REPORT
PROJECT: 136794.6.04.03

ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES
3700 TWIN FALLS PLACE
RIVERSIDE SOUTH

Prepared for RIVERSIDE SOUTH DEVELOPMENT CORPORATION
by IBI GROUP

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1 INTRODUCTION

1.1 Purpose

The purpose of this report is to investigate and confirm the adequacy of public services for the proposed site. This report will review major municipal infrastructure including water supply, wastewater collection and disposal and management of stormwater. This report will also include a Sedimentation and Erosion Control Plan. A review of traffic components will be the subject of a separate report.

This report is being prepared as a technical document in support of the draft plan submission for the subject site and was prepared in accordance with the November 2009 “Servicing Study Guidelines for Development Applications” in the City of Ottawa. **Appendix A** contains a customized copy of those guidelines which can be used as a quick reference for the location of each of the guideline items within the study report.

1.2 Background

The Riverside South Community, formerly known as South Urban Community (SUC), is a part of the former City of Gloucester. The Council of the City of Gloucester adopted the first Official Plan for the community in September 1990. The original concept plan for the community served as the basis for both a Gloucester and a Regional OPA. A Master Drainage Plan (MDP) for the community was formulated in June 1992 based on the preliminary land use plan prepared by J. Bousfields and Associates Ltd. in December 1991.

The South Urban Community became a part of the City of Ottawa through amalgamation in 2001 and the new Official Plan of the City of Ottawa designated the areas as “General Urban Area” and “Employment Area” with some adjustments to the urban boundaries. In 2003, the City of Ottawa initiated a Community Design Plan (CDP) for the Riverside South area. The basis of the CDP is the land use plan for the community, which has evolved over the time and has changed significantly since the original plan prepared in early 1990’s.

The South Urban Community River Ridge Master Infrastructure Plan (SUC RR MIP) prepared by Ainley Graham and Associates in 1994 presented a preferred servicing strategy for potable water, sanitary and storm infrastructure in the Riverside South community. The Riverside South Infrastructure Servicing Study Update (ISSU) was issued in 2008 as an update to the SUC RR MIP, to account for modifications to the MDP and CDP since 1994.

There have been significant revisions to the CDP, MDP and City of Ottawa Design Guidelines since 2008 so in June 2017, Stantec helped the City of Ottawa complete an update to the 2008 ISSU for a portion of the Riverside Community called Rideau River Area and which includes the lands proposed to be tributary to Pond 5. The 2017 Riverside South Community Infrastructure Servicing Study Update – Rideau River Area (2017 ISSU) report recognized the approved 2016 CDP which considers changes in land use planning and development densities in accordance with Official Plan objectives. For reference a copy of the 2016 Riverside South Community Design Plan – Land use Plan is included in **Appendix A**. The infrastructure analyses also accounted for existing sewer and infrastructure and the stormwater management pond within the study area.

1.3 Previous Studies

Since the South Urban Community and Riverside South Community have been planned and developed for over twenty five years, there have been numerous background studies dealing with major municipal infrastructure. The following reports, however, were referenced prior to completing this assessment:

1. **Riverside South Community Infrastructure Servicing Study Update Phase 1 Mosquito Creek Study Area – by IBI, Stantec, GHD, Paterson Group and GEO Morphix, December 2, 2022.** The report provides a macro level servicing plan of the Mosquito Creek area of the Riverside South Community area. The study is currently under review.
2. **Riverside South Community Infrastructure Servicing Study Update (RSCISSU) – by Stantec, September 30, 2008.** The report provides a macro level servicing plan of the Riverside South Community area.

1.4 Subject Property

The site is located north of Spratt Road and west of Limebank Road, **Figure 1.1** Location Plan is included in **Appendix A**. The current draft plan of subdivision for the subject property is shown on **Figure 1.2** which is included in **Appendix A**. The site consists of 13 blocks with 3 local roads and the Leitrim Road realignment. Leitrim Road will be a fully urbanized roadway per **Figure 1.4** while the local streets will have a rural road section. Blocks are identified as ESD (Employment and Special District) on the RSCDP Land Use Plan with Block 12 as OS. There is a small area of land owned by others adjacent to Limebank Road. The total site area excluding OS is 47.4 hectares. There is an existing high tension power line running in a northeast direction from the Spratt/Limebank intersection.

1.5 Existing Infrastructure

Figure 1.3 shows the location of existing infrastructure in the vicinity of the site. There is a 375 mm sanitary sewer on Limebank Road, a 375 mm stub has been provided to service Blocks 1 to 13. A 300 mm watermain is on Limebank with a 300 mm stub adjacent to the sanitary stub mentioned above. While there are storm sewers on Limebank and Spratt Road, all the stormwater runoff from the site will be directed to Mosquito Creek.

1.6 Pre-Consultation

There was a pre-consultation meeting with the City of Ottawa for the employment lands on February 18, 2020 however, no notes were issued.

1.7 Geotechnical Considerations

The subject lands are included in the

- Report No. PG4958-2, Revision 2 March 29, 2023. Geotechnical Investigation Proposed Commercial Development, Employment Lands – Riverside South Development Corporation by Paterson Group.

Generally the site is relatively flat sloping in the south and west direction. The subsurface profile includes a topsoil layer underlain by a deep silty clay deposit. The reports give a permissible grade raise of 2 meters for Blocks 1 to 11 and 1.5 meters for Blocks 13 and 14. Slope stability analysis is provided in both reports.

2 WATER SUPPLY

2.1 Existing Conditions

As noted in Section 1.5 there is an existing 300 mm watermain on Limebank Road with an existing 300mm stub provided for Blocks 1 to 11, there is a 750 mm feedermain and local watermain on Spratt Road. Figure 1.3 in **Appendix A** shows the location of the existing watermains.

2.2 Servicing Study Update

The subject are included in the 2008 Riverside South Community Infrastructure Servicing Study Update, a 300 mm watermain is shown on Limebank Road extending to Leitrim Road on Drawings WM-1. A 300 mm watermain is extended from Limebank Road through the employment lands and extending north to Leitrim Road. In the 2022 Infrastructure Servicing Update Phase 1 for the Mosquito Creek Area the 300mm watermain on Limebank Road from Spratt to Leitrim Road is twinned under interim conditions, The servicing update is currently under review, a copy of **Figure3-2 Potable Water Servicing Plan** is included in **Appendix B**.

2.3 Design Criteria

2.3.1 Water Demands

Water demands have been calculated for the site based on per unit population density and consumption rates taken from Tables 4.1 and 4.2 of the City of Ottawa Design Guidelines – Water Distribution and are summarized as follows:

- Single Family 3.4 person per unit
- Townhouse and Semi-Detached 2.7 person per unit
- Average Apartment 1.8 person per unit
- Residential Average Day Demand 280 l/cap/day
- Residential Peak Daily Demand 700 l/cap/day
- Residential Peak Hour Demand 1540 l/cap/day
- ICI Average Day Demand 28,000 l/ha/day
- ICI Peak Daily Demand 42,000 l/ha/day
- ICI Peak Hour Demand 75,600 l/ha/day

A water demand was calculated using the Concept Plan per Figure 1.3 in Appendix A using a retail rate for the commercial and office building.

- Average Day 14.7 l/s
- Maximum Day 22.0 l/s
- Peak Hour 39.6 l/s

2.3.2 System Pressure

The Ottawa Design Guidelines – Water Distribution (WDG001), July 2010, City of Ottawa, Clause 4.2.2 states that the preferred practice for design of a new distribution system is to have normal

operating pressures range between 345 kPa (50 psi) and 552 kPa (80 psi) under maximum daily flow conditions. Other pressure criteria identified in Clause 4.2.2 of the guidelines are as follows:

Minimum Pressure	Minimum system pressure under peak hour demand conditions shall not be less than 276 kPa (40 psi)
Fire Flow	During the period of maximum day demand, the system pressure shall not be less than 138 kPa (20 psi) during a fire flow event.
Maximum Pressure	Maximum pressure at any point in the distribution system shall not exceed 689 kPa (100 psi). In accordance with the Ontario Building/Plumbing Code, the maximum pressure should not exceed 552 kPa (80 psi). Pressure reduction controls will be required for buildings where it is not possible/feasible to maintain the system pressure below 552 kPa.

2.3.3 Fire Flow Rates

There are no proposed building layouts for the subject lands at this time. Fire analysis is conducted with a 10,000 l/min fire demand and a 13,000 l/min demand to evaluate the fire flow rates that can be accommodated on the site.

2.3.4 Boundary Conditions

The City of Ottawa has provided two boundary conditions at the watermain connection locations for the 300 mm diameter Limebank Road at Spratt Road and on the existing watermain on Spratt Road west of the Limebank intersection. Boundary conditions are provided for the existing pressure zone and for the SUC Zone Reconstruction. A copy of the boundary condition is included in Appendix B and summarized as follows for the two adjacent locations.

	CONNECTION 1 EXISTING ZONE	CONNECTION 1 SUC ZONE	CONNECTION 2 - EXISTING ZONE	CONNECTION 2 SUC ZONE
Max HGL (Basic Day)	131.8 m	148.4 m	131.8 m	148.4 m
Peak Hour	125.3 m	145.7 m	125.3 m	145.8 m
Max Day + Fire (10,000 l/min Fire Flow)	126.4 m	145.1 m	127.4 m	146.2 m
Max Day + Fire (13,000 l/min Fire Flow)	125.3 m	144.2 m	126.8 m	145.8 m

2.3.5 Hydraulic Model

A computer model has been created for the subject site using the InfoWater 12.4 program. The model includes the hydraulic boundary conditions at the connections to existing watermains.

2.4 Proposed Water Plan

2.4.1 Watermain Layout

Figure 2.1 in Appendix B shows the proposed Conceptual Water Plan for the proposed development. A connection to the existing 300 mm watermain on Limebank at the Leitrim Road Realignment is proposed, an existing 300 mm watermain stub was provided for this site, however, it is not at the new road location and will be blanked. In order to provide two watermain feeds to the employment area, a second watermain on Limebank Road is proposed that will be installed on the west side of the road paralleling the existing 300 mm watermain on the east side of the road and connecting to an existing watermain on Spratt Road as noted in Section 2.2. The location of the second watermain in the Limebank Road right of way will be determined during detailed design. A 300 mm watermain is proposed to be extended through the per the RSCISSU-Phase 1 Mosquito Creek Area. All other watermains are 200 mm diameter. For the portion of Street No. 3 between Street No. 2 and the cu-de-sac at Blocks 8 and 9 a second watermain is required on the opposite side of the street to avoid a long dead end watermain. After watermain construction flushing chambers may be required for a period of time to improve water circulation until there is sufficient development to produce an adequate water demand.

2.4.2 Modeling Results

The hydraulic model was run under basic day, maximum day with fire flows and under peak hour conditions. Water pipes are sized to provide sufficient pressure and to deliver the required fire flows.

Results of the hydraulic model are included in **Appendix B,** and summarized as follows:

Scenario	**Existing Zone**	**SUC Zone Reconfiguration**
Basic Day (Max HGL) Pressure Range	381.8 to 395.3 kPa	544.5 to 557.9 kPa
Peak Hour Pressure Range	316.4 to 330.2 kPa	516.9 to 531.1 kPa
Max Day + 10,000 l/min Fire Flow		
Minimum Design Flow	131.6.4 l/s	189.5 l/s
Max Day + 13,000 l/min Fire Flow		
Minimum Design Flow	128.5 l/s	187.7 l/s

A comparison of the results and design criteria is summarized as follows:

Maximum Pressure — Under existing conditions all nodes are less than 552 kPa while under the SUC Zone Reconfiguration, the majority of the nodes exceed 552 kPa. Pressure reducing control will be required for the majority of the site and can be confirmed during detailed design.

Minimum Pressure — All nodes under both scenarios exceed the minimum value of 276 kPa (40 psi).

Fire Flow — Under the existing boundary conditions with the 10,000 l/min (167,7 l/s) fire there are 4 nodes which have design flows that do not meet the requirement, the lowest design flow is 131.6 l/s at the cul-de-sac on Street No. 3. With the 13,000 l/min (216.7 l/s) under existing conditions there are 5 nodes which do meet the design flow requirement. Under the

SUC Zone Reconfiguration all nodes meet the design flow requirement for the 10,000 l/min (167.7 l/s) and under the 13,000 l/min (216.7 l/s) fire there are 4 nodes which are just under the design flow with the lowest at 187.7 l/s for the cul-de-sac on Street No.3

Should development proceed before the SUC Zone Reconfiguration at a block which doesn't meet the design flow requirement then the building will have to be designed to produce a smaller fire demand that the watermain system can be accommodate. Similarity after the SUC Zone Reconfiguration there are some blocks that have a design flow less than 13,000 l/min but greater than 10,000 l/min so the building will require a fire demand that matches the design flow. The location, size and type of future building will determine the fire flow demand, using fire resistive building materials, sprinkler systems and possible firewalls the fire demand for a large building can be lower than 10,000 l/s.

3 SANITARY SEWERS

3.1 Existing Conditions

As noted in Section 1.5, there is an existing 375 mm sanitary sewer on Limebank Road with a 375 mm stub to service the employment lands.

3.2 Servicing Study Update

The employment lands are included in the 2008 Riverside South Community Infrastructure Servicing Study Update, a 375 mm diameter sanitary sewer extending from Spratt Road to the employment lands is shown on Drawing SAN-1. A 375 mm sewer is shown servicing the employment lands, the drainage boundary for this sewer matches the northern property line with the NCC lands. The employment lands are represented area BP-3 in the RSCISSU with a total flow 39.8 l/s. A copy of the Drawing SAN-1 and the Sanitary Sewer Design Sheet from the RSCISSU is included in **Appendix C**. There was no change in the sanitary serving for the subject lands in the 2022 RSCISSU-Phase 1 Mosquito Creek Area study.

3.3 Design Criteria

The estimated wastewater flows from the subject site are based on the revised City of Ottawa design criteria. Among other items, these include:

- Average residential flow = 280 l/c/d
- Peak residential flow factor = (Harmon Formula) x 0.80
- Average commercial flow = 28,000 l/s/ha
- Average institutional flow = 28,000 l/s/ha
- Peak ICI flow factor = 1.5 if ICI area is ≤ 20% total area
  1.0 if ICI area is > 20% total area
- Inflow and Infiltration Rate = 0.33 l/s/ha
- Minimum Full Flow Velocity = 0.60 m/s
- Maximum Full Flow Velocity = 3.0 m/s
- Minimum Pipe Size = 200 mm diameter

In accordance with the City of Ottawa Sewer Design Guidelines table 4.2, the following density rates are estimated for the subject site:

- Single units = 3.4
- Semi units = 2.7
- Townhouse and back to back units = 2.7
- Apartment units = 1.8

3.4 Recommended Sanitary Plan

Figure 3.1 in **Appendix C** shows the Conceptual Sanitary Plan for the proposed development. A connection to the existing 375 mm sanitary sewer on Limebank Road is proposed, on existing 375 mm stub that was installed for that development is not located at the new Leitrim Road alignment and will be decommissioned. The 375 mm sanitary sewer is proposed along to be extended into

the site. The peak total flow from the employment lands is 35.75 l/s which compares to the flow of 39.8 l/s from the RSCISSU, a copy of the sanitary sewer calculation is included in **Appendix C.**

4 STORMWATER MANAGEMENT

4.1 Existing Conditions

Runoff from the subject site drains to Mosquito Creek, either directly or via Tributary 3 or 4.

4.2 2021 Master Drainage Plan (MDP) Update

The subject employment lands at 3700 Twin Falls Place were accounted for in the 2021 MDP Update, part of a larger business park area. Standard practice in a business park setting is to subdivide the development to parcels that include parking lots, buildings and grassed areas. The MDP Update identified the subject property and surrounding development area to be provided with on-site infiltration measures in conjunction with on-site water quality and quantity treatment on the private development blocks. It is anticipated that these features would be privately serviced and operated in the grassed open space of a given block.

The MDP Update estimated that to provide adequate servicing, combined SWM controls would be provided on each development block. Target reductions in runoff volume were established for the business park land use for various storm events. The localized frequent ponding (during the 13 mm event) must be designed with a maximum drawdown time of 48 hours. This approach satisfies Transport Canada and the Airport Authority's preference for no ponds in the Primary Bird Hazard Zone (in which the subject lands are located). Quality treatment to an enhanced level is to be provided. The pro-rated on-site quantity storage requirements within the business park are 600 m^3/ha for the development area.

The business park area is proposed to be provided with a rural road cross-section serviced with road-side ditches. The on-site SWM measures located on each development block are to be provided with an overland outlet through a shallow depression with a maximum 100 year depth of ponding of 0.7 m. The overland outlet would tie-in to the proposed roadside ditch network. The topography generally falls from east to west, which facilitates surface drainage to Mosquito Creek.

The MDP Update proposed that the downstream end of Tributary 4 be maintained and the treated runoff from the business park lands be directed to it.

4.3 Minor Storm Sewer Design Criteria

The minor system storm sewers for the subject site are proposed to be sized based on the rational method, applying standards of both the City of Ottawa and MECP. Some of the key criteria include the following:

- Sewer Sizing: Rational Method
- Design Return Period: 1:2 year (local streets)
  1:5 year (collector streets)
  1:10 year (arterial streets)
- Initial Time of Concentration 10 minutes
- Manning's: 0.013
- Minimum Velocity: 0.80 m/s
- Maximum Velocity: 3.00 m/s

PIPE DIAMETER (MM)	SLOPE (%)
250	0.43
300	0.34
375	0.25
450	0.20
525	0.16
600	0.13
675	0.11
750 and larger	0.1

- Runoff Coefficients (per MDP Update, to be confirmed at detailed design stage):

LAND USE		RUNOFF COEFFICIENT
Residential	Low Density	0.60
	Medium Density	0.85
	High Density	0.85
Commercial		0.85
Green Space		0.20
Institutional		0.90
Park		0.30
Transitway		0.67
Arterial Road		0.70
Collector Road		0.70

4.4 Recommended Minor Storm Plan

As Leitrim Road is an urban section a storm sewer is required to convey the minor flow as shown on the Storm Drainage Area Plan **Figure 4.1**. The storm sewer will convey flow from east of Limebank Road, it will intercept the ditch flow from Street No. 1. and potentially service adjacent blocks. The storm sewer outlets to an existing watercourse (Tributary 4) in Block 12 via Street No.3, an oil and grit separator will be installed at the sewer outlet.

4.5 Storm Servicing Concept

The storm servicing concept for 3700 Twin Falls Place remains generally consistent with that outlined in the 2021 MDP Update; however, following discussion with the City, the future ultimate Leitrim Road ROW has been considered as an urbanized cross-section, provided with a storm sewer. Otherwise, the proposed drainage system for the subject site is comprised of a ditch conveyance network.

For the ultimate urbanized Leitrim Road ROW, a dual drainage design has been considered, which accommodates both minor and major stormwater runoff. During frequent storms the effective runoff collected by catchment areas is directly released via catch basin inlets into the network of storm sewers, called the minor system. During less frequent storms, the balance of the flow (in excess of the minor flow) is accommodated by a system of rear yard swales and street segments (or other forms of underground storage or surface storage such as dry ponds). The main advantage of this arrangement is its ability to adjust the rate of total inflow into the minor system to satisfy the required level of service. The required total inflow is typically maintained by the restriction of the capacity and the density of the inlets directly connected into this system. As noted, during less frequent storms, the balance of the flow is accommodated by the major system. Typically, this accommodation is achieved by the attenuation on catchment surfaces called on-site detention and/or direct conveyance of the flow to a recipient. Specifically for the ultimate

Leitrim Road ROW, a minor system capture corresponding to the 10 year storm has been considered, with no on-site storage assumed.

The delineation of the 3700 Twin Falls Place subcatchments has been refined to reflect the legal plan. The lands are considered employment and special district (ESD). Under ultimate build out conditions, lands to the east will drain towards the subject site. The delineation of these lands, as well as of lands to the north that will also outlet to Tributary 4, has been refined to reflect the latest secondary plan land use designation. These external lands to the east and north of the subject site are considered ESD with a natural environment area (NEA) towards the northeast. The on-site SWM measures have been updated accordingly and a conceptual ditch network for all CDP lands draining to Tributary 4 has been developed.

In addition to the conventional design of the SWM system, the subject site will be provided with LIDs. The LIDs are consistent with those outlined in the 2021 MDP Update (refer to **Section 4.2**), and additional detail is provided in **Appendix D**, including an update to the water budget presented in the 2021 MDP Update. The drainage system (both dual drainage system and the ditch network and associated culverts) was designed assuming that the LID features are fully saturated with groundwater and therefore no benefit was applied in the sizing of the conventional SWM infrastructure.

4.5.1 Water Quality

On-site SWM measures located at each development block are proposed to provide water quality and quantity treatment. Due to the proximity to the airport, the detention time of the open water surface should be limited to less than 48 hours. Therefore, the upper portion of the SWM measure was designed to drawdown for a minimum of 24 hours to satisfy MOE criteria. In addition to the surface storage, an underground permanent storage is designed in granular to provide additional dilution of rainwater. General water quality volume requirements are presented in **Table 4.1** and requirements for each subcatchment are detailed in **Table 4.2**.

The roads have been removed from the calculations related to the storage treatment requirement of the developable land. Runoff from rural roads will be collected directly by roadside ditches and treated via filtration.

The proposed storm sewer servicing Leitrim Road will be provided with an oil-grit separator at the downstream end to provide water quality treatment of the minor flow prior to outletting to Tributary 4.

The CDP lands east of Limebank that will drain to Tributary 4 are included, as these lands were considered developed for the design of the drainage system.

Table 4.1 General Water Quality Volumes – Employment and Special District Lands to Tributary 4

LAND USE	IMPERVIOUSNESS (%)	WATER QUALITY VOLUMES FOR ENHANCED LEVEL OF PROTECTION (CU-M/HA)			
		PERMANENT		EXTENDED	
		REQ.	PROV.	REQ.	PROV.
Employment Lands	93	90 cu-m/ha	92-123 cu-m/ha	40 cu-m/ha	93-105 cu-m/ha

Table 4.2 Water Quality Volume Calculations – Employment and Special District Lands to Tributary 4

CATCHMENT ID	TRIBUTARY URBAN DRAINAGE AREA (HA)	IMPERVIOUSNESS (%)	WATER QUALITY VOLUMES FOR ENHANCED LEVEL OF PROTECTION (CU-M)			
			PERMANENT		EXTENDED	
			REQ.	PROV.	REQ.	PROV.
4_B1	4.21	93	379	519	168	408
4_B2	2.56	93	230	315	102	243
4_B3	4.28	93	385	527	171	415
4_B4	3.16	93	284	389	126	306
4_B5	1.71	93	154	211	68	166
4_B6	3.17	93	285	391	127	320
4_B7	2.09	93	188	257	84	203
4_B8	4.19	93	377	516	168	406
4_B9	1.23	93	111	152	49	119
4_B10	2.49	93	224	307	100	242
4_B11	2.24	93	202	276	90	217
4_B13	7.27	93	654	896	291	678
4_S12	4.09	93	368	378	164	410
4_S13	8.11	92	737	757	328	833
4_S14	10.09	84	1040	1067	462	1109
4_S15	3.75	93	338	462	150	362
4_S16	15.88	93	1429	1467	635	1658
4_S17	14.18	91	1307	1342	581	1490
4_S18	20.38	93	1834	1883	815	2148
4_S21	11.03	93	993	1019	441	1138

4.6 Hydrological and Hydraulic Evaluation

The PCSWMM model developed for the MDP Update and recently updated in support for the first submission of the Phase 1 Infrastructure Servicing Study Update (ISSU) has been updated to reflect the above-noted refinements. Subcatchments are presented on **Figure 4.1** (enclosed in **Appendix D**) and are summarized in the below tables. Further detail on the SWM servicing of the employment lands is outlined in the following sections.

