Lalonde; Colin Haskin; Erik Derks; Ferguson, Erin; Christopher

Gordon; John Kingsley; Adam Fobert; 'Jocelyn Chandler'

Subject: Meeting Minutes - Caivan - 141 Peter St. - Draft Plan of Subdivision

Attachments: Meeting Minutes Town of Perth September 16 2022.pdf

EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hello everyone,

Thank you again for meeting with us on September 16, 2022.

Please find attached the Meeting Minutes. If there are any errors or omissions, please advise by end of day, Wednesday, Oct. 19, 2022.

Thank you.

Regards,



Nadia De Santi, MCIP, RPP

Practice Lead
Urban and Community Planning

T +1 (613) 690-1114 M +1 (613) 816-0664 WSP Canada Inc. 2611 Queensview Drive, Suite 300 Ottawa, Ontario, K2B 8K2

NOTICE: This communication and any attachments ("this message") may contain information which is privileged, confidential, proprietary or otherwise subject to restricted disclosure under applicable law. This message is for the sole use of the intended recipient(s). Any unauthorized use, disclosure, viewing, copying, alteration, dissemination or distribution of, or reliance on, this message is strictly prohibited. If you have received this message in error, or you are not an authorized or intended recipient, please notify the sender immediately by replying to this message, delete this message and all copies from your e-mail system and destroy any printed copies. You are receiving this communication because you are listed as a current WSP contact. Should you have any questions regarding WSP's electronic communications policy, please consult our Anti-Spam Commitment at www.wsp.com/casl. For any concern or if you believe you should not be receiving this message, please forward this message to caslcompliance@wsp.com so that we can promptly address your request. Note that not all messages sent by WSP qualify as commercial electronic messages.

AVIS : Ce message, incluant tout fichier l'accompagnant (« le message »), peut contenir des renseignements ou de l'information privilégiés, confidentiels, propriétaires ou à divulgation restreinte en vertu de la loi. Ce message est destiné à l'usage exclusif du/des destinataire(s) voulu(s). Toute utilisation non permise, divulgation, lecture, reproduction, modification, diffusion ou distribution est interdite. Si vous avez reçu ce message par erreur, ou que vous n'êtes pas un destinataire autorisé ou voulu, veuillez en aviser l'expéditeur immédiatement et détruire le message et toute copie électronique ou imprimée. Vous recevez cette communication car vous faites partie des contacts de WSP. Si vous avez des questions concernant la politique de communications électroniques de WSP, veuillez consulter notre Engagement anti-pourriel au www.wsp.com/lcap. Pour toute question ou si vous croyez que vous ne devriez pas recevoir ce message, prière de le transférer au conformitelcap@wsp.com afin que nous puissions rapidement traiter votre demande. Notez que ce ne sont pas tous les messages transmis par WSP qui constituent des messages electroniques commerciaux.



Meeting Minutes

	· ·	Review Comments & Resubmission Requirements Re: Application for Draft Plan of Subdivision Approval or Perth Golf Course Lands, County of Lanark File No. 09-T-22001									
Date of Meeting	Time 10:00 am to 12:00 pm										
Location	Sunshine Room, Town of Perth Municipal Offi	ce at 80 Gore S	treet East and virtual via Zoom								
Minutes Prepared By	Erin Ferguson (WSP). Minutes Reviewed by F	Hugo Lalonde an	nd Colin Haskin (Caivan).								

Attendees

Town of Perth: Michael Touw (Chief Administrative Officer), Joanna Bowes (Director of Development Services), Grant Machan (Director of Environmental Services)

Lanark County: Julie Stewart (County Planner)

Rideau Valley Conservation Authority: Glen McDonald (Director of Science and Planning) via Zoom

Caivan: Susan Murphy (Vice President of Land Development), Hugo Lalonde (Director of Land Development), Colin Haskin (Manager of Land Development), Erik Derks (Land Development Coordinator) via Zoom

Consulting Team: Adam Fobert (Senior Design Engineer with David Schaeffer Engineering Ltd), Christopher Gordon (Engineer with CGH Transportation), John Kingsley (EIT with CGH Transportation) via Zoom, Jocelyn Chandler (Land and Water Resource Planner with J.F. Sabourin and Associates Inc.) via Zoom, Nadia De Santi (Practice Lead with WSP), Erin Ferguson (Senior Planner with WSP) via Zoom

Agenda Items, Discussion, Actions

Topic	Discussion						
1. Introductions	Nadia De Santi opened the meeting and round table introductions were made. It was noted						
	that Colin is the main contact at Caivan for day-to-day project coordination.						
2. Overview of Draft	Hugo Lalonde gave a brief overview of the draft plan of subdivision and development						
Plan of Subdivision	master plan including the project rationale, pre-application discussions, design features, and						
and Project Design	key issues.						
Brief	 Draft Plan of Subdivision is 30 acres of residential, parks, roadways, pump station consistent with OP policies 						
	 There are 30 acres on Town's OP is designated as Residential, largely consistent with draft subdivision plan area but slight differences in the boundaries 						
	 Development is outside of environmentally sensitive wetlands and floodplain 						
	 At this point the plan is to retain a 9 hole golf course and renovate the clubhouse, potentially expanding commercial uses 						

- High quality parks as shown on the plan and connected through trail network, and there will also be connection to the Tay River Trail. Park in Phase 1 is seen as a gateway feature. Caivan would build the parks
- Proposed blocks and lots are reflective of Caivan's approach in Ottawa with a 21 m lot depth and 3 m front yard setback
- Street cross-sections are 24 m, 18.5 m and 16.75 m following the policy direction of Town's OP
- Peter St bridge will service Phase 1 with later phases triggering a second crossing that will likely tie into the County property as identified in the IMP

Working Strategy Going Forward

- Caivan's approach has been to complete pre-consultation and extensive due diligence to inform the development of this site. Town of Perth has provided commitments during these discussions. Caivan is acting on the Town's planning and engineering work done through the past OPA and IMP to present a plan that provides residential growth and sustains the historic downtown and the local businesses. This was presented to and received buy-in from Council.
- Caivan acknowledged that is a difficult site to develop due to existing environmental constraints, and considerable offsite and external work to be done but that Caivan is committed to working together with the Town to move forward. Caivan is excited to be in Perth.
- Agreement from those in attendance that this is a cooperative exercise. Today is about gaining clarity, need to set up some smaller working sessions related to different components of the plan going forward, but the group needs to reconvene prior to next submission as an integrated planned approach is required

Floodplain Mapping Clarification

- o Glen asked about the Tay River floodplain mapping.
- Jocelyn explained that LIDAR data was collected and it was run through RVCA's model to generate the new floodplain boundary
- Glen stated some pinch points with floodplain line and roads were identified on the draft plan of subdivision – the dotted line. Jocelyn advised that these will be addressed through a volumetric cut and fill approach and it is anticipated that this will be minor.
- Julie asked if the floodplain line was surveyed. Jocelyn replied it was not, but ground survey work will be done as part of the application for cut and fill. LIDAR is very accurate so the difference between that and ground survey will be minimal

JFSA (Jocelyn) to resend map showing minor floodplain boundary changes to the RVCA, County, and Town by Sept. 30, 2022

3. Questions on Review Comments

Servicing

Adam requested clarification on one of the Town's circulation comments on the downtown intensification infrastructure work. Town indicated that there is no update on the infrastructure master plan. Michael advised that this work hasn't begun but it is still in the works under the current 2022-2026 Strategic Plan, which was recently approved by Council. Grant confirmed that it is the Town's intention to do a full IMP for the Town owned, infill, and brownfield sites.

- Adam gave an overview of servicing plans and reported that the work done to date indicates there is sufficient capacity available and is consistent with the past discussions with the Town regarding the servicing of the Western Annex Lands. Currently, DSEL is working with Caivan on identifying a metric to indicate when expansion would be triggered, and they are looking at historical population and permit data. Asked which metric the Town wants to see (eg. population, units, flow).
- Town indicated that they do not have a specified metric. Grant uses a volumetric metric. Town wants to see phases for servicing requirements to look at the capacity of the Town lands overall and want to see this information ahead of time for infrastructure planning purposes but indicated that an onsite system is an option that wouldn't affect the Town's infrastructure planning/timeline.
- Relating to the suggestion that an on-site sanitary treatment system should be explored, Adam noted that based on his exploration of these systems in other projects, the operational costs are quite high and the approval logistics are challenging as it triggers a Schedule C project, discharging upstream likely not great for residents. He suggested that additional offsite improvements would likely be more financially viable for the Town rather than an onsite system.
- Grant clarified that the on-site system was simply a brainstorming idea and does not reflect what is recommended in the IMP, nor is it the desired strategy from the Town's perspective for the Western Annex Lands. Grant further acknowledged that Caivan requires allocation commitments from the Town for Phase 1 and beyond before proceeding with the development.
- Hugo indicated that DSEL has been tasked to do the technical work on phasing and lagoon capacity. Caivan anticipates starting construction in 2025/26 with the first building permits and then occupancy. Hugo stated that Caivan and the Town can work out an appropriate allocation that works for the Town and gives Caivan the security to move forward. Caivan and the Town of Perth could look at a flow monitoring program as part of the allocation strategy.
- Grant commented on how to maximize the 5th cell. Council didn't approve the 5th cell.
- Hugo stated that with DSEL, they will look at an appropriate allocation for Phase 1 with the Town so that some development can occur and keep capacity for others too. There are tools that can be explored through the draft subdivision conditions.
- Adam Fobert expressed concern with connection to Inverness in IMP as it would run between two homes and significantly impact these properties. Alternate solution is preferred and would potentially benefit seniors home and wouldn't affect water pressure. Town not opposed to the proposed alternate solution and acknowledged the limitations of the connection shown in IMP.
- Grant Machan shared that planned redesign and improvements for Highway 7 will be oversized.
- DSEL confirmed that no additional fire flow is needed for Phase 1. Town asked to confirm trigger point for tank and contingency plan.
- Town noted that looping will be required to resolve bottleneck between Phase 1 and
 WM looping strategy will need to be defined and reflected on the Draft Plan.

Transportation

 Chris Gordon reported that transportation planning has followed the IMP and noted that traffic volume is not a constraint for Phase 1. The Peter Street Bridge has adequate capacity to handle the anticipated traffic volume for initial development

- phases but later phases will trigger the need for an additional crossing. Monitoring, including changes in travel patterns, following occupancy will give a better indication of the appropriate timing for the second bridge.
- Chris advised that HP Engineering has been retained and has confirmed that the bridge structure can support construction and emergency vehicle traffic. The Memo also outlines potential Bridge enhancements for 10 to 20 years. HP's Memo will be included in the resubmission. Additionally, Caivan is exploring options to address active transportation/pedestrian connections and will bring this forward in the next submission.

Caivan/WSP to provide Town with bridge structural capacity information and will present options for providing pedestrian connection to the development at the Peter Street crossing.

- Joanna expressed that they have major concerns with the single bridge particularly related to emergency response access. There are also concerns about the timeframe or trigger for second bridge should the next phases of development not proceed. The Town is firm that a second bridge crossing is needed to support this development and stated that there are Official Plan policies related to this requirement and that more detail on the second access needs to be provided upfront with this application to ensure the health and safety of future residents. Joanna also confirmed that Peter Street is a truck route.
- o In relation to the proposed location of the second crossing, the Town noted that the road is used by the County but it is a private road and that although it appears in IMP, other jurisdictions may not have reviewed the proposed crossing. The adjacent Townships didn't participate in the Town's IMP even though the second crossing is proposed to run through multiple municipalities.

Julie said that she can reach out to the Township contacts and County.

- Hugo acknowledged that they are aware it isn't a public ROW and more coordinated work will need to be done to determine how this will work. Caivan followed guidance of the IMP re: second bridge location.
- Town confirmed that the second crossing is not included in their 4-year infrastructure plans
- Julie stated that the second access needs to be thought out more clearly.
- Sue asked if the Town has plans to do the EA for the second bridge crossing.
- Grant confirmed that the Town is not currently planning for an EA for the second bridge.

Parks and Open Space

- Town indicated that they need to do more work to determine the parks and open space needs for the community.
- Grant would like to see the stormwater ponds designed to be incorporated in parks and openspace network, no fences. Caivan confirmed that this is part of their plans to integrate the ponds into the parks and trails network.
- It was confirmed that the Town does not have a Parks and Open Space Master Plan.

Grant also would like to see where the onsite parking would be located for the parks and open space. Town to involve Community Services in review/working sessions on parks and open space needs. Caivan and Town to work cooperatively with cost effective designs to minimize maintenance and to not overload Town resources. Caivan to include Blocks for pathways on the draft plan of subdivision for the resubmission. Update on EIS and It was acknowledged that the environmental studies were not complete given the time of Integrated year when Caivan submitted. Once the field monitoring program is finished and the data **Hydrological** is analyzed, the studies will be completed and provided as part of the next submissions. Assessment Jocelyn acknowledged that more work needs to be done on EIS and they are waiting until ground and surface water monitoring is done to complete EIS. o Integrated Hydrological Assessment will help Caivan determine if LIDs are appropriate or not in terms of ensuring water balance model will sustain wetlands Caivan/WSP to submit completed EIS and Integrated Hydrological Assessment with next submission **Heritage Impact** o Town has not yet initiated the peer review **Assessment Update Application Status** County deemed the application complete but Joanna said more information was required to properly review the application. **Boundary Adjustment** o Nadia presented the rationale that the draft plan of subdivision is largely consistent with Interpretation the Residential designation boundary in the OP, that the OP boundaries do not appear to reflect specific features and that the adjustment results in no net gain of residential lands therefore our planning opinion is that this can be done without OPA as per policy statement o Julie and Joanna indicated that they don't share this opinion and OPA is required. The Residential designation boundary is tied to previous OPAs, it is not considered to be a minor boundary adjustment. Stated that other lands designated as a Special Study Area not Future Development and that there are other components in OP that guide development of these lands. Nadia sought direction on policies that would prevent development from moving forward. Joanna referred to servicing allocation and land use policies. Joanna indicated that she hasn't done a boundary adjustment before and that an OPA has to be done. Hugo indicated that Caivan is not opposed to doing an OPA. Nadia also said that the more detailed studies will be provided in the next submission and this will also help with the PPS policies and other comments that were provided by the Town. Hugo suggested having a separate meeting on the OPA and this was agreed upon as the best way to move forward before filing an OPA application. o Joanna confirmed that a zoning by-law amendment should be done in advance not as a condition of subdivision approval as there is no indication of density, unit mix, or affordable housing. Town requested further information on proposed uses and density to be able to understand the development and determine if it is appropriate. Joanna also

Millates	
	 indicated that affordable housing will need to be discussed. Caivan are exploring the affordable housing comments. Caivan indicated that there will be a variety of housing to meet different needs, and there will be a range of small to large lot singles. Joanna stated that she didn't think Perth will be accepting of Ottawa housing types. Sue indicated that Caivan has developed a farmhouse style single design that can be shared with the Town. Sue offered a tour of the Ottawa Caivan sites for Town staff. Joanna would like to see the sites in person. Sue also indicated that Caivan can present their architectural package to the Town to show the different housing styles, materials, etc.
Street Cross-sections	 Town acknowledges that the proposed road cross-sections are consistent with OP and that they do not have additional street specifications, but they have concerns with the functionality of the proposed 16.75 m and 18.5 m ROW in relation to parking and snow clearing
	o Town noted that as shown in the cross-sections in the Urban Design Brief, with a 3 m front setback a car will not fit in the driveway and will be parked within the ROW, across the sidewalk or trying to park in the space between the sidewalk and curb. Hugo confirmed that it is not Caivan's intention to have easements in the public r-o-w, and that the cross-sections don't reflect this properly.
	 Joanna commented that the 16.75 m is in the OP and the Town can't challenge Caivan on this. However, the Town will be looking to change this r-o-w in the new OP review.
	 Grant advised that this is pickup truck land. Hugo said that there would be housing options with double car garages and double driveway widths.
	 Caivan indicated that they can provide a parking plan to demonstrate how parking with driveway widths and on-street parking can work.
	 Caivan to provide street cross-sections for reduced width ROWs approved for Ottawa showing that parking, snow clearing, and emergency vehicle manoeuvring can work for Town's review.
	o Town suggested alternating on-street parking locations for traffic calming.
	o Joanna mentioned that there is no public transit. People are commuting out too.
	 Grant advised that the Town would like to see alternate parking on driveways and streets.
Additional Studies	 Cavian is seeking clarification on the additional studies requested by the Town. Town indicated that study requirements can be discussed further and that some of the previously listed studies might not be required.
	Caivan to draft an expanded table of contents for the revised FSR for the Town's review to see if it addresses the Town's requirements.
	 Nadia mentioned that the Neighbourhood-Servicing Use Study and the Public Services Capacity Study are not applicable since the OP policies for these studies refer to institutional type of development which isn't being proposed by Caivan. Grant wasn't aware of these studies. Joanna will confirm whether these are needed by Oct. 5, 2022.
Closing Remarks	o Grant to follow-up with Adam re servicing

- Hugo requested clarity on process requirements for draft subdivision approval, registration and servicing but Town indicated that these are being developed and are not yet in place. Julie advised that the County's process will be shared.
- Chris reiterated that they have relied on the IMP which indicated that a North Street crossing was not considered due to perceived traffic impacts but asked if Town would consider exploration of this option. Town confirmed that they are open to Caivan exploring this option but that it would likely require lights and could have a domino effect.
- John asked where the R-O-Ws are as it isn't clear from the County maps. Julie advised that the County lands are in Tay Valley Township. The County's Administrative Office share lands with Tay Valley and with the Township of Drummond. Julie can provide Chris and John with the County's Public Works Department contact.
- Nadia asked who should be the primary point of contact as we move forward. Joanna confirmed that she should be the contact for the smaller working group meetings, including discussions on the OPA where the County would be invited to. Julie should be the point of contact to coordinate the larger group meetings with the Town and the RVCA.

Adam Fobert

From: Marika Livingston <marika.livingston@mrsourcewater.ca>

Sent: November 18, 2022 10:04 AM

To: Jocelyn Chandler; Brian Stratton; Adam Fobert

Subject: RE: SWP Perth

EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hi there,

Great to meet you both this morning.

I know I committed to only touching base if something changes, but here is just a quick summary email.

The circumstances for a stormwater pond or outlet to be a significant drinking water threat are:

Click here to view chemical list

Circumstance 1 (Circumstance Summary)

The system is a storm water management facility designed to discharge storm water to land or surface water.

The system is a storm water management facility designed to discharge

The policy that applies if the threat (SWM) meets the circumstances is:

Policy: SEW-10-LB-PI-MC

Future Stormwater Management Facility in Welli Protection Zone Scored 8 to 9 — Prescribed Instr

A future stormwater management facility that would be Appendix B is permitted in the:

- Intake Protection Zone with a vulnerability score of
- Wellhead Protection Area "A" (under the exemption
- Wallhood Protection Area "R" with a vulnerability e

However, I don't think the development meets the circumstances since I don't believe the development is over 100 hectares, in which case the Ministry shouldn't put any Source Water components in the ECA.

Thanks.

Marika

From: Jocelyn Chandler < jchandler@jfsa.com> Sent: Friday, November 18, 2022 9:27 AM

Adam Fobert < AFobert@dsel.ca>

Subject: RE: SWP Perth

Hi Marika, I just sent you and invite for 930. We can chat and see if we can get what we need without Brian and then follow up later. J

Jocelyn Chandler, M.Pl., RPP, MCIP (she/her)

Land and Water Resource Planner / Project Manager

Cell.: 613-371-5242 | Email: jchandler@jfsa.com

From: Marika Livingston < marika.livingston@mrsourcewater.ca >

Sent: November 18, 2022 9:23 AM

To: Jocelyn Chandler < ichandler@jfsa.com >; Brian Stratton < brian.stratton@mrsourcewater.ca >; Adam Fobert

<<u>AFobert@dsel.ca</u>> **Subject:** RE: SWP Perth

Hello Jocelyn,

Can you please update me on this meeting. I have just returned from Holidays. Also, please be advised that Brian is away today.

Thanks, Marika

----Original Appointment----

From: Jocelyn Chandler < ichandler@jfsa.com Sent: Friday, November 18, 2022 9:22 AM

To: Brian Stratton; Adam Fobert; Marika Livingston

Subject: SWP Perth

When: Friday, November 18, 2022 9:30 AM-10:00 AM (UTC-05:00) Eastern Time (US & Canada).

Where: Microsoft Teams Meeting

Microsoft Teams meeting

Join on your computer, mobile app or room device

Click here to join the meeting

Meeting ID: 235 715 214 65

Passcode: tJFBnL

Download Teams | Join on the web

Learn More | Meeting options

** Caution : External Email /// Attention : Courriel externe **

Adam Fobert

From: Adam Fobert

Sent: November 30, 2022 2:13 PM

To: 'Grant Machan'

Cc: Hugo Lalonde; 'Colin Haskin'

Subject: RE: rough format- actual flow numbers san-2022-11-30_1278_projections.xlsx

Hello Grant,

Thank you for the additional flow data below.

I downloaded and reviewed the rain fall data from Environment Canada. Nearest station to Perth is Drummond, which is 14km away from the town Centre. Interestingly enough, 2018 experienced less rain than in 2021, however more wastewater flow was observed. I've highlighted 2022 since we have an incomplete rainfall data set.

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Avg Daily Flow (m3/d)	6264	5042	5981					6639	6650	5454
Annual Rain (mm)	806	626.8	872.4					785	860.2	825.2
Lagoon Capacity	80.5	64.8	76.9					85.3	85.5	70.1

While 2019 was significantly wetter than 2018, there was only a small increase in lagoon flow.

We reviewed the rainfall data sets for the years between 2018 and 2021 to better understand the flow monitoring results.

Rainfall Analysis

	2018	2019	2020	2021
Total Annual	785	860.2	825.2	802.2
Max daily	58.4	50	49.2	47.8
Number of rain days	119	126	128	121
Rainfall greater than 5mm	43	46	46	43
Rainfall greater than 10mm	26	26	23	24
Rainfall greater than 20mm	9	11	8	12
Rainfall greater than 30mm	5	7	5	5

2019 had the highest annual rainfall, most number of rainy days, and more significant rain events than 2018, 2020, and 2021. Rain events between 2019 and 2020 are comparable, while the lagoon saw a 1,196m3/d drop in daily average flow. This could be attributed to change in water use at the outset of COVID.

Has the Town continued its efforts to reduce wastewater inflows to the lagoons between 2018 and 2021?

Do you have data for 2014 to 2017?

I've attached our projection analysis as well as the rain analysis I've described above. Let me know if you would like to discuss.

Adam Fobert, P.Eng.

DSEL

david schaeffer engineering ltd.

120 Iber Road, Unit 103 Stittsville, ON K2S 1E9

direct: (613) 845-2105 cell: (613) 222-9493 email: afobert@DSEL.ca

This email, including any attachments, is for the sole use of the intended recipient(s) and may contain private, confidential, and privileged information. Any unauthorized review, use, disclosure, or distribution is prohibited. If you are not the intended recipient or if this information has been inappropriately forwarded to you, please contact the sender by reply email and destroy all copies of the original.

*** NOTE UPDATED PHONE NUMBER ***

From: Grant Machan <gmachan@perth.ca>

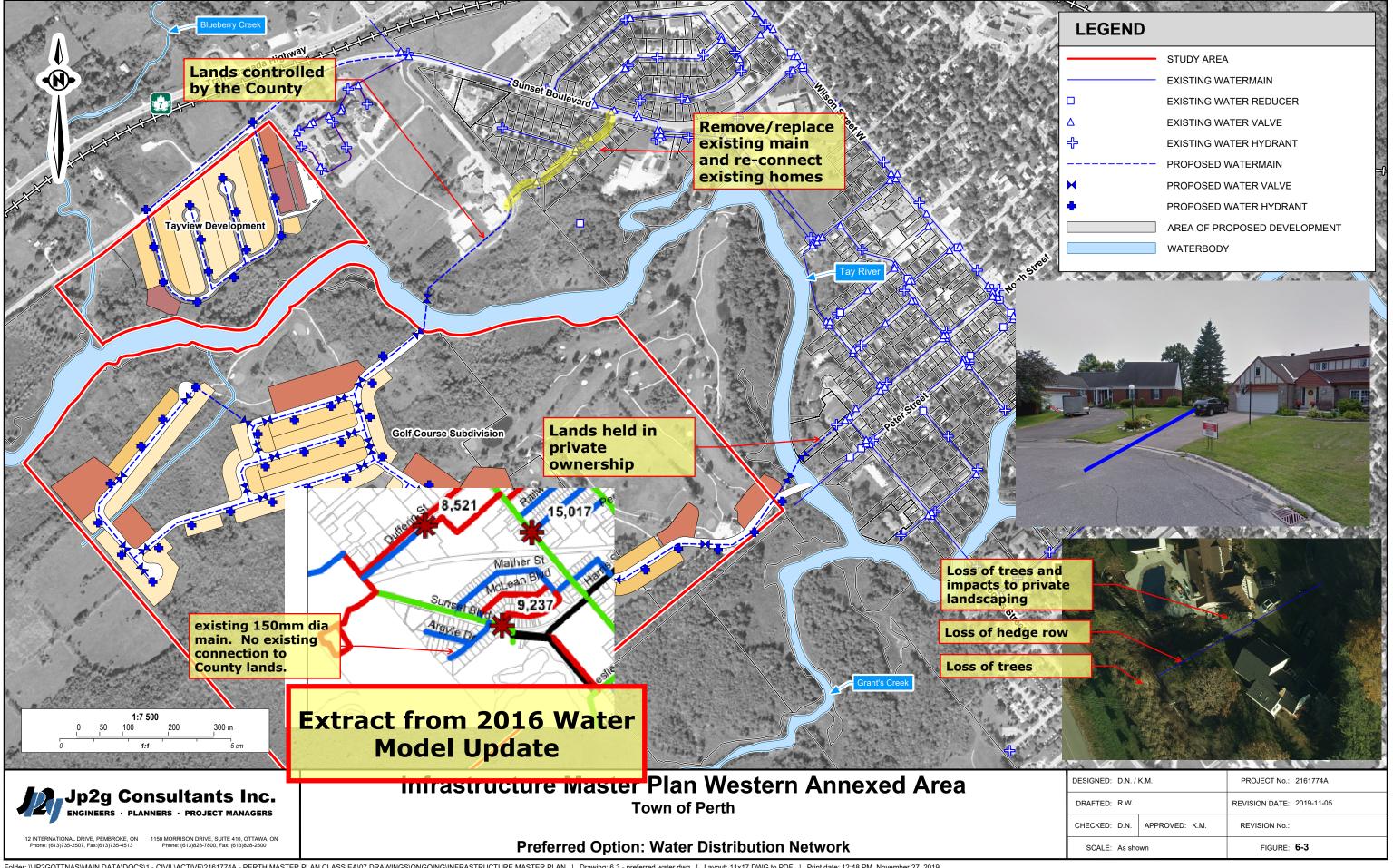
Sent: November 25, 2022 11:41 AM **To:** Adam Fobert <AFobert@dsel.ca>

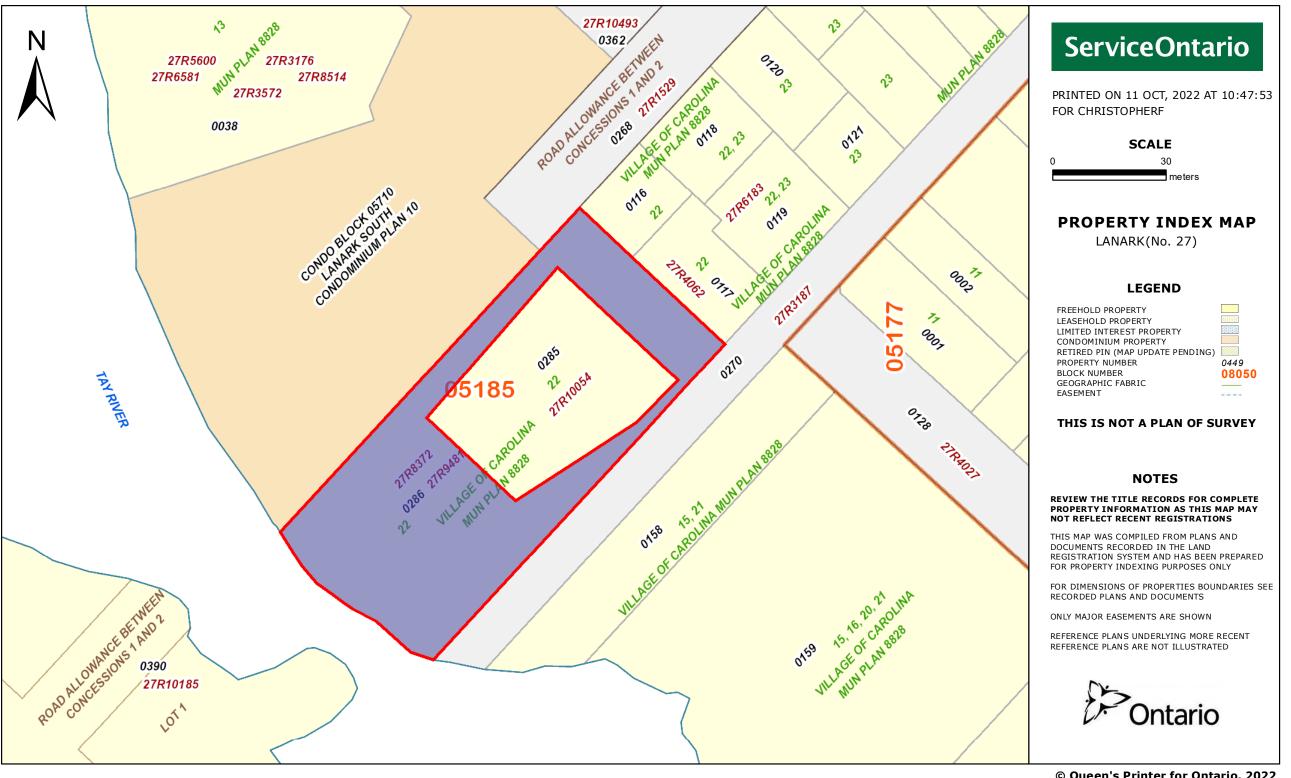
Subject: rough format- actual flow numbers

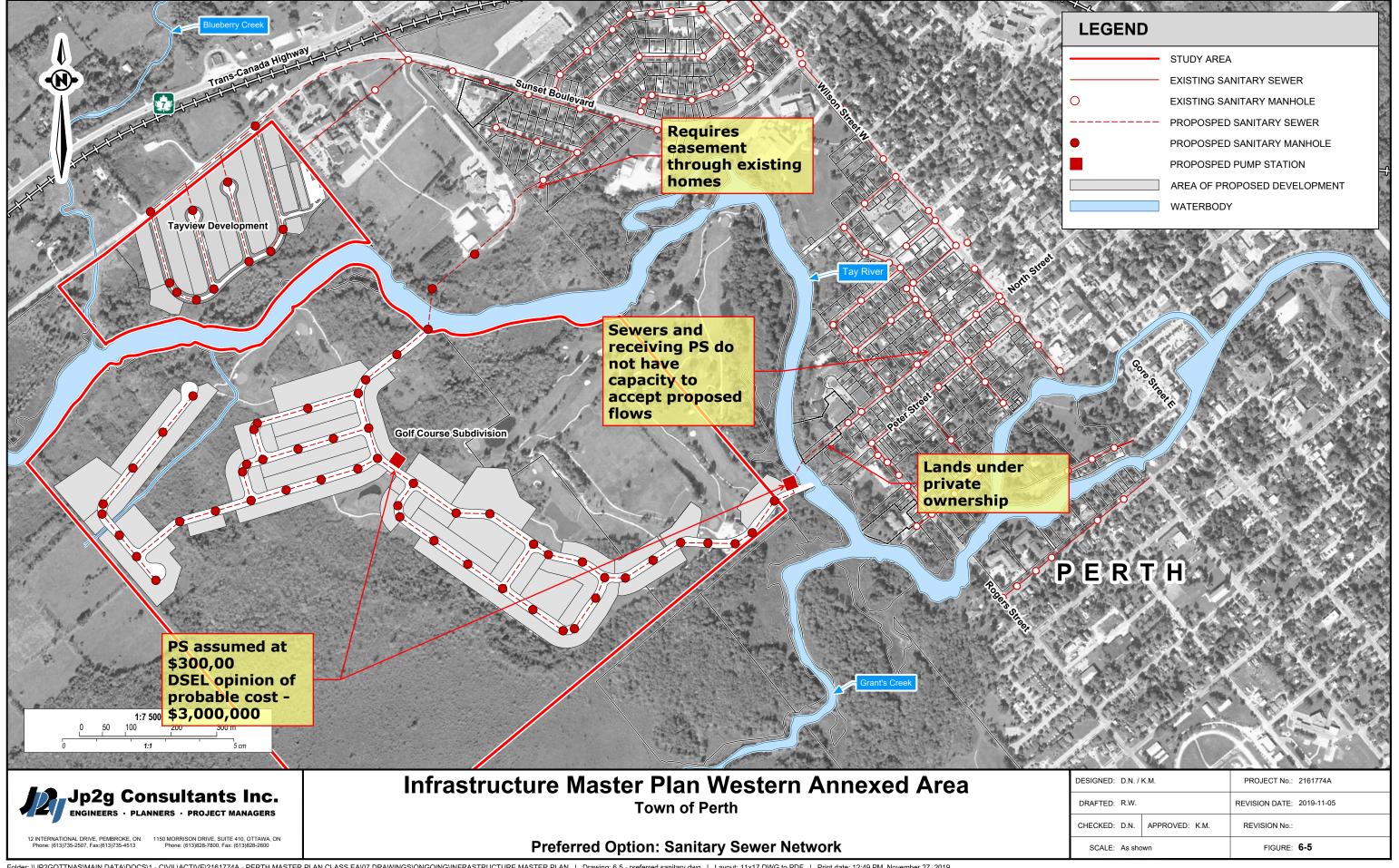
EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

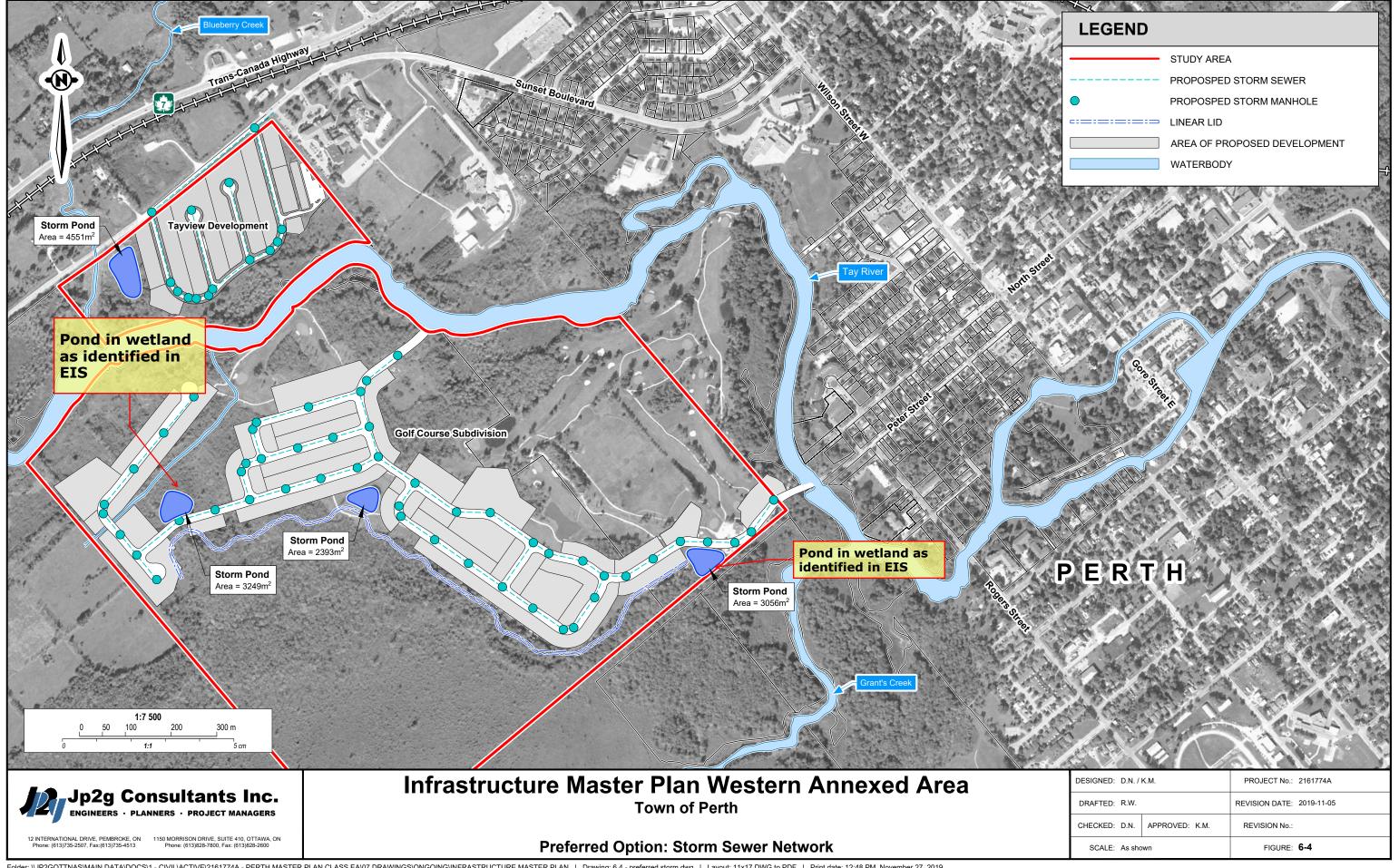
<u>Year</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>
Avg Daily Flow (m3)	6639	6650	5454
% Capacity	86%	86%	71%

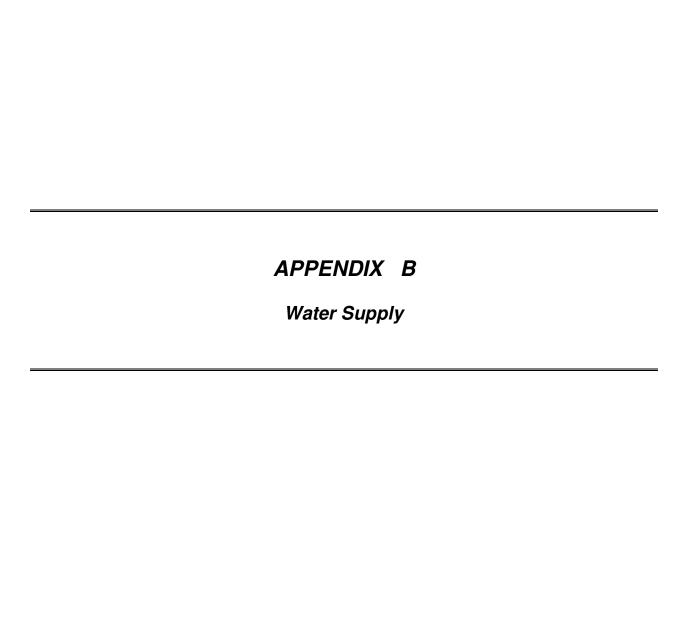
Grant Machan CET Director of Environmental Services gmachan@perth.ca 613-267-3311 ex2233

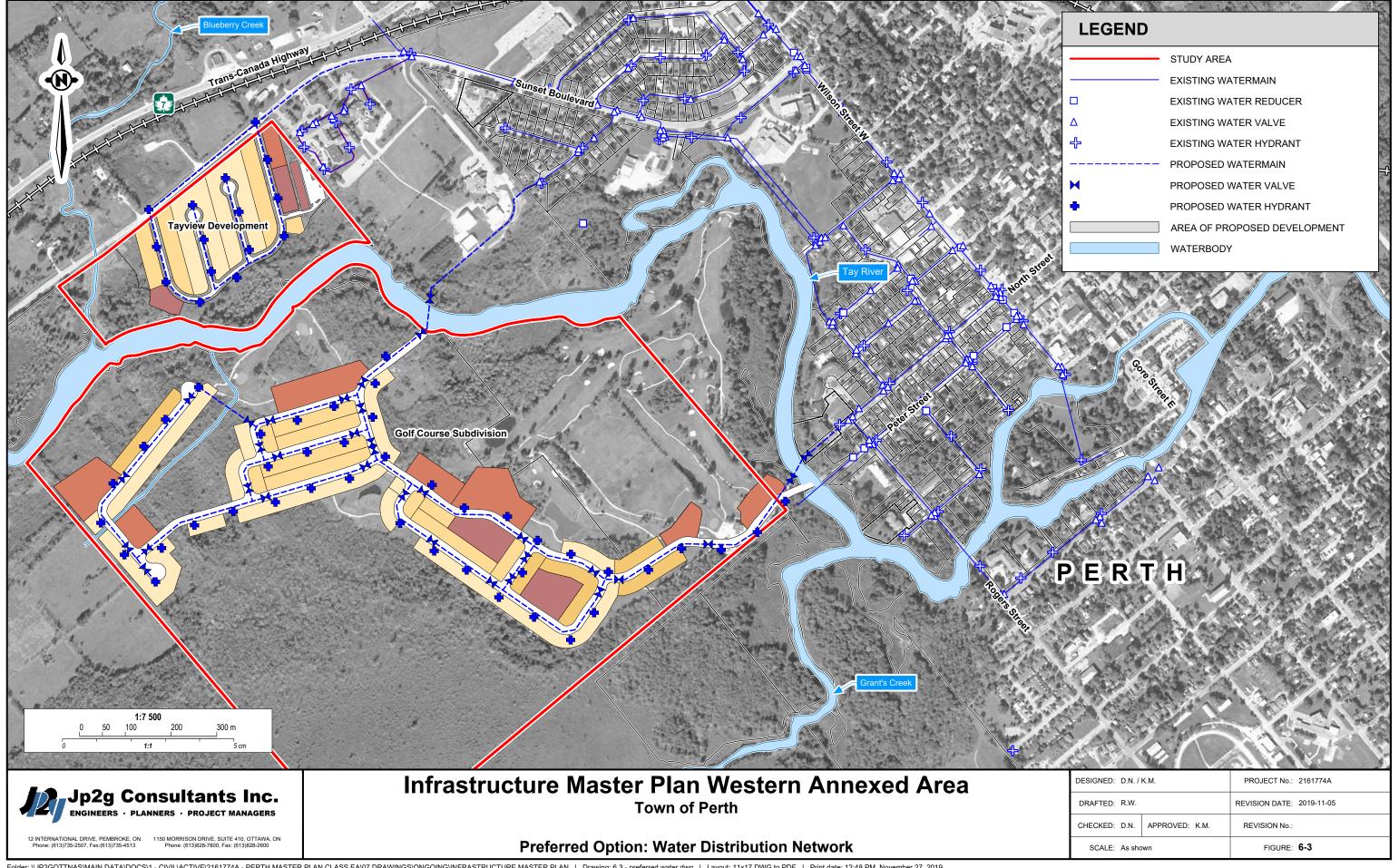


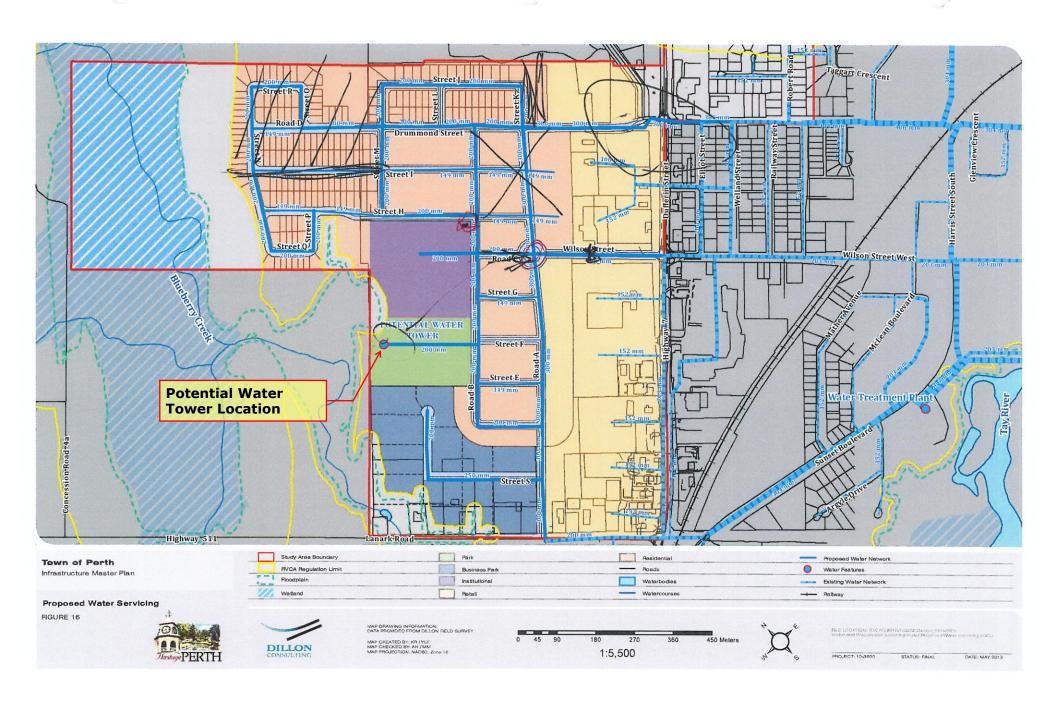














Perth Western Annex Lands - 141 Peter Street: Potable Water Hydraulic Analysis

Final Report

February 22, 2023

Prepared for:

Caivan (Perth GC) Limited

Prepared by:

Stantec Consulting Ltd.

