

Functional Servicing Report

Project Eagle Battery Plant



Prepared for:
EllisDon Corporation

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Functional Servicing Report

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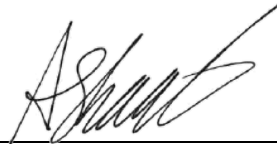
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Introduction

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1 Introduction

Stantec Consulting Ltd. (Stantec) has been engaged by EllisDon to prepare a Functional Servicing Report (FSR) in support of Site Plan Approval for a proposed industrial development: the Hipore™ wet-process lithium-ion separator manufacturing facility. The development is located on approximately 74.4 hectares of land at 5088 Highway 140, Port Colborne, Ontario. The site is situated along the northern boundary of the Port Colborne Municipality, bordered by Highway 140 to the east, the Welland Canal to the west, Highway 58A to the north, and Forks Road East to the south.

The proposed industrial complex will consist of a multi-phased development, including a manufacturing building and a tank yard. According to the Site Plan prepared by Stantec, the initial phase of the facility will have a gross floor area of approximately 60,107 m², with subsequent phases adding 58,641 m² and 39,508 m², respectively.

In accordance with Schedule A2 of the City of Port Colborne Comprehensive Zoning By-law No. 6575-30/18, the site is subject to a site-specific holding provision. This provision requires the landowner to obtain approvals for a private sewage disposal system and private water supply from the Region or Ministry before municipal servicing infrastructure becomes available. Additionally, the landowner must register a Site Plan Agreement on the title with the City of Port Colborne.

In response to the 1st submission site plan comments from the City, this FSR provides a detailed assessment of the functional servicing requirements for the proposed development. It focuses on the water, wastewater, and stormwater networks to ensure compliance with municipal and provincial standards. This report also outlines the servicing strategy, including phased implementation, and identifies the capacity and location of the infrastructure required to support the development.

2 Scope of Work

The scope of work in developing this report involves the following:

- a) Collecting existing servicing drawings from the Municipality, Government Agencies, and Utility Companies in order to establish availability of site servicing.
- b) Collecting and Reviewing background studies, models and documents, including Nylon Energy Park Studies (2012), Port Colborne Design and Development Manual (2024), Niagara Region 2021 Water and Wastewater Master Servicing Plan Update (GM BluePlan, 2023), East Side Employment Lands Municipal Class Environmental Assessment Master Plan (AECOM, 2018), Nylon Servicing Review Technical Memo



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(GM BluePlan, 2023), Letters from Region to BMI Group Re: wastewater and water estimated infrastructure timelines (2023), and City of Port Colborne InfoWater Hydraulic Model.

- c) Collecting Manufacturing Facility production water and wastewater requirements from Asahi Kasei representatives and other consultants retained by Client.
- d) Meeting with Municipal Engineers, Governing Authorities and Developers.
- e) Evaluation of the data.
- f) Presentation of the findings in a Functional Servicing Report in support of the Site Plan Approval Application.
- g) Co-ordinate with other Consultants retained by the client.

3 Site Servicing Considerations

3.1 Wastewater Servicing

There are no existing Municipal sanitary sewers in vicinity of the subject site. The nearest local sanitary sewer is the 200mm diameter sewer on Chippawa Road, ultimately draining to the Clarke Sanitary Pump Station (SPS), which pumps to the East Side SPS which conveys the flows to the Seaway Wastewater Treatment Plant (WWTP). The City of Port Colborne is serviced by the Seaway WWTP, an overview of the existing wastewater system for the sewershed is provided in attached Figure 4 (**Appendix A**), adapted from GM Blue Plan Technical Memo (2023). The existing local and trunk sewers as well as both downstream SPS's do not have excess capacity to accommodate the proposed development full build-out flows.

It is understood as per discussion with the Niagara Region and consisted with the EA for the Site Servicing of the East Side Employment Lands (AECOM, Jan 2017) the proposed development will utilize the new SPS, constructed on the west side of Ramey Road, south of Third Concession Road. A forcemain from the SPS will direct flow south on Ramey Road to the City owned railway and south along the railway connecting to the future wastewater forcemain at second concession Road that will cross the Weland Canal and ultimately outlet to the Seaway WWTP. The City of Port Colborne will design and construct a gravity sewer upstream of the new SPS along Ramey Road to Third Concession Road. The Niagara Region has committed to provide required capacity and the sanitary outlet at Third Concession Road by Q3-2027.



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As the municipal sanitary outlet at Third Concession Road is approximately 3 km south of the proposed development, BMI Group by Q3-2027 will design and construct private sewage pumping station and forcemain following Snider Road, Third Concession, Ramey Road and/or Railway, to discharge into the future City sanitary sewer. Appropriate approvals would be required for this installation.

3.1.1 Proposed Sanitary Design Flow

Sanitary design flows can be determined using various methodologies, including those outlined in the Port Colborne Design and Development Manual (2024), the Ministry of the Environment, Conservation and Parks (MECP) Design Guidelines for Sewage Works (2008), and the Ontario Building Code (OBC, 2012).

For industrial developments, the calculation of dry weather design average and peak sewage flow rates is highly dependent on the specific industrial processes involved. Accordingly, the sewage flow rates for this development were estimated by representatives from Asahi Kasei Corporation, based on the operational requirements of their Hipore™ wet-process lithium-ion separator manufacturing equipment.

The facility is projected to employ 483 full-time staff per shift at full build-out. Employee sanitary flows were conservatively estimated in accordance with OBC Table 8.2.1.3.B, using the "Factory occupancy (with showers)" category, which assigns 125 L per employee per 8-hour shift. Since the facility will operate continuously on a 24/7 basis, no significant peaks in production-related sanitary flows are expected.

The development of the facility will occur in multiple phases, with production start dates staggered over several years. A summary of the estimated industrial and employee-related sanitary sewage flows for each phase is provided in **Figure 3-1** below.

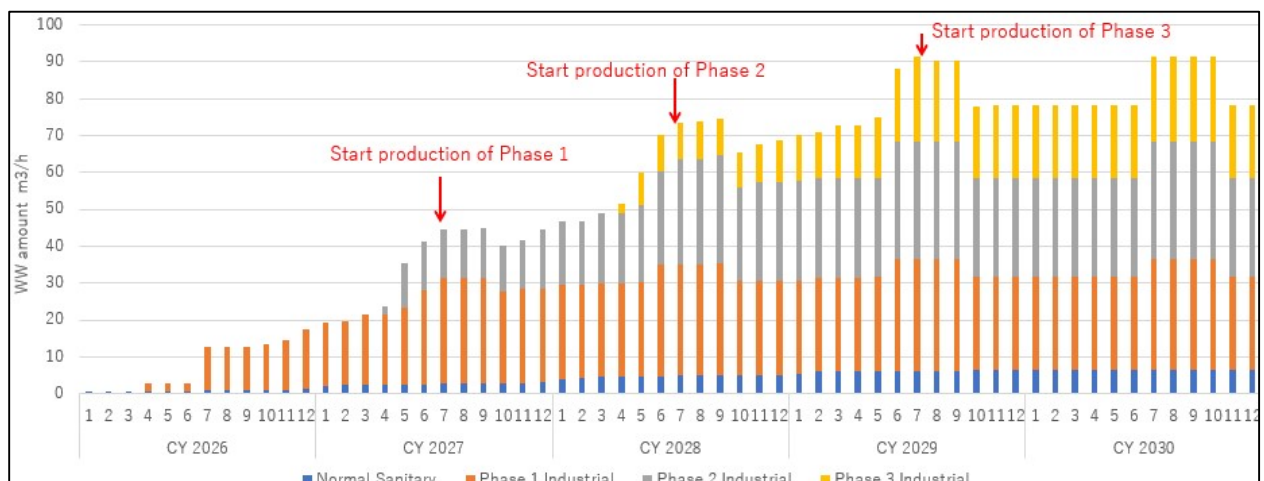


Figure 3-1. Estimated monthly dry weather Sanitary Flows (2026 to 2030)



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The estimated average and peak dry weather sewage flows for Phase 1 and the ultimate build-out scenarios are summarized in **Table 3-1** below. These flows were derived from Asahi Kasei's projected data for both employee and industrial sewage. To calculate peak dry weather flows for employee sewage, a Peaking Factor was applied using the Harmon formula, with a conservative maximum value of four times the average dry weather flow. A detailed breakdown of the projected flows, including supporting data from Asahi Kasei, is provided in **Appendix A**.

Table 3-1: Proposed Sanitary Design Flow

	Phase 1		Ultimate	
	Average Dry Weather Flow (L/s)	Peak Dry Weather Flow (L/s)	Average Dry Weather Flow (L/s)	Peak Dry Weather Flow (L/s)
Employee Sewage	1.67	6.67	2.11	8.46
Industrial Process Sewage	7.21	8.06	20.93	23.33
Total Sewage	8.87	14.72	23.04	31.79

To account for wet weather conditions, the extraneous flow design allowance of 0.286 L/s/ha for new developments, as stipulated by the City of Port Colborne Standards, has been applied. For the 74.4-hectare subject lands, this results in an additional 21.28 L/s being added to the peak dry weather flow. However, the actual inflow and infiltration (I&I) contributions to the downstream sanitary system are anticipated to be significantly lower due to the limited length of gravity sewers within the proposed development.

A more precise estimation of inflow and infiltration has been calculated based on the anticipated area likely to contribute to the sewer, which totals 4.30 hectares. This targeted approach results in an I&I contribution of 1.23 L/s.

In addition, the peak dry weather flows were calculated using flow projections provided by Asahi Kasei Corporation. These projections incorporate maximum monthly flows, based on anticipated industrial equipment specifications and usage patterns. Recognizing that equipment selection will be finalized at a later stage and may involve minor deviations, an uncertainty factor of 16.98 L/s has been included in the calculations to provide a buffer.

Consequently, the total sanitary flow contributions from the Project Eagle site to the downstream system are estimated to be 50 L/s, combining dry weather flows, I&I contributions, and the uncertainty factor.

To ensure the downstream system's adequacy, flow monitoring is recommended following the build-out of each development phase. This real-time data will confirm peak flows, ensuring that downstream components, including sanitary pump stations, are appropriately sized; neither overly conservative nor insufficient in capacity.

The proposed industrial development is expected to generate initial wastewater flows starting in Q2-2026. However, the downstream sanitary outlet for the development will not become



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operational until Q3-2027. This timeline necessitates an interim wastewater servicing strategy, which is detailed in the following section.

3.1.2 Proposed Sanitary Servicing Strategy

The proposed development will require an on-site sewage disposal solution during the interim period before the downstream municipal sanitary system becomes available. This strategy addresses the treatment of domestic, industrial, and contact stormwater flows.

Domestic sanitary flows, including those from handwashing, sinks, toilets, and food preparation, will be conveyed through an underground sanitary pipe to an on-site package plant. A package plant is a compact, pre-engineered system designed for efficient wastewater treatment in locations where traditional treatment plants are not feasible or cost-effective. These modular systems are easy to transport, install, and expand as needed. Once treated at the package plant, the effluent will be discharged into the Welland Canal via an underground gravity piping system.

Industrial flows generated within the development will be conveyed via above-ground pipe racks to the proposed on-site wastewater treatment plant (WWTP). The design of the above-ground pipes and racks will be undertaken by others. After treatment at the WWTP, the industrial flows will be directed via gravity to Stormwater Management Facility #4 (SWMF #4). SWMF #4 will feature an online monitoring system to measure methylene chloride, total organic carbon (TOC), pH, and temperature. It will also include a bottom-diffused aeration system, pre-placed spill booms, and automatic gate valves at the outlet as a precautionary measure as specified by Asahi Kasei Corporation. The SWMF is not intended for containment and shall receive treated water only. The WWTP includes a containment dike and is to discharge treated clean water. The SWMF #4 will ultimately discharge into the Welland Canal via an underground gravity storm sewer.

A quantity of the industrial flow, particularly from the Phase 1 tank yard, which is expected to contain leakage effluent, will first be directed to an industrial underground pit via underground gravity sanitary pipes. From the pit, the effluent will be transported to the above-ground pipe rack system and ultimately to the WWTP for treatment prior to discharge.

Contact stormwater, which interacts with industrial areas such as loading docks, fueling stations, material storage zones, and equipment yards, may carry contaminants like oils, greases, heavy metals, chemicals, or sediments. To prevent environmental harm, the stormwater system conveying these flows will include valves installed at discharge points, which will remain in a closed position by default. Collected stormwater will flow into sumps, where it will be tested for contaminants. If no contaminants are detected, the valve will be opened, allowing the clean water to be discharged into an underground piping system connected to SWMF #4. In cases where contamination is present, the water will be contained and transported off-site via truck for proper treatment. This process ensures that only clean water is discharged to the SWMF.



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The wastewater and stormwater management strategy for the proposed development is further detailed in the civil servicing plans prepared by Stantec Consulting Ltd., dated December 2024. These plans outline the flow pathways for domestic, industrial, contact, and non-contact stormwater, including their respective discharge locations and pipe sizes. The servicing plans provide a clear visual representation of the proposed infrastructure and demonstrate how the system adheres to regulatory and functional requirements.

The proposed strategy is reliant on approval from the Seaway Canal Authority for discharging treated flows into the Welland Canal. Based on ongoing discussions and the rigorous protocols established to ensure compliance with quality and quantity standards, approval is anticipated.

In the ultimate condition, once the downstream municipal sanitary system becomes operational, the WWTP outflows can be redirected to the municipal system via a gravity sewer. This sewer will discharge southwest of the subject lands into the BMI Group-designed sanitary system, which routes flows through a forcemain and sanitary pumping station (SPS) to the future municipal sanitary outlet, as detailed in Section 3.1. Additionally, the bulkhead at the maintenance hole servicing the building may be removed to enable the redirection of domestic sanitary flows to the municipal system.

Temporary systems, such as the on-site package plant, may be decommissioned; however, the interim strategy for discharging into the Welland Canal could remain operational under the ultimate condition. This dual-outlet strategy may help alleviate pressure on the downstream municipal system and provide an emergency discharge option when necessary, ensuring greater operational flexibility and resilience.



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3.2 Water Servicing & Fire Protection

3.2.1 Design Criteria

The following resources were used to establish the FSR Criteria and constraints for the site:

- Development and Design Manual Schedule D – Water Distribution System (City of Port Colborne, 2024)
- Design Guidelines for Drinking-Water Systems (MECP)
- Water Supply for Public Fire Protection, Fire Underwriter's Survey (FUS, 2020)

3.2.1.1 System Pressures and Velocity

As per the City of Port Colborne Design Guidelines, minimum accepted operating pressure within the water distribution system is 275 kPa (40 psi), and maximum accepted operating pressure is 550 kPa (80 psi). The minimum accepted pressure under maximum day plus fire flow conditions is 140 kPa (20 psi). **Table 3-2** provides a summary of the pressure scenarios and the corresponding preferred and accepted pressures.

Table 3-2: Recommended Operating Pressures

Demand Scenario	Preferred (kPa (psi))	Accepted (kPa (psi))
Max Day Demand	345 – 480 (50 – 70)	275 – 550 (40 – 80)
Max Day + Fire	>140 (20)	>140 (20)
Peak Hour Demand	345 – 480 (50 – 70)	275 – 550 (40 – 80)
Average Day Demand	345 – 480 (50 – 70)	275 – 550 (40 – 80)
Min Hour Demand	345 – 480 (50 – 70)	275 – 550 (40 – 80)

These operating pressures were used as the criteria for minimum and maximum allowable pressures under the various demand scenarios.

Watermains are also to be designed such that a flushing velocity of 0.8 m/s can be achieved for cleaning and disinfection procedures. The Water Supply for Public Fire Protection guidelines by the Fire Underwriters Survey (FUS, 2020) do not explicitly define a maximum velocity for watermains. However, general engineering practice suggests that during fire flow conditions, velocities up to 5.0 m/s are acceptable, as the focus is on ensuring sufficient fire protection flows rather than minimizing pipe wear or other long-term considerations. For normal operations, velocities are typically maintained below 3.0 m/s to avoid excessive pressure loss and pipe stress.



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3.2.1.2 Demands

The design criteria for water demands, specified in *Development and Design Manual Schedule D – Water Distribution System (City of Port Colborne, 2024)* were not used to determine the industrial demands for the proposed development. Instead, consistent with MECP Design Guidelines for Drinking-Water Systems, water requirements were estimated in discussion with Asahi Kasei Corporation representatives based on the industrial process equipment and number of employees. Monthly water demand requirement estimates (**Figure 3-3**) were utilized to establish average industrial water demand for Phase 1, Phase 2 and Phase 3. It should be noted that the plant is intended to operate 24 hours a day, which means there is no expected peak during the day in terms of production or water usage. The number of employees is expected to be higher during the day, resulting in maximum usage occurring during the daytime. For this reason, it is assumed that the peak hour demand (PHD) will be the same as the maximum day demand (MDD). A peaking factor of 1.57, as outlined in the City guidelines, will be applied to determine both the MDD and PHD scenarios, representing 1.57 times the Average Day Demand (ADD).

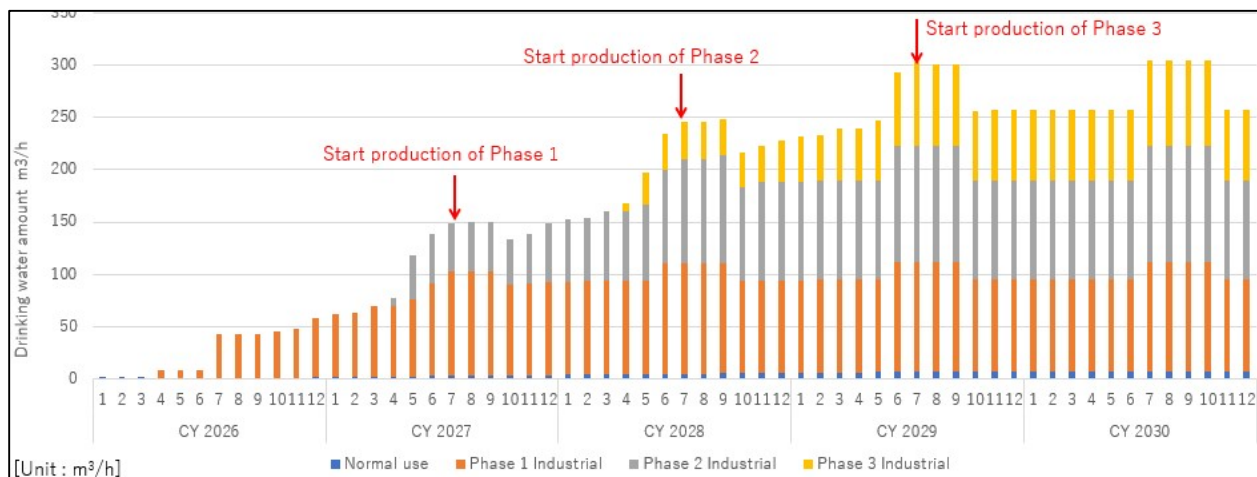


Figure 3-2: Estimated monthly water requirements (2026 to 2030)

For building sites serviced by municipal water supply systems, where the water supply duration is not a concern, water supply flow rates at minimum pressures is the main focus. The City guidelines specify that for industrial and commercial use, fire flow (FF) demands are to be determined by the Design Engineer in accordance with various fire protection requirements. The City Guidelines specify that FF demands are to be determined in accordance with FUS and/or AWWA requirements. Per comments received from the City (August 8th 2024), it was noted that the preference for FF determination is the Fire Underwriters Survey Water Supply for Public Fire Protection (FUS) method.

The demand for adequate property protection fire flow per FUS guidelines was calculated as 21,000 L/min (350 L/s) based on the critical proposed building floor area of 45,117 m². The critical floor area includes the building floor area and accounts for floor area reductions due to



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fire wall separations rated for 2 hours or greater. The life safety plan for the building, including all fire wall separations is included in **Appendix B**. Due to phasing and fire wall separators, the ultimate required fire flow is based off the phase with the largest floor area. For the proposed development, Phase 1 governs the fire flow demand since it has the largest floor area of which is not separated by a 2 hours or greater fire wall. Therefore, the fire flow requirement of 350 L/s applies to both the interim and ultimate build out conditions.

The required fire flow is calculated using building specifications such as non-combustible construction type, rapid burning building contents, and a fully supervised sprinkler system with standard water supply, conforming to NFPA13. Supporting FUS fire flow calculations, including the Life Safety Plan are included in **Appendix B** of this report.

Given that the building will be equipped with an automatic sprinkler system, the Fire Underwriters Survey (FUS) method for calculating required fire flow applies only to hydrants within the building fire loop. Additionally, a fire loop is proposed around the phased tank yards, necessitating a fire flow demand for the tank yard hydrants (see **Section 3.2.2.2** for details on the proposed infrastructure). The required fire flow for a tank yard in an industrial development depends on factors such as the type of materials stored, construction features, exposure risks, and fire protection measures. Since these details are yet to be confirmed, a conservative estimate of 150 L/s has been assumed for the fire flow demand of hydrants within the tank yard fire loop.

Since the proposed industrial building is also to be sprinklered, the sprinkler system hydraulic demand was calculated. In consultation with the Fire Protection Contractor (Classic Fire + Life Safety) it is understood that the sprinkler system's demand is 2,200 GPM (138.8 L/s). Therefore, the required fire flow for the site fire pump house is 138.8 L/s, where the required hydrant flow throughout the building fire loop is 350 L/s and tank yard fire loop is 150 L/s. The total calculated demands for the development are summarized in **Table 3-3**. Proposed infrastructure is typically sized to accommodate the greater of MDD + FF or PHD flows. However, since the demands for MDD and PHD are the same, the system will be sized to accommodate MDD + FF flows.