Table 4.3 Summary of subcatchment input parameters – 3700 Twin Falls Place

CATCHMENT ID	LAND USE	AREA (HA)	IMP (%) [TIME OF CONC. (MIN)]	WIDTH (M) [LENGTH (M)]	AVAILABLE SURFACE STORAGE FOR DEVELOPMENT AREAS[1] (CU-M/HA)	100 YEAR FLOW TO CONVEYANCE NETWORK (L/S) (3 HOUR CHICAGO STORM)
4_B1	ESD	4.21	93	415	600	83
4_B2	ESD	2.56	93	110	600	50
4_B3	ESD	4.28	93	500	600	84
4_B4	ESD	3.16	93	270	600	62
4_B5	ESD	1.71	93	240	600	34
4_B6	ESD	3.17	93	400	600	62
4_B7	ESD	2.09	93	240	600	41
4_B8	ESD	4.19	93	340	600	82
4_B9	ESD	1.23	93	130	600	24
4_B10	ESD	2.49	93	250	600	49
4_B11	ESD	2.24	93	200	600	44
4_B12	SWM Outlet	0.61	40	50	N/A	148
4_B13	ESD	7.27	93	200	600	141
4_R1_1-1	Road	0.26	70	262	N/A	122
4_R1_1-2	Road	0.27	70	268	N/A	125
4_R1_2-1	Road	0.23	70	227	N/A	106
4_R1_2-2	Road	0.24	70	238	N/A	111
4_R2_1-1	Road	0.11	70	109	N/A	51
4_R2_1-2	Road	0.11	70	109	N/A	51
4_R2_2-1	Road	0.14	70	142	N/A	66
4_R2_2-2	Road	0.15	70	149	N/A	70
4_R3_1-1	Road	0.31	70	261	N/A	146
4_R3_1-2	Road	0.3	70	248	N/A	139
4_R3_2-1	Road	0.39	70	323	N/A	180
4_R3_2-2	Road	0.36	70	302	N/A	168
4_R3_3-1	Road	0.3	70	296	N/A	139
4_R3_3-2	Road	0.28	70	285	N/A	133
4_R4_1	Leitrim Road	0.34	70	210	N/A	155

CATCHMENT ID	LAND USE	AREA (HA)	IMP (%) [TIME OF CONC. (MIN)]	WIDTH (M) [LENGTH (M)]	AVAILABLE SURFACE STORAGE FOR DEVELOPMENT AREAS[1] (CU-M/HA)	100 YEAR FLOW TO CONVEYANCE NETWORK (L/S) (3 HOUR CHICAGO STORM)
4_R4_2	Leitrim Road	0.8	70	500	N/A	368
4_R4_3	Leitrim Road	0.49	70	308	N/A	226
4_R4_4	Leitrim Road	0.33	70	204	N/A	150

(1) Within the ESD land use tributary to Tributary 4, this storage is proposed to be provided in the on-site SWM measure

Table 4.4 Summary of subcatchments – External CDP lands tributary to Tributary 4

CATCHMENT ID	LAND USE	AREA (HA)	IMP (%) [TIME OF CONC. (MIN)]	WIDTH (M) [LENGTH (M)]	AVAILABLE SURFACE STORAGE FOR DEVELOPMENT AREAS[1] (CU-M/HA)	100 YEAR FLOW TO CONVEYANCE NETWORK (L/S) (3 HOUR CHICAGO STORM)
4_S12	ESD	4.09	93	920	600	80
4_S13	ESD	8.19	92	1843	600	161
4_S14	ESD	11.55	84	2599	600	220
4_S15	ESD	3.75	93	270	600	74
4_S16	ESD	15.88	93	3573	600	313
4_S17	ESD	14.52	91	3266	600	284
4_S18	ESD	20.38	93	4586	600	401
4_S21	ESD	11.03	93	2481	600	217
4_S19	NEA	7.612	[73]	[200]	N/A	N/A
4_S20A	NEA	7.712	[73]	[550]	N/A	N/A
4_S20B	NEA	2.801	[73]	[320]	N/A	N/A

(1) Within the ESD land use tributary to Tributary 4, this storage is proposed to be provided in the on-site SWM measure

4.6.1 Combined SWM Measures

For the employment lands, on-site storge in the proposed SWM measures has been considered at 600 cu-m/ha. The measures are provided with an overland outlet through a shallow depression tying-in to the proposed roadside ditch network, which itself outlets to Tributary 4.

Due to the significant frontage along Leitrim Road and as a conservative assumption for sizing of the Leitrim Road storm sewer, outflow from drainage areas 4_S15 and 4_B3 are assumed to be captured by ditch inlets connected directly to the storm sewer. Outflow from drainage areas 4_B1 and 4_B2 and runoff from Street 1 is directed into roadside ditches which are captured by ditch inlets connected to the storm sewer at the downstream intersection of Leitrim Road and Street 1.

It should also be noted that Leitrim Road storm sewer will convey flow from east of Limebank Road. Flow connectivity is indicated on **Figure 4.1**.

The on-site SWM measures were designed assuming that the associated LID features are fully saturated with groundwater and therefore no benefit was applied in their sizing. This is also true of the ditch network and culverts.

4.6.2 Ditch Network

Outflow from the combined SWM measures cascades to a roadside ditch network that outlets to Tributary 4. The ditch network starts in the employment and special district lands east of Limebank Road and continues west, ultimately discharging to Tributary 4. The proposed network is presented conceptually on **Figures 4.1** and **4.2**, with the latter indicating proposed culvert dimensions and cross-section locations. There are two proposed culvert crossings of Limebank Road, refer to **Figures 4.3** and **4.4**. Ditch cross-sections are included in **Figure 4.5**. Figures are enclosed in **Appendix D**.

The elevation of the ditches generally follows existing terrain. The overall longitudinal slope ranges from 0.08% to 0.15% Ditches are proposed with a v-notch geometry with some trapezoidal ditches with a 0.6 m wide bottom. Cross-sectional geometry is indicated on **Figure 4.5**. At all locations 3H:1V side slopes are proposed. The ditches are located within the right-of-way, with 100 year depth of flow in the right-of-way. Fill may be required on select development blocks to provide a minimum 15 cm freeboard from 100 year water surface elevations.

The ditch that receives runoff from east of Limebank as well as localized runoff from the subject employment lands extends southwesterly from Limebank Road to Tributary 4 along the alignment of the existing tributary, on the northwestern NCC property (refer to cross-section 2-2 on **Figure 4.5**).

It should be noted that the evaluation was set up to direct runoff from all drainage areas to ditches or storm sewers for conservatism in the ditch and sewer sizing, with Drainage Areas 4_B13 and 4_S12 (refer to **Figure 4.1**) directed to the downstream ends of the ditch network. At the detailed design stage, consideration can be given to providing development blocks adjacent to Tributary 4 and Mosquito Creek with independent outlets directly to the respective adjacent watercourse, subject to review. It should further be noted that maintenance access to Mosquito Creek is to be maintained for development blocks along the Creek.

Flow through the culverts for the 2, 5 and 100 year storm events is tabulated in **Table 4.5** below and 100 year water surface elevations are tabulated in **Table 4.6**, as well as indicated on the cross-sections on **Figure 4.5**. The 100 year depth of flow throughout the ditch network ranges from 0.12 m to 1.00 m, with an average depth of 0.41 m. The culverts have generally been sized to convey the 100 year flow with no surcharging.

At the proposed southern culvert crossing of Limebank Road, the culvert and proposed watermain will conflict and therefore the watermain will have to be installed above or below the culvert.

Table 4.5 Summary of flow through proposed culverts

PROPOSED CULVERT ID (REFER TO FIGURE 4.2)	PCSWMM CONDUIT	GEOMETRY		PEAK FLOW (L/S) 24 HOUR SCS TYPE II		
				2 YEAR	5 YEAR	100 YEAR
4	4C-27-1	Circular	0.600 m	89	132	214
5	4C-03-2	Circular	0.825 m	170	267	449
6	4C-03	Box	1.2x1.5 m	452	569	1478
7	4C-05	Box	0.9x1.2 m	340	430	1274

PROPOSED CULVERT ID (REFER TO FIGURE 4.2)	PCSWMM CONDUIT	GEOMETRY		PEAK FLOW (L/S) 24 HOUR SCS TYPE II		
				2 YEAR	5 YEAR	100 YEAR
8	4P-13	Circular	0.975 m	402	505	853

Table 4.6 100 year water surface elevation at culverts

PROPOSED CULVERT ID (REFER TO FIGURE 4.2)	PCSWMM CONDUIT	PROPOSED CENTRELINE ROAD GRADE (M)	PROPOSED BLOCK ELEVATION (M)		100 YEAR WATER SURFACE ELEVATION (M)		FREEBOARD TO BLOCK ELEVATION (M)	
			U/S	D/S	U/S	D/S	U/S	D/S
4	4C-27-1	91.60	90.81	90.81	90.66	90.56	0.15	0.25
5	4C-03-2	91.55	90.50	90.32	90.17	89.83	0.33	0.49
6	4C-03	91.50	90.75	90.75	90.60	90.53	0.15	0.22
7	4C-05	93.76(1)	92.00	91.80	91.65	91.41	0.35	0.39
8	4P-13	92.25(1)	92.00	N/A(2)	91.21	N/A(2)	0.79	N/A(2)

(1) Limebank Road as-built elevations
(2) Culvert #8 outlets to the proposed Leitrim Road storm sewer

4.6.3 Storm Sewer Hydraulic Grade Line

A hydraulic grade line (HGL) evaluation of the proposed ultimate Leitrim Road storm sewer has been completed with results summarized in the below table. Results reflect the 100 year 24 hour SCS Type II storm and 100 year 3 hour Chicago storm. Results are compared to the centreline road grade. There are no proposed basement connections to the Leitrim Road sewer.

Table 4.7 Storm hydraulic grade line

LOCATION	PROPOSED CENTERLINE OF ROAD GRADE (M)	24 HOUR 100 YEAR SCS TYPE II STORM		3 HOUR 100 YEAR CHICAGO STORM	
		HGL (M)	FREEBOARD TO CENTERLINE OF ROAD GRADE (M)	HGL (M)	FREEBOARD TO CENTERLINE OF ROAD GRADE (M)
Intersection at Street 3 and Leitrim	91.50	88.89	2.61	88.28	3.22
Intersection at Street 2 and Leitrim	91.75	89.21	2.54	88.53	3.22
Intersection at Street 1 and Leitrim upstream	92.30	89.68	2.62	89.6	2.70
West of Limebank and Leitrim	92.25	90.22	2.03	90.16	2.09

HGL elevations range from 1.04 m to 2.62 m below the centreline road grade.

4.6.4 Major System

Inlet control devices (ICDs) will be proposed on Leitrim Road to control the surcharge in the minor system during infrequent storm events and maximize the use of available on-site storage. Surface runoff in excess of the minor system capture (corresponding to 10 year capture for arterial roads) will cascade via street segments and ultimately the ditch network to Tributary 4. A depth by velocity evaluation has been completed for Leitrim Road for the 100 year 3 hour Chicago storm, with results summarized in the below table. Major flow from Leitrim has been accounted in the Street 3 ditch (refer to **Figure 4.2**).

Table 4.8 Velocity by depth (100 year 3 hour Chicago)

LOCATION	DEPTH OF FLOW (M)	VELOCITY (M/S)	VELOCITY X DEPTH (M^2/S)
Intersection at Leitrim and Street 3	0.04	0.78	0.03
Intersection at Leitrim and Street 2	0.05	0.20	0.01
Intersection at Leitrim and Street 1 upstream	0.03	0.21	0.01

The 100 year depth of flow on Leitrim Road allows for one lane of traffic to be free of water, consistent with City guidelines for arterial roads. The product of depth by velocity remains below the City guideline of 0.6 m^2/s.

4.6.5 Summary of Model Files

The following PCSWMM files are included with the digital submission:

- 13 mm 4 hour Chicago – EMP-RSDC-AAPSR_4H13MM_V03-1-NOLID.PCZ
- 25 mm 4 hour Chicago – EMP-RSDC-AAPSR_4H25MM_V03-1-NOLID.PCZ
- 2 year 3 hour Chicago – EMP-RSDC-AAPSR_3H2CHI_V03-1-NOLID.PCZ
- 10 year 3 hour Chicago – EMP-RSDC-AAPSR_3H10CHI_V03-1-NOLID.PCZ
- 100 year 3 hour Chicago – EMP-RSDC-AAPSR_3H100CHI_V03-1-NOLID.PCZ
- 2 year 12 hour SCS – EMP-RSDC-AAPSR_12H2SCS_V03-1-NOLID.PCZ
- 5 year 12 hour SCS – EMP-RSDC-AAPSR_12H5SCS_V03-1-NOLID.PCZ
- 100 year 12 hour SCS – EMP-RSDC-AAPSR_12H100SCS_V03-1-NOLID.PCZ
- 2 year 24 hour SCS – EMP-RSDC-AAPSR_24H2SCS_V03-1-NOLID.PCZ
- 5 year 24 hour SCS – EMP-RSDC-AAPSR_24H5SCS_V03-1-NOLID.PCZ
- 100 year 24 hour SCS – EMP-RSDC-AAPSR_24H100SCS_V03-1-NOLID.PCZ

5 EROSION AND SEDIMENTATION CONTROL PLAN

During construction, existing conveyance systems and water courses can be exposed to sediment loading. In order to prevent site generated sediments from entering the environment, an Erosion and Sedimentation Control Plan (ESCP) will be implemented prior to development. Although a generic ESCP can be developed as part of this report and subsequent Design Briefs, the final plan will be developed and implemented by the Owner's general contractor.

The erosion and sedimentation control strategy for the subject site could include erection of silt fences, straw bale barriers and rock check dams. These measures will ensure protection of both adjacent developments and the natural environment adjacent to and downstream of the site.

A copy of a potential Erosion and Sedimentation Control Plan (ESCP) is shown on **Figure 6.1**, which is included in **Appendix E**.

6 APPROVALS AND PERMIT REQUIREMENTS

6.1 City of Ottawa

The City of Ottawa will review all development documents including final working drawings and related reports. Upon completion, the City will approve the local watermains, under Permit No. 008-202; submit the sewer extension MECP application to the province and eventually issue a Commence Work Notification.

6.2 Province of Ontario

The Ministry of Environment, Conservation and Parks (MECP) will approve the local sewers under Section 53 of the Ontario Water Resources Act and issue an Environmental Compliance Approval. A Permit To Take Water may also need to be issued by the MECP.

6.3 Conservation Authority

At this time it is understood that there are no required permits, authorizations or approvals needed expressly for this development from the Conservation Authority; however, this will be confirmed through a subsequent pre-consultation with the RVCA.

6.4 Federal Government

At this time it is understood that there are no required permits, authorizations or approvals needed expressly for this development from the Federal Government; however, this will be confirmed through subsequent consultation with Parks Canada as a minimum.

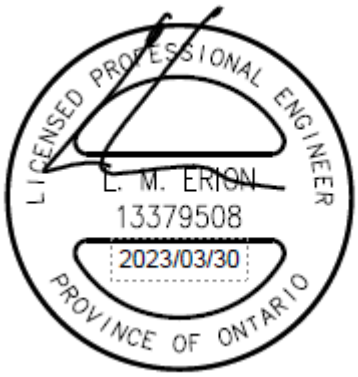
7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusion

All infrastructure which is needed to help service the subject site already exists. The development plan will include connections to the infrastructure to adequately service the site with water supply, wastewater collection and disposal, and management of stormwater runoff. The extension of the existing watermains through the subject site will provide a reliable source of both drinking water and fire flows. The ultimate wastewater outlet and stormwater outlet are already in place. Therefore, there are suitable public services in place to service the subject site.

7.2 Recommendation

From an assessment of major municipal infrastructure perspective, it is recommended that the development application for the Riverside South Development Corporation property known as 3700 Glen Falls Place be accepted and that the development of the property move forward.



Lance Erion, P. Eng.
Associate

Appendix A

- **City of Ottawa Servicing Study Guidelines Checklist**
- **2016 Riverside South Community Design Plan – Land Use Plan**
- **Figure 1.1 – Location Plan**
- **Figure 1.2 – Draft Plan**
- **Figure 1.3 – Location of Existing Infrastructure**
- **Figure 1.4 – Leitrim Road 32m Urban Road Allowance**
- **Figure 5.1 – Proposed Macro Grading Plan**

Development Servicing Study Checklist

The following table is a customized copy of the current City of Ottawa's Development Servicing Study Checklist. It is meant to be a quick reference for location of each of the items included on the list. The list contains the various item description and the study section in which the topic is contained.

GENERAL CONTENT

	ITEM DESCRIPTION	LOCATION
	Executive Summary (for larger reports only)	N/A
√	Date and revision number of the report	Front Cover
√	Location Map and plan showing municipal address, boundary, and layout of proposed development.	Figure 1.1
√	Plan showing the site and location of all existing services.	Figure 1.3
√	Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Figure 1.2
√	Summary of Pre-consultation Meeting with City and other approval agencies.	Section 1.6
√	Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	Section 1.3
√	Statement of objectives and servicing criteria	Section 1.1, 2.3, 3.3 & 4.3
√	Identification of existing and proposed infrastructure available in the immediate area.	Figure 1.3 Section 1.5
√	Identification of Environmentally Significant Areas, Watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	N/A
√	Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Figure 5.1 Detail Design
√	Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	N/A
	Proposed phasing of the development, if applicable.	N/A
√	Reference to geotechnical studies and recommendations concerning servicing.	Section 1.7

√	All preliminary and formal site plan submissions should have the following information: • Metric scale • North arrow (including construction North) • Key plan • Name and contact information of applicant and property owner • Property limits including bearings and dimensions • Existing and proposed structures and parking areas • Easements, road widening and rights-of-way • Adjacent street names	Noted

DEVELOPMENT SERVICING REPORT: WATER

	ITEM DESCRIPTION	LOCATION
√	Confirm consistency with Master Servicing Study, if available	Section 2.2
√	Availability of public infrastructure to service proposed development	Section 2.1
√	Identification of system constraints – external water needed	Sections 2.1
√	Identify boundary conditions	Section 2.3.4
√	Confirmation of adequate domestic supply and pressure	Section 2.4.2 & Appendix B
√	Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Section 2.4.2
√	Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	Section 2.4.2 Appendix B
	Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defining phases of the project including the ultimate design.	N/A
	Address reliability requirements such as appropriate location of shut-off valves.	Detail Design
√	Check on the necessity of a pressure zone boundary modification.	N/A
√	Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range.	Section 2.4.2 Appendix B
√	Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Detail Design
√	Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities and timing of implementation.	N/A
√	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Section 2.3.1
√	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	Detailed Design

DEVELOPMENT SERVICING REPORT: WASTEWATER

	ITEM DESCRIPTION	LOCATION
√	Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Section 3.3
√	Confirm consistency with Master Servicing Study and/or justifications for deviations.	Section 3.2
√	Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age condition of sewers.	Detail Design
√	Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 3.4, Appendix C
√	Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	Section 3.4 Appendix C
	Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix "C") format.	Section 3.4 & Detail Design
√	Description of proposed sewer network including sewers, pumping stations and forcemains.	Section 3.1, 3.4 & Figure 3.1 in Appendix C
√	Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N/A
√	Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
√	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
√	Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
√	Special considerations such as contamination, corrosive environment etc.	Detail Design

DEVELOPMENT SERVICING REPORT: STORMWATER CHECKLIST

	ITEM DESCRIPTION	LOCATION
√	Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 4.3
√	Analysis of available capacity in existing public infrastructure.	N/A
√	A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Figure 4.1

√	Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Targets established in MDP Update summarized in Section 4.2
√	Water quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Targets established in MDP Update summarized in Section 4.2; storage requirements summarized in Section 4.4.1.1
√	Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Section 4.3, 4.4
√	Set-back from private sewage disposal systems.	N/A
√	Watercourse and hazard lands setbacks.	Figure 4.1 and 4.2
√	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	Section 1.6
√	Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Section 4.2, Section 4.4.1 and Section 4.4.2
√	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	Section 4.4.1 and 4.4.2, Detail Design
√	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Figure 4.1 and 4.2
	Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Detail Design
√	Any proposed diversion of drainage catchment areas from one outlet to another.	N/A
√	Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Ditch network discussed in Section 4.4.1.2
	If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	N/A
√	Identification of potential impacts to receiving watercourses	N/A
√	Identification of municipal drains and related approval requirements.	N/A
√	Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 4.4.1 and 4.4.2, Detail Design
√ √	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Detail Design
	Inclusion of hydraulic analysis including hydraulic grade line elevations.	Hydraulic analysis of ditch network enclosed
√	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 5

√	Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A
√	Identification of fill constraints related to floodplain and geotechnical investigation.	Section 1.7

APPROVAL AND PERMIT REQUIREMENTS: CHECKLIST

	ITEM DESCRIPTION	LOCATION
√	Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	Section 6.3
	Application for Certification of Approval (CofA) under the Ontario Water resources Act.	Section 6.2 Detail Design
√	Changes to Municipal Drains	N/A
√	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	Section 6

CONCLUSION CHECKLIST

	ITEM DESCRIPTION	LOCATION
√	Clearly stated conclusions and recommendations	Section 7.1 & 7.2
	Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	Detail Design
√	All draft and final reports shall be signed and stamped by professional Engineer registered in Ontario.	Completed

Riverside South / Riverside-sud

SECONDARY PLAN - VOLUME 2

Schedule A - Designation Plan

PLAN SECONDAIRE - VOLUME 2

Annexe A - Plan de désignation

0 125 250 500 750 1,000 m

Planning, Real Estate and Economic Development Department, Geospatial Analytics, Technology and Solutions
Services de la planification, des biens immobiliers et du développement économique
Analyse géospatiale, technologie et solutions