Revision	Description	Aut	hor	Quality	Check	Independe	ent Review
0	Draft	AM	20230208	KA	20230208	JS	20230208
1	Final	AM	20230222	KA	20230222	JS	20230222



This document entitled **Perth Western Annex Lands - 141 Peter Street: Potable Water Hydraulic Analysis** was prepared by Stantec Consulting Ltd. ("Stantec") for the account of David Schaeffer Engineering Ltd. (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by	
· ·	(signature)
Alexandre Mineault-Guitard,	M.A.Sc., ing., P.Eng.
Paylowed by	
Reviewed by	(signature)
	(signature)
Jasmin Sidhu, P.Eng.	
Approved by	
	(signature)
Kevin Alemany, M.A.Sc., P.E	ing.



February 22, 2023

Table of Contents

1.0	INTRODUCTION	1.1
1.1	STUDY AREA	1.1
1.2	EXISTING HYDRAULIC MODEL	1.3
2.0	HYDRAULIC ASSESSMENT	2.1
2.1	SERVICEABILITY	2.1
	2.1.1 System Pressures	2.1
	2.1.2 Fire Flows	2.1
2.2	GROWTH AND POPULATION	2.3
	2.2.1 Western Annex Development	2.3
	2.2.2 Other Developments	2.3
2.3	DEMAND PROJECTIONS	2.4
2.4	MODEL DEVELOPMENT	2.6
	2.4.1 Proposed Watermain Sizing & Layout	2.8
3.0	PRELIMINARY HYDRAULIC MODELLING RESULTS	3.1
3.1	AVERAGE DAY & PEAK HOUR DEMANDS	3.1
3.2	MAXIMUM DAY PLUS FIRE FLOW	3.1
3.3	RELIABILITY	3.1
4.0	PRELIMINARY COST ESTIMATE	4.1
5.0	CONCLUSION AND RECOMMENDATIONS	5.1
6.0	REFERENCES	6.1



i

February 22, 2023

ı	.IST	ΩF	TΛ	RI	FS
_	.I O I	UГ	1 🖴	DL	.⊏ാ

Table 2-1: Estim	nated Unit Counts and Populations (Western Annex)	2.3
Table 2-2: Estim	nated Demand Projections – Proposed Developments	2.4
	n-Williams Coefficients by Watermain Size	
	nated Population at Under Ultimate Build-Out Conditions	
	r Storage Requirement (Existing Conditions)	
	r Storage Requirement (Ultimate Built-Out Conditions)	
Table 4-1: Prelii	minary Cost Estimates ¹	4.1
LIST OF FIGUR	RES	
Figure 1-1: Prop	posed Development Location	1.2
	ly Area Elevation	
	er Developments within the Town's Limit	
	posed Watermain Sizing & Layout	
Figure 3-1: Relia	ability Analysis Watermain Break Locations	3.3
LIST OF APPE	NDICES	
APPENDIX A	FUS FIRE FLOW CALCULATIONS	A.1
APPENDIX B	JUNCTION IDS	B.1
APPENDIX C	MODEL RESULTS	C.1



Introduction February 22, 2023

1.0 INTRODUCTION

To support Caivan (Perth GC) Limited (Caivan) with their draft plan submission for the Western Annex Lands development (Western Annex), Stantec Consulting Ltd (Stantec) was requested to provide engineering services to complete a water distribution system analysis for this proposed subdivision. The purpose of the analysis is to confirm associated watermain sizing and redundancy needs.

For this assignment, Stantec's scope of work included the following tasks:

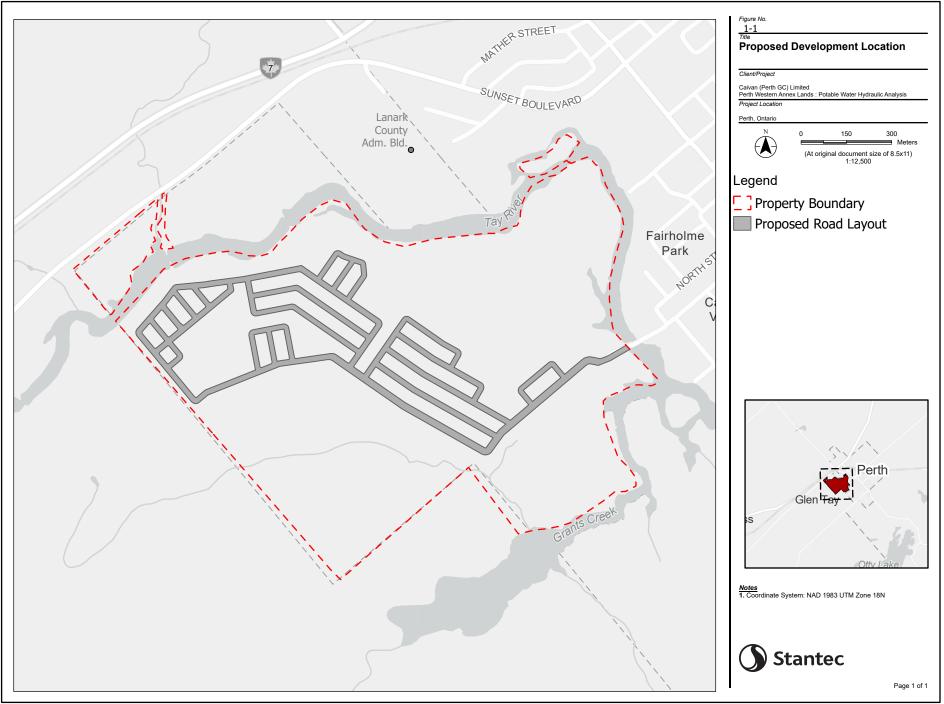
- 1. Review and update of the existing water distribution model;
- 2. Review of past studies, including the Western Annex Lands IMP (Jp2g, 2019), and the Area North of Highway 7 IMP (Dillon, 2013);
- 3. Analysis of Caivan's concept plan to develop water supply demands and Fire Underwriters Survey (FUS) Fire flow requirements;
- 4. Set up and run model simulations for average day (AVDY), peak hour (PKHR), and maximum day (MXDY) plus fire flow demands;
- 5. Assess the Town of Perth's (the Town) distribution system needs and upgrades to service Caivan's development and meet design criteria within the development lands;
- 6. Prepare a preliminary cost estimate (Class D) related to the upgrades to service Caivan's development; and,
- 7. Documenting the approach used, findings and recommendations from the analysis.

1.1 STUDY AREA

The study area is located along the western banks of the Tay River in the Town of Perth (Ontario). The proposed development location is on the Perth Golf Course property. Based on the updated site plan provided by Caivan (dated January 2023), the property is approximately 148 ha, where about 44 ha is proposed urban development. The proposed development is composed of townhouse units and single house units. For this analysis, the new development is considered as a single phase (ultimate build-out conditions).

Ultimately, these development lands are proposed to be serviced by a dual connection to the existing distribution network across the Tay River, along Peter Street. The proposed development location is shown in **Figure 1-1**. Note that further discussion related to the dual connection is provided in **Section 2.4.1**.





Introduction February 22, 2023

1.2 EXISTING HYDRAULIC MODEL

As part of a previous study in 2016, Stantec developed a hydraulic model of the Town's water distribution system. Based on communications with the Town's staff, no major upgrades to the distribution system have been made since the development of the hydraulic model. Thus, the 2016 model is assumed to be representative of the current state of the Town's water distribution system and water demands and was used as the basis for the serviceability analysis for the proposed Western Annex development.

It is noted that other new developments are also being planned in Perth and will be connected to the Town's distribution system. Further details of those developments are discussed in **Section 2.2.2**.



Hydraulic Assessment February 22, 2023

2.0 HYDRAULIC ASSESSMENT

For this analysis, the Town's recently adopted Engineering Design Guidelines (herein referred to as the "Town's Design Guidelines") and the Ontario Ministry of Environment, Conservation and Parks (MECP) Design Guidelines for Drinking Water Systems (2019) were used to establish water demands and design criteria. As per the Town's Design Guidelines, the potable water servicing shall meet the requirements of the Fire Underwriters Survey (FUS). However, in areas where such flow cannot be achieved, the Town will consider the minimum fire flows as per the MECP Design Guidelines. It is to note that the City of Ottawa Water Design Guidelines (herein referred to as "Ottawa's Design Guidelines") are also considered for specific applications (ex.: hydrant coverage and reliability analysis).

2.1 SERVICEABILITY

2.1.1 System Pressures

As per the Town's Design Guidelines, the static pressure at any point in the distribution system shall not exceed 550 kPa (80 psi) and no less than 275 kPa (40 psi) at ground elevation (i.e., at street level). The maximum pressure at any point in the water distribution system should not exceed 552 kPa (80 psi). For areas where pressures greater than 552 kPa (80 psi) are anticipated, pressure reducing measures are required. Under emergency fire conditions, a residual pressure of 140 kPa (20 psi) must be maintained in the distribution system while the appropriate fire flow is provided. **Figure 2-1** shows the elevations throughout the study area, based on the site's proposed grading. As shown, the elevations range from 135.38 m to 138.13 m.

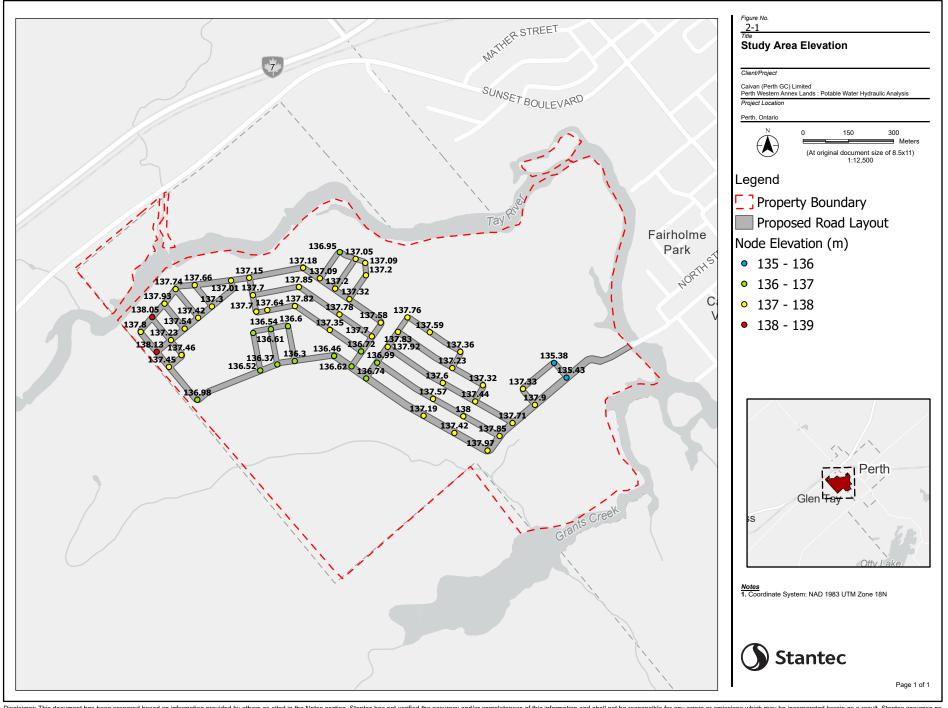
2.1.2 Fire Flows

The MECP Design Guidelines require a fire flow assessment to be completed to demonstrate that local watermains can provide the objective fire flows. The detailed FUS Guidelines (long method) can be used to calculate the objective fire flows, based on site plan information. The proposed layouts for both unit types (single house and townhouse) were provided to Stantec (see **Appendix A**) and were used to estimate the fire flow requirements.

Layout and unit information yielded a governing required fire flow (RFF) of 7,000 L/min (117 L/s) for single house units, and a RFF of 10,000 L/min (167 L/s) for townhouse units, based on the assumptions listed below. Detailed FUS calculations are provided in **Appendix A**. It is to note that those calculations are to be revisited at the detailed design stage, based on the characteristics of the proposed buildings.

- Two storeys building, with the basement more than 50% below grade;
- Typical construction (e.g., wood frame, limited combustible building contents); and
- Buildings are not sprinklered.





Hydraulic Assessment February 22, 2023

On the other hand, the FUS Guidelines (simple method, 2020 Version) suggest a fire flow of 8,000 L/min (133 L/s) for one- or two-family dwellings up to 450 m² with less than 3 m of exposure distance; and 8,000 L/min (133 L/s) for row housing with exposure distances between 3 and 10 m.

For this analysis, the required fire flow defined using the FUS Guidelines "long method" will be used, as the "simple method" yields more of an average suggested value. Indeed, the "simple method" does not consider factors such as actual total effective area, combustibility of building contents, or separation distances on all four sides of the structure. Therefore, the RFF for the row housing units defined using the "long method" (10,000 L/min or 167 L/s) will be analyzed as part of the local watermain sizing.

2.2 GROWTH AND POPULATION

2.2.1 Western Annex Development

The residential population for the Western Annex Development was estimated based on projected household sizes as per population densities (or persons per unit, PPU) specified in the Town's Design Guidelines.

The proposed development consists of single house and townhouse units. Based on the proposed site layout, 640 single house units, and 299 townhouse units are considered for this analysis. **Table 2-1** shows the estimated number of units in these development lands and the projected population based on the distribution of residential unit types. The total estimated population is 3,479 persons.

Unit Type	Unit Count	PPU	Population
Singles	640	3.8	2,432
Townhouses	299	3.5	1,047
Total	939		3,479

Table 2-1: Estimated Unit Counts and Populations (Western Annex)

2.2.2 Other Developments

Other developments, as shown in **Figure 2-2**, are being considered within the Town's limits, and those will be connected to the existing water distribution network. As such, the estimations of residential population are needed to account for the projected increase in water demands.

First, the Tayview Developments (Tayview), described in the Jp2g 2019 IMP study, is located just north of the study site. As part of that development, a new retirement home (total of 160 beds, 1.3 PPU) is being planned close to the Lanark County Administration Building. Additionally, 57 single houses (3.8 PPU), 16 townhouses (3.5 PPU), 60 condos (2.0 PPU), and a commercial centre are also considered. As such, a population of 601 (excluding the commercial centre) is expected under the ultimate build-out conditions.



Hydraulic Assessment February 22, 2023

Secondly, the area north of Highway 7 (North HWY 7), studied in Dillon's 2013 IMP study, was also included in this serviceability analysis. Based on the mixed-density residential planning projections, 1,340 residents are expected in this area. Furthermore, provision for a new school, with 700 students and 35 staff members, was also accounted for. As such, the projected population for this area consists of 2,075 (1,340 residential, and 735 institutional). Additionally, 35 ha of commercial properties are planned for the area.

2.3 DEMAND PROJECTIONS

The criteria outlined in the Town's Design Guidelines and the MECP Design Guidelines for Drinking Water Systems (specifically Table 3-3) were followed to establish water demands for the new developments. Subsequently, the average day (AVDY) consumption rates were applied to align with revised water rates identified by the Town's Design Guidelines. As such, a residential consumption rate of 450 L/cap/d was used, as well as consumption rates of 28,000 L/ha/d and 70 L/cap/d for commercial and institutional areas, respectively.

For residential consumption, a maximum day (MXDY) peaking factor of 2 was then applied to the AVDY demand to provide a MXDY demand. A peak hour (PKHR) peaking factor of 2.2 was then applied to the MXDY demand to provide a PKHR demand. For commercial and institutional water demands, MXDY demands were calculated by multiplying the AVDY demands by a peaking factor of 1.5, while PKHR demands were calculated by multiplying MXDY demands by a peaking factor of 1.8. Estimated AVDY, MXDY and PKHR demand projections are summarized in **Table 2-2**.

Table 2-2: Estimated Demand Projections - Proposed Developments

Development	AVDY (L/S)	MXDY (L/s)	PKHR (L/s)
Western Annex	18.12	36.23	79.72
Tayview	3.17	6.32	13.88
North HWY 7	18.91	31.85	69.71
Total	40.20	74.41	163.31

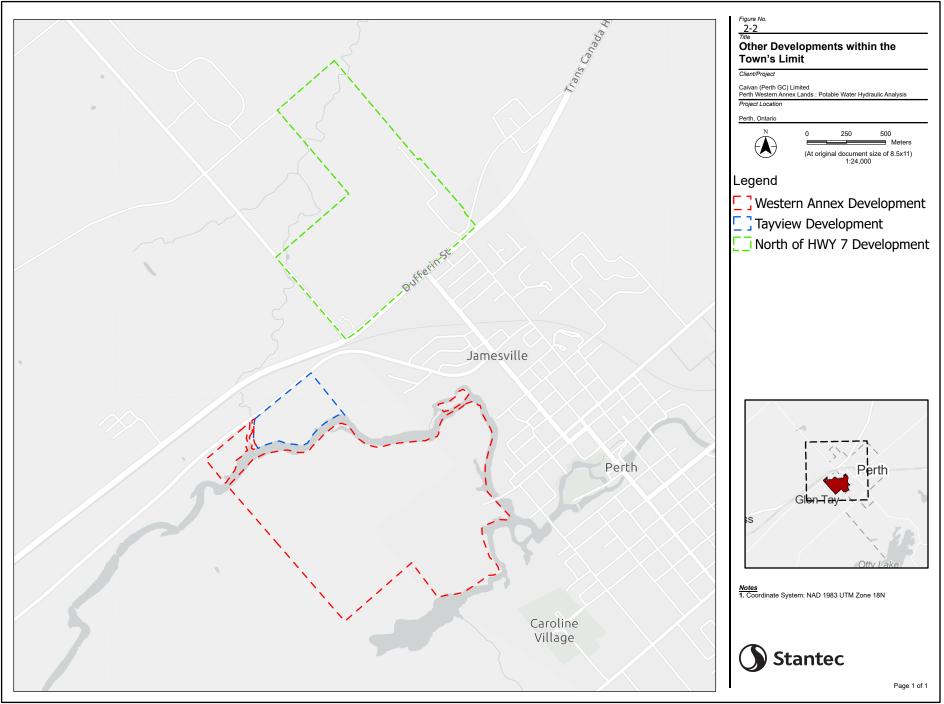
For this analysis, the total population from all developments (Western Annex, Tayview and North of HWY 7) will be considered as the "ultimate build-out conditions". The demands presented in **Table 2-2** were added to the hydraulic model, in addition to the existing water demands in the distribution models. Those demands were developed by Stantec (2016) based on water meter records, and data from the Water treatment Plant (WTP). The total water demands for the existing system are listed below. It is to note that under PKHR conditions, the total demand (269.5 L/s) exceeds the capacity of the two (2) domestic high lift pumps at the WTP (each rated at 105 L/s).

AVDY: 35.4 L/s;

MXDY: 70.8 L/s; and

PKHR: 106.2 L/s.





Hydraulic Assessment February 22, 2023

2.4 MODEL DEVELOPMENT

The existing water model (Innovyze's H2OMap Water) was imported into Innovyze's InfoWater Pro (Suite 3.5, Update #3). Then new development demands were incorporated in the model.

The model was developed to reflect the most current site plan, including the proposed watermain layout (based on proposed road alignment) and water demands. Watermains added to the model were assigned Hazen-Williams coefficients ("C-Factors") in accordance with the Town's Design Guidelines. These factors are listed in **Table 2-3**.

Table 2-3: Hazen-Williams Coefficients by Watermain Size

Watermain Diameter (mm)	Coefficient
150	100
200 - 250	110
300 and over	120

Analysis of the distribution network was completed by adjusting the controls at the WTP pumping station to fill and draw the existing elevated tank between levels of 60% and 100 % full.

A new elevated storage tank was recommended to support new developments within the Town, as discussed in both the Dillon and Jp2g IMP studies. At this time, the characteristics of the future elevated tank are unknown, and the design of the elevated tank is not part of this study. For this analysis, an elevated tank was sized based on MECP Design Guidelines, as per the Town's population expected under the ultimate build-out conditions. This includes all envisioned developments, namely Western Annex, Tayview and North HWY 7. The new elevated tank will be considered only under the ultimate build-out conditions. **Table 2-4** shows the population expected under the ultimate build-out conditions, including the existing Town's population of 6,360 (Jp2g, 2019).

Table 2-4: Estimated Population at Under Ultimate Build-Out Conditions

Item	Population
Existing population	6,360
Western Annex	3,479
Tayview	601
North HWY 7	2,075
Total	12,515

Hydraulic Assessment February 22, 2023

MECP Design Guidelines specifies that treated water storage should be composed of Fire Storage (A), Equalization Storage (B), and Emergency Storage (C). Each storage component is defined as follows:

- Fire Storage (A) is defined based on population;
- Equalization Storage (B) corresponds to 25% of the MXDY demand; and
- Emergency Storage (C) corresponds to 25% of the sum of A and B components.

Under the existing conditions, a population of 6,360 (Jp2g, 2019) yields a fire flow of 162 L/s, as per the MECP Design Guidelines. It is noted that the existing pumping reserve capacity of the WTP accounts for 19.72 L/s (1,669 m³/d), which could be reduced from the Fire Storage (A) requirement. Furthermore, the existing MXDY demand is 6,117 m³/d (or 70.8 L/s as listed in **Section 2.3**). **Table 2-4** shows the total storage requirement as per the MECP under existing conditions. As shown, the storage requirement exceeds the existing elevated storage of 945 m³. Note that the capacity of the high lift pumps at the WTP exceeds the existing MXDY demand, which addresses the storage deficiency.

Table 2-5: Water Storage Requirement (Existing Conditions)

	Description	Value	Unit
Α	Fire Storage (Fire + Duration) ¹	1,533	m ³
В	Equalization Storage (25% of MXDY)	1,529	m³
С	Emergency Storage (25% of A+B)	766	m³
Total Water Storage	A+B+C	3,828	m³

¹ Reduced based on pumping reserve capacity.

For a future population of 12,515, the MECP Design Guidelines yield a recommended fire flow of 215 L/s. Furthermore, the expected MXDY demand under ultimate build-out conditions is 12,546 m³/d or 145.2 L/s (i.e., 70.8 L/s for existing demands, plus 74.4 L/s for the proposed developments). **Table 2-6** shows the total water storage requirement for the ultimate build-out conditions, as per the population presented in **Table 2-4**. The required elevated storage volume at ultimate built-out conditions exceeds the existing elevated storage of 945 m³.

Table 2-6: Water Storage Requirement (Ultimate Built-Out Conditions)

	Description	Value	Unit
А	Fire Storage (Fire + Duration) ¹	2,109	m³
В	Equalization Storage (25% of MXDY)	3,136	m³
С	Emergency Storage (25% of A+B)	1,311	m ³
Total Water Storage	A+B+C	6,557	m³

¹ Reduced based on pumping reserve capacity.



Hydraulic Assessment February 22, 2023

Considering the configuration of the existing distribution network (i.e., a single elevated tank, as well as a single feed leaving the WTP), it is recommended to provide additional storage to improve the network's resiliency, as per both the Dillon and Jp2g IMP studies. As such, 5,612 m³ of additional storage was considered as part of this analysis, and the new elevated tank was assumed to be positioned within the North HWY 7 development. Note that the high-water level (HWL) of the new elevated tank is the same as the existing tank (i.e., 180.52 m), as per the 2013 Dillon Study.

2.4.1 Proposed Watermain Sizing & Layout

Based on the design requirements for pressure and fire protection, preliminary modelling indicates the need for a mix of 150 and 200 mm diameter watermains, as well as a 300 mm diameter feedermain, as shown in **Figure 2-3**. This layout was identified to provide sufficient flow to achieve the objective fire flow of 10,000 L/min, as well as domestic water demands.

As introduced, a dual connection is planned to the existing distribution network. There are two (2) options for the proposed connection: 1) connection to the existing 300 mm watermain at the corner of North Street and Lustre Lane via a new watermain; or 2) connection to the existing 75 mm watermain along Peter Street, on the west bank of the Tay River. Option 2 would require the replacement of the existing 75 mm (167 m) and 150 mm (45 m) watermains along Peter Street, up to the 300 mm watermain at the corner of Peter Street and Rogers Road. This is needed such that the objective fire flows are achieved within the proposed development. Both options are presented in **Figure 2-3**.

It is recommended to have two independent connections to the Town's network, to provide better resiliency. As reference, updated Section 4.3.1 of the Ottawa Water Distribution Systems Design Guidelines (ISTB-2021-03) states that "Industrial, commercial, institutional service areas with a basic day demand greater than 50 m³/d and *residential areas serving 50 or more dwellings shall be connected with a minimum of two watermains*, separated by an isolation valve, to avoid the creation of a vulnerable service area." As a connection is planned at only one location (i.e., across the Tay River along Peter Street), the proposed development could be considered a vulnerable service area under the Ottawa's Design Guidelines, depending on the characteristics of the connections.

As such, two individual connections should be implemented, so that if one of the connections is interrupted (e.g., watermain break), the other can still service the proposed development. This would require the installation of a line valve along each connection point, so that the feed from the existing system can be isolated when needed. In that sense, it is recommended that connections to the Town's network are implemented at both options listed above, for better resiliency. However, note that for this hydraulic analysis, both connections to the Town's network were assumed as Option 1.

Furthermore, it is necessary that the watermains are separated from each other (i.e., installed in separate trenches). If a watermain break occurs along one of the feedermain, and that both pipes are installed one next to the other, the second pipe could be affected (either by being "washed out" or being hit by crews during repairs).

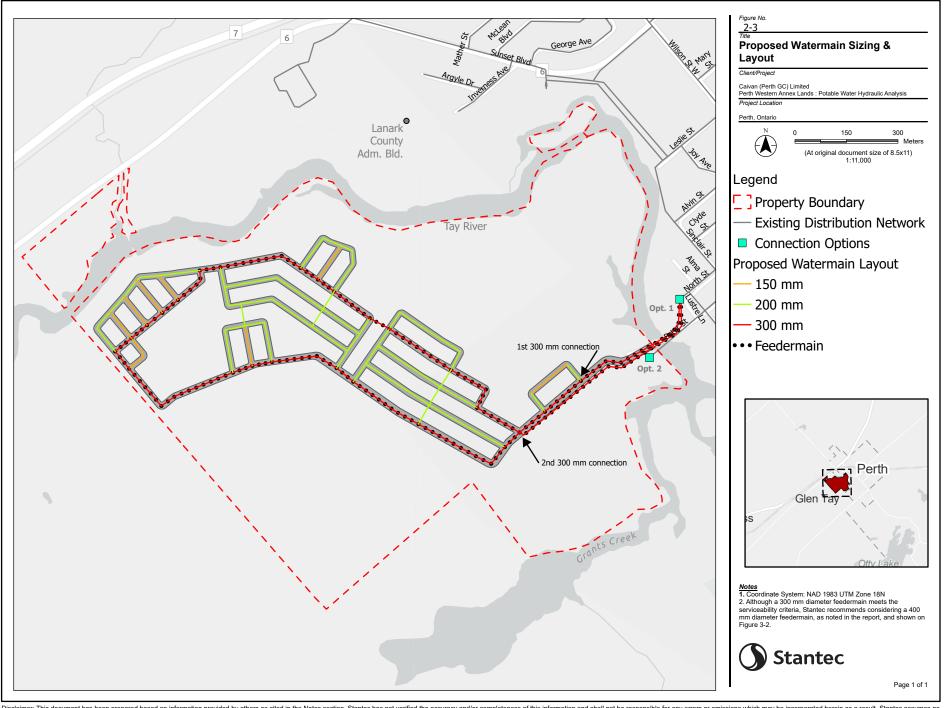


Hydraulic Assessment February 22, 2023

Similarly, there is a risk factor to consider regarding the crossings of the Tay River. It is not recommended that both feedermains cross the Tay River along the Peter Street bridge. If the bridge fails (e.g., major flooding) and that both lines are running along the bridge, it will interrupt the water servicing to the proposed development. As such, some considerations (e.g., trenchless crossing below the river) are to be taken regarding the crossings to mitigate the risks.

As such, it is recommended to have two independent connections to the existing network, as described above. This would avoid the creation of a vulnerable service area, increase resiliency against a major failure and minimize the risks for customers, as discussed in **Section 3.3**.





Preliminary Hydraulic Modelling Results February 22, 2023

3.0 PRELIMINARY HYDRAULIC MODELLING RESULTS

Preliminary hydraulic modelling was completed to assess the network's performance under different demand scenarios. The following subsections present the preliminary modelling results under AVDY, PKHR, and MXDY+FF demands for the proposed development. Note that for this analysis, a new elevated tank, sized based on MECP Design Guidelines, was assumed under ultimate build-out conditions.

All junction IDs are shown in **Appendix B**, with detailed modelling results for all scenarios provided in **Appendix C**.

3.1 AVERAGE DAY & PEAK HOUR DEMANDS

Under AVDY demands, maximum modelled pressures are between 55 and 64 psi, which falls within the desired pressure range of 40 to 80 psi based on the Town's Design Guidelines. As such, pressures are within the desired pressure range of 40 to 80 psi, and no pressure reducing measures are required within the proposed development.

For PKHR conditions, modelling results show that minimum pressures range between 48 psi and 58 psi. Note that under PKHR conditions, all three high lift pumps at the WTP are assumed to be in operations at the WTP, as PKHR demands exceed the rated capacity of the two (2) domestic pumps (refer to **Section 2.3**). The domestic pumps should be upsized before all developments are fully constructed.

3.2 MAXIMUM DAY PLUS FIRE FLOW

In this demand scenario, available fire flows across the proposed development must meet or exceed the RFF of 10,000 L/min (167 L/s) as described in **Section 2.1.2**.

Under MXDY+FF demands, assuming that the elevated tank is a 60% full and all high lift pumps running at the treatment plant, modelling shows that the RFF is exceeded across all nodes with a residual pressure of 20 psi. The minimum available fire flow within the new development is estimated at 10,600 L/min (177 L/s) at node J87.

3.3 RELIABILITY

It is good practice to assess the serviceability of the system under failure scenarios. As per the Ottawa's Design Guidelines, the system must be able to provide average day demand plus fire flow (AVDY + FF) while meeting serviceability requirements during a major failure (i.e., watermain break).

As such, four (4) reliability scenarios (shown in **Figure 3-1**) were reviewed to confirm sufficient pressure and flow can be achieved during a major failure. These break scenarios are described below. Note that



Preliminary Hydraulic Modelling Results February 22, 2023

the reliability scenarios assume that both feedermains connecting to the Town's existing network are independent from each other, as described in **Section 2.4.1**.

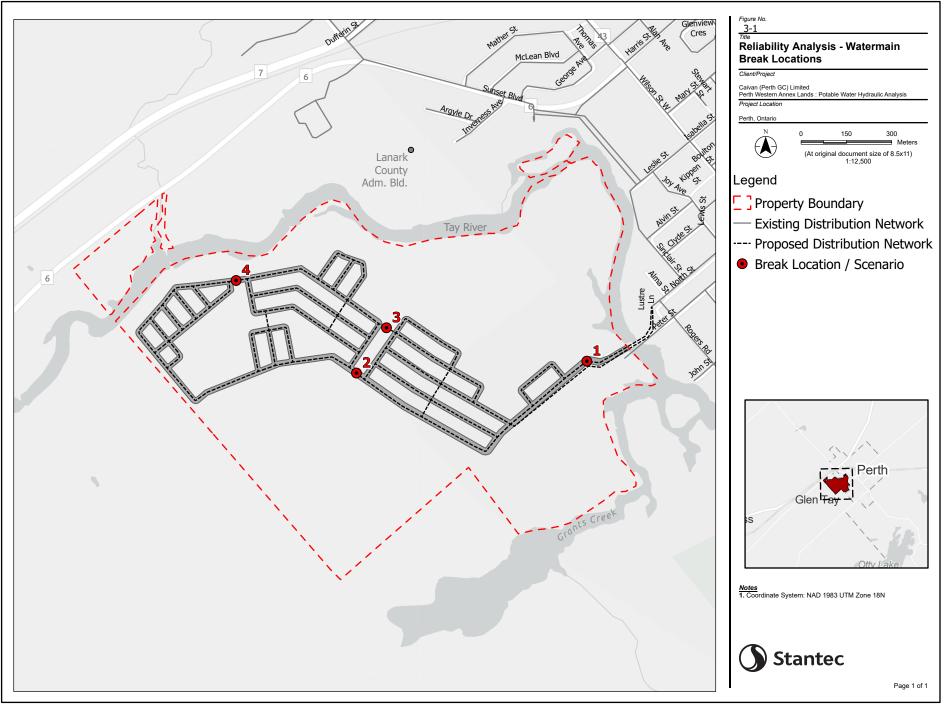
- 1. Break Scenario 1: Break in the one of the 300 mm feedermain connecting to the existing network;
- 2. Break Scenario 2: Break in the southern 300 mm feedermain connection to the western portion of the study area;
- 3. Break Scenario 3: Break in the northern 300 mm feedermain connection to the western portion of the study area.
- 4. Break Scenario 4: Break along the 300 mm feedermain in the western portion of the study area.

Model results (see **Appendix C**) show that a few junctions do not meet the RFF of 10,000 L/min (167 L/s), as discussed below:

- Under Break Scenario 1, the RFF is not met at node J87 (8,800 L/min) and node J121 (9,900 L/min).
- Under Break Scenarios 2 to 4, the RFF is met at all locations, except at node J87 (varying from 9,000 to 9,700 L/min).

Although modelling results suggest that portions of the local network may be vulnerable under a major break scenario, sufficient fire flow coverage could be provided if hydrant spacing is planned as per Ottawa's ISDTB-2018-02. Planning for hydrant spacing such that two (2) Class AA hydrants (rated at 5,700 L/min each) are placed within 75 m of all buildings would yield a cumulative available fire flow that would exceed the 10,000 L/min RFF, under all break scenarios. It is thus recommended to plan hydrant spacing as per Ottawa's ISDTB-2018-02, rather than the Town's Design Guidelines maximum hydrant spacing of 90 m for high density residential areas, to avoid oversizing local watermains.





Preliminary Cost Estimate February 22, 2023

4.0 PRELIMINARY COST ESTIMATE

A preliminary cost estimate was completed regarding the necessary upgrades to the existing network to service the Western Annex development. As previously discussed, a new elevated tank is required to support new developments within the Town. Furthermore, the domestic high lift pumps at the WTP will have to be upsized before all planned developments within Perth are constructed. As discussed in **Section 2.3**, the PKHR demand (269.5 L/s) exceeds the rated capacity of the two (2) domestic pumps (each rated at 105 L/s). The design of the elevated tank, as well as upgrades at the WTP pumping station are not part of Stantec's mandate related to the serviceability of the Western Annex development. As such, these were not included in the cost estimate analysis. The required upgrades are linked to the proposed connections to the Town's existing water distribution network. As discussed in **Section 2.4**, there are two (2) options at the proposed connection, as presented below.

- Option 1: connection to the 300 mm watermain at the corner of North Street and Lustre Lane.
- Option 2: connection to 75 mm watermain along Peter Street, on the west bank of the Tay River.

Option 1 would be completed via new watermains, whereas Option 2 would require upgrades to the existing water distribution network (watermain replacement/upsizing), in addition to new watermains.

The preliminary cost estimate for the supply and installation of new watermain was based on a unit cost of \$900 / linear m for 300 mm watermains. The unit costs include supply, labour, administration, and contractor's profits, but excludes applicable taxes.

However, the items listed below were not considered as part of the cost estimate analysis. As such, the cost estimates, presented in **Table 4-1**, will have to be re-evaluated as part the detailed design phase. Note that the cost analysis considered only the water infrastructure outside of the Western Annex development boundary.

- Removal and reinstatement of watermain, paving and street infrastructure;
- Removal or supply of fire hydrants, valve boxes, and water service connections;
- Supply and installation of a temporary water supply;
- Temporary traffic maintenance and road signs; and
- Cost associated with water infrastructure crossing the Tay River and/or rock breaking and removal.

Table 4-1: Preliminary Cost Estimates¹

Option	Description	Quantity	Unit	Unit Price (\$)	Cost (\$)
1	Supply and installation of new dual 300 mm watermains	352	m	900	325,800
2	Supply and installation of new dual 300 mm watermains	366	m	900	329,400

¹ Preliminary cost estimate based on the assumption listed in **Section 4.0**, without applicable taxes.



Conclusion and Recommendations February 22, 2023

5.0 CONCLUSION AND RECOMMENDATIONS

A preliminary water distribution system hydraulic analysis was completed for the Western Annex development. The purpose of this analysis was to confirm associated watermain sizing and redundancy needs for the proposed development.

Based on the hydraulic analysis, the following conclusions and recommendations were made:

- Based on the current site plan layout, the estimated AVDY, MXDY and PKHR demands for the proposed development are 18.12 L/s, 36.23 L/s, and 79.72 L/s, respectively.
- Under the ultimate build-out conditions, the estimated AVDY, MXDY and PKHR demands for all envisioned developments in Perth (Western Annex, Tayview, and North of HWY 7) are 40.20 L/s, 74.41 L/s, and 163.31 L/s, respectively. This results in AVDY, MXDY and PKHR demands for the whole Town of 75.6 L/s, 145.2 L/s, and 269.5 L/s, respectively.
- Note that PKHR demands exceed the rated capacity of the two (2) existing domestic pumps at
 the WTP (refer to Section 2.3). As such, the domestic pumps should be upsized before all
 developments are fully constructed. Furthermore, additional storage is needed to support new
 developments within the Town. However, the design of the elevated tank, and any upgrades at
 the WTP pumping station are not part of Stantec's mandate.
- Governing required fire flows (RFF) of 7,000 L/min (117 L/s) for single house units, and a RFF of 10,000 L/min (167 L/s) for townhouse units were identified based on the assumptions listed in Section 2.1.2. The RRF calculations should be reviewed or updated as needed as part of subsequent design stages, based on available building information.
- Preliminary modelling indicates the need for a 300 mm feedermain to adequately service the
 proposed development. Local watermains are proposed to be 150 and 200 mm watermains. As
 noted in Section 2.4.1, it is recommended that both feedermains connecting to the existing
 network are fully independent from each other, even if they both cross the Tay River along Perter
 Street. This would avoid the creation of a vulnerable service area, increase resiliency against a
 major failure and minimize the risks for customers.
- With the proposed watermain layout, system pressure requirements are met under AVDY and PKHR demands. Furthermore, the RFF (10,000 L/min or 167 L/s) is exceeded across all nodes under MXDY+FF demands.
- To assess reliability and resiliency against major failures, a number of reliability scenarios were completed under AVDY+FF demand conditions to confirm sufficient pressure and flow can be achieved during a major failure. Under all break scenarios, some locations do not meet the RRF. However, sufficient fire flow coverage could be provided if hydrant spacing is planned as per Ottawa's ISDTB-2018-02. As such, it is recommended to plan for hydrant spacing such that all buildings are located within 75 m of two (2) class AA fire hydrants (as per ISTB-2018-02, Appendix I). This will provide sufficient fire protection and avoid oversizing local watermains.



Conclusion and Recommendations February 22, 2023

• A preliminary cost estimate was completed for the necessary upgrades to the existing network to service the Western Annex development. Note that upgrades at the WTP and any new storage were not included in the cost estimate analysis. The cost for the supply and installation of new dual 300 mm diameter watermains is estimated at \$325,800 for Option 1 (connection to the existing 300 mm diameter watermain at North Street and Lustre Lane), and \$329,400 for Option 2 (connection to 75 mm watermain along Peter Street, on the west bank of the Tay River). Preliminary cost estimates are based on the assumption listed in Section 4.0, and only consider water infrastructure outside of the Western Annex development boundary.



References February 22, 2023

6.0 REFERENCES

City of Ottawa. (2010). Ottawa Design Guidelines - Water Distribution. Ottawa.

City of Ottawa. (2018). Technical Bulletin ISTB-2018-02. Ottawa.

City of Ottawa. (2021). Technical Bulletin ISTB-2021-03. Ottawa.

Corporation of the Town of Perth (2022). Engineering Design Guidelines. Perth.

Dillon Consulting Ltd. (2013). *Infrastructure Master Plan for Area North of Highway 7*. October 2013. Ontario.

Fire Underwriters Survey (2020). *Water Supply For Public Fire Protection – A Guide to Recommended Practice In Canada*. 2020 Version.

Jp2g Consultants Inc. (2019). *Infrastructure Master Plan – Western Annex in the Town of Perth*. November 2019. Ontario.

Ministry of the Environment, Conservation and Parks. (2008). *Design Guidelines for Drinking Water Systems*. Ontario.

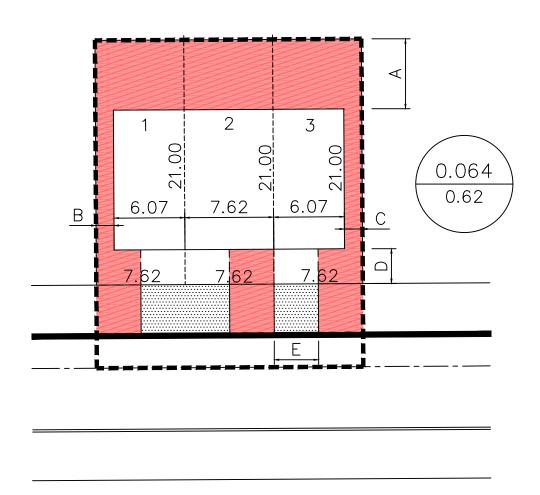
Stantec Consulting Ltd. (2016). 2016 Perth Potable Water Model Update. October 12, 2016. Ottawa.



PERTH WESTERN ANNEX LANDS -	141 PETER STREET	: POTABLE WATER	HYDRAULIC
ANALYSIS			

Appendix A FUS FIRE FLOW CALCULATIONS





DIMENSIONS:

A = 6.00 m

B = 1.55 m

C = 1.55 m

D = 3.00 m

E = 3.80 m

ENVELOPE LENGTH: 12.00 m

LOT: 22.86x21.00 m

NOTE:

TOTAL AREA: 643.00 m2 TOTAL IMP AREA: 386.36 m2

IMP %: 60% RC: 0.62

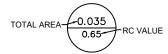
16.75 m ROW TH RC FIGURE



120 Iber Road, Unit 203 Stittsville, Ontario, K2S 1E9 Tel. (613) 836-0856 Fax. (613) 836-7183 www.DSEL.ca

LEGENDS



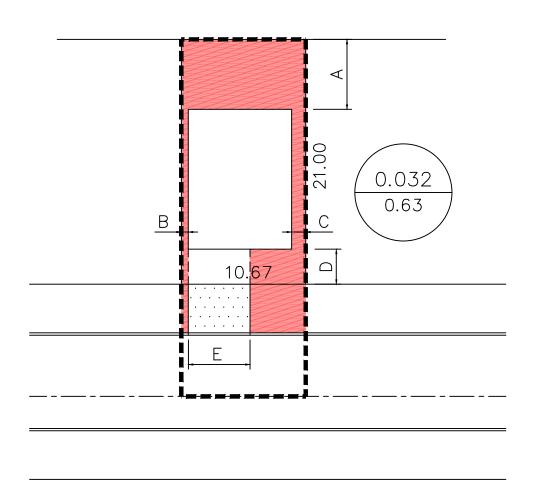


■■■ STM TRIB LINE

7.62 LOT DIMENSION

 SCALE:
 NTS
 PROJECT No.:
 19-1092

 DATE:
 FEB 2022
 FIGURE:



DIMENSIONS:

A = 6.00 m

B = 0.60 m

C = 1.20 m

D = 3.00 m

E = 5.30 m

ENVELOPE: 8.87x12.00 m

LOT: 10.67x21.00 m

NOTE:

TOTAL AREA: 326.82 m2 TOTAL IMP AREA: 202.64 m2

IMP %: 62% RC: 0.63

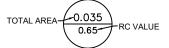
16.75 m ROW SINGLE UNIT RC FIGURE



120 Iber Road, Unit 203 Stittsville, Ontario, K2S 1E9 Tel. (613) 836-0856 Fax. (613) 836-7183 www.DSEL.ca

LEGENDS





■■■ STM TRIB LINE

10.67 LOT DIMENSION

SCALE: NTS PROJECT No.: 19-1092

DATE: FEB 2022 FIGURE:



FUS Fire Flow Calculation - Long Method

Calculations based on: "Water Supply for Public Fire Protection" by Fire Underwriters' Survey, 2020

Fire Flow Calculation #: 1

Building Type/Description/Name: Residential

Stantec Project #: 163401476

Project Name: Perth Western Annex Lands

Date: January 30, 2023

Data inputted by: Alexandre Mineault-Guitard, ing., P.Eng Data reviewed by: Kevin Alemany, M.A.Sc., P.Eng.