Table 3-3: Calculated Demands

Demand Scenario	Average Day Demand (ADD) (L/s)	Maximum Day Demand (MDD) (L/s)	Peak Hour Demand (PHD) (L/s)	Fire Flow (FF) Demand (L/s) – Sprinkler	Fire Flow (FF) Demand (L/s) – Building Loop Hydrant supply	Fire Flow (FF) Demand (L/s) – Tank Yard Loop Hydrant supply
Phase 1	27.72	43.52	43.52	138.8	350	150
Phase 2	55.70	87.45	87.45	138.8	350	150
Ultimate	76.48	120.07	120.07	138.8	350	150



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3.2.1.3 Fire Flow Water Supply

It is understood based on discussion with the City and Niagara Region that an interim water supply will be required for structural fire-fighting purposes during the construction of the proposed building and in advance of a reliable municipal water supply being available. This interim water supply will also provide supplemental water supply on-site should municipal water supply capacities ever become limited.

The volume of on-site water supply is dependent on the building size, construction, occupancy, exposure and environmental impact potential. The on-site water supply should be sized to sufficiently allow for the calculated demand to be supplied for at least 30 minutes of fire department hose stream use, as deemed sufficient by the Fire Chief. According to FUS calculations, the required flow rate is 350 L/s for a duration of 4.75 hours. This results in a total required volume of 5,985 m³ for fire protection water supply under both Phase 1 and ultimate conditions (**Appendix B**). To satisfy the demand for 30 minutes of continual fire department hose use, a minimum required volume of 630 m³ must be readily available on site.

Given that the existing infrastructure does not provide an adequate immediate feed to the site (**Section 3.2.2.1**), the interim fire protection will be provided through an above-grade tank. Since no reliable servicing infrastructure currently exists on site, it is anticipated that no watermains and pressurized hydrants will be available during the commencement of construction; therefore, an interim supply source is required. Although water supply may be available from Welland Canal, an on-site above-grade tank is proposed to provide a more reliable source of water supply. The tank is proposed to be 13.3 m (43'-6") diameter and 8.4 m (27' – 6 9/16") in height, resulting in a working volume of 737 m³. Details of the proposed tank can be found in **Appendix B**. This volume exceeds the minimum required supply volume of 630 m³, which is sufficient for interim condition supply. This volume strategy has been approved per discussion with the Fire Chief. It is anticipated that fire trucks will be available with additional water supply to further supplement the site in the event of a fire.

The tank will be adequately heated/insulated such that this water source will be accessible to fire department equipment under all climatic conditions. The initial fill of the reservoir tank will be with water trucks, followed by a hookup to the municipal service to an automatic fill station once it becomes available. Since this site under ultimate conditions is potentially a vulnerable service area (one single feed from the distribution system), the above-grade tank is to remain as a permanent feature of the site so that backup water supply can be provided.

3.2.2 Watermain Infrastructure

3.2.2.1 Existing Infrastructure

Under existing conditions, the City of Port Colborne is serviced with infrastructure generally ranging from 100 – 750 mm diameter watermain. The site location is situated to the north of Port Colborne, in an area which is not currently serviced. The closest watermain (that does not require crossing the Welland Canal) is at 2nd Concession Rd and Highway 140, which is approximately 4.7 km south of the proposed site location. Therefore, to service the Project Eagle lands, an extension of the watermain from 2nd Concession Rd is required.



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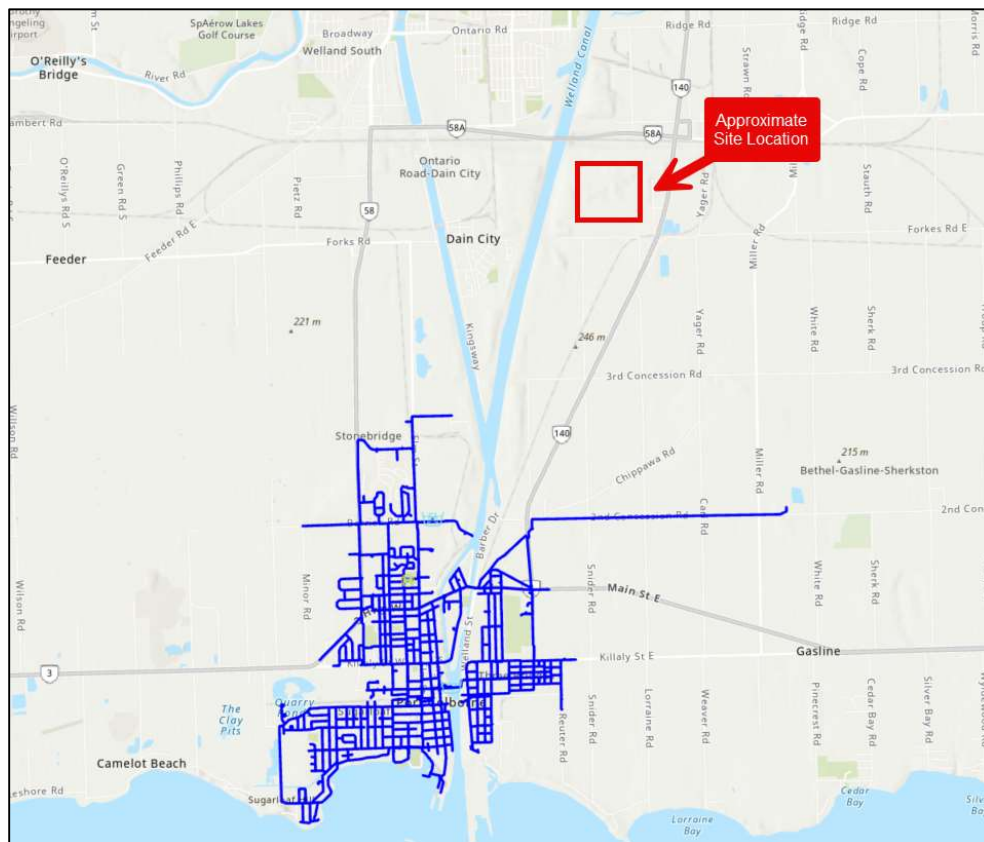


Figure 3-3: Existing Water Infrastructure in Relation to Project Site

3.2.2.2 Proposed Infrastructure

The need for a watermain extension on 2nd Concession Rd has been identified in both the 2021 Niagara Region Water Master Servicing Plan and the East Side Employment Lands Class Environmental Assessment. The 2021 Master Plan identified watermain extensions involved with the water servicing strategy capital program. A trunk main to the east side of Port Colborne across the canal was identified as part of this program (W-M-002). The purpose of this main is to improve security and supply of water to the east side lands and is also consistent with that identified by the East Side Employment Lands Class Environmental Assessment. This proposed main is required to help support the servicing of the Project Eagle site.

The report titled, 'Project Eagle Servicing Review – Project Eagle Local Servicing' completed by GEI (September 2024) has outlined watermain alignments required to service the northeast employment lands, which include:

- 500 mm watermain crossing the Welland Canal at 2nd Concession Rd (W-M-002) with anticipated construction by the end of 2027; and,

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- New 500 mm watermain which follows the City owned railway from 2nd Concession Rd north to Ramey Rd and north along Ramey Rd to Third Concession Rd.

The Welland Canal crossing watermain is consistent with the 2021 Master Plan alignment, however, GEI has proposed sizing of 500 mm where the 2021 Master Plan has proposed 450 mm. For the purpose of this servicing analysis, it is assumed that the GEI proposed size of 500 mm is to be used moving forward. The watermain proposed by GEI are shown in **Figure 3-4**.

The secondary watermain proposed by GEI is expected to terminate at Third Concession Rd. The Project Eagle site is located approximately 2.6 km north of Third Concession Rd. Therefore, additional watermain is required for the project site to be able to tie in with the municipal domestic water supply. It is assumed that the 500 mm watermain be extended northerly along the rail line to Snider Rd. Then the watermain will follow Snider Rd north to the project site property boundary. This results in approximately 2,750 m of additional watermain. This watermain extension will be private servicing, therefore, BMI Group will be responsible for the design and construction of the watermain extension from Snider Rd to the proposed development south-western boundary.

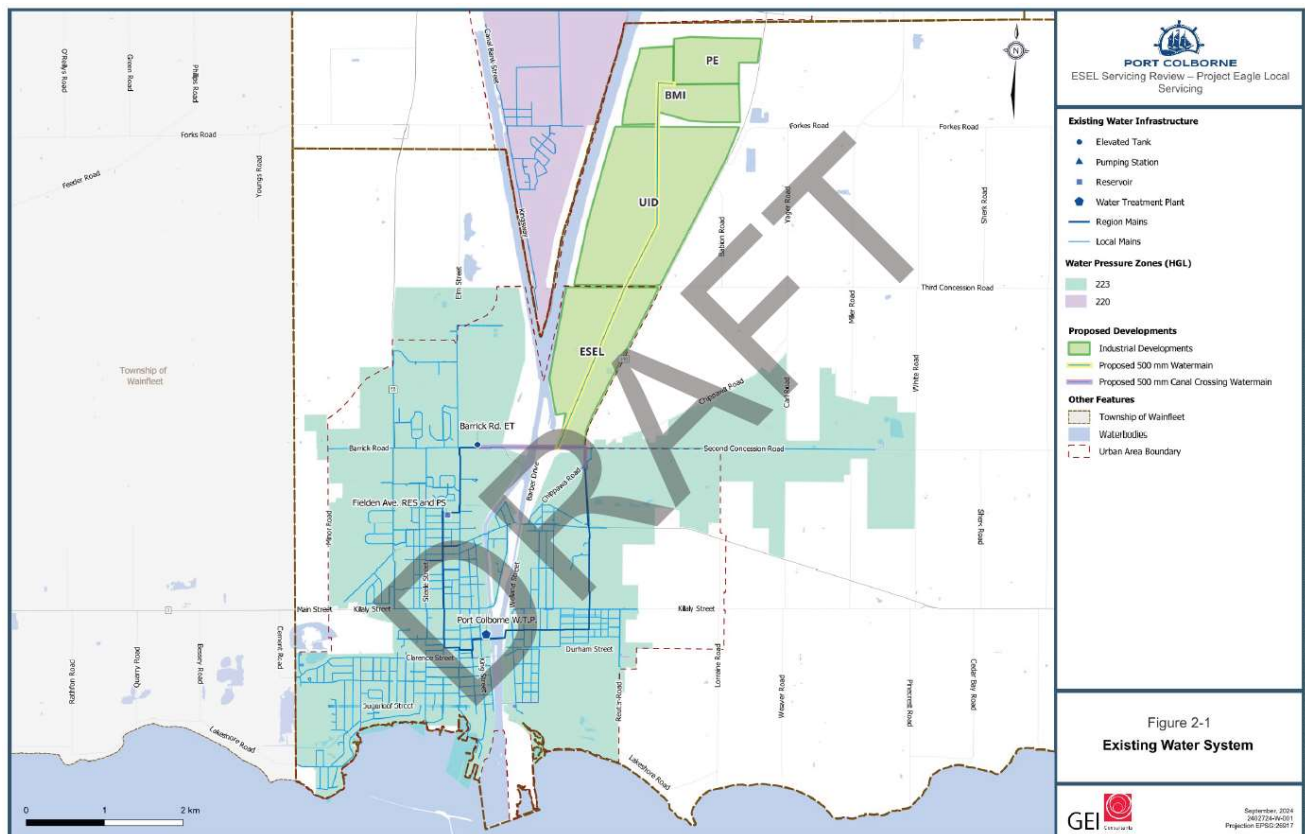


Figure 3-4: GEI Proposed Watermains



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In order for the additional required watermain to be accommodated, an amendment to the EA for the Site Servicing of the East Side Employment Lands (AECOM, Jan 2017) may need to occur. If all the work for the new watermain is within an existing ROW or utility corridor, then it could potentially be a Class EA Schedule A+ which would require less work. All City and Region projects are subject to budget approvals by their respective Councils. The Region and City are committed to working with the BMI Group on the required water servicing of this important employment opportunity.

The Site Servicing Plan, prepared by Stantec shows that the water servicing for the Project Eagle site consists of:

- 300 mm connection to 500 mm proposed northward extension
- 300 mm domestic water line with booster pump and 100 mm service connection at Phase 1 building and 150 mm service connection at the Phase 1 tank yard
- 300 mm fire loop surrounding all three building phases
- Two 250 mm building connections to Phase 1 building from the 300 mm fire line
- 300 mm loops around the Phase 1, Phase 2, and Phase 3 tank yards, connecting to the 300 mm building fire loop
- New fire pump house along with a permanent 737 m³ water tank within the Phase 1 tank yard to supply the fire loop watermain
- 35 total hydrants across the site

Please refer to Stantec Site Servicing Plan drawing proposed water servicing (**Appendix C**). The performance curve for the pump to be used at the fire pump house is included in **Appendix B**.

3.2.3 Boundary Conditions

In the received InforWater Pro hydraulic model, existing boundary conditions were set at the infrastructure that supply the site area to define hydraulic grade lines (HGLs) of the system. The connection to 2nd Concession Rd is located in Zone 223, according to the mapping contained in the InforWater Pro hydraulic model. The HGLs in this area are controlled by the Barrick St Tank. The operating HGLs of the tank are reported in **Table 3-4**.



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Table 3-4: Barrick St Tank Operating Levels

Scenario	Max Level (m)	Minimum Level (m)	Initial Level (m)
2021 Average Day	223.10	210.55	217.45
2021 Max Day			
2051 Average Day			
2051 Max Day			

3.2.4 Methodology

The City-wide InfoWater Pro extended period simulation hydraulic model was provided by the City of Port Colborne (received on March 13, 2024). The model titled '620126 – Port Colborne Water Model' was used for this analysis and completed with InfoWater Pro version 3.5. This analysis was completed assuming the model has been calibrated and is adequate for use. Therefore, no model calibration was completed as part of this assessment.

The model was updated to reflect the proposed servicing of the site, as described in **Section** Error! Reference source not found.. The pump curve established for the fire pump house was included in the model (**Appendix B**). New pipes inserted in the hydraulic model are assumed to have the following C-factor values for friction, as outlined in the City of Port Colborne design guidelines:

- 100 for pipe sizes 150 mm and smaller
- 110 for 200 mm – 250 mm
- 120 for 300 mm – 600 mm
- 130 for pipe sizes greater than 600 mm

The model was run under the following scenarios: 2051 ADD, 2051 MDD, 2051 MDD + FF. Each scenario was run for the following phased condition: Phase 1, Phase 1+2, Ultimate build-out. As mentioned in **Section 3.2.1.2**, the demands for PHD will be the same for MDD, therefore, only results for MDD are required. The servicing will be sized to satisfy MDD + FF conditions. 2051 is an existing planning horizon scenario which includes ultimate demands for the City of Port Colborne. This scenario in the existing model is selected as the base for analysis since it will be reflective of the ultimate buildout conditions, even though the year of ultimate buildout for Project Eagle is expected in year 2030.

The demands summarized in **Table 3-3** represent the entire site demands. To assess the sizing of the domestic service connections (100 mm to Phase 1 building and 150 mm to Phase 1 tank yard), the demands were assumed to be split. A 60%/40% (tank yard/building) split was



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assumed for the purpose of the analysis. This split only applies to the Phase 1 demands. The remainder of the Phase 2 and ultimate demands were applied to the 300 mm domestic main to ensure it is sized adequately for ultimate conditions.

Elevations and demands were inputted into new nodes created for the development. Elevations were taken from publicly available DEM raster data and confirmed with the site survey (prepared by MTE Ontario Land Surveyors Ltd.), and the site grading plan (prepared by Stantec). The model layout with proposed pipes and labelled nodes is shown in **Figure 3-5**, **Figure 3-6**, and **Figure 3-5**.



Figure 3-5: Watermain Model Layout

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Figure 3-6: Watermain Model Layout to Building Connection



Figure 3-7: Watermain Model Layout Surrounding Fire Pump House



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Details on the domestic booster pump are under design review. For the purpose of this analysis, theoretical design point curves were used to show that > 40 psi can be achieved at the Phase 1 building connection. Two separate design points were used, one for ADD and one for MDD. The design point curves used are summarized below.

Table 3-5: Booster Pump Theoretical Design Point Curves

	ADD	MDD
Design Head (m)	14.06	14.06
Design Flow (L/s)	11.09	17.41

3.2.5 Results

The hydraulic model was run under a 24-hour extended period simulation (EPS) and the pressure results under 2051 ADD and MDD were assessed for each Phase 1, Phase 2, and Ultimate conditions to determine if the proposed servicing is sufficient to support the Project Eagle development.

3.2.5.1 ADD System Pressures

The results under ADD showed that the maximum pressures in the domestic line range from 317 kPa to 434 kPa (46 psi to 63 psi) under Phase 1, 296 kPa to 414 kPa (43 psi to 60 psi) under Phase 2 (including Phase 1), and 276 kPa to 386 kPa (40 psi to 56 psi) under ultimate build-out conditions. Under all ADD scenarios, the pressures in the domestic services do not exceed the preferred maximum of 480 kPa (70 psi). However, the maximum pressures in some locations are below the preferred 345 kPa (50 psi) but are above the acceptable 275 kPa (40 psi). Under all scenarios, the booster pump is able to achieve pressures well above 275 kPa (40 psi) at the Phase 1 building connection. The maximum ADD pressure results are summarized in **Table 3-6**. The highest pressures are consistently observed around the connection to the 500 mm watermain extension, at the southwest corner of the site (excluding pressures achieved due to booster pumping). The lower pressures tend to occur in the furthest north nodes which have higher elevations compared to the existing system. The low-pressure locations are prior to the booster pump and at the tank yard connection.

The velocities in the main 300 mm domestic feed were analyzed under ADD ultimate conditions, which found that a velocity of 1.08 m/s is achieved in the pipe. This value is above the minimum required velocity of 0.8 m/s for flushing purposes. Therefore, no water quality issues are expected in the proposed pipes. However, it should be noted that in the interim ADD conditions (Phase 1, Phase 2) the velocity in the domestic pipe falls below 0.8 m/s. Therefore, additional flushing may be considered under interim phases to achieve the minimum required flushing velocities. However, proposed isolation valves including backflow preventers at the pump house will ensure no water quality issues arise as a result of the fire loop. The detailed water model results are shown in **Appendix D**.



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Table 3-6: ADD Maximum Pressures in Domestic Line

Junction ID	Phase 1 Max Pressure (kPa)	Phase 1 + Phase 2 Max Pressure (kPa)	Ultimate Max Pressure (kPa)
J-PE-532	414 (60 psi)	400 (58 psi)	386 (56 psi)
J-PE-534	414 (60 psi)	400 (58 psi)	379 (55 psi)
J-PE-536	414 (60 psi)	400 (58 psi)	379 (55 psi)
J-PE-538	407 (59 psi)	393 (57 psi)	379 (55 psi)
J-PE-540	400 (58 psi)	379 (55 psi)	365 (53 psi)
J-PE-542	352 (51 psi)	338 (49 psi)	317 (46 psi)
J-PE-544	345 (50 psi)	331 (48 psi)	310 (45 psi)
J-PE-628	379 (55 psi)	365 (53 psi)	345 (50 psi)
J-PE-722	338 (49 psi)	317 (46 psi)	296 (43 psi)
J-PE-726	331 (48 psi)	310 (45 psi)	290 (42 psi)
J-PE-728 ⁽¹⁾	317 (46 psi)	296 (43 psi)	276 (40 psi)
J-PE-730⁽²⁾	434 (63 psi)	414 (60 psi)	386 (56 psi)
J-PE-724	338 (49 psi)	310 (45 psi)	290 (42 psi)
J-PE-788	338 (49 psi)	317 (46 psi)	296 (43 psi)
J-PE-790	338 (49 psi)	317 (46 psi)	290 (42 psi)
J-PE-792	331 (48 psi)	310 (45 psi)	290 (42 psi)
J-PE-794	331 (48 psi)	310 (45 psi)	283 (41 psi)
J-PE-796⁽³⁾	324 (47 psi)	303 (44 psi)	283 (41 psi)

Notes:

- (1) Upstream of domestic booster pump
- (2) Phase 1 building connection
- (3) Tank yard connection

3.2.5.2 MDD System Pressures

Under MDD, the pressures in the domestic line range from 276 kPa to 386 kPa (40 psi to 56 psi) under Phase 1, 241 kPa to 372 kPa (35 psi to 54 psi) under Phase 2 (including Phase 1), and 186 kPa to 338 kPa (27 psi to 49 psi) under ultimate conditions. Pressures along the domestic line under Phase 2 and ultimate drop below the lowest acceptable pressure (275 kPa). The booster pump allows the building connection to overcome the pressure deficiencies and deliver pressures greater than 275 kPa (40 psi) to the proposed building. However, low pressures still exist in the pipe upstream of the booster pump. Pressures less than 275 kPa are present at the tank yard connection. If 275 kPa is targeted at the tank yard, further on-site improvements are required to overcome pressure deficiencies. The low pressures in the domestic line are a function of the elevation constraints of the site (further discussed in **Section 3.2.5.4**). It is important to note that while sufficient pressures at the building delivery point can be achieved



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through boosting, pressure deficiencies exist along the 300 mm main. This is important to be aware of if future services are to connect to this line. However, since no future expansion or connections are expected after ultimate full buildout conditions, the low pressures are less of a concern.

Similar to the ADD results, the highest pressures (excluding the building boosted pressure) are experienced at the connection to the 500 mm watermain extension, in the southwest corner of the site where the elevations are lowest. The lowest pressures are experienced furthest to the north where the elevations are highest. The lowest pressures are found prior to the booster pump and at the tank yard connection. The MDD minimum pressure results in the domestic line are summarized in **Table 3-7** and shown in **Appendix D**.