DRAFT

Jan 24, 2022 Rev 3

LEITRIM ROAD REALIGNMENT
NOUVEAU TRACÉ DU CHEMIN LEITRIM

BOWESVILLE

Airport Operating Influence Zone
Zone d'influence d'exploitation de l'aéroport

Vimy Memorial Bridge /
Pont commémoratif Vimy

SPRATT

SHORELINE

CANYON WALK

EARL ARMSTRONG

MAIN STREET/
RUE PRINCIPALE

ruisseau Mosquito Creek

COLLECTOR/
COLLECTRICE 'F'

COLLECTOR/
COLLECTRICE 'G'

COLLECTOR/
COLLECTRICE 'H'

SPRATT ROAD EXTENSION/
PROLONGEMENT DE CHEMIN SPRATT

COLLECTOR/
COLLECTRICE 'I'

RIVIÈRE RIDEAU RIVER

RIVER

SPRATT

COLLECTOR/
COLLECTRICE 'J'

COLLECTOR/
COLLECTRICE 'A'

COLLECTOR/
COLLECTRICE 'B'

COLLECTOR/
COLLECTRICE 'C'

LIMEBANK

COLLECTOR/
COLLECTRICE 'D'

COLLECTOR/
COLLECTRICE 'E'

Town Centre Boundary
Limite du centre ville

DESIGNATION / DÉSIGNATION

- LD - Neighbourhood - Low Density / Quartier de faible densité
- MD - Neighbourhood - Medium Density / Quartier de densité moyenne
- HD1 - Neighbourhood - High Density 1 / Quartier de densité élevée 1
- HD2 - Neighbourhood - High Density 2 / Quartier de densité élevée 2
- TC - Town Centre / Centre ville
- NC - Commercial - Neighbourhood / Commercial quartier
- LC - Commercial - Local / Commercial local
- ESD - Employment and Special District / Emploi et District Particulier
- I/F - Institutional / Firehall / Institutionnel / Caserne de pompiers
- FC / FP / EC / EP - Schools - Secondary - Elementary / Écoles - secondaire - élémentaire
- DP - Park - District / Parc secteur
- CP - Park - Community / Parc communautaire
- NP - Park - Neighbourhood / Park quartier
- SP - Park - Parkette / Mini-parc
- OS - Passive Open Space(s) / Espace(s) de détente
- NEA - Natural Environment Area / Zone écologique naturelle
- SWM - Stormwater Management Facility / Installation de gestion des eaux pluviales
- UNF - Urban Natural Feature / Caractéristique naturelle zone urbaine
- UC - Green Transportation and Utility Corridor(s) / Transport vert et couloir(s) de(s) service(s) public(s)
- P&R - Park and Ride / Parc-o-bus
- Multi-Use Pathway / Sentier polyvalent

- Transfer Station / Station de correspondance
- Future O-Train Station / Station O-Train (futur)
- O-Train and Station / O-Train et station
- Transitway – at grade / Transitway – Voie à niveau
- Scenic Route / Route panoramique
- Main Street / Rue principale
- Transit Street / Rue longeant la Ligne Trillium, où circulent les autobus
- Secondary Plan Boundary / Limite du Plan secondaire

Consolidation and Amendments / Amendment au plan directeur approuvé

J:\136974_RSS_Employme\7.0_Production\7.03_Design\04_Civil_LAND_Adequacy Report\136974-Fig-1.1-Location Plan.dwg Layout Name: FIGURE 1.1 LOCATION PLAN Last Saved By: Chris.Cornier Last Saved At: Mar. 21, 23

Scale	Project Title	Drawing Title	Sheet No.
N.T.S.	RIVERSIDE SOUTH 3700 TWIN FALLS PLACE	LOCATION PLAN	FIGURE 1.1

J:\36974_RSS_Employme\7.0_Production\7.03_Design\04_Civil_LAND_Adequacy Report\FIGURE 1.2 DRAFT PLAN.dwg Layout Name: DRAFT PLAN Last Saved By: Chris.Cormier Last Saved At: Mar. 21, 23

REVISION SCHEDULE

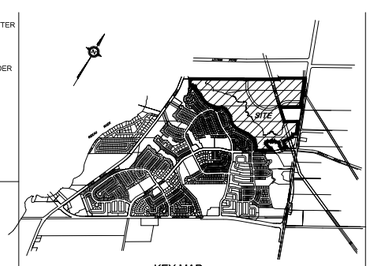
NO.	REVISION	DATE	BY
10	REVISED LEITRIM RD RE-ALIGNMENT	MAR. 14, 2023	N
9	REVISED LEITRIM RD, ST NO. 1 & 3 RE-ALIGNMENT BASED ON FIELD PICKUP OF HYDRO TOWERS	MAR. 10, 2023	MA
8	REVISED LEITRIM RD RE-ALIGNMENT & DEVELOPMENT LIMITS	MAR. 9, 2023	N
7	REVISED LEITRIM RD RE-ALIGNMENT	MAR. 1, 2023	N
6	ADJUSTED WIDTH STREETS 2 & 3	FEB. 23, 2023	N
5	REVISED CONCEPT	FEB. 21, 2023	N
4	ADDED BLOCKS 14 & 15, FUTURE MUP & PATH	JUNE 17, 2022	ns
3	REVISIONS	APR. 20, 2022	N
2	ADJUSTED STREET No. 2	MAY 23, 2019	N
1	PLAN PREPARED	MAY 21, 2019	N

SUBJECT TO THE CONDITIONS, IF ANY, SET FORTH IN OUR LETTER DATED

_____.

THIS DRAFT PLAN IS APPROVED BY THE CITY OF OTTAWA UNDER SECTION 51 OF THE PLANNING ACT, THIS ____ DAY OF _____, 20__.

_____
DON HERWEYER, MCIP RPP, MANAGER
DEVELOPMENT REVIEW-SOUTH
PLANNING, REAL ESTATE AND ECONOMIC
DEVELOPMENT DEPARTMENT, CITY OF OTTAWA



KEY MAP
NOT TO SCALE

DRAFT PLAN OF SUBDIVISION OF

PART OF LOTS 16, 17 And 18 CONCESSION 1 (RIDEAU FRONT)

Geographic Township of Gloucester

CITY OF OTTAWA

Prepared by ANNIS, O'SULLIVAN, VOLLEBEKK LTD.

Scale 1 : 2500

100 75 50 25 0 50 100 Metres

Metric

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :
The boundaries of the lands to be subdivided and their relationship to adjoining lands have been accurately and correctly shown.

_____ Date

_____ T. Hartwick
ONTARIO LAND SURVEYOR

OWNER'S CERTIFICATE

This is to certify that I am the owner / agent of the lands to be subdivided and that this plan was prepared in accordance with my instructions.

_____ Date

_____
Marcel Denomme
Authorized Signing Officer
Riverside South Development Corp.
I have authority to bind the corporation.

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51-17 OF THE PLANNING ACT

(a) see plan
(b) see plan
(c) see plan
(d) Business Park, Institutional, Valley Lands, and Storm Water Management Area
(e) see plan
(f) see plan
(g) see plan
(h) City of Ottawa
(i) see soils report
(j) see plan
(k) sanitary, storm sewers, municipal water, bell, hydro, cable and gas to be available
(l) see plan

AREA SCHEDULE	
BLOCK	AREA Ha / Ac
1	4.213 / 10.41
2	2.560 / 6.33
3	4.288 / 10.60
4	3.184 / 7.87
5	1.708 / 4.22
6	3.172 / 7.84
7	2.084 / 5.15
8	4.194 / 10.36
9	1.225 / 3.03
10	2.488 / 6.15
11	2.136 / 5.28
12	0.868 / 2.14
13	8.211 / 20.29
14	34.178 / 84.45
15	0.108 / 0.27
STREETS	5.140 / 12.70
TOTAL	79.757 / 197.09

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
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Email: Nepean@aovltd.com
Ontario Land Surveyors

Job No. FIGURE 1.2 DRAFT PLAN | N

IBI

Scale: N.T.S.

Project Title: RIVERSIDE SOUTH
3700 TWIN FALLS PLACE

Drawing Title: DRAFT PLAN

Sheet No.: FIGURE 1.2

J:\136974_RSS_Employme\7.0_Production\7.03_Design\04_Civil_LAND_Adequacy Report\FIGURE 1.3 EXISTING INFRASTRUCTURE.dwg Layout Name: EXISTING INFRASTRUCTURE Last Saved By: Chris.Cormier Last Saved At: Mar. 14, 23

LEITRIM ROAD

RIVER ROAD

LIMEBANK ROAD

BLOCK 13

BLOCK 12

BLOCK 4

BLOCK 1

STREET No. 3

STREET No. 1

BLOCK 15

BLOCK 6

BLOCK 5

Leitrim Road

BLOCK 3

SUBJECT PROPERTY

3700 TWIN FALLS PLACE

STREET No. 1

BLOCK 2

BLOCK 11

STREET No. 2

Re-alignment

BLOCK 7

BLOCK 8

BLOCK 10

BLOCK 9

BLOCK 14

CANYON WALK DRIVE

RIVERSIDE SOUTH

SPRATT ROAD

LIMEBANK ROAD

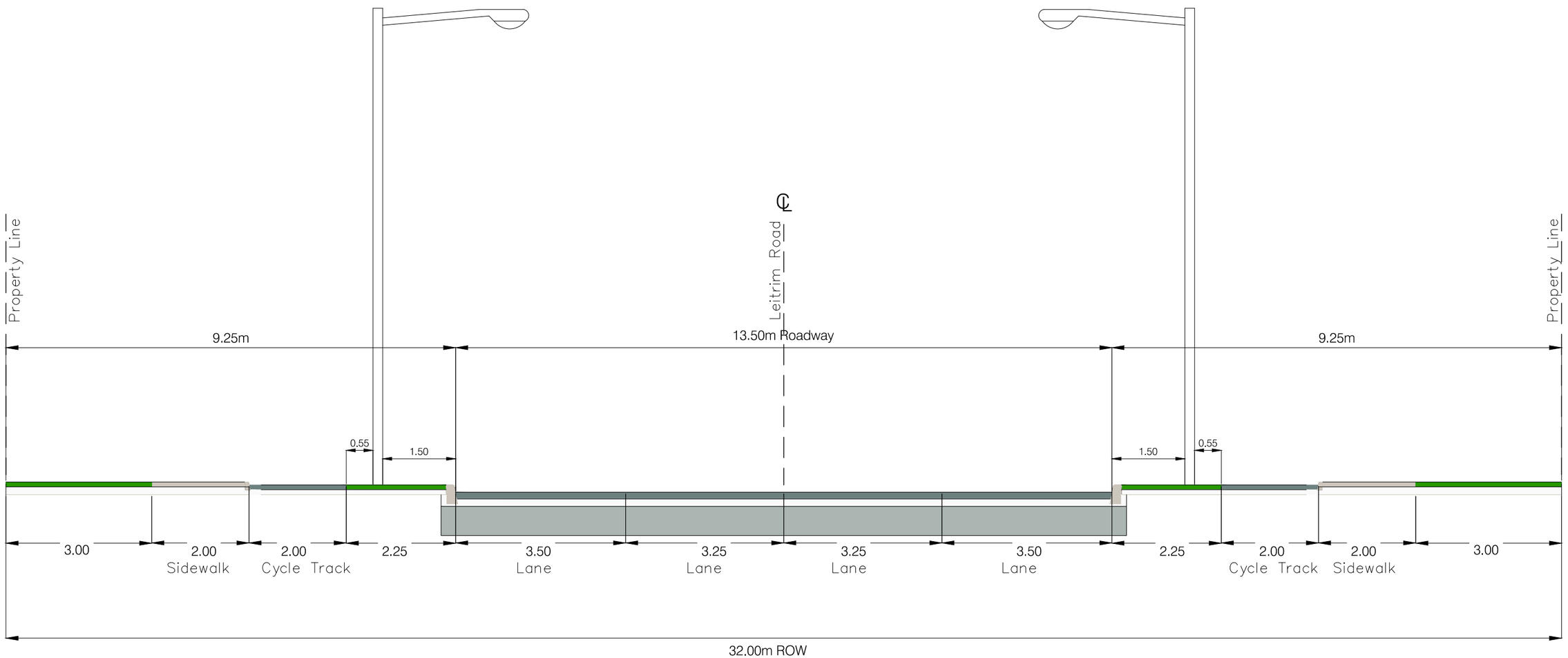
LEGEND:

EXISTING WATERMAIN

EXISTING SANITARY

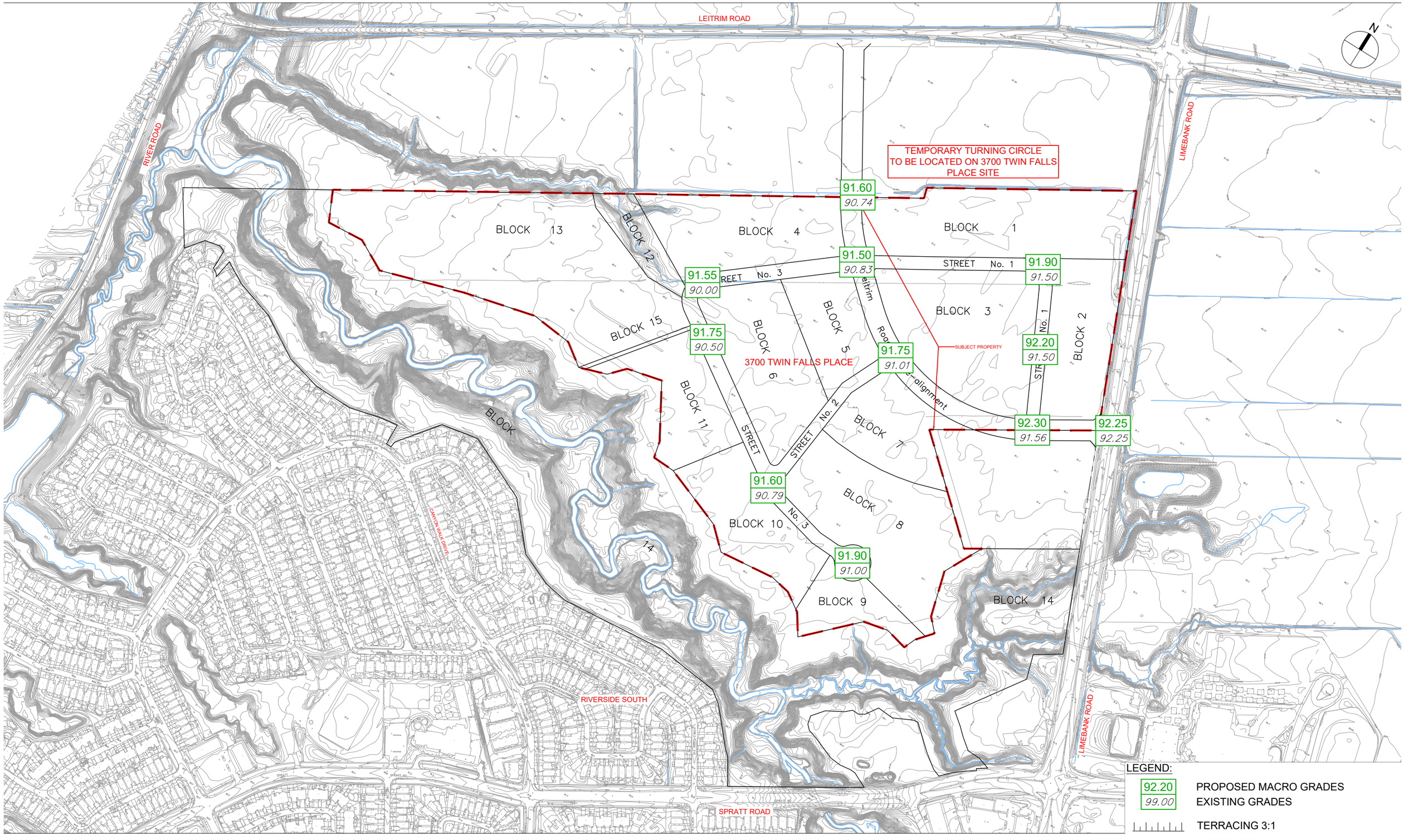
EXISTING STORM

Scale	Project Title	Drawing Title	Sheet No.
N.T.S.	RIVERSIDE SOUTH 3700 TWIN FALLS PLACE	LOCATION OF EXISTING INFRASTRUCTURE	FIGURE 1.3



J:\136974_RSS_Employme\7.0_Production\7.03_Design\04_Civil_LAND_Adequacy Report\FIGURE 1.4 LEITRIM ROAD CROSS SECTION.dwg Layout Name: CROSS SECTION Last Saved By: Chris.Cormier Last Saved At: Mar. 29, 23

Scale	Project Title	Drawing Title	Sheet No.
N.T.S.	RIVERSIDE SOUTH 3700 TWIN FALLS PLACE	LEITRIM ROAD 32m URBAN ROAD ALLOWANCE	FIGURE 1.4



J:\136974_RSS_Employme\7.0_Production\7.03_Design\04_Civil_LAND_Adequacy Report\FIGURE 5.1 CONCEPTUAL GRADING PLAN.dwg Layout Name: CONCEPTUAL GRADING PLAN Last Saved By: ddore Last Saved At: Mar. 29, 23

Scale	Project Title	Drawing Title	Sheet No.
IBI N.T.S.	RIVERSIDE SOUTH 3700 TWIN FALLS PLACE	CONCEPTUAL GRADING PLAN	FIGURE 5.1

Appendix B

- Figure 3-2 Potable Water Servicing Plan (RSCISSU-Phase1 Mosquito Creek Area)
- Figure 2.1 Conceptual Water Plan
- City of Ottawa Boundary Conditions
- Watermain Demand Calculation Sheet
- Modeling Output Files

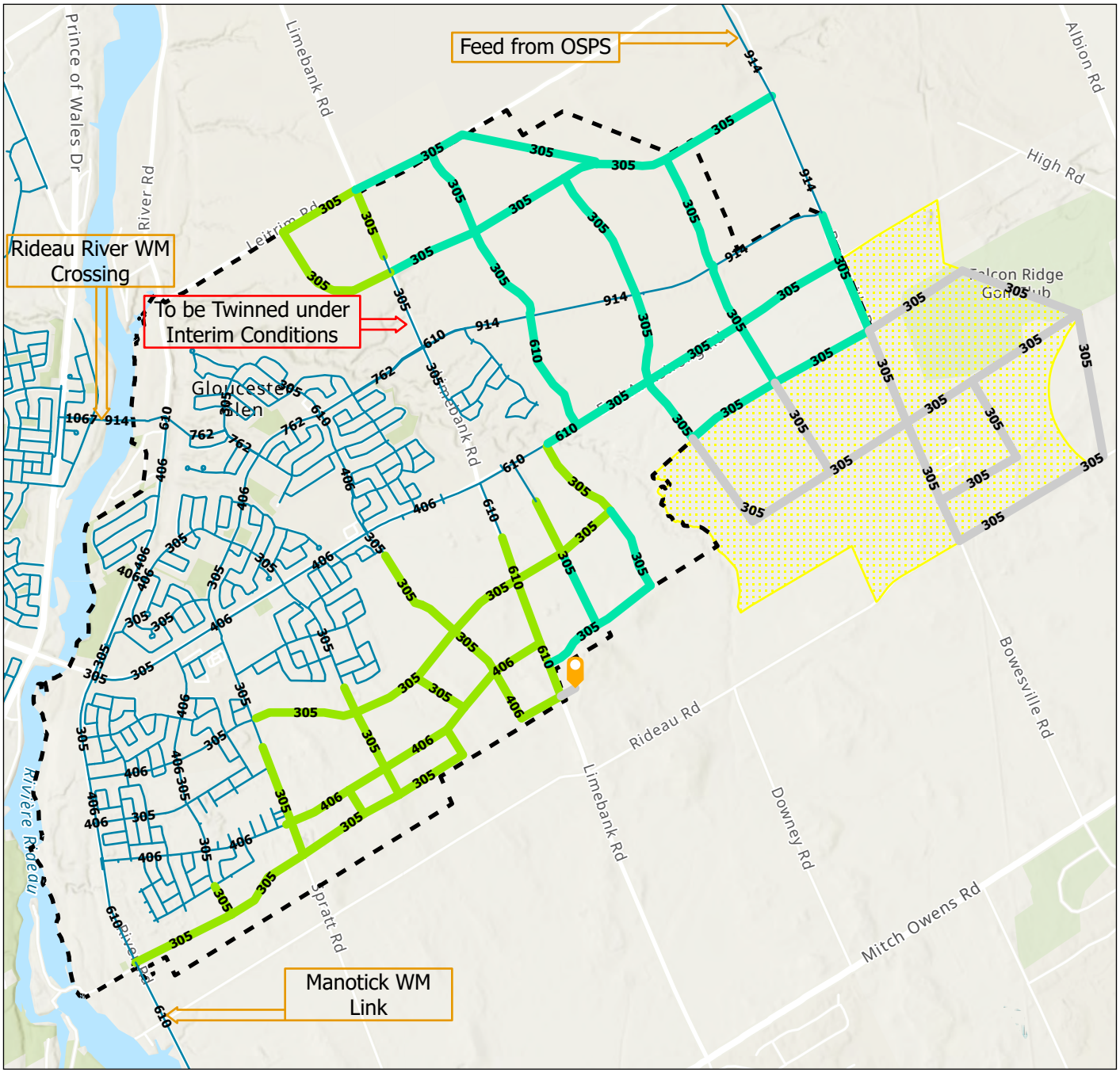


Figure No.
3-2

Title
Potable Water Servicing Plan

Client/Project
Riverside South Development Corporation
Riverside South ISSU Update
Potable Water Servicing

Project Location
Riverside South
Ottawa, Ontario

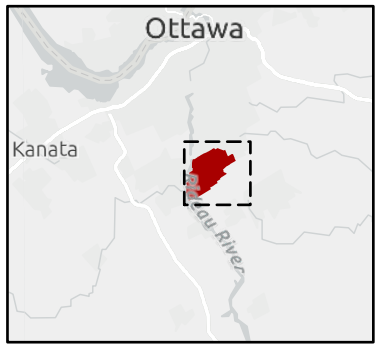
N

0 500 1,000 Meters

(At original document size of 8.5x11)
1:40,000

Legend

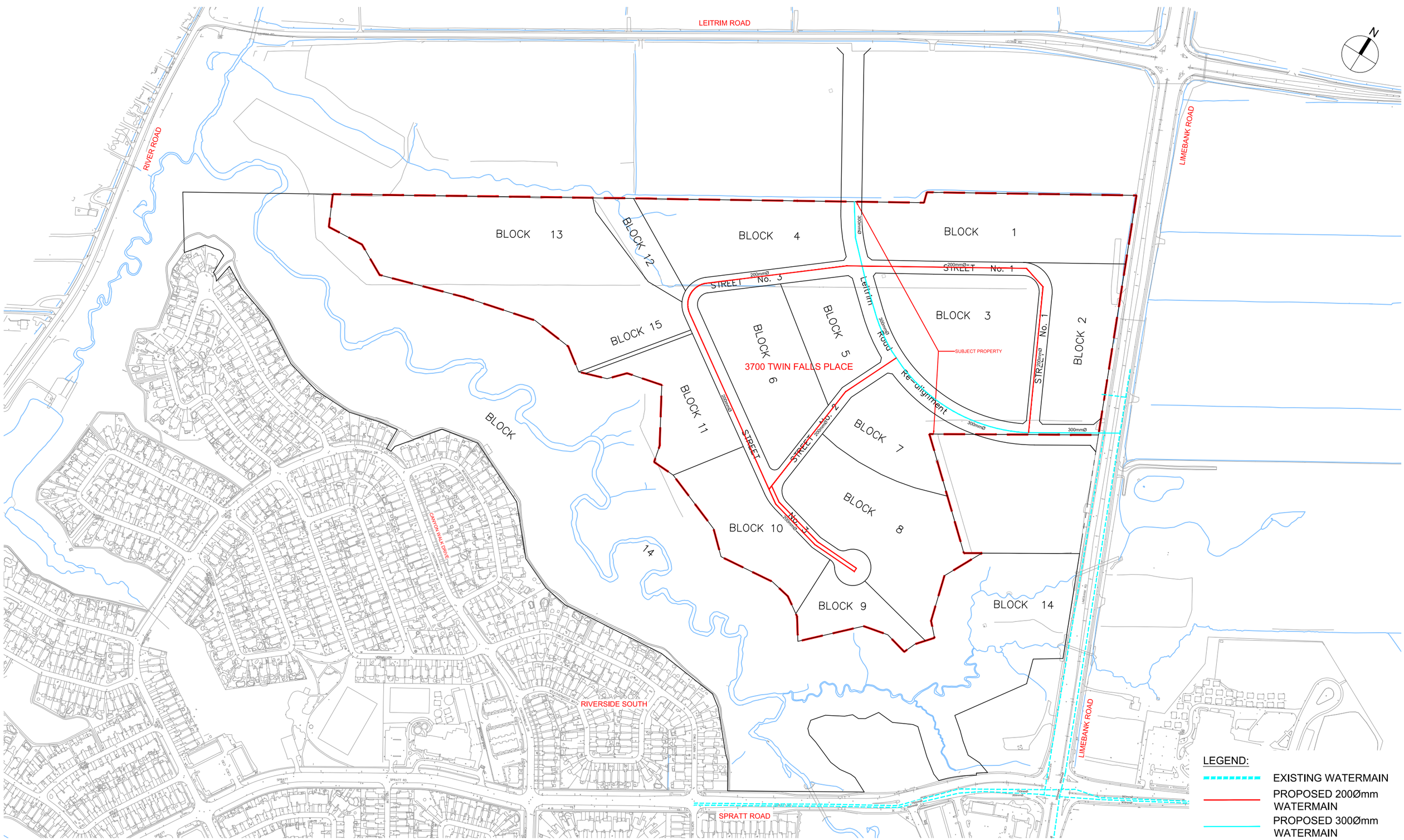
- Riverside South CDP Lands
- Expansion Lands
- Proposed Riverside South Elevated Tank
- Existing Watermain
- Proposed Watermain - Phase 1
- Proposed Watermain - Phase 2
- Proposed Watermain - Other



Notes
1. Coordinate System: NAD 1983 CSRS MTM 9
2. Watermain layout east of Bowesville Rd based on highlevel indications provided by Novatech.