Notes: Townhouse unit

		Fire U	nderwriters Survey Determination o	of Required Fire Fl	ow - Long Method				
Step	Task	Term	Options	Multiplier Associated with Option	Choose:	Value Used	Unit	Total Fire Flow (L/min)	
		Framing Material							
			Type V - Wood Frame	1.5					
			Type IV-A - Mass Timber	0.8					
_	Choose Frame Used		Type IV-B - Mass Timber	0.9	Type V - Wood Frame				
1	for Construction of Unit	Coefficient related to type	Type IV-C - Mass Timber	1		1.5	m		
	Oilit	of construction (C)	Type IV-D - Mass Timber	1.5					
			Type III - Ordinary construction	1					
			Type II - Non-combustible construction	0.8					
			Type I - Fire resistive construction	0.6					
	Choose Type of			Floor Space Area	a				
2	Housing (if TH, Enter		Single Family	0	T				
	Number of Units Per TH Block)	Type of Housing	Townhouse - indicate # of units	1	Townhouse - indicate # of units	1	Units		
	TH Block)		Other (Comm, Ind, Apt etc.)	0	Or unito				
2.2	# of Storeys	Number of Floor	rs/Storeys in the Unit (do not include baseme	nt if 50% below grade):	2	2	Storeys		
	Enter Ground Floor	Average Floor Area (/	A) based on total floor area of all floors for one	a unit (non-fire resistive	237		A is 0		
3	Area of One Unit	Average Floor Area (A	ty based of total floor area of all floors for one	construction):	Square Metres (m2)	237			
3.1	Obtain Total Effective Building Area	Total Effective Bu	474	474	Area in Square Metres (m²)				
4	Obtain Required Fire Flow without	Average Floor Area): Required Fire Flow (without reductions or increases per FUS) (F = 220 * C * √A) Round to nearest 1,000 L/min					7,000		
5	Reductions Apply Factors	Reductions/Increases Due to Factors Affecting Burning							
	Affecting Burning		Non-combustible				т		
			Limited combustible	-0.25 -0.15	5 Limited combustible	-0.15	N/A		
5.1	Choose Combustibility of	Choose Occupancy Content Mbustibility of Hazard Reduction or	Combustible	-0.13				5,950	
J. 1	Building Contents	Surcharge	Free burning	0.15				0,000	
			Rapid burning	0.13					
			Adequate Sprinkler conforms to NFPA13	-0.3		_			
		Sprinkler Reduction	None	0	-l None	0	N/A	0	
	Choose Reduction		Water supply is standard for sprinkler and		Water supply is not standard or N/A	0	N/A		
5.2	Due to Presence of		fire dept. hose line	-0.1				0	
	Sprinklers		Water supply is not standard or N/A	0					
		Sprinkler Supervision	Sprinkler system is fully supervised	-0.1	Sprinkler not fully	0	N/A	0	
		Credit	Sprinkler not fully supervised or N/A	0	supervised or N/A				
		Sprinkler Conforms to	Adequate sprinkler for exposures conforms	None for exposures		N/A			
		NFPA13	PA13 None for exposures				140110 for exposures		
	Choose Presence of		Water supply is standard for sprinkler and fire dept. hose line of					1	
	Sprinklers for	Water Cupply	exposures	e dept. Hose line of	Water supply is not standard or N/A for		N/A		
5.3	Exposures within	Water Supply	Water supply is not standard or N/A for exposures		exposures	0 N/A	0		
	30m								
		Sprinkler Supervision Sprinkler Supervised		Sprinkler not fully supervised or N/A for		N/A			
			Sprinkler not fully supervised or N/A for exposures		exposures				
	Choose Separation Distance Between	tance Retween Exposure Distance	North Side	10.1 to 20.0m	0.15			3,868	
5.4			East Side	3.1 to 10.0m	0.2	0.65	m		
Units	IRetween Units	South Side	20.1 to 30.1m		5.00		3,000		
	West Side 3.1 to 10.0m 0.2								
		Total Required Fire Flow, rounded to nearest 1,000 L/min, with max/min limits applied:					10,000		
	Obtain Required Fire	Total Required Fire Flow (above) in L/s:					167		
6	Flow, Duration & Volume				Required Du	ıration of F	ire Flow (hrs)	2.00	
		Required Volume of Fire Flow (m ³) 1,2					1,200		
		Required volume of Fire Flow (m) 1,4					1,200		



FUS Fire Flow Calculation - Long Method

Calculations based on: "Water Supply for Public Fire Protection" by Fire Underwriters' Survey, 2020

Fire Flow Calculation #: 2

Building Type/Description/Name: Residential

Stantec Project #: 163401476

Project Name: Perth Western Annex Lands

Date: January 30, 2023

Data inputted by: Alexandre Mineault-Guitard, ing., P.Eng **Data reviewed by:** Kevin Alemany, M.A.Sc., P.Eng.

Notes: Single house unit

		Fire U	nderwriters Survey Determination o	of Required Fire Flo	ow - Long Method			
Step	Task	Term	Options	Multiplier Associated with Option	Choose:	Value Used	Unit	Total Fire Flow (L/min)
				Framing Materia	ı		•	
			Type V - Wood Frame	1.5				
			Type IV-A - Mass Timber	0.8				
1	Choose Frame Used for Construction of		Type IV-B - Mass Timber	0.9	Type V - Wood Frame	1.5	m	
•	Unit	Coefficient related to type of construction (C)	Type IV-C - Mass Timber	1				
		of construction (C)	Type IV-D - Mass Timber	1.5				
			Type III - Ordinary construction Type II - Non-combustible construction	0.8				
			Type I - Fire resistive construction	0.6				
	Observe Towns of		Trype 1 - 1 lie resistive construction	Floor Space Area				
	Choose Type of Housing (if TH, Enter		Cinada Familio					
2	Number of Units Per	Type of Housing	Single Family Townhouse - indicate # of units	1 0	Single Family	1	Units	
	TH Block)	Type of Flousing	Other (Comm, Ind, Apt etc.)	0		'	Utilis	
2.2	# of Storeys	Number of Floo	rs/Storeys in the Unit (do not include baseme		2	2	Storeys	
2.2	•		· ·	<u> </u>	106		Otoreys	
3	Enter Ground Floor Area of One Unit	Average Floor Area (A	A) based on total floor area of all floors for one	e unit (non-fire resistive construction):		106	106 Area in Square Metres (m²)	
				<u> </u>	,			
3.1	Obtain Total Effective Building Area	Total Effective Building Area (# of Storeys x # of Units (if single family or townhouse) x Average Floor Area): 213				213	Mica es (iii)	
4	Obtain Required Fire Flow without Reductions	Required Fire Flow (without reductions or increases per FUS) (F = 220 * C * √A) Round to nearest 1,000 L/min				5,000		
5	Apply Factors Affecting Burning	Reductions/Increases Due to Factors Affecting Burning						
		Choose Occupancy Content ombustibility of Hazard Reduction or	Non-combustible	-0.25	Limited combustible	-0.15	N/A	
	Choose		Limited combustible	-0.15				
5.1	Combustibility of		Combustible	0				4,250
	Building Contents	Surcharge	Free burning	0.15				
			Rapid burning	0.25				
		Sprinkler Reduction Water Supply Credit Sprinklers Sprinkler Supply Credit	Adequate Sprinkler conforms to NFPA13	-0.3	None	0	N/A	0
			None	0		0	N/A N/A	
5.2			Water supply is standard for sprinkler and fire dept. hose line	-0.1	Water supply is not standard or N/A Sprinkler not fully			0
·			Water supply is not standard or N/A	0				
			Sprinkler system is fully supervised	-0.1				0
		Credit	Sprinkler not fully supervised or N/A	0	supervised or N/A			U
		Sprinkler Conforms to	forms to Adequate sprinkler for exposures conforms to NFPA13					
		None for exposures			None for exposures	0	N/A N/A	
	Choose Presence of		Water supply is standard for sprinkler and fire dept. hose line of		Water supply is not standard or N/A for			
5.3	Sprinklers for							0
Exposures within 30m	Water supply is not standard or N/A for exposures		exposures					
		Sprinkler system of exposures is fully supervised Sprinkler Supervision		Sprinkler not fully supervised or N/A for		N/A	•	
		Opinikier Oupervision	Sprinkler not fully supervised or N/A for exposures		exposures		14//3	
	Choose Separation	noose Separation stance Between Units Exposure Distance Between Units	North Side	10.1 to 20.0m	0.15			
5.4			East Side	3.1 to 10.0m	0.2		2,975	
			South Side	20.1 to 30.1m		m		
	West Side 0 to 3.0m 0.25							
		Total Required Fire Flow, rounded to nearest 1,000 L/min, with max/min limits applied:				7,000		
Obtain Required Fire Flow, Duration &	Total Required Fire Flow (above) in L/s:					117		
	Required Duration of Fire Flow (hrs)				2.00			
Volume								
		Required Volume of Fire Flow (m ³)					840	

Appendix B JUNCTION IDS





Appendix C MODEL RESULTS



AVDY Conditions

Junction ID	Domand (L/a)	Elevation (m)	Hood (m)	Pressure (psi)
Janction ID	Demand (L/s) 0.29	135.4	Head (m) 179.0	62
J9	0.29	137.9	179.0	58
J11	0.29	138.0	178.9	58
J13	0.29	137.4	178.9	59
J15	0.29	138.0	178.9	58
J17	0.29	137.2	178.9	59
J19	0.29	137.6	178.9	59
J21	0.29	137.6	178.9	59
J23	0.29	137.4	178.9	59
J25	0.29	137.3	178.9	59
J27	0.29	137.2	178.9	59
J33	0.29	137.0	178.9	59
J35	0.29	137.6	178.9	59
J37	0.29	137.8	178.9	58
J39	0.29	137.8	178.9	58
J41	0.29	137.6	178.9	59
J43	0.29	136.7	178.9	60
J45	0.29	136.7	178.9	60
J47	0.29	137.4	178.9	59
J49	0.29	137.7	178.9	58
J51	0.29	137.9	178.9	58
J57	0.29	136.3	178.9	60
J59	0.29	136.4	178.9	60
J61	0.29	136.5	178.9	60
J63	0.29	136.5	178.9	60
J65	0.29	137.2	178.9	59
J67	0.29	137.3	178.9	59
J69	0.29	137.4	178.9	59
J71	0.29	137.5	178.9	59
J73	0.29	137.2	178.9	59
J75	0.29	138.1	178.9	58
J77	0.29	138.1	178.9	58
J79	0.29	137.9	178.9	58
J81	0.29	137.7	178.9	58
J83	0.29	137.5	178.9	59
J85	0.29	137.0	178.9	59
J87	0.29	137.5	178.9	59
J89	0.29	137.8	178.9	58
J91	0.29	137.7	178.9	59
J93	0.29	136.6	178.9	60
J95	0.29	136.6	178.9	60
J97	0.29	137.7	178.9	58
J99	0.29	137.0	178.9	60
J103	0.29	137.3	179.0	59
J105	0.29	135.4	179.0	62
J109	0.29	137.1	178.9	59
J111	0.29	137.3	178.9	59
J113	0.29	137.1	178.9	59
J115	0.29	137.2	178.9	59
J117	0.29	137.1	178.9	59
J119	0.29	136.5	178.9	60
J121	0.29	137.9	178.9	58
J123	0.29	137.2	178.9	59
J125	0.29	137.2	178.9	59
J131	0.29	137.9	178.9	58
J133	0.29	137.7	178.9	59
J135	0.29	136.6	178.9	60
J137	0.29	137.8	178.9	58
J139	0.29	137.7	178.9	58
J141	0.29	137.0	178.9	59
				I EO
J143	0.29	137.6	178.9	59
J143 J145 J147	0.29 0.29 0.29	137.6 137.8 137.4	178.9 178.9 178.9	58 59



PKHR Conditions

Junction ID	Domand (L/s)	Elevation (m)	Head (m)	Drossuro (nei)
Junction 1D J7	Demand (L/s) 1.27	135.4	178.3	Pressure (psi) 61
J9	1.27	137.9	178.2	57
J11	1.27	138.0	178.0	57
J13	1.27	137.4	178.0	58
J15	1.27	138.0	178.0	57
J17	1.27	137.2	177.9	58
J19	1.27	137.6	177.9	57
J21	1.27	137.6	177.9	57
J23	1.27	137.4	177.9	57
J25	1.27	137.3	177.9	58
J27	1.27	137.2	177.9	58
J33	1.27	137.0	177.8	58
J35	1.27	137.6	177.8	57
J37	1.27	137.8	177.8	57
J39	1.27	137.8	177.8	57
J41	1.27	137.6	177.8	57
J43	1.27	136.7	177.8	58
J45	1.27	136.7	177.8	58
J47	1.27	137.4	177.9	57
J49	1.27	137.7	177.8	57
J51	1.27	137.9	177.8	57
J57	1.27	136.3	177.7	59
J59	1.27	136.4	177.7	59
J61	1.27	136.5	177.7	58
J63	1.27	136.5	177.7	58
J65	1.27	137.2	177.7	58
J67	1.27	137.3	177.7	57
J69	1.27	137.4	177.7	57
J71	1.27	137.5	177.7	57
J73	1.27	137.2	177.7	57
J75	1.27	138.1	177.7	56
J77	1.27	138.1	177.7	56
J79	1.27	137.9	177.7	56
J81	1.27	137.7	177.7	57
J83	1.27	137.5	177.7	57
J85	1.27	137.0	177.7	58
J87	1.27	137.5	177.7	57
J89	1.27	137.8	177.7	57
J91	1.27	137.7	177.7	57
J93	1.27	136.6	177.7	58
J95	1.27	136.6	177.7	58
J97	1.27	137.7	177.7	57
J99	1.27	137.0	177.7	58
J103	1.27	137.3	178.2	58
J105	1.27	135.4	178.3	61
J109	1.27	137.1	177.7	58
J111	1.27	137.3	177.7	57
J113	1.27	137.1	177.7	58
J115	1.27	137.2	177.7	57
J117	1.27	137.1 136.5	177.7	58
J119 J121	1.27 1.27	136.5	177.8 177.7	59 57
J121 J123	1.27	137.9	177.7 177.7	57
J123 J125	1.27	137.2	177.7	57
J125 J131	1.27	137.2	177.7	57
J133	1.27	137.9	178.1	57
J135	1.27	136.6	177.8	58
J135	1.27	137.8	177.7	57
J137 J139	1.27	137.7	177.7	57
J139 J141	1.27	137.0	177.7	58
J141 J143	1.27	137.6	177.7	57
J145	1.27	137.8	177.7	57
J145	1.27	137.4	177.7	57
3147	1.21	137.4	111.1	J JI



PERTH WESTERN ANNEX LANDS - 141 PETER STREET: POTABLE WATER HYDRAULIC ANALYSIS

MXDY + FF Conditions

Junction ID	Demand (L/s)	Static Pressure (psi)	Static Head (m)	Hydrant Available Flow at 20 psi (L/s				
J7	0.58	66	182.2	382				
J9	0.58	63	182.2	355				
J11	0.58	63	182.2	247				
J13	0.58	63	182.2	313				
J15	0.58	63	182.2	320				
J17	0.58	64	182.1	313				
J19	0.58	63	182.1	302				
J21	0.58	63	182.1	313				
J23	0.58	63	182.2	323				
J25	0.58	64	182.1	315				
J27	0.58	64	182.1	312				
J33	0.58	64	182.1	284				
J35	0.58	63	182.1	227				
J37	0.58	63	182.1	300				
J39	0.58	63	182.1	246				
J41	0.58	63	182.1	295				
J43	0.58	64	182.1	277				
J45	0.58	64	182.1	305				
J47	0.58	64	182.1	248				
J49	0.58	63	182.1	272				
J51	0.58	63	182.1	280				
J57	0.58	65	182.1	284				
J59	0.58	65	182.1	280				
J61	0.58	65	182.1	261				
J63	0.58	65	182.1	276				
J65	0.58	64	182.1	273				
J67	0.58	64	182.1	262				
J69	0.58	63	182.1	260				
J71	0.58	63	182.1	258				
		64						
J73	0.58		182.1	259				
J75	0.58	62	182.1	254				
J77	0.58	63	182.1	224				
J79	0.58	63	182.1	227				
J81	0.58	63	182.1	228				
J83	0.58	63	182.1	258				
J85	0.58	64	182.1	262				
J87	0.58	63	182.1	177				
J89	0.58	63	182.1	221				
J91	0.58	63	182.1	231				
J93	0.58	65	182.1	240				
J95	0.58	65	182.1	238				
J97	0.58	63	182.1	254				
J99	0.58	64	182.1	230				
J103	0.58	64	182.2	253				
J105	0.58	66	182.2	266				
J109	0.58	64	182.1	279				
J111	0.58	64	182.1	286				
J113	0.58	64	182.1	234				
J115	0.58	64	182.1	230				
J117	0.58	64	182.1	229				
J119	0.58	65	182.1	292				
J121	0.58	63	182.1	213				
J123	0.58	64	182.1	281				
J125	0.58	64	182.1	275				
J131	0.58	63	182.2	333				
J133	0.58	63	182.2	352				
J135	0.58	65	182.1	300				
J137	0.58	63	182.1	224				
J139	0.58	63	182.1	245				
J141	0.58	64	182.1	269				
J143	0.58	63	182.1	253				
J145	0.58	63	182.1	271				
0.70	0.58	64	182.1	259				

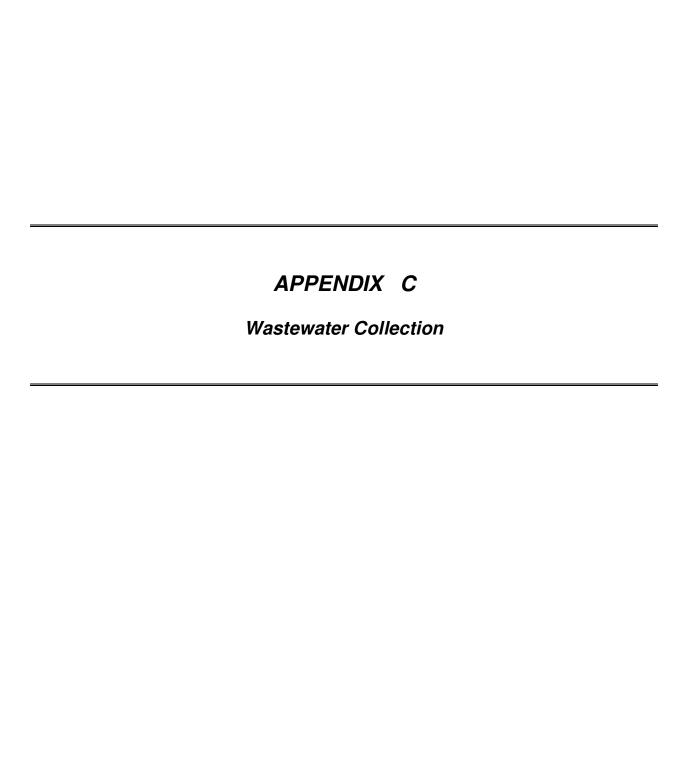


PERTH WESTERN ANNEX LANDS - 141 PETER STREET: POTABLE WATER HYDRAULIC ANALYSIS

Reliability Analysis (AVDY + FF Conditions)

	Hydrant Available Flow at 20 psi (L/s)												
Junction ID	Break Scenario 1	Break Scenario 2	Break Scenario 3	Break Scenario 4									
J7	273	380	380	380									
J9	235	353	353	353									
J11	182	244	244	244									
J13	209	309	308	312									
J15	210	317	317	319									
J17	209	307	305	312									
J19	205	300	300	301									
J21	208	311	312	313									
J23	212	320	321	323									
J25	209	310	311	314									
J27	209	304	306	311									
J33 J35	199	282 220	281	283									
J35	173 204	283	221 285	224 299									
J39	182	237	238	244									
J41	202	267	215	293									
J43	197	230	232	276									
	208	286	283	304									
	184	241	242	246									
J49	193	237	217	270									
J51	196	278	278	279									
J57	201	227	245	273									
J59	199	227	241	265									
J61	191	219	225	256									
J63	197	226	237	257									
J65	195	234	223	254									
J67	190	224	219	180									
J69	189	222	218	183									
J71	188	220	217	185									
J73	189	221	219	190									
J75	185	216	215	189									
J77	172	197	195	172									
J79	173	199	196	172									
J81	174	200	197	170									
J83	188	219	219	197									
J85	191	220	224	216									
J87	147	162	161	151									
J89	170	194	192	172									
J91	175	202	198	169									
J93	181	204	212	234									
J95	180	202	209	230									
J97	186	219	212	249									
J99	176	208	191	225									
J103	198	249	249	249									
J105	215	262	262	262									
J109	197	243	220	271									
J111	200	251	220	282									
J113	178	211	193	229									
J115	176	209	190	226									
J117	175	208	190	225									
J119	204	223	257	287									
J121	166	190	183	209									
J123	198	246	220	276									
J125	196	239	220	265									
J131	214	332	331	332									
J133	220	352	352	352									
J135	206	222	267	298									
J137	172	196	193	222									
J139	182	211	208	243									
J141	193	230	222	176									
J143	186	216	215	252									
J145	193	235	218	269									
J147	189	223	215	257									





Content Copy Of Original

Ministry of the Environment Ministère de l'Environnement

AMENDMENT TO ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 1045-6VTHH8 Notice No. 1

Issue Date: November 15, 2012

The Corporation of the Town of Perth 80 Gore Street East Perth, Ontario K7H 1H9

Site Location: Perth Sewage Treatment Lagoons

390 Wild Life Road

Township of Drummond-North Elmsley, County of Lanark, Ontario

You are hereby notified that I have amended Approval No. 1045-6VTHH8 issued on March 26, 2007 for a three cell waste stabilization lagoon system having a rated capacity of 7,718 cubic metres per day, located in the east half of Lots 23,24, and 25, Concession X (Township of Elmsley North), in the Town of Perth, as follows:

temporary installation of two (2) Submerged Attached Growth Reactor (SAGR) cell systems, one (1) SAGR cell with dimensions of 9.0 metres wide by 15.0 metres long by 2.0 meters water depth and the other SAGR cell with dimensions of 9.0 metres wide by 10.5 metres long by 2.0 meters water depth, each system has a design flow capacity of 100 cubic metres per day, receiving lagoon effluent from existing transfer structure between lagoon Cells #2 and #3 and discharging back to lagoon Cells #3, including all controls, electrical equipment, instrumentation, aeration system, influent chambers and splitting tank, effluent chambers, piping, pumps, flow meter, valves and appurtenances essential for the proper operation of the SAGR cell systems;

all in accordance with the following submitted supporting documents:

- 1. Application for Approval of Sewage Works dated October 22, 2012 and submitted by Grant Machan, Director of Environmental Services, The Corporation of the Town of Perth;
- 2. a design brief dated October 12, 2012 and a water quality monitoring program dated October 25, 2012, prepared by Nelson Environmental Inc.;
- 3. all other supporting information and documentation provided by R.V. Anderson Associates Limited.

For the purpose of this environmental compliance approval, the following definitions apply:

- " Approval" means this entire document and any schedules attached to it, and the application;
- " *Director*" means a person appointed by the Minister pursuant to section 5 of the *EPA* for the purposes of Part II.1 of the *EPA*;
- "District Manager" means the District Manager of Ottawa District Office;

- " EPA" means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended;
- " *Ministry*" means the ministry of the government of Ontario responsible for the *EPA* and *OWRA* and includes all officials, employees or other persons acting on its behalf;
- "Owner" means the The Corporation of the Town of Perth and includes its successors and assignees;
- "OWRA" means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;
- " Works" means the sewage works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the special terms and conditions outlined below:

SPECIAL TERMS AND CONDITIONS

1. EXPIRY OF APPROVAL

This temporary *Approval* shall expire and become null and void **two (2) years** after the issuance date of this temporary *Approval*.

2. MONITORING AND RECORDING

The *Owner* shall, upon commencement of operation of the *Works*, carry out the following monitoring program:

(1) Samples shall be collected at the following sampling points, at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

Table 1 -	Influent and Effluent Monitoring
Sampling Locations	A: influent at splitter structure
	B: SAGR Cell #1 effluent
	C: SAGR Cell #2 effluent
Sample Type	Grab
Frequency	Weekly (except Chlorophyll-a)
Parameters	CBOD5, Total Suspended Solids, Total Kjeldahl
	Nitrogen, Total Ammonia Nitrogen, Nitrates and
	Nitrites, Total Phosphorus, Alkalinity, <i>E. Coli,</i>
	Total Coliform, Chlorophyll-a (monthly),
	Temperature (on field), Dissolved Oxygen (on
	field), and pH (on field)

- (2) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:
 - (a) the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;
 - (b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more

recently published editions; and

- (c) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition), as amended from time to time by more recently published editions.
- (3) The *Owner* shall install and maintain a continuous flow measuring device, to measure the flowrate of the influent to the *Works* with an accuracy to within plus or minus 15 per cent (+/- 15%) of the actual flowrate for the entire design range of the flow measuring device, and record the flowrate at weekly frequency.

3. REPORTING

- (1) The *Owner* shall prepare, and submit to the *District Manager* and Technical Support Unit of Kingston Regional Office of the *Ministry*, a monitoring result report, within **thirty (30) days** following a **one (1) year** pilot study. The reports shall contain, but shall not be limited to, the following information:
 - (a) a summary and interpretation of all monitoring data collected pursuant to Condition 2, and a comparison to the effluent objectives outlined in the design brief dated October 12, 2012 prepared by Nelson Environmental Inc., including an overview of the success and adequacy of the *Works*;
 - (b) a description of any operating problems encountered and corrective actions taken; and
 - (c) If necessary, the *Owner* may want to obtain a written permission from the *District Manager* for extending the pilot study duration within the time frame set in Condition 1.

The reason for the imposition of the special condition is as follows:

- 1. Condition 1 is included to ensure that the *Works* are constructed in a timely manner
- 2. Condition 2 is included to enable the *Owner* to evaluate and demonstrate the performance of the *Works*, on a continual basis.
- 3. Condition 3 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this *Certificate*, so that the *Ministry* can work with the *Owner* in resolving any problems in a timely manner.

This Notice shall constitute part of the approval issued under Approval No. 1045-6VTHH8 dated March 26, 2007.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the

environmental compliance approval in respect of which the hearing is required, and;

2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

- 3. The name of the appellant;
- 4. The address of the appellant;
- 5. The environmental compliance approval number:
- 6. The date of the environmental compliance approval;
- 7. The name of the Director, and;
- 8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act Ministry of the Environment 2 St. Clair Avenue West, Floor 12A Toronto, Ontario M4V 1L5

* Further information on the Environmental Review Tribunal 's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 314-4506 or www.ert.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 15th day of November, 2012

Mansoor Mahmood, P.Eng.
Director
appointed for the purposes of Part II.1 of
the Environmental Protection Act

NH/

c: District Manager, MOE Ottawa District Office Grant Machan, The Corporation of the Town of Perth > Census of Population > Data products, 2021 Census > Census Profile, 2021 Census of Population

Search results for "perth"

Census Profile, 2021 Census of Population

Data table

	Perth, Town (T) ① Ontario [Census subdivision]
	Counts
Characteristic	Total
Population and dwellings	
Population, 2021 ¹	6,469
Population, 2016 ¹	5,930
Population percentage change, 2016 to 2021	9.1
Total private dwellings ²	3,395
Private dwellings occupied by usual residents $^{\underline{3}}$	3,271
Population density per square kilometre	529.8
Land area in square kilometres	12.21

Source: Statistics Canada, 2021 Census of Population.

How to cite: Statistics Canada. 2022. (table). Census Profile. 2021 Census. Statistics Canada Catalogue no. (number) 98-316-X2021001. Ottawa. Released February 9, 2022. https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/index.cfm?Lang=E (accessed April 13, 2022).

Note(s):

Footnote 1

2021 and 2016 population

Statistics Canada is committed to protect the privacy of all Canadians and the confidentiality of the data they provide to us. As part of this commitment, some population counts of geographic areas are adjusted in order to ensure confidentiality.

The adjustment to counts of the total population for any dissemination block is controlled to ensure that the population counts for dissemination areas will always be within 5 of the actual values. The adjustment has no impact on the population counts of census divisions and large census subdivisions.

Footnote 2

Total private dwellings

Private dwelling refers to a separate set of living quarters with a private entrance either from outside the building or from a common hall, lobby, vestibule or stairway inside the building. The entrance to the dwelling must be one that can be used without passing through the living quarters of some other person or group of persons.

Footnote 3

Private dwellings occupied by usual residents

A private dwelling occupied by usual residents refers to a private dwelling in which a person or a group of persons is permanently residing. Also included are private dwellings whose usual residents are temporarily absent on May 11, 2021.

Date modified: 2022-01-30



140 RENFREW DRIVE, SUITE 100, MARKHAM, ON L3R 6B3 T: 1-800-805-6155 www.onsitelocates.ca

AWN BY: CHECKED BY: REFERENCE NO.:

VC ZK 21-46-31298 FILE: S: \ONSITE\21-46-31298\Drawing\21-46-31298.dgr DATED: 2021-06-14

PLOTTED: 6/15/2021



Memo



To: Adam Fobert From: Gregory Chochlinski, Ben Morrison

DSEL Stantec, Ottawa

File: Cockburn PS in Perth – Capacity Date: June 17, 2021

Review

Reference: Cockburn PS in Perth - Capacity Review Memo

Introduction

Stantec was retained by DSEL to perform a review of the existing Cockburn sanitary pumping station (PS) that presently services the Town of Perth. Cockburn PS is the larger of two sanitary pumping stations in the Town of Perth.

The proposed new development by Caivan will discharge into the gravity sanitary system that conveys sewage to the Cockburn PS. This increased flowrate would need to be handled by Cockburn PS. The purpose of this Memo is to review the present condition, and capacity of the Cockburn pumping station and provide a high-level discussion on potential upgrades, if required.

Site Investigation

Stantec visited the Cockburn PS on June 14, 2021 and met with the Town's operator. The basic elements of the PS are as follows:

- The PS has three pumps, two pumps are in the dry well and one pump is submersible. The wet well/dry
 well were originally constructed around 1982, and the wet well was expanded later to allow the
 installation of the third pump (submersible).
- The two original old pumps in the dry well are 30 HP with reported flowrate capacity of about 90 L/s.
 The new submersible pump #3 is 45 HP (less than 2 years old) and the available documentation indicates a duty point of 140 L/s at 16.8 m head.
- 3. The concrete wet well, as originally constructed, is rectangular, with dimensions of 4.9 x 3.0 m. The additional wet well was constructed beside the original one and is about 1.2 m wide. An opening was provided in the common wall to interconnect the two wells. The wells are about 6.6 m deep and the top of wells is at a ground level.
- 4. A trash screen is installed in front of the sewer inlet. The operators have to enter a confined space to clean the screen manually. This is not a desirable arrangement.
- 5. The 45 HP submersible pump discharges to the dedicated 400 mm forcemain. The two 30 HP pumps discharge to another 400 mm FM. Both FMs discharge to the sewage lagoon about 1.0 km away.
- 6. There is a gravity overflow from the wet well directly to the river.
- 7. There are no flowmeters on the forcemains. The incoming and pumped flowrates could be calculated based on the sewage levels rate of drop (or increase) over time.
- 8. A standby 125 kW Diesel Generator is installed on site. It has an Automatic Transfer Switch and is capable of supplying power to all pumps and other equipment. The Generator is about 16 years old.

Reference: Cockburn PS in Perth – Capacity Review Memo

- 9. The electrical and control equipment is housed in a Control Building that was installed years after the initial construction.
- 10. Pumps have soft starts, housed in the Control Building.
- 11. Alarms are communicated to the operator's cell phones. The alarms include power failure, Generator On, and high-level alarms.
- 12. At the time of inspection (early afternoon, June 14, 2021) the sewage level in the wet well was going up by 0.6 m in about 3 minutes, triggering the pumping cycle. It took about 2 min of pumping by Pump 1 or 2 and about 1 min of pumping by pump #3 to lower the sewage level by 0.6 m. This indicates that the incoming flow was around 50 L/s and pumping rate was about 130 L/s (for Pumps 1 and 2) and about 210 L/s for pump #3. These are approximate numbers and should be verified by more precise and longer-term measurements.

The facility operator provided the following comments:

- Generally the PS operates well. Only one time (spring 2019) all three pumps had to operate at once to keep up with an incoming flow. Since then, a larger submersible pump was added (45HP). The diesel generator operates well.
- 2. Some concrete deficiencies and rusty access hatches were noticed and should be considered for replacement.
- 3. The two forcemains operate well.
- 4. There is no bypass chamber that would allow bypassing the wet well if needed for repairs or new construction. Pumper trucks are used to handle the flow in situations like this.
- 5. The sanitary system in the Town is in reality a combined system as there are numerous storm connections to the sanitary pipes.
- 6. The existing sewage treatment lagoon where forcemains discharge to was recently expanded and there should be no capacity problem.

Discussion

The Certificate of Approval was not available at the time of the site visit to confirm the firm rated capacity of the pumping station and other information. We requested the information from the Town and we will review as soon as the information becomes available.

1. Pump #3 is much larger than pumps #1 and #2. The firm capacity of the pumping station is calculated based on the largest pump being out of service. In this case, the flowrate generated by Pumps #1 and #2 pumping at the same time through a common forcemain would be the "firm capacity" of the station. Two smaller pumps pumping at the same time through a common forcemain would have a flowrate similar to one larger pump pumping through an independent forcemain (the same diameter). Therefore, the replacement of two old pumps #1 and #2 with two new identical 45 HP pumps would essentially

Reference: Cockburn PS in Perth – Capacity Review Memo

<u>double the firm capacity</u> of the pumping station. The two forcemains should be interconnected near the PS to allow using two pumps with two FMs at the same time to maximize the flowrate.

- 2. The wet well currently fills up too quickly because the active storage band is very narrow (0.60 m approx.), causing the pumps to start too often (every 3 minutes). Expansion of the wet well could be considered to provide more storage and to extend the time between pumping cycles to at least 5 minutes (preferably 10 minutes).
- 3. With the present configuration of the suction at the two existing dry well pumps, the stop command for the lead pump is at 127.40 m (the wet well bottom is at elev. 125.95), as per the available drawings. If these two pumps were replaced with submersible pumps, the suction configuration would change and the stop command could be lowered by 0.50 0.60m. This would provide 80% to 100% more active storage in the wet well and require less frequent pump cycles. This may be just enough to resolve the issue of too frequent pump starts.
- 4. The arrangement for cleaning the existing trash screens requires confined space entry by the operator, which is very inconvenient and unsafe. A new arrangement would be recommended (removable trash basket with opening right above to allow removal by working on the surface).
- 5. An isolation valve on the incoming sewer (inside the wet well) should be installed to eliminate the need for inflatable balloons to be used each time the wet well must be isolated.
- 6. A permanent Bypass Chamber should be considered to allow any works inside the wet well to be done without an extensive mobilization of pumper trucks.
- 7. Electrical review would be needed to confirm if the existing 125 kW generator would be sufficient to support three 45 HP pumps and other essential equipment. The same applies to the evaluation of the Hydro power service. If insufficient, an upgrade/replacement would be required to accommodate larger pumps.
- 8. Replacement of the existing Control Building with a larger, sturdier one, should be considered. There is sufficient area on the site to accommodate this.
- 9. Improving the alarm communication system could be considered. However, the existing cell phone alarm system appears to be satisfactory.

Conclusion

The proposed new development by Caivan is expected to generate about 31.5 L/s of additional flow (at peak). The existing Cockburn PS is performing well, however it is operating close to it's maximum was operating capacity. When the largest pump is out of service the pumping station may not be able to handle the peak flow during rainy days or the spring conditions and could overflow. The additional 31.5 L/s coming from the new development would make the situation worse.

The pumping station could significantly increase its capacity by:

1. Replacing the existing 30 HP dry well pumps with two new 45 HP submersible pumps, the same as the existing Pump #3.

June 17, 2021 Adam Fobert Page 4 of 6

Reference: Cockburn PS in Perth – Capacity Review Memo

2. Interconnecting the two 400 mm forcemain to allow pumping through both of the forcemains at the same time under all pumping configurations.

Additional improvements could be done as discussed in the Discussion section of this Memo.

Please contact us if you have any questions or comments.

Sincerely,

Stantec Consulting Ltd.

Gregory Chochlinski P. Eng., M. Eng.

Senior Associate, Water

Direct: 613 724-4407 Mobile: 613 290-2322 Fax: 613 722-2799

gregory.chochlinski@stantec.com

Ben Morrison

Co-op Student, Water Mobile: 613 325-2687

benjamin.morrison@stantec.com

Attachement:

1. Pictures

Reference: Cockburn PS in Perth – Capacity Review Memo

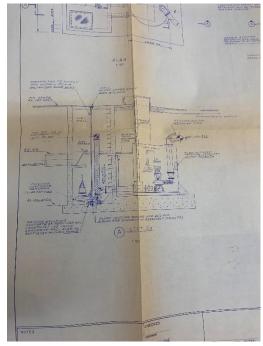
Pictures





Reference: Cockburn PS in Perth – Capacity Review Memo





SANITARY SEWER CALCULATION SHEET - EXISTING CONDITIONS

PROJECT: Cai

Caivan Existing Town of Perth

FILE REF: 19-1092A7
DATE: 15-Jun-21

DESIGN PARAMETERS

Avg. Daily Flow Res. 280 L/p/d
Avg. Daily Flow Comm. 28,000 L/ha/d
Avg. Daily Flow Instit. 28,000 L/ha/d

Peak Fact Res. Per Harmons: Min = 2.0, Max =4.0
Harmon Correction Factor 0.8
Peak Fact. Comm. 1 (< 20% ICI)

Peak Fact. Comm. 1 (< 20% ICI)
Peak Fact. Instit. 1 (< 20% ICI)
Peak Fact. Indust. per MOE graph

Infiltration / Inflow Min. Pipe Velocity Max. Pipe Velocity Mannings N 0.33 L/s/ha
0.60 m/s full flowing
3.00 m/s full flowing
0.013



Avg. Daily Flow Indust. 35,000 L/ha/d Peak Fact. Instit.

Ex. Population Per Hectare* 69 Pop/Ha Peak Fact. Indust. per *Based on an average from Areas 2, 12 and 10.