Under ultimate MDD the velocity experienced in the 300 mm pipe is 1.70 m/s, which does not exceed MECF recommended maximum velocity of 3m/s under normal operating conditions. Meaning, 300 mm is an adequate pipe size to deliver the required demands.

Table 3-7: MDD Minimum Pressures in Domestic Line

Junction ID	Phase 1 Min Pressure (kPa)	Phase 1 + Phase 2 Min Pressure (kPa)	Ultimate Min Pressure (kPa)
J-PE-532	386 (56 psi)	372 (54 psi)	338 (49 psi)
J-PE-534	386 (56 psi)	365 (53 psi)	331 (48 psi)
J-PE-536	386 (56 psi)	365 (53 psi)	331 (48 psi)
J-PE-538	379 (55 psi)	365 (53 psi)	324 (47 psi)
J-PE-540	365 (53 psi)	352 (51 psi)	310 (45 psi)
J-PE-542	324 (47 psi)	303 (44 psi)	262 (38 psi)
J-PE-544	317 (46 psi)	296 (43 psi)	255 (37 psi)
J-PE-628	351 (51 psi)	331 (48 psi)	290 (42 psi)
J-PE-722	310 (45 psi)	276 (40 psi)	221 (32 psi)
J-PE-726	296 (43 psi)	262 (38 psi)	214 (31 psi)
J-PE-728 ⁽¹⁾	276 (40 psi)	241 (35 psi)	186 (27 psi)
J-PE-730⁽²⁾	372 (54 psi)	338 (49 psi)	283 (41 psi)
J-PE-724	303 (44 psi)	269 (39 psi)	221 (32 psi)
J-PE-788	303 (44 psi)	276 (40 psi)	221 (32 psi)
J-PE-790	306 (44 psi)	269 (39 psi)	221 (32 psi)
J-PE-792	296 (43 psi)	262 (38 psi)	214 (31 psi)
J-PE-794	296 (43 psi)	262 (38 psi)	207 (30 psi)
J-PE-796⁽³⁾	290 (42 psi)	255 (37 psi)	200 (29 psi)

Notes:

- (1) Upstream of domestic booster pump
- (2) Phase 1 building connection
- (3) Tank yard connection



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3.2.5.3 Fire Flow

The proposed servicing plan is complete with 35 total hydrants: 21 hydrants around the building fire loop, 5 hydrants around phase 1 tank yard loop, 4 hydrants around phase 2 tank yard loop, and 5 hydrants around phase 3 tank yard loop. The spacing of the hydrants was determined to be 90 m per Table 2 of the FUS guidelines (2020). This was determined to be adequate based on the required fire flow of 21,000 L/min (350 L/s). Please refer to **Appendix B** for the hydrant coverage plan.

The available fire flow of the nodes in the fire line watermain was assessed to determine if the site can be serviced from a fire flow perspective. A fire flow demand of 350 L/s was applied to the hydrant locations and building connections to ensure that this fire demand could be achieved at every location with the proposed sizing. Additionally, a fire flow demand of 138.8 L/s was applied at the fire pumphouse location to ensure that the sprinkler demand requirements are met. As mentioned in **Section 3.2.1.2**, since building details for the tank yards are unknown, a fire flow demand of 150 L/s was applied to the hydrants for each phased tank yard fire loop (Phase 1, Phase 2, and Ultimate).

A fire flow run was completed in the InfoWater Pro model and the results show that fire flows above 350 L/s (@ 40 psi residual pressure) are available at all points across the project site under all phases of build out. Therefore, the sizing proposed for the fire line watermain is adequate to service the site. The model results for the fire flow analysis are included with this report as **Appendix D**. It should be noted that the model was run without specifying controls for the pump in the fire pumphouse. Prior to operation, controls at the fire pumphouse should be optimized to control flows for both building fire loop usage and tank yard fire loop usage.

3.2.5.4 System Elevations

For both ADD and MDD scenarios, the proposed infrastructure is generally meets the minimum target of 275 kPa throughout the entire site, with some areas having limited pressures. The reason for this is likely due to topography limitations of the site. The project site is located at a higher elevation compared to the 500 mm watermain extension and the rest of the system which limits the hydraulics from being able to reach the minimum pressure criteria (**Figure 3-8**). This notion was seen through the pressure results where the highest pressures in the site existed to the southwest. The southwest of the project site is where the elevations are most similar to the existing Port Colborne system. The site pressures were lowest in areas of higher elevations (according to the proposed grading plans). Due to the system elevation constraints, upsizing the proposed pipes would not help solve the low-pressure issues. Increased pipe sizes would help increase pressures slightly. However, given the velocities experienced in the pipes, the sizing was determined to be adequate and increasing the pipe sized may result in oversized pipes with water quality issues. Therefore, to overcome the pressure deficiencies in the system, on-site measures such as booster pumping are required.



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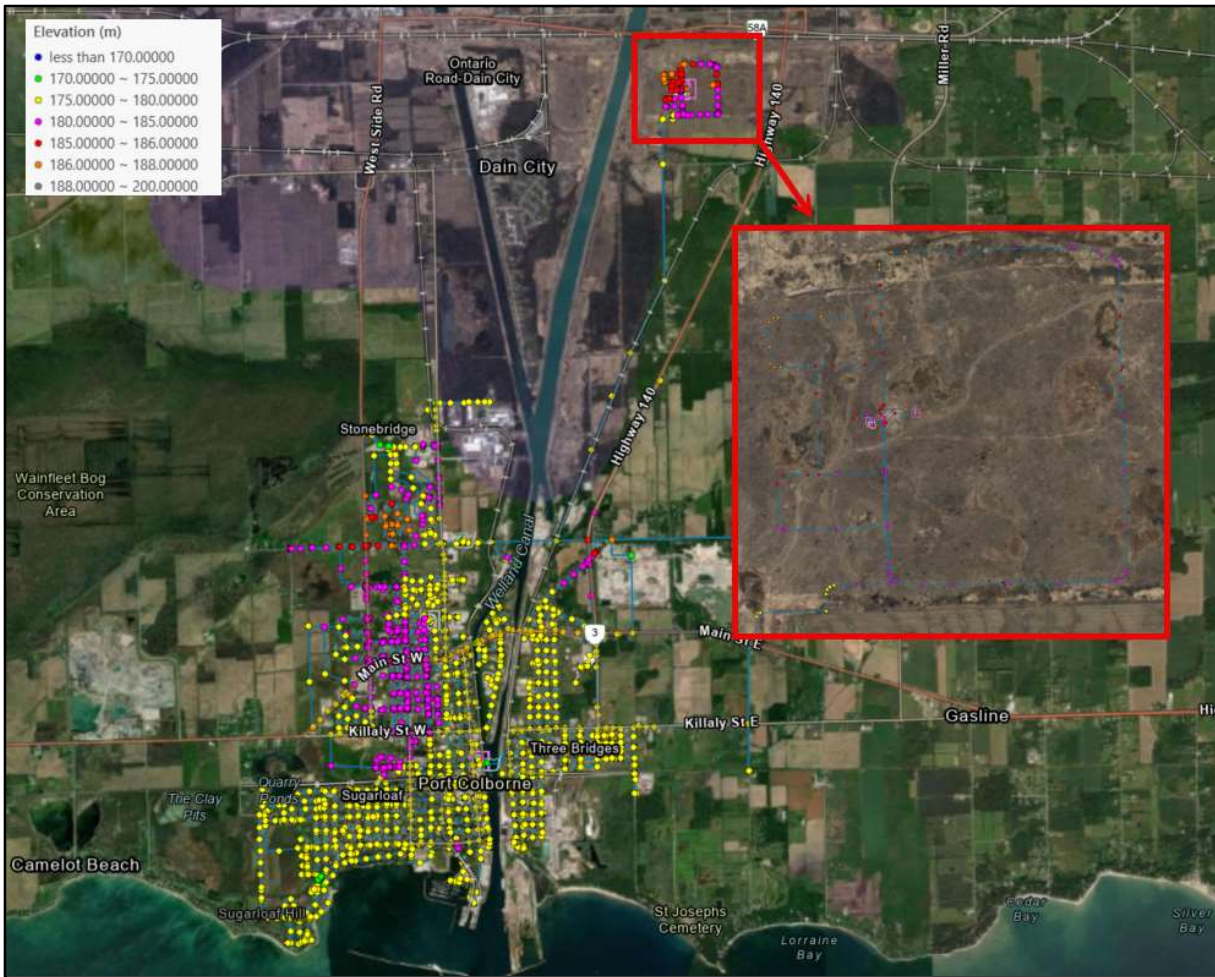


Figure 3-8: Elevation Distribution of Port Colborne System and Project Eagle Site

3.2.6 Water Recommendations

The results achieved from the watermain hydraulic analysis determined that while the servicing is adequate from a fire protection standpoint in terms of hydrant available flow, the system may experience pressure deficiencies under certain scenarios without on-site upgrades. It is unlikely that upsizing the watermain will increase the pressures to the minimum requirement. Therefore, to meet minimum pressures the following is recommended:

- Upsize internal plumbing of the building
- Install an individual in-house booster pump or localized booster pumping station



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The hydraulic model results showed that a booster pump at the building is able to achieve pressures greater than 275 kPa. To achieve similar pressures at the tank yard connection, pressure boosting is also required. This can be done through a secondary individual in-house booster pump, or the site can be evaluated to include a localized booster pumping station to service the total site area.

If these recommendations are incorporated in the proposed building design, it should allow adequate pressures to be achieved.

3.3 Storm Water Management

Stormwater management for the site will match post-development flows to pre-development targets. Four stormwater management ponds are proposed, three wet ponds and one wetland facility along with oil and grit separators to address maintenance requirements. The stormwater management strategy is detailed under separate cover in the Stormwater Management Report prepared by Stantec.

4 Conclusions & Recommendations

From our investigation the site is serviceable from a wastewater, water, and stormwater perspective. Based on the information presented under this cover, the following conclusions and recommendations are provided:

- On-site sanitary treatment and disposal in the interim is required until municipal infrastructure is available
- On-site water storage is required for interim water supply as well as to supply water for redundancy purposes during ultimate build-out conditions
- Booster pumping should be provided to overcome elevation related pressure deficiencies in the water system
- Controls at the firehouse pump should be optimized to better control flows and pressures within the building and tank yard fire loops
- Water quality limits are achieved under ultimate condition with proposed backflow preventers in the system to eliminate the risk of water deterioration.
- Hydrant testing should be completed on all new hydrants to further confirm the results achieved from the hydraulic model
- Three wet ponds and one wetland facility, along with oil and grit separators, are able to provide stormwater quantity and quality control



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References

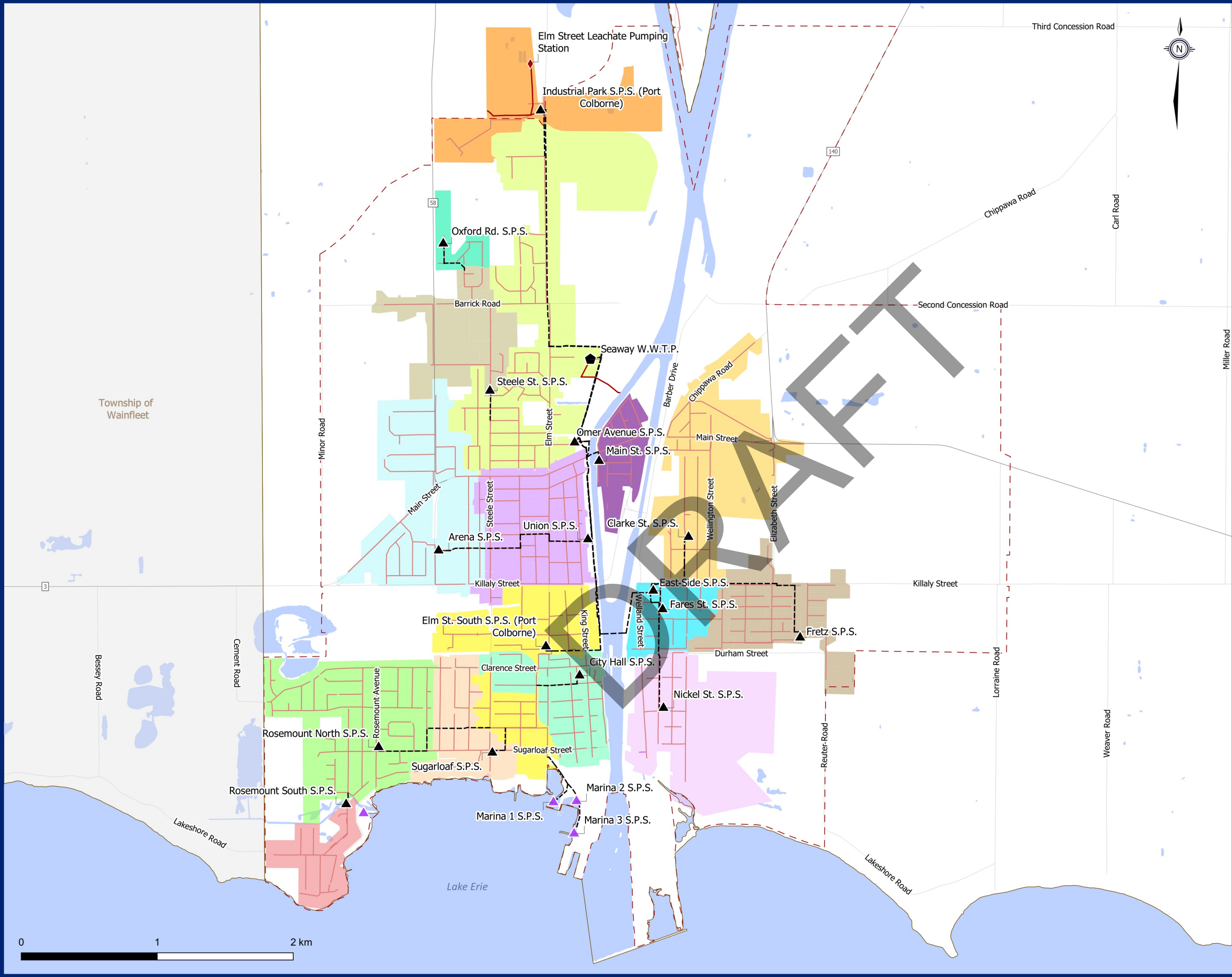
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5 References

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2. Design Guidelines for Drinking-Water Systems, Ontario Ministry of the Environment, 2008
3. Niagara Region 2021 Water and Wastewater Master Servicing Plan Update, December 5, 2023
4. Nylon Servicing Review – Technical Memo, GMBLuePlan, August 21, 2023
5. Project Eagle Servicing Review – Project Eagle Local Servicing (Draft), GEI Consultants, September 27, 2024
6. Section 2.0 of the Ministry of Environment, Conservation and Parks (MECP) Design Criteria for Sanitary Sewers, Storm Sewers and Force mains dated July 28, 2022
7. Section 7 of the Ontario Building Code with regards to on site plumbing (sanitary sewers, storm sewers, water within the site)
8. Site Servicing of the East Side Employment Lands Municipal Class Environmental Assessment Master Plan Project File Report, April 2018
9. Storm Water Management Planning and Design Manual, Ontario Ministry of the Environment, March 2003.
10. Water Supply for Public Fire Protection, Fire Underwriters Survey, 2020.



Appendix A – Existing Wastewater System



PORT COLBORNE
Port Colborne Engineering and Modelling
Support Services

Existing Wastewater Infrastructure

■ Wastewater Treatment Plant (WWTP)

Sanitary Pumping Stations (SPS)

- ▲ Regional
- ▲ Municipal
- ▲ Private

Wastewater Network

---- Force Mains

Gravity Mains

- Regional
- Local
- Private

Wastewater Catchments

- | | |
|---------------|-----------------|
| Arena | Nickel |
| City Hall | Omer |
| Clarke Street | Oxford Road |
| Eastside | Rosemount North |
| Elm | Rosemount South |
| Fretz | Steele |
| Industrial | Sugarloaf |
| Main Street | Union |

Other Features

- Municipal Boundary
- Waterbodies
- - - Urban Area Boundary

Figure 4
Existing Wastewater System



Project Eagle

Asahi Kasei Corporation (AKC)

Average Day Demand (ADD) average usage per day
Max Day Demand (MDD) largest whole day usage over year
Peak Hour Demand (PHD) largest usage in 1 hr period (peak usage)

Average Dry Weather Flow (ADWF) Average sewage generation in dry weather
Max Day Dry Weather Flow (MDDWF) Large sewage generation in dry weather during 1 day in a year
peak Wet Weatehr Flow (PWWF) Peak flow during Wet Weather

Ultimate	Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	ADD & ADWF	MDD & MDDWF	PHD & PWWF
	Water Max Day Demand (L/s)	0	16.11	41.67	68.89	84.44	84.44	84.44	84.44	84.44	84.44	84.44	84.44	76.48	84.44	84.44
	Sewage Max Day (L/s)	0	4.72	12.50	20.83	25.28	25.28	25.28	25.28	25.28	25.28	25.28	25.28	23.04	25.28	50.56
	Normal MDDWF (L/s)	0	0.56	1.39	1.94	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.11	2.22	4.44
	Industrial MDDWF (L/s)		4.17	11.39	18.89	23.33	23.33	23.33	23.33	23.33	23.33	23.33	23.33	20.93	23.33	46.67

Phase 1	Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	ADD & ADWF	MDD & MDDWF	PHD & PWWF
	Water Max Day Demand (L/s)	0	15.83	28.61	30.83	31.11	31.11	31.11	31.11	31.11	31.11	31.11	31.11	27.72	31.11	31.1
	Sewage Max Day (L/s)	0	4.72	8.89	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	9.32	10.00	20.0
	Normal MDDWF (L/s)		0.56	1.67	1.94	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	1.43	1.67	3.3
	Industrial MDDWF (L/s)		4.17	7.78	8.06	8.06	8.06	8.06	8.06	8.06	8.06	8.06	8.06	7.21	8.06	16.1

Phase 1	Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	ADD & ADWF	MDD & MDDWF	PHD & PWWF
	Water Max Day Demand (L/s)		15.83	41.67	59.44	61.94	61.94	61.94	61.94	61.94	61.94	61.94	61.94	55.70	61.94	61.94

WATER FLOWS (ASAHI KASEI CORPORATION)

Drinking Water (m3/hr)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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SANITARY FLOWS (ASAHI KASEI CORPORATION)

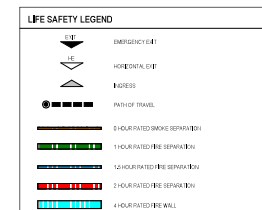
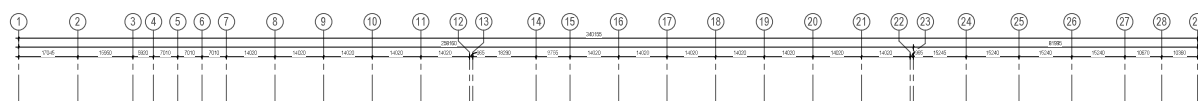
Wastewater (m3/hr)														CY 2027												CY 2028											
Year	CY 2026																																				
Month	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
Total Ultimate ww	1	1	1	3	3	3	13	13	13	13	14	17	19	20	21	24	35	41	45	45	45	40	42	45	47	47	49	51	60	70	74	74	75	65	67	69	
Sanitary normal	1	1	1	1	1	1	2	2	2	1	2	2	3	4	3	4	3	3	4	4	4	3	5	5	6	6	6	6	6	6	6	7	6	6	7		
Industrial Total	0	0	0	2	2	2	11	11	11	12	12	15	16	16	18	20	32	38	41	41	41	37	37	40	41	41	43	45	54	64	68	68	59	61	62		
Industrial Ph1	0	0	0	2	2	2	11	11	11	12	12	15	16	16	18	18	20	25	28	28	28	24	24	24	24	24	24	24	24	29	29	29	24	24	24		
Industrial ph2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	12	13	13	13	13	13	13	16	17	17	19	19	21	25	29	29	29	26	27	27	
Industrial ph3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	9	10	10	10	10	9	10	11	
Phase 1 Total	1	1	1	3	3	3	13	13	13	13	14	17	19	20	21	22	23	28	32	32	32	27	29	29	30	30	30	30	30	35	35	35	36	30	30	31	

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Appendix B – Fire Design Details (Life Safety Plan, FUS Calculations, Fire Pump Curve, Fire Pumphouse and Tank Details, Fire Hydrant Coverage Plan)

Building Code Data Matrix, Part 3 on
 Building Code Administration and Enforcementing Code Data Matrix, Parts 3 to 9

OVERALL LIFE SAFETY PLAN - LEVEL



Mark	Area Use Group	Allowable per Code
0207	72	0.01167
0208	72	0.01167
0209	72	0.01167
0210	72	0.01167
0211	72	0.01167
0212	72	0.01167
0213	72	0.01167
0214	72	0.01167

* PERIOD SENTENCE 3.4.3.4.05

NOTES:

[illegible]

Permit/Sec

PRELIMINARY
NOT FOR CONSTRUCTION

Design is not final, coordinated or complete. Not all disciplinary components are shown. Information shown is expected to change, possibly in a major way, as the project, following project award at design, is developed. Design is coordinated, site conditions are determined, and comments are received from all cultures having jurisdiction and an ownership stake. Any party using the design is solely responsible for decisions that it makes based on the design. The impact on it is weak because of subsequent design growth and changes and for finding appropriate allowances to cover the same.