Stantec

J:\136974_RSS_Employme\7.0_Production\7.03_Design\04_Civil_LAND_Adequacy Report\FIGURE 2.1 CONCEPTUAL WATER SERVICES.dwg Layout Name: CONCEPTUAL WATER SERVICES Last Saved By: Chris.Cormier Last Saved At: Mar. 14, 23



Scale	Project Title	Drawing Title	Sheet No.
N.T.S.	RIVERSIDE SOUTH 3700 TWIN FALLS PLACE	CONCEPTUAL WATER SERVICES	FIGURE 2.1

Boundary Conditions
Employment Lands

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	786	13.10
Maximum Daily Demand	1,968	32.80
Peak Hour	4,332	72.20
Fire Flow Demand #1	10,000	166.67
Fire Flow Demand #2	13,000	216.67

Location

Results – Existing Conditions

Connection 1 – Spratt Rd.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	131.8	56.9
Peak Hour	125.3	47.7
Max Day plus Fire 1	126.4	49.3
Max Day plus Fire 2	125.3	47.7

Ground Elevation = 91.7 m

Connection 2 – Limebank Rd. / Spratt Rd.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	131.8	56.9
Peak Hour	125.3	47.7
Max Day plus Fire 1	127.4	50.7
Max Day plus Fire 2	126.8	49.9

Ground Elevation = 91.8 m

Results – SUC Zone Reconfiguration

Connection 1 – Spratt Rd.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	148.4	80.5
Peak Hour	145.7	76.7
Max Day plus Fire 1	145.1	75.9
Max Day plus Fire 2	144.2	74.6

Ground Elevation = 91.7 m

Connection 2 – Limebank Rd. / Spratt Rd.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	148.4	80.5
Peak Hour	145.8	76.8
Max Day plus Fire 1	146.2	77.4
Max Day plus Fire 2	145.8	76.9

Ground Elevation = 91.8 m

Notes

1. As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:
    a. If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
    b. Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

FILE: 136974
DATE PRINTED: 09-Mar-23
DESIGN: LE
PAGE : 1 OF 1

PROJECT : RIVERSIDE SOUTH - 3700 TWIN FALLS PLACE
LOCATION : CITY OF OTTAWA
DEVELOPER : RIVERSIDE SOUTH DEVELOPMENT CORPORATION

NODE	BLOCK	RESIDENTIAL UNITS SF	RESIDENTIAL UNITS SD & TH	RESIDENTIAL UNITS MD (ha)	POP'N	NON-RESIDENTIAL INDTRL (ha.)	NON-RESIDENTIAL COMM. (ha.)	NON-RESIDENTIAL INST. (ha.)	AVERAGE DAILY DEMAND (l/s) Res.	AVERAGE DAILY DEMAND (l/s) Non-res.	AVERAGE DAILY DEMAND (l/s) Total	MAXIMUM DAILY DEMAND (l/s) Res.	MAXIMUM DAILY DEMAND (l/s) Non-res.	MAXIMUM DAILY DEMAND (l/s) Total	MAXIMUM HOURLY DEMAND (l/s) Res.	MAXIMUM HOURLY DEMAND (l/s) Non-res.	MAXIMUM HOURLY DEMAND (l/s) Total	FIRE DEMAND (l/min)
J2	2						2.56		0.00	0.83	0.83	0.00	1.24	1.24	0.00	2.24	2.24	13,000
J3	3						4.61		0.00	1.49	1.49	0.00	2.24	2.24	0.00	4.03	4.03	13,000
J4	1						4.16		0.00	1.35	1.35	0.00	2.02	2.02	0.00	3.64	3.64	13,000
J5	5						1.52		0.00	0.49	0.49	0.00	0.74	0.74	0.00	1.33	1.33	13,000
J8	4, 13						11.92		0.00	3.86	3.86	0.00	5.79	5.79	0.00	10.43	10.43	13,000
J9	6, 11						5.41		0.00	1.75	1.75	0.00	2.63	2.63	0.00	4.73	4.73	13,000
J10	10						2.72		0.00	0.88	0.88	0.00	1.32	1.32	0.00	2.38	2.38	13,000
J11	8, 9						6.52		0.00	2.11	2.11	0.00	3.17	3.17	0.00	5.71	5.71	13,000
J12	7						1.95		0.00	0.63	0.63	0.00	0.95	0.95	0.00	1.71	1.71	13,000
J13	OTHER						3.90		0.00	1.26	1.26	0.00	1.90	1.90	0.00	3.41	3.41	13,000
											14.65			22.00			39.61	

ASSUMPTIONS

RESIDENTIAL DENSITIES

- Single Family (SF) 3.4 p / p / u
- Semi Detached (SD) & Townhouse (T 2.7 p / p / u
- Apartment (APT) 1.8 p / p / u
- -Medium Density Area (MD) 130 p / p / ha

AVG. DAILY DEMAND

- Residential 280 l / cap / day
- ICI 28,000 l / ha / day

MAX. DAILY DEMAND

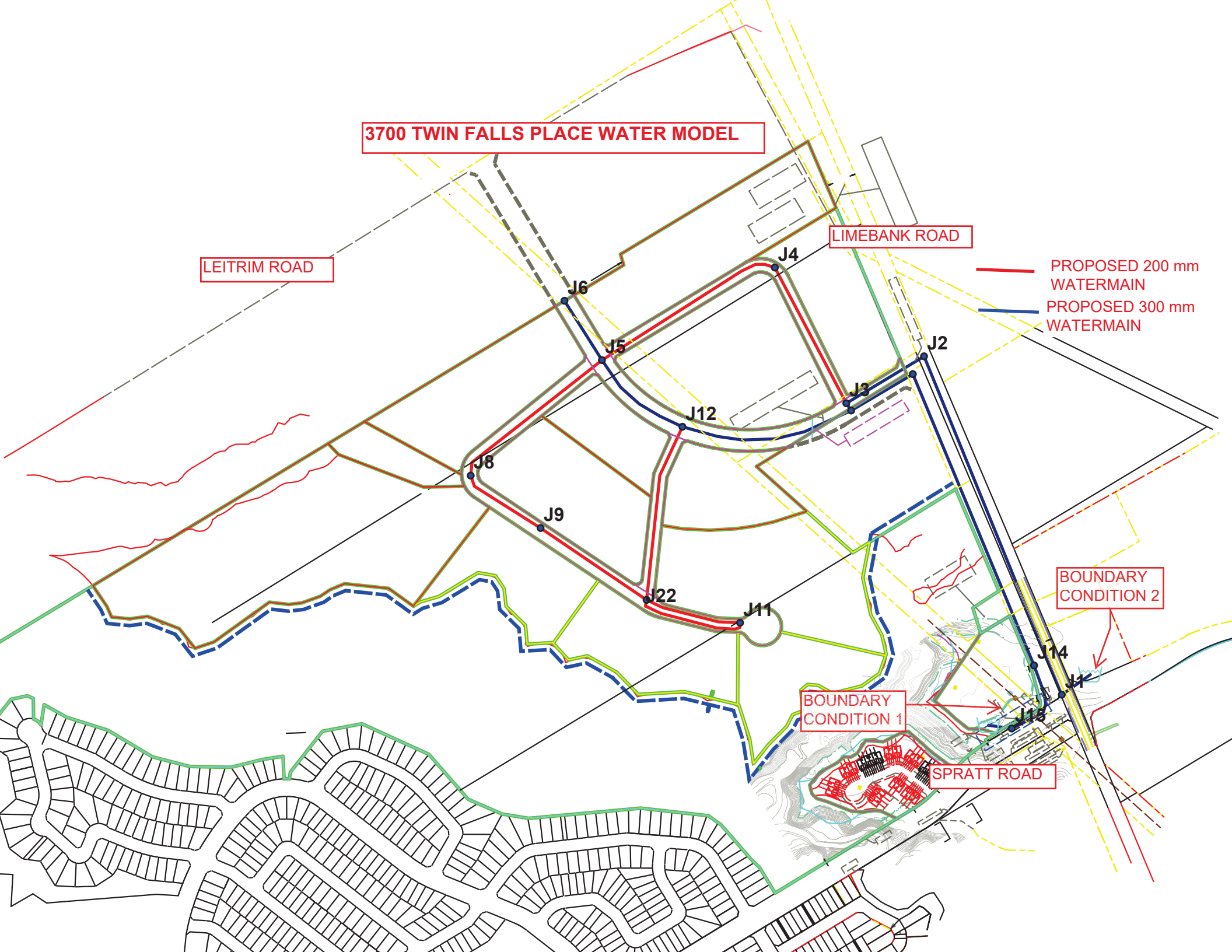
- Residential 700 l / cap / day
- ICI 42,000 l / ha / day

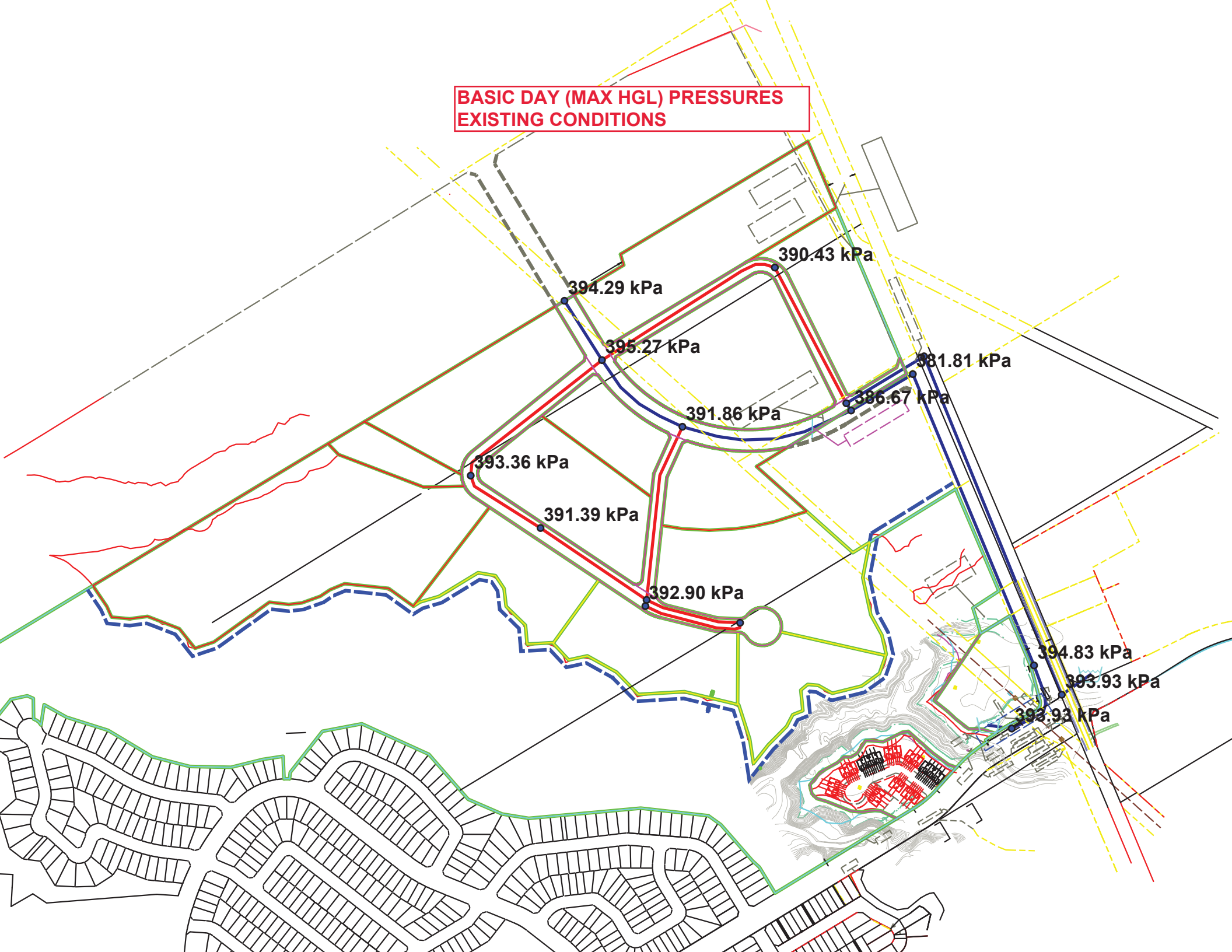
MAX. HOURLY DEMAND

- Residential 1,540 l / cap / day
- ICI 75,600 l / ha / day

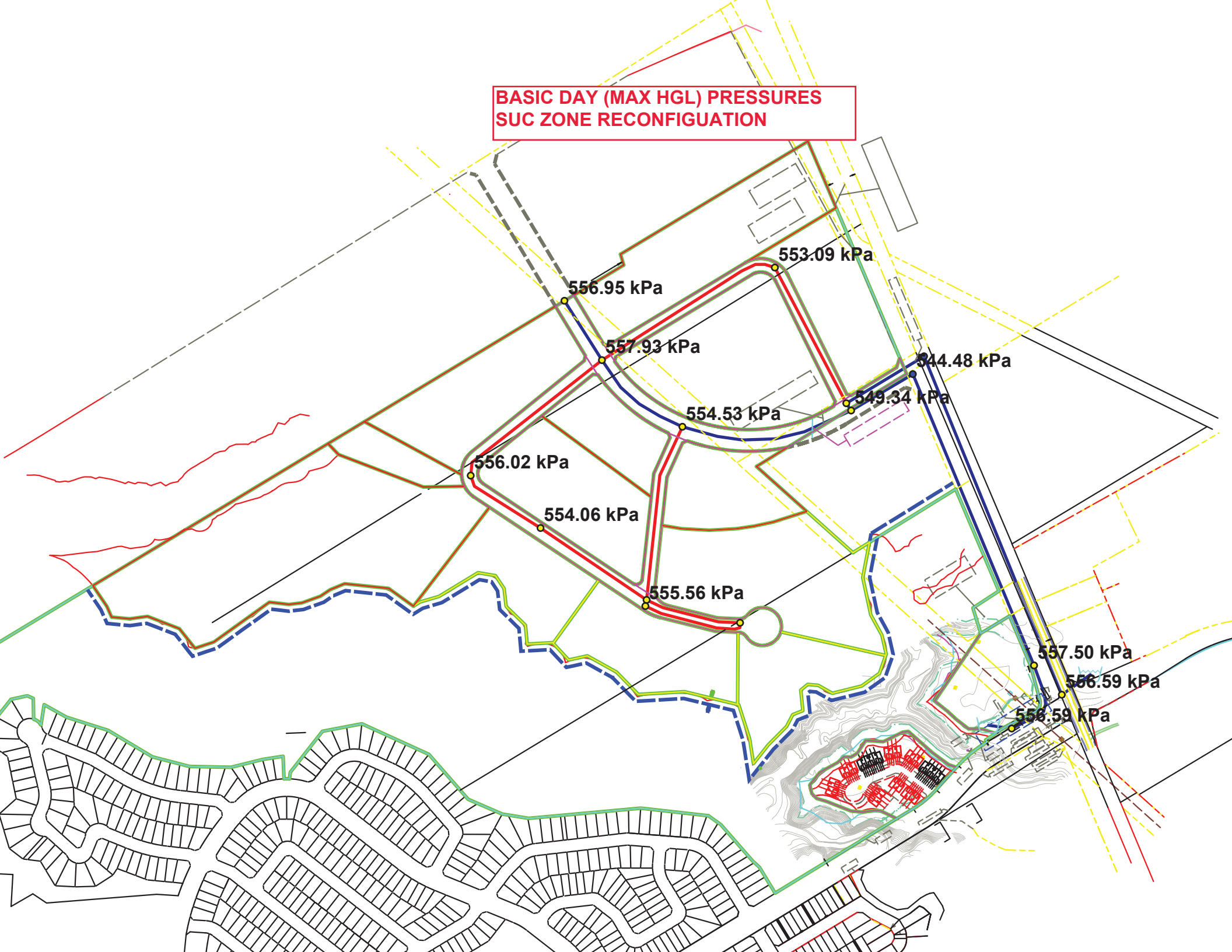
FIRE FLOW

- SF, SD, TH & ST 10,000 l / min
- l / min
- ICI 13,000 l / min

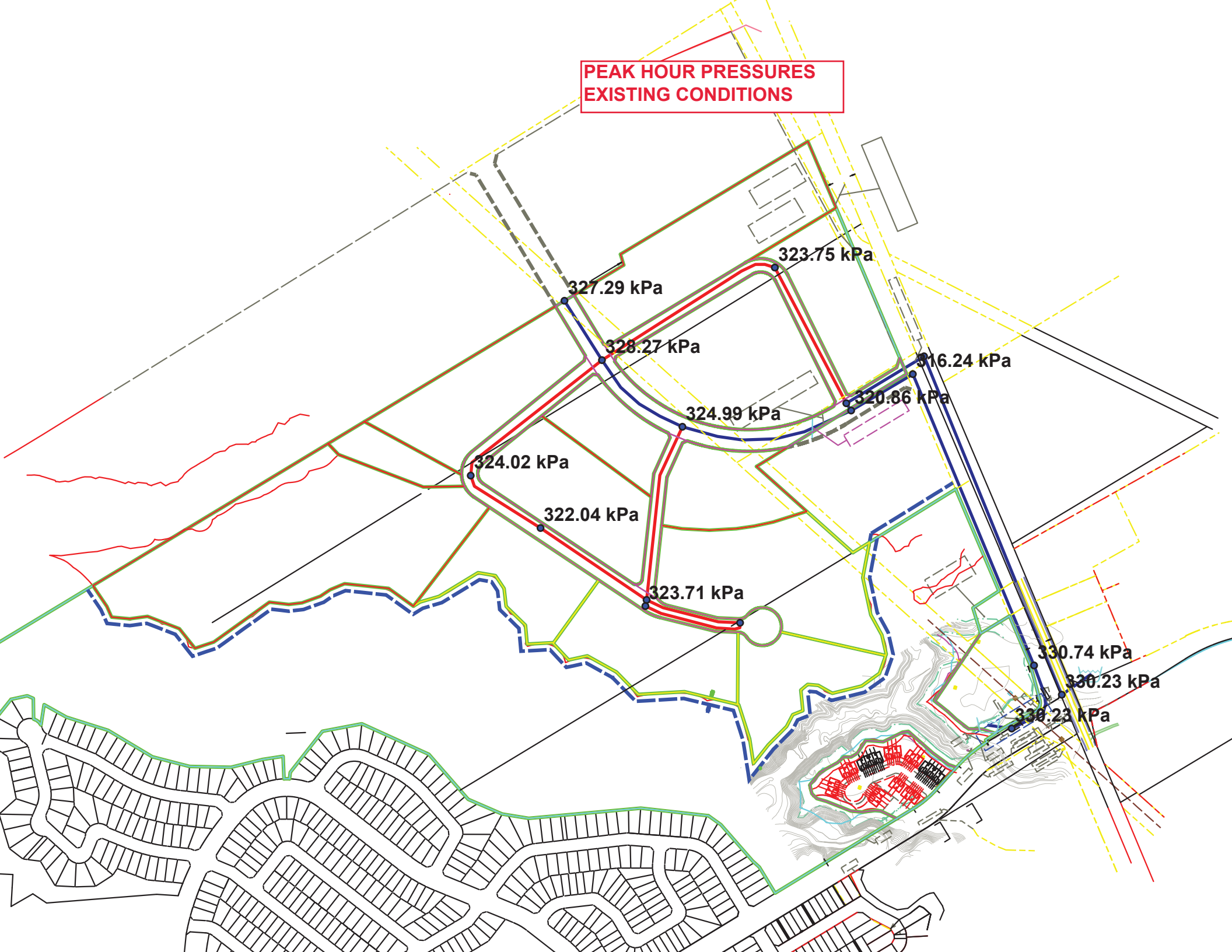

3700 TWIN FALLS PLACE WATER MODEL
LEITRIM ROAD
LIMEBANK ROAD
PROPOSED 200 mm WATERMAIN
PROPOSED 300 mm WATERMAIN
J6
J4
J5
J2
J3
J12
J8
J9
J22
J11
J14
J1
J15
BOUNDARY CONDITION 2
BOUNDARY CONDITION 1
SPRATT ROAD