	Location	n		F	Residential	Area and	Populatio	n	Col	mmercial	Institu	tional	Indu	ıstrial			Infiltratio	n	Pipe Data											
Area ID	Up	Down	Area	Pop.	Cum	ulative	Peak.	Q _{res}	Area	Accu.	Area	Accu.	Area	Accu.	$\mathbf{Q}_{\text{C+I+I}}$	Total	Accu.	Infiltration	Total	DIA	Upstream	Downstream	Length	Slope	A hydraulic	R	Velocity	Q cap	Q / Q full	Qresidual
					Area	Pop.	Fact.			Area		Area		Area		Area	Area	Flow	Flow		Invert	Invert								
			(ha)		(ha)		(-)	(L/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(mm)	(m)	(m)	(m)	(%)	(m ²)	(m)	(m/s)	(L/s)	(-)	(L/s)
				I	<u> </u>			l								l											l			
Rogers Road	21	22			0.00	0	3.80	0.00		0.00	2.14	2.14	56.34	56.34	46.3	58.480	58.480	19.298	65.64	525	136.59	136.37	91.1	0.24	0.216	0.131	0.98	211.4	0.31	145.7
Rogers Road	22	23			0.00	0	3.80	0.00		0.00		2.14		56.34	46.3	0.000	58.480	19.298	65.64	525	136.35	136.21	103.0	0.14	0.216	0.131	0.73	158.5	0.41	92.9
Rogers Road	23	24			0.00	0	3.80	0.00		0.00		2.14		56.34	46.3	0.000	58.480	19.298	65.64	525	136.20	136.02	99.1	0.18	0.216	0.131	0.85	183.3	0.36	117.6
Rogers Road	24	25			0.00	0	3.80	0.00		0.00		2.14	9.80	66.14	54.3	9.800	68.280	22.532	76.81	525	135.98	135.63	91.5	0.38	0.216	0.131	1.23	266.0	0.29	189.2
Rogers Road	25	26			0.00	0	3.80	0.00		0.00		2.14		66.14	54.3	0.000	68.280	22.532	76.81	600	135.52	135.39	79.8	0.16	0.283	0.150	0.88	247.9	0.31	171.1
Rogers Road	26	27			0.00	0	3.80	0.00		0.00		2.14		66.14	54.3	0.000	68.280	22.532	76.81	600	135.37	135.24	72.4	0.18	0.283	0.150	0.92	260.2	0.30	183.4
Rogers Road	27	28			0.00	0	3.80	0.00		0.00		2.14		66.14	54.3	0.000	68.280	22.532	76.81	600	135.23	135.13	83.0	0.12	0.283	0.150	0.75	213.1	0.36	136.3
Rogers Road	28	29			0.00	0	3.80	0.00		0.00		2.14		66.14	54.3	0.000	68.280	22.532	76.81	600	135.10	134.93	72.9	0.23	0.283	0.150	1.05	296.4	0.26	219.6
Rogers Road	29	30			0.00	0	3.80	0.00		0.00		2.14		66.14	54.3	0.000	68.280	22.532	76.81	600	134.92	134.63	124.0	0.23	0.283	0.150	1.05	297.0	0.26	220.2
Rogers Road	30	31			0.00	0	3.80	0.00		0.00		2.14		66.14	54.3	0.000	68.280	22.532	76.81	600	134.59	134.03	145.9	0.38	0.283	0.150	1.35	380.4	0.20	303.6
Rogers Road	31	32		1	0.00	0	3.80	0.00		0.00		2.14		66.14	54.3	0.000	68.280	22.532	76.81	600	134.02	133.81	117.0	0.18	0.283	0.150	0.92	260.2	0.30	183.3

Perth Water Treatment Plant

	2021	2020	2019	2018	2017	2016	2015
JAN.	2491	2762	2972	2982	2,381	2,502	2,872
FEB.	2670	2750	3036	2890	2,454	2,571	3,290
MARCH	2630	2704	3047	2961	2,491	2,455	3,298
APRIL	2409	2555	3038	2983	2,586	2,471	3,157
MAY	3030	2938	3049	3363	2,495	2,931	3,392
JUNE	3154	3347	3062	3268	2,836	2,996	3,002
JULY	2993	3635	3469	3602	2,796	2,954	3,048
AUG.	3498	3223	3228	3269	2,837	3,024	3,015
SEPT.	2890	2981	2902	2947	2,886	2,694	2,979
ост.	2774	2805	2912	2982	2,830	2,603	2,998
NOV.	2486	2513	2707	2840	2,568	2,372	2,852
DEC.	2417	2534	2711	2776	2,681	2,300	2,784
MAXIMUM	3,498	3,635	3,469	3,602	2,886	3,024	3,392
MINIMUM	2,409	2,513	2,707	2,776	2,381	2,300	2,784
AVERAGE	2,787	2,896	3,011	3,072	2,654	2,656	3,057

4.2 Appendix Table 2 – Historical Average Daily Treated Water Flow (m³)

Caivan (Perth GC) Limited Town of Perth

Wastewater Design Flows per Unit Count City of Ottawa Sewer Design Guidelines, 2004



Site Area 41.100 ha

Extraneous Flow Allowances

Infiltration / Inflow 13.56 L/s

Domestic Contributions

Unit Type	Unit Rate	Units	Pop
Single Family	3.4	640	2176
Semi-detached and duplex	2.7	299	808
Townhouse	2.7		0
Stacked Townhouse	2.3		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0

Total Pop	2984	
Average Domestic Flow	9.67	L/s
Peaking Factor	2.96	
Peak Domestic Flow	28.58	L/s

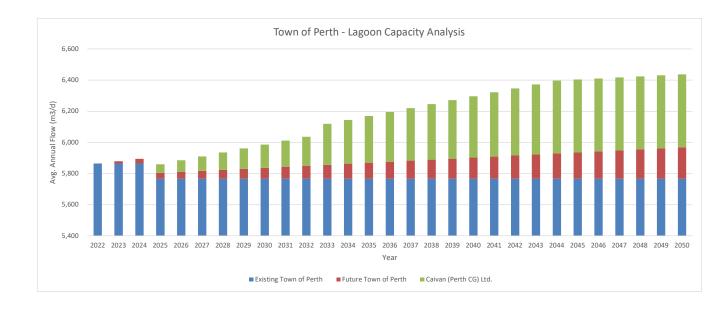
Total Estimated Average Dry Weather Flow Rate	9.67 L/s
Total Estimated Peak Dry Weather Flow Rate	28.58 L/s
Total Estimated Peak Wet Weather Flow Rate	42.14 L/s

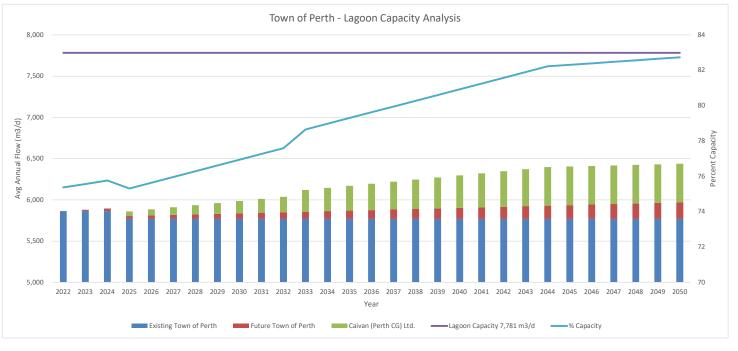
		Unit Occ	2.20 p/unit	Unit Occ	2.20	p/unit
Residential	200 L/p/d	Residential	200 L/p/d	Residential	170	L/p/d
Commercial	17,000 L/d/ha	Commercial	17,000 L/d/ha	Commercial	17,000	L/d/ha
Institutional	17,000 L/d/ha	Institutional	17,000 L/d/ha	Institutional	17,000	L/d/ha
Industrial	10,000 L/d/ha	Industrial	10,000 L/d/ha	Industrial	10,000	L/d/ha
1&1	0.033 L/s/ha	1&1	0.054 L/s/ha	1&1	0.025	L/s/ha
		New units to 2024	34			
		New units beyond 2024	15			

				Existing	Town of Pert	th							Future	Town of Pert	h							Caivan (Perth CG) Ltd	d.						Total	Lagoon Capacity 7,781 m ³ /c			
Year	Area	Units	Pop	Commercia	Institutional	Industrial	Q _{I&I}	Q _{dry}	Q _{wet}	Area	Units	Pop	Commercial	Institutiona	Industrial	Q _{I&I}	Q _{dry}	Q _{wet}	Area	Units	Pop	Commercial	Institutiona	Industrial	Q _{I&I}	Q _{dry}	Q _{wet}	Units	Pop	Q _{I&I}	Q _{dry}	Q _{wet}	Qcap	% Capacity
	(ha)		(-)	(ha)	(ha)	(ha)	(m ³ /d)	(m ³ /d)	(m ³ /d)	(ha)		(-)	(ha)	(ha)	(ha)	(m ³ /d)	(m ³ /d)	(m ³ /d)	(ha)		(-)	(ha)	(ha)	(ha)	(m ³ /d)	(m ³ /d)	(m ³ /d)		(-)	(m ³ /d)	(m ³ /d)	(m ³ /d)	(m ³ /d)	
2022	548.67	3,270	6469	111.44	<u> </u>	111.18	1,564	4,300	5,864	` ,		``	· · ·	<u> </u>	 	-	-		` /		``	` /	<u> </u>	 		-		3,270	6,469	1,564	4,300	5,864	7,781	75
2023	548.67	3,270	6469	111.44		111.18	1,564	4,300	5,864		34	75	5			-	15	15							-	-	- 1	3,304	6,544	1,564	4,315	5,879	7,781	76
2024	548.67	3,270	6469	111.44		111.18	1,564	4,300	5,864		68	150				-	30	30							-	-	- 1	3,338	6,619	1,564	4,330	5,894	7,781	76
2025	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		83	183	3			-	37	37	17.118	50	110				37	19	56	3,403	6,762	1,504	4,355	5,860	7,781	75
2026	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		98	216	5			-	43	43	17.118	100	220				37	37	74	3,468	6,905	1,504	4,381	5,885	7,781	76
2027	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		113	249				-	50	50	17.118	150	330				37	56	93	3,533	7,048	1,504	4,406	5,910	7,781	76
2028	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		128	282	2			-	56	56	17.118	200	440				37	75	112	3,598	7,191	1,504	4,431	5,935	7,781	76
2029	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		143	0.0	4			-	63	63	17.118	250	550				37	94	130	3,663	7,334	1,504	4,457	5,961	7,781	77
2030	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		158	348	3			-	70	70	17.118	300	660				37	112	149	3,728	7,477	1,504	4,482	5,986	7,781	77
2031	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		173	381				-	76	76	17.118	350	770				37	131	168	3,793	7,620	1,504	4,507	6,011	7,781	77
2032	514.58	3,270	6469	111.44		111.18	1,467	4,300	-,		188	414				-	83	83	17.118	400	000				37	150	187	3,858	7,763	1,504	4,532	6,037	7,781	78
2033	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		203	447	'			-	89	89	43.648	450	990				94	168	263	3,923	7,906	1,561	4,558	6,119	7,781	79
2034	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		218	480				-	96	96	43.648	500	1100				94	187	281	3,988	8,049	1,561	4,583	6,145	7,781	79
2035	514.58	3,270	6469	111.44		111.18	1,467	4,300			233	513	'			-	103	103	43.648	550	_				94	206	300	4,053	8,192	1,561	4,608	6,170	7,781	79
2036	514.58	3,270	6469	111.44		111.18	1,467	4,300			248	546	5			-	109	109	43.648	600					94	224	319	4,118	8,335	1,561	4,634	6,195	7,781	80
2037	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		263	579				-	116	116	43.648	650	1430				94	243	337	4,183	8,478	1,561	4,659	6,220	7,781	80
2038	514.58	3,270	6469	111.44		111.18	1,467	4,300	0,7 0.		278	612	·			-	122	122	43.648	700	1540				94	262	356	4,248	8,621	1,561	4,684	6,246	7,781	80
2039	514.58	3,270	6469	111.44		111.18	1,467	4,300	-,		293	645				-	129	129	43.648	750					94	281	375	4,313	8,764	1,561	4,710	6,271	7,781	81
2040	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		308	678	3			-	136	136	43.648	800					94	299	393	4,378	8,907	1,561	4,735	6,296	7,781	81
2041	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		323	711				-	142	142	43.648	850	1870				94	318	412	4,443	9,050	1,561	4,760	6,322	7,781	81
2042	514.58	3,270	6469	111.44		111.18	1,467	4,300	-,		338	744				-	149	149	43.648	900					94	337	431	4,508	9,193	1,561	4,785	6,347	7,781	82
2043	514.58	3,270	6469	111.44		111.18	1,467	4,300	-,		353	777	1		1	-	155	155	43.648	950					94	355	450	4,573	9,336	1,561	4,811	6,372	7,781	82
2044	514.58	3,270	6469	111.44		111.18	1,467	4,300	0,7 0.		368	810			1	-	162	162	43.648	1000					94	374	468	4,638	9,479	1,561	4,836	6,398	7,781	82
2045	514.58	3,270	6469	111.44		111.18	1,467	4,300			383	843	1	1	1	-	169	169	43.648	1000				1	94	374	468	4,653	9,512	1,561	4,843	6,404	7,781	82
2046	514.58	3,270	6469	111.44		111.18	1,467	4,300	- 7 -		398	876				-	175	175	43.648	1000					94	374	468	4,668	9,545	1,561	4,849	6,411	7,781	82
2047	514.58	3,270	6469	111.44		111.18	1,467	4,300	0,707		413	909	4	1	1	-	182	182	43.648	1000			ļ	1	94	374	468	4,683	9,578	1,561	4,856	6,417	7,781	82
2048	514.58	3,270	6469	111.44		111.18	1,467	4,300	-, -		428	942	2			-	188	188	43.648	1000	2200				94	374	468	4,698	9,611	1,561	4,862	6,424	7,781	83
2049	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		443	975		ļ	1	-	195	195	43.648	1000				1	94	374	468	4,713	9,644	1,561	4,869	6,431	7,781	83
2050	514.58	3,270	6469	111.44		111.18	1,467	4,300	5,767		458	1008	5			-	202	202	43.648	1000	2200				94	374	468	4,728	9,677	1,561	4,876	6,437	7,781	83

Notes:

- 1. Lagoon Capacity per ECA 7,781m³/d
 2. 2022 population and number of units from 2021 census collected by StatsCAN (https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/details/page.cfm?Lang=E&SearchText=Perth&DGUIDlist=2021A00053509021&GENDERlist=1,2,3&STATISTIClist=1&HEADERlist=0)
 3. 2021 StatsCAN census indicates average unit occupany at 1.9p/unit.
 4. Caivan Community annual dry weather l&I per City of Ottawa technical buletin 2018-01.
 5. Existing l&I estimated from water use and monitored lagoon flows in 2021.





SANITARY SEWER CALCULATION SHEET

Mann	ing's	n=0.	.013

Commence	Manning's n=0.013																											
Mile		FROM TO AREA UNITS POP. CUMULATIVE PEAK PEAK AREA ACCU.														COLL		TOTAL		N INCHES	TOTAL	DICT	L DIA	LCLODE	PIPE	L DATIO		-
CONTRELINE FOR POR 12/14 12/24 CONTRELINE FOR POR 12/14 12/24	SIREEI																	AREA		FLOW		DIST	DIA	SLOPE	(FULL)			(ACT.)
CONTINELINE (1908) FURTHER (1908) FU																			1			(m)	(mm)	(%)		Q act Q cap		(m/s)
CONTINELINE (1908) FURTHER (1908) FU	CENTRELINEAZ CENTRELINEAGOA																		1					1				
CONTINELINE (100), Pepe (2) A - 1/2 A 0.02 21 0.00		Pine 120A -	 122Α				0.27	20				0.00		0.00		2.00		0.27	0.27					+				
CENTRELINETO, Fige 124A - 124A 1.77 87 18 1.02 0.00 0																												
CONTRELINETO Pile 124-125A				0.62		46			3.6	1.02		0.00			C	0.00	0.00			0.33	1.35	111.5	200	0.35	19.40	0.07	0.62	0.35
GENTRELINÉSOS 106A 106A 0.88 51 0.8 5			124A				1.17		3.6	1.02		0.00		0.00	C	0.00	0.00	0.00	1.17	0.33	1.35	8.5	200	0.35	19.40	0.07	0.62	0.35
TO CENTRELINE 19 196A 196A 196A 196B 19	To CENTRELINE16, Pipe 124A - 125A						1.17	87				0.00		0.00	0	0.00			1.17					-				
196A 196B	CENTRELINE1008		+	+					1										1			+		+	+			
TO CENTRELINE 10, Ppo 109A-129A		105A	106A	0.68		51	0.68	51	3.7	0.60		0.00		0.00	C	0.00	0.00	0.68	0.68	0.19	0.80	112.5	200	0.65	26.44	0.03	0.84	0.37
TO CENTRELINET OF I. Pape 122A 123A 0.27 20 0.00 0	To CENTRELINE16, Pipe 106A - 126A						0.68	51				0.00		0.00	C	0.00												
TO CENTRELINET CENTRELINE 1001, Pipe 122A- 123A 10 CENTRELINET CENTRELINE 1001, Pipe 122A- 123A 10 CENTRELINE 1001, Pipe		1001	1001	0.07			0.07		0.7	0.04		0.00		0.00		200	0.00	0.07	0.07	0.00	0.00	54.0	000	0.05	00.44	0.04	0.04	0.00
To CENTRELINE 100 Piper 122A 122A 0.28 21 0.28 21 0.28 21 0.7 0.25 0.00 0.	To CENTRELINE 17 CENTRELINE 100			0.27		20			3.7	0.24	+						0.00	0.27		0.08	0.32	51.0	200	0.65	26.44	0.01	0.84	0.28
TO CENTRELINE 100 Fipe 19A - 12A 19A 0.69 52 0.69 32 3.6 0.61 0.00	10 GENTREEINE 17 GENTREEINE 100	1, 1 IPC 1227	120/4				0.21	20				0.00		0.00		5.00			0.27								†	
177A				0.28		21			3.7	0.25							0.00	0.28		0.08	0.33	50.5	200	0.65	26.44	0.01	0.84	0.28
118A	To CENTRELINE17 CENTRELINE100	1, Pipe 122A	- 123A				0.28	21				0.00		0.00	0	0.00			0.28									
TO CENTRELINE 18, Pipe 119A - 124A 0.69 \$2 3.6 661 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.81 8.5 200 0.35 19.40 0.04 0.62		117Δ	118Δ	0.69		52	0.69	52	3.6	0.61		0.00		0.00		2.00	0.00	0.69	0.69	0.20	0.81	113.5	200	0.65	26.44	0.03	0.84	0.38
TO CENTRELINE 16, Pipe 119A-124A				0.03		52																						0.30
CENTRELINE 1006, Pipe 44A 49A 0.21 16 0.21 16 3.7 0.19 0.00 0.00 0.00 0.00 0.00 1.25 1.21 0.06 0.25 4.95 200 0.65 26.44 0.01 0.84 control to the control to	To CENTRELINE16, Pipe 119A - 124A						0.69	52				0.00		0.00	C	0.00			0.69									
CENTRELINE 1006, Pipe 44A - 49A																												
Contribution From CENTRELINEGO, Pipe 47A - 49A	CENTRELINE07	101	404	0.21		16	0.21	16	2.7	0.10		0.00		0.00		2.00	0.00	0.21	0.21	0.06	0.25	10.5	200	0.65	26.44	0.01	0.94	0.26
## 49A	Contribution From CENTRELINE06 Pi		49A	0.21		10			3.1	0.19							0.00			0.00	0.23	49.5	200	0.03	20.44	0.01	0.04	0.20
S1A S2A 0.78 58 2.55 2.17 3.5 2.47 0.00 0.00 0.00 0.00 0.00 0.78 2.55 0.73 3.20 122.5 200 0.35 19.40 0.16 0.62	Contribution 1 fem CENTITIES (1)		50A	0.22		17			3.6	1.75							0.00			0.48	2.23	51.0	200	0.35	19.40	0.11	0.62	0.41
S2A 53A 0.49 37 3.04 254 3.5 2.87 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.35 19.40 0.19 0.62		50A	51A	0.09		7	1.77	159	3.5	1.83		0.00		0.00	C	0.00	0.00	0.09	1.77	0.51	2.33	11.0	200	0.35	19.40	0.12	0.62	0.41
S3A 54A 0.56 42 3.60 296 3.5 3.32 0.00																												0.45
S4A 55A 0.49 37 4.09 333 3.4 3.72 0.00 0.00 0.00 0.00 0.00 0.49 4.09 1.17 4.89 89.5 200 0.35 19.40 0.25 0.62											-																	0.47
To CENTRELINE 1006, Pipe 55A - 102A CENTRELINE 6 42A 43A 0.64 61 0.64 61 3.6 0.72 0.00 0.00 0.00 0.00 0.00 0.64 0.64 0.18 0.90 105.0 200 0.65 28.44 0.03 0.84 0.61 0.64 0.64 0.18 0.90 105.0 200 0.65 28.44 0.03 0.84 0.61 0.64 0.64 0.64 0.64 0.64 0.64 0.64 0.64																												0.50
42A 43A 0.64 61 0.64 61 3.6 0.72 0.00 0.00 0.00 0.00 0.00 0.00 0.04 0.64 0.61 0.65 26.44 0.03 0.84	To CENTRELINE1006, Pipe 55A - 102		00/1	1 00		<u> </u>				0.72							0.00	00				1 00.0		0.00	100	0.20	0.02	0.01
42A 43A 0.64 61 0.64 61 3.6 0.72 0.00 0.00 0.00 0.00 0.00 0.00 0.04 0.64 0.64 0.61 0.65 26.44 0.03 0.84																												
A3A A4A 0.61 58 1.25 119 3.6 1.38 0.00	CENTRELINE06	424	12.4	0.64		61	0.64	61	2.6	0.72	+	0.00		0.00		2.00	0.00	0.64	0.64	0.10	0.00	105.0	200	0.65	26.44	0.02	0.04	0.39
To CENTRELINE 1006, Pipe 44A - 55A 45A 46A 0.35 33 0.35 33 0.35 33 3.7 0.39 0.00 0.00 0.00 0.00 0.00 0.35 0.35 0.10 0.49 61.0 200 0.65 26.44 0.02 0.84 0.00 0.00 0.00 0.00 0.00 0.00 0.00											+ +																	0.38
## A	To CENTRELINE1006. Pipe 44A - 55A	43/	440	0.01		30			3.0	1.50							0.00	0.01		0.50	1.74	110.5	200	0.55	13.40	0.03	0.02	0.50
A6A 47A 0.07 7 0.42 40 3.7 0.48 0.00 0.00 0.00 0.00 0.00 0.00 0.07 0.42 0.12 0.60 10.0 200 0.35 19.40 0.03 0.62																												
A																												0.32
To CENTRELINE07, Pipe 49A - 50A																												0.28
CENTRELINE09 33A 34A 0.63 47 0.63 0.63 0.63 0.63 0.63 0.63 0.18 0.74 10.5 200 0.35 19.40 0.04 0.62 Designed: M.S. PROJECT: 1278 Caivan-Perth M.S. Checked: LOCATION:	To CENTRELINE07. Pipe 49A - 50A	4//	49A	0.03		19			3.0	1.30							0.00	0.03		0.30	1.74	149.5	200	0.33	19.40	0.09	0.02	0.36
33A 34A 0.63 47 0.63 47 3.7 0.56 0.00 0.00 0.00 0.00 0.00 0.63 0.63 0.18 0.74 100.0 200 0.65 26.44 0.03 0.84 0.63 47 3.7 0.56 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.63 0.18 0.74 10.5 200 0.35 19.40 0.04 0.62 0.65 0.00 0.																												
DESIGN PARAMETERS Designed: PROJECT: Tark Flow = 2800 L/ha/da 2800 L/ha/da 0.3241 l/s/Ha Extraneous Flow = 0.286 L/s/ha L/ma/da 0.3241 l/s/Ha Extraneous Flow = 0.286 L/s/ha Checked: LOCATION:	CENTRELINE09	004	044	0.00		47	0.00	47	0.7	0.50		0.00		0.00		200	0.00	0.00	0.00	0.40	0.74	100.0	000	0.05	00.44	0.00	0.04	0.00
To CENTRELINE08, Pipe 35A - 36A				0.63		47																						0.36
DESIGN PARAMETERS Designed: PROJECT:	To CENTRELINE08, Pipe 35A - 36A	347	337						5.7	0.50							0.00	0.00		0.10	0.74	10.5	200	0.55	13.40	0.04	0.02	0.23
Park Flow = 9300 L/ha/da 0.10764 l/s/Ha Average Daily Flow = 280 l/p/day Industrial Peak Factor = as per MOE Graph M.Š. 1278 Caivan-Perth Comm/Inst Flow = 28000 L/ha/da 0.3241 l/s/Ha Extraneous Flow = 0.286 L/s/ha Checked: LOCATION:							0.00							0.00														
Park Flow = 9300 L/ha/da 0.10764 l/s/Ha Average Daily Flow = 280 l/p/day Industrial Peak Factor = as per MOE Graph M.Š. 1278 Caivan-Perth Comm/Inst Flow = 28000 L/ha/da 0.3241 l/s/Ha Extraneous Flow = 0.286 L/s/ha Checked: LOCATION:																												
Park Flow = 9300 L/ha/da 0.10764 l/s/Ha Average Daily Flow = 280 l/p/day Industrial Peak Factor = as per MOE Graph M.S. 1278 Caivan-Perth Comm/Inst Flow = 2800 L/ha/da 0.3241 l/s/Ha Extraneous Flow = 0.286 L/s/ha Checked: LOCATION:				DESIGN PA	RAMETE	RS	I	ı	1	l				Designer	<u> </u>				IPROJEC:	<u>Г</u>		1	l	1	1	I	1	I
Comm/Inst Flow = 28000 L/ha/da 0.3241 l/s/Ha Extraneous Flow = 0.286 L/s/ha Checked: LOCATION:	Park Flow =	9300 L/ha/da 0.10764 l/s/Ha																		• •			127	8 Caivan-	Perth			
	Average Daily Flow =	280 I/p/day Industrial Peak Factor = as per MOE Graph 28000 L/ha/da 0.3241 I/s/Ha Extraneous Flow = 0.286 L/s/ha																										
Industrial Flow = 35000 L/ha/da 0.40509 l/s/Ha Minimum Velocity = 0.600 m/s W.L. Town of Perth															:				LOCATIO	N:					- f D41			
May Dee Deek Feeter - 4.00 Maynington - (Care) 0.042 (Due) 0.042		35000 L/ha/da 0.40509 l/s/Ha Minimum Velocity = 0.600 m/s																						Iown	of Perth			
		4.00 Manning's n = (Conc) 0.013 (Pvc) 0.013												Dwg Ro	ference:				File Ref				Date:				Sheet No	1 1
Commercialization = 1.00 Townhouse Coeff = 2.7 Division Presentation File Ref. Date: The Ref. Date		1.00 Townhouse coeff= 2.7														Dwgs.	No.		I IIC INCI.				Daile.	02 Feb 202	:3			

SANITARY SEWER CALCULATION SHEET Manning's n=0.013 LOCATION RESIDENTIAL AREA AND POPULATION COMM INSTIT PARK C+I+I INFILTRATION PIPE STREET UNITS CUMULATIVE PEAK ACCU. ACCU. PEAK TOTAL CAP RATIO FROM PFAK ARFA ARFA ARFA ACCU TOTAL ACCU. INFILT SLOPE VFL. TO DIST ARFA POP. FACT. FLOW AREA AREA AREA FLOW AREA AREA FLOW FLOW (FULL) Q act/Q cap (FULL) (ACT.) (ha) (ha) (l/s) (ha) (ha) (ha) (ha) (ha) (l/s) (ha) (ha) (l/s) (%) (m/s) (m/s) (1/s)(mm) CENTRELINE08 44 3.7 0.52 0.59 0.17 0.69 26.44 0.84 29A 30A 0.59 44 0.59 0.00 0.00 0.00 0.00 0.59 93.0 200 0.65 0.03 0.36 30A 0.68 3.7 200 0.35 19.40 0.30 31A 0.09 51 0.60 0.00 0.00 0.00 0.09 0.68 0.19 0.80 11.0 0.04 0.62 0.00 31A 32A 0.07 0.75 57 3.6 0.67 0.00 0.00 0.00 0.00 0.07 0.75 0.21 17.0 200 0.35 19.40 0.05 0.62 0.31 0.89 32A 35A 0.11 0.86 3.6 0.78 0.00 0.00 0.00 0.00 0.11 0.86 0.25 1.02 32.5 200 0.35 19.40 0.05 0.62 0.33 Contribution From CENTRELINE09, Pipe 34A - 35A 0.63 47 0.00 0.00 0.00 0.63 1.49 35A 36A 0.15 12 1.64 125 3.6 1.45 0.00 0.00 0.00 0.00 0.15 1.64 0.47 1.92 31.5 200 0.35 19.40 0.10 0.62 0.39 36A 37A 0.07 6 1.71 131 3.6 1.51 0.00 0.00 0.00 0.00 0.07 1.71 0.49 2.00 8.0 200 0.35 19.40 0.10 0.62 0.40 1.90 37A 38A 0.19 14 1.90 145 3.6 1.67 0.00 0.00 0.00 0.00 0.19 0.54 2.21 37.0 200 0.35 19.40 0.11 0.62 0.41 38A 39A 0.56 42 2.46 187 3.5 2.14 0.00 0.00 0.00 0.00 0.56 2.46 0.70 2.84 99.5 200 0.35 19.40 0.15 0.62 0.44 To CENTRELINE1006, Pipe 39A - 40A 2.46 187 0.00 0.00 0.00 2.46 CENTRELINE12 3.7 0.48 18A 19A 0.42 40 0.42 40 0.00 0.00 0.00 0.00 0.42 0.42 0.12 0.60 80.5 200 0.65 26.44 0.02 0.84 0.34 To CENTRELINE11, Pipe 19A - 20A 0.42 40 0.00 0.00 0.00 0.42 CENTRELINE13 16A 57 3.6 0.67 17A 0.60 0.60 57 0.00 0.00 0.00 0.00 0.60 0.60 0.17 0.84 109.5 200 0.65 26.44 0.03 0.84 0.38 57 To CENTRELINE11, Pipe 17A - 19A 0.60 0.00 0.00 0.00 0.60 CENTRELINE14 14A 15A 0.55 52 3.6 0.61 0.00 0.00 0.55 0.16 0.77 98.0 200 0.03 0.55 52 0.00 0.00 0.55 0.65 26.44 0.84 0.37 To CENTRELINE11, Pipe 15A - 17A 0.55 52 0.00 0.00 0.00 0.55 CENTRELINE15 11A 13A 0.48 0.48 3.7 0.43 0.00 0.00 0.48 0.48 0.14 0.57 86.5 200 0.65 26.44 0.02 0.84 36 0.00 0.00 0.34 36 To CENTRELINE 11. Pipe 13A - 15A 0.48 36 0.00 0.00 0.00 0.48 12A 0.00 13A 0.15 0.15 12 3.7 0.14 0.00 0.00 | 0.00 | 0.15 | 0.15 0.04 0.19 29.0 200 1.40 38.81 0.00 1.24 0.32 To CENTRELINE11, Pipe 13A - 15A 0.15 12 0.00 0.00 0.00 0.15 107A 108A 0.14 11 0.14 11 3.7 0.13 0.00 0.00 0.00 0.00 0.14 0.14 0.04 0.17 22.5 200 1.40 38.81 0.00 1.24 0.30 108A 109A 0.20 11 3.7 0.13 0.00 0.00 0.00 0.06 0.20 0.06 200 0.35 19.40 0.01 0.62 0.19 0.06 0.00 0.19 11.0 109A 111A 0.17 13 0.37 24 3.7 0.29 0.00 0.00 0.00 0.00 0.17 0.37 0.11 0.39 51.5 200 0.35 19.40 0.02 0.62 0.24 To CENTRELINE16, Pipe 111A - 112A 0.37 24 0.00 0.00 0.00 0.37 CENTRELINE11 Contribution From CENTRELINE16, Pipe 2A - 10A 0.79 60 0.00 0.00 0.00 0.79 0.79 Contribution From CENTRELINE16, Pipe 9A - 10A 0.21 16 0.00 0.00 0.00 0.21 1.00 0.31 1.20 59.5 250 29.73 0.09 1.09 76 3.6 0.89 0.00 0.00 0.00 0.00 0.09 1.09 0.25 0.04 0.61 Contribution From CENTRELINE15, Pipe 11A - 13A 0.48 36 0.00 0.00 0.00 0.48 1.57 Contribution From CENTRELINE15, Pipe 12A - 13A 0.00 0.00 0.00 0.15 12 0.15 1.72 0.15 3.6 1.57 0.53 0.35 13A 15A 12 1.87 136 0.00 0.00 0.00 0.00 0.15 1.87 2.11 59.5 250 0.25 29.73 0.07 0.61 Contribution From CENTRELINE14, Pipe 14A - 15A 0.55 52 0.00 0.00 0.00 0.55 2.42 15A 17A 0.24 18 2.66 206 3.5 2.35 0.00 0.00 0.00 0.00 0.24 2.66 0.76 3.11 59.5 250 0.25 29.73 0.10 0.61 0.39 Contribution From CENTRELINE13, Pipe 16A - 17A 0.60 57 0.00 0.00 0.00 0.60 3.26 3.5 3.16 1.00 0.14 17A 19A 0.23 18 3.49 281 0.00 0.00 0.00 | 0.00 | 0.23 | 3.49 4.16 59.0 250 0.25 29.73 0.61 0.42 DESIGN PARAMETERS ROJECT Desianed Park Flow = 9300 L/ha/da 0.10764 M.S. 1278 Caivan-Perth 280 Industrial Peak Factor = as per MOE Graph Average Daily Flow = I/p/day Comm/Inst Flow = 28000 L/ha/da 0.3241 l/s/Ha Extraneous Flow = 0.286 L/s/ha Checked: LOCATION Town of Perth Industrial Flow = 35000 L/ha/da 0.40509 l/s/Ha Minimum Velocity = 0.600 m/s W.L. Max Res. Peak Factor = 4.00 Manning's n = 0.013 (Pvc) 0.013 (Conc)

Dwa. Reference:

Sanitary Drainage Plan, Dwgs. No.

Commercial/Inst./Park Peak Factor =

Institutional =

1.00

0.32

l/s/Ha

Townhouse coeff=

Single house coeff=

2.7

3.4

File Ref:

Date:

02 Feb 2023

Sheet No.

of

SANITARY SEWER CALCULATION SHEET

Mann	ing's	n=0.	.013

Manning's n=0	LOCATION			R	ESIDENTIAL	AREA ANI	POPULATION	ON	I		CC	OMM	INS	STIT	PAR	RK	C+I+I	1	INFILTRATIO	N		1			PIPE			
	STREET	FROM	ТО	AREA	UNITS	POP.	CUMU	LATIVE	PEAK	PEAK	AREA	ACCU.	AREA	ACCU.	AREA	ACCU.	PEAK	TOTAL	ACCU.	INFILT.	TOTAL	DIST	DIA	SLOPE	CAP.	RATIO	VI	EL.
		M.H.	M.H.				AREA	POP.	FACT.	FLOW		AREA		AREA		AREA	FLOW	AREA	AREA	FLOW	FLOW				(FULL)	Q act/Q cap	(FULL)	(ACT.)
				(ha)			(ha)			(l/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(I/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)	(%)	(l/s)		(m/s)	(m/s)
0 17 5	OFNITRE IN E40 B:	101 101					0.40	40				0.00		0.00		0.00		0.40	0.04					1				
Contribution Fro	om CENTRELINE12, Pip	oe 18A - 19A 19A	20A	0.31		23	0.42 4.22	40 344	3.4	3.84	-	0.00		0.00		0.00	0.00	0.42	3.91 4.22	1.21	5.04	85.5	250	0.25	29.73	0.17	0.61	0.45
\vdash		20A	21A	0.31		9	4.22	353	3.4	3.93		0.00		0.00		0.00	0.00	0.31	4.22	1.24	5.04	7.5	250	0.25	29.73	0.17	0.61	0.45
		21A	22A	0.12		5	4.40	358	3.4	3.99		0.00		0.00		0.00	0.00	0.12	4.40	1.24	5.24	25.0	250	0.25	29.73	0.17	0.61	0.45
To CENTRELIN	NE1006, Pipe 22A - 23A	ZIA	ZZA	0.00			4.40	358	0.4	0.00		0.00		0.00		0.00	0.00	0.00	4.40	1.20	J.24	20.0	200	0.20	25.70	0.10	0.01	0.40
CENTRELINE1	006																											
	om CENTRELINE11, Pip	oe 21A - 22A					4.40	358				0.00		0.00		0.00		4.40	4.40									
Contribution Fro	om CENTRELINE16, Pip	oe 8A - 22A					1.25	95				0.00		0.00		0.20		1.45	5.85									
		22A	23A	0.15		12	5.80	465	3.4	5.11		0.00		0.00		0.20	0.02	0.15	6.00	1.72	6.85	60.5	250	0.25	29.73	0.23	0.61	0.49
		23A	24A	0.65		49	6.45	514	3.4	5.62		0.00		0.00		0.20	0.02	0.65	6.65	1.90	7.54	123.5	250	0.25	29.73	0.25	0.61	0.50
		24A	25A	0.20		15	6.65	529	3.4	5.78		0.00		0.00		0.20	0.02	0.20	6.85	1.96	7.76	50.5	250	0.25	29.73	0.26	0.61	0.51
		25A	26A	0.02		0	6.67	529	3.4	5.78	ļ	0.00		0.00		0.20	0.02	0.02	6.87	1.96	7.76	11.0	250	0.25	29.73	0.26	0.61	0.51
		26A	27A	0.24		18	6.91	547	3.4	5.96		0.00		0.00		0.20	0.02	0.24	7.11	2.03	8.02	62.0	250	0.25	29.73	0.27	0.61	0.51
—		27A 28A	28A 39A	0.20		15 18	7.11 7.35	562 580	3.4	6.12 6.30		0.00		0.00		0.20	0.02	0.20	7.31	2.09	8.23 8.48	59.0 59.0	250 250	0.25	29.73 29.73	0.28 0.29	0.61	0.51 0.52
Contribution Err	L om CENTRELINE08, Pig			0.24		10	2.46	187	3.4	0.30		0.00		0.00		0.20	0.02	2.46	10.01	2.10	0.40	39.0	250	0.20	29.13	0.29	0.01	0.52
	JIII OLIVITALLIINEUO, PI	39A	40A	0.72		54	10.53	821	3.3	8.73		0.00		0.00		0.00	0.02	0.72	10.01	3.07	11.82	125.5	300	0.20	43.25	0.27	0.61	0.52
		40A	41A	0.12		13	10.70	834	3.3	8.86		0.00		0.00		0.20	0.02	0.12	10.73	3.12	12.00	11.0	300	0.20	43.25	0.27	0.61	0.52
		41A	44A	0.19		18	10.89	852	3.3	9.04		0.00		0.00		0.20	0.02	0.19	11.09	3.17	12.24	52.0	300	0.20	43.25	0.28	0.61	0.52
Contribution Fro	om CENTRELINE06, Pip						1.25	119				0.00		0.00		0.00		1.25	12.34									
		44A	55A	0.24		23	12.38	994	3.2	10.44		0.00		0.00		0.20	0.02	0.24	12.58	3.60	14.06	59.0	300	0.20	43.25	0.33	0.61	0.55
Contribution Fro	om CENTRELINE07, Pip						4.09	333				0.00		0.00		0.00		4.09	16.67									
		55A	102A	0.20		19	16.67	1346	3.2	13.83		0.00		0.00		0.20	0.02	0.20	16.87	4.82	18.68	62.0	300	0.20	43.25	0.43	0.61	0.59
To CENTRELIN	NE16, Pipe 102A - 103A						16.67	1346				0.00		0.00		0.20			16.87									
05115051 11150																								1				
CENTRELINE0)4	054	004	0.57		F.4	0.57	F.4	0.0	0.04		0.00		0.00		0.00	0.00	0.57	0.57	0.40	0.00	00.0	000	0.05	00.44	0.00	0.04	0.07
		95A 96A	96A	0.57		54	0.57	54	3.6	0.64		0.00		0.00		0.00	0.00	0.57	0.57	0.16	0.80	83.0 113.5	200	0.65 0.25	26.44 29.73	0.03	0.84	0.37
<u> </u>		96A 97A	97A 98A	0.68		64 60	1.25 1.88	118 178	3.6	1.37 2.04		0.00		0.00		0.00	0.00	0.68	1.25	0.36 0.54	1.73 2.58	104.0	250 250	0.25		0.06	0.61 0.61	0.33
—		97A 98A	98A 99A	0.63		46	2.36	224	3.5	2.04		0.00		0.00		0.00	0.00	0.63	1.88 2.36	0.54	3.22	79.5	250	0.25	29.73	0.09	0.61	0.37
		99A	100A	0.40		39	2.77	263	3.5	2.97		0.00		0.00		0.00	0.00	0.40	2.77	0.07	3.76	76.0	250	0.25	29.73	0.11	0.61	0.39
To CENTRELIN	NE05, Pipe 100A - 101A	33A	100A	0.41		- 55	2.77	263	3.5	2.51		0.00		0.00		0.00	0.00	0.41	2.77	0.73	3.70	70.0	230	0.23	23.13	0.13	0.01	0.41
TO OLIVINGE IN	1200, 1 ipo 100/1 101/1		<u> </u>				2.,,	200	<u> </u>			0.00		0.00		0.00												
CENTRELINEO:)5																											
		81A	82A	0.24		23	0.24	23	3.7	0.28		0.00		0.00		0.00	0.00	0.24	0.24	0.07	0.34	54.0	200	0.65	26.44	0.01	0.84	0.29
To CENTRELIN	NE03, Pipe 82A - 83A						0.24	23				0.00		0.00		0.00			0.24									
	•																											
		94A	100A	0.24		23	0.24	23	3.7	0.28		0.00		0.00		0.00	0.00	0.24	0.24	0.07	0.34	60.5	200	2.35	50.28	0.01	1.60	0.44
Contribution Fro	om CENTRELINE04, Pip						2.77	263				0.00		0.00		0.00		2.77	3.01									
		100A	101A	0.20		19	3.21	305	3.5	3.42		0.00		0.00		0.00	0.00	0.20	3.21	0.92	4.34	62.5	300	0.20	43.25	0.10	0.61	0.39
To CENTRELIN	NE16, Pipe 101A - 102A		-				3.21	305				0.00		0.00		0.00			3.21									
 		74A	75A	0.17		13	0.17	13	3.7	0.16	-	0.00		0.00		0.00	0.00	0.17	0.17	0.05	0.21	38.0	200	0.65	26.44	0.01	0.84	0.24
		74A 75A	76A	0.17		9	0.17	22	3.7	0.16		0.00		0.00		0.00	0.00	0.17	0.17	0.05	0.21	11.0	200	0.65	19.40	0.01	0.62	0.24
 		76A	77A	0.12		32	0.29	54	3.6	0.26		0.00		0.00	+	0.00	0.00	0.12	0.29	0.08	0.84	73.0	200	0.35	19.40	0.02	0.62	0.23
		77A	78A	0.38		29	1.09	83	3.6	0.04		0.00		0.00		0.00	0.00	0.38	1.09	0.20	1.28	67.5	200	0.35	19.40	0.07	0.62	0.34
		78A	79A	0.31		23	1.40	106	3.6	1.23		0.00		0.00		0.00	0.00	0.31	1.40	0.40	1.63	55.5	200	0.35	19.40	0.08	0.62	0.37
				DESIGN PA		KS								Designed	d:				PROJEC	I:			4.0-	0.0-1	D41			
Park Flow =		9300	L/ha/da	0.10764	I/s/Ha									M.S.									1278	8 Caivan-	rertn			
Average Daily Flo		280	l/p/day				Industrial		or = as p		•																	
Comm/Inst Flow =	=	28000	L/ha/da	0.3241	l/s/Ha		Extraneou				L/s/ha			Checked	l:				LOCATIO	N:				_				
Industrial Flow =		35000	L/ha/da	0.40509	I/s/Ha		Minimum '	,		0.600				W.L.										Town	of Perth			
Max Res. Peak Fa		4.00					Manning's		(Conc)	0.013	(Pvc)	0.013							<u> </u>				1= .					
	/Park Peak Factor =	1.00	I/o/Ho				Townhous			2.7				Dwg. Re		an P	No		File Ref:				Date:	00 Ect 000	•		Sheet No	
Institutional =		0.32	l/s/Ha				Single ho	use coem=		3.4				oanitary L	Orainage Pla	an, Dwgs.	. INO.							02 Feb 202	ა		of	6

SANITARY SEWER CALCULATION SHEET Manning's n=0.013 LOCATION RESIDENTIAL AREA AND POPULATION COMM INSTIT PARK C+I+I INFILTRATION PIPE STREET UNITS CUMULATIVE PEAK ACCU. ACCU. PEAK TOTAL RATIO FROM AREA PFAK ARFA ARFA ARFA ACCL TOTAL ACCU. INFILT SLOPE CAF VFL. DIST AREA POP. FACT. FLOW AREA AREA AREA FLOW AREA AREA FLOW FLOW (FULL) Q act/Q cap (FULL) (ACT.) (ha) (ha) (l/s) (ha) (ha) (ha) (l/s) (ha) (ha) (l/s) (%) (m/s) (m/s) 0.35 79A 80A 118 0.00 0.00 200 19.40 0.16 12 1.56 3.6 1.37 0.00 0.00 0.16 1.56 0.45 1.81 11.0 0.09 0.62 0.39 80A 85A 12 1.72 130 3.6 1.50 0.00 0.00 0.16 1.72 0.49 2.00 52.0 200 0.35 19.40 0.10 0.62 0.40 0.16 0.00 0.00 To CENTRELINE03, Pipe 85A - 86A 1.72 1.72 130 0.00 0.00 0.00 **CENTRELINE03** contribution From CENTRELINE05, Pipe 81A - 82A 0.00 23 0.00 0.00 0.24 0.24 0.24 82A 83A 0.40 30 0.64 53 3.6 0.63 0.00 0.00 0.00 0.00 0.40 0.64 0.18 0.81 73.5 200 0.35 19.40 0.04 0.62 0.30 83A 84A 0.47 35 1.11 88 3.6 1.03 0.00 0.00 0.00 0.00 0.47 1 11 0.32 1.35 77.0 200 0.35 19.40 0.07 0.62 0.35 3.6 1.35 0.42 1.77 0.35 19.40 84A 85A 0.37 28 1.48 116 0.00 0.00 0.00 0.00 0.37 1.48 66.0 200 0.09 0.62 0.38 Contribution From CENTRELINE05, Pipe 80A - 85A 1.72 130 0.00 0.00 0.00 1.72 3.20 86A 1.08 4.34 85A 0.59 44 3.79 290 3.5 3.26 0.00 0.00 0.00 0.00 0.59 3.79 109.5 250 0.25 29.73 0.15 0.61 0.43 87A 0.00 3.92 1.12 4.49 250 0.15 86A 0.13 10 3.92 300 3.5 3.37 0.00 0.00 0.00 0.13 13.0 0.25 29.73 0.61 0.43 87A 90A 16 316 3.5 3.54 0.00 0.00 0.00 1.18 4.72 53.0 250 0.25 29.73 0.16 0.61 0.44 0.21 4.13 0.00 0.21 4.13 To CENTRELINE02, Pipe 90A - 89A 4.13 316 0.00 0.00 0.00 4.13 CENTRELINE02 129A 93A 92A 29 3.7 0.35 0.00 0.00 0.39 0.00 0.00 0.39 0.39 0.46 62.5 26.44 93A 0.49 37 3.6 0.78 79.5 0.88 66 0.00 0.00 0.00 0.00 0.49 0.25 1.03 200 0.35 19.40 0.05 0.62 0.33 0.88 92A 91A 0.55 41 1.43 107 3.6 1.24 0.00 0.00 0.00 0.00 0.55 1.43 0.41 1.65 91.0 200 0.35 19 40 0.09 0.62 0.37 91A 90A 0.56 42 1.99 149 3.6 1.72 0.00 0.00 0.00 0.00 0.56 1.99 0.57 2.29 98.0 200 0.35 19.40 0.12 0.62 0.41 Contribution From CENTRELINE03, Pipe 87A - 90A 0.00 4.13 316 0.00 0.00 4.13 | 6.12 0.29 22 6.41 487 3.4 5.34 0.00 0.00 0.00 0.00 0.29 6.41 1.83 7.17 69.0 250 0.25 29.73 0.24 0.61 0.50 90A 89A 7.44 250 89A 65A 506 3.4 5.54 0.00 0.00 0.25 6.66 1.90 76.5 0.25 29.73 0.25 0.50 0.25 19 6.66 0.00 0.00 0.61 To CENTRELINE 16. Pipe 65A - 66A 506 0.00 0.00 6.66 6.66 0.00 CENTRELINE01 56A 57A 0.34 26 0.34 26 3.7 0.31 0.00 0.00 0.00 0.34 0.34 0.10 0.41 57.0 3.10 57.75 0.01 1.84 0.50 57A 58A 0.13 10 0.47 36 3.7 0.43 0.00 0.00 0.00 0.00 0.13 0.47 0.13 0.56 11.0 200 2.50 51.86 0.01 1.65 0.53 58A 60A 15 29.73 0.03 0.20 0.67 51 3.7 0.60 0.00 0.00 0.00 0.00 0.20 0.67 0.19 0.79 59.0 250 0.25 0.61 0.26 To CENTRELINE16, Pipe 60A - 64A 0.67 51 0.00 0.00 0.00 0.67 61A 62A 0.44 33 0.44 33 3.7 0.39 0.00 0.00 0.00 0.00 0.44 0.44 0.13 0.52 60.5 200 0.65 26.44 0.02 0.84 0.33 62A 63A 0.09 0.53 40 3.7 0.48 0.00 0.00 0.00 0.00 0.09 0.53 0.15 0.63 11.0 200 0.35 19.40 0.03 0.62 0.28 17 60.0 200 63A 64A 0.22 0.75 57 3.6 0.67 0.00 0.00 0.00 0.00 0.22 0.75 0.21 0.89 0.35 19.40 0.05 0.62 0.31 To CENTRELINE16, Pipe 64A - 65A 0.00 0.00 0.00 0.75 57 0.75 **CENTRELINE16** 3.7 0.19 9A 10A 0.21 16 0.21 16 0.00 0.00 0.00 0.00 0.21 0.21 0.06 0.25 28.0 200 2.75 54.39 0.00 1.73 0.42 To CENTRELINE11, Pipe 10A - 13A 0.21 16 0.00 0.00 0.00 128A ЗА 0.00 0.00 0.25 19 19 3.7 0.23 0.00 0.00 0.25 0.25 0.07 0.30 50.0 26.44 0.01 0.84 0.27 0.25 200 0.65 3A 2A 0.08 6 0.33 25 3.7 0.30 0.00 0.00 0.00 0.00 0.08 0.33 0.09 0.39 9.5 200 0.35 19.40 0.02 0.62 0.24 2A 10A 0.46 35 0.79 60 3.6 0.71 0.00 0.00 0.00 0.46 0.79 0.23 0.93 81.5 200 0.35 19.40 0.05 0.62 0.31 0.00 To CENTRELINE11, Pipe 10A - 13A 0.79 60 0.00 0.00 0.00 0.79 4A 5A 0.23 0.23 18 3.7 0.22 0.00 0.00 0.00 0.00 0.23 0.23 0.07 0.28 55.5 200 0.65 26.44 0.01 0.84 0.27 18 6A 18 0.47 36 3.7 0.43 0.00 0.24 0.47 0.13 60.5 200 0.35 19.40 0.03 0.62 0.27 5A 0.24 0.00 0.00 0.00 0.56 7A 6A 0.10 8 0.57 44 3.7 0.52 0.00 0.00 0.00 0.00 0.10 0.57 0.16 0.68 18.0 200 0.35 19.40 0.04 0.62 0.29 DESIGN PARAMETERS ROJECT 1278 Caivan-Perth Park Flow = 9300 L/ha/da 0.10764 I/s/Ha M.S. Average Daily Flow = 280 I/n/day Industrial Peak Factor = as per MOE Graph Comm/Inst Flow : 28000 L/ha/da 0.3241 Extraneous Flow = 0.286 L/s/ha Checked: LOCATION: ndustrial Flow = 35000 0.40509 I/s/Ha 0.600 m/s W.L. Town of Perth L/ha/da Minimum Velocity = 4.00 0.013 (Pvc) 0.013 Max Res. Peak Factor = Manning's n = (Conc)

Dwg. Reference:

Sanitary Drainage Plan, Dwgs. No.