Client/Project Lead

Client/Project
MANUFACTURING FACILITY

PROJECT EAGLE

PORT COLBORNE, ON
CANADA

OVERALL LIFE SAFETY PLAN -
MEZZANINE



FUS Fire Flow Calculation - Long Method

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

Stantec Project #: 161581318
 Project Name: Project Eagle
 Date: December 11, 2024
 Data inputted by: Gillian Wilton, M.E.Sc., EIT
 Data reviewed by: Abdalla Shaat

Fire Flow Calculation #: 1
 Building Type/Description/Name: Industrial

Notes: 1-storey battery plant consisting of 57,427 m2 building area (gross area of 64,071 m2) with a mezzanine area of 6,644 m2. Building is to be equipped with fire wall protection of over 2-hour ratings.

Fire Underwriters Survey Determination of Required Fire Flow - Long Method											
Step	Task	Term	Options	Multiplier Associated with Option	Choose:	Value Used	Unit	Total Fire Flow (L/min)			
1	Choose Frame Used for Construction of Unit	Coefficient related to type of construction (C)	Framing Material								
			Type V - Wood Frame	1.5	Type II - Non-combustible construction	0.8	m				
			Type IV-A - Mass Timber	0.8							
			Type IV-B - Mass Timber	0.9							
			Type IV-C - Mass Timber	1							
			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										
2	Choose Type of Housing (If TH, Enter Number of Units Per TH Block)	Type of Housing	Floor Space Area								
			Single Family	1	Other (Comm, Ind, Apt etc.)	0	Units				
			Townhouse - indicate # of units	0							
			Other (Comm, Ind, Apt etc.)	0							
2.2	# of Storeys	Number of Floors/Storeys in the Unit (do not include basement if 50% below grade):			1	1	Storeys				
3	Enter Ground Floor Area of One Unit	Average Floor Area (A) based on fire resistive building design (C < 1.0), with one hour rating for vertical openings and exterior vertical communications:	66,751		66,751	Area in Square Metres (m ²)					
			Square Metres (m2)								
3.1	Fire Wall Separation Areas	Area for fire wall separation rated 2 hours or greater:			Square Metres (m2)	21,634					
3.2	Obtain Total Effective Building Area	Average Floor Area (A) based on fire resistive building design (C < 1.0), with one hour rating for vertical openings and exterior vertical communications:			45,117	45117					
4	Obtain Required Fire Flow without Reductions	Required Fire Flow (without reductions or increases per FUS) ($F = 220 \times C \times \sqrt{A}$) Round to nearest 1,000 L/min						37,000			
5	Apply Factors Affecting Burning	Reductions/Increases Due to Factors Affecting Burning									
5.1	Choose Combustibility of Building Contents	Occupancy Content Hazard Reduction or Surcharge	Non-combustible	-0.25	Rapid burning	0.25	N/A	46,250			
			Limited combustible	-0.15							
			Combustible	0							
			Free burning	0.15							
			Rapid burning	0.25							
5.2	Choose Reduction Due to Presence of Sprinklers	Sprinkler Reduction	Adequate Sprinkler conforms to NFPA13	-0.3	Adequate Sprinkler conforms to NFPA13	-0.3	N/A	-13,875			
			None	0							
		Water Supply Credit	Water supply is standard for sprinkler and fire dept. hose line	-0.1	Water supply is standard for sprinkler and fire dept. hose line	-0.1	N/A	-4,625			
			Water supply is not standard or N/A	0							
		Sprinkler Supervision Credit	Sprinkler system is fully supervised	-0.1	Sprinkler system is fully supervised	-0.1	N/A	-4,625			
			Sprinkler not fully supervised or N/A	0							
5.3	Choose Presence of Sprinklers for Exposures within 30m	Sprinkler Conforms to NFPA13	Adequate sprinkler for exposures conforms to NFPA13		Adequate sprinkler for exposures conforms to NFPA13		N/A	-11,563			
			None for exposures								
		Water Supply	Water supply is standard for sprinkler and fire dept. hose line of exposures		Water supply is standard for sprinkler and fire dept. hose line of exposures	-0.25	N/A				
			Water supply is not standard or N/A for exposures								
		Sprinkler Supervision	Sprinkler system of exposures is fully supervised		Sprinkler system of exposures is fully supervised		N/A				
			Sprinkler not fully supervised or N/A for exposures								
		5.4	Choose Separation Distance Between Units	Exposure Distance Between Units	Front Yard	Fire Wall	0.1		0.2	m	9,250
					Right Side	30.1m or greater	0				
Rear Yard	Fire Wall				0.1						
Left Side	30.1m or greater				0						
6	Obtain Required Fire Flow, Duration & Volume	Total Required Fire Flow, rounded to nearest 1,000 L/min, with max/min limits applied:						21,000			
		Total Required Fire Flow (above) in L/s:						350			
		Required Duration of Fire Flow (hrs)						4.75			
		Required Volume of Fire Flow (m ³)						5,985			

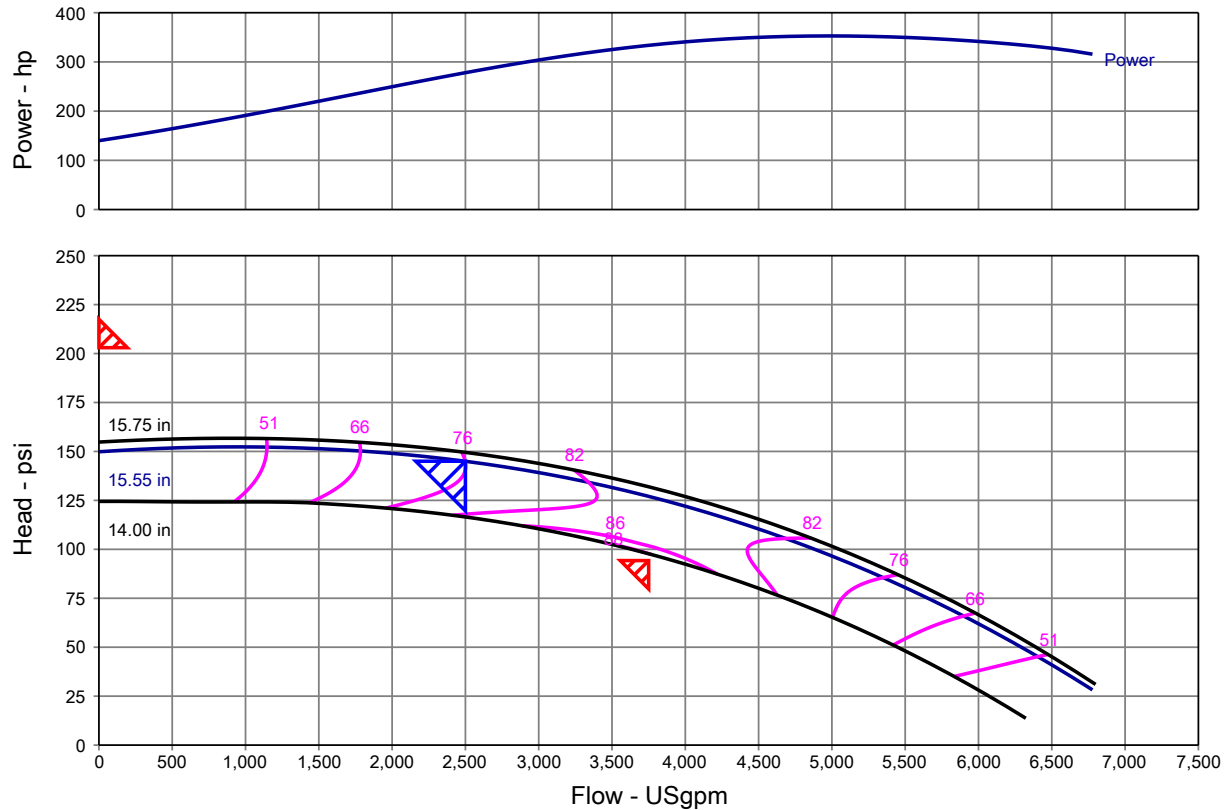
Pump Performance Curve

Performance based on test acceptance - Hyd Inst 14.6 Unilateral (1U)

The rated point is the only guaranteed point (within the specified HI grade) on the performance curve.

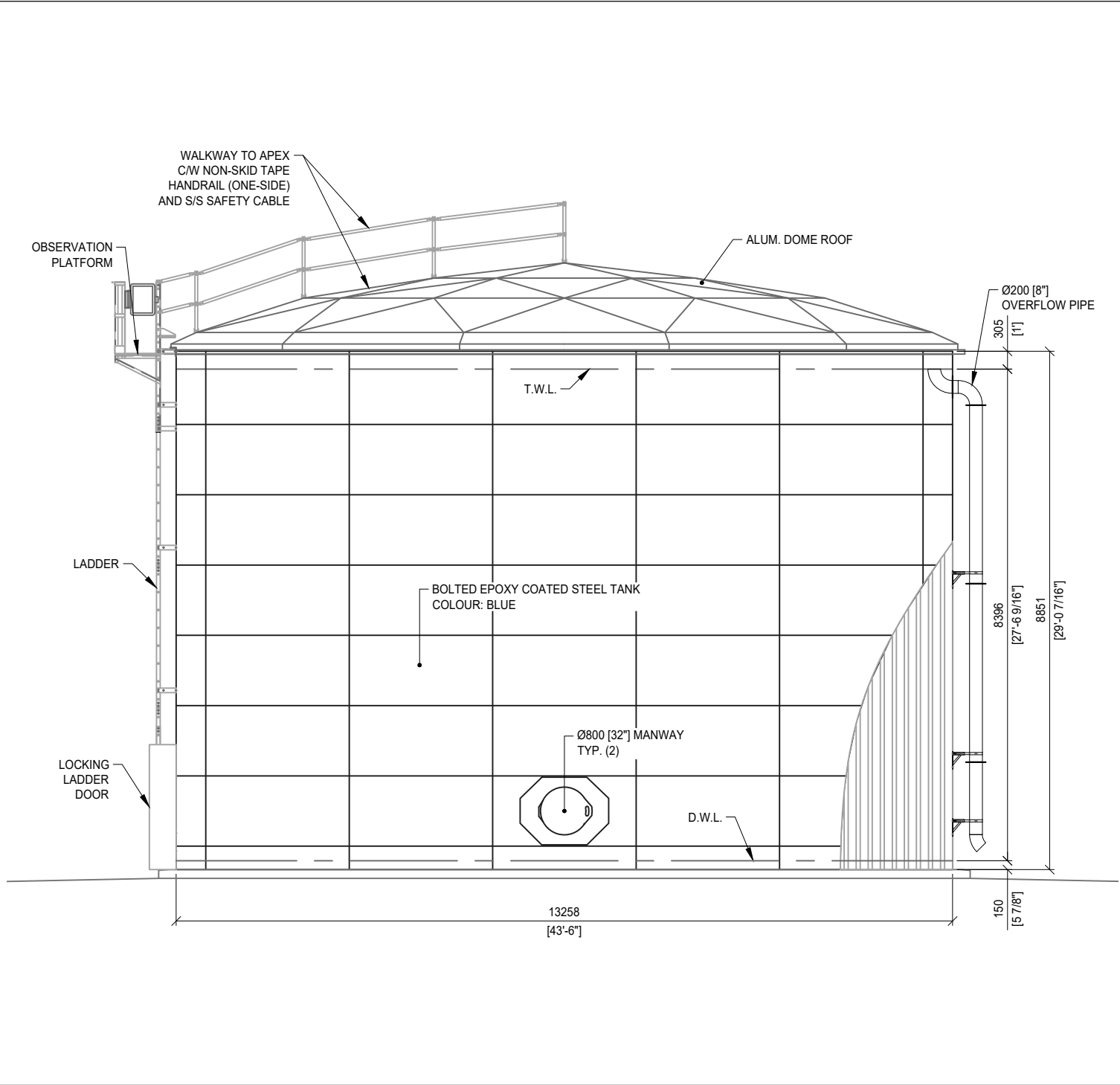
The published closed valve head has a +6% tolerance.

Other specified duty points, including their tolerances, shall be per separate agreement between Peerless Pump Co. and buyer.

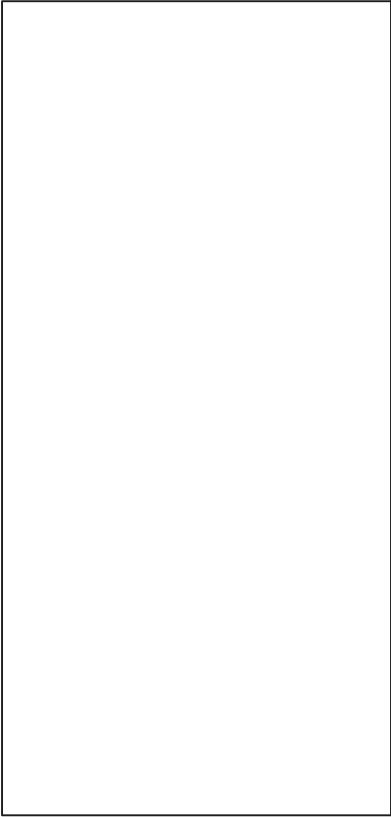


Customer	: Classic Fire & Life Safety	Peerless Model	: 8AEF17Q
Customer ref. / PO	:	Stages	: 1
Tag Number	: 001	Speed, rated	: 2100 rpm
Service	:	Based on curve number	: 8AEF17Q-2100 Rev Nov 2021
Quantity	: 1	Efficiency	: 76.02 %
Quote Number / ID	: 1736932	Rated power (based on duty point)	: 278.1 hp
Date last saved	: 21 Dec 2022 2:43 PM	Max power (non-overloading)	: 352.8 hp
Flow, rated	: 2,500 USgpm	NPSH required	: -
Differential head / pressure, rated	: 145.00 psi	Viscosity	: 1.00 cP
Fluid density, rated / max	: 1.000 / 1.000 SG	Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00

Flow (USgpm)	Head (psi)	Efficiency (%)	Power (hp)	NPSHr (ft)	Thrust, total (lbf)
0	149.82	0.00	140.0	-	-
753	152.23	37.65	177.6	-	-
1,506	151.38	60.32	220.5	-	-
2,259	147.13	73.27	264.6	-	-
3,012	139.04	80.25	304.5	-	-
3,765	126.76	83.31	334.2	-	-
4,518	109.91	82.73	350.2	-	-
5,271	88.12	77.01	351.9	-	-
6,024	61.02	62.86	341.1	-	-
6,778	28.22	35.33	315.7	-	-



REV	DESCRIPTION	yy.mm.dd
-	ISSUED FOR REVIEW	24.10.10
1		
2		
3		



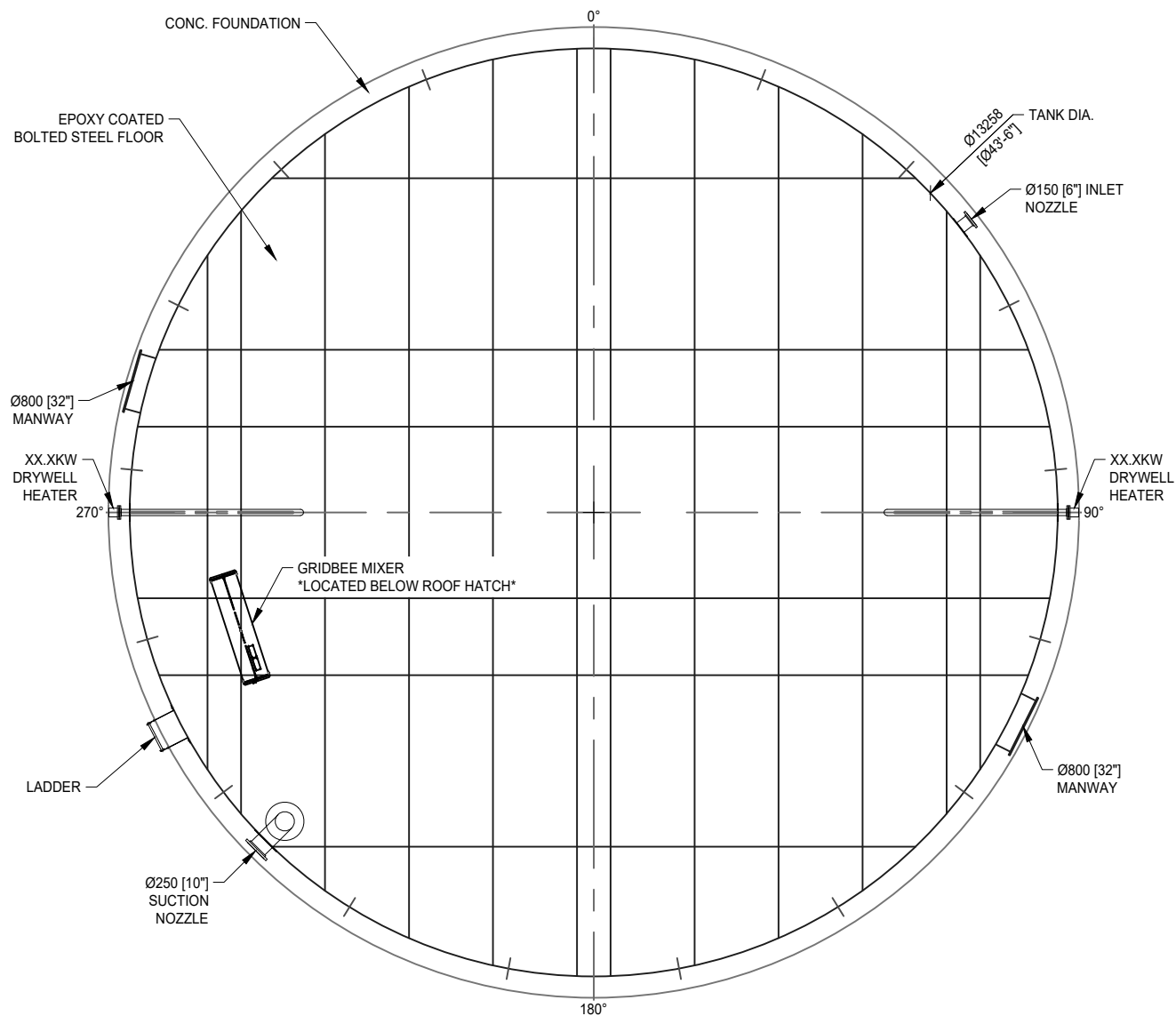
NOT TO SCALE



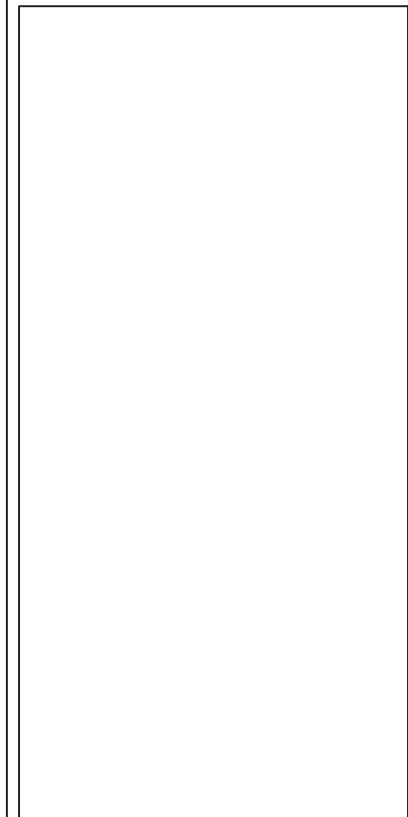
www.greatario.com (866) 299-3009

Project: PORT COLBORNE, ON
Ø44' x 29'