BASIC DAY (MAX HGL) PRESSURES
EXISTING CONDITIONS
390.43 kPa
394.29 kPa
395.27 kPa
381.81 kPa
386.67 kPa
391.86 kPa
393.36 kPa
391.39 kPa
392.90 kPa
394.83 kPa
393.93 kPa
393.93 kPa

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	☐	J1	0.00	91.60	131.80	393.93
2	☐	J10	0.88	91.60	131.69	392.90
3	☐	J11	2.11	91.90	131.69	389.94
4	☐	J12	0.63	91.75	131.74	391.86
5	☐	J13	1.26	92.80	131.76	381.81
6	☐	J14	0.00	91.50	131.79	394.83
7	☐	J15	0.00	91.60	131.80	393.93
8	☐	J2	0.83	92.80	131.77	381.84
9	☐	J20	0.00	92.30	131.76	386.67
10	☐	J22	0.00	91.60	131.69	392.90
11	☐	J3	1.49	92.10	131.76	388.63
12	☐	J4	1.35	91.90	131.74	390.43
13	☐	J5	0.49	91.40	131.74	395.27
14	☐	J6	0.00	91.50	131.74	394.29
15	☐	J8	3.86	91.55	131.69	393.36
16	☐	J9	1.75	91.75	131.69	391.39

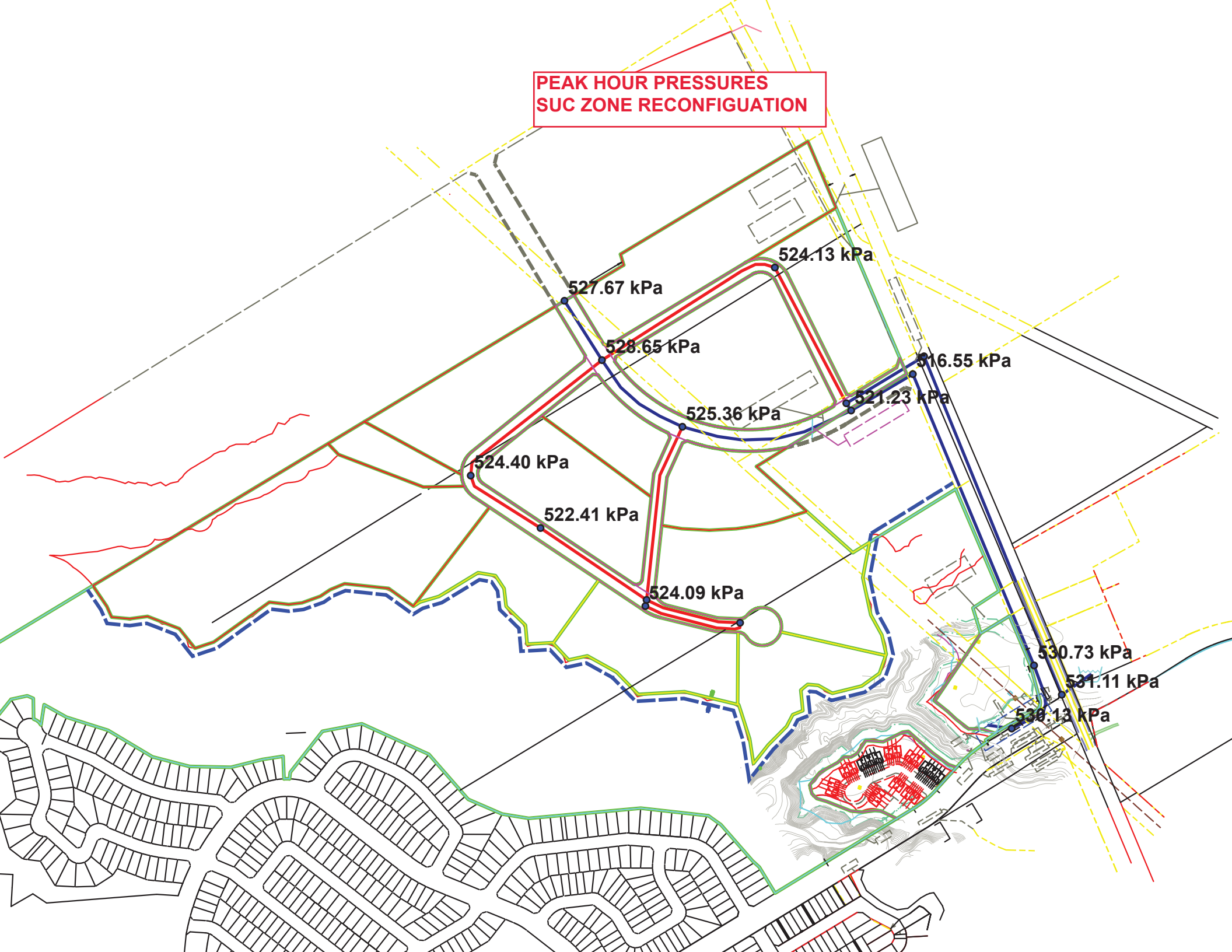

BASIC DAY (MAX HGL) PRESSURES
SUC ZONE RECONFIGUATION
553.09 kPa
556.95 kPa
557.93 kPa
544.48 kPa
549.34 kPa
554.53 kPa
556.02 kPa
554.06 kPa
555.56 kPa
557.50 kPa
556.59 kPa
556.59 kPa

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	☐	J1	0.00	91.60	148.40	556.59
2	☐	J10	0.88	91.60	148.29	555.56
3	☐	J11	2.11	91.90	148.29	552.60
4	☐	J12	0.63	91.75	148.34	554.53
5	☐	J13	1.26	92.80	148.36	544.48
6	☐	J14	0.00	91.50	148.39	557.50
7	☐	J15	0.00	91.60	148.40	556.59
8	☐	J2	0.83	92.80	148.37	544.50
9	☐	J20	0.00	92.30	148.36	549.34
10	☐	J22	0.00	91.60	148.29	555.56
11	☐	J3	1.49	92.10	148.36	551.30
12	☐	J4	1.35	91.90	148.34	553.09
13	☐	J5	0.49	91.40	148.34	557.93
14	☐	J6	0.00	91.50	148.34	556.95
15	☐	J8	3.86	91.55	148.29	556.02
16	☐	J9	1.75	91.75	148.29	554.06


PEAK HOUR PRESSURES
EXISTING CONDITIONS
323.75 kPa
327.29 kPa
328.27 kPa
316.24 kPa
320.86 kPa
324.99 kPa
324.02 kPa
322.04 kPa
323.71 kPa
330.74 kPa
330.23 kPa
330.23 kPa

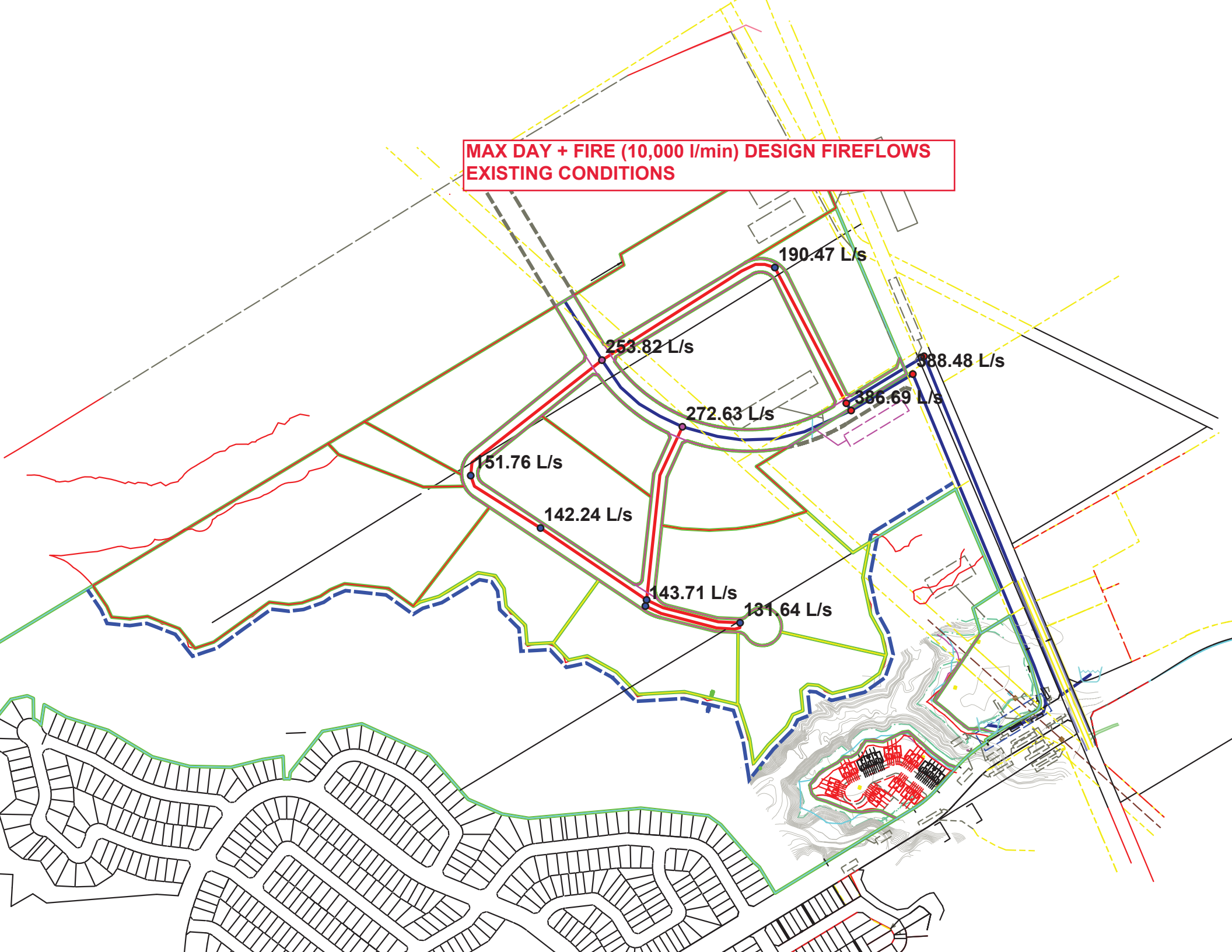
		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	☐	J1	0.00	91.60	125.30	330.23
2	☐	J10	2.38	91.60	124.64	323.72
3	☐	J11	5.71	91.90	124.62	320.66
4	☐	J12	1.71	91.75	124.91	324.99
5	☐	J13	3.41	92.80	125.07	316.24
6	☐	J14	0.00	91.50	125.25	330.74
7	☐	J15	0.00	91.60	125.30	330.23
8	☐	J2	2.24	92.80	125.09	316.38
9	☐	J20	0.00	92.30	125.04	320.86
10	☐	J22	0.00	91.60	124.63	323.71
11	☐	J3	4.03	92.10	125.04	322.82
12	☐	J4	3.64	91.90	124.94	323.75
13	☐	J5	1.33	91.40	124.90	328.27
14	☐	J6	0.00	91.50	124.90	327.29
15	☐	J8	10.43	91.55	124.62	324.02
16	☐	J9	4.73	91.75	124.61	322.04

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/k-m)	Status	Flow Reversal Count
1		P11	J1	J2	540.33	297.00	120.00	19.94	0.29	0.21	0.40	Open	0
2		P13	J3	J2	134.17	297.00	120.00	-17.70	0.26	0.04	0.32	Open	0
3		P15	J3	J4	226.76	204.00	110.00	7.41	0.23	0.10	0.46	Open	0
4		P17	J5	J4	296.70	204.00	110.00	-3.77	0.12	0.04	0.13	Open	0
5		P19	J5	J6	103.80	297.00	120.00	0.00	0.00	0.00	0.00	Open	0
6		P21	J5	J8	264.05	204.00	110.00	11.68	0.36	0.28	1.07	Open	0
7		P25	J9	J8	132.20	204.00	110.00	-1.25	0.04	0.00	0.02	Open	0
8		P27	J9	J10	189.42	204.00	110.00	-3.48	0.11	0.02	0.11	Open	0
9		P29	J11	J10	143.24	204.00	110.00	-2.95	0.09	0.01	0.08	Open	0
10		P31	J10	J12	264.45	204.00	110.00	-11.57	0.35	0.28	1.06	Open	0
11		P33	J12	J5	157.90	297.00	120.00	9.24	0.13	0.02	0.10	Open	0
12		P35	J12	J20	259.41	297.00	120.00	-22.52	0.33	0.13	0.50	Open	0
13		P37	J13	J14	466.62	297.00	120.00	-19.67	0.28	0.18	0.39	Open	0
14		P39	J14	J15	124.95	297.00	120.00	-19.67	0.28	0.05	0.39	Open	0
15		P43	J15	CON1	1.00	297.00	120.00	-19.67	0.28	0.00	0.38	Open	0
16		P45	J1	CON2	1.00	297.00	120.00	-19.94	0.29	0.00	0.39	Open	0
17		P53	J20	J13	105.87	297.00	120.00	-16.26	0.23	0.03	0.27	Open	0
18		P55	J20	J3	12.95	297.00	120.00	-6.26	0.09	0.00	0.05	Open	0
19		P57	J22	J10	9.37	204.00	110.00	-2.76	0.08	0.00	0.07	Open	0
20		P59	J22	J11	152.25	204.00	110.00	2.76	0.08	0.01	0.07	Open	0

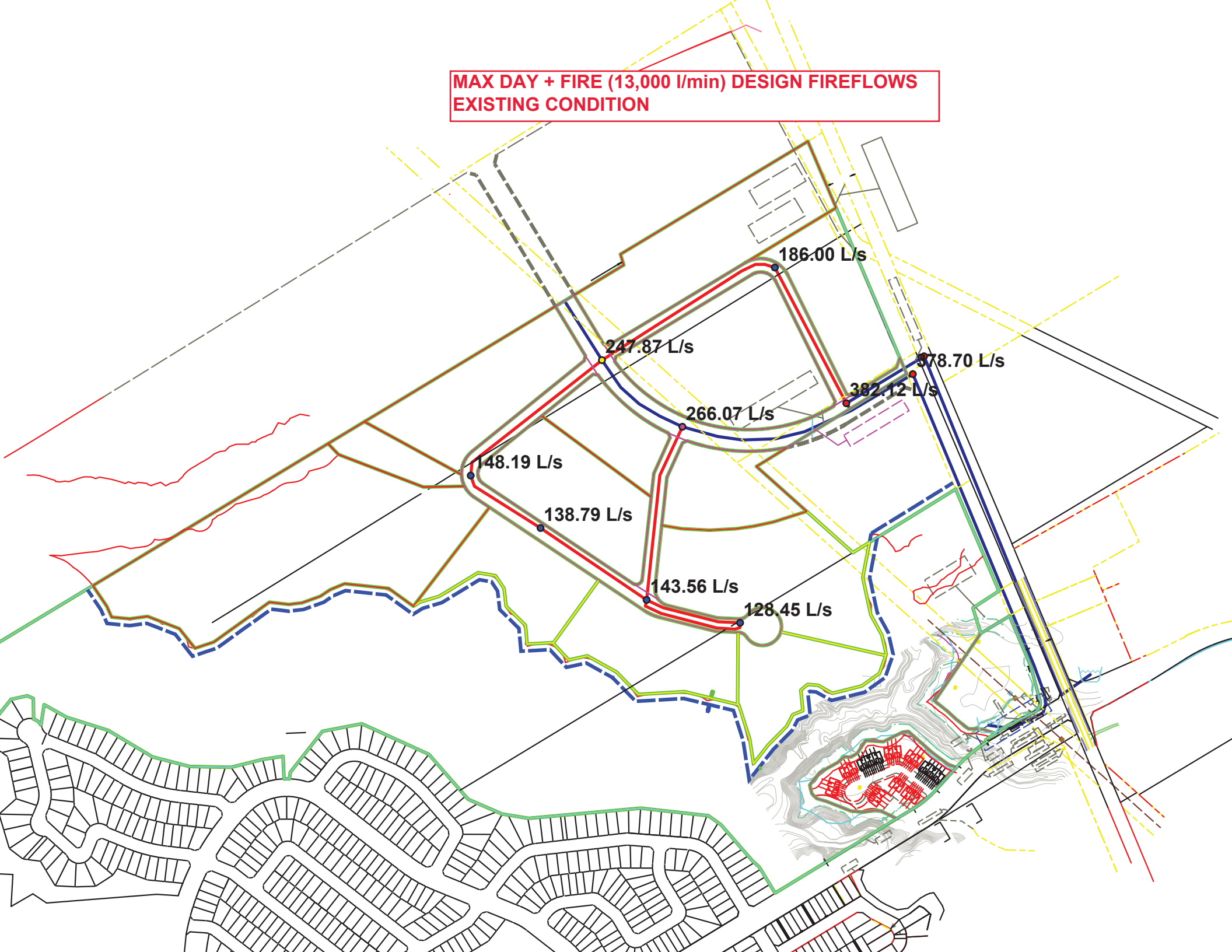

PEAK HOUR PRESSURES
SUC ZONE RECONFIGUATION
524.13 kPa
527.67 kPa
528.65 kPa
516.55 kPa
521.23 kPa
525.36 kPa
524.40 kPa
522.41 kPa
524.09 kPa
530.73 kPa
531.11 kPa
530.13 kPa

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	☐	J1	0.00	91.60	145.80	531.11
2	☐	J10	2.38	91.60	145.08	524.10
3	☐	J11	5.71	91.90	145.07	521.04
4	☐	J12	1.71	91.75	145.36	525.36
5	☐	J13	3.41	92.80	145.51	516.55
6	☐	J14	0.00	91.50	145.66	530.73
7	☐	J15	0.00	91.60	145.70	530.13
8	☐	J2	2.24	92.80	145.54	516.85
9	☐	J20	0.00	92.30	145.49	521.23
10	☐	J22	0.00	91.60	145.08	524.09
11	☐	J3	4.03	92.10	145.49	523.20
12	☐	J4	3.64	91.90	145.39	524.13
13	☐	J5	1.33	91.40	145.35	528.65
14	☐	J6	0.00	91.50	145.35	527.67
15	☐	J8	10.43	91.55	145.06	524.40
16	☐	J9	4.73	91.75	145.06	522.41

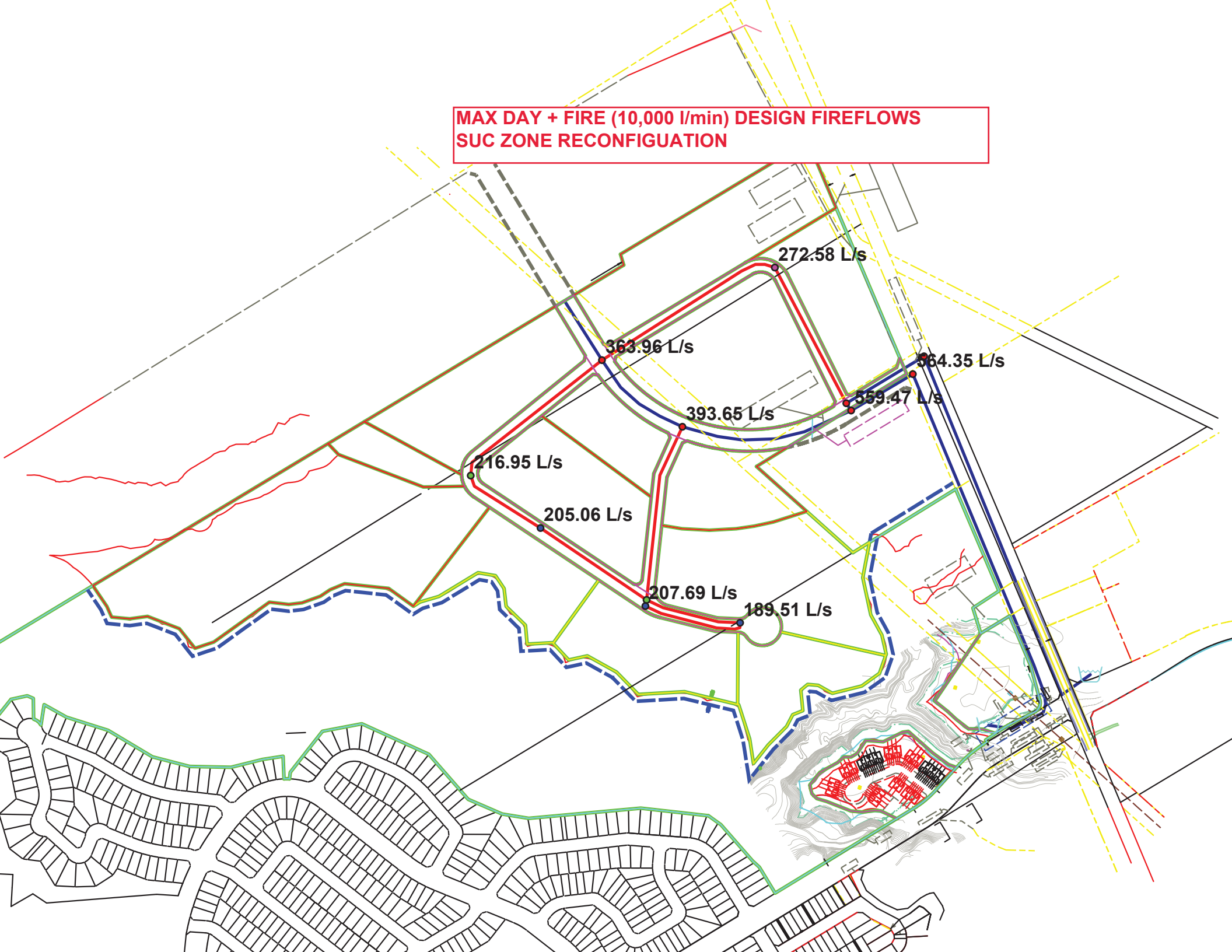
		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/k-m)	Status	Flow Reversal Count
1	☐	P11	J1	J2	540.33	297.00	120.00	21.97	0.32	0.26	0.47	Open	0
2	☐	P13	J3	J2	134.17	297.00	120.00	-19.73	0.28	0.05	0.39	Open	0
3	☐	P15	J3	J4	226.76	204.00	110.00	7.41	0.23	0.10	0.46	Open	0
4	☐	P17	J5	J4	296.70	204.00	110.00	-3.77	0.12	0.04	0.13	Open	0
5	☐	P19	J5	J6	103.80	297.00	120.00	0.00	0.00	0.00	0.00	Open	0
6	☐	P21	J5	J8	264.05	204.00	110.00	11.68	0.36	0.28	1.07	Open	0
7	☐	P25	J9	J8	132.20	204.00	110.00	-1.25	0.04	0.00	0.02	Open	0
8	☐	P27	J9	J10	189.42	204.00	110.00	-3.48	0.11	0.02	0.11	Open	0
9	☐	P29	J11	J10	143.24	204.00	110.00	-2.95	0.09	0.01	0.08	Open	0
10	☐	P31	J10	J12	264.45	204.00	110.00	-11.57	0.35	0.28	1.06	Open	0
11	☐	P33	J12	J5	157.90	297.00	120.00	9.23	0.13	0.01	0.09	Open	0
12	☐	P35	J12	J20	259.41	297.00	120.00	-22.52	0.32	0.13	0.49	Open	0
13	☐	P37	J13	J14	466.62	297.00	120.00	-17.64	0.25	0.15	0.31	Open	0
14	☐	P39	J14	J15	124.95	297.00	120.00	-17.64	0.25	0.04	0.31	Open	0
15	☐	P43	J15	CON1	1.00	297.00	120.00	-17.64	0.25	0.00	0.32	Open	0
16	☐	P45	J1	CON2	1.00	297.00	120.00	-21.97	0.32	0.00	0.47	Open	0
17	☐	P53	J20	J13	105.87	297.00	120.00	-14.23	0.21	0.02	0.21	Open	0
18	☐	P55	J20	J3	12.95	297.00	120.00	-8.29	0.12	0.00	0.08	Open	0
19	☐	P57	J22	J10	9.37	204.00	110.00	-2.76	0.08	0.00	0.07	Open	0
20	☐	P59	J22	J11	152.25	204.00	110.00	2.76	0.08	0.01	0.07	Open	0