File Ref:

Commercial/Inst./Park Peak Factor =

Institutional =

1.00

l/s/Ha

0.32

Townhouse coeff=

Single house coeff=

2.7

34

Sheet No.

of

02 Feb 2023

SANITARY SEWER CALCULATION SHEET Manning's n=0.013 LOCATION RESIDENTIAL AREA AND POPULATION СОММ INSTIT PARK C+I+I INFILTRATION PIPE UNITS CUMULATIVE ACCU. PEAK TOTAL RATIO STREET FROM PFAK PFAK ARFA ACCU ARFA ARFA ACCU TOTAL ACCU. INFILT. SLOPE CAP VFL. DIST AREA POP. FACT. FLOW AREA AREA AREA FLOW AREA AREA FLOW FLOW (FULL) Q act/Q cap (FULL) (ha) (ha) (l/s) (ha) (ha) (l/s) (ha) (l/s) (m/s) (m/s) (ha) 7A 8A 71 3.6 0.83 0.27 19.40 0.36 27 0.93 0.00 0.00 0.00 | 0.00 | 0.36 0.93 1.10 87.0 200 0.35 0.06 0.62 0.33 8A 22A 24 1.25 3.6 0.00 0.20 0.02 0.52 1.45 0.41 1.54 85.5 200 0.35 19.40 0.08 0.32 95 0.00 0.20 0.62 0.37 To CENTRELINE1006, Pipe 22A - 23A 1.45 1.25 95 0.00 0.00 0.20 110A 111A 0.17 13 3.7 0.16 0.00 0.00 0.00 0.00 0.17 0.17 0.05 0.21 31.5 200 0.65 26.44 0.01 0.84 0.24 0.17 13 0.00 Contribution From CENTRELINE15, Pipe 109A - 111A 0.37 24 0.00 0.00 0.37 0.54 111A 112A 0.36 27 0.90 64 3.6 0.75 0.00 0.00 0.00 0.00 0.36 0.90 0.26 1 01 69.5 200 0.35 19.40 0.05 0.62 0.33 112A 113A 0.39 29 1.29 93 3.6 1.09 0.00 0.00 0.00 0.00 0.39 1.29 0.37 1.45 69.5 200 0.35 19.40 0.07 0.62 0.36 113A 114A 0.13 10 1.42 103 3.6 1.20 0.00 0.00 0.00 0.00 0.13 1.42 0.41 1.61 10.5 200 0.35 19.40 0.08 0.62 0.37 114A 115A 0.23 18 1.65 121 | 3.6 | 1.40 0.00 0.00 0.00 | 0.00 | 0.23 | 1.65 0.47 1.87 41.0 200 0.35 19.40 0.10 0.62 0.39 115A 3.6 1.40 0.00 0.00 0.09 1.74 0.50 0.70 116A 0.09 0 1.74 121 0.00 0.00 1.90 51.5 200 1.85 44.61 0.04 1.42 116A 119A 0.58 43 2.32 164 3.5 1.88 0.00 0.00 0.00 | 0.00 | 0.58 | 2.32 0.66 2.55 134.0 200 0.35 19.40 0.13 0.62 0.42 Contribution From CENTRELINE1008, Pipe 118A - 119A 0.00 0.69 3.01 0.69 52 0.00 0.00 3.5 2.59 0.90 119A 0.15 3.16 228 0.00 0.00 0.00 0.00 0.15 3.16 3.49 60.0 0.35 19.40 0.18 0.62 Contribution From CENTRELINE17 CENTRELINE1001, Pipe 123A - 124A 1.17 0.00 0.00 0.00 1.17 4.33 3.5 3.53 125A 0.02 4.35 315 0.00 0.00 0.00 0.00 0.02 4.35 1.24 4.77 13.5 200 0.35 19.40 0.25 0.62 0.51 315 3.5 3.53 126A 0 0.00 0.00 0.04 4.39 1.26 26.5 200 0.35 0.25 0.62 0.51 125A 0.04 4.39 0.00 0.00 4.78 19.40 To CENTRELINE1008, Pipe 126A - 127A 4.39 315 0.00 0.00 0.00 4 39 59A 60A 0.18 0 0.18 0.00 0.00 0.00 0.00 0.18 0.18 0.05 0.05 82.0 200 0.65 26.44 0.00 0.84 0.15 Contribution From CENTRELINE01, Pipe 58A - 60A 0.67 51 0.00 0.00 0.00 0.67 0.85 60A 64A 0.60 45 1.45 96 3.6 1.12 0.00 0.00 0.00 0.00 0.60 1.45 0.41 1.53 139.0 250 0.25 29.73 0.05 0.61 0.31 Contribution From CENTRELINE01, Pipe 63A - 64A 0.75 2.20 57 0.00 0.00 0.00 0.75 0.20 1.00 2.88 250 0.25 29.73 0.10 64A 65A 0 2.40 153 3.6 1.76 0.00 0.00 1 11 1.11 0.12 1.31 3.51 93.0 0.61 0.38 Contribution From CENTRELINE02, Pipe 89A - 65A 6.66 506 0.00 0.00 0.00 6.66 10.17 10.16 29.73 66A 0.09 2.93 65A 9.15 659 3.3 0.00 0.00 1.11 0.12 0.09 10.26 44.0 250 0.61 66A 67A 0.04 3.3 7.11 0.00 0.00 0.12 10.17 19.0 250 29.73 0.34 0.61 0.55 0 9.19 659 1.11 0.04 10.30 2.95 0.25 67A 68A 0.11 9.30 3.3 7.11 0.00 0.00 1.11 0.12 0.11 10.41 2.98 10.20 53.5 250 0.25 29.73 0.34 0.61 0.55 0 659 68A 69A 0.05 9.35 659 3.3 7.11 0.00 0.00 0.12 2.99 10.22 15.0 250 0.25 29.73 0.34 0.55 1 11 0.05 10.46 0.61 0 69A 70A 0.54 40 9.89 699 3.3 7.51 0.00 0.00 1.11 0.12 0.54 11.00 3.15 10.78 84.5 300 0.20 43.25 0.25 0.61 0.51 70A 71A 0.73 55 10.62 754 3.3 8.07 0.00 0.00 1.11 0.12 0.73 11.73 3.35 11.54 115.5 0.20 43.25 0.52 300 0.27 0.61 71A 72A 0.69 52 11.31 806 3.3 8.59 0.00 0.00 1.11 0.12 0.69 12.42 3.55 12.26 105.0 300 0.20 43.25 0.28 0.61 0.52 72A 73A 0.49 37 11.80 843 3.3 8.95 0.00 0.00 1.11 0.12 0.49 12.91 3.69 12.77 81.0 300 0.20 43.25 0.30 0.61 0.53 73A 101A 0.51 38 12.31 881 3.3 9.33 0.00 0.00 1.11 0.12 0.51 13.42 3.84 13.29 78.0 300 0.20 43.25 0.31 0.61 0.54 Contribution From CENTRELINE05, Pipe 100A - 101A 3.21 305 0.00 0.00 0.00 3.21 16.63 102A 0.26 20 1206 3.2 12.49 0.00 0.12 4.83 17.44 60.5 300 0.20 43.25 0.40 0.61 0.58 101A 15.78 0.00 1.11 0.26 16.89 Contribution From CENTRELINE1006, Pipe 55A - 102A 16.67 1346 0.00 0.00 0.20 16.87 33.76 103A 3.0 25.05 0.34 26 1.31 0.14 0.34 34.10 9.75 34.94 300 0.20 43.25 102A 32.79 2578 0.00 0.00 60.5 0.81 0.61 0.68 104A 0.09 3.0 25.11 0.00 1.31 0.14 9.78 35.03 0.20 103A 2585 0.00 0.09 34.19 13.0 300 43.25 0.81 0.61 0.68 32.88 3.0 25.31 104A 106A 0.00 0.00 0.92 2.23 0.24 1.23 35.42 10.13 35.68 0.15 0.53 0.31 23 2608 126.5 375 67.91 0.61 0.62 33.19 Contribution From CENTRELINE1008, Pipe 105A - 106A 0.68 51 0.00 0.00 0.00 0.68 36.10 126A 0.02 0 33.89 2659 3.0 25.76 0.00 0.00 2.23 0.24 0.02 36.12 10.33 36.33 17.5 375 0.15 67.91 0.53 0.61 0.62 To CENTRELINE1008, Pipe 126A - 127A 33.89 2659 0.00 0.00 2.23 36.12 CENTRELINE1008 Contribution From CENTRELINE16, Pipe 106A - 126A 33.89 2659 0.00 0.00 2.23 36.12 36.12 Contribution From CENTRELINE16, Pipe 125A - 126A 4.39 40.51

				DESIGN PA	RAMETE	RS							Designe	d:		PROJEC [*]	Τ:				
Park Flow =		9300	L/ha/da	0.10764	l/s/Ha								M.S.						1278	Caivan-l	Per
Average Daily Flow =	=	280	l/p/day				Industrial	Peak Fact	or = as p	er MOE G	iraph										
Comm/Inst Flow =		28000	L/ha/da	0.3241	l/s/Ha		Extraneou	s Flow =		0.286	L/s/ha		Checked	d:		LOCATIO	N:				
Industrial Flow =		35000	L/ha/da	0.40509	l/s/Ha		Minimum '	Velocity =		0.600	m/s		W.L.							Town o	of P
Max Res. Peak Facto	or =	4.00					Manning's	n =	(Conc)	0.013	(Pvc)	0.013									
Commercial/Inst./Par	rk Peak Factor =	1.00					Townhous	se coeff=		2.7			Dwg. Re	ference:		File Ref:			Date:		
Institutional =		0.32	l/s/Ha				Single hou	use coeff=		3.4			Sanitary I	Drainage Plan, Dw	gs. No.					02 Feb 2023	3

0.00

0.00

0.00

0.00

2.23 0.24 0.06 40.57

11.60

40.34

11.0 375

0.15

67.91

n-Perth

of Perth

0.59

0.61

Sheet No.

of

4.39

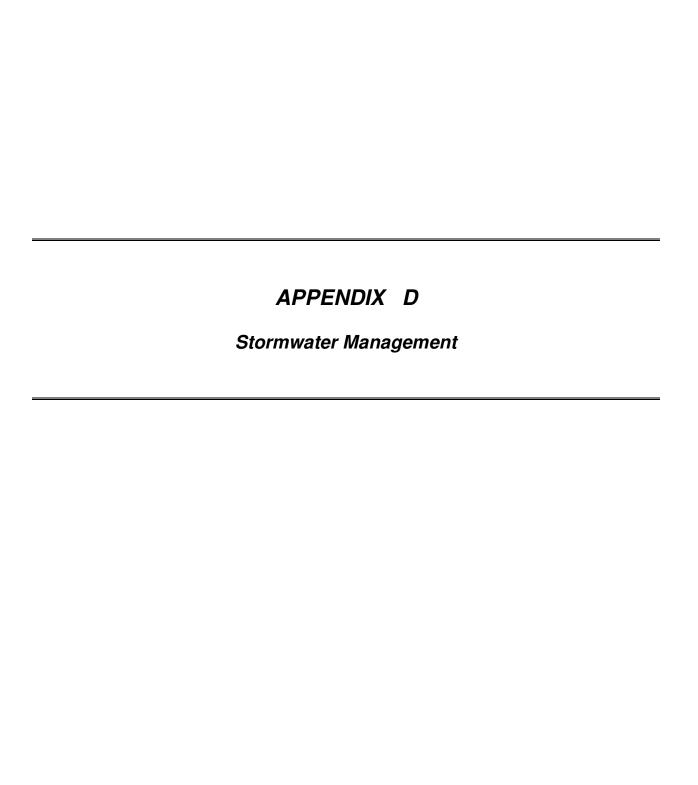
38.34

0.06

315

2974 3.0 28.49

NING'S N=0.013 LOCATION STREET	FROM M.H.	TO M.H.	RI AREA	ESIDENTIA	I ARFA AN																						
				-		D POPULATI	ON			CC	MM	INS	STIT	PA	RK	C+I+I	1	INFILTRATIO	N .	I	1			PIPE			
				UNITS		CUMU	ILATIVE POP.	PEAK FACT.	PEAK FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW	TOTAL FLOW	DIST	DIA	SLOPE	CAP. (FULL)	RATIO Q act/Q cap	(FULL)	ÆL.
			(ha)	+	1	(ha)			(l/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(I/s)	(m)	(mm)	(%)	(l/s)		(m/s)	(m
			-																								\vdash
																											\vdash
																											lacksquare
+			+																								╁
																											上
						1																					╀
																											╁
		-		-															-				-				+
																											t
																											I
			+												-		-		-								+
																											t
																											I
			+			1																					+
																											t
																											Į
+			+																								╁
																											İ
																											Ŧ
																											+
																											İ
			-																								Ŧ
+			+																								t
																											İ
																											Ŧ
																											t
																											Į
				1															-				-				+
																											t
																											f
		-	+												-				-				-				+
																											İ
																											Ŧ
			+												 												+
I			DESIGN PA		ERS	•	•		•	•			Designed	i:		•		PROJEC	Ť:		•						_
ow =	9300	L/ha/da	0.10764	I/s/Ha									M.S.									1278	B Caivan-I	Perth			
e Daily Flow = Inst Flow =	280 28000	l/p/day L/ha/da	0.3344	l/s/Ha		Industrial Extraneou		tor = as p		Graph L/s/ha			Checked					LOCATIO	NI:								_
ial Flow =	35000	L/na/da L/ha/da	0.3241			Minimum			0.600				W.L.	•				LOCATIC	/1 N.				Town o	f Perth			
s. Peak Factor =	4.00		2.70000	37. 10		Manning's	s n =	(Conc)	0.013		0.013																
ercial/Inst./Park Peak Factor = ional =	1.00 0.32	l/s/Ha				Townhous Single ho			2.7 3.4				Dwg. Ref Sanitary D	erence:	lan P	Ne		File Ref:				Date:	02 Feb 2023	,		Sheet No	



STORM SEWER CALCULATION SHEET (RATIONAL METHOD) Local Roads Return Frequency = 2 years Collector Roads Return Frequency = 5 years Manning 0.013 Arterial Roads Return Frequency = 10 years

I = Rainfall Intensity (mm/h)

R = Runoff Coefficient

Manning	0.013	;	Arterial Ro	oads Return	Frequency	= 10 years																											
	LOC	ATION								ARE/	A (Ha)										_	LOW		I					SEWER DA				
				2 Y	EAR			5 YEAF				10 Y	EAR			100	YEAR					Intensity		Peak Flow	DIA. (mm)	DIA. (mm) TYPE	SLOPE	LENGTH	CAPACITY	VELOCIT	TIME OF	RATI
Location	From Nod	e To Node	AREA (Ha)	R	Indiv.	Accum. 2.78 AC	AREA (Ha)			Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	Conc. (min)	2 Year (mm/h)		10 Year (mm/h)	100 Year (mm/h)	O (1/s)	(actual)	(nominal)	1	(%)	(m)	(l/s)	(m/s)	LOW (min	O/O f
Location	1 Tom I tou	10 Node	(1.0)		2.70710	2.70710	(1.0)			2.70710	(1.14)		2.70710	2.70710	(1.0)		2.70710	2.70710	(11111)	(11111/11)	(!!!!!/!)	(11111/11)	(111111/11)	Q (13)	(actuar)	(HOHIHIAI)	+	(70)	(111)	(13)	(1123)	LOW (IIII	Q/Q 1
CENTRE	LINE01																																
	151	13	0.21	0.66	0.39	0.39			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19		178.56	30	300	300	PVC	0.35	56.5	57.2089		1.1635	0.51
	13	12	0.13	0.66	0.24	0.62			0.00	0.00			0.00	0.00			0.00	0.00	11.16	72.61			168.58	45	300	300	PVC	0.35	13.5	57.2089	0.8093		0.792
	12	11	0.39	0.66	0.72	1.34 2.02			0.00	0.00			0.00	0.00			0.00	0.00	11.44 12.65	71.68 67.93	97.15 92.01	113.85 107.79	166.37 157.49	96 137	450 450	450 450	CONC	0.25 2.80	65.0 61.5	142.5531 477.0738	0.8963 2.9997		0.673
-	2	3	0.37	0.66	0.08	2.02			0.00	0.00			0.00	0.00			0.00	0.00	12.05	66.95			157.49	151	450	450	CONC		13.5	408.2099	2.5667		0.287
	3	5	0.20	0.66	0.37	2.62			0.00	0.00			0.00	0.00			0.00	0.00	13.08	66.71		105.81	154.58	175	675	675	CONC		63.5	325.5584	0.9098	1.1633	0.538
To CENT		6, Pipe 5 -				2.62				0.00				0.00				0.00	14.24														
	LINE1002																																
Contribut			NE16, Pip	e 8 - 9		2.62				0.92				0.00				0.00	18.62														
——	9	10			0.00	2.62			0.00	0.92			0.00	0.00			0.00	0.00	18.62		73.43	85.95	125.43	210	750	750	CONC		17.5	369.2322			0.569
-	10	HW1			0.00	2.62			0.00	0.92			0.00	0.00			0.00	0.00	18.97	53.75	72.60	84.97	123.99	208	750	750	CONC	0.11	28.5	369.2322	0.8358	0.5683	0.562
CENTRE	LINE02																																
	154	30	0.39	0.66	0.72	0.72			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	55	375	375	PVC	0.30	58.0	96.0323	0.8695	1.1118	0.572
	30	24	0.48	0.66	0.88	1.60			0.00	0.00			0.00	0.00			0.00	0.00	11.11	72.78	98.67	115.63	169.00	116	750	750	CONC	0.11	83.0	369.2322	0.8358		0.315
	24	25	0.55	0.66	1.01	2.61			0.00	0.00			0.00	0.00			0.00	0.00	12.77	67.60	91.54	107.25	156.68	176	750	750	CONC	0.11	87.5	369.2322	0.8358		0.477
T. OFNI	25	26	0.58	0.66	1.06	3.67			0.00	0.00			0.00	0.00			0.00	0.00	14.51	62.94	85.17	99.75	145.68	231	750	750	CONC	0.11	101.0	369.2322	0.8358	2.0141	0.626
		3, Pipe 26	- 27 NE16, Pip	15.22	-	3.67 1.23		+-+		0.00				0.00				0.00	16.53 13.09	-	-	-		-	-		-	-	-		-	-	
			NE16, Pip			1.05				1.49				0.00				0.00	14.45														
Contribut	22	23	0.26	0.66	0.48	2.76			0.00	2.40			0.00	0.00			0.00	0.00	14.45	63.09	85.37	99.99	146.03	379	825	825	CONC	0.11	81.0	476.0801	0.8906	1.5158	0.796
	23	26	0.26	0.66	0.48	3.23			0.00	2.40			0.00	0.00			0.00	0.00	15.97		80.56		137.72	386	825	825	CONC		66.0	476.0801			0.811
To CENT	RELINE03	3, Pipe 26	- 27			3.23				2.40				0.00				0.00	17.20														
CENTRE	LINE03																																
Contribut			NE05, Pip			0.64				0.00				0.00				0.00	11.78														
	33	34	0.40	0.66	0.73	1.38			0.00	0.00			0.00	0.00			0.00	0.00	11.78	70.58		112.07	163.77	97	750	750	CONC	0.11	76.5	369.2322			0.263
	34 35	35 43	0.46	0.66	0.84	2.22			0.00	0.00			0.00	0.00			0.00	0.00	13.31	66.08 62.17		104.79 98.49	153.08 143.84	147 182	750 750	750 750	CONC	0.11	76.5 69.0	369.2322 369.2322			0.397 0.494
Contribut			NE05, Pip		0.12	3.16			0.00	0.00			0.00	0.00			0.00	0.00	16.22	02.17	04.10	50.40	140.04	102	100	700	00110	0.11	00.0	000.2022	0.0000	1.0700	0.404
		44		0.66	0.22	6.31			0.00	0.00			0.00	0.00			0.00	0.00	16.22	59.03	79.82	93.45	136.44	373	825	825	CONC	0.11	32.5	476.0801	0.8906	0.6082	0.783
		003, Pipe 4				6.31				0.00				0.00				0.00	16.83														
			NE02, Pip			3.23				2.40				0.00				0.00	17.20														
Contribut	26	JENTRELI 27	NE02, Pip		0.33	3.67 7.23			0.00	0.00 2.40			0.00	0.00			0.00	0.00	16.53 17.20	57.02	77.06	90.21	131.68	598	975	975	CONC	0.11	F4 F	743.2733	0.9955	0.8622	0.804
	27	28	0.18	0.66	0.33	7.23			0.00	2.40			0.00	0.00			0.00	0.00	18.06	55.37		87.57	127.80	596	975	975	CONC	0.11	51.5 15.0	743.2733			0.804
	28	44	0.44	0.66	0.81	8.32			0.00	2.40			0.00	0.00			0.00	0.00	18.32	54.91			126.72	635	1050	1050	CONC		75.0	905.6791			0.701
To CENT	RELINE10	003, Pipe 4	4 - 45			8.32				2.40				0.00				0.00	19.51														
CENTRE	LINE1003	<u> </u>																															
			NE03, Pip			8.32				2.40				0.00				0.00	19.51														
Contribut			NE03, Pip			6.31			205	0.00				0.00				0.00	16.83		1	05.1	40:		46	46	05:::		05.7	4500			
	44 45	45 HW2	0.03	0.66	0.06	14.68 14.68			0.00	2.40			0.00	0.00			0.00	0.00	19.51 19.87		71.34 70.53		121.83 120.43	947 937	1200 1200	1200 1200	CONC		29.0 15.0	1509.9717 1509.9717			0.627 0.620
CENTE	1 151545 2	ENTES: "	154004						-																								
		ENTRELII	NE1001 NE07, Pip	0.66 70		1.56				0.00				0.00				0.00	12.66		-	-											
			NE07, Pipi		<u> </u>	0.70		+		0.00				0.00				0.00	11.22	_	+				1		+	1			 	 	
	70	73			0.07	2.33			0.00	0.00			0.00	0.00			0.00	0.00	12.66	67.90	91.96	107.74	157.41	158	600	600	CONC	0.15	53.5	237.8056	0.8411	1.0602	0.665
To CENT	RELINE17		LINE1001		74	2.33				0.00				0.00				0.00	13.72														
	1	-																															
	1																																
	+	+		 	+			+ +											1		+	<u> </u>		 	1			1	1		1	 	
Definition	s:	1	1	1	-	1							l				1		1	-	-	-	-	Designed	:		PROJECT	:	1	I	-	1	
	AIR, where								1	Notes:														M.S.			1278 Caiv						
		res per seco	nd (L/s)								Rainfall-Inte													Checked:			LOCATIO	ON:					
	in hectares								:	2) Min. Vel	ocity = 0.80	m/s												W.L.			File Def:			Town of	Perth	Sheet No.	
i = Rainfa	II Intensity (mm/h)																															

Sheet No. SHEET 1 OF 6

02 Feb 2023

Dwg. Reference:

File Ref:

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years Collector Roads Return Frequency = 5 years Arterial Roads Return Frequency = 10 years

			Collector F																														
Manning	0.013		Arterial Ro	oads Return	Frequency	= 10 years																											
	LOCA	ATION								ARE	A (Ha)	40.1/5				400.1	/F.A.D.		m: c			LOW	I	D 1 E1	DIA ()	DIA ()	TATA	OI OBE	SEWER DA		TEX OCTES	TTD CE OF	D LTTO
				2 Y	EAR			5 Y	EAR		1051	10 YE				100 Y								Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
Location	From Node	To Node	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum.	AREA (Ha)	R	Indiv. 2.78 AC	Accum.	Conc. (min)	2 Year (mm/h)	5 Year (mm/h)		100 Year (mm/h)	O (1/e)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	O/O full
Location	Prom Node	10 Noue	(па)		2.76 AC	2.76 AC	(па)		2.76 AC	2.76 AC	(па)		2.76 AC	2.76 AC	(па)		2.76 AC	2.76 AC	(111111)	(11111/11)	(111111/11)	(111111/11)	(11111/11)	Q (1/s)	(actual)	(Hollillai)		(70)	(m)	(1/8)	(111/8)	LOW (IIIII	Q/Q Iuli
CENTRE	LINE17 CE	NTDELI	IE4004																														
	ion From C			ITDEI INE	1001 Dine	2.33				0.00				0.00				0.00	13.72													$\overline{}$	
	ion From C					0.46				0.00				0.00				0.00	11.14													-	
	ion From C					0.53				0.00				0.00				0.00	10.96													-	
Continua	73	74	1121000,1	.po.r	0.00	3.32			0.00	0.00			0.00	0.00			0.00	0.00	13.72	64.96	87.93	102.99	150.44	216	675	675	CONC	0.15	118.5	325.5584	0.9098	2.1709	0.663
	74	79	0.63	0.66	1.16	4.48			0.00	0.00			0.00	0.00			0.00	0.00	15.89	59.74		94.59	138.10	267	675	675	CONC	0.15	8.5	325.5584		0.1557	0.821
To CENT	RELINE16					4.48				0.00				0.00			0.00	0.00	16.05														
																																,	
CENTRE	LINE1008																															,	
	71	73	0.25	0.66	0.46	0.46			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	35	450	450	CONC	0.20	55.0	127.5033	0.8017	1.1434	0.276
To CENT	RELINE17	CENTRE	LINE1001,	Pipe 73 -	74	0.46				0.00				0.00				0.00	11.14													, , ,	
																																'	
	72	73	0.29	0.66	0.53	0.53			0.00	0.00			0.00	0.00			0.00	0.00		76.81	104.19	122.14	178.56	41	375	375	PVC	0.30	50.0	96.0323	0.8695	0.9584	0.426
To CENT	RELINE17	CENTRE	LINE1001,	Pipe 73 -	74	0.53				0.00				0.00				0.00	10.96													<u> </u>	
					L	1			L.									_				ļ		<u> </u>					l			<u> </u>	
- 05:::	81	82	0.68	0.66	1.25	1.25			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	96	450	450	CONC	0.20	117.0	127.5033	0.8017	2.4324	0.752
To CENT	RELINE16	, Pipe 82	- 83			1.25				0.00				0.00				0.00	12.43													 '	
—	76	77	0.67	0.66	1.23	1.23	-	-	0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.10	122.14	178.56	94	450	450	CONC	0.20	119.5	127.5033	0.0017	2.4843	0.741
	76		0.67	0.00	0.00				0.00				0.00				0.00						158.64									0.1767	
To CENT	77 RELINE16	78 Dina 79	70		0.00	1.23			0.00	0.00			0.00	0.00			0.00	0.00	12.48 12.66	68.42	92.68	108.58	158.64	84	450	450	CONC	0.20	8.5	127.5033	0.8017	0.1767	0.000
10 CENT	KELINE 10	, ripe 76	- 79 			1.23				0.00				0.00				0.00	12.00													$\overline{}$	
CENTRE	I INFO4																															-	
OLIVING.	19	20	0.57	0.66	1.05	1.05			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104 19	122.14	178.56	80	450	450	CONC	0.20	100.0	127.5033	0.8017	2 0789	0.630
To CENT	RELINE16			0.00	1.00	1.05			0.00	0.00			0.00	0.00			0.00	0.00	12.08	7 0.0 1	101110	122	110.00		100	100	00.10	0.20	100.0	121.0000	0.0011	2.0700	0.000
10 02.11		,po <u></u>	Γ.							0.00				0.00				0.00	12.00														
	46	47	0.69	0.66	1.27	1.27			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	97	375	375	PVC	0.50	108.5	123.9771	1.1225	1.6110	0.784
	47	48	0.63	0.66	1.16	2.42			0.00	0.00			0.00	0.00			0.00	0.00	11.61	71.13	96.39	112.95	165.06	172	600	600	CONC	0.15	104.5	237.8056	0.8411	2.0708	0.724
	48	49	0.48	0.66	0.88	3.30			0.00	0.00			0.00	0.00			0.00	0.00	13.68	65.06	88.07	103.16	150.69	215	600	600	CONC	0.20	79.0	274.5943	0.9712	1.3557	0.783
	49	51	0.42	0.66	0.77	4.07			0.00	0.00			0.00	0.00			0.00	0.00	15.04	61.68	83.44	97.71	142.69	251	750	750	CONC	0.11	79.0	369.2322	0.8358	1.5754	0.680
To CENT	RELINE05	, Pipe 51	- 56			4.07				0.00				0.00				0.00	16.61													'	
																																└─ ─	
CENTRE	_																																
	31	32	0.12	0.66	0.22	0.22			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81			178.56	17	300	300	PVC	0.35	26.0	57.2089	0.8093	0.5354	0.296
- 05117	32	33	0.23	0.66	0.42	0.64			0.00	0.00			0.00	0.00			0.00	0.00	10.54	74.81	101.45	118.91	173.81	48	300	300	PVC	0.35	60.5	57.2089	0.8093	1.2459	0.840
TO CENT	RELINE03	, Pipe 33	- 34			0.64				0.00				0.00				0.00	11.78			-											
-	50	51	0.11	0.66	0.20	0.20			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76 01	104.10	122.14	178.56	16	300	300	PVC	3.00	24.5	167.4906	2 2605	0.1723	0.003
Contribut	ion From C				0.20	4.07			0.00	0.00			0.00	0.00			0.00	0.00	16.61	70.01	104.19	122.14	170.30	10	300	300	PVC	3.00	24.5	167.4900	2.3093	0.1723	0.093
Sommout	51	56	0.23	0.66	0.42	4.70			0.00	0.00			0.00	0.00			0.00	0.00	16.61	58.21	78.68	92.12	134.49	273	825	825	CONC	0.11	68.5	476.0801	0.8906	1.2819	0.574
To CENT	RELINE16			0.00	0.72	4.70			0.00	0.00			0.00	0.00			0.00	0.00	17.89	00.21	7 3.00	V2.12	10-773	10	020	020	55140	0.11	55.5	77 0.0001	0.0000	1.2010	0.017
1.0 02111		,pc 50	Ī			1 5				0.00				0.00				0.00	55														
	36	37	0.18	0.66	0.33	0.33			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	25	300	300	PVC	0.35	37.0	57.2089	0.8093	0.7619	0.443
	37	38	0.08	0.66	0.15	0.48			0.00	0.00			0.00	0.00			0.00	0.00	10.76	74.00			171.88	35	375	375	PVC	0.30	13.5	96.0323	0.8695	0.2588	0.368
	38	39	0.42	0.66	0.77	1.25			0.00	0.00			0.00	0.00			0.00	0.00	11.02	73.10	99.09	116.14	169.74	91	600	600	CONC	0.15	71.0	237.8056	0.8411	1.4069	0.384
	39	40	0.41	0.66	0.75	2.00			0.00	0.00			0.00	0.00			0.00	0.00	12.43	68.59			159.04	137	600	600	CONC	0.15	70.5	237.8056	0.8411	1.3970	0.577
	40	41	0.33	0.66	0.61	2.61			0.00	0.00			0.00	0.00			0.00	0.00	13.82	64.69			149.80	169	600	600	CONC	0.15		237.8056	0.8411	1.1295	0.709
	41	42	0.13	0.66	0.24	2.84			0.00	0.00	\Box		0.00	0.00			0.00	0.00	14.95	61.88	83.71	98.03	143.15	176	600	600	CONC	0.15	13.5	237.8056	0.8411	0.2675	0.740
	42	43	0.17	0.66	0.31	3.16			0.00	0.00			0.00	0.00			0.00	0.00	15.22	61.25	82.85	97.02	141.67	193	750	750	CONC	0.11	50.0	369.2322	0.8358	0.9971	0.524
To CENT	RELINE03	, Pipe 43	- 44			3.16				0.00				0.00				0.00	16.22			1										 '	
OFNES	 					1																											
	LINE1004 ion From C	ENITOE	NE16 Din	64 92		9.22			-	E 71				0.00				0.00	21.45			-											
	ion From C				-	8.62	-	-	-	5.71 0.00				0.00				0.00	17.26		-	-		-	-				-				
Contribut	83	ENTRELI 84	iv⊏io, Pipe T	02 - 83	0.00	17.85			0.00	5.71			0.00	0.00			0.00	0.00	21.45	49.82	67.23	78.66	114.74	1273	1200	1200	CONC	0.15	13.5	1509.9717	1 2251	0.1685	0.843
-	84	HW3			0.00	17.85			0.00	5.71			0.00	0.00			0.00	0.00	21.45	49.82			114.74	1273	1200	1200		0.15	7.5	1509.9717		0.1685	0.839
	04	11449			0.00	17.00	 		0.00	J./ I	 		0.00	0.00			0.00	0.00	21.01	45.01	00.90	10.21	114.17	1200	1200	1200	CONC	0.10	1.0	1305.8111	1.5551	0.0330	0.039
						 																										$\overline{}$	
Definition	3:	1	1	1	1	1	-	1	-	1									-	1	1	-		Designed:			PROJECT		1				
Q = 2.78 A										Notes:														M.S.			1278 Caiva						
1.	′																																

Q = 2.78 AIR, where Q = Peak Flow in Litres per second (L/s) A = Areas in hectares (ha)

I = Rainfall Intensity (mm/h) R = Runoff Coefficient

1) Ottawa Rainfall-Intensity Curve

2) Min. Velocity = 0.80 m/s

LOCATION: Checked: W.L. Town of Perth Dwg. Reference: File Ref: Sheet No. SHEET 2 OF 6

02 Feb 2023

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years Collector Roads Return Frequency = 5 years Arterial Roads Return Frequency = 10 years

DOUBLE The Part	Mi 0.012	Collector Roads R																														
Control Cont	Manning 0.013	Arteriai Roads Rei	urn Freq	uency =	= 10 years				ΔRF	Δ (Ha)								1		F	I OW							SEWED DA				
Company Comp	LOCATION		2 YEAR				5 `	YEAR	7412	1	10 Y	/EAR			100`	YEAR		Time of	Intensity			Intensity	Peak Flow	DIA. (mm)	DIA. (mm	TYPE	SLOPE			VELOCIT	TIME OF	RATIO
Process Proc		APEA			Accum.	AREA	I		Accum.	AREA			Accum.	AREA			Accum.							()	(,						
Description Company	Location From Node To Node	(Ha)	2.7	78 AC	2.78 AC	(Ha)	IX	2.78 AC	2.78 AC	(Ha)	- 1	2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
Continue Continue	CENTREI INEGO														-	 																
Comment Comm		0.63 0.60	6 1	1 16	1 16			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104 19	122 14	178.56	89	450	450	CONC	0.20	98.5	127 5033	0.8017	2 0478	0.696
CENTRELANDES 19 1 3.0 56 505 505 150 300 300 300 300 300 300 300 300 300 3		0.00		_																												0.632
13 1 20 20 20 20 20 20 20	To CENTRELINE08, Pipe 10	1 - 102			1.16				0.00				0.00				0.00	12.32														
13 1 20 20 20 20 20 20 20															<u> </u>															<u> </u>		
Fig. Fig.		0.20 0.60) E E	0.55			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76 01	104.10	122.14	170 EG	42	600	600	CONC	0.15	E2 E	227 9056	0.0411	1.0602	0.178
B			').55				0.00				0.00				0.00			70.01	104.19	122.14	170.30	42	000	000	CONC	0.13	33.3	237.8030	0.0411	1.0002	0.176
## 87 0.28 0.88 0.37 0.79 0.00 0																																
97 98 010 000 038 048 074 050 000 000 000 000 000 000 000 000 00																																0.567
B 10 10 10 60 02 12 10 00 00 00 00 0		0.00																														0.607
Controlled From CENTRELINGS Pige 100 - 191																																0.723 0.672
11 102 103 0.86 0.15 2.86 0.00				7.24				0.00				0.00				0.00			70.00	33.34	112.40	104.23	- 00	430	430	CONC	0.20	33.3	127.3033	0.0017	0.7300	0.072
133 104 117 066 027 230 0.00).18				0.00	0.00			0.00				0.00	0.00		68.52	92.82	108.75	158.88	175	525	525	CONC	0.25	29.5	215.0311	0.9933	0.4950	0.813
Commission From Cell No. 10.0 0.07 0.08 0.13 3.03 0.00 0																																0.836
Centreline 100															<u> </u>																	0.808
Contriction From CENTRELINFOOK Pipe 92 - 94			9 0).13				0.00				0.00				0.00			65.53	88.72	103.92	151.80	198	750	750	CONC	0.11	13.5	369.2322	0.8358	0.2692	0.537
Controller From CENTRELINGS Pipe 13: -94 0.40 0.00			- 94													\vdash															-	
CENTRELINEION Fig.																																
GENTRELINESIO, Pipe 14-105 Commission From Centrelinesio, Pipe 14-105 Commission From Centrelinesio, Pipe 14-105 To Centrelinesio From Centrelinesio, Pipe 14-105 To Centrelinesio From Centrelinesio, Pipe 14-105 To Centrelinesio From Centrelinesio, Pipe 14-105 To Centrelinesio From Centrelinesio, Pipe 14-105 To Centrelinesio From Centrelinesio, Pipe 14-105 To Centrelinesio From Centrelinesio, Pipe 14-105 To Centrelinesio From Centrelinesio, Pipe 14-105 To Centrelinesio From Centrelinesio, Pipe 14-105 To Centrelinesio From Centrelinesio, Pipe 14-105 To Centrelinesio From Centrelinesio, Pipe 14-105 To Centrelinesio From Centrelinesio, Pipe 14-105 To Centrelinesio From Centrelin			6 0	0.90				0.00				0.00				0.00			50.89	68.69	80.38	117.26	366	825	825	CONC	0.11	90.0	476.0801	0.8906	1.6843	0.769
Contribution From CENTRELINEGR Pye 104 - 105 3.03 0.00 0.	To CENTRELINE1005, Pipe	105 - 106			7.19				0.00				0.00		-	\vdash	0.00	22.41												<u> </u>		
Contribution From CENTRELIHEOB, Pepe 104 - 105 3.03 0.00	CENTRELINE 1005	+ +													 	\vdash																
105 106 0.00 10.22 0.00		INE08. Pipe 104 -	105		3.03				0.00				0.00				0.00	13.78														
106	Contribution From CENTREL	INE08, Pipe 94 - 1	05		7.19				0.00				0.00				0.00	22.41														
CENTRELINEOS 86 86 0.61 0.66 1.12 1.12 0.00 0.00 0.00 0.00 0.00 0.00																																0.825
85 88 0.61 0.06 1.12 1.12 0.00 0.00 0.00 0.00 0.00 0.00	106 HW4		_ °	0.00	10.22			0.00	0.00			0.00	0.00			0.00	0.00	22.94	47.73	64.39	75.32	109.86	488	900	900	CONC	0.11	10.5	600.4123	0.9438	0.1854	0.812
85 88 0.61 0.06 1.12 1.12 1.00 0.00 0.00 0.00 0.00 0.00	CENTRELINE06																												 			
To CENTRELINEO, Pipe 88 - 89		0.61 0.60	6 1	1.12	1.12			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	86	450	450	CONC	0.20	101.5	127.5033	0.8017	2.1101	0.674
129 130 0.35 0.66 0.64 0.64 0.00 0.			6 1	1.17				0.00				0.00				0.00			69.55	94.23	110.41	161.32	160	600	600	CONC	0.15	121.5	237.8056	0.8411	2.4077	0.671
130 131 132 0.08 0.66 0.15 0.79 0.00 0.0	To CENTRELINE1006, Pipe	88 - 89			2.29				0.00				0.00		<u> </u>		0.00	14.52												<u> </u>		
130 131 132 0.08 0.66 0.15 0.79 0.00 0.0	120 130	0.35 0.60	6 0	1.64	0.64			0.00	0.00			0.00	0.00		 	0.00	0.00	10.00	76.81	10// 10	122 14	178 56	10	300	300	P\/C	0.40	50.5	61 1580	0.8652	1 1/61	0.806
131 132 134 0.98 0.66 0.72 2.31 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 1.34 72.00 97.59 114.37 167.14 115 450 450 CONC 0.25 76.5 142.531 0.9898 1.4225 1.4251 0.00 0.00 0.00 0.00 1.420 0.00 1.420 0.00 1.420 0.00 1.420 0.00 1.420 0.00 1.420 0.00 1.420 0.00 1.420 0.00																																0.838
TO CENTRELINEO? Pipe 134 - 135	131 132	0.44 0.60			1.60			0.00	0.00			0.00	0.00			0.00	0.00	11.34	72.00	97.59				450	450	CONC	0.25					0.806
CENTRELINEO7			6 0).72				0.00				0.00				0.00			67.60	91.54	107.25	156.68	156	525	525	CONC	0.20	76.5	192.3297	0.8885	1.4351	0.813
65 66 0.31 0.66 0.57 0.57 0.00	To CENTRELINE07, Pipe 13	4 - 135			2.31				0.00				0.00			\longrightarrow	0.00	14.20												<u> </u>		
65 66 0.31 0.66 0.57 0.57 0.00	CENTRELINE07															\vdash													 			
TO CENTRELINETOOL, Pipe 70 - 73		0.31 0.60	6 0).57	0.57			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	44	300	300	PVC	0.35	43.0	57.2089	0.8093	0.8855	0.764
57 58 0.23 0.66 0.42 0.42 0.00 0.00 0.00 0.00 0.00 0.00).99				0.00				0.00				0.00	0.00		73.56	99.74	116.89	170.85	115	450	450	CONC	0.25	95.5	142.5531	0.8963	1.7758	0.805
58 59 0.56 0.66 1.03 1.45 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	To CENTRELINE17 CENTRE	ELINE1001, Pipe 7	0 - 73		1.56				0.00				0.00		<u> </u>		0.00	12.66												<u> </u>		
58 59 0.56 0.66 1.03 1.45 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	57 59	0.23 0.60	8 0	1.42	0.42			0.00	0.00	-		0.00	0.00		 	0.00	0.00	10.00	76.81	10// 10	122 14	178 56	32	300	300	PVC	0.50	33.0	68 3779	0.9672	0.5686	0.474
59 61 0.50 0.66 0.92 2.37 0.00 0.00 0.00 0.00 0.00 0.00 11.88 70.28 95.22 111.57 163.04 166 525 525 CONC 0.25 92.5 215.0311 0.9933 1.5520 0.00 0.00 13.43 0.00 0.00 13.43 0.00 0.00 0.00 13.43 0.00 0.00 0.00 0.00 0.00 0.00 13.43 0.00 0.00 0.00 0.00 0.00 0.00 0.00																																0.833
67 68 0.10 0.66 0.18 0.18 0.00 0.00 0.00 0.00 0.00 0.00																																0.774
68 69 0.13 0.66 0.24 0.42 0.00 0.00 0.00 0.00 0.00 0.00	To CENTRELINE1006, Pipe	61 - 62			2.37				0.00				0.00				0.00	13.43														
68 69 0.13 0.66 0.24 0.42 0.00 0.00 0.00 0.00 0.00 0.00	07 00	0.40		10	0.40			0.00	0.00			0.00	0.00			0.00	0.00	10.00	70.04	104.40	400.44	470.50	11	200	200	DVC	0.25	20.0	F7 0000	0.0000	0.4440	0.040
69 70 0.15 0.66 0.28 0.70 0.00 0.00 0.00 0.00 0.00 0.00 0.0				_								0.00																				0.246 0.555
To CENTRELINE17 CENTRELINE1001, Pipe 70 - 73 0.70 0.00 0.00 11.22 0 0.00 11.22 0 0.00 0.0																																0.847
Designed: PROJECT:																																
Designed: PROJECT:		1														4						l								1	1	
	133 134	0.11 0.60	ö 0).20	0.20		-	0.00	0.00	-		0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	16	600	600	CONC	0.15	25.0	237.8056	0.8411	0.4954	0.065
	Definitions:	1				L	1		1			1	L	l	<u> </u>			I	I		1		Designed:			PROJECT	:	1				I
									Notes:																							