Drawing: TANK ELEVATION VIEW



REV	DESCRIPTION	yy.mm.dd
-	ISSUED FOR REVIEW	24.10.10
1		
2		
3		



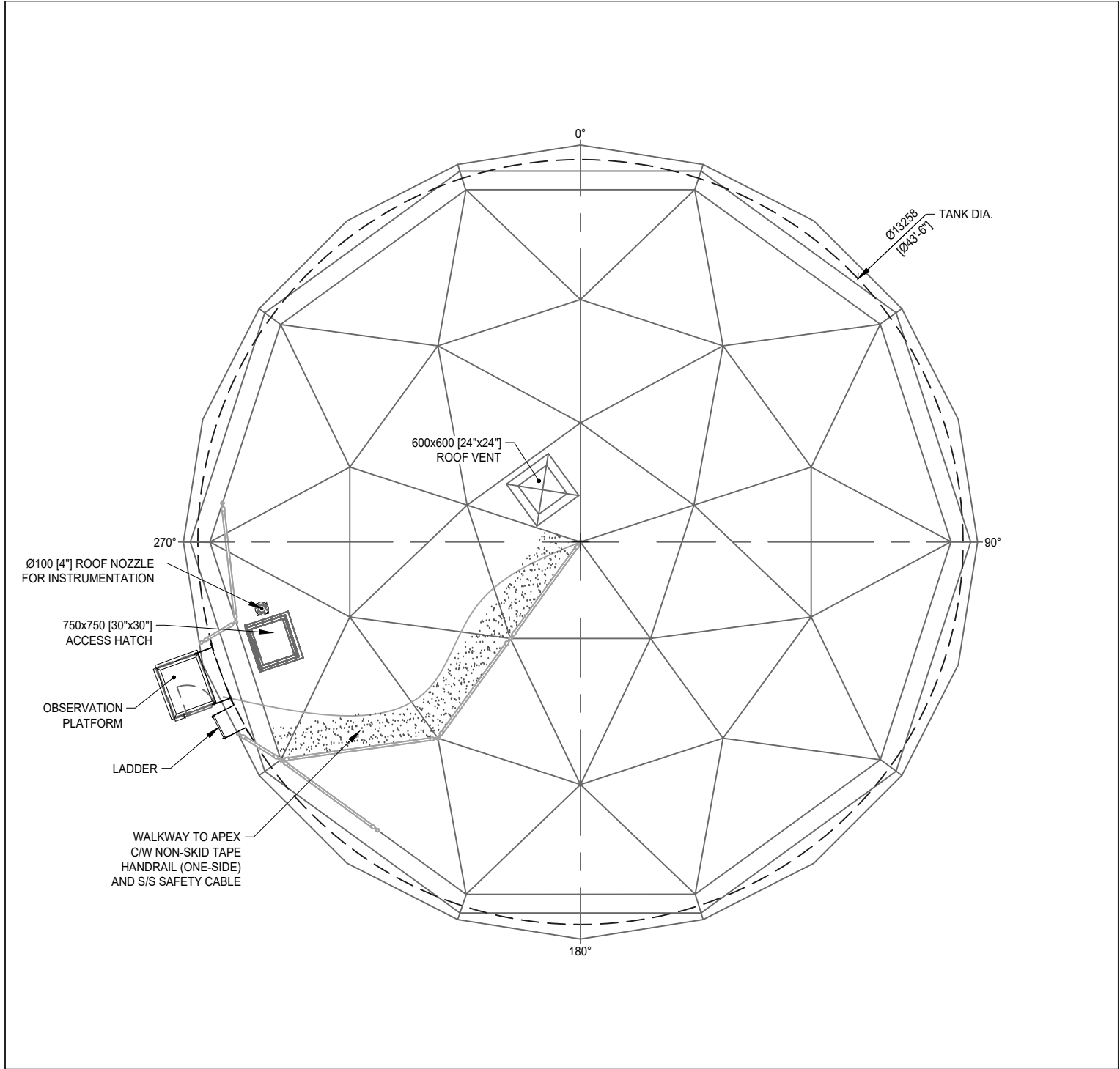
NOT TO SCALE



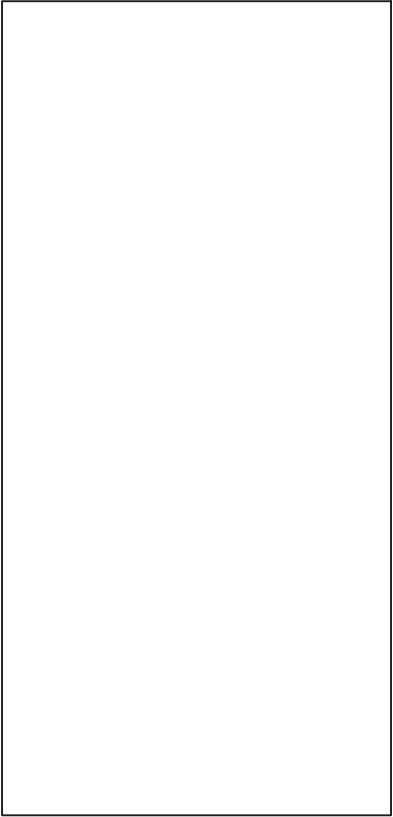
Project: PORT COLBORNE, ON
Ø44' x 29'

Drawing: TANK FLOOR PLAN

Dwg. No.: 102 Date: 2024 OCT 10



REV	DESCRIPTION	yy.mm.dd
-	ISSUED FOR REVIEW	24.10.10
1		
2		
3		



NOT TO SCALE



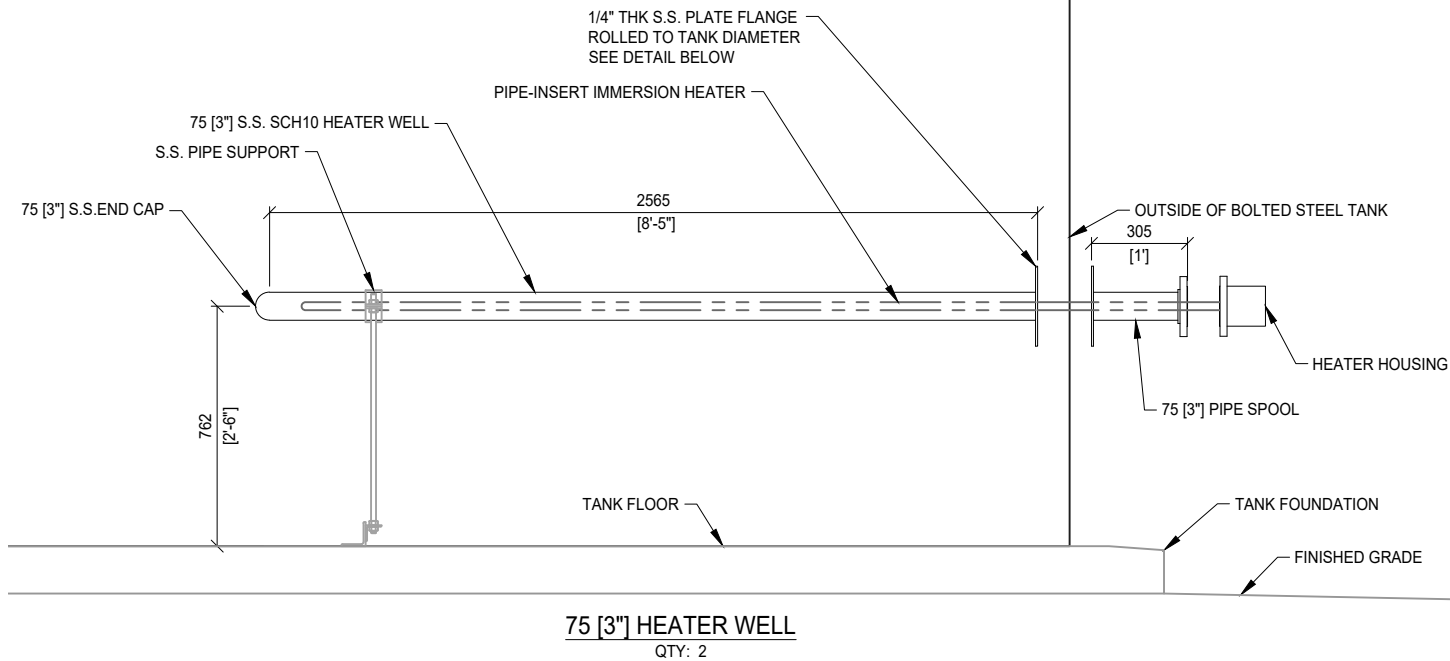
www.greatario.com (866) 299-3009

Project: PORT COLBORNE, ON
Ø44' x 29'

Drawing: TANK ROOF PLAN

Dwg. No.: 103

Date: 2024 OCT 10



REV	DESCRIPTION	yy.mm.dd
-	ISSUED FOR REVIEW	21.09.22

NOT TO SCALE



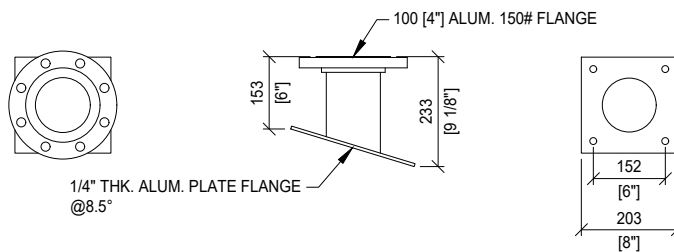
**Greatario Engineered
Storage Systems Ltd.**

P.O. Box 399, Innerkip,
ON N0J 1M0
(519) 469-8169
www.greatario.com

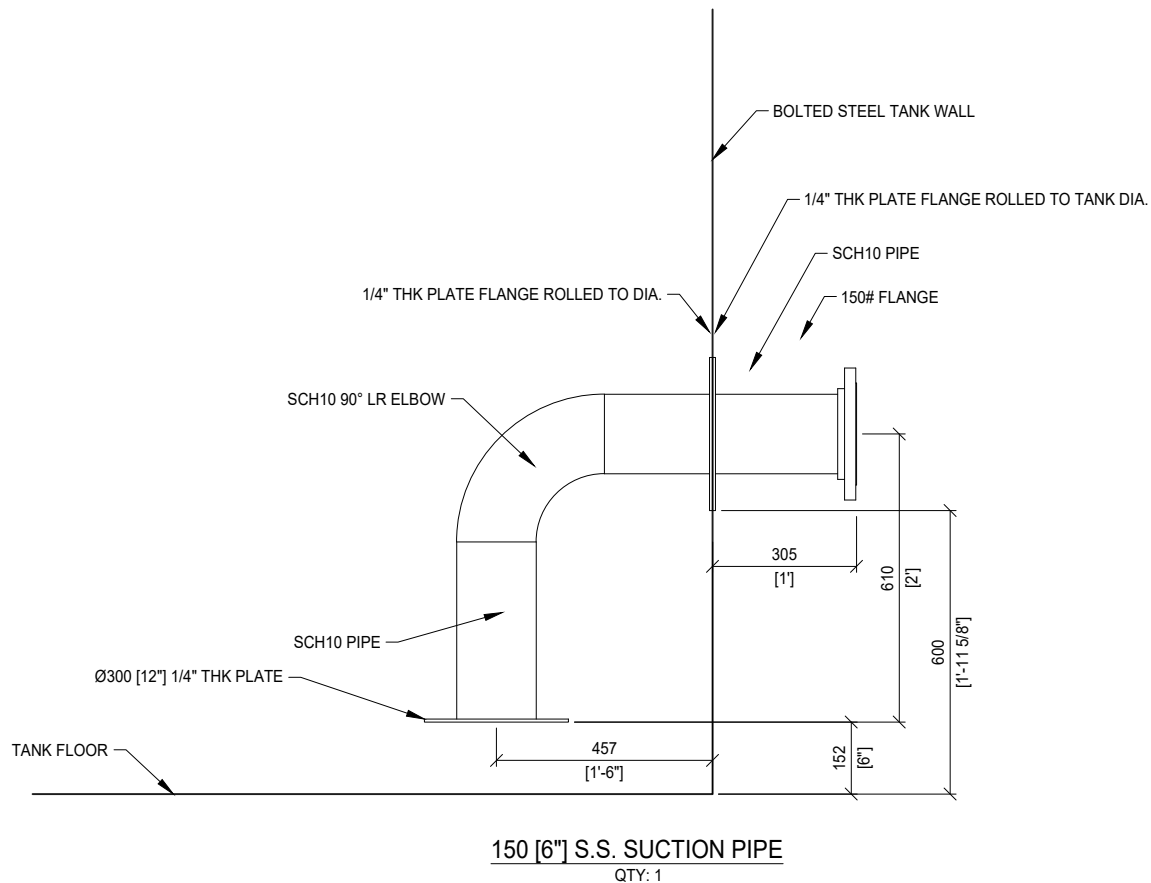
Project: **IDEAL SUPPLY
Ø25' x 29' FPT**

Drawing: **HEATER WELL DETAILS**

Dwg. No.: **105** Date: **2021 SEP 22**

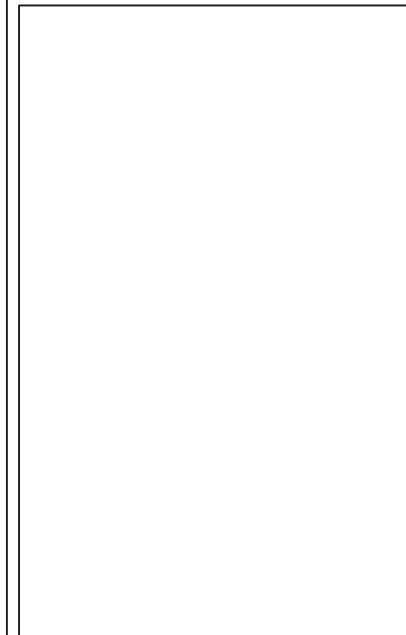


100 [4"] ALUM. ROOF NOZZLE
QTY: 1 INCL. BLIND FLANGE C/W 1" NPT COUPLING



150 [6"] S.S. SUCTION PIPE
QTY: 1

REV	DESCRIPTION	yy.mm.dd
-	ISSUED FOR REVIEW	21.09.22



NOT TO SCALE



**Greatario Engineered
Storage Systems Ltd.**

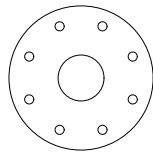
P.O. Box 399, Innerkip,
ON N0J 1M0
(519) 469-8169
www.greatario.com

Project:	IDEAL SUPPLY Ø25' x 29' FPT
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Drawing:	NOZZLE DETAILS
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Dwg. No.:	106	Date:	2021 SEP 22
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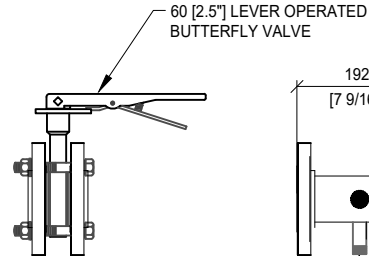
$\frac{1}{4}$ " ss 304 PLATE FLANGE
ROLLED TO TANK DIAMETER



100 [4"] 304 SS SPOOL

248
[9 3/4"]

150# FLANGE



150# FLANGE

192
[7 9/16"]

100 [4"] 304 SS SPOOL

NPT THREAD c/w SCREW
ON CAP

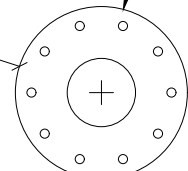
$\frac{3}{4}$ " COUPLER c/w $\frac{1}{2}$ " BRASS BALL VALVE

60 [2.5"] INLET
QTY: 1

FASTEN TO TANK WALL
WITH STANDARD $\frac{1}{2}$ " BUILDING
BOLTS AND SEALER

$\frac{1}{4}$ " ss 304 PLATE FLANGE
ROLLED TO TANK DIAMETER

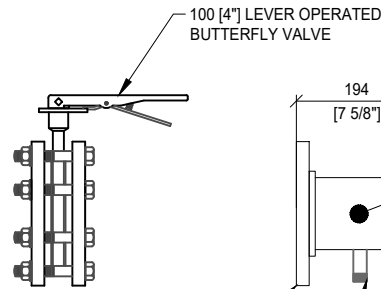
$\varnothing 273$
[$\varnothing 10 3/4$ "]



100 [4"] 304 SS SPOOL

248
[9 3/4"]

150# FLANGE



150# FLANGE

194
[7 5/8"]

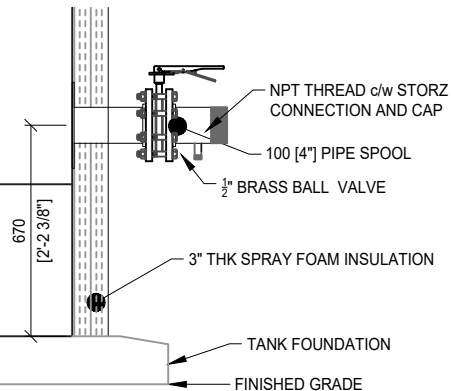
100 [4"] 304 SS SPOOL

NPT THREAD c/w SCREW
ON CAP

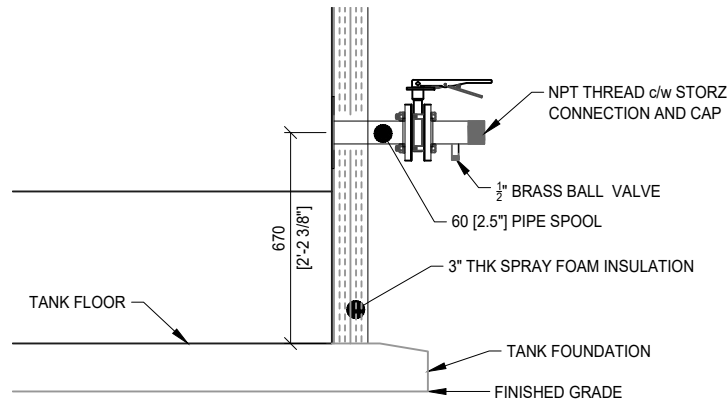
$\frac{3}{4}$ " COUPLER c/w $\frac{1}{2}$ " BRASS BALL VALVE

100 [4"] INLET
QTY: 1

FASTEN TO TANK WALL
WITH STANDARD $\frac{1}{2}$ " BUILDING
BOLTS AND SEALER



100 [4"] INLET
QTY: 1



60 [2.5"] INLET
QTY: 1

REV	DESCRIPTION	yy.mm.dd
-	ISSUED FOR REVIEW	21.09.22

NOT TO SCALE



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(519) 469-8169
www.greatario.com

Project:	IDEAL SUPPLY $\varnothing 25'$ x 29' FPT
Drawing:	INLET DETAILS
Dwg. No.:	108
Date:	2021 SEP 22

FIRE PROTECTION NOTES:

PROJECT SCOPE OF WORK:

THIS PROJECT CONSISTS OF DESIGNING AND INSTALLING AN OVERHEAD SPRINKLER AND STANDPIPE SYSTEMS IN A NEW INDUSTRIAL BUILDING. THE TOTAL AREA OF WORK IS 57,427 SQ. M. (618,140 SQ. FT.)

THE STARTING POINT FOR INSTALLATION IS THE 12" INCOMING FLANGE IN THE PUMP HOUSE

BUILDING DETAILS:

BUILDING DESCRIPTION: NEW 1-STORY INDUSTRIAL BUILDING WITH MEZZANINE

FIRE ALARM: YES

BUILDING CONSTRUCTION: NON-COMBUSTIBLE STEEL BEAM AND OWLS CONSTRUCTION

ONTARIO BUILDING CODE CLASSIFICATION: GROUP F, DIVISION 2: MEDIUM HAZARD INDUSTRIAL

SPRINKLER SYSTEM DESIGN:

THIS SPRINKLER SYSTEM HAS BEEN DESIGNED IN ACCORDANCE WITH THE FOLLOWING CODES & STANDARDS:

- NFPA 13 (2022) "STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS"
- NFPA 20 (2018) "STANDARD FOR THE INSTALLATION OF STATIONARY PUMPS FOR FIRE PROTECTION"
- THE ONTARIO BUILDING CODE (2012)

DESIGN CRITERIA - PLASTIC COMMODITIES IN RACKS - WET:

AREAS INCLUDED:

RAW MATERIAL STORAGE AND PACKAGING & PRODUCT WAREHOUSE

CODE REFERENCES:

THIS SPRINKLER SYSTEM IS DESIGNED FOR THE PROTECTION OF PLASTIC COMMODITIES STORED IN RACKS. NOTE THAT NO SOLID SHELVING OR OPEN TOP CONTAINERS ARE PERMITTED.

- NFPA 13 - TABLE 12.2.3.1:
 - STORAGE ARRANGEMENTS: SINGLE, DOUBLE, AND MULTIPLE ROW RACKS
 - COMMODITY TYPE: EXPOSED, NON-EXPANDED PLASTICS
 - MAXIMUM STORAGE HEIGHT: 25 FT
 - MAXIMUM CEILING HEIGHT: 40 FT
 - CHOICE 0.20 USGPM / FT² OVER 1,500 SQ. FT.
- IN-RACK SPRINKLERS ARE NOT REQUIRED
- NFPA 13 - 12.2.3.3:
 - THE DESIGN AREA SHALL CONSIST OF THE MOST HYDRAULICALLY DEMANDING AREA OF 12 SPRINKLERS, CONSISTING OF FOUR SPRINKLERS ON EACH OF THE THREE BRANCH LINES
- NFPA 13 - TABLE 12.6.1:
 - HOSE ALLOWANCE FOR UP TO 12 (FSR) SPRINKLERS IN THE DESIGN AREA IS 250 GPM

SPRINKLER DESIGN CRITERIA - EXTRA HAZARD II - DOUBLE INTERLOCK PRE-ACTION:

AREAS INCLUDED:

MANUFACTURING AREAS

CODE REFERENCES:

- 1. NFPA 13 - FIGURE 12.2.3.1.1: CHOICE 0.40 USGPM / FT² OVER 2,500 SQ. FT.
- 2. NFPA 13 - 11.2.2.2.2: A 30% INCREASE IN DESIGN AREA WAS APPLIED FOR DOUBLE INTERLOCK PRE-ACTION SYSTEMS WITHOUT REVERSING THE DENSITY. THE RESULTING DESIGN AREA IS 3,250 SQ. FT.
- 3. NFPA 13 - TABLE 11.2.3.1.2: EXTRA HAZARD II -> 500 USGPM HOSE ALLOWANCE

STORAGE CRITERIA:

AS PER NFPA 13, PRODUCT STORAGE IS NOT TO EXCEED THE FOLLOWING HEIGHTS:

- GROUP A PLASTICS, CARBONED, EXPANDED AND UNEXPANDED, SOLID PILED - STORAGE HEIGHT: -> 10' TO 12' <
- GROUP A PLASTICS, EXPOSED, EXPANDED AND UNEXPANDED, SOLID PILED - STORAGE HEIGHT: -> 10' TO 10' <

SPRINKLER DESIGN CRITERIA - ORDINARY HAZARD II - DOUBLE INTERLOCK PRE-ACTION:

AREAS INCLUDED:

ELECTRICAL ROOMS, CONTROL CENTERS AND CLEAN ROOM INTERSTITIAL SPACES

CODE REFERENCES:

- 1. NFPA 13 - FIGURE 12.2.3.1.1: CHOICE 0.20 USGPM / FT² OVER 1,500 SQ. FT.
- 2. NFPA 13 - 11.2.2.2.2: A 30% INCREASE IN DESIGN AREA WAS APPLIED FOR DOUBLE INTERLOCK PRE-ACTION SYSTEMS WITHOUT REVERSING THE DENSITY. THE RESULTING DESIGN AREA IS 3,250 SQ. FT.
- 3. NFPA 13 - TABLE 11.2.3.1.2: ORDINARY HAZARD II -> 250 USGPM HOSE ALLOWANCE