MAX DAY + FIRE (10,000 l/min) DESIGN FIREFLOWS
EXISTING CONDITIONS
190.47 L/s
253.82 L/s
388.48 L/s
386.69 L/s
272.63 L/s
151.76 L/s
142.24 L/s
143.71 L/s
131.64 L/s

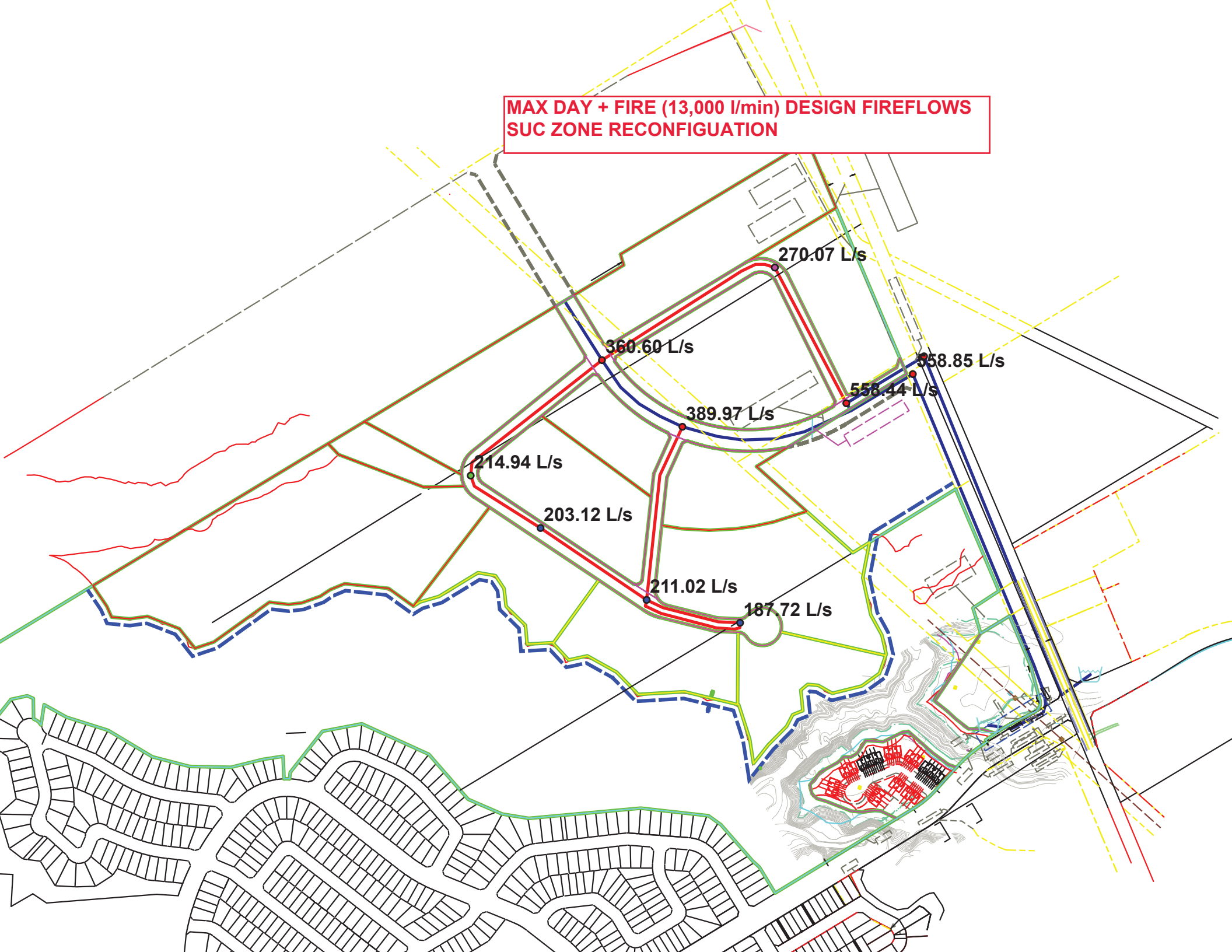
		ID	Total Demand (L/s)	Available Flow at Hydrant (L/s)	Critical Node ID	Critical Node Pressure (kPa)	Critical Node Head (m)	Design Flow (L/s)	Design Pressure (kPa)	Design Fire Node Pressure (kPa)
1	☐	J10	167.99	148.42	J11	136.98	105.88	147.17	139.96	142.95
2	☐	J11	169.84	131.64	J11	139.96	106.18	131.64	139.96	139.98
3	☐	J12	167.62	273.91	J11	138.30	106.01	272.63	139.96	141.72
4	☐	J13	168.57	388.48	J13	139.96	107.08	388.48	139.96	140.09
5	☐	J2	167.91	394.41	J2	139.96	107.08	394.41	139.96	140.13
6	☐	J20	166.67	386.69	J20	139.96	106.58	386.69	139.96	140.20
7	☐	J22	166.67	143.71	J22	139.96	105.88	143.71	139.96	139.97
8	☐	J3	168.91	391.40	J3	139.96	106.38	391.40	139.96	140.13
9	☐	J4	168.69	190.47	J4	139.96	106.18	190.47	139.96	139.96
10	☐	J5	167.41	253.82	J5	139.96	105.68	253.82	139.96	140.04
11	☐	J8	172.46	151.76	J8	139.96	105.83	151.76	139.96	139.96
12	☐	J9	169.30	142.24	J9	139.96	106.03	142.24	139.96	139.97


MAX DAY + FIRE (13,000 l/min) DESIGN FIREFLOWS
EXISTING CONDITION
186.00 L/s
247.87 L/s
378.70 L/s
382.12 L/s
266.07 L/s
148.19 L/s
138.79 L/s
143.56 L/s
128.45 L/s

		ID	Total Demand (L/s)	Available Flow at Hydrant (L/s)	Critical Node ID	Critical Node Pressure (kPa)	Critical Node Head (m)	Design Flow (L/s)	Design Pressure (kPa)	Design Fire Node Pressure (kPa)
1	☐	J10	217.99	144.83	J11	136.98	105.88	143.56	139.96	143.01
2	☐	J11	219.84	128.45	J11	139.96	106.18	128.45	139.96	140.01
3	☐	J12	217.62	267.40	J11	138.28	106.01	266.07	139.96	141.66
4	☐	J13	218.57	378.70	J13	139.96	107.08	378.70	139.96	140.00
5	☐	J2	217.91	385.10	J2	139.96	107.08	385.10	139.96	140.03
6	☐	J3	218.91	382.12	J3	139.96	106.38	382.12	139.96	140.02
7	☐	J4	218.69	186.00	J4	139.96	106.18	186.00	139.96	139.96
8	☐	J5	217.41	247.87	J5	139.96	105.68	247.87	139.96	139.97
9	☐	J8	222.46	148.19	J8	139.96	105.83	148.19	139.96	139.98
10	☐	J9	219.30	138.79	J9	139.96	106.03	138.79	139.96	140.02


MAX DAY + FIRE (10,000 l/min) DESIGN FIREFLOWS
SUC ZONE RECONFIGUATION
272.58 L/s
363.96 L/s
564.35 L/s
559.47 L/s
393.65 L/s
216.95 L/s
205.06 L/s
207.69 L/s
189.51 L/s

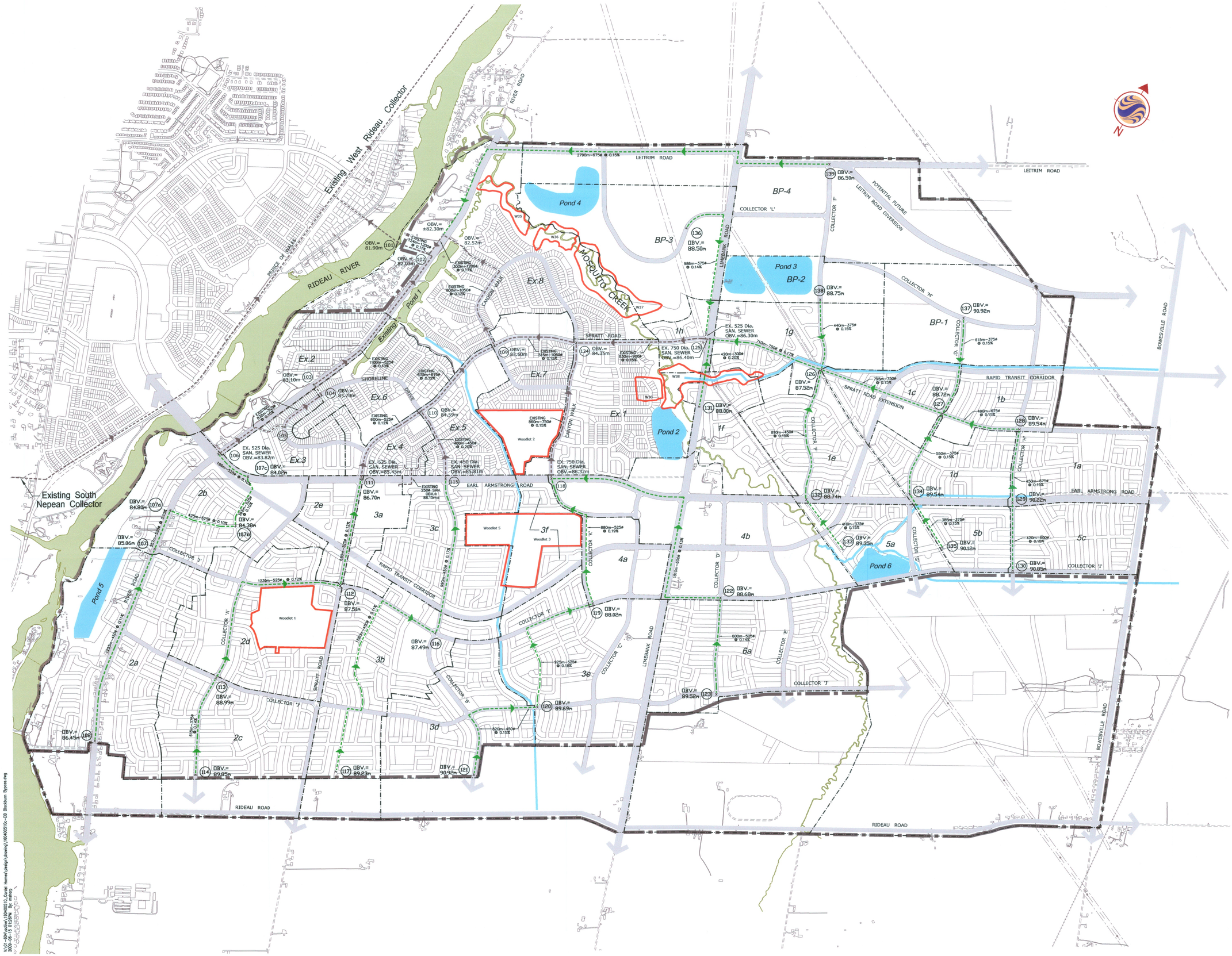
		ID	Total Demand (L/s)	Available Flow at Hydrant (L/s)	Critical Node ID	Critical Node Pressure (kPa)	Critical Node Head (m)	Design Flow (L/s)	Design Pressure (kPa)	Design Fire Node Pressure (kPa)
1	☐	J10	167.99	148.42	J11	136.98	105.88	147.17	139.96	142.95
2	☐	J11	169.84	131.64	J11	139.96	106.18	131.64	139.96	139.98
3	☐	J12	167.62	273.91	J11	138.30	106.01	272.63	139.96	141.72
4	☐	J13	168.57	388.48	J13	139.96	107.08	388.48	139.96	140.09
5	☐	J2	167.91	394.41	J2	139.96	107.08	394.41	139.96	140.13
6	☐	J20	166.67	386.69	J20	139.96	106.58	386.69	139.96	140.20
7	☐	J22	166.67	143.71	J22	139.96	105.88	143.71	139.96	139.97
8	☐	J3	168.91	391.40	J3	139.96	106.38	391.40	139.96	140.13
9	☐	J4	168.69	190.47	J4	139.96	106.18	190.47	139.96	139.96
10	☐	J5	167.41	253.82	J5	139.96	105.68	253.82	139.96	140.04
11	☐	J8	172.46	151.76	J8	139.96	105.83	151.76	139.96	139.96
12	☐	J9	169.30	142.24	J9	139.96	106.03	142.24	139.96	139.97


MAX DAY + FIRE (13,000 l/min) DESIGN FIREFLOWS
SUC ZONE RECONFIGUATION
270.07 L/s
360.60 L/s
558.85 L/s
558.44 L/s
389.97 L/s
214.94 L/s
203.12 L/s
211.02 L/s
187.72 L/s

		ID	Total Demand (L/s)	Available Flow at Hydrant (L/s)	Critical Node ID	Critical Node Pressure (kPa)	Critical Node Head (m)	Design Flow (L/s)	Design Pressure (kPa)	Design Fire Node Pressure (kPa)
1	☐	J10	217.99	144.83	J11	136.98	105.88	143.56	139.96	143.01
2	☐	J11	219.84	128.45	J11	139.96	106.18	128.45	139.96	140.01
3	☐	J12	217.62	267.40	J11	138.28	106.01	266.07	139.96	141.66
4	☐	J13	218.57	378.70	J13	139.96	107.08	378.70	139.96	140.00
5	☐	J2	217.91	385.10	J2	139.96	107.08	385.10	139.96	140.03
6	☐	J3	218.91	382.12	J3	139.96	106.38	382.12	139.96	140.02
7	☐	J4	218.69	186.00	J4	139.96	106.18	186.00	139.96	139.96
8	☐	J5	217.41	247.87	J5	139.96	105.68	247.87	139.96	139.97
9	☐	J8	222.46	148.19	J8	139.96	105.83	148.19	139.96	139.98
10	☐	J9	219.30	138.79	J9	139.96	106.03	138.79	139.96	140.02

Appendix C

- **Drawing SAN-1 Sanitary Servicing Plan (RSCISSU)**
- **Sanitary Sewer Design Sheet (RSCISSU)**
- **Sanitary Sewer Flow**
- **Figure 3.1 – Conceptual Sanitary Plan**



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Ottawa ON Canada
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Tel. 613.722.4420
Fax. 613.722.2799
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Legend

- Proposed SWM Facility
- Overland Flow Corridor
- Riverside South (Urban Boundary Limit)
- Existing Sanitary Sewer
- Proposed Sanitary Sewer
- (106) OBV.= 83.82m — Existing Manhole Node
- (135) OBV.= 85.77m — Sanitary Manhole Node
- Sub-drainage Area Limit
- 4a — Sub-drainage Area I.D.
- W35 — Wood Lot

7	REALIGNMENT AT LRT CROSSING	MJS	NG	JUNE 9/09
6	FINAL SUBMISSION	BCB	NG	JULY 30/08
5	FINAL REPORT (DRAFT)	BCB	NG	MAR 5/08
4	GENERAL REVISIONS	BCB	PM	JAN 25/08
3	REVISED TRANSIT ALIGNMENT	DRP	DRP	MAY 17/06
2	REVISED SIZES AND ELEVATIONS	DRP	DRP	NOV 23/05
1	SECOND SUBMISSION	GBU	DFE	MAY 25/05
Revision		By	Appd.	YY.MM.DD
File Name: 163400917		BCB	NG	PM FEB. 2007
		Dwn.	Chkd.	Dsgn. YY.MM.DD

Seal

Client/Project

CLARIDGE HOMES

Riverside South Community
Master Servicing Study Update
Ottawa ON Canada

Title

SANITARY SERVICING PLAN

Project No. 163400917

Scale 1:10,000 (0, 100, 300, 500m)

Drawing No. SAN-1

Sheet 2 of 3

Revision 7

Stantec

Riverside South Community
Infrastructure Servicing Study

Revision Date: March 4, 2008
Date: February 15, 2005
Designed by: DRP
Checked By: RRC

SANITARY SEWER DESIGN SHEET

CITY CRITERIA & DENSITIES
Approved area

File Number: 604 - 00176

DESIGN PARAMETERS

Average Daily Flow / Person:	350	l/p/day	Commercial:	0.579	l/s/ha
Minimum Velocity:	0.60	m/s	Industrial:	0.405	l/s/ha
n =	0.013		Institutional:	0.579	l/s/ha
Max Peaking Factor:	4.0		Infiltration:	0.280	l/s/ha
Min. Peacking Factor:	2.0				
Peacking Factor Industrial:	Based on Appendix 4-B		Low Density:	@ 3.2	pers/unit
Peacking Factor Comm. / Inst.:	1.5		Medium Density:	@ 2.4	pers/unit
			High Density:	@ 1.9	pers/unit