Q = 2.78 AIR, where Q = Peak Flow in Litres per second (L/s)

A = Areas in hectares (ha)

I = Rainfall Intensity (mm/h) R = Runoff Coefficient

1) Ottawa Rainfall-Intensity Curve

2) Min. Velocity = 0.80 m/s

M.S. Checked: 1278 Caivan-Perth LOCATION: W.L. Town of Perth Dwg. Reference: File Ref: Sheet No. SHEET 3 OF 6 Date: 02 Feb 2023

STORM SEWER CALCULATION SHEET (RATIONAL METHOD) Local Roads Return Frequency = 2 years Collector Roads Return Frequency = 5 years Manning 0.013 Arterial Roads Return Frequency = 10 years

Manning	0.013		Arterial Ro	ads Return	Frequency	= 10 years																											
	LOCA	TION								AREA	A (Ha)											ow							SEWER DA				
				2 Y	EAR			5 Y	EAR			10 Y	'EAR			100 Y						Intensity		Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
L			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
Contribut	on From C					2.31				0.00				0.00				0.00	14.20													 	
- 05115		135		0.66	0.37	2.88			0.00	0.00			0.00	0.00			0.00	0.00	14.20	63.72	86.23	100.99	147.50	184	750	750	CONC	0.11	59.5	369.2322	0.8358	1.1865	0.497
TO CENT	RELINE10	06, Pipe 1	35 - 138			2.88				0.00				0.00				0.00	15.39													─ ──	
OFNITRE	INITAO																																
CENTRE		125	0.45	0.66	0.83	0.83			0.00	0.00			0.00	0.00			0.00	0.00	10.00	70.04	101 10	122.14	178.56	63	450	450	CONC	0.20	81.5	127.5033	0.0047	1.6943	0.407
To CENT	124 RELINE11			0.00	0.83	0.83			0.00	0.00			0.00	0.00	-		0.00	0.00	11.69	76.81	104.19	122.14	178.50	03	450	450	CONC	0.20	81.5	127.5033	0.8017	1.0943	0.497
10 CENT	KELINETT	, Pipe 123	- 120			0.63				0.00				0.00	-			0.00	11.09														
CENTRE	INF13																																
CLIVING	122	123	0.60	0.66	1.10	1.10			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	10// 10	122.14	178 56	85	450	450	CONC	0.20	109.5	127.5033	0.8017	2 2764	0.663
To CENT	RELINE11			0.00	1.10	1.10			0.00	0.00			0.00	0.00			0.00	0.00	12.28	70.01	104.10	122.17	170.00	- 00	400	400	00110	0.20	100.0	127.0000	0.0011	2.2704	0.000
10 02.11		,po .zo	1.20							0.00				0.00				0.00	12.20														
CENTRE	LINE14																																
	120	121	0.56	0.66	1.03	1.03			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	79	450	450	CONC	0.20	98.0	127.5033	0.8017	2.0374	0.619
To CENT	RELINE11	Pipe 121	- 123			1.03				0.00				0.00				0.00	12.04														
																																,	
CENTRE	LINE11																																
	on From C					1.50				0.00				0.00				0.00	13.04														
Contribut	on From C					0.28				0.00				0.00				0.00	10.17													\Box	
			0.10			1.96			0.00	0.00			0.00	0.00			0.00	0.00	13.04	66.83	90.49	106.01	154.87	131	750	750	CONC	0.11	66.0	369.2322	0.8358	1.3162	0.355
	on From C					0.90				0.00				0.00				0.00	11.82													└─ ─	
Contribut	on From C					0.26				0.00				0.00				0.00	10.39														
	119		0.15			3.39			0.00	0.00			0.00	0.00			0.00	0.00	14.35	63.34	85.71	100.39	146.62	215	750	750	CONC	0.11	53.5	369.2322	0.8358	1.0669	0.582
Contribut	on From C					1.03				0.00				0.00				0.00	12.04													 _	
			0.22		0.40	4.83			0.00	0.00			0.00	0.00			0.00	0.00	15.42	60.80	82.23	96.29	140.60	293	750	750	CONC	0.11	59.5	369.2322	0.8358	1.1865	0.795
Contribut	on From C					1.10			0.00	0.00			0.00	0.00	-		0.00	0.00	12.28	50.00	70.74	00.45	404.50	000	005	005	00110	0.44	50 F	470 0004	0.0000	4 00 40	0.774
Caradailace	123		0.22			6.33 0.83			0.00	0.00			0.00	0.00			0.00	0.00	16.60	58.22	78.71	92.15	134.53	369	825	825	CONC	0.11	58.5	476.0801	0.8906	1.0948	0.774
Contribut	on From C 125	126	0.34	0.66	0.62	7.78			0.00	0.00			0.00	0.00			0.00	0.00	11.69 17.70	56.05	75.74	88.66	129.41	436	900	900	CONC	0.11	89.0	600.4123	0.0438	1.5717	0.726
-	126	127	0.09	0.66	0.02	7.76			0.00	0.00			0.00	0.00			0.00	0.00	19.27	53.23		84.14	122.78	423	900	900	CONC	0.11	9.0	600.4123		0.1589	0.720
	127	128	0.08	0.66	0.17	8.09			0.00	0.00			0.00	0.00			0.00	0.00	19.43	52.97		83.71	122.76	429	900	900	CONC	0.11	29.0	600.4123		0.1369	0.714
To CENT	RELINE10			0.00	0.15	8.09			0.00	0.00			0.00	0.00			0.00	0.00	19.94	52.51	71.55	00.71	122.10	723	300	300	00140	0.11	23.0	000.4123	0.3430	0.5121	0.714
10 OLIVI	VEE II VE I O	oo, ripe i	100			0.00				0.00				0.00				0.00	10.04														
CENTRE	LINE1006																																
	93	94	0.22	0.66	0.40	0.40			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	31	300	300	PVC	0.35	50.5	57.2089	0.8093	1.0399	0.542
To CENT	RELINE08					0.40				0.00				0.00				0.00	11.04					-						0			
	136	137	0.04	0.66	0.07	0.07			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	6	300	300	PVC	1.30	12.5	110.2558	1.5598	0.1336	0.051
	137	138	0.19	0.66	0.35	0.42			0.00	0.00			0.00	0.00			0.00	0.00	10.13	76.30	103.49	121.32	177.35	32	300	300	PVC	0.35	51.0	57.2089	0.8093	1.0502	0.563
To CENT	RELINE10	06, Pipe 1	38 - 139			0.42				0.00				0.00				0.00	11.18													<u> </u>	
	60	61	0.13	0.66	0.24	0.24			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	18	300	300	PVC	3.05	30.0	168.8806	2.3892	0.2093	0.108
Contribut	on From C					2.37				0.00				0.00				0.00	13.43									_				<u></u> '	
	61	62	0.20	0.66	0.37	2.97			0.00	0.00			0.00	0.00			0.00	0.00		65.74	89.00	104.25	152.29	195	750	750	CONC	0.11	62.0	369.2322	0.8358	1.2364	0.529
To CENT	RELINE16	, Pipe 62 -	63			2.97				0.00				0.00				0.00	14.67													 -'	
						0.00				0.00				2.22				0.00	40.00	70.07	1011-	100.1:	470.55				D) (0		05.0	== 000c	0.0005	L	0.07/
0	87	88	0.11	0.66	0.20	0.20			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	16	300	300	PVC	0.35	25.0	57.2089	0.8093	0.5148	0.271
Contribut	on From C				0.27	2.29			0.00	0.00			0.00	0.00			0.00	0.00	14.52	60.00	05.45	00.70	145.01	400	750	750	CONC	0.44	50.0	200 2200	0.0050	0.0071	0.400
—	88	89	0.20	0.66	0.37	2.86	-	-	0.00	0.00			0.00	0.00			0.00	0.00	14.52 15.51	62.93			145.64	180	750	750	CONC	0.11	50.0	369.2322	0.8358	0.9971	0.488
	89 90	90 91	0.15 0.72	0.66	0.28 1.32	3.14 4.46			0.00	0.00			0.00	0.00	-		0.00	0.00		60.58 59.98	81.93 81.11	95.94 94.97	140.09 138.67	190 267	750 750	750 750	CONC	0.11	13.5 124.0	369.2322 369.2322	0.8358 0.8358	0.2692 2.4728	0.515 0.724
Contribut	on From C	_			1.32	0.55	-		0.00	0.00			0.00	0.00	+		0.00	0.00	15.78 11.06	J9.98	01.11	94.97	130.07	201	100	100	CONC	U.II	124.0	309.2322	U.0338	2.4128	0.724
Continual	91	92	0.25	0.66	0.46	5.47	 		0.00	0.00			0.00	0.00	+	-	0.00	0.00	18.26	55.02	74.32	87.00	126.97	301	750	750	CONC	0.11	65.0	369.2322	0.8358	1.2962	0.815
	92	94	0.23	0.66	0.40	5.89			0.00	0.00			0.00	0.00			0.00	0.00	19.55	52.76		83.38	120.97	311	750	750	CONC	0.11	59.0	369.2322	0.8358	1.1766	0.842
To CENT	RELINE08			0.00	0.72	5.89			0.00	0.00			0.00	0.00			0.00	0.00	20.73	0 <u>2</u> .10	71.20	00.00	121.07	J	700	,,,,,	30110	0.11	00.0	500.2022	3.0000	, 00	0.0-12
OLIVI		, . ipc 04 -	.50			0.00				0.00				0.00				0.00	20.70													$\overline{}$	
																																$\overline{}$	
																																\Box	
Definitions	:																							Designed:			PROJECT	:					
Q = 2.78 A										Notes:														M.S.			1278 Caiva						
	low in Litre	s per secon	nd (L/s)								Rainfall-Inter	nsity Curve												Checked:			LOCATIO						

Q = Peak Flow in Litres per second (L/s)

A = Areas in hectares (ha)

I = Rainfall Intensity (mm/h) R = Runoff Coefficient

2) Min. Velocity = 0.80 m/s

Checked: LOCATION: W.L. Town of Perth Dwg. Reference: File Ref: Sheet No. SHEET 4 OF 6 Date: 02 Feb 2023

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years Collector Roads Return Frequency = 5 years Arterial Roads Return Frequency = 10 years

			Collector F																														
Manning	0.013		Arterial Ro	ads Return	Frequency	= 10 years																											
	LOCA	TION								ARE	A (Ha)											ow							SEWER DA				
				2 Y	EAR			5 Y	EAR			10 YE				100 \	/EAR							Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
		m > 1	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year			100 Year					(0.1)		 			0 (0 0 11
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (1/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
																														<i>'</i>	\vdash		
	ion From C					2.41				0.00				0.00				0.00	15.76											\vdash	\vdash		
Contribut	ion From C					8.09			0.00	0.00			0.00	0.00			0.00	0.00	19.94	50.40	70.00	00.00	400.47	504	075	075	00110	0.44	54.5	740.0700	0.0055	0.0404	0.755
C = = 4=ib			0.14			10.76			0.00	0.00			0.00	0.00			0.00	0.00	19.94	52.12	70.38	82.36	120.17	561	975	975	CONC	0.11	54.5	743.2733	0.9955	0.9124	0.755
Contribu	ion From C					2.88 14.83			0.00	0.00			0.00	0.00			0.00		15.39 20.85	F0 70	CO 42	00.07	440.04	750	4050	1050	CONC	0.44	400 F	005 6704	1.0450	2.0457	0.830
To CENT	RELINE10	138		0.66	1.19	14.83			0.00	0.00			0.00	0.00			0.00	0.00	22.87	50.70	68.43	80.07	116.81	752	1050	1050	CONC	0.11	126.5	905.6791	1.0459	2.0157	0.830
10 CENT	TELINE IU	uo, ripe i	30 - 139 			14.03				0.00				0.00				0.00	22.01												$\overline{}$		
CENTRE	LINE1006																														-		
	ion From C	FNTRFII	NF1006 P	ine 135 - 1	138	14.83				0.00				0.00				0.00	22.87												$\overline{}$		
	ion From C					0.42				0.00				0.00				0.00	11.18												$\overline{}$		
Continua	138	139	12 1000, 1	100 107	0.00	15.26			0.00	0.00			0.00	0.00			0.00	0.00	22.87	47.83	64.52	75.48	110.08	730	1050	1050	CONC	0.11	11.0	905.6791	1 0459	0.1753	0.806
	139	HW5			0.00	15.26			0.00	0.00			0.00	0.00			0.00	0.00	23.05	47.60		75.11	109.54	726	1050	1050	CONC	0.11	10.0	905.6791		0.1593	0.802
CENTRE	LINE15																																
	117	119	0.49	0.66	0.90	0.90			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	69	450	450	CONC	0.20	87.5	127.5033	0.8017	1.8191	0.542
To CENT	RELINE11					0.90				0.00				0.00				0.00	11.82														
	118	119		0.66	0.26	0.26			0.00	0.00			0.00	0.00			0.00	0.00		76.81	104.19	122.14	178.56	20	300	300	PVC	0.55	24.0	71.7152	1.0146	0.3943	0.275
To CENT	RELINE11	, Pipe 119	- 121			0.26				0.00				0.00				0.00	10.39											<u> </u>			
																															$\overline{}$		
	140	141	0.15	0.66	0.28	0.28			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81		122.14	178.56	21	300	300	PVC	0.35	21.5		0.8093	0.4427	0.369
	141	142	0.06	0.66	0.11	0.39			0.00	0.00			0.00	0.00			0.00	0.00	10.44	75.15			174.61	29	375	375	PVC	0.30	13.5		0.8695	0.2588	0.302
	142	144	0.18	0.66	0.33	0.72			0.00	0.00			0.00	0.00			0.00	0.00	10.70	74.21	100.63	117.94	172.39	53	450	450	CONC	0.20	56.0	127.5033	0.8017	1.1642	0.416
TO CENT	RELINE16	, Pipe 144	- 145			0.72				0.00				0.00				0.00	11.87												$\overline{}$		
OFNITRE	1 101540																														\longrightarrow		
CENTRE	115	110	0.15	0.00	0.28	0.28			0.00	0.00			0.00	0.00			0.00	0.00	40.00	70.04	101.10	122.14	178.56	24	300	200	PVC	2.65	23.0	157.4174	2 2270	0.1721	0.404
To CENT	RELINE11	116 Pino 116		0.66	0.28	0.28			0.00	0.00			0.00	0.00			0.00	0.00	10.00	70.81	104.19	122.14	178.50	21	300	300	PVC	2.00	23.0	157.4174	2.2210	0.1721	0.134
10 CLIVI	INCLINCTI	, ripe i io	- 119			0.20				0.00				0.00				0.00	10.17												\leftarrow		
	148	149	0.18	0.66	0.33	0.33			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	10// 10	122.14	178 56	25	300	300	PVC	0.35	18.0	57.2089	0.8003	0.3707	0.443
To CENT	RELINE10			0.00	0.55	0.33			0.00	0.00			0.00	0.00			0.00	0.00	10.37	70.01	104.19	122.14	170.50	23	300	300	FVC	0.55	10.0	37.2009	0.0093	0.5707	0.443
10 OLIVI	T T T T T T T T T T T T T T T T T T T	01,1 IPC 1	100			0.00				0.00				0.00				0.00	10.07														
	14	15			0.00	0.00	0.31	0.66	0.57	0.57			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	59	750	750	CONC	0.11	69.5	369.2322	0.8358	1.3859	0.161
					0.00	0.00	0.19		0.35	0.92			0.00	0.00			0.00	0.00															
	15	22	1.11	0.40	1.23	1.23			0.00	0.92			0.00	0.00			0.00	0.00	11.39	71.86	97.40	114.14	166.81	178	750	750	CONC	0.11	85.5	369.2322	0.8358	1.7050	0.482
To CENT	RELINE02	Pipe 22 -	23			1.23				0.92				0.00				0.00	13.09														
	152	109	0.23	0.66	0.42	0.42			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81			178.56	32	450	450	CONC	0.20	52.5	127.5033		1.0914	0.254
	109	108	0.11	0.66	0.20	0.62			0.00	0.00			0.00	0.00			0.00	0.00	11.09	72.85			169.16	45	450	450	CONC	0.20	12.0	127.5033		0.2495	0.356
L	108	116	0.48	0.66	0.88	1.50			0.00	0.00			0.00	0.00			0.00	0.00		72.01	97.61	114.38	167.16	108	600	600	CONC	0.15	85.5	237.8056	0.8411	1.6943	0.456
To CENT	RELINE11	, Pipe 116	- 119			1.50	-			0.00				0.00				0.00	13.04												$\overline{}$		
-	440	444	0.00	0.00	0.07	0.07			0.00	0.00			0.00	0.00			0.00	0.00	40.00	70.04	40440	400.41	470.50		000	000	D) (O	0.05	54.5	57,0000	0.0000	4.4000	0.400
1	110	111	0.20	0.66	0.37	0.37	-	-	0.00	0.00			0.00	0.00			0.00	0.00		76.81		122.14	178.56	28	300	300	PVC	0.35	54.5	57.2089		1.1223	
		112	0.22	0.66	0.40	0.77				0.00				0.00			0.00	0.00	11.12 12.27	72.75	98.62 93.55	115.57	168.91	56 67	375 375	375 375	PVC	0.30	60.0 22.0			1.1501	0.584
—	112 113	113 114	0.11	0.66	0.20	1.56	1		0.00	0.00			0.00	0.00			0.00	0.00	12.27	69.06 67.81	93.55	109.61 107.59	160.15 157.18	106	375	375	PVC PVC	0.30	84.5	96.0323 123.9771		0.4217 1.2546	0.699
	113	114	0.32	0.40	0.39	1.77			0.00	0.00			0.00	0.00			0.00	0.00	12.03	07.01	91.03	107.59	131.10	100	313	313	FVC	0.50	04.0	123.3111	1.1223	1.2340	0.000
	114	128	0.15	0.40	0.64	2.41			0.00	0.00			0.00	0.00			0.00	0.00	13.95	64 37	87.11	102 04	149.04	155	600	600	CONC	0.15	91.5	237.8056	0.8411	1.8132	0.653
To CENT	RELINE10			0.00	0.04	2.41			1 0.00	0.00			0.00	0.00			0.00	0.00	15.76	04.07	57.11	102.04	140.04	100	000	000	30.10	0.10	01.0	257.0000	5.5411	0102	0.000
1		,	00							2.00				2.00				2.00												$\overline{}$			
	16	17			0.00	0.00	0.52	0.66	0.95	0.95			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	99	450	450	CONC	0.20	80.5	127.5033	0.8017	1.6735	0.780
	17	18			0.00	0.00	0.04	0.66	0.07	1.03			0.00	0.00			0.00	0.00	11.67	70.93		112.63	164.58	99	450	450	CONC	0.20	17.5	127.5033		0.3638	0.775
	18	20			0.00	0.00	0.12	0.66	0.22	1.25			0.00	0.00			0.00	0.00	12.04	69.78			161.86	118	600	600	CONC	0.15	58.0	237.8056		1.1493	0.496
Contribut	ion From C	ENTRELI	NE04, Pipe	19 - 20		1.05				0.00				0.00				0.00	12.08														
	20	21			0.00	1.05	0.03	0.66	0.06	1.30			0.00	0.00			0.00	0.00	13.19	66.41		105.33	153.87	187	600	600	CONC	0.15	15.5	237.8056	0.8411	0.3072	0.785
	21	22			0.00	1.05	0.10	0.66	0.18	1.49			0.00	0.00			0.00	0.00	13.49	65.57	88.76	103.97	151.88	200	750	750	CONC	0.11	48.0	369.2322	0.8358	0.9572	0.543
To CENT	RELINE02	, Pipe 22 -	23			1.05				1.49				0.00				0.00	14.45												-		
Definition	S: AID where									XY														Designed:			PROJECT						
1(1) = 2.78	VIV where									Notes:														MS			1278 Caive						



Q = 2.78 AIR, where Q = Peak Flow in Litres per second (L/s)

A = Areas in hectares (ha)

I = Rainfall Intensity (mm/h)

R = Runoff Coefficient

1) Ottawa Rainfall-Intensity Curve

2) Min. Velocity = 0.80 m/s

M.S. 1278 Caivan-Perth Checked: LOCATION: W.L. Town of Perth Dwg. Reference: File Ref: Sheet No. SHEET 5 OF 6 Date:

02 Feb 2023

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years Collector Roads Return Frequency = 5 years Arterial Roads Return Frequency = 10 years

Manning	0.013		Arterial Ro	oads Return	Frequency	= 10 years																										
	LOCA	ATION								ARE	A (Ha)										.ow							SEWER DA				
				2 Y	EAR			5 Y	EAR	_		10 YEAR	.		100 Y	/EAR	_			Intensity			Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
Y	E N 1	T N 1	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R Indiv.	Accum.	AREA	R		Accum.	Conc.	2 Year		10 Year	100 Year	0 (1/)	(, 1)	(· 1)		(0/)		(1/.)	(/)	TOW (0/0.6.11
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)	2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (Vs)	(actual)	(nominai)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q tuli
	143	144	0.19	0.66	0.35	0.35			0.00	0.00		0.00	0.00			0.00	0.00	10.00	76.81	10/ 10	122.14	178.56	27	450	450	CONC	0.20	32.5	127.5033	0.8017	0.6757	0.210
Contribut		ENTRELIN				0.72			0.00	0.00		0.00	0.00			0.00	0.00	11.87	70.01	104.10	122.17	170.00		400	400	00110	0.20	02.0	127.0000	0.0017	0.0707	0.210
Continuat	144	145	0.35	0.66	0.64	1.71			0.00	0.00		0.00	0.00			0.00	0.00	11.87	70.31	95.27	111.64	163.13	120	600	600	CONC	0.15	68.5	237.8056	0.8411	1.3574	0.505
	145	146	0.41	0.66	0.75	2.46			0.00	0.00		0.00				0.00	0.00	13.22	66.31			153.63	163	600	600	CONC	0.15	68.5	237.8056	0.8411	1.3574	0.686
	146	147	0.13	0.66	0.24	2.70			0.00	0.00		0.00	0.00			0.00	0.00	14.58	62.78	84.94	99.48	145.28	169	600	600	CONC	0.15	13.0	237.8056	0.8411	0.2576	0.712
	147	149	0.11	0.66	0.20	2.90			0.00	0.00		0.00	0.00			0.00	0.00	14.84	62.15	84.08	98.47	143.80	180	600	600	CONC	0.15	23.5	237.8056	0.8411	0.4657	0.758
To CENT	RELINE10	07, Pipe 1	49 - 150			2.90				0.00			0.00				0.00	15.30														
	52	53			0.00	0.00	0.75	0.66	1.38	1.38		0.00				0.00	0.00	10.00	76.81			178.56	143	525	525	CONC	0.20	110.5	192.3297		2.0729	0.745
-	53	54			0.00	0.00	0.69	0.66	1.27	2.64		0.00	0.00	+ +		0.00	0.00	12.07	69.67	94.39	110.59	161.60	249	600	600	CONC	0.25	105.5	307.0058		1.6194	0.812
-	54 55	55 56			0.00	0.00	0.52	0.66	0.95	3.60 4.50		0.00				0.00	0.00	13.69 15.31	65.04 61.05		103.12 96.70	150.62 141.20	317 371	750	750	CONC	0.11	81.0 81.0	369.2322 476.0801		1.6153 1.5158	0.857 0.780
Contribut		ENTRELIN	VE05 Pine	- 51 - 56	0.00	4.70	0.49	0.00	0.90	0.00	\vdash	0.00	0.00			0.00	0.00	17.89	01.00	02.00	30.70	141.20	3/1	825	825	CONC	0.11	01.0	470.0001	0.0800	1.5106	0.760
Sommout	56	62		331.50	0.00	4.70	0.22	0.66	0.40	4.90		0.00	0.00			0.00	0.00	17.89	55.68	75.24	88.07	128.54	630	975	975	CONC	0.11	54.5	743.2733	0.9955	0.9124	0.848
Contribut		ENTRELIN	NE1006. P	ipe 61 - 61		2.97	0.22	0.00	0.40	0.00		0.00	0.00			0.00	0.00	14.67	55.00	7 0.24	55.07	120.04	550	5/5	515	55140	0.11	04.0	170.2100	0.0000	0.0124	0.040
	62	63	,1	,	0.00	7.67	0.36	0.66	0.66	5.56		0.00				0.00	0.00	18.81	54.03	72.98	85.42	124.66	820	1050	1050	CONC	0.15	62.0	1057.6053	1.2214	0.8460	0.775
	63	64			0.00	7.67	0.08	0.66	0.15	5.71		0.00	0.00			0.00	0.00	19.65	52.60		83.12	121.28	809	1200	1200	CONC	0.11	14.0	1293.0625		0.2041	0.625
			0.29	0.66	0.53	8.20			0.00	5.71		0.00	0.00			0.00	0.00															
	64	83	0.92	0.40	1.02	9.22			0.00	5.71		0.00	0.00			0.00	0.00	19.86	52.26	70.57	82.58	120.49	885	1200	1200	CONC	0.11	109.0	1293.0625	1.1433	1.5889	0.684
To CENT	RELINE10	04, Pipe 8	3 - 84			9.22				5.71			0.00				0.00	21.45														
0 1 1	75	78	0.57	0.66	1.05	1.05			0.00	0.00		0.00				0.00	0.00	10.00	76.81	104.19	122.14	178.56	80	450	450	CONC	0.20	92.0	127.5033	0.8017	1.9126	0.630
Contribut	on From C	ENTRELIN	0.17			1.23 2.59			0.00	0.00		0.00	0.00			0.00	0.00	12.66	07.00	04.00	407.74	457.44	470	000	000	00110	0.45	00.0	007.0050	0.0444	4.4000	0.700
Contribut		79 ENTRELIN		0.66					0.00	0.00		0.00	0.00			0.00	0.00	16.05	67.90	91.96	107.74	157.41	176	600	600	CONC	0.15	60.0	237.8056	0.8411	1.1890	0.739
Continuut	79	80	0.02	0.66	0.04	7.10			0.00	0.00		0.00				0.00	0.00	16.05	59.40	80.32	94.04	137.30	422	750	750	CONC	0.20	16.5	497.8726	1 1270	0.2440	0.847
	80	82	0.13	0.66	0.24	7.34			0.00	0.00		0.00	0.00			0.00	0.00	16.29	58.88		93.20	136.07	432	825	825	CONC	0.15	47.0	555.9418		0.7532	0.777
Contribut		ENTRELIN				1.25			0.00	0.00		0.00	0.00			0.00	0.00	12.43	00.00	10.00	00.20	100.01	.02	020	020	00.10	0.10		000.0110	1.0100	0.7002	0
	82	83	0.02	0.66	0.04	8.62			0.00	0.00		0.00	0.00			0.00	0.00	17.05	57.33	77.48	90.71	132.42	494	900	900	CONC	0.11	12.0	600.4123	0.9438	0.2119	0.823
To CENT	RELINE10	04, Pipe 8	3 - 84			8.62				0.00			0.00				0.00	17.26														
	4	5			0.00	0.00	0.29	0.66	0.53	0.53		0.00				0.00	0.00		76.81	104.19	122.14	178.56	55	300	300	PVC	4.00	65.5	193.4015	2.7361	0.3990	0.287
Contribut		ENTRELI	NE01, Pipe	e 3 - 5		2.62				0.00			0.00				0.00	14.24														
	5 6	6 7			0.00	2.62	0.21	0.66	0.39	0.92		0.00	0.00			0.00	0.00	14.24	63.61		100.83	147.26	246	750	750	CONC	0.11	92.5	369.2322	0.8358	1.8446	0.666
	7	8			0.00	2.62			0.00	0.92		0.00	0.00			0.00	0.00	16.09 17.06	59.31 57.29	80.20 77.43	93.91 90.65	137.10 132.32	229 221	750 750	750 750	CONC	0.11 0.11	49.0 24.0	369.2322 369.2322		0.9771	0.621 0.599
	8	9			0.00	2.62			0.00	0.92		0.00				0.00	0.00	17.54	56.35			130.12	218	750	750	CONC	0.11	54.0	369.2322		1.0769	0.590
To CENT		02. Pipe 9	- 10		0.00	2.62			0.00	0.92		0.00	0.00			0.00	0.00	18.62	30.33	70.13	03.14	130.12	210	750	750	CONC	0.11	34.0	303.2322	0.0000	1.0703	0.000
10 02.11		02, 1 .pe 0				2.02				0.02			0.00				0.00	10.02														
CENTRE	LINE1007								1																							
		ENTRELI				2.90				0.00			0.00				0.00	15.30														
Contribut		ENTRELI	NE16, Pipe	e 148 - 149		0.33				0.00			0.00				0.00	10.37														
	149	150			0.00	3.23			0.00	0.00		0.00	0.00			0.00	0.00	15.30	61.06		96.71	141.22	197	600	600	CONC	0.15	16.5	237.8056		0.3270	0.829
	150	HW6			0.00	3.23			0.00	0.00		0.00	0.00			0.00	0.00	15.63	60.32	81.57	95.52	139.47	195	600	600	CONC	0.15	26.0	237.8056	0.8411	0.5152	0.819
<u> </u>	-				-	-	-	-	-											-	-	-								-		-
—					-		-		1												-	-						-				
H					<u> </u>	1			1		\vdash								 		<u> </u>											
						1			1																							
									1																							
<u> </u>									-				_																			
Definitions	<u> </u>			l	1	1	1		1				_						L		L	1	Designed:			PROJECT	<u> </u>	1		l	l	l
	IR, where									Notes:													M.S.			1278 Caiva						
	ir, where		101/								D - ! f - !! ! f												NI.S.			12/8 Calva	an-i citti					

Q = Peak Flow in Litres per second (L/s)

A = Areas in hectares (ha)

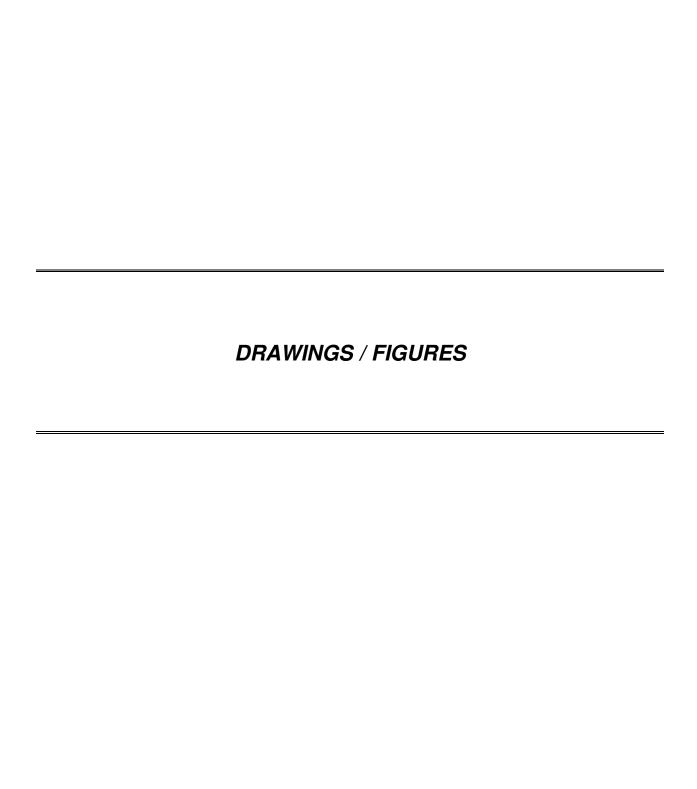
I = Rainfall Intensity (mm/h) R = Runoff Coefficient

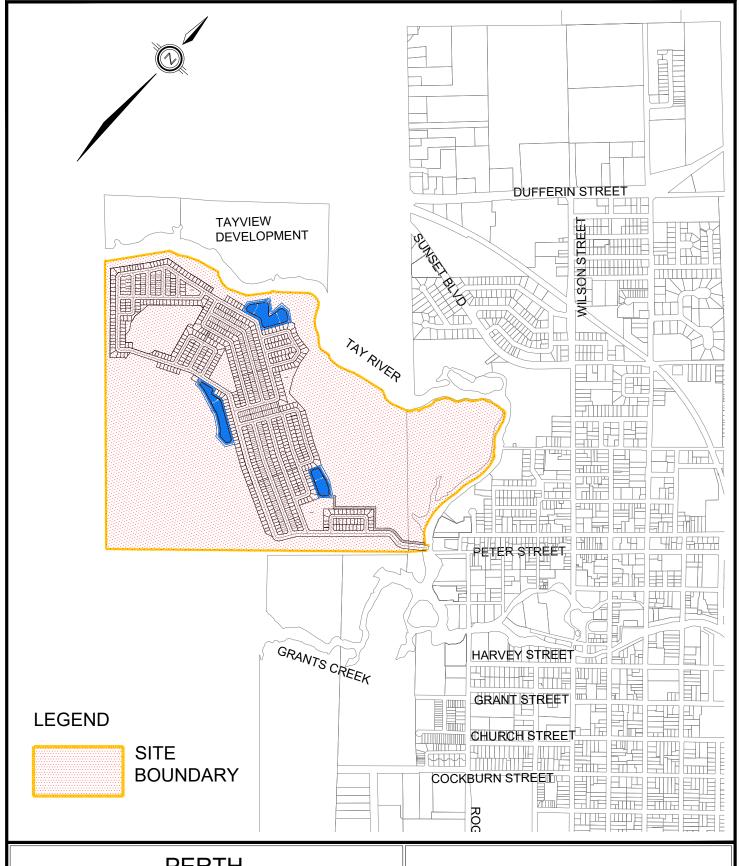
1) Ottawa Rainfall-Intensity Curve

2) Min. Velocity = 0.80 m/s

Checked: LOCATION: W.L. Town of Perth Dwg. Reference: File Ref: Sheet No. SHEET 6 OF 6 Date:

02 Feb 2023





PERTH TOWN OF PERTH

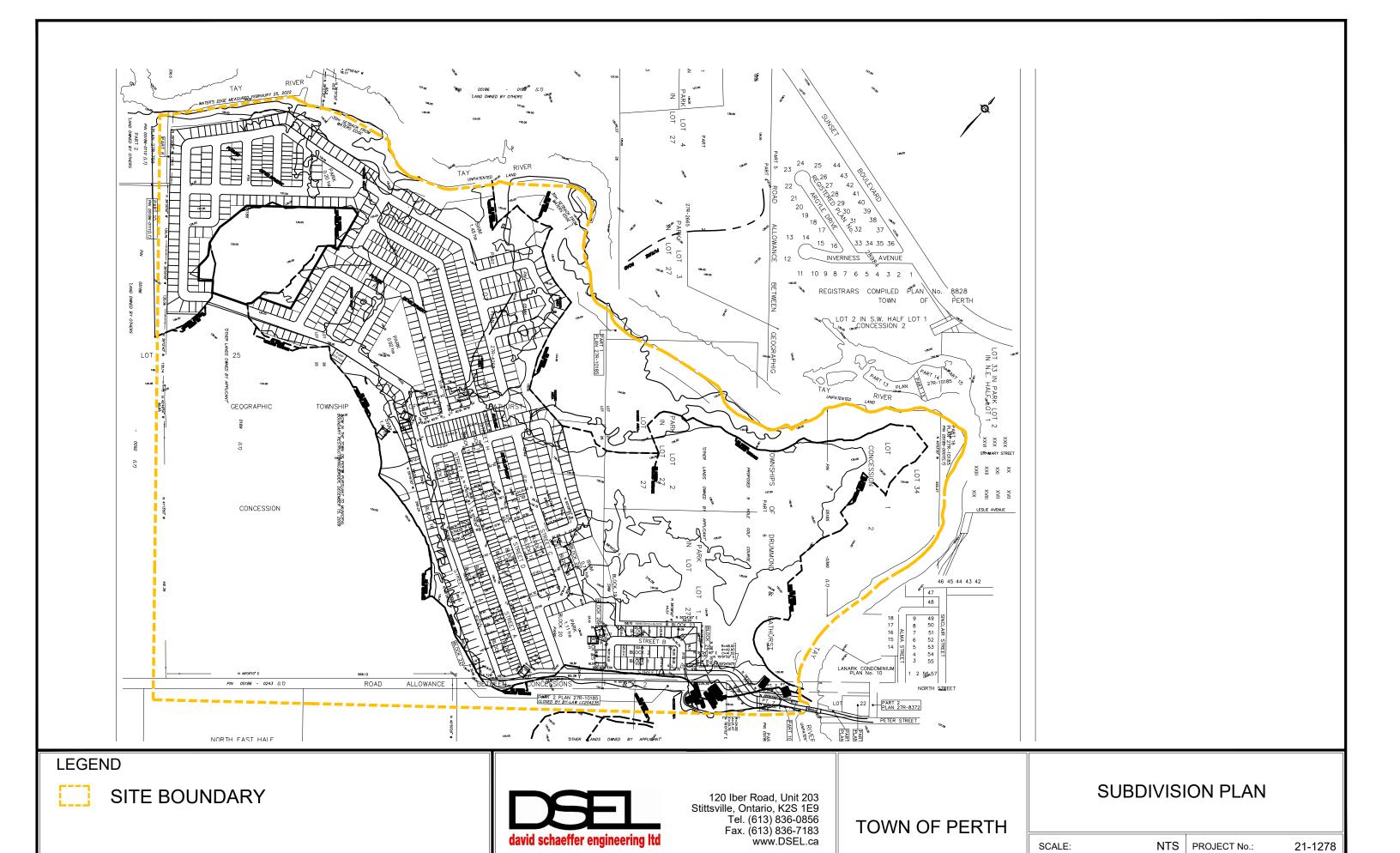


120 Iber Road, Unit 203 Stittsville, Ontario, K2S 1E9 Tel. (613) 836-0856 Fax. (613) 836-7183 www.DSEL.ca

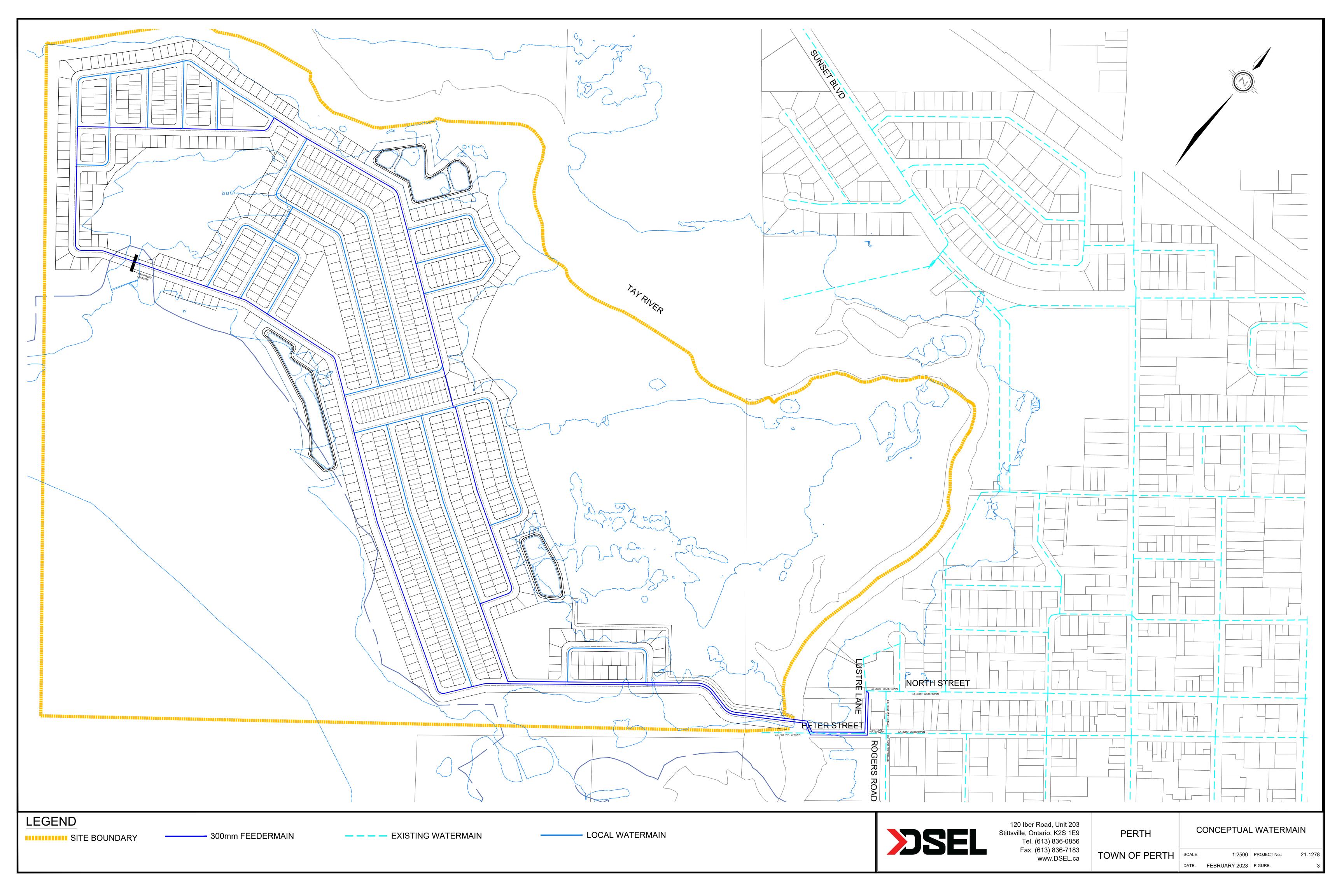
SITE LOCATION

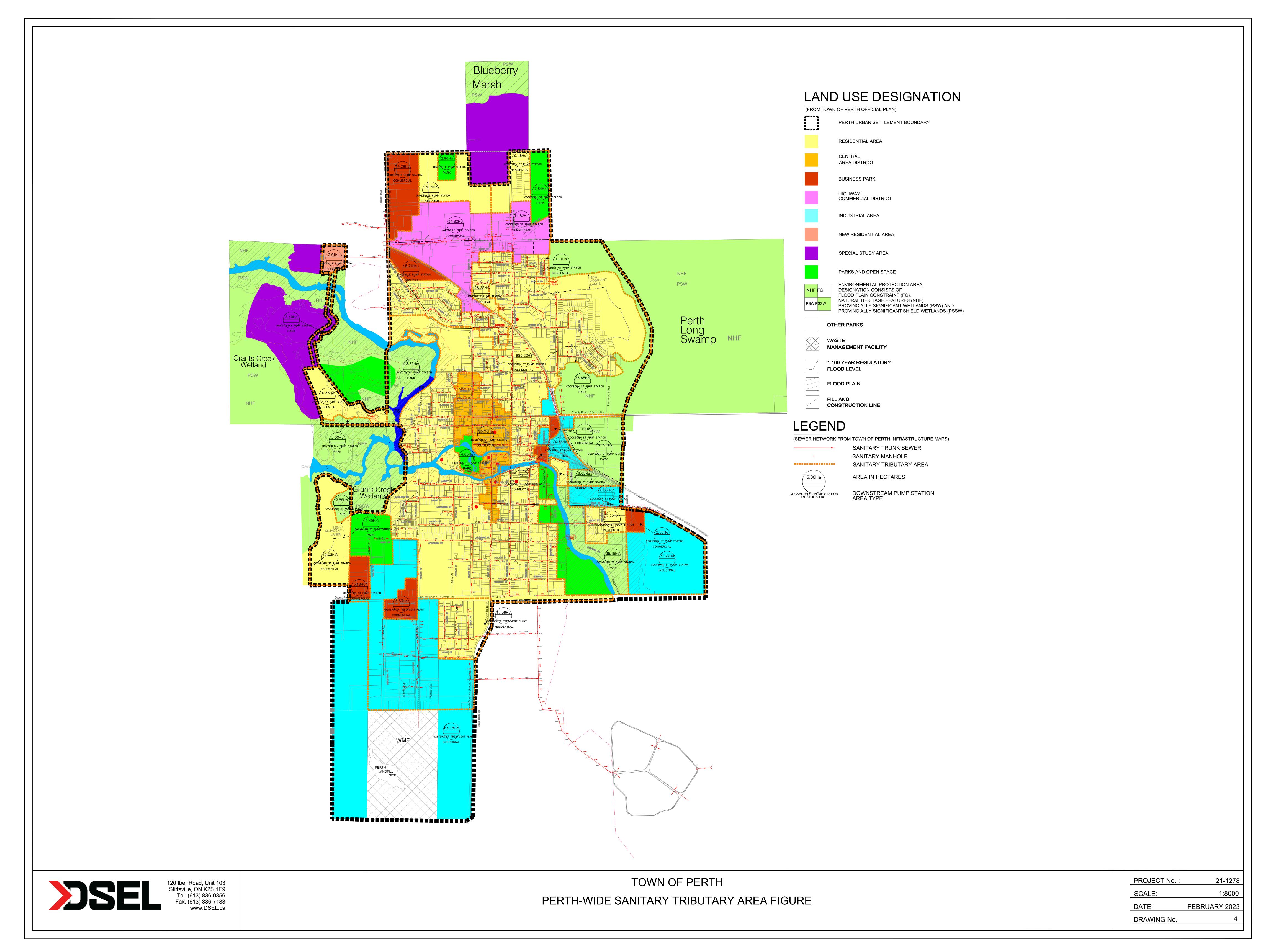
 SCALE:
 1:15000
 PROJECT No.:
 21-1278

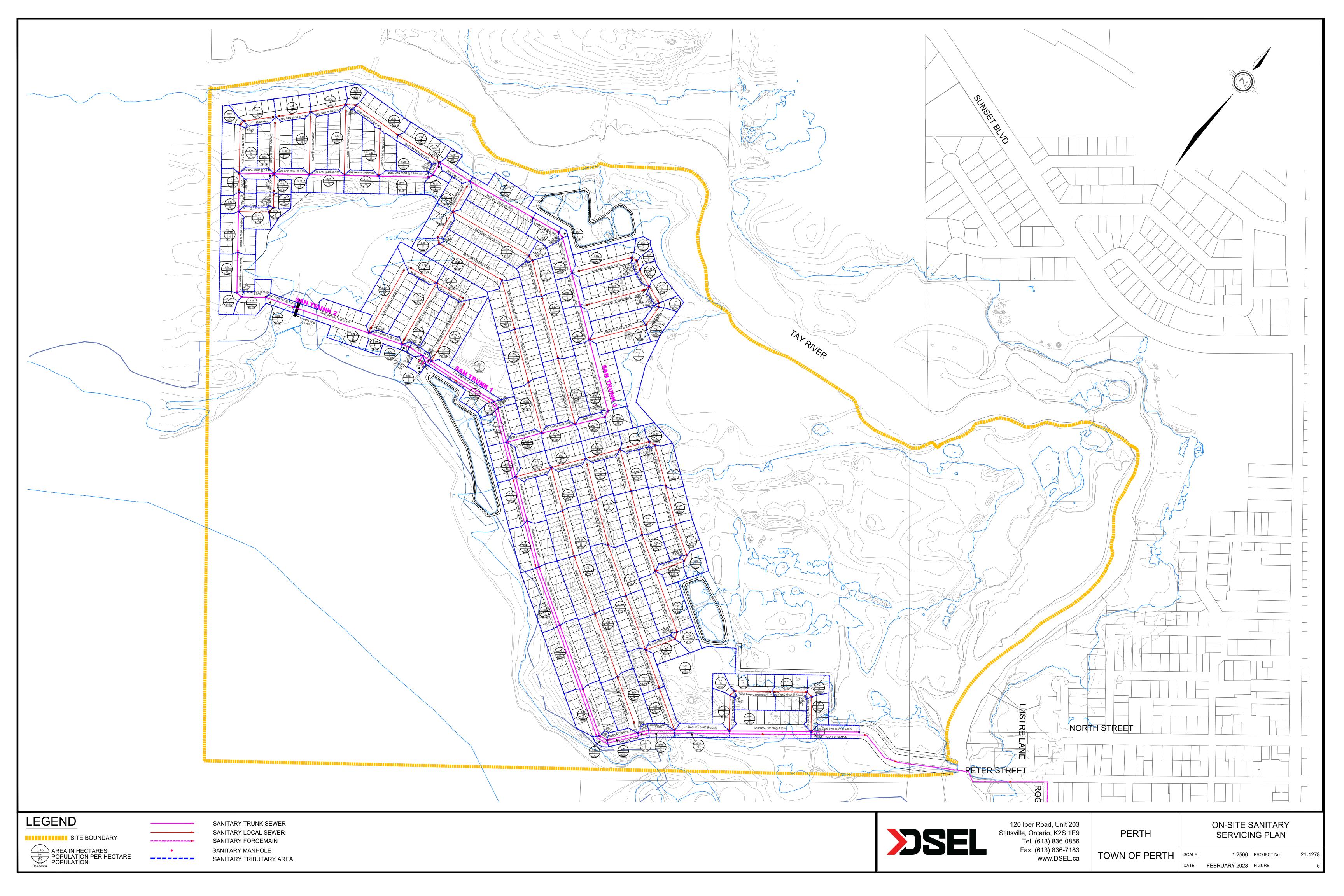
 DATE:
 FEBRUARY 2023
 FIGURE:
 1

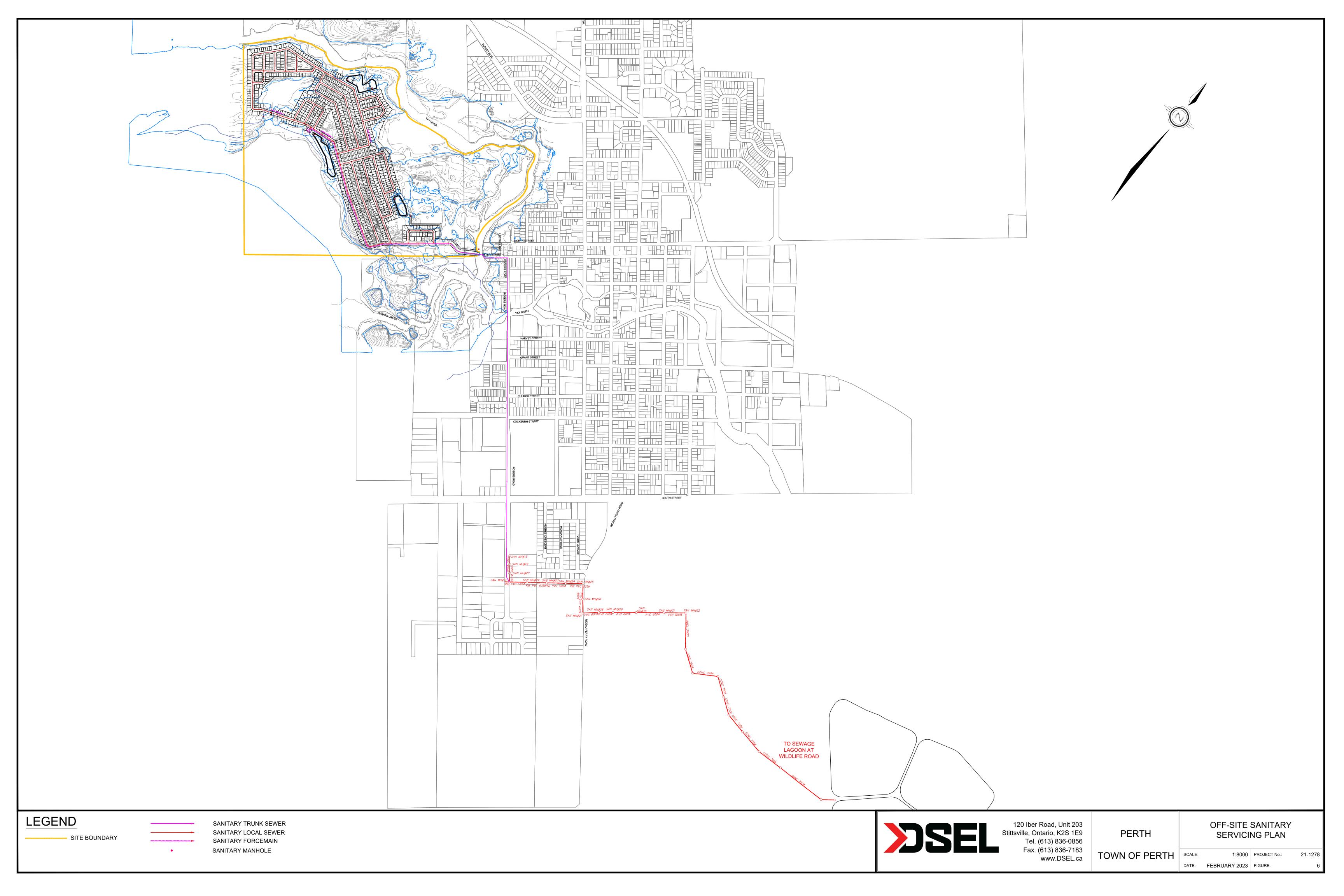


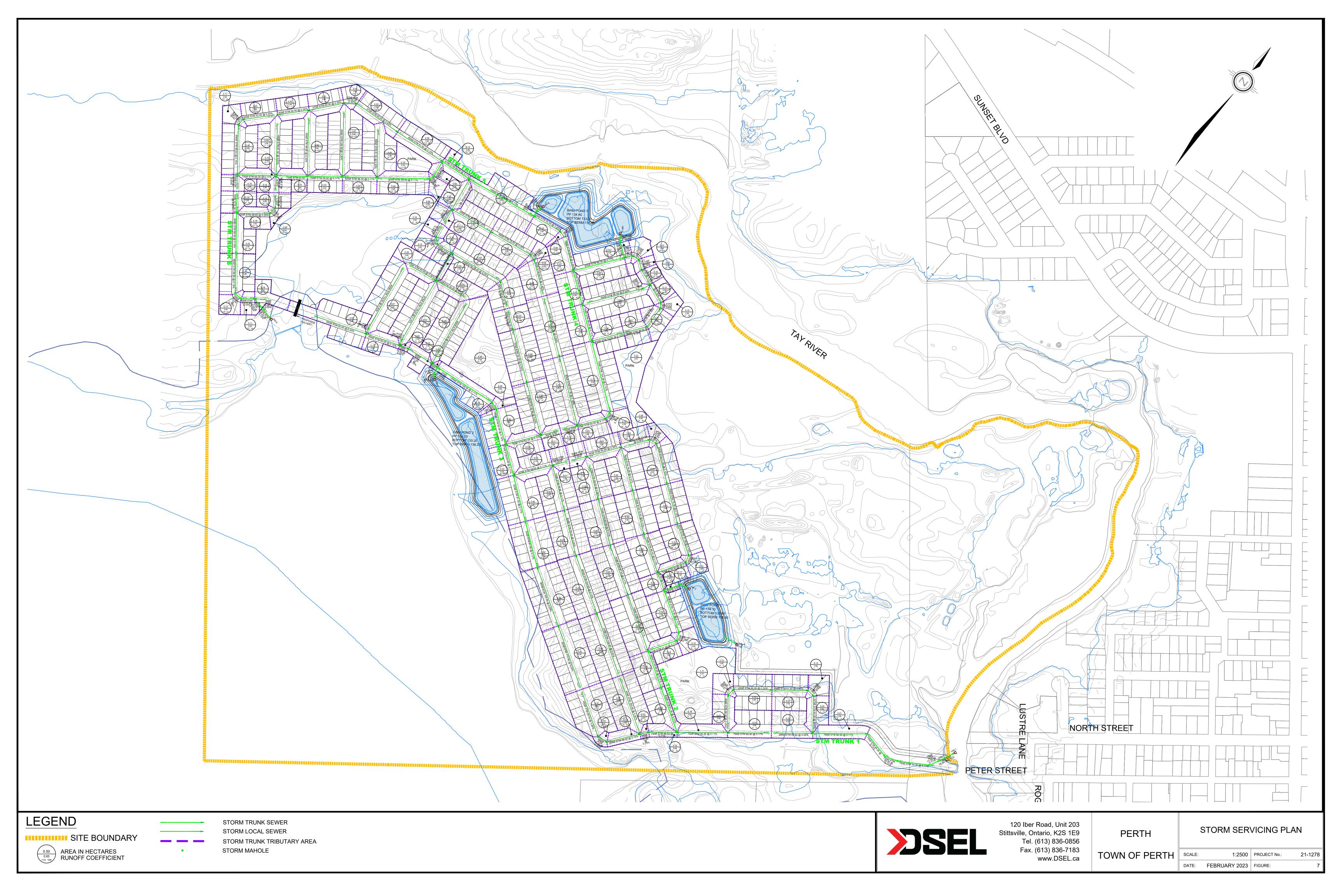
FEBRUARY 2023 | FIGURE:

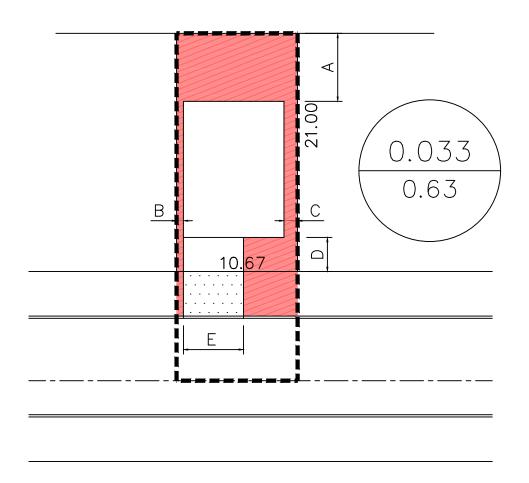












A = 6.00 m

B = 0.60 m

C = 1.20 m

D = 3.00 m

E = 5.30 m

ENVELOPE: 8.87x12.00 m

LOT: 10.67x21.00 m

NOTE:

TOTAL AREA: 326.82 m2 TOTAL IMP AREA: 204.00 m2

IMP %: 62% RC: 0.63

16.75 m ROW SINGLE UNIT RC FIGURE



120 Iber Road, Unit 203 Stittsville, Ontario, K2S 1E9 Tel. (613) 836-0856 Fax. (613) 836-7183 www.DSEL.ca

LEGENDS



TOTAL AREA 0.033 RC VALUE

■■■ STM TRIB LINE

10.67 LOT DIMENSION

SCALE:	NTS	PROJECT No.:	21-1278
DATE:	FEB 2023	FIGURE:	8A



A = 6.00 m

B = 1.55 m

C = 1.55 m

D = 3.00 m

E = 3.80 m

ENVELOPE LENGTH: 12.00 m

LOT: 22.86x21.00 m

NOTE:

TOTAL AREA: 643.00 m2 TOTAL IMP AREA: 389.23 m2

IMP %: 61% RC: 0.63

16.75 m ROW TH RC **FIGURE**



120 Iber Road, Unit 203 Stittsville, Ontario, K2S 1E9 Tel. (613) 836-0856 Fax. (613) 836-7183 www.DSEL.ca

LEGENDS PERVIOUS

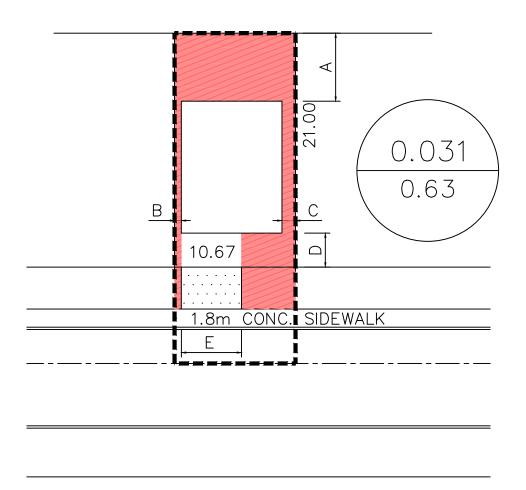
HATCH

-0.065 TOTAL AREA RC VALUE

■ ■ STM TRIB LINE

7.62 LOT DIMENSION

NTS SCALE: PROJECT No.: 21-1278 DATE: FEB 2023 FIGURE: 8B



A = 6.00 m

B = 0.60 m

C = 1.20 m

D = 3.00 m

E = 5.30 m

ENVELOPE: 8.87x12.00 m

LOT: 10.67x21.00

NOTE:

TOTAL AREA: 310.82 m2 TOTAL IMP AREA: 189.91 m2

IMP %: 61% RC: 0.63

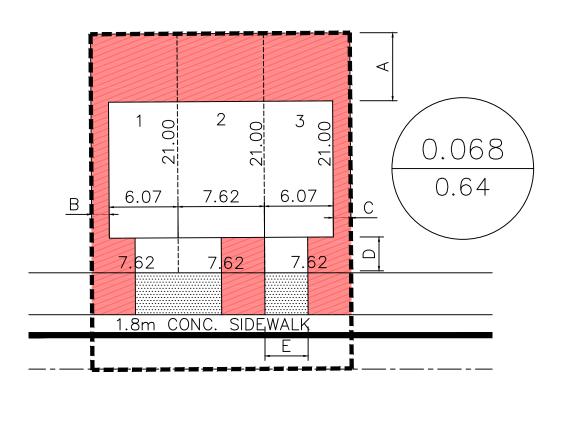
18.50 m ROW SINGLE UNIT RC FIGURE



120 Iber Road, Unit 203 Stittsville, Ontario, K2S 1E9 Tel. (613) 836-0856 Fax. (613) 836-7183 www.DSEL.ca

LEGENDS PERVIOUS HATCH TOTAL AREA 0.035 RC VALUE 10.67 LOT DIMENSION

SCALE:	NTS	PROJECT No.:	21-1278
DATE:	FEB 2023	FIGURE:	8C



A = 6.00 m

B = 1.55 m

C = 1.55 m

D = 3.00 m

E = 3.80 m

ENVELOPE LENGTH: 12.00 m

LOT: 22.86x21.00 m

NOTE:

TOTAL AREA: 676.66 m2 TOTAL IMP AREA: 424.29 m2

IMP %: 63% RC: 0.64

18.5 m ROW TH RC **FIGURE**



120 Iber Road, Unit 203 Stittsville, Ontario, K2S 1E9 Tel. (613) 836-0856 Fax. (613) 836-7183 www.DSEL.ca

LEGENDS PERVIOUS

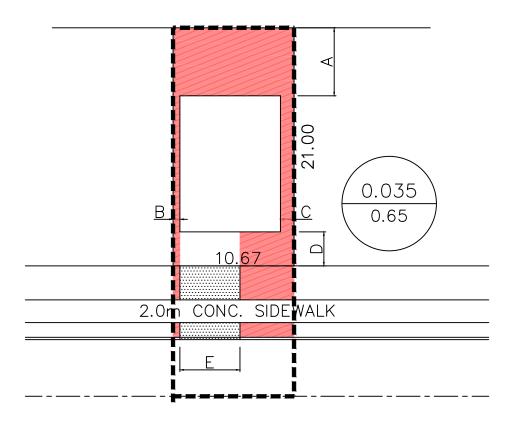
HATCH

-0.035 TOTAL AREA RC VALUE

■ ■ STM TRIB LINE

7.62 LOT DIMENSION

NTS SCALE: PROJECT No.: 21-1278 DATE: FEB 2023 FIGURE: 8D



A = 6.00 m

B = 0.60 m

C = 1.20 m

D = 3.00 m

E = 5.30 m

ENVELOPE: 8.87x12.00 m

LOT: 10.67x21.00 m

NOTE:

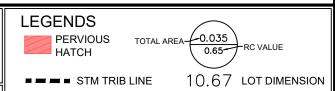
TOTAL AREA: 346.78 m2 TOTAL IMP AREA: 221.96 m2

IMP %: 64% RC: 0.65

23.0 m ROW SINGLE UNIT RC FIGURE



120 Iber Road, Unit 203 Stittsville, Ontario, K2S 1E9 Tel. (613) 836-0856 Fax. (613) 836-7183 www.DSEL.ca



SCALE:	NTS	PROJECT No.:	21-1278
DATE:	FEB 2023	FIGURE:	8E



A = 6.00 m

B = 1.55 m

C = 1.55 m

D = 3.00 m

E = 3.80 m

ENVELOPE LENGTH: 12.00 m

LOT: 22.86x21.00 m

NOTE:

TOTAL AREA: 742.93 m2 TOTAL IMP AREA: 484.92 m2

IMP %: 65% RC: 0.66

23.0 m ROW TH RC FIGURE



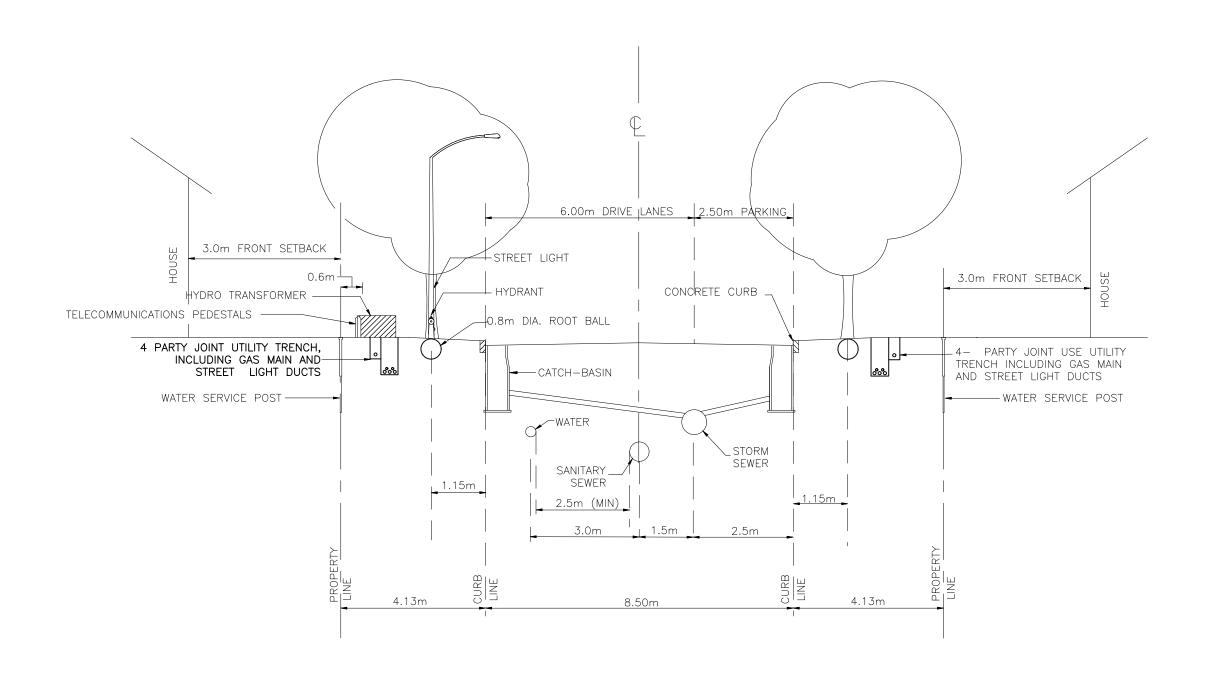
120 Iber Road, Unit 203 Stittsville, Ontario, K2S 1E9 Tel. (613) 836-0856 Fax. (613) 836-7183 www.DSEL.ca



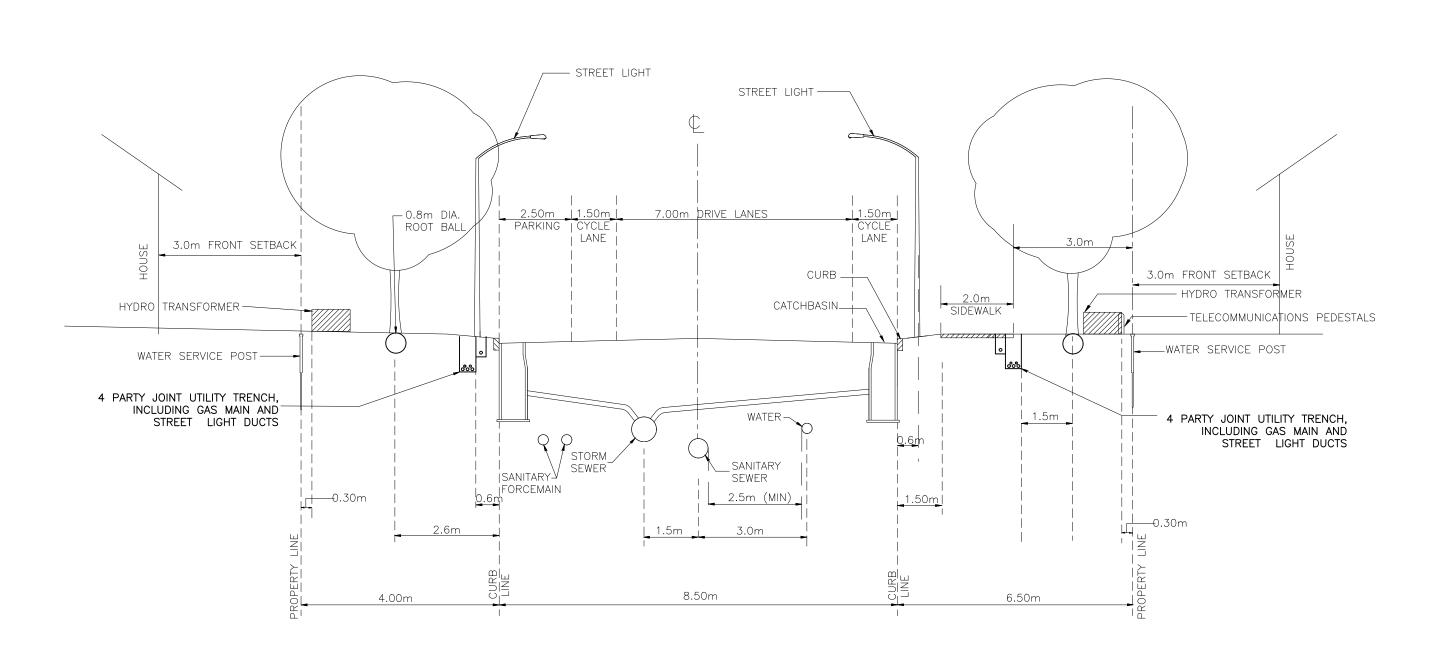
■■■ STM TRIB LINE

7.62 LOT DIMENSION

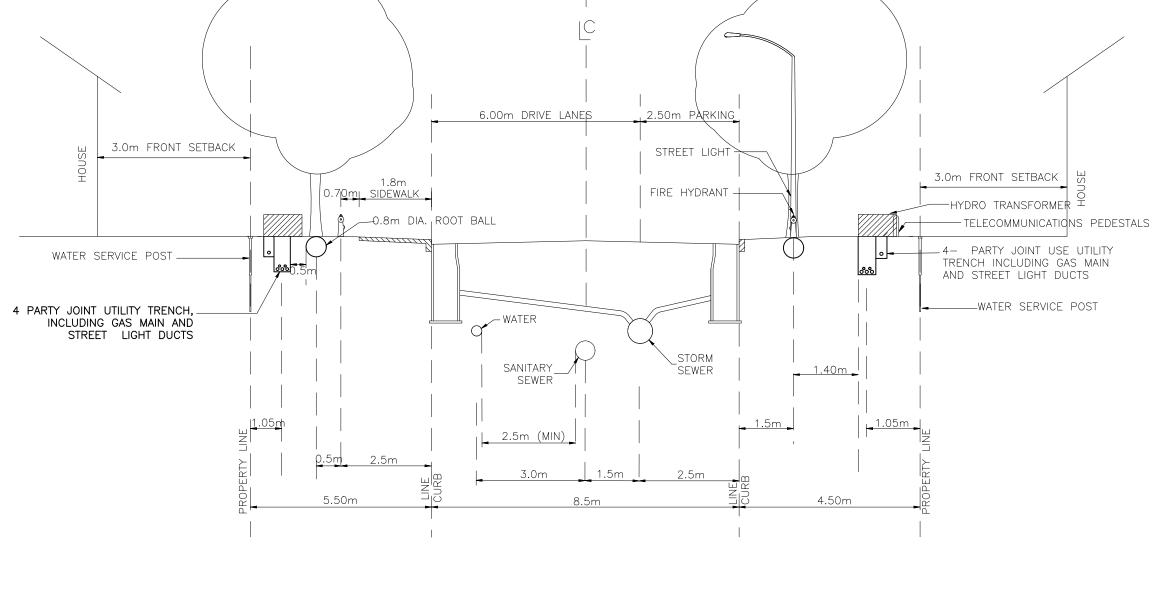
SCALE:	NTS	PROJECT No.:	21-1278
DATE:	FEB 2023	FIGURE:	8F