STORAGE CRITERIA:

AS PER NFPA 13, PRODUCT STORAGE IS NOT TO EXCEED THE FOLLOWING HEIGHTS FOR ORDINARY HAZARD II OCCUPANCIES:

- CLASS II-B COMMODITIES: 12'-0" HIGH MAXIMUM (SOLID PILE OR RACK)
- CLASS II-C COMMODITIES: 12'-0" HIGH MAXIMUM (SOLID PILE)
- CLASS II-D COMMODITIES: 10'-0" HIGH MAXIMUM (SOLID PILE)
- PLASTICS COMMODITIES: 5'-0" HIGH MAXIMUM (SOLID PILE)

NO WOOD OR PLASTIC PALLET STORAGE ALLOWED

SPRINKLER DESIGN CRITERIA - ORDINARY HAZARD II - WET:

AREAS INCLUDED:

MAINTENANCE ROOMS, MEP, CORRIDORS, INSPECTION ROOMS

CODE REFERENCES:

- 1. NFPA 13 - FIGURE 12.2.3.1.1: CHOICE 0.20 USGPM / FT² OVER 1,500 SQ. FT.
- 2. NFPA 13 - TABLE 11.2.3.1.2: ORDINARY HAZARD II -> 250 USGPM HOSE ALLOWANCE

STORAGE CRITERIA:

AS PER NFPA 13, PRODUCT STORAGE IS NOT TO EXCEED THE FOLLOWING HEIGHTS FOR ORDINARY HAZARD II OCCUPANCIES:

- CLASS II-B COMMODITIES: 12'-0" HIGH MAXIMUM (SOLID PILE OR RACK)
- CLASS II-C COMMODITIES: 12'-0" HIGH MAXIMUM (SOLID PILE)
- CLASS II-D COMMODITIES: 10'-0" HIGH MAXIMUM (SOLID PILE)
- PLASTICS COMMODITIES: 5'-0" HIGH MAXIMUM (SOLID PILE)

NO WOOD OR PLASTIC PALLET STORAGE ALLOWED

SPRINKLER DESIGN CRITERIA - LIGHT HAZARD - WET:

AREAS INCLUDED:

OFFICES

CODE REFERENCES:

- 1. NFPA 13 - FIGURE 12.2.3.1.1: CHOICE 0.10 USGPM / FT² OVER 1,500 SQ. FT.
- 2. NFPA 13 - 11.2.2.2.1.1: A DESIGN AREA REDUCTION OF 780% WAS APPLIED FOR QUICK RESPONSE SPRINKLERS. THE RESULTING DESIGN AREA IS 380 SQ. FT.
- 3. NFPA 13 - TABLE 11.2.3.1.2: LIGHT HAZARD -> 300 USGPM HOSE ALLOWANCE

STANDPIPE SYSTEM DESIGN:

THIS STANDPIPE SYSTEM HAS BEEN DESIGNED IN ACCORDANCE WITH THE FOLLOWING CODES & STANDARDS:

- NFPA 14 (2013) "STANDARD FOR THE INSTALLATION OF STANDPIPE SYSTEMS"
- NFPA 20 (2018) "STANDARD FOR THE INSTALLATION OF STATIONARY PUMPS FOR FIRE PROTECTION"
- THE ONTARIO BUILDING CODE (2012)

STANDPIPE DESIGN CRITERIA:

BUILDING HEIGHT: 28,955 MM (95' - 0")

OF STOREYS: 3

BUILDING AREA: 57,427 SQ. M. (618,140 SQ. FT.)

ONTARIO BUILDING CODE (OBC) REFERENCES:

- OBC 2.2.9.3 (1): 38 MM (1-1/2") HOSE VALVES ARE REQUIRED
- OBC 2.2.9.2 (4): THE RESIDUAL PRESSURE AT THE REMOTE HOSE CONNECTION IS PERMITTED TO BE LESS THAN 65 PSI (4.5 BAR) AS THE BUILDING IS FULLY SPRINKLERED AND A FIRE DEPARTMENT CONNECTION IS PROVIDED FOR THE FIRE DEPARTMENT TO DELIVER THE FULL DEMAND FLOW AT A RESIDUAL PRESSURE OF 65 PSI (4.5 BAR).
- OBC 2.2.9.3 (2): 65 MM (2-1/2") HOSE VALVES ARE REQUIRED
- OBC 2.2.9.2 (2): IF THE BUILDING IS LESS THAN 64 M HIGH, MEASURED BETWEEN GRADE AND THE CEILING LEVEL OF THE TOP STOREY, THE WATER SUPPLY REQUIRED IN SENTENCE (1) IS PERMITTED TO BE SUPPLIED THROUGH THE FIRE DEPARTMENT CONNECTION.

NFPA 14 SYSTEM CLASS:

CLASS II WET STANDPIPE SYSTEM

WATER SUPPLY INFORMATION:

PUMP BOOST: 2,500 USGPM @ 145 PSI

PUMP TYPE: DIESEL

NOTES: FIRE PUMP SIZING AND PRESSURE TO BE CONFIRMED WITH HYDRAULIC CALCULATIONS

FIRE PUMP IS FED FROM 300,000 US GALS OF FIRE WATER STORAGE TANK

MATERIALS:

SPRINKLER HEADS:

REFER TO THE HEAD LEGEND

SPRINKLER SYSTEM PIPING:

25 MM - 50 MM SCHEDULE-40, THREADED, BLACK, ULC & FM

(WHERE THREADED PIPE IS NECESSARY)

32 MM - 250 MM SCHEDULE-40, ROLL GROOVED, BLACK, ULC & FM

SPRINKLER SYSTEM FITTINGS:

25 MM - 50 MM CAST IRON FITTINGS, THREADED, ULC & FM

(WHERE THREADED PIPE IS NECESSARY)

32 MM - 200 MM GROOVED FITTINGS & COUPLINGS, ULC & FM

STANDPIPE SYSTEM PIPING:

40 MM SCHEDULE-40, THREADED, BLACK, ULC & FM

(AT CONNECTIONS TO CABINETS)

40 MM - 100 MM SCHEDULE-40, ROLL GROOVED, BLACK, ULC & FM

STANDPIPE SYSTEM FITTINGS:

40 MM CAST IRON FITTINGS, THREADED, ULC & FM

(AT CONNECTIONS TO CABINETS)

40 MM - 100 MM GROOVED FITTINGS & COUPLINGS, ULC & FM

FIRE EXTINGUISHERS:

REFER TO THIS PAGE FOR FIRE EXTINGUISHER DETAILS

HANGERS:

REFER TO THE HANGER DETAILS SECTION

MATERIAL NOTES:

ALL MATERIALS SHALL BE UL LISTED FOR FIRE PROTECTION USE IN ACCORDANCE WITH NFPA 13 STANDARDS.

SEISMIC HAZARD INDEX (SHI):

SHI = $S_{SI} \times D_{SI} \times F_{SI} \times I_{SI} = 0.298 \times 1.35 \times 1 \times 0.34$

AS PER OBC (2022) 4.1.8.3(2), SEISMIC BRACING IS NOT REQUIRED WHEN THE SHI IS LESS THAN 0.35.

THEFORE SEISMIC BRACING IS NOT REQUIRED

ITEMS NOT INCLUDED IN THIS CONTRACT:

- ELECTRICAL WIRING OF SPRINKLER DEVICES
- PAINTED OR GALVANIZED SPRINKLER PIPING
- UNDERGROUND/POCKETING WATER SUPPLY
- ALTERATIONS TO THE EXISTING SYSTEM OTHER THAN OUTLINED ON THESE DRAWINGS

NOTES TO THE OWNER / OCCUPANTS:

THE OWNER / OCCUPANT IS RESPONSIBLE FOR SUPPLYING & MAINTAINING ADEQUATE HEAT (4°C, 40°F) TO ALL AREAS WHERE WET PIPING IS INSTALLED IN ORDER TO PREVENT THE WET PIPING FROM FREEZING.

THE FIRE DEPARTMENT CONNECTION IS TO BE LOCATED WITHIN 45M (147'-7")

OF A FIRE HYDRANT AS PER THE

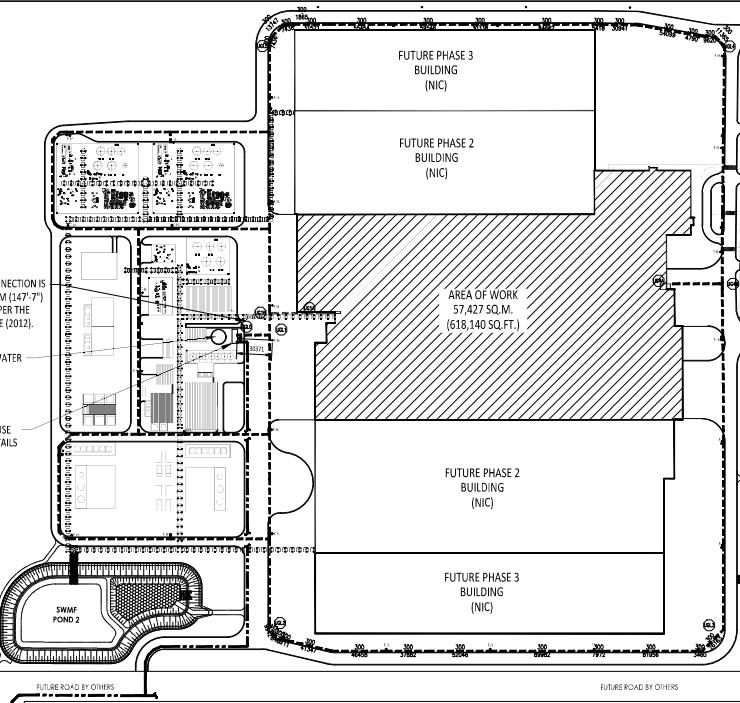
ONTARIO BUILDING CODE (2012).

ABOVE GROUND FIRE WATER

STORAGE TANK

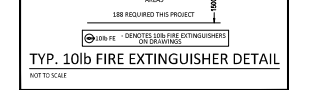
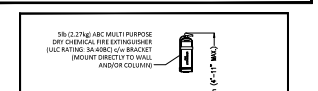
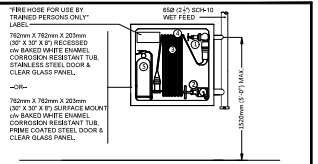
FIRE PUMP HOUSE

SEE FP-2 FOR DETAILS



SITE PLAN
SCALE: 1:500

SYMBOL	DESCRIPTION	QUANTITY
1	120 BIR CHEMICAL FIRE EXTINGUISHER (5A:80BC) C/W WALL MOUNTING ACCESSORIES	158
2	120 BIR CHEMICAL FIRE EXTINGUISHER (5A:80BC) C/W WALL MOUNTING ACCESSORIES	101

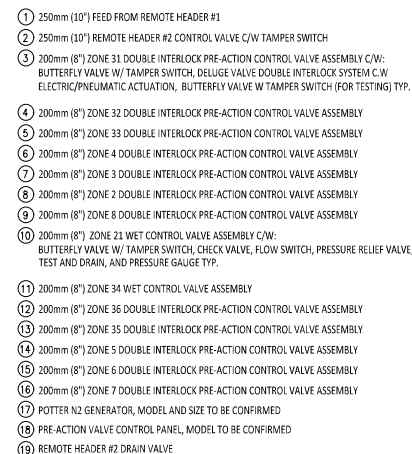


SYMBOL	SIZE	K/FAC	NAME	SN R	RESPONSE	QTY
1	100	100	100	100	100	100
2	100	100	100	100	100	100
3	100	100	100	100	100	100
4	100	100	100	100	100	100
5	100	100	100	100	100	100
6	100	100	100	100	100	100
7	100	100	100	100	100	100
8	100	100	100	100	100	100
9	100	100	100	100	100	100
10	100	100	100	100	100	100
11	100	100	100	100	100	100
12	100	100	100	100	100	100
13	100	100	100	100	100	100
14	100	100	100	100	100	100
15	100	100	100	100	100	100
16	100	100	100	100	100	100
17	100	100	100	100	100	100
18	100	100	100	100	100	100
19	100	100	100	100	100	100
20	100	100	100	100	100	100
21	100	100	100	100	100	100
22	100	100	100	100	100	100
23	100	100	100	100	100	100
24	100	100	100	100	100	100
25	100	100	100	100	100	100
26	100	100	100	100	100	100
27	100	100	100	100	100	100
28	100	100	100	100	100	100
29	100	100	100	100	100	100
30	100	100	100	100	100	100
31	100	100	100	100	100	100
32	100	100	100	100	100	100
33	100	100	100	100	100	100
34	100	100	100	100	100	100
35	100	100	100	100	100	100
36	100	100	100	100	100	100
37	100	100	100	100	100	100
38	100	100	100	100	100	100
39	100	100	100	100	100	100
40	100	100	100	100	100	100
41	100	100	100	100	100	100
42	100	100	100	100	100	100
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45	100	100	100	100	100	100
46	100	100	100	100	100	100
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53	100	100	100	100	100	100
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83	100	100	100	100	100	100
84	100	100	100	100	100	100
85	100	100	100	100	100	100
86	100	100	100	100	100	100



N2 GENERATORS SIZING TO BE CONFIRMED AFTER PIPE LAYOUT AND SIZING IS FINALIZED (SYSTEM VOLUME REQUIRED FOR GENERATOR SIZING).
DIFFERENT VOLTAGE OPTIONS AVAILABLE:

- 200-208V (26.8A) THREE PHASE
- 230-240V (22.3A) THREE PHASE
- 460-480V (11.2A) THREE PHASE

[illegible]

2024-12-16			ISSUED FOR 90% CD	
2024-12-16			ISSUED FOR 100% DD	
2024-08-16			ISSUED FOR LINK CD	
2024-07-16			ISSUED FOR 80% CD	
DATE	REV		DESCRIPTION	
REVISION HISTORY				



NORTHERN
SPRINKLER DESIGN INC.
445 COLBORNE STREET
LONDON ONTARIO CANADA N6B 2T2
PHONE: (866) 798-1154

CLASSIC FIRE • 645 GARYRAY DRIVE
LIFE TORONTO, ON
SAFETY M9L 1P9
PHONE: (416) 740-3000

PROJECT NAME: PROJECT EAGLE - ASAH KASEI
HIGHWAY 140 AND KLEINSMITH RD
PORT COLBORNE, ON

SHEET TITLE:

**FIRE PROTECTION
HEADER DETAILS**

DRAWN BY: L.S.	CHECKED BY: A.C.
DRAWING DATE: 2024-07-16	DRAWING SCALE: AS SHOWN
DESIGN NUMBER: 2024-CFLS-110	
CLIENT NUMBER: 24-BUR-620-0860	SHEET NUMBER: FP 3 OF 12

Legend

- SITE LIMIT
- FIRE ROUTE
- F.H. ♦ FIRE HYDRANT
- F.R. 1 FIRE ROUTE SIGN
- FIRE HYDRANT COVERAGE (R=45m)

8	FOR SITE PLAN APPROVAL - SUBMISSION 2	RT	BB	2024.12.13
7	80% CD	RT	BB	2024.11.29
6	50% CD	RT	BB	2024.08.30
5	100% DD	RT	BB	2024.07.24
4	80% DD	RT	BB	2024.06.28
3	FOR SITE PLAN APPROVAL - SUBMISSION 1	RT	BB	2024.06.18
Issued/Revision		By	Appd	YYYY.MM.DD

Permit/Seal



Client/Project Logo

AsahiKASEI

Client/Project
MANUFACTURING FACILITY

PROJECT EAGLE
5088 HIGHWAY 140

PORT COLBORNE, ON
CANADA

Title
SITE PLAN
FIRE ROUTE & FIRE HYDRANT
COVERAGE PLAN
DECEMBER 13, 2024

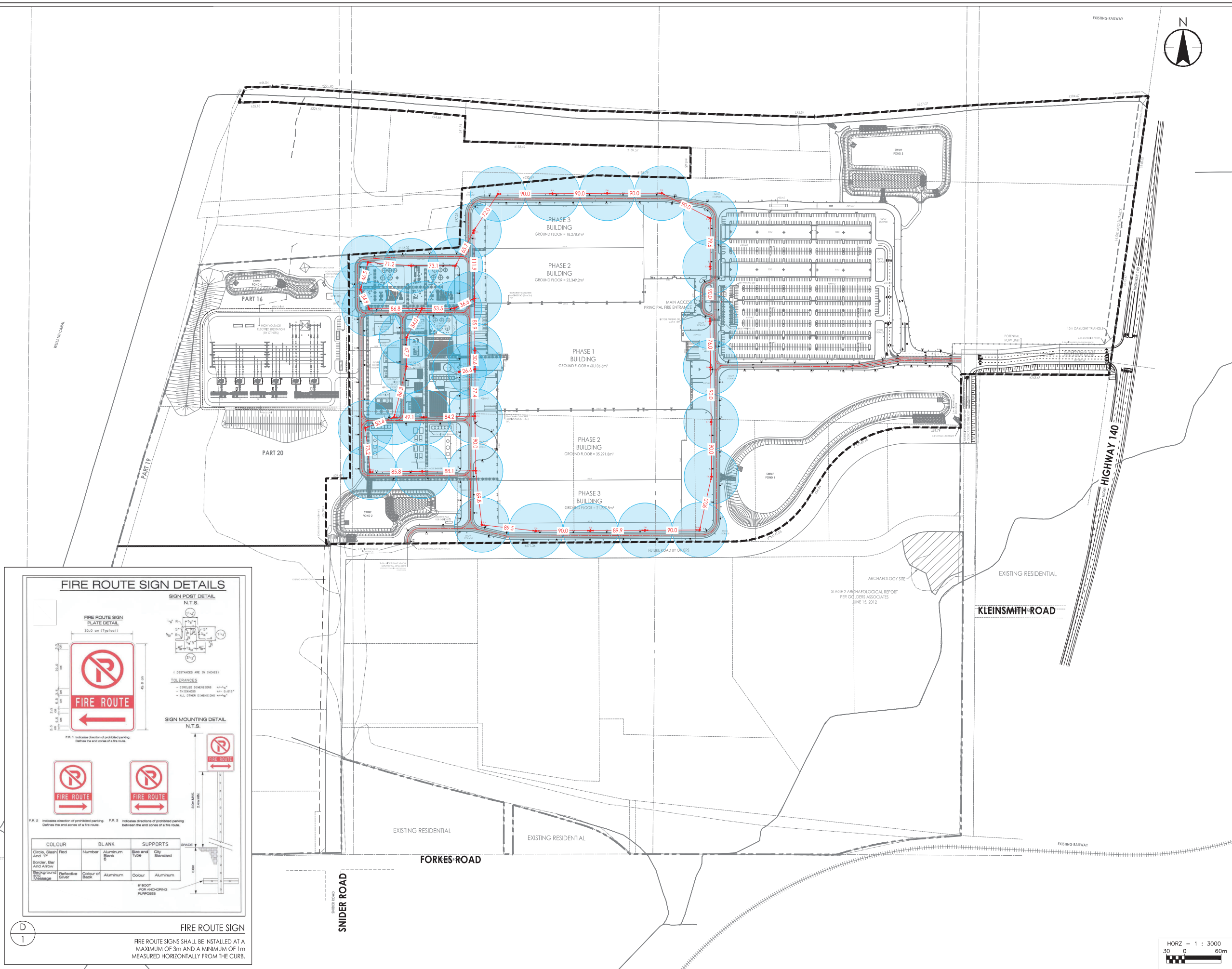
Project No.
161500301

Scale
1:3000

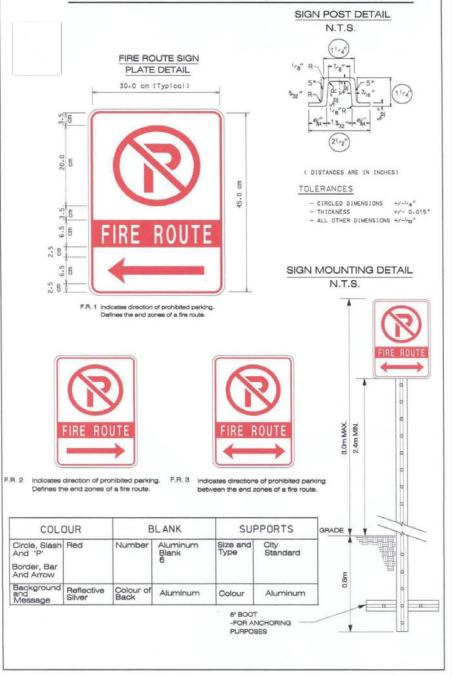
Revision

Drawing No.