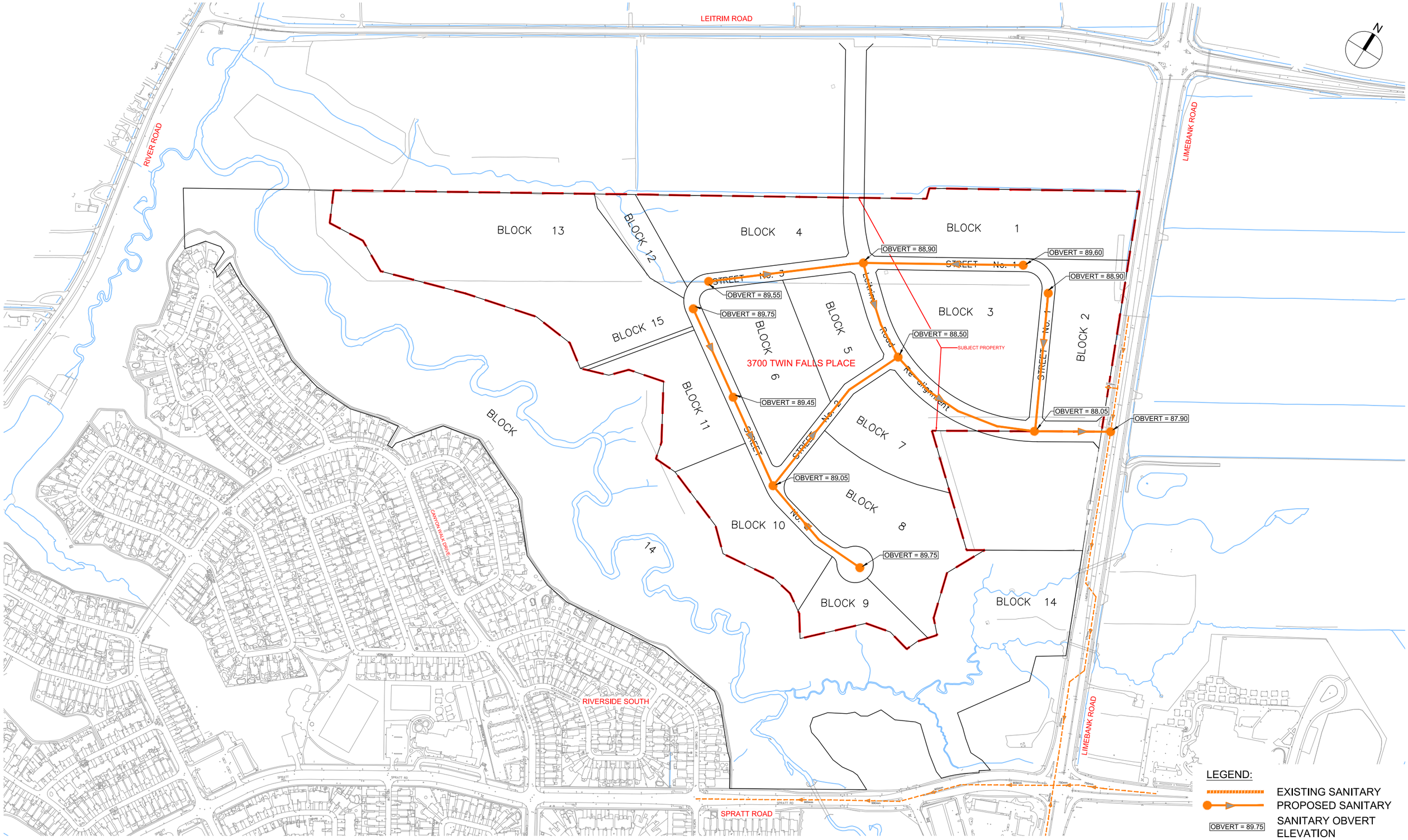
Existing Sanitary Sewer Lines

ID Area	From MH	To MH	RESIDENTIAL AREA (ha)	LOW Area (ha)	LOW Pop.	LOW Accum. Pop.	MED Area (ha)	MED Pop.	MED Accum. Pop.	HIGH Area (ha)	HIGH Pop.	HIGH Accum. Pop.	Units	Accum. Units	Total Accum. Pop.	Peak Factor	Peak Flow (l/s)	COMMERCIAL Area (ha)	COMMERCIAL Accum. Area (ha)	INDUSTRIAL Area (ha)	INDUSTRIAL Accum. Area (ha)	INSTITUTIONAL Area (ha)	INSTITUTIONAL Accum. Area (ha)	C+I+I Peak Flow (l/s)	PARK / ROAD Area (ha)	PARK / ROAD Accum. Area (ha)	INFILTRATION Total Area (ha)	INFILTRATION Accum. Area (ha)	Infilt. Flow (l/s)	Total Flow (l/s)	PIPE Distance (m)	Diameter (mm)	Slope (%)	Capacity (Full) (l/s)	Velocity (Full) (m/s)	Velocity (Actual) (m/s)	Upstream Obvert Elevation (m)	Upstream Invert Elevation (m)	Downtream Obvert Elevation (m)	Downtream Invert Elevation (m)
2a	108	107	18.33	64.83	3194	3194	3.50	223	223	0	0	0	1091	1091	3417	3.4	47.0	1.20	1.20	0	0	1.00	1.00	1.9	5.66	5.66	76.19	76.19	21.3	70.2	1255	450	0.12	103.0	0.63	0.68	87.96	87.31	86.46	86.01
2b	107	107a	34.10	21.11	1040	4234	12.99	830	1053	0	0	0	671	1762	5287	3.2	69.1	0	1.20	0	0	0	1.00	1.9	19.35	25.01	53.45	129.64	36.3	107.2	257	525	0.12	155.4	0.70	0.75	86.46	85.93	86.15	85.62
	107a	107b	0.00	0.00	0	4234	0.00	0	1053	0	0	0	0	1762	5287	3.2	69.0	0.00	1.20	0	0	0	1.00	1.9	0.00	25.01	0.00	129.64	36.3	107.2	**636**	**525**	**0.12**	**155.4**	**0.70**	**0.75**	86.15	85.62	85.38	84.86
	107b	107c	0.00	0.00	0	4234	0	0	1053	0	0	0	0	1762	5287	3.2	69.0	0	1.20	0	0	0	1.00	1.9	0.00	25.01	0.00	129.64	36.3	107.2	**500**	**525**	**0.15**	**173.8**	**0.78**	**0.82**	85.36	84.86	84.63	84.11
	107c	106	0.00	0.00	0	4234	0	0	1053	0	0	0	0	1762	5287	3.2	69.0	0	1.20	0	0	0	1.00	1.9	0.00	25.01	0.00	129.64	36.3	107.2	**590**	**525**	**0.14**	**167.9**	**0.75**	**0.80**	84.83	84.11	83.81	83.28
Ex3	106	103	17.90	10.04	417	4647	7.86	564	1617	0	0	0	364	2126	6264	3.2	80.0	5.35	6.55	0	0	0	1.00	8.6	0.00	25.01	23.25	152.89	42.8	129.4	**835**	**525**	**0.10**	**141.9**	**0.63**	**0.73**	83.82	83.30	83.10	82.58
Ex2	103	102	16.42	16.42	573	5220	0	0	1617	0	0	0	179	2305	6837	3.1	86.3	0	6.55	0	0	0	1.00	6.6	5.11	30.12	21.53	174.42	48.8	141.7	**1100**	**525**	**0.10**	**141.9**	**0.63**	**0.74**	83.10	82.58	82.00	81.48
																																							Ex. Obv. @ SAN 102	82.20
																																							Ex. Inv. @ SAN 102	81.00
2c	114	113	46.31	44.35	2186	2186	1.96	125	125	0	0	0	735	735	2311	3.5	33.1	0	0	0	0	0	0	0.0	6.96	6.96	53.27	53.27	14.9	48.0	615	375	0.14	68.4	0.60	0.65	89.73	89.35	88.87	88.49
2d	113	112	44.89	26.13	1286	3472	18.76	1198	1323	0	0	0	901	1636	4795	3.3	63.4	0	0	0	0	8.69	8.69	7.5	5.13	12.09	58.71	111.98	31.4	102.3	1230	525	0.12	155.4	0.70	0.74	88.87	88.34	87.39	86.87
2e-3a	112	111	18.65	1.86	90	3562	11.60	740	2063	5.19	591	591	647	2283	6216	3.2	79.5	2.40	2.40	0	0	8.47	17.16	17.0	4.77	16.86	34.29	146.27	41.0	137.4	680	525	0.12	155.4	0.70	0.79	87.39	86.87	86.57	86.05
Ex4	111	110	14.93	13.31	90	3652	1.62	468	2531	0	0	591	223	2506	6774	3.1	85.6	0.91	3.31	0	0	0	17.16	17.8	0	16.86	15.84	162.11	45.4	148.8	**600**	**525**	**0.12**	**155.4**	**0.70**	**0.80**	85.45	84.93	84.73	84.21
																																							Ex. Obv. @ SAN	85.45
																																							Ex. Inv. @ SAN	84.93
3b	117	116	60.37	43.08	2122	2122	17.29	1104	1104	0	0	0	1123	1123	3226	3.4	44.6	0.60	0.60	0	0	2.83	2.83	3.0	7.17	7.17	70.97	70.97	19.9	67.5	1580	450	0.11	98.6	0.60	0.65	89.23	88.78	87.49	87.04
3c	116	115	43.75	21.27	1050	3172	19.43	1241	2345	3.05	348	348	1028	2151	5865	3.2	75.6	0	0.60	0	0	0	2.83	3.0	8.51	15.68	52.26	123.23	34.5	113.0	990	450	0.17	122.6	0.75	0.86	87.49	87.04	85.81	85.36
Ex5	115	110	20.60	14.47	480	3652	6.13	302	2647	0	0	348	276	2427	6647	3.1	84.2	0.80	1.40	0	0	3.16	5.99	6.4	2.21	17.89	26.77	150.00	42.0	132.7	**480**	**450**	**0.20**	**133.0**	**0.81**	**0.94**	85.81	85.36	84.85	84.40
																																							Ex. Obv. @ SAN	85.81
																																							Ex. Inv. @ SAN	85.36
Ex6	110	109	25.47	20.32	822	8126	5.15	288	5466	0	0	939	377	5310	14531	2.8	164.4	0	4.71	0	0	2.39	25.54	26.3	2.71	37.46	30.57	342.68	96.0	286.6	**675**	**675**	**0.12**	**303.8**	**0.82**	**0.95**				
3d	121	120	44.62	39.50	1946	1946	5.12	326	326	0	0	0	744	744	2272	3.5	32.6	0.60	0.60	0	0	1.00	1.00	1.4	6.70	6.70	52.92	52.92	14.8	48.8	820	450	0.15	115.2	0.70	0.67	90.92	90.47	89.69	89.24
3e	120	119	45.28	36.39	1792	3738	8.89	566	892	0	0	0	796	1540	4630	3.3	61.4	0	0.60	0	0	10.12	11.12	10.2	24.79	31.49	80.19	133.11	37.3	108.9	925	525	0.18	190.3	0.85	0.88	89.69	89.16	88.02	87.50
3f-4a	119	118	28.00	0	0	3738	10.30	658	1550	17.70	1157	1157	854	2394	6445	3.1	82.0	0	0.60	0	0	0	11.12	10.2	9.44	40.93	37.44	170.55	47.8	139.9	880	525	0.19	195.6	0.88	0.95	88.02	87.50	86.35	85.83
																																							Ex. Obv. @ SAN	86.32
																																							Ex. Inv. @ SAN	85.57
6a	123	122	53.24	36.74	1811	1811	16.50	1054	1054	0	0	0	1005	1005	2865	3.5	40.1	1.20	1.20	0.00	0	4.15	4.15	4.6	12.11	12.11	70.70	70.70	19.8	64.6	600	525	0.14	167.9	0.75	0.69	89.52	89.00	88.68	88.16
4b	122	118	62	0	0	1811	0	0	1054	62.45	4079	4079	2045	3050	6944	3.1	87.5	0	1.20	0.00	0	0	4.15	4.6	16.96	29.07	79.41	150.11	42.0	134.2	1810	600	0.13	231.0	0.79	0.82	88.68	88.08	86.33	85.73
																																							Ex. Obv. @ SAN	86.32
																																							Ex. Inv. @ SAN	85.57
Ex1	118	124	45.64	22.12	896	6445	23.52	1687	4291	0.00	0	5236	983	6427	15972	2.8	178.0	1.55	3.35	0	0	0	15.27	16.2	0	70.00	47.19	367.85	103.0	297.1	**860**	**750**	**0.15**	**449.8**	**0.99**	**1.06**				
																																							Ex. Obv. @ SAN	86.32
																																							Ex. Inv. @ SAN	85.57
5c	130	129	24.82	19.94	982	982	4.88	312	312	0	0	0	437	437	1294	3.7	19.5	0	0	0	0	2.83	2.83	2.5	7.38	7.38	35.03	35.03	9.8	31.8	420	600	0.15	248.1	0.85	0.56	90.85	90.25	90.22	89.62
1a	129	128	27.43	19.41	957	1939	8.02	511	823	0	0	0	512	949	2762	3.5	38.9	0	0	0	0	1.00	3.83	3.3	9.41	16.79	37.84	72.87	20.4	62.6	450	675	0.15	339.6	0.92	0.68	90.22	89.54	89.54	88.87
1b	128	127	20.32	6.63	326	2265	13.69	874	1697	0	0	0	466	1415	3962	3.3	53.6	0	0	0	0	2.86	6.69	5.8	3.90	20.69	27.08	99.94	28.0	87.4	490	675	0.15	339.6	0.92	0.74	89.54	88.87	88.81	88.13
5b	135	134	17.36	9.93	490	490	7.43	475	475	0	0	0	351	351	965	3.8	14.9	0	0	0	0	0	0	0.0	2.46	2.46	19.82	19.82	5.5	20.4	385	375	0.15	70.8	0.62	0.53	90.12	89.75	89.54	89.17
1d	134	127	22.74	12.34	608	1098	10.40	665	1140	0	0	0	467	818	2238	3.5	32.2	3.20	3.20	0	0	0	0	2.8	5.30	7.76	31.24	51.06	14.3	49.2	550	375	0.15	70.8	0.62	0.67	89.54	89.17	88.72	88.34
BP-1	137	127	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	59	59	51.3	6.90	6.90	66.00	66.00	18.5	69.8	725	375	0.15	70.8	0.62	0.72	90.92	90.55	89.83	89.46
1c	127	126	14.79	0	0	3363	9.29	593	3430	5.50	627	627	577	2810	7420	3.1	92.6	0.60	3.80	0	0.0	6.50	72.29	66.1	4.57	39.92	26.46	243.46	68.2	226.9	795	750	0.15	449.8	0.99	0.99	88.72	87.97	87.53	86.78
5a	133	132	19.47	12.37	608	608	7.10	454	454	0	0	0	379	379	1062	3.8	16.3	0.60	0.60	0	0	1.79	1.79	2.1	7.56	7.56	29.42	29.42	8.2	26.6	410	375	0.15	70.8	0.62	0.57	89.35	88.98	88.74	88.36
1e	132	126	29.70	20.74	1021	1629	8.96	571	1025	0	0	0	557	936	2654	3.5	37.5	0	0.60	0	0	1.40	3.19	3.3	12.16	19.72	43.26	72.68	20.3	61.1	810	450	0.15	115.2	0.70	0.71	88.74	88.29	87.52	87.07
BP-2	138	126	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	10	10	8.3	4.20	4.20	13.80	13.80	3.9	12.2	440	375	0.15	70.8	0.62	0.45	88.75	88.38	88.09	87.72
1g	126	125	15.69	4.82	237	5229	10.87	694	5149	0	0	627	363	4109	11005	2.9	129.9	0	4.40	0	0.0	12.19	97.27	88.3	3.53	67.37	31.41	361.34	101.2	319.3	710	750	0.17	478.9	1.05	1.13	87.52	86.77	86.31	85.56
1f	131	125	15.61	11.07	544	544	4.54	290	290	0	0	0	291	291	834	3.8	13.0	0	0	0	0.0	0	0	0.0	1.54	1.54	17.15	17.15	4.8	17.8	420	300	0.20	45.1	0.62	0.57	88.00	87.70	87.16	86.86
BP3	136	125	0.00	0.00	0	0	0.00	0	0	0	0	0	0	0	0		0.0	0	0	0	0.0	25	25	22.0	38.40	38.40	63.70	63.70	17.8	39.8	986	375	0.14	68.4	0.60	0.62	88.50	88.13	87.09	86.72
1h	125	124	3.99	2.43	118	5891	1.56	98	5537	0	0	627	78	4478	12055	2.9	140.3	4.70	9.10	0	0.0	0	132.17	122.7	0.19	111.70	8.88	464.86	130.2	393.2	**830**	**900**	**0.15**	**731.4**	**1.11**	**1.12**	86.31	85.41	85.07	84.17
Ex7	124	109	17.26	11.40	768	13104	3.00	250	10078	2.86	327	6190	516	11421	29372	2.5	295.8	0.64	13.09	0	0.0	0	147.44	139.4	2.40	184.10	20.30	853.01	238.8	674.1	**515**	**1050**	**0.15**	**1103.3**	**1.23**	**1.30**	84.35	83.30	83.60	82.55
Ex8	109	102	56.40	54.40	2150	23380	2.00	134	15678	0	0	7129	728	17459	46187	2.3	429.7	0	17.80	0	0.0	0	172.98	165.7	5.45	227.01	61.85	1257.54	352.1	947.5	**1100**	**1050**	**0.15**	**1103.3**	**1.23**	**1.39**	83.6	82.55	82.03	80.98
BP-4	139	102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	149	149	129.4	15.00	15.00	164.04	164.04	45.9	175.4	2790	675	0.15	339.6	0.92	0.92	**86.50**	85.83	82.03	81.36
	102	101	0			27614			16731			7129	0	**19221**	**51474**	2.3	469.8	0	19.00	0	0.0	0	323.02	297.0	0	267.02	0	1551.22	434.3	1201.1	**145**	**1200**	**0.11**	**1349.0**	**1.16**	**1.32**	82.03	80.83	81.90	80.70

***Note:**
Area BP-4 also accounts for additional 39ha area outside the CDP that was accounted for in calculation of Employment Area
PIPE Capacity (Full) calculated using ACTUAL PIPE SIZE
Limiting Capacity Calculated based on 1200 mm pipe @ 0.11% between Rideau Road and River
Additional sanitary flow of 29.21 L/s from Rideau Carleton Raceway (RCR) is not included in the above calculation
Net Residual Capacity at River Crossing is 118.69 l/s (1349 - 1201.1 -29.21)

Sanitary Design Flow 3700 Twin Falls Place

Area of Blocks 1 to 11 and 13	41.38	ha
Area of Streets & Block 12	6.00	
Total Site Area	47.38	ha
Flow Rate for Employment Lands	28,000	l/ha/day
Peaking Factor	1.5	
Peak Flow	20.12	l/s
Infiltration Rate	0.33	l/s/ha
Infilration Flow	15.64	l/s
Total Flow	35.75	l/s



J:\136974_RSS_Employme\7.0_Production\7.03_Design\04_Civil_LAND_Adequacy Report\FIGURE 3.1 CONCEPTUAL SANITARY SERVICES.dwg Layout Name: CONCEPTUAL SANITARY SERVICES Last Saved By: Chris.Cormier Last Saved At: Mar. 14, 23

IBI

Scale: N.T.S.

Project Title: RIVERSIDE SOUTH
3700 TWIN FALLS PLACE

Drawing Title: CONCEPTUAL SANITARY SERVICES

Sheet No.: FIGURE 3.1

Appendix D

- **Figure 4.1 -Storm Drainage Area Plan**
- **Figure 4.2 -Cross-sections Plan View**
- **Figure 4.3 -Proposed Limebank Road Crossing (North)**
- **Figure 4.4 -Proposed Limebank Road Crossing (South)**
- **Figure 4.5 -Cross-sections**
- **Figure 4.6 -Business Park LID Conceptual Profile**
- **LIDs 3700 Twin Falls Place**

RIDEAU RIVER
RIVER ROAD
TRIBUTARY 4
MOSQUITO CREEK
LIMEBANK ROAD
LEITRIM ROAD
TRIBUTARY 3
SPRATT ROAD
LIMEBANK ROAD
N

4_S12 4.09 93
4_S13 8.19 92
4_S14 11.55 84
4_S16 15.86 93
4_S19 7.61 [28]
4_S20A 7.71 [63]
4_S20B 2.80 [41]
4_S21 11.03 93
4_S17 14.52 91
4_S18 20.36 93
4_S15 3.75 93
4_B1 4.21 93
4_B2 2.56 93
4_B3 4.28 93
4_B4 3.16 93
4_B5 1.71 93
4_B6 3.17 93
4_B7 2.09 93
4_B8 4.20 93
4_B9 1.23 93
4_B10 2.49 93
4_B11 2.25 93
4_B12 0.61 40
4_B13 7.27 93
4_R1_1-1 0.26 70
4_R1_1-2 0.27 70
4_R1_2-1 0.23 70
4_R1_2-2 0.24 70
4_R2_1-1 0.11 70
4_R2_1-2 0.11 70
4_R2_2-1 0.14 70
4_R2_2-2 0.15 70
4_R3_1-1 0.31 70
4_R3_1-2 0.30 70
4_R3_2-1 0.36 70
4_R3_2-2 0.39 70
4_R3_3-1 0.30 70
4_R3_3-2 0.29 70
4_R4_1 0.34 70
4_R4_2 0.80 70
4_R4_3 0.49 70
4_R4_4 0.33 70

LEGEND:

- SUBJECT SITE DRAINAGE AREAS
- EXTERNAL TRIBUTARY DRAINAGE AREAS TO TRIBUTARY 4 - EMPLOYMENT AND SPECIAL DISTRICT
- EXTERNAL TRIBUTARY DRAINAGE AREAS TO TRIBUTARY 4 - NATURAL ENVIRONMENT AREA
- EXTERNAL DRAINAGE AREAS
- 4_B1 / 5.36 | 83 — AREA ID; IMPERVIOUS VALUE (%) / [TIME OF CONCENTRATION (min)]; AREA (h)
- TOTAL FLOW CONNECTIVITY
- PROPOSED DITCH WITH FLOW DIRECTION
- PROPOSED CULVERT
- EXISTING CULVERT
- RVCA REGULATION LIMIT
- GEO Morphix (July 2019): MEANDER BELT WIDTH
- Paterson Group (June 2020): TOP OF SLOPE; STABLE SLOPE ALLOWANCE; TOE EROSION ALLOWANCE; EROSION ACCESS ALLOWANCE; LIMIT OF HAZARD LANDS

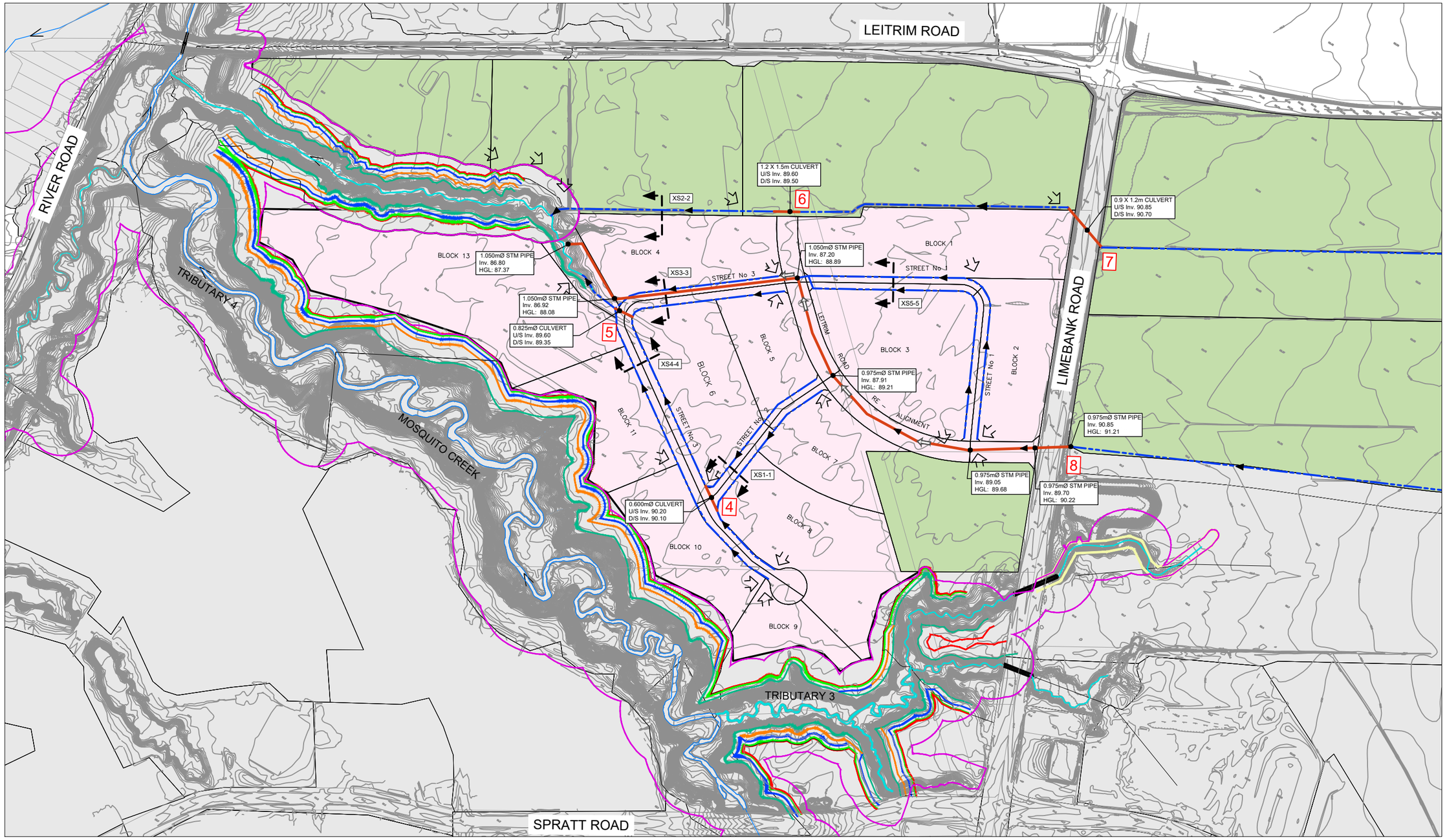
IBI

Scale: N.T.S

Project Title: RIVERSIDE SOUTH
3700 TWIN FALLS PLACE

Drawing Title: STORM DRAINAGE AREA PLAN

Sheet No.: FIGURE 4.1



LEGEND:

- SUBJECT SITE DRAINAGE AREAS
- EXTERNAL DRAINAGE AREAS TO TRIBUTARY 4 - EMPLOYMENT AND SPECIAL DISTRICT
- EXTERNAL DRAINAGE AREAS TO TRIBUTARY 4 - NATURAL ENVIRONMENT AREA
- EXTERNAL DRAINAGE AREAS
- PROPOSED DITCH WITH FLOW DIRECTION
- PROPOSED CULVERT / STORM PIPE
- EXISTING CULVERT
- 8 PROPOSED CULVERT ID
- XS1-1 CROSS SECTION ID
- TOTAL FLOW CONNECTIVITY
- MAJOR FLOW CONNECTIVITY
- RVCA REGULATION LIMIT

GEO Morphix (July 2019)

- MEANDER BELT WIDTH

Paterson Group (June 2020)

- TOP OF SLOPE
- STABLE SLOPE ALLOWANCE
- TOE EROSION ALLOWANCE
- EROSION ACCESS ALLOWANCE
- LIMIT OF HAZARD LANDS

NOTE:

FOR PROPOSED LIMEBANK CROSSING CULVERT "7" AND "8" REFER TO FIGURE 4.3 AND 4.4

FOR CROSS SECTIONS REFER TO FIGURE 4.5

IBI

Scale: N.T.S

Project Title: RIVERSIDE SOUTH
3700 TWIN FALLS PLACE

Drawing Title: CROSS SECTIONS
PLAN VIEW

Sheet No.: FIGURE 4.2

CATCH BASIN DATA / CATCH BASIN LEAD

STATION	OFFSET	CATCH BASIN TYPE	T/G ELEVATION	LENGTH (1)	LENGTH (2)	INVERT (1)	INVERT (2)
14+364.02	17.00 L	OPSD 705.020 - S3,S22,S23	92.76	22.97	6.25	91.16	91.16
14+365.01	13.50 R	OPSD 705.010 - S3,S22,S23	92.84	7.22	6.25	91.24	91.24
14+394.00	17.00 L	OPSD 705.020 - S3,S22,S23	92.87	22.97	6.25	91.27	91.27
14+399.99	13.50 R	OPSD 705.010 - S3,S22,S23	92.97	7.22	6.25	91.37	91.37
14+424.01	17.00 L	OPSD 705.010 - S3,S22,S23	93.00	22.91	6.25	91.40	91.40
14+435.02	13.50 R	OPSD 705.010 - S3,S22,S23	93.11	7.19	6.25	91.51	91.51
14+454.01	17.00 L	OPSD 705.010 - S3,S22,S23	93.12	22.87	6.25	91.52	91.52
14+469.98	13.50 R	OPSD 705.010 - S3,S22,S23	93.25	7.24	6.25	91.65	91.65
14+489.01	16.25 L	OPSD 705.010 - S3,S22,S23	93.27	22.13	6.25	91.67	91.67

CATCH BASIN DATA / CATCH BASIN LEAD

NO.	STATION	OFFSET	CATCH BASIN TYPE	T/G ELEVATION	LENGTH (1)	LENGTH (2)	INVERT (1)	INVERT (2)
CB 46	14+521.00	13.50 R	OPSD 705.010 - S3,S22,S23	93.45	7.26	6.25	91.85	91.85
CB 47	14+524.00	14.50 L	OPSD 705.010 - S3,S22,S23	93.44	20.52	7.50	91.84	91.84
CB 48	14+600.04	13.50 L	OPSD 705.010 - S3,S22,S23	93.39	19.35	7.80	91.79	91.79
CB 49	14+601.04	13.50 R	OPSD 705.010 - S3,S22,S23	93.39	7.15	6.25	91.79	91.79
CB 50	14+645.00	13.50 L	OPSD 705.010 - S3,S22,S23	93.21	18.56	7.35	91.61	91.61
CB 51	14+685.29	12.25 L	OPSD 705.010 - S3,S22,S23	93.06	17.26	7.00	91.46	91.46
CB 52	14+696.06	12.25 R	OPSD 705.010 - S3,S22,S23	93.00	7.03	7.75	91.40	91.40

NOTES:
- CATCH BASIN OFFSETS ARE FROM ALIGNMENT CONTROL LINE TO FACE OF CURB .
- CB LEAD NOTE (1) DENOTES CB LEAD LENGTH AND INVERT ELEVATION FOR FINAL CONNECTION TO THE STORM SEWER. CATCH BASIN LEAD TO BE CAPPED WITH SPIGOT PLUG. ALL CATCH BASIN LEADS TO STORM SEWER SHALL BE 200mm DIA. PVC SDR 35 INSTALLED AT 2% SLOPE UNLESS OTHERWISE SPECIFIED ON THE DRAWINGS.
- CB LEAD NOTE (2) DENOTES CB LEAD LENGTH AND INVERT ELEVATION FOR INTERIM CONNECTION TO THE DRAINAGE DITCH. ALL CATCH BASIN LEADS SHALL OUTLET AT BOTTOM OF DITCH; SLOPE OF EACH LEAD TO BE ADJUSTED ACCORDINGLY.
- REFER TO GENERAL ARRANGEMENT DRAWINGS BY MORRISON HERSHFIELD FOR CULVERT INSTALLATION DETAILS.

STORM MAINTENANCE HOLE DATA

NO.	STRUCTURE TYPE / SIZE	COORDINATES NORTHING	COORDINATES EASTING
ST 202	OPSD 701.010 - 1200mm Ø	5017796.165	369368.870
ST 203	OPSD 701.010 - 1200mm Ø	5017704.087	369408.021
ST 204	OPSD 701.011 - 1200mm Ø C/W SAFETY PLATFORM	5017610.161	369447.652

SANITARY MAINTENANCE HOLE DATA

NO.	STRUCTURE TYPE / SIZE	COORDINATES NORTHING	COORDINATES EASTING
SA 20	OPSD 701.010 - 1200mm Ø C/W SAFETY PLATFORM	5017539.271	369474.740

J.L.Richards
ENGINEERS ARCHITECTS PLANNERS
J.L. Richards & Associates Limited
864 Lady Ellen Place
Ottawa, ON Canada
K1Z 5M2
Tel: 613 728 3571
Fax: 613 728 6012

NO.	REVISIONS	BY	DATE
0	*ISSUED FOR TENDER*	JB	12/08/08
1	ISSUED FOR CONSTRUCTION	JB	03/06/09
2	ISSUED WITH CCN # 7	JB	09/08/09
3	'AS BUILT' INFORMATION ADDED	JB	10/25/12

NOTE: The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage

LIMEBANK ROAD WIDENING
BALMORAL DRIVE TO SPRATT ROAD

PLAN AND PROFILE
STA. 14+350 TO 14+700

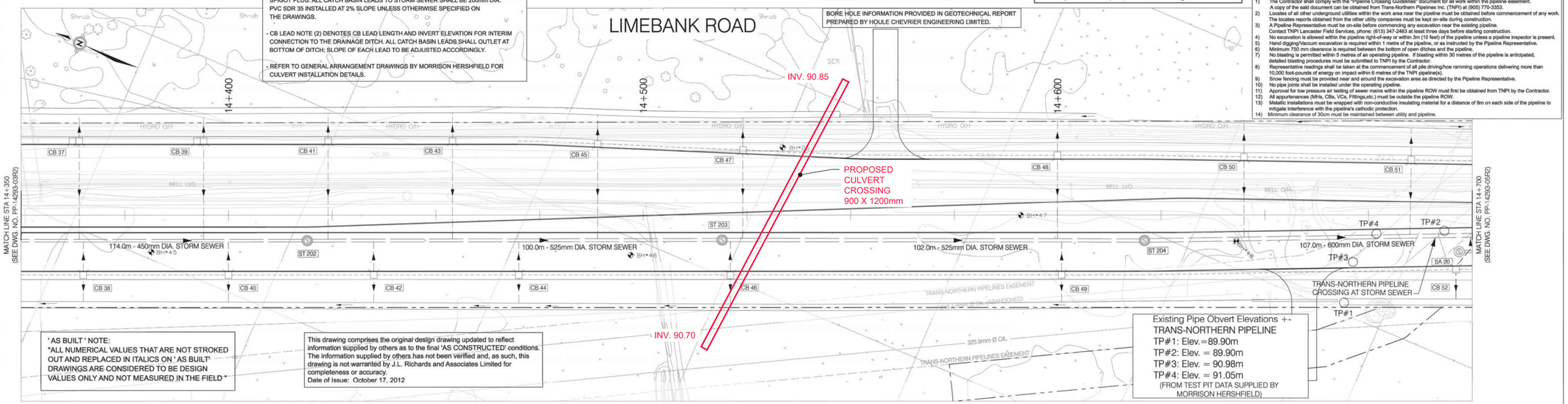
Ottawa

CONTRACT NO.
ISB07-5047
DWG. NO.
PP -14293 -04R2
SHEET 53 OF 149
Date: OCTOBER 2008
Scale: 0m 5 10 20

W. NEWELL, P. Eng
Director Infrastructure Services
ZIAD A. GHADBAN, P. Eng.
Manager Construction Services - Development

Dwn: MF , MGB Chkd: PDR Des: KD , JB Chkd: PDR

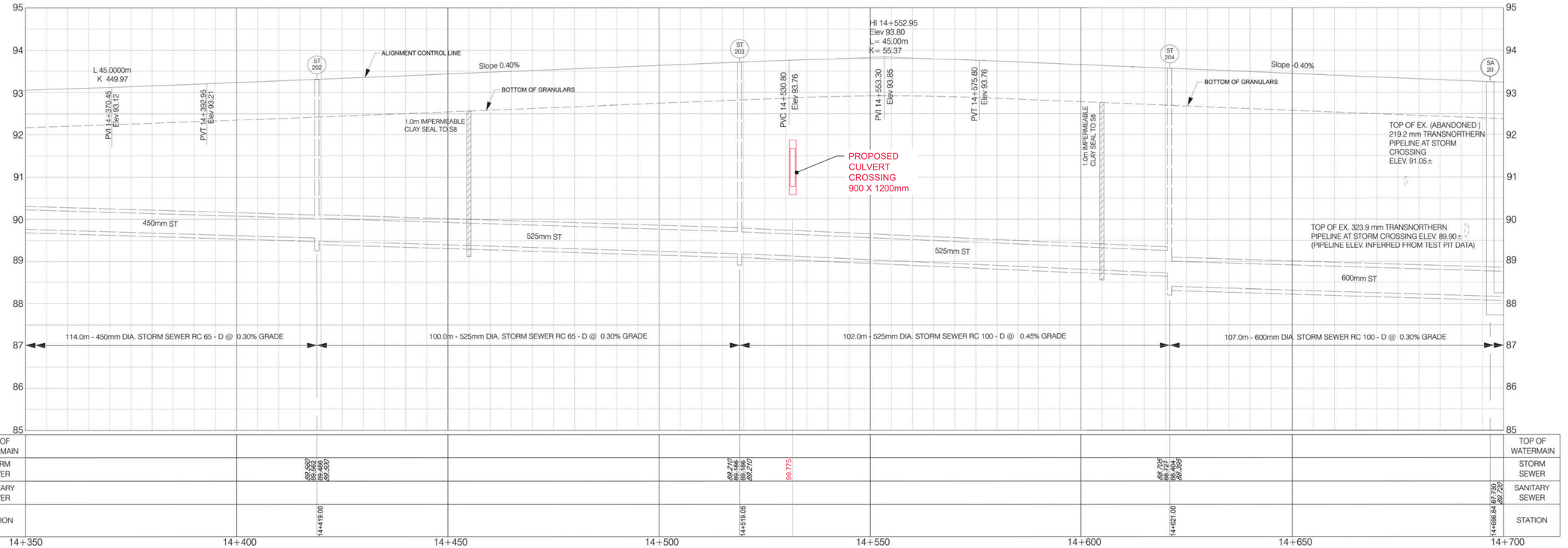
Trans-Northern Pipeline Crossing
1) The Contractor shall comply with the "Pipeline Crossing Guidelines" document for all work within the pipeline easement. A copy of the said document can be obtained from Trans-Northern Pipelines Inc. (TNPI) at (905) 770-3353.
2) Locates of all other underground utilities within the work area near the pipeline must be obtained before commencement of any work. The locates reports obtained from the other utility companies must be kept on-site during construction.
3) A Pipeline Representative must be on-site before commencing any excavation near the existing pipeline. Contact TNPI Lancaster Field Services, phone; (613) 347-2463 at least three days before starting construction.
4) No excavation is allowed within the pipeline right-of-way or within 3m (10 feet) of the pipeline unless a pipeline inspector is present.
5) Hand digging/Vacuum excavation is required within 1 metre of the pipeline, or as instructed by the Pipeline Representative.
6) Minimum 750 mm clearance is required between the bottom of open ditches and the pipeline.
7) No blasting is permitted within 5 metres of an operating pipeline. If blasting within 30 metres of the pipeline is anticipated, detailed blasting procedures must be submitted to TNPI by the Contractor.
8) Representative readings shall be taken at the commencement of all pile driving/hoe ramming operations delivering more than 10,000 foot-pounds of energy on impact within 6 metres of the TNPI pipeline(s).
9) Snow fencing must be provided near and around the excavation area as directed by the Pipeline Representative.
10) No pipe joints shall be installed under the operating pipeline.
11) Approval for low pressure air testing of sewer mains within the pipeline ROW must first be obtained from TNPI by the Contractor.
12) All appurtenances (MHs, CBs, VCs, Fittings,etc.) must be outside the pipeline ROW.
13) Metallic installations must be wrapped with non-conductive insulating material for a distance of 8m on each side of the pipeline to mitigate interference with the pipeline's cathodic protection.
14) Minimum clearance of 30cm must be maintained between utility and pipeline.



'AS BUILT' NOTE:
"ALL NUMERICAL VALUES THAT ARE NOT STROKED OUT AND REPLACED IN ITALICS ON 'AS BUILT' DRAWINGS ARE CONSIDERED TO BE DESIGN VALUES ONLY AND NOT MEASURED IN THE FIELD "

This drawing comprises the original design drawing updated to reflect information supplied by others as to the final 'AS CONSTRUCTED' conditions. The information supplied by others has not been verified and, as such, this drawing is not warranted by J.L. Richards and Associates Limited for completeness or accuracy.
Date of Issue: October 17, 2012

Existing Pipe Obvert Elevations +-
TRANS-NORTHERN PIPELINE
TP#1: Elev.=89.90m
TP#2: Elev. = 89.90m
TP#3: Elev. = 90.98m
TP#4: Elev. = 91.05m
(FROM TEST PIT DATA SUPPLIED BY MORRISON HERSHFIELD)



LEGEND:
PROPOSED CULVERT

z:\136974_RSS_Employment\7.0_Production\7.03_Design\37_Water\Sheets\136974-Figure 4.3 Proposed Limebank Road Crossing (North).dwg Layout Name: 4.3 Plot Style: ----- Plot Scale: 1:2.5849 Plotted At: 7/12/2022 9:30 AM Last Saved By: svukic Last Saved At: Jul. 12, 22

Scale

Project Title
RIVERSIDE SOUTH EMPLOYMENT LANDS AND BLOCKS 13, 14

Drawing Title
PROPOSED LIMEBANK ROAD CROSSING (NORTH)

Sheet No.
FIGURE 4.3

CATCH BASIN DATA

STATION	OFFSET	CATCH BASIN TYPE	T/G ELEVATION	CATCH BASIN LEAD LENGTH (1)	LENGTH (2)	INVERT (1)	INVERT (2)
4+735.00	11.75 L	OPSD 705.010 - S3,S22,S23	92.87	15.86	8.25	91.27	91.27
4+741.12	11.75 R	OPSD 705.020 - S3,S22,S23	92.84	6.91	8.25	91.24	91.24
4+784.95	11.75 L	OPSD 705.020 - S3,S22,S23	92.66	15.86	8.25	91.06	91.06
4+787.01	11.75 R	OPSD 705.010 - S3,S22,S23	92.66	6.91	8.25	91.06	91.06
4+829.99	11.75 L	OPSD 705.010 - S3,S22,S23	92.47	15.86	8.25	90.87	90.87
4+830.99	11.75 R	OPSD 705.020 - S3,S22,S23	92.47	6.91	8.25	90.87	90.87
4+875.03	11.75 L	OPSD 705.010 - S3,S22,S23	92.29	15.86	8.25	90.69	90.69
4+877.00	11.75 R	OPSD 705.020 - S3,S22,S23	92.28	6.91	8.25	90.68	90.68
4+914.99	11.75 L	OPSD 705.020 - S3,S22,S23	92.12	15.75	8.25	90.52	90.52

SUBDRAIN INSERT LOCATION TO ACCOMMODATE 200mm DIA. LEAD

CATCH BASIN DATA

NO.	STATION	OFFSET	CATCH BASIN TYPE	T/G ELEVATION	CATCH BASIN LEAD LENGTH (1)	LENGTH (2)	INVERT (1)	INVERT (2)
CB 62	14+921.00	11.75 R	OPSD 705.010 - S3,S22,S23	92.10	6.82	8.25	90.50	90.50
CB 63	14+954.96	12.00 L	OPSD 705.010 - S3,S22,S23	91.95	16.61	8.25	90.35	90.35
CB 64	14+965.98	12.25 R	OPSD 705.020 - S3,S22,S23	91.90	6.72	8.25	90.30	90.30
*CB 65	14+994.98	12.75 L	OPSD 705.020 - S3,S22,S23	91.77	17.81	8.25(E)	90.17	90.11(E&S)
*CB 66	15+011.00	13.00 R	OPSD 705.020 - S3,S22,S23	91.71	6.94	8.25(W)	90.11	89.86(S&W)
*CB 67	15+034.69	13.50 L	OPSD 705.010 - S3,S22,S23	91.60	18.77	39.00(N)	90.00	90.30(N)

NOTES:
- CATCH BASIN OFFSETS ARE FROM ALIGNMENT CONTROL LINE TO FACE OF CURB .
- CB LEAD NOTE (1) DENOTES CB LEAD LENGTH AND INVERT ELEVATION FOR FINAL CONNECTION TO THE STORM SEWER. CATCH BASIN LEAD TO BE CAPPED WITH SPIGOT PLUG. ALL CATCH BASIN LEADS TO STORM SEWER SHALL BE 200mm DIA. PVC SDR 35 INSTALLED AT 2% SLOPE UNLESS OTHERWISE SPECIFIED ON THE DRAWINGS.
- CB LEAD NOTE (2) DENOTES CB LEAD LENGTH AND INVERT ELEVATION FOR INTERIM CONNECTION TO THE DRAINAGE DITCH. ALL CATCH BASIN LEADS SHALL OUTLET AT BOTTOM OF DITCH; SLOPE OF EACH LEAD TO BE ADJUSTED ACCORDINGLY.
- REFER TO GENERAL ARRANGEMENT DRAWINGS BY MORRISON HERSHFIELD FOR CULVERT INSTALLATION DETAILS.

STORM MAINTENANCE HOLE DATA

NO.	STRUCTURE TYPE / SIZE	COORDINATES NORTHING	COORDINATES EASTING
ST 205	OPSD 701.011 - 1200mm Ø C/W SAFETY PLATFORM	5017512.291	369490.943
ST 206	OPSD 701.011 - 1200mm Ø C/W SAFETY PLATFORM	5017416.549	369531.556
ST 207	1520mm x 1830mm BOX MH C/W SAFETY PLATFORM	5017343.806	369562.369
ST 208	OPSD 701.011 - 1500mm Ø C/W SAFETY PLATFORM	5017260.463	369596.359

SANITARY MAINTENANCE HOLE DATA

NO.	STRUCTURE TYPE / SIZE	COORDINATES NORTHING	COORDINATES EASTING
SA 21	OPSD 701.010 - 1200mm Ø C/W SAFETY PLATFORM	5017459.133	369509.583
SA 21A	OPSD 701.010 - 1200mm Ø	5017437.048	369518.936
SA 22	OPSD 701.010 - 1200mm Ø	5017348.620	369556.389
SA 23	OPSD 701.010 - 1200mm Ø	5017237.505	369601.845

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NO.	REVISIONS	BY	DATE
0	ISSUED FOR TENDER	JB	12/06/08
1	ISSUED FOR CONSTRUCTION	JB	03/06/09
2	ISSUED WITH CCN # 7	JB	09/08/09
3	'AS BUILT' INFORMATION ADDED	JB	10/25/12

NOTE: The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage

LIMEBANK ROAD WIDENING
BALMORAL DRIVE TO SPRATT ROAD

PLAN AND PROFILE
STA.14+700 TO STA. 15+050

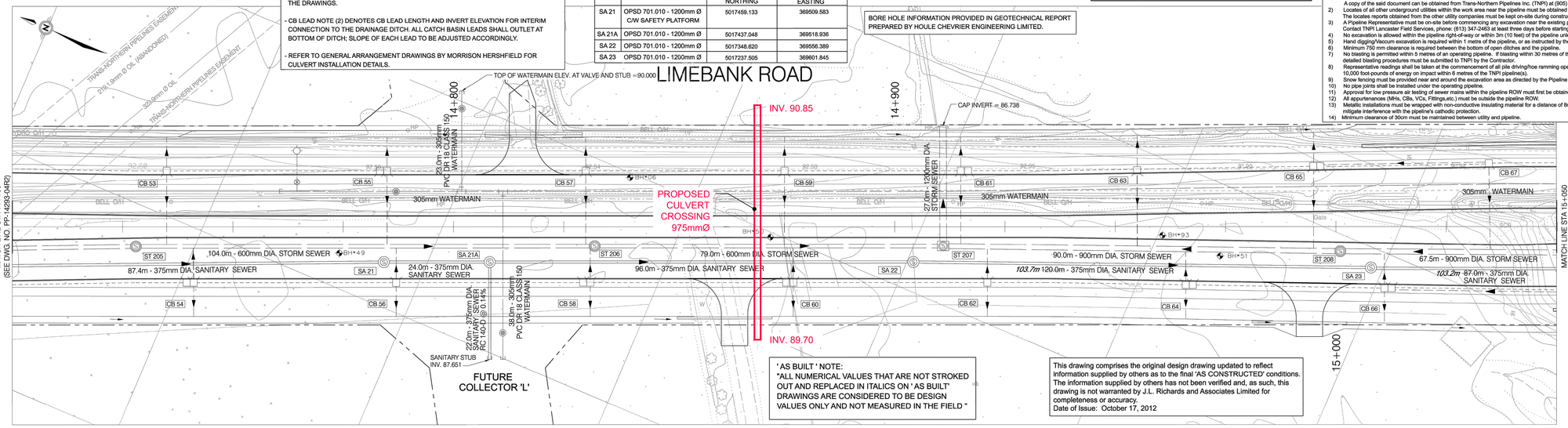
Ottawa
CONTRACT NO.
ISB07-5047
DWG. NO.
PP -14293 -05R2
SHEET 54 OF 149
Date: OCTOBER 2008
Scale: 0m 5 10 20

W. NEWELL, P. Eng
Director Infrastructure Services

ZIAD A. GHADBAN, P. Eng.
Manager Construction Services - Development