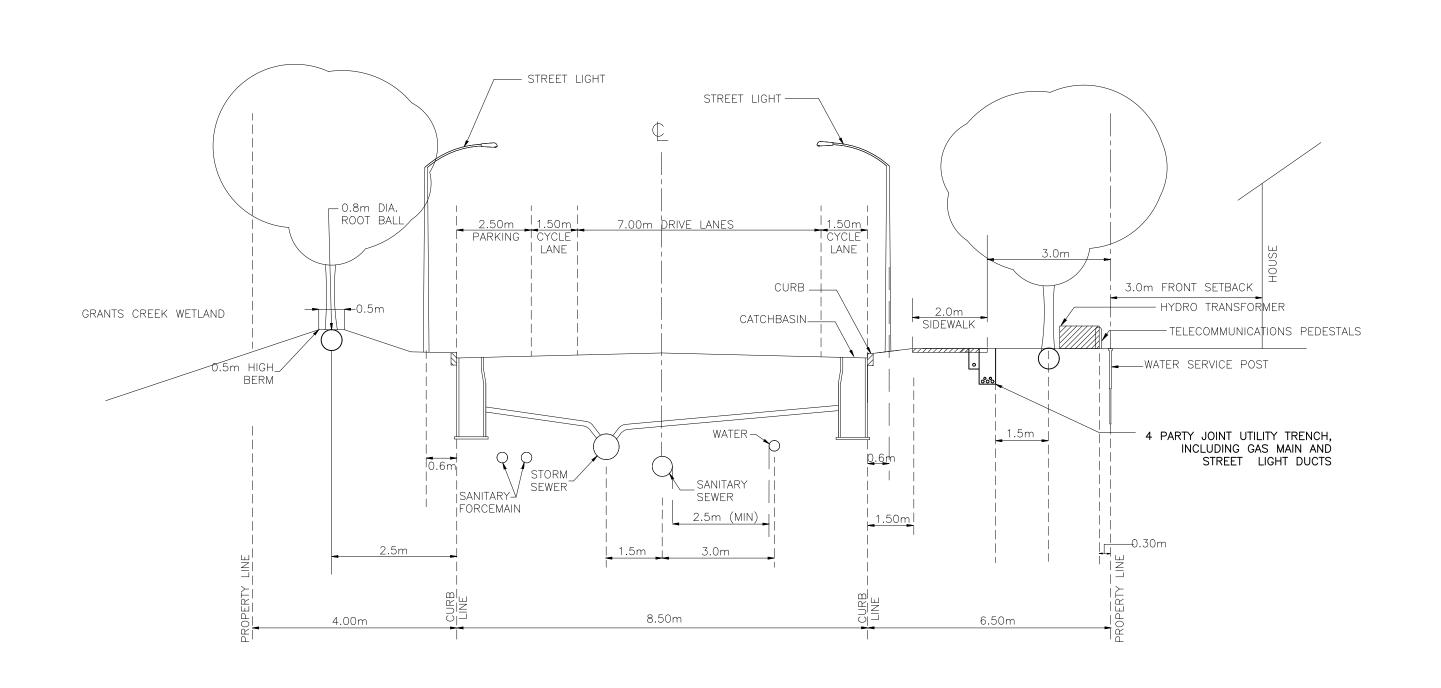
16.75 m SECTION



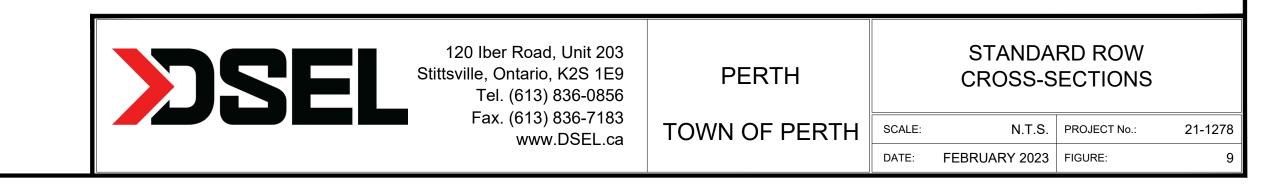
23.0 m ROW SECTION

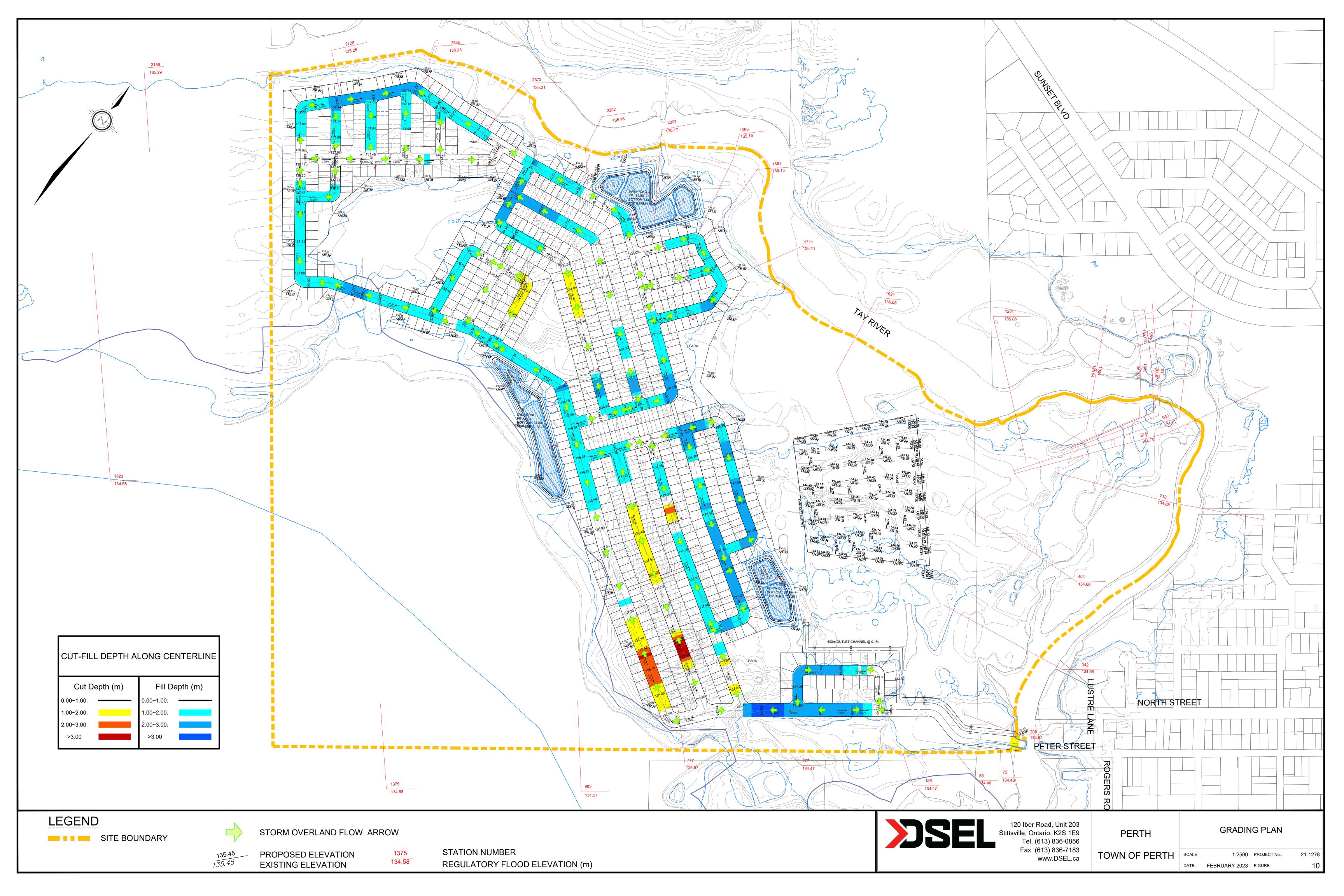


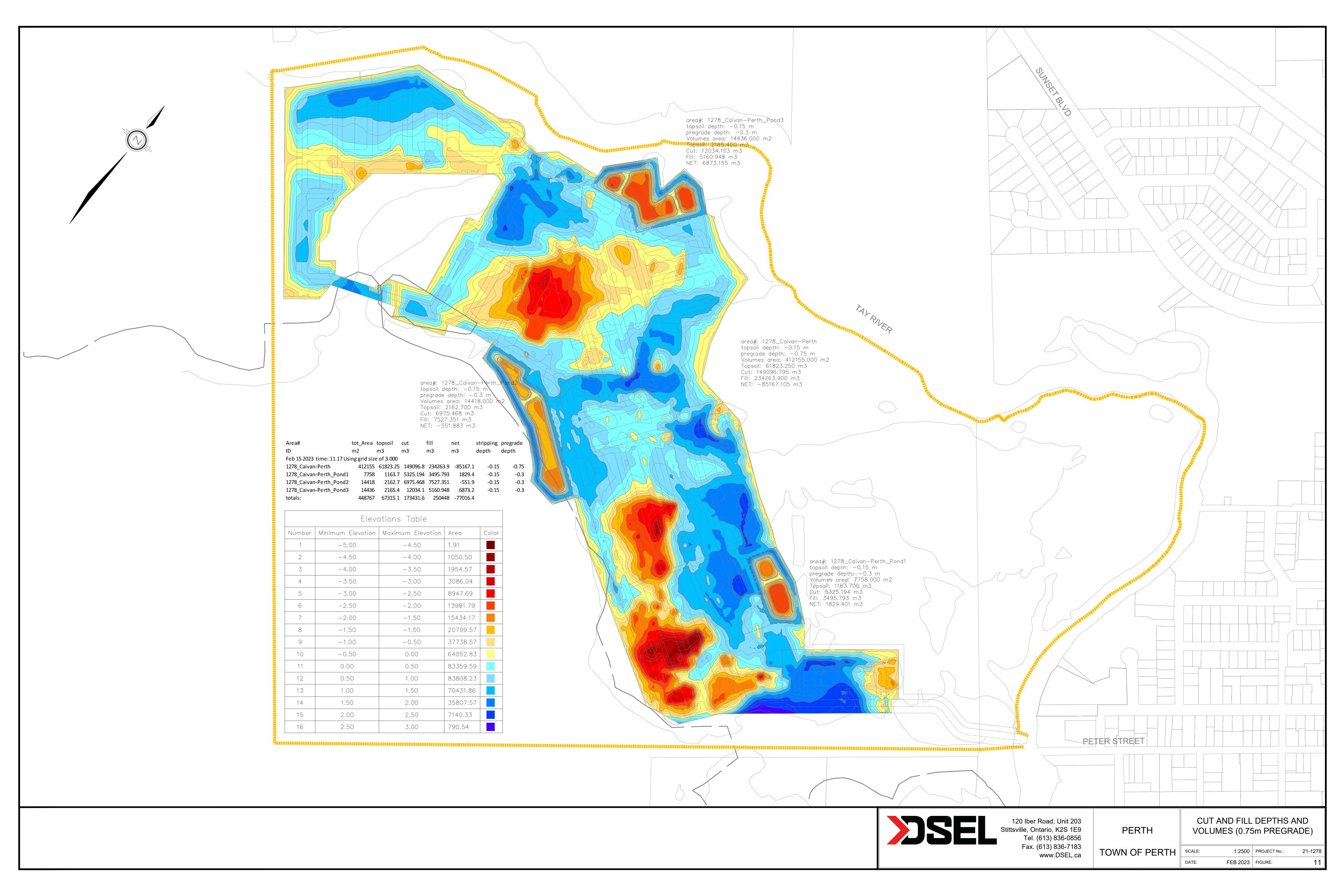
18.50 m SECTION

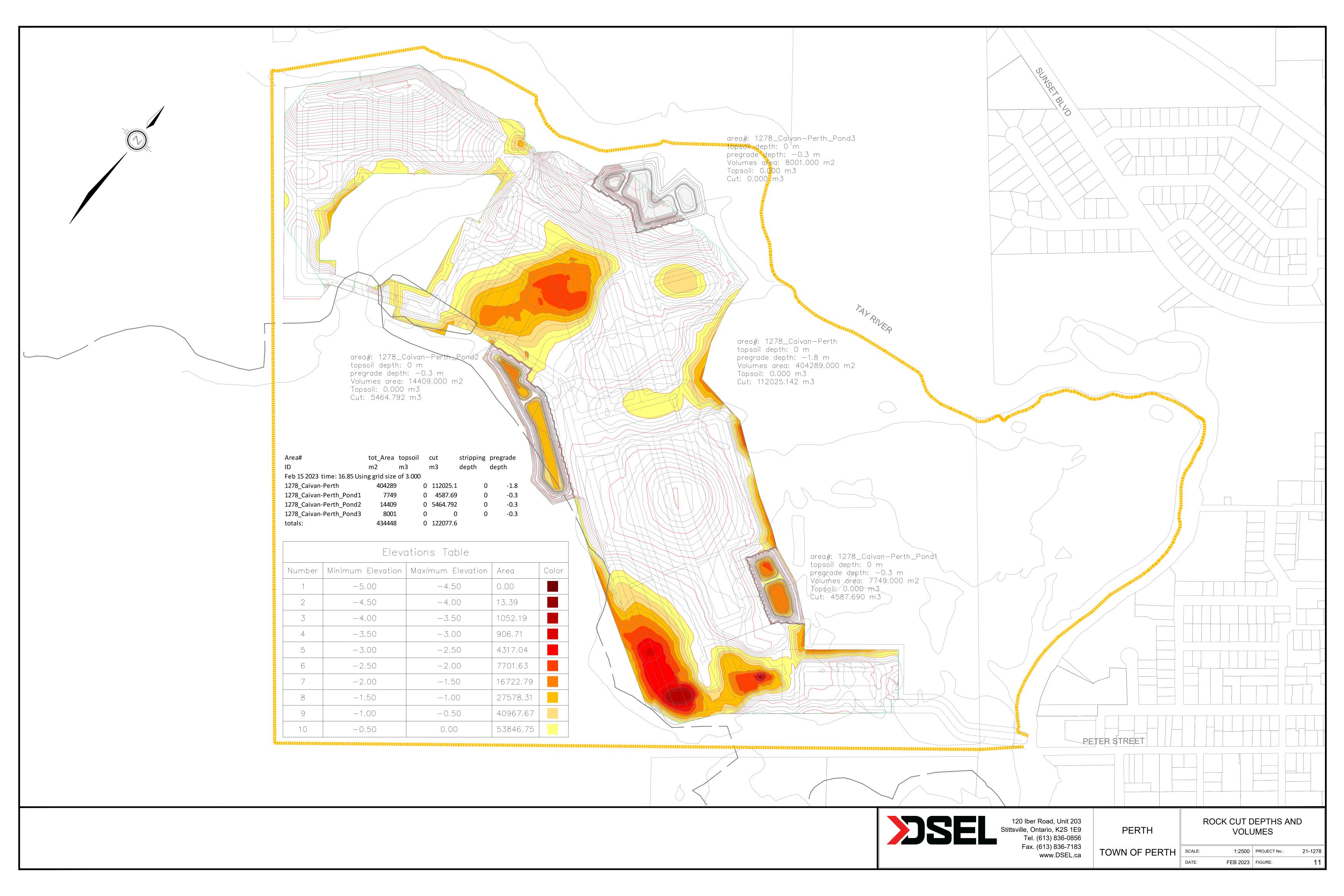


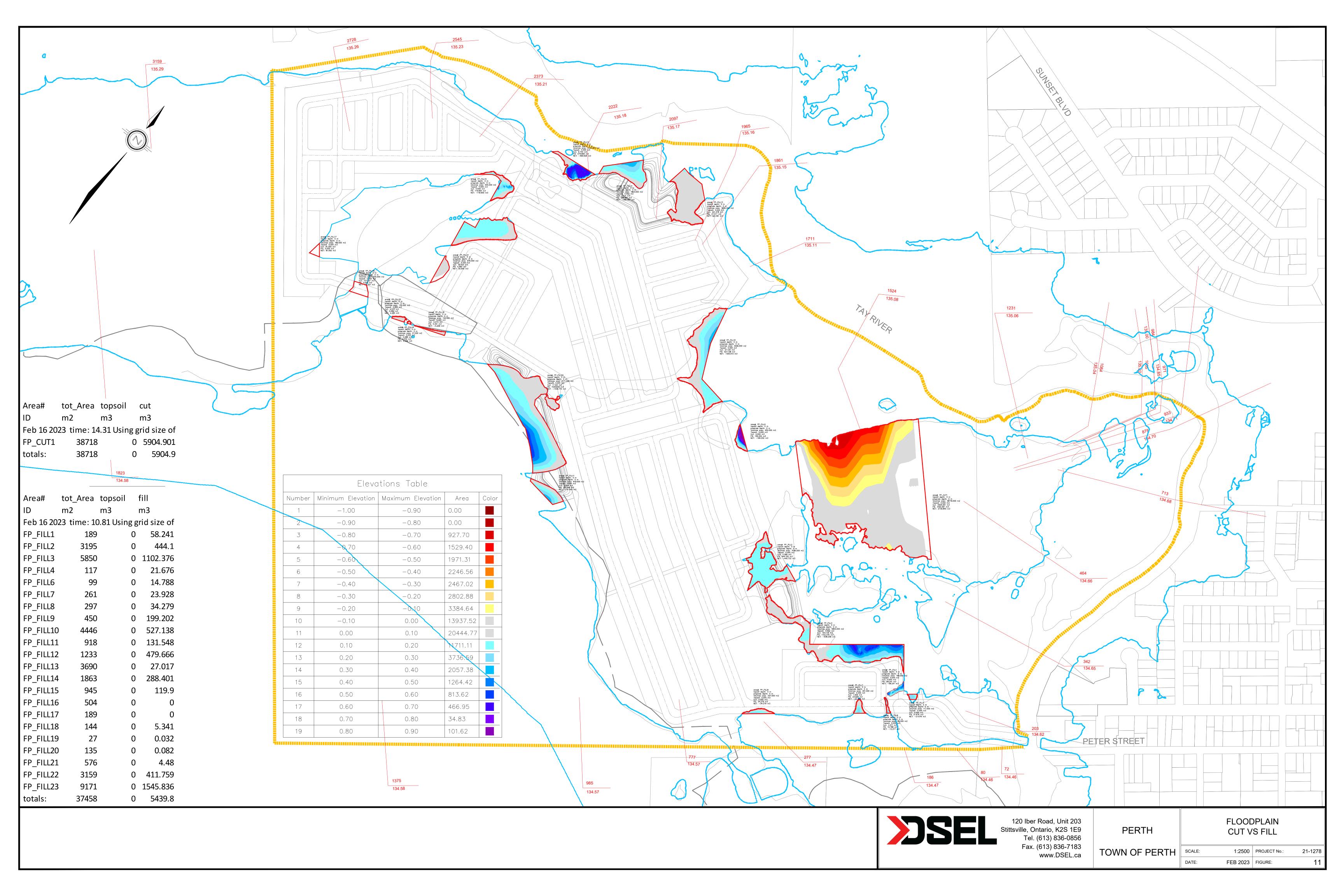
23.0 m ROW SECTION - WINDOW STREET



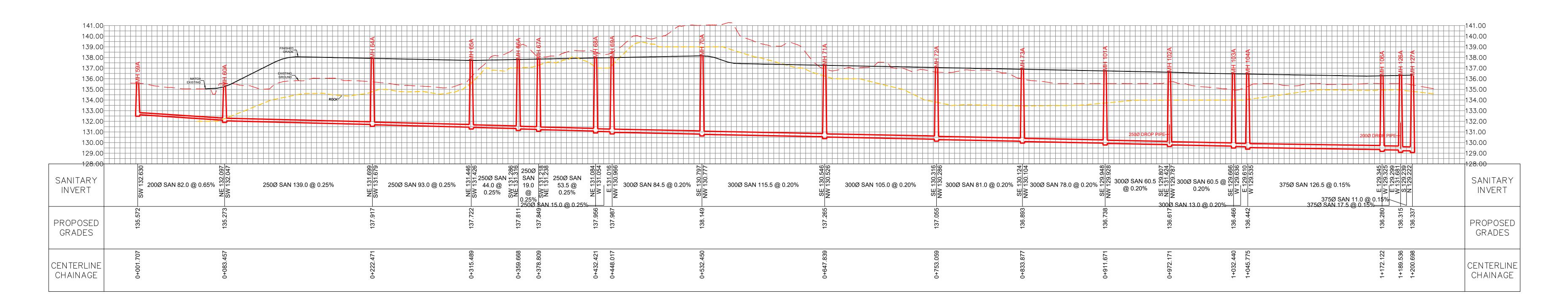




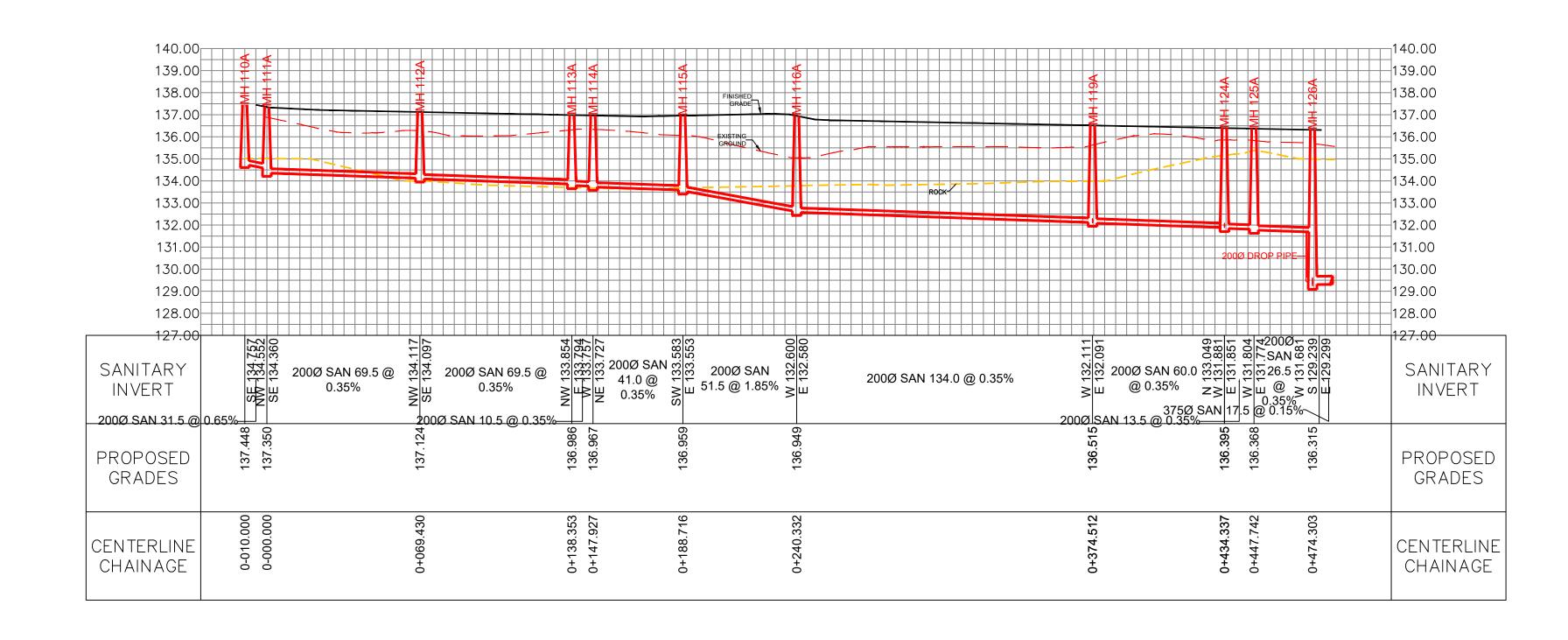




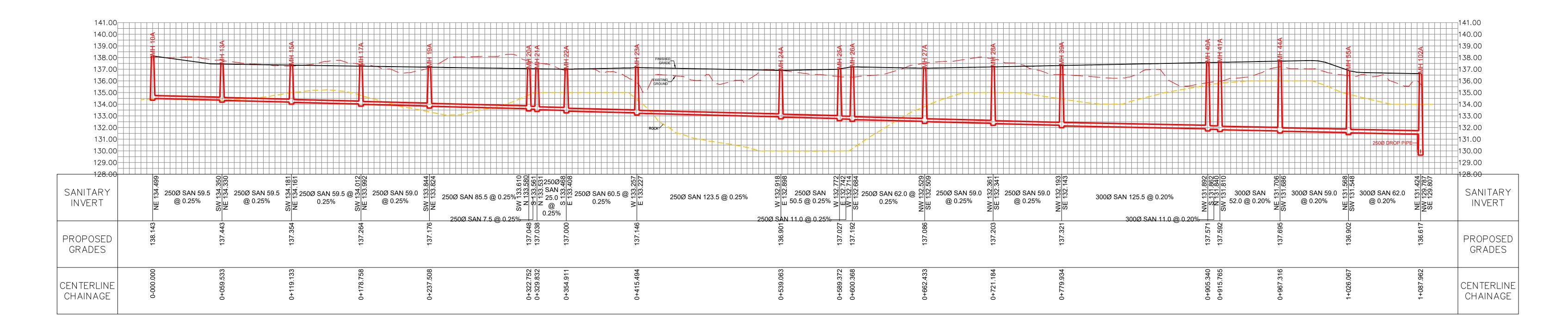
SAN TRUNK 1



SAN TRUNK 2



SAN TRUNK 3





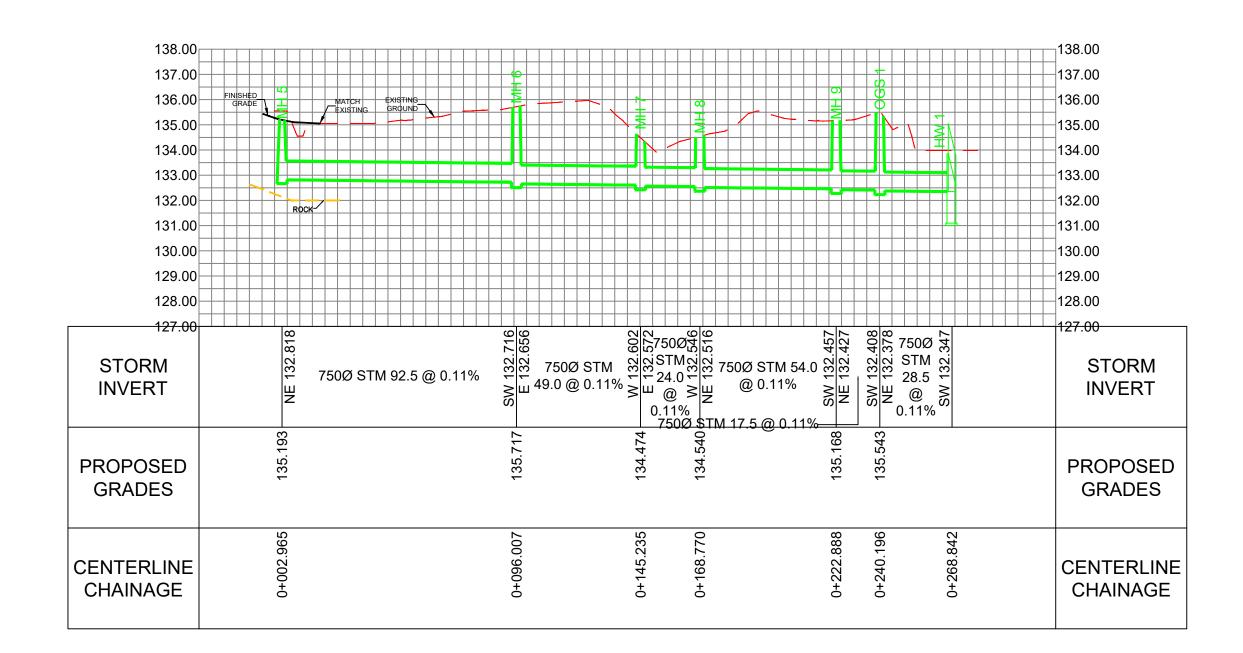
PROJECT No.: 21-1278

SCALE: 1:1500

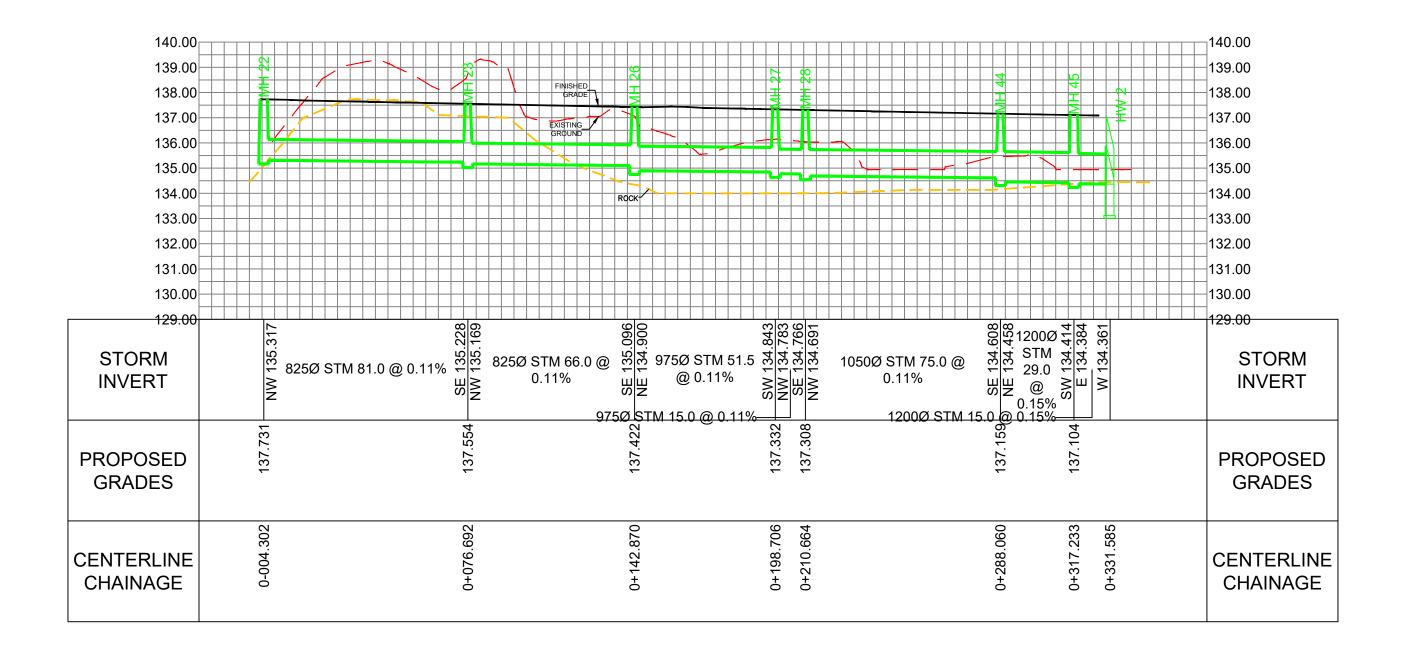
DATE: FEBRUARY 2023

DRAWING No. 13

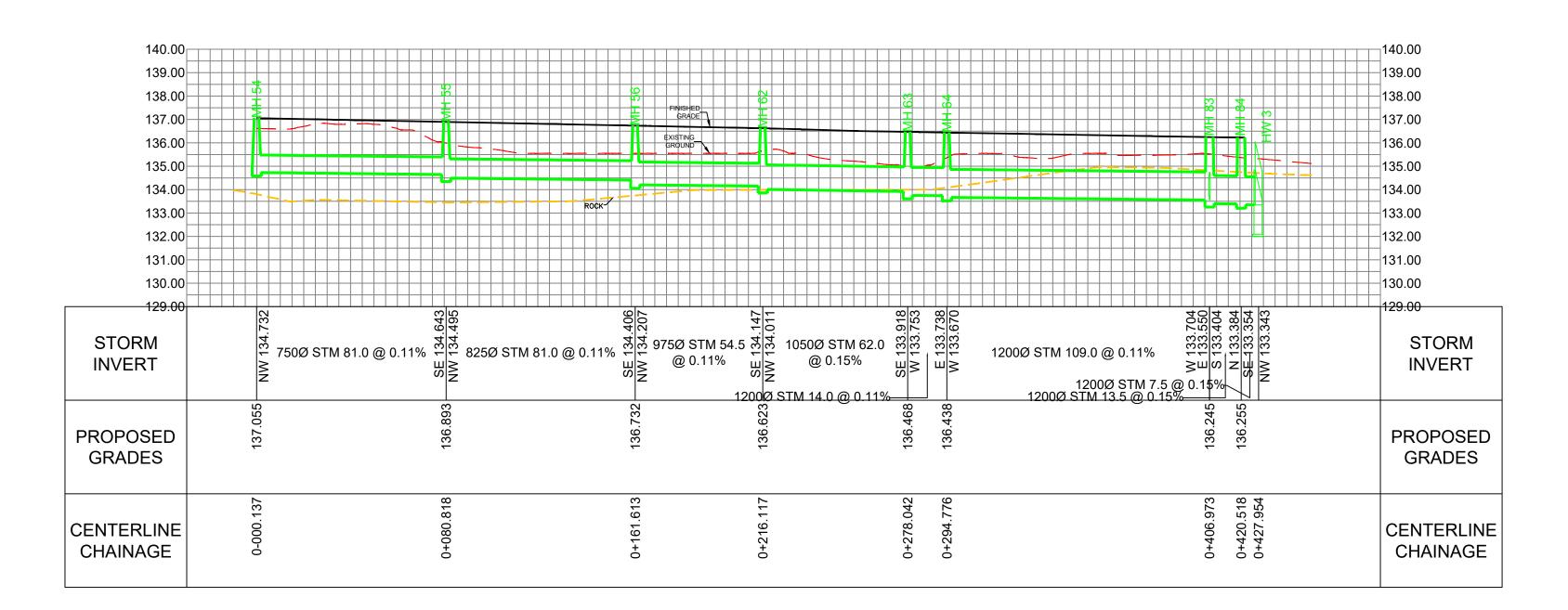
STM TRUNK 1



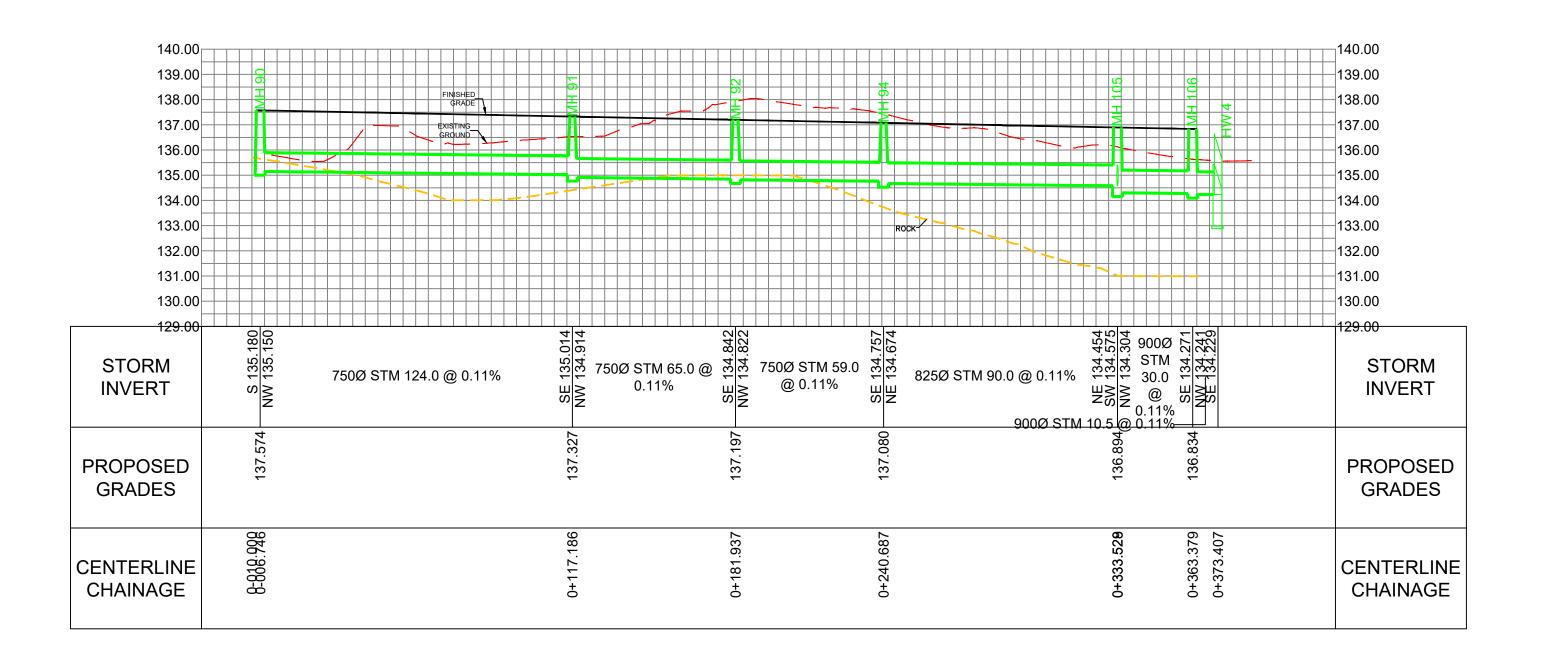
STM TRUNK 2



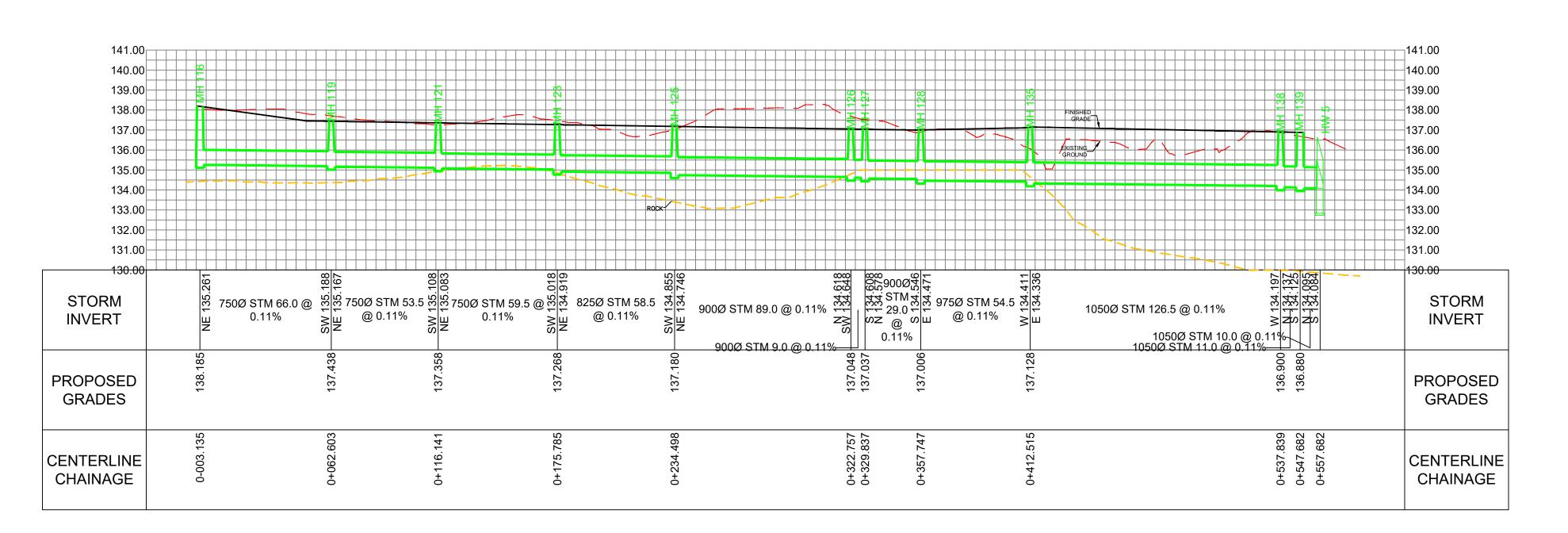
STM TRUNK 3



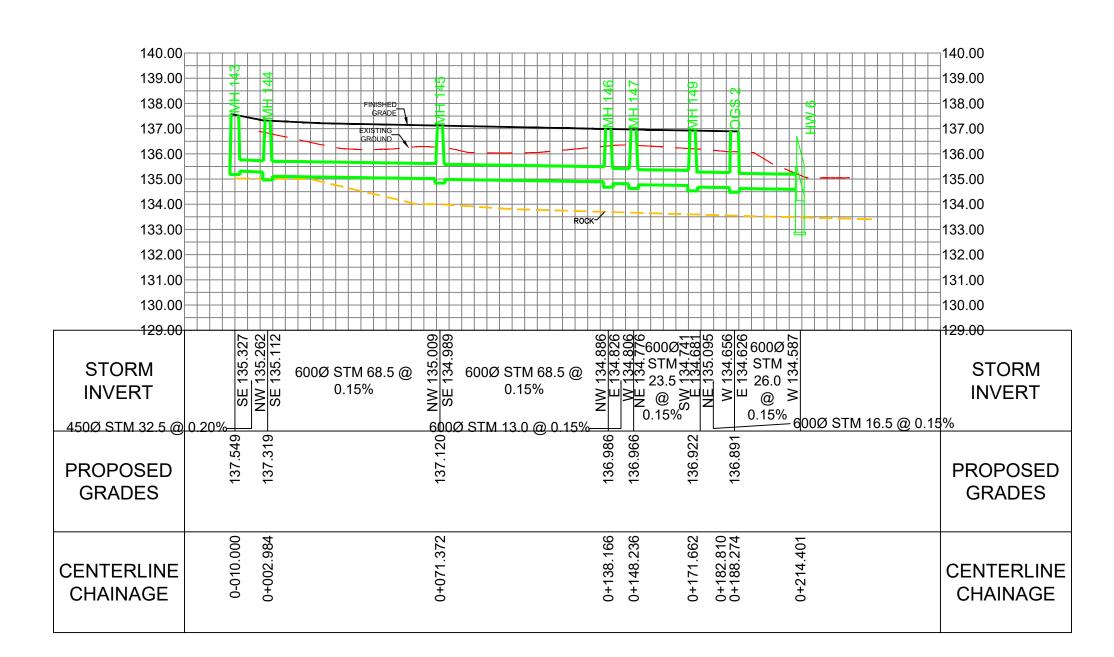
STM TRUNK 4



STM TRUNK 5



STM TRUNK 6







120 Iber Road, Suite 103 Stittsville, ON K2S 1E9 613-836-0856 dsel.ca

APPENDIX D

DSEL



April 21, 2023

Caivan

Re: Preliminary Comments on Complete Application for Caivan OPA/ZBL

As a formal follow up to your submission package, the Town of Perth has deemed the application for Official Plan Amendment and Zoning By-law Amendment complete.

Town of Perth staff will continue to review the documents provided, and as discussed are organizing a peer review for the documents prior to providing formal comments.

Below are some of the preliminary planning and building comments for consideration. Planning staff wanted to get back to you as soon as possible with some comments to consider regarding these applications. We understand you would like to have a public meeting as soon as possible, which can be organized given the status of complete application. However, staff continue to recommend that there is additional back and forth between Caivan and the Town on many of these topics prior to presenting at a public meeting.

Please advise how you would like to continue.

Sincerely,

Joanna Bowes MCIP, RPP
Director of Development Services

Cc: Michael Touw, CAO
Grant Machan, Director of Environmental Services
Brian Gass, Chief Building Official
Trevor Choffe, Director of Protective Services
Shannon Baillon, Director of Community Services
Julie Stewart, Lanark County
Nadia De Santi, WSP
Erin Ferguson, WSP
Colin Haskin, Caivan
Hugo Lalonde, Caivan



<u>Urban Design Guidelines:</u>

- **4.0 Site Analysis** is noted the twinning of the Bridge. Wording makes the assumption that this will be done. As we are aware an EA process is required. Town staff and Council have showed no support for twinning of the Bridge on Peter Street. As discussed in meeting, trigger points for construction of second bridge should be discussed with Environmental Services and Fire Department.
- **6.0 Community Structure** notes roadways that are 16.75 m in width will not have sidewalks. Roadways at 16.75 m do not facilitate the safe movement of pedestrians/cyclists. Official Plan 5.5.7a) "Sidewalks constructed to appropriate standard may be constructed on one side of the road for any local road or collector road". One side walk on each side of the roads will be required. This should be a walkable community, and historically Perth has experienced significant complaints for any areas that do not have sidewalks, to the point where the Town had to go and put them in.

Obviously this statement says MAY, but I would strongly suggest that sidewalks are placed on all roadways or you may not have support of the community, council and staff.

This section also notes only one river crossing which is **contradictory to the findings of the IMP and OP Section 8.1.4.5**.

7.0 Community Plan notes residential dwellings townhouses/single. Subdivision plan also notes this. However, it is contradictory to your own amendments which note uses for single, semis, towns, rows and additional dwellings. While the OPA/Zoning applications appear to comply with the PPS for mix of housing uses (apartments aside – which will be required) the Plan of subdivision itself does not indicate these uses nor does the UDG or the rest of the Planning Rationale Report. Please advise how you intend to bring these other uses/mix of housing, including apartment buildings, on board in the subdivision. Each phase will be required to have a complete mix of housing, appropriate densities and mixed use. Please advise.

Affordable Housing is a requirement per Bill 23. Rough-ins are not acceptable as "affordable" housing.

-Mix of uses commercial/institutional/residential are required as per OP 8.1.4.2. Again, zoning by-law appears to meet PPS, OP but reality is there are no commercial or institutional blocks indicated on subdivision. Strictly commercial or institution at Golf club house is not the only location. Commercial block for



convenience store, grocery store or other should be made available in subdivision. Please advise.

Environmental Services requires 1 storm pond.

Staff insist that Townhouses be distributed amongst the singles (along with other required housing types). It is my experience (and yours I'm sure) that a straight stretch of 300 townhouses leads to impossible parking scenarios, snow removal issues, people parking on grass, motorhomes and boats everywhere. I don't have to look far into my experience to see that, nor do you I am sure.

8.0 Built Form Design

Building Department notes that by the artist's renderings of the buildings, the single car garages will be made useless for parking a vehicle in them if doors from the houses to garages are provided. The artist's drawings shows the exterior porch steps being about 3 risers high. Given that front porches are level with the inside main floor, one can easily assume that either a landing and stair combo or maybe just a set of stairs would be required in the garage. This means necessary floor space for the car would not be available.

Generally speaking the proposed layouts are unacceptable and are not supported by staff. Room must be provided within the garage and the entire car must fit within the property boundaries. This is a MUST for townhouses in particular. Temporary/occasional parking (not during winter) is acceptable IF room for cars within the garage and front yard can be made available.

Will services be provided under the driveways or under the landscaped space? Please confirm with Environmental Services as to which is appropriate. If it is under the landscaped space, be reminded that there are required setbacks from trees to pipes. This will necessarily impact your landscape plan.

The Town of Perth is not a city, we pride ourselves on greenspace/openness. The proposed setbacks are completely out of alignment with what staff deem appropriate for Perth. I would suggest if the developer truly wanted the garage to not be the main focus of the building, they would ensure the garage was behind or in line with, the main wall of the home, which would also help open up room in the driveway area for off street parking.

No planning matrix has been provided to indicate for each type of building proposed, how it meets or does not meet the current zoning by-law, density as per the definitions in the Perth ZBL, open space, greenspace, parking space size etc. Please provide.

Additionally, I would like to see a discussion with regard to where Caivan believes there will be room on the properties for people to add and maintain items such as



fencing, sheds, pools and decks. My suggestion would be there would be little room if any for those given what is proposed to be built. These are typically the permits the building department sees in number once the homes are completed.

The ZBL as presented will need to be revised to reflect the Town of Perth zoning or something more palatable than what has been presented here. As it currently sits, it will not be supported by staff at a public meeting. Anything other than what is presented in our zoning by-law will required a much more comprehensive planning rationale report.

Street Functionality as discussed with Caivan previously despite the Official Planstaff are concerned about the functionality of any street under 20m. Between snow storage, infrastructure, landscaping and sidewalks we believe in order to have a FUNCTIONAL site, 20m road widths should be provided. All roads are to be between 20 and 24 m in width. This is particularly important in Townhouse streets (which by the way are also not supported as noted above).

Parking as demonstrated in 9.5 is good in theory but not on narrow streets and certainly not in winter.

Caivan notes cycling and pedestrian traffic are important in the community and thus should be supported on every street. The Town believes this will also help with community interaction and involvement. It also maintains safety for pedestrians and cyclists.

Generally speaking, roads are too narrow, lots lack depth and houses are too big. Please revise design accordingly.

10.0 Is it the intent for Caivan to develop all of the multi-use trails (conceptual) as indicated? Has staff been advised so that they can determine if staffing levels are available to maintain such a system? Any proposed trails that fall within current Caivan ownership should be property indicated.

Planning Rationale Report

These are general comments. I will do a full review upon your decision as to whether or not you wish to proceed to public meeting as discussed at our last meeting.

- The majority of documents note townhouses and SFD, amendments note single, semi, rows and towns. ZBA meets PPS in this regard but what is actually PLANNED for the subdivision does not indicate semi or apartments which ARE required.
- 2. Bridge and capacity analysis to be peer reviewed. Staff have outstanding concerns with respect to these topics which are preliminary and basic



- issues to the continuation of this project (RED LIGHT if these are not resolved). (2.2.1 and 2.2.2)
- 3. 2.2.3 does fiscal report consider the maintenance of Town assets- parks, garbage collection, snow removal, replacement of infrastructure, maintenance or parks/trails etc.? I would suggest the Town is not making money on this development but at best breaking even, more likely in the red.
- 4. Generally understand the argument to not have commercial taken from the Downtown Core, but respectfully, at full build out 2500 people need at the very least a commercial block for a grocery store or at the very least a convenience store. While the OPA/ZBL indicates these items, they are not addressed or indicated in current plan of Subdivision. Mixed use could also consider institutional uses- community centre, library, school, pool etc. Mixed use is a requirement. A tip of the hat to commercial at the golf course is insufficient in my professional opinion for a community of that size and distance (last phases) to grocery shopping when it could be made available within the community. Start thinking big picture. 2 of 3 elementary schools are at capacity.
- 5. Respectfully Caivan cannot, nor should they be expected, to provide home based business. I agree that you are allowing it in the amendments, but you cannot consider that as part of the mixed use argument. OP notes public service, institutional, long term care as potential to alternate residential uses.
- 6. IMP is not a planning document. Supporting yes, but not a planning document. You cannot base your decision on what is allowed for a comprehensive review, based on what IMP says.

Proposed Official Plan Amendment

- 7. As discussed at previous meeting about Comprehensive Review with Julie you have found a technical error in the OP, but that was not the intent of the by-law..
- 8. Purpose in the OPA indicates site plan required. Please advise why?
- 9. You note removal of reference to Perth Golf Course. Why? 9 holes would still exist, and it is a heritage feature of our Town. Staff are not supportive of the removal of the reference.
- 10. Wil have to review Section 8.10 very specifically to OP, but I am generally not supportive of any section of an OP that takes precedence over anything else. Maybe a portion of it, but certainly not the entirety. This is to be a mixed uses community. Not residential. Again, the actual by-law notes numerous uses are permitted but no blocks on the plan of subdivision are shown, nor is any serious intent indicated in documents.
- 11.8.10.4.1 Remove "Small scale" neighbourhood commercial and just not neighbourhood commercial uses. Then take what you have drafted in your OPA and put into action in your draft plan. Add institutional uses.
- 12.8.10.4.2 Apartments, semis, townhouse and single, stacked towns are a mix of uses.



- 13.8.10.4.2 remove. Meet density as required under current OP
- 14.8.10.4.2 remove. Disagree with this section.
- 15.8.10.4.2 (4) add apartment, stacked town, ARU
- 16.8.10.4.2 (5) remove wording "as ancillary to golf course building area" or alternatively keep wording but also add other blocks within plan of subdivision for neighborhood commercial/institutional uses. 2500 people should be recognized as a community and as such require these amenities.
- 17.8.10.5.2(4) remove the word "encourage" and replace with "required" Add "trees may only be removed if there is a health and safety issue as determined by an arborist". Trees are to be replaced at a 1:1 ratio and at a caliper/height determined by the Town.
- 18.8.10.7.1 (2) add to the end "that have completed the EA process and received the required approvals"
- 19.8.10.7.2(3) spelling "conservation"
- 20.8.10.8.1(4) confirm with Environmental Services
- 21.8.10.9(4) not opposed to this but would like to have a little more detail in zoning
- 22.8.10.10(4) No. You have already noted heritage value. Also mentioned in OP and/or if you deemed it not to be heritage, then institutional or commercial use is appropriate.
- 23. Schedule B- why are you changing EP lands to residential? A large area on A and C is PSW and others are wetland. I assume it is dealt with in EIS but have not had a chance to review in detail yet.

Proposed Zoning By-Law Amendment

- 23.1 Add institutional uses, apartment, stacked town. Provide zone requirements for all permitted uses as outlined. Indicate appropriate blocks on plan of subdivision.
- 23.3(a) required 2 parking spaces per home, apartments 1.5 plus visitor, what of ARU parking in homes? You indicate rough in. 1 parking space for any apartments within houses. This means individual lots where future apartments pay be considered would be required to be designed and built to accommodate a minimum of 3 off street parking spaces during the initial development of these lots.
- 23.3 (e) you indicate Section 4.28 lot coverage and impervious surfaces do not apply to western annex lands. This is a firm no. In fact, given the nature of this site surrounded by wetlands in a water intake zone, MORE, not less pervious surface should be required. Driveways must be paved and therefore pervious surface will be required to be found elsewhere on the lot.
- 23.2 (b), (c), (f) can be explored. No to f(III)

Same comments for zoning and OP.



These are my preliminary thoughts on the urban design brief and planning rationale. I have yet to review other documentation and as mentioned, am organizing a peer review of documents. Please advise if you would like to proceed with me sending out a public meeting notice

Building Comments

- a. No commentary of existing soils can be used for backfill, or if damproofing or waterproofing of the homes is required
- b. I did not see any commentary as to the existing radon levels in the ground, given the proximity to the wet lands, they could be high, they say soil dampness is not a factor, but seems the areas with the highest counts were are a wetland. I suggest that the Subdivision Agreement mandate radon mitigation measures be installed in each unit. I was looking to introduce the "100 unit Radon testers" program from Health Canada when COVID hit, and were nearing build out of the subdivisions. Since we will have nothing but new subdivisions on the horizon, now would be a good time to introduce this, as no existing builder would be burdened with a extra cost not anticipated.
- c. Nor did I see any comments regarding acidity of the soils.
- 2. The geo tech report already advises that each residential lot should be investigate further to soil conditions
- 3. The geo tech report is also mandating reinforced foundations, so this needs to be added as a condition that foundations be designed by a P.Eng.
- 4. By the artist rendering of the buildings, the single car garages will be made useless for parking a vehicle in them, if doors from the garage to the house are provided. The Artist drawing shows the ext. porch steps being about 3 risers high. Given front porches are level with the main floor inside, one can easily assume that either a landing/stair combo, or maybe just a set of stairs would be required in the garage. This means floor space needed for a car is not available. Also looks like part of each driveway will need to use the municipal boulevard to accommodate the length of a average vehicle. Also with the driveway layout not seeing very much on-street parking opportunities.





MEMORANDUM

DATE: JULY 25, 2023

TO: GRANT MACHAN, TOWN OF PERTH

FROM: MARK BISSETT

RE: WESTERN ANNEX LANDS – 141 PETER STREET

FUNCTIONAL SERVICING REPORT REVIEW

123056

CC: EDSON DONNELLY, STEVE PENTZ, JENNIFER LUONG

Novatech was retained to provide assistance with planning, engineering, and transportation matters related to Draft Plan, Official Plan Amendment, and Zoning Amendment applications for the above development. The development consists of 640 single family homes and 299 townhouse dwellings.

We have reviewed the following civil engineering related documents:

- Functional Servicing Report for Caivan (Perth GC) Limited Proposed Residential Subdivision, by DSEL (February 2023)
- Infrastructure Master Plan, Western Annex in the Town of Perth, by JP2G (November 2019)

This memo provides a summary of our review and recommendations.

Water Supply

The water distribution system needs to reliably convey adequate supply for domestic consumption and fire protection to the new community. This is achieved by maintaining system pressures during a wide range of operating conditions. Typically, a water distribution model is prepared to analyze the design based on pipe layout (size, length, material), demand and background pressure to ensure compliance with regulations. Reliability is a key objective commonly assessed via break-analysis whereby the designer reviews how the distribution system would perform during a failure scenario. These are infrequent events of short duration (i.e., frozen pipe repair) that potentially affect many dwellings creating both public nuisance while supply is unavailable and hazard while hydrants are non-functional. Connection redundancy to the supply network often permits the distribution system to continue operating during a failure scenario with reduced pressure.

Caivan has proposed a dual watermain crossing at the Peter Street Bridge with connections in the vicinity of North Street and Lustre Lane to service the new subdivision. They used a hydraulic model Stantec prepared in 2016 for the Town of Perth to establish background conditions, then added the subdivision pipe network and demands to analyze system pressures. The proposed water distribution design is a viable solution that complies with regulatory criteria and provides two connections to the existing network, but it may be vulnerable to cascade failure.



We are concerned the twin bridge crossing and proximity of connection to the existing network reduces reliability for the development. An event that leads to failure of one pipe segment is more likely to affect adjacent infrastructure. The proposed design deviates from the Infrastructure Master Plan (IMP) that identifies a crossing of the Tay River with a connection near Inverness and North Street.

In sum, the dual water connection proposed by Caivan is technically viable but is more vulnerable to failure. Separating the water connection points will improve both system redundancy and hydraulics, while removing duplicate infrastructure from a planned roadway. We recommend the developer provide two spatially separated water connections as outlined in the IMP.

Both the Functional Servicing Report and IMP identify a future need for additional reservoir and/or elevated storage (water tower). The timing, scope, and obligation for the expansion works should be analyzed as part of detailed design; current information suggests these capital works are not urgent.

Wastewater Collection

A municipal wastewater system is generally comprised of gravity sewers, local pump stations, discharge (forcemain) lines, and a treatment facility. Peak flow is calculated using criteria provided by the province with the engineer responsible to design a conveyance system with appropriate freeboard to basements. Typically, sewers should not exceed their free-flow conveyance capacity and pump stations should have an emergency overflow in the event of extreme weather.

Caivan has proposed a network of gravity sewers draining to a single pump station to service the development lands. The local pump station has an emergency overflow into an adjacent storm pond in the event of catastrophic failure. A forcemain is routed through the subdivision, across the Peter Street Bridge, and extends southeast along Roger Road discharging into the 750mm trunk sewer near Jessie Drive. Wastewater would flow by gravity to the sewage lagoon at Wildlife Road for treatment before discharge into the Tay River. Research suggests the lagoon has adequate capacity to service the development lands.

The wastewater design deviates from the IMP that recommends two local pump stations for the development with discharge to gravity sewers in addition to upgrades at the Cockburn PS. On this matter, Novatech supports the proponent recommendation to construct a single local pump station for reasons of efficiency, cost, and maintenance. We believe a single local pump station is mutually beneficial for both the developer and town.

The proposed wastewater design presents a viable solution that will by-pass the Cockburn PS which is near capacity and avoids gravity sewers approaching their free-flow limit. The preceding benefits are contrasted by significant public disruption to Roger Road during the forcemain construction.

The town might benefit from a hybrid approach whereby a single local pump station discharges to gravity sewers across the Peter Street Bridge. This would require additional analysis of the sewer system to ensure adequate freeboard to basements along the discharge line. The Cockburn PS would require upgrades as outlined in the IMP, but this appears viable and would significantly increase the firm capacity of the station offering increased public protection and growth opportunities for the town. We recommend the proponent explore this hybrid option.



Stormwater Management

Stormwater design is regulated by the Ministry of Environment, Conservation and Parks and the Rideau Valley Conservation Authority (RVCA) with the objective to provide both quantity and quality control of runoff from new developments. Quantity control is achieved by restricting outflow to predevelopment discharge rates for a variety of design storms. Quality control is typically achieved by removing Total Suspended Solids (TSS) prior to release into the environment. Low Impact Development (LID) measures can assist with both quality and quantity control.

Gravity sewers typically convey stormwater to designated treatment facilities such as wet ponds. The designer must calculate the hydraulic grade line to ensure adequate clearance to the underside of footing elevation as protection against basement flooding. Stormwater ponds are commonly located in naturally low-lying areas adjacent to a receiving watercourse. The pond location needs to consider the flood elevation under a variety of return periods and any natural environment features such as Provincially Significant Wetlands.

Caivan has proposed three stormwater management facilities (SWMF) around the development with a normal water level at the modelled 2-year elevation of the receiving watercourse (either the Tay River or Grant's Creek). This deviates from the IMP that recommends the pond water level is set at the 100-year elevation. Novatech supports setting the normal water level in the ponds based on the 2-year elevation. This conforms to standard design practice, keeps the earthwork operation within reasonable limits, and appropriately protects the public.

The proponent recommends the installation of oil and grit (OGS) separators in two locations that cannot easily drain to a pond. These units provide some treatment function but are not as effective as a wet pond; further the OGS units require ongoing maintenance. We recommend the town challenge the developer to route these areas to a SWMF.

Stormwater ponds are subject to regulatory floodplain and development restrictions; facilities are typically located outside the 30m setback from wetlands and other sensitive areas. Confirming the 100-year floodplain location is deemed critical to advancing the application as this establishes the development boundary and dwelling setbacks. The IMP indicates that any SWMF located within the floodplain would need approval through a satisfactory Environmental Assessment process that demonstrates there is no viable alternative. The floodplain boundary is regulated by RVCA, and confirmation of the line requires their approval.

In short, the Caivan stormwater design generally follows the regulatory intent, but we cannot meaningfully complete a review until the floodplain is established with consensus from the RVCA.