FR-01



FIRE ROUTE SIGN DETAILS

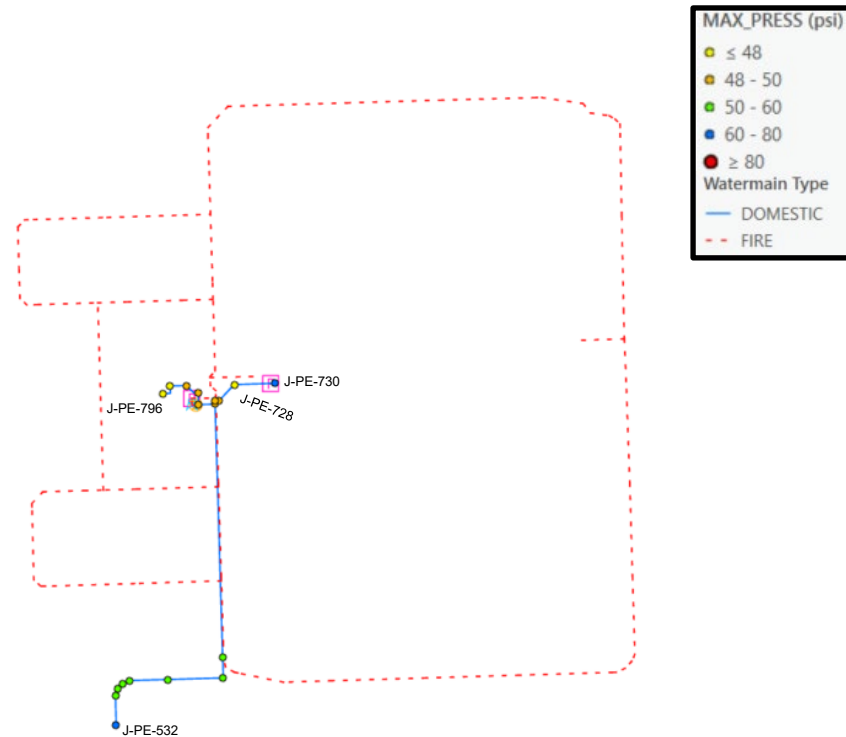


Appendix C – Stantec Drawing Set

Appendix D – Water Model Results



Results – Phase 1 ADD



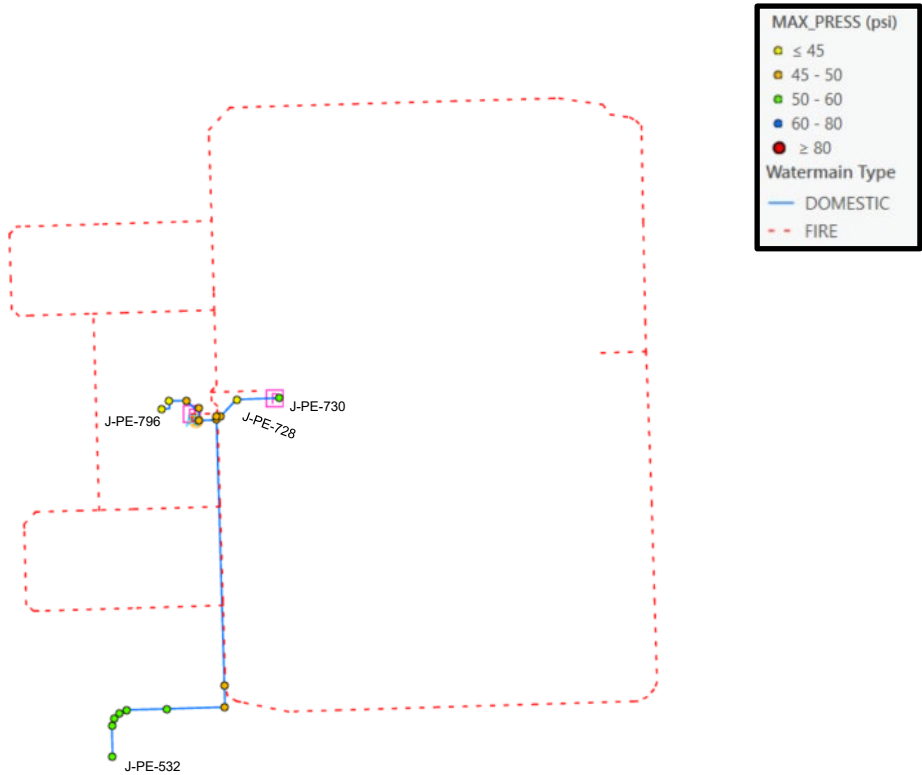
Velocity in 300 mm domestic pipe: 0.39 m/s

Junction ID	Max Pressure (psi)
J-PE-532	60.38387
J-PE-534	59.67314
J-PE-536	59.66587
J-PE-538	59.37381
J-PE-540	57.51839
J-PE-542	51.38792
J-PE-544	50.33740
J-PE-628	54.96632
J-PE-722	49.28094
J-PE-726	48.17182
J-PE-728*	46.09916
J-PE-730**	62.62039
J-PE-724	48.59944
J-PE-788	49.10424
J-PE-790	48.99360
J-PE-792	48.37415
J-PE-794	47.77788
J-PE-796***	47.48734

- * Upstream of domestic booster pump
- ** Phase 1 building connection
- *** Tank yard connection



Results – Phase 2 ADD



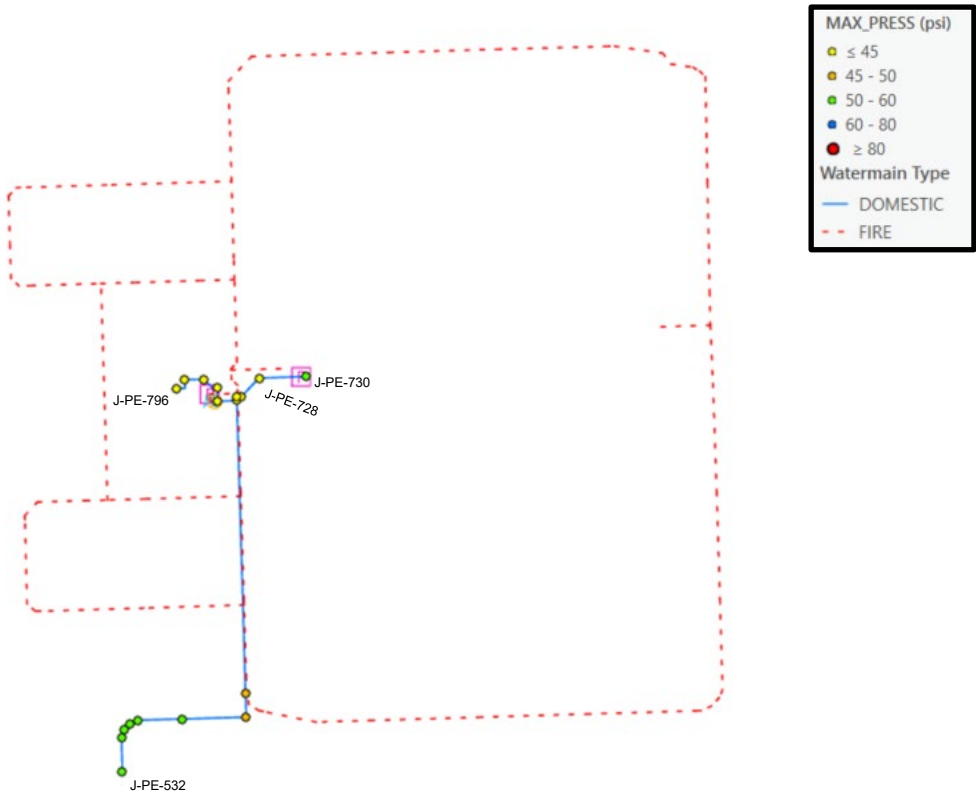
Velocity in 300 mm domestic pipe: 0.78 m/s

Junction ID	Max Pressure (psi)
J-PE-532	58.32186
J-PE-534	57.53866
J-PE-536	57.51217
J-PE-538	57.20337
J-PE-540	55.32849
J-PE-542	48.96330
J-PE-544	47.86024
J-PE-628	52.68158
J-PE-722	46.17146
J-PE-726	45.06234
J-PE-728*	42.98965
J-PE-730**	59.51091
J-PE-724	45.48996
J-PE-788	45.99476
J-PE-790	45.88413
J-PE-792	45.26467
J-PE-794	44.66840
J-PE-796***	44.37787

- * Upstream of domestic booster pump
- ** Phase 1 building connection
- *** Tank yard connection



Results – Ultimate ADD



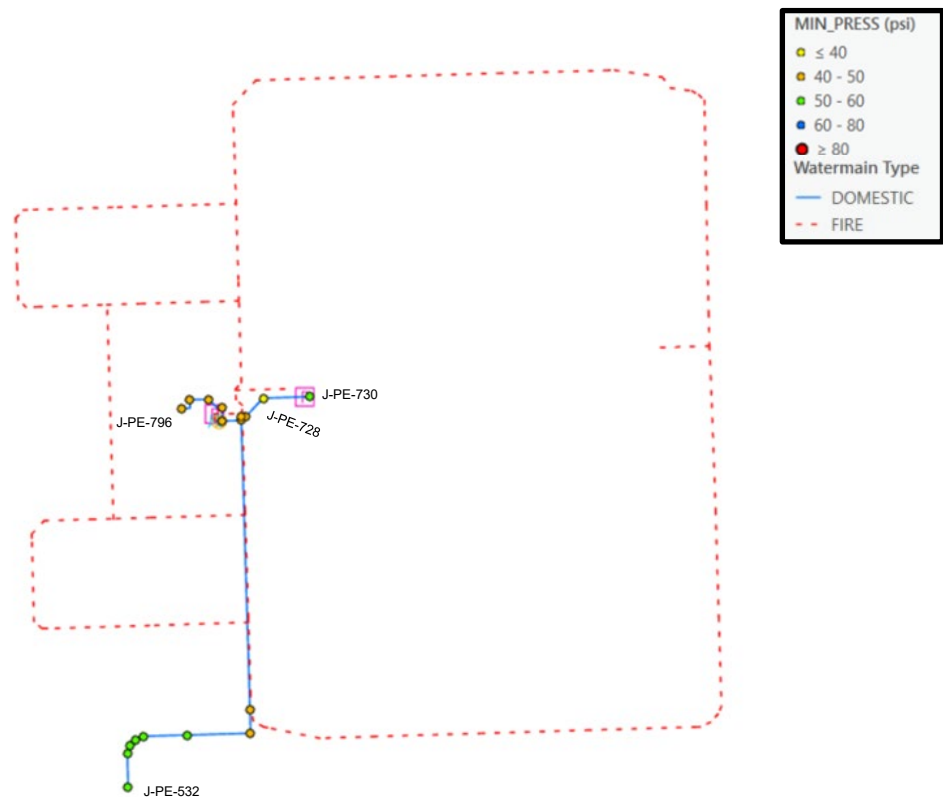
Velocity in 300 mm domestic pipe: 1.08 m/s

Junction ID	Max Pressure (psi)
J-PE-532	56.02540
J-PE-534	55.16261
J-PE-536	55.11495
J-PE-538	54.78779
J-PE-540	52.89149
J-PE-542	46.26832
J-PE-544	45.10750
J-PE-628	50.14036
J-PE-722	42.72368
J-PE-726	41.61456
J-PE-728*	39.54187
J-PE-730**	56.06313
J-PE-724	42.04218
J-PE-788	42.54698
J-PE-790	42.43635
J-PE-792	41.81689
J-PE-794	41.22062
J-PE-796***	40.93008

- * Upstream of domestic booster pump
- ** Phase 1 building connection
- *** Tank yard connection



Results – Phase 1 MDD



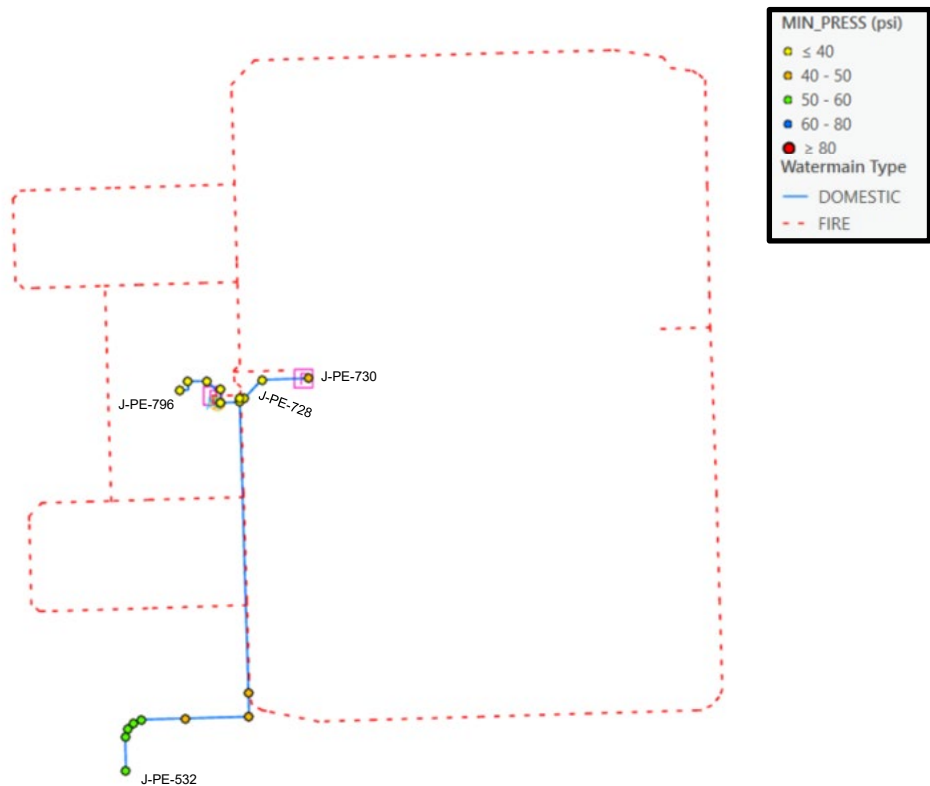
Velocity in 300 mm domestic pipe: 0.62 m/s

Junction ID	Min Pressure (psi)
J-PE-532	56.29177
J-PE-534	55.54526
J-PE-536	55.52849
J-PE-538	55.22818
J-PE-540	53.36314
J-PE-542	47.11683
J-PE-544	46.04037
J-PE-628	50.76428
J-PE-722	44.67184
J-PE-726	43.30819
J-PE-728*	39.73662
J-PE-730**	53.50998
J-PE-724	43.98960
J-PE-788	44.48712
J-PE-790	44.13916
J-PE-792	43.23048
J-PE-794	42.31958
J-PE-796***	41.74242

- * Upstream of domestic booster pump
- ** Phase 1 building connection
- *** Tank yard connection



Results – Phase 2 MDD



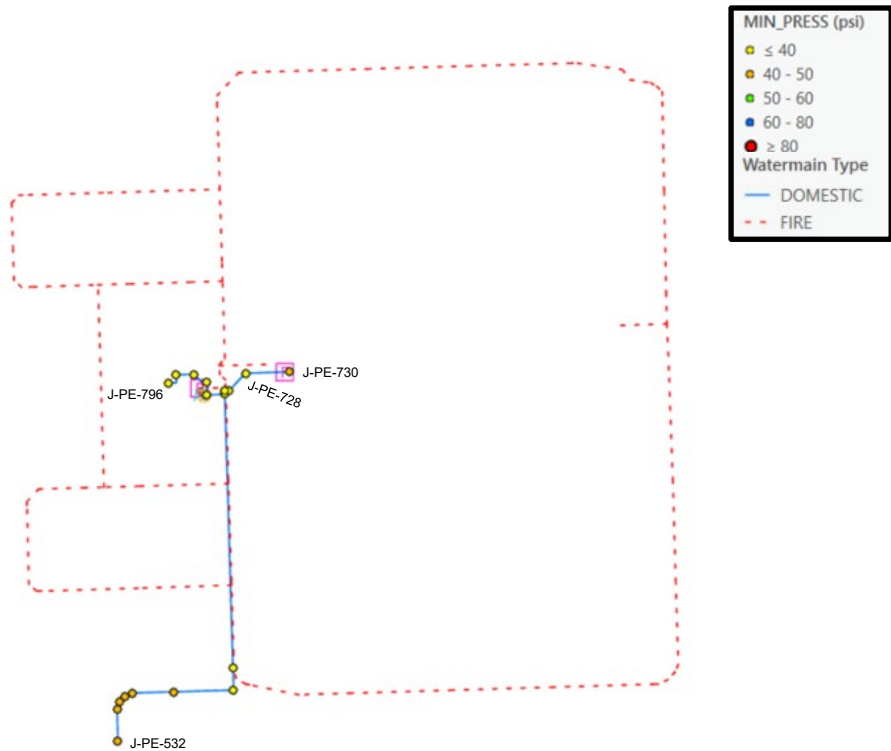
Velocity in 300 mm domestic pipe: 1.23 m/s

Junction ID	Min Pressure (psi)
J-PE-532	53.88961
J-PE-534	52.97630
J-PE-536	52.91526
J-PE-538	52.57647
J-PE-540	50.66657
J-PE-542	43.87985
J-PE-544	42.68243
J-PE-628	47.84937
J-PE-722	39.85804
J-PE-726	38.49439
J-PE-728*	34.92283
J-PE-730**	48.69618
J-PE-724	39.17580
J-PE-788	39.67332
J-PE-790	39.32536
J-PE-792	38.41668
J-PE-794	37.50578
J-PE-796***	36.92862

- * Upstream of domestic booster pump
- ** Phase 1 building connection
- *** Tank yard connection



Results –Ultimate MDD



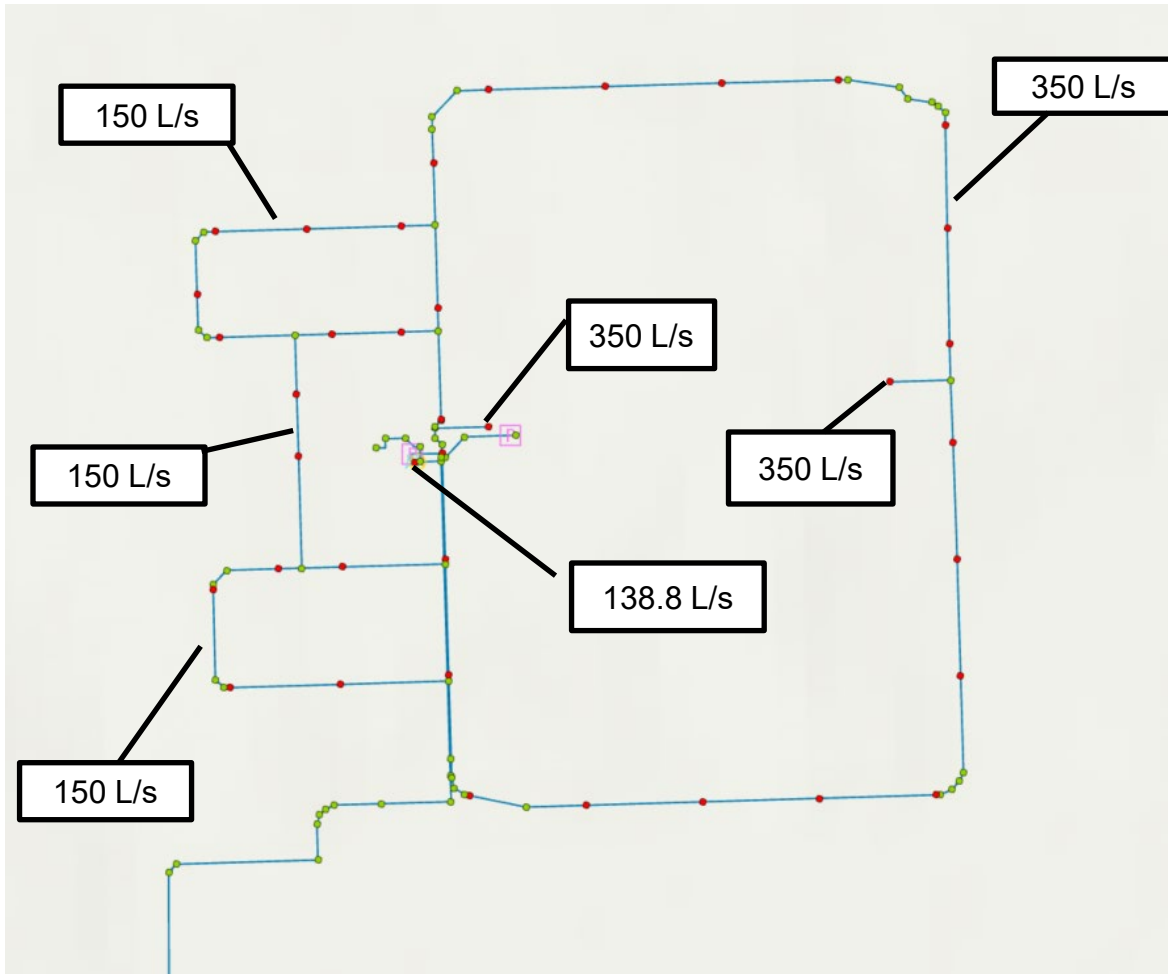
Velocity in domestic pipe: 1.70 m/s

Junction ID	Min Pressure (psi)
J-PE-532	48.98787
J-PE-534	47.89092
J-PE-536	47.78111
J-PE-538	47.39993
J-PE-540	45.44066
J-PE-542	38.05889
J-PE-544	36.72823
J-PE-628	42.38303
J-PE-722	32.30076
J-PE-726	30.93711
J-PE-728*	27.36554
J-PE-730**	41.13890
J-PE-724	31.61852
J-PE-788	32.11604
J-PE-790	31.76808
J-PE-792	30.85940
J-PE-794	29.94850
J-PE-796***	29.37134

- * Upstream of domestic booster pump
- ** Phase 1 building connection
- *** Tank yard connection



Fire Flow Simulation

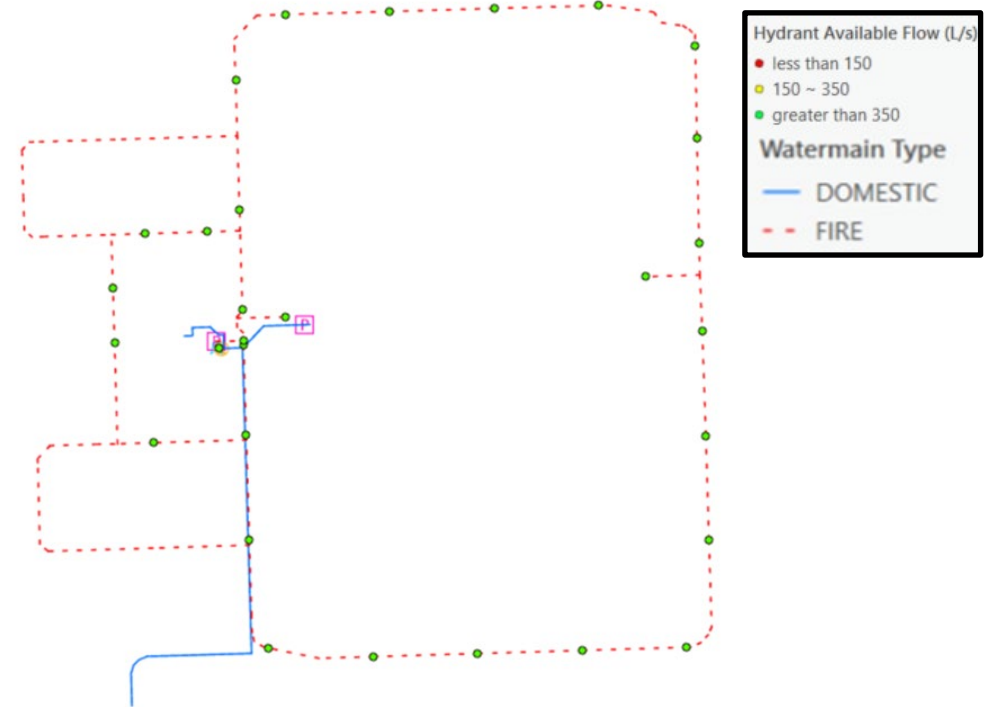


- Red nodes = fire flow demand nodes (i.e., hydrants, building connections)
- FF in building fire loop + building connection = 350 L/s per FUS
- FF in tank yard fire loops = 150 L/s (assumption since we don't have building details)
- FF @ pump house = 138.8 L/s (provided value for sprinkler demand)



Fire Flow Results – Phase 1

ID	Static Demand (L/s)	Static Pressure (psi)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (psi)	Hydrant Available Flow (L/s)	Hydrant Pressure at Available Flow (psi)
GMBP21_J_095	0.06368	51.77362	217.82968	149.99893	46.00391	225.07359	40.00003
GMBP21_J_096	0.03033	53.67672	217.82959	149.99893	48.80120	270.51013	40.00004
GMBP21_J_097	0.15614	53.05489	217.82826	149.99893	29.09765	107.59258	40.00000
GMBP21_J_098	0.02426	53.15772	217.82730	149.99893	30.62540	111.62000	40.00001
GMBP21_J_099	0.04246	56.46050	217.82671	149.99893	52.75795	355.31839	40.00007
GMBP21_J_100	0.07278	56.62126	217.82959	149.99893	53.20333	375.82074	40.00008
GMBP21_J_101	0.06672	52.35727	217.83012	149.99893	42.30412	168.36905	40.00002
GMBP21_J_102	0.12130	54.58632	217.82834	149.99893	42.65070	167.78384	40.00002
GMBP21_J_103	0.04852	58.03717	217.82559	149.99893	54.51847	386.50021	40.00008
GMBP21_J_104	0.03639	58.93538	217.82364	149.99893	55.47400	401.67206	40.00009
GMBP21_J_105	0.03942	58.31755	217.82364	149.99893	17.98721	97.53659	40.00000
GMBP21_J_106	0.02123	59.45301	217.82155	149.99893	56.28669	432.52289	40.00010
GMBP21_J_107	0.02123	58.83177	217.82155	149.99893	21.58761	103.37773	40.00000
GMBP21_J_108	0.66733	59.62198	217.81841	149.99893	43.89798	170.23683	40.00002
GMBP21_J_109	0.00000	50.95299	217.81592	149.99893	26.53891	96.42304	40.00000
J-PE-548	0.00000	161.78937	298.43890	349.99753	86.61685	420.73053	40.00010
J-PE-562	0.00000	161.33446	298.43890	349.99753	82.47582	413.04565	40.00009
J-PE-580	0.00000	160.90797	298.43890	349.99753	80.67279	409.94794	40.00009
J-PE-588	0.00000	159.66295	298.43890	349.99753	70.34166	393.05469	40.00008
J-PE-590	0.00000	162.48593	298.43890	349.99753	66.88008	387.05777	40.00008
J-PE-602	0.00000	160.44597	298.43890	349.99753	59.44442	376.60803	40.00008
J-PE-606	0.00000	158.56235	298.43890	349.99753	43.17515	353.95194	40.00007
J-PE-608	0.00000	162.61388	298.43890	349.99753	61.74021	379.75436	40.00008
J-PE-610	0.00000	167.58945	298.43890	349.99753	67.45744	386.64774	40.00008
J-PE-616	0.00000	165.44241	298.43890	349.99753	68.53393	388.71817	40.00008
J-PE-618	0.00000	163.42419	298.43890	349.99753	71.98950	394.47199	40.00008
J-PE-630	0.00000	162.11633	298.43890	349.99753	74.65600	399.13925	40.00009
J-PE-632	0.00000	164.43210	298.43890	349.99753	69.92430	391.03616	40.00008
J-PE-634	0.00000	166.31001	298.43890	349.99753	67.58484	387.13541	40.00008
J-PE-636	0.00000	161.38422	298.43890	349.99753	60.24341	377.66519	40.00008
J-PE-640	0.00000	163.89331	298.43890	349.99753	66.14661	385.66177	40.00008
J-PE-642	0.00000	161.06436	298.43890	349.99753	68.22864	389.41794	40.00008
J-PE-644	0.00000	160.16164	298.43890	349.99753	75.23747	400.80588	40.00009
J-PE-648	0.00000	160.50993	298.43890	149.99893	154.59238	407.99991	40.00009
J-PE-690	0.00000	161.97417	298.43890	349.99753	80.08604	408.41846	40.00009
J-PE-696	0.00000	160.51704	298.43890	149.99893	154.43407	406.60358	40.00009
J-PE-708	0.00000	165.52815	298.43890	349.99753	66.05427	385.15268	40.00008
J-PE-710	0.00000	161.07857	298.43890	349.99753	60.67482	378.40595	40.00008
J-PE-716	0.00000	160.69473	298.43890	149.99893	154.89983	409.30289	40.00009
J-PE-718	0.00000	161.98839	298.43890	149.99893	156.11307	410.34650	40.00009
J-PE-720	0.00000	160.39621	298.43890	149.99893	154.36299	406.96328	40.00009
J-PE-752	0.00000	161.66142	298.43890	138.79901	158.46799	421.25726	40.00010
J-PE-760	0.00000	158.56235	298.43890	349.99753	69.39019	391.89795	40.00008
J-PE-766	0.00000	160.62366	298.43890	349.99753	83.70100	415.70645	40.00009
W-M-002-JN01	0.11533	45.06451	217.70013	249.99823	40.33937	261.61374	40.00004
W-M-002-JN02	0.00000	46.48026	217.69601	249.99823	41.48588	295.40897	40.00005

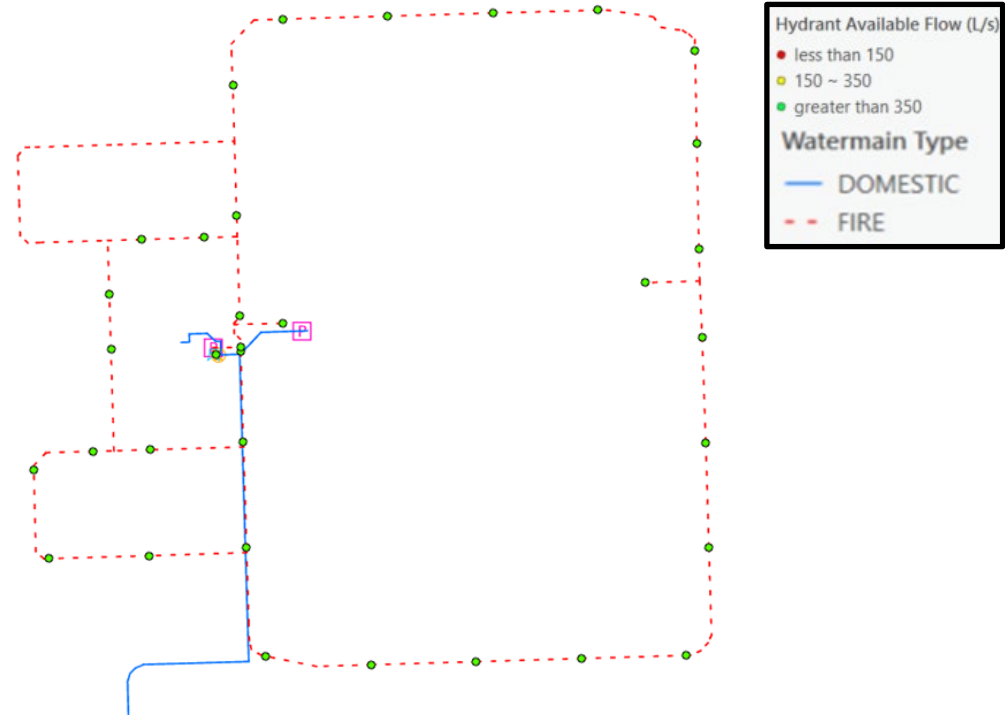


- Hydrant available flow > 350 L/s
- Controls will have to be set in the PCN to optimize the operation of the fire pump for building and tank yard fire supply conditions



Fire Flow Results – Phase 2

ID	Static Demand (L/s)	Static Pressure (psi)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (psi)	Hydrant Available Flow (L/s)	Hydrant Pressure at Available Flow (psi)
GMBP21_J_099	0.04246	56.39443	217.78023	149.99893	53.25934	372.71671	40.00007
GMBP21_J_100	0.07278	56.54187	217.77374	149.99893	53.69074	394.81271	40.00008
GMBP21_J_101	0.06672	52.27576	217.77280	149.99893	42.78861	172.81644	40.00002
GMBP21_J_102	0.12130	54.51205	217.77609	149.99893	43.13808	171.50533	40.00002
GMBP21_J_103	0.04852	57.97657	217.78297	149.99893	55.02878	405.63138	40.00009
GMBP21_J_104	0.03639	58.88468	217.78798	149.99893	55.99981	421.87137	40.00010
GMBP21_J_105	0.03842	58.26685	217.78795	149.99893	18.51302	98.28399	40.00000
GMBP21_J_106	0.02123	59.41321	217.79355	149.99893	56.83231	456.35049	40.00011
GMBP21_J_107	0.02123	58.79198	217.79355	149.99893	22.13382	104.27631	40.00000
GMBP21_J_108	0.66733	59.59394	217.79869	149.99893	44.49003	173.60573	40.00002
GMBP21_J_109	0.00000	50.96061	217.82127	149.99893	27.16321	98.01578	40.00000
J-PE-548	0.00000	161.78885	298.43854	349.99753	86.61639	420.72986	40.00010
J-PE-562	0.00000	161.33394	298.43854	349.99753	82.47526	413.04492	40.00009
J-PE-580	0.00000	160.90746	298.43854	349.99753	80.67227	409.94721	40.00009
J-PE-588	0.00000	159.66243	298.43854	349.99753	70.34116	393.05399	40.00008
J-PE-590	0.00000	162.48543	298.43854	349.99753	66.87952	387.05716	40.00008
J-PE-602	0.00000	160.44545	298.43854	349.99753	59.44383	376.60745	40.00008
J-PE-606	0.00000	158.56186	298.43854	349.99753	43.17462	353.95142	40.00007
J-PE-608	0.00000	162.61337	298.43854	349.99753	61.73965	379.75357	40.00008
J-PE-610	0.00000	167.58893	298.43854	349.99753	67.45703	386.64716	40.00008
J-PE-616	0.00000	165.44191	298.43854	349.99753	68.53357	388.71768	40.00008
J-PE-618	0.00000	163.42368	298.43854	349.99753	71.98904	394.47147	40.00008
J-PE-630	0.00000	162.11581	298.43854	349.99753	74.65554	399.13867	40.00009
J-PE-632	0.00000	164.43158	298.43854	349.99753	69.92381	391.03543	40.00008
J-PE-634	0.00000	166.30949	298.43854	349.99753	67.58437	387.13498	40.00008
J-PE-636	0.00000	161.38370	298.43854	349.99753	60.24289	377.66440	40.00008
J-PE-640	0.00000	163.89279	298.43854	349.99753	66.14600	385.66116	40.00008
J-PE-642	0.00000	161.06384	298.43854	349.99753	68.22807	389.41730	40.00008
J-PE-644	0.00000	160.16113	298.43854	349.99753	75.23698	400.80521	40.00009
J-PE-648	0.00000	160.50943	298.43854	149.99893	154.59186	407.99921	40.00009
J-PE-674	0.00000	160.62315	298.43854	149.99893	154.21176	404.00275	40.00009
J-PE-682	0.00000	163.89279	298.43854	149.99893	157.24609	406.34482	40.00009
J-PE-684	0.00000	163.08249	298.43854	149.99893	156.52541	406.02710	40.00009
J-PE-690	0.00000	161.97365	298.43854	349.99753	80.08557	408.41782	40.00009
J-PE-696	0.00000	160.51653	298.43854	149.99893	154.43355	406.60281	40.00009
J-PE-708	0.00000	165.52763	298.43854	349.99753	66.05372	385.15216	40.00008
J-PE-710	0.00000	161.07805	298.43854	349.99753	60.67427	378.40530	40.00008
J-PE-716	0.00000	160.69423	298.43854	149.99893	154.89932	409.30216	40.00009
J-PE-718	0.00000	161.98787	298.43854	149.99893	156.11255	410.34583	40.00009
J-PE-720	0.00000	160.39569	298.43854	149.99893	154.36249	406.86267	40.00009
J-PE-752	0.00000	161.66090	298.43854	138.79901	158.46745	421.25635	40.00010
J-PE-760	0.00000	158.56186	298.43854	349.99753	69.38969	391.89731	40.00008
J-PE-766	0.00000	160.62315	298.43854	349.99753	83.70046	415.70578	40.00009
J-PE-786	0.00000	161.19179	298.43854	149.99893	155.17778	408.08875	40.00009
W-M-002-JN01	0.11533	44.89314	217.57958	249.99823	40.31917	261.56003	40.00004
W-M-002-JN02	0.00000	46.36998	217.61844	249.99823	41.63815	303.70474	40.00005

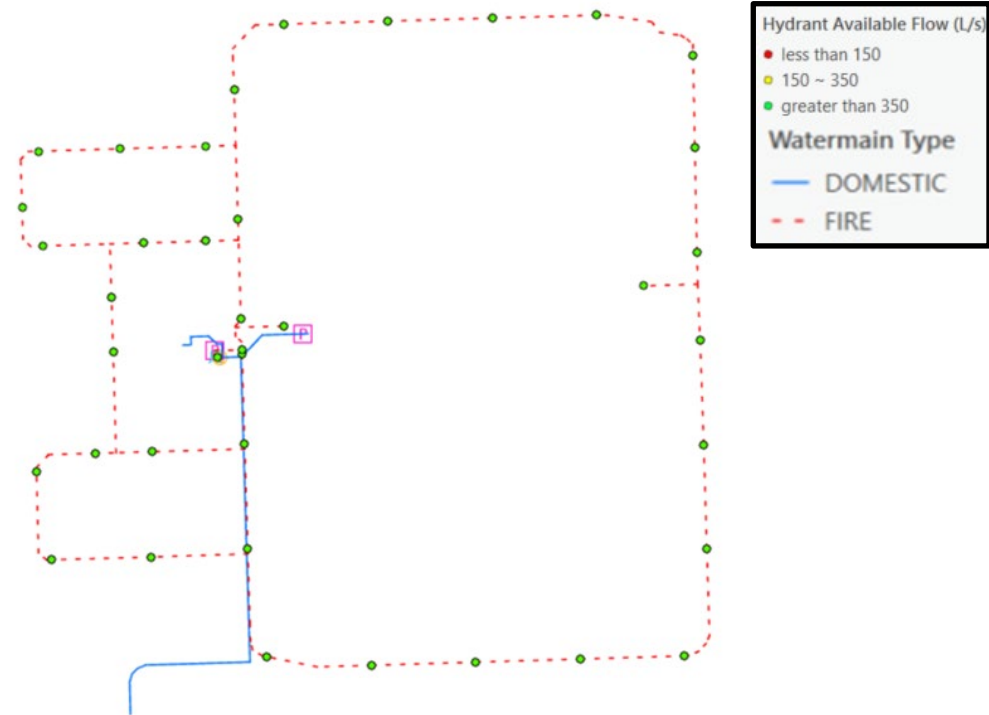


- Hydrant available flow > 350 L/s
- Controls will have to be set in the PCN to optimize the operation of the fire pump for building and tank yard fire supply conditions



Fire Flow Results – Ultimate MDD

ID	Static Demand (L/s)	Static Pressure (psi)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (psi)	Hydrant Available Flow (L/s)	Hydrant Pressure at Available Flow (psi)
GMBP21_J_104	0.03639	58.65683	217.62769	149.99893	55.75790	417.61307	40.00009
GMBP21_J_105	0.03942	58.03900	217.62769	149.99893	18.27111	97.61127	40.00000
GMBP21_J_106	0.02123	59.18483	217.63292	149.99893	56.59018	451.59201	40.00011
GMBP21_J_107	0.02123	58.56360	217.63292	149.99893	21.89110	103.57893	40.00000
GMBP21_J_108	0.66733	59.36497	217.63762	149.99893	44.24561	172.38313	40.00002
GMBP21_J_109	0.00000	50.72969	217.65883	149.99893	26.91720	96.87501	40.00000
J-PE-548	0.00000	161.78964	298.43842	349.99753	86.61615	420.72955	40.00010
J-PE-562	0.00000	161.33373	298.43842	349.99753	82.47512	413.04456	40.00009
J-PE-580	0.00000	160.90724	298.43842	349.99753	80.67204	409.94684	40.00009
J-PE-588	0.00000	159.66223	298.43842	349.99753	70.34088	393.05371	40.00008
J-PE-590	0.00000	162.48521	298.43842	349.99753	66.87933	387.05685	40.00008
J-PE-602	0.00000	160.44522	298.43842	349.99753	59.44365	376.60700	40.00008
J-PE-606	0.00000	158.56163	298.43842	349.99753	43.17442	353.95108	40.00007
J-PE-608	0.00000	162.61316	298.43842	349.99753	61.73940	379.75327	40.00008
J-PE-610	0.00000	167.58872	298.43842	349.99753	67.45673	386.64691	40.00008
J-PE-616	0.00000	165.44168	298.43842	349.99753	68.53321	388.71729	40.00008
J-PE-618	0.00000	163.42345	298.43842	349.99753	71.98880	394.47110	40.00008
J-PE-630	0.00000	162.11559	298.43842	349.99753	74.65528	399.13840	40.00009
J-PE-632	0.00000	164.43137	298.43842	349.99753	69.92358	391.03519	40.00008
J-PE-634	0.00000	166.30928	298.43842	349.99753	67.58414	387.13458	40.00008
J-PE-636	0.00000	161.38347	298.43842	349.99753	60.24269	377.66419	40.00008
J-PE-640	0.00000	163.89259	298.43842	349.99753	66.14586	385.66092	40.00008
J-PE-642	0.00000	161.06361	298.43842	349.99753	68.22789	389.41702	40.00008
J-PE-644	0.00000	160.16092	298.43842	349.99753	75.23673	400.80484	40.00009
J-PE-646	0.00000	160.55185	298.43842	149.99893	154.38129	405.91251	40.00009
J-PE-648	0.00000	160.50820	298.43842	149.99893	154.59163	407.99893	40.00009
J-PE-650	0.00000	159.62782	298.43842	149.99893	153.29643	403.35065	40.00009
J-PE-652	0.00000	159.51181	298.43842	149.99893	152.95946	401.39087	40.00009
J-PE-654	0.00000	157.81529	298.43842	149.99893	151.16991	398.42328	40.00009
J-PE-674	0.00000	160.62293	298.43842	149.99893	154.21153	404.00263	40.00009
J-PE-682	0.00000	163.89259	298.43842	149.99893	157.24585	406.34451	40.00009
J-PE-684	0.00000	163.08228	298.43842	149.99893	156.52516	406.02686	40.00009
J-PE-690	0.00000	161.97343	298.43842	349.99753	80.08535	408.41751	40.00009
J-PE-696	0.00000	160.51630	298.43842	149.99893	154.43332	406.60266	40.00009
J-PE-708	0.00000	165.52741	298.43842	349.99753	66.05352	385.15179	40.00008
J-PE-710	0.00000	161.07784	298.43842	349.99753	60.67408	378.40494	40.00008
J-PE-714	0.00000	158.59050	298.43842	149.99893	152.04964	400.27637	40.00009
J-PE-716	0.00000	160.69402	298.43842	149.99893	154.89909	409.30185	40.00009
J-PE-718	0.00000	161.98766	298.43842	149.99893	156.11229	410.34555	40.00009
J-PE-720	0.00000	160.39546	298.43842	149.99893	154.36224	406.86234	40.00009
J-PE-752	0.00000	161.60069	298.43842	138.79901	158.46722	421.25610	40.00010
J-PE-760	0.00000	158.56163	298.43842	349.99753	69.38946	391.89703	40.00008
J-PE-766	0.00000	160.62293	298.43842	349.99753	83.70026	415.70544	40.00009
J-PE-786	0.00000	161.19156	298.43842	149.99893	155.17752	408.08847	40.00009
W-M-002-JN01	0.11533	44.43731	217.25893	249.99823	39.34377	227.00258	40.00003
W-M-002-JN02	0.00000	45.92350	217.30438	249.99823	40.70422	272.78812	40.00004



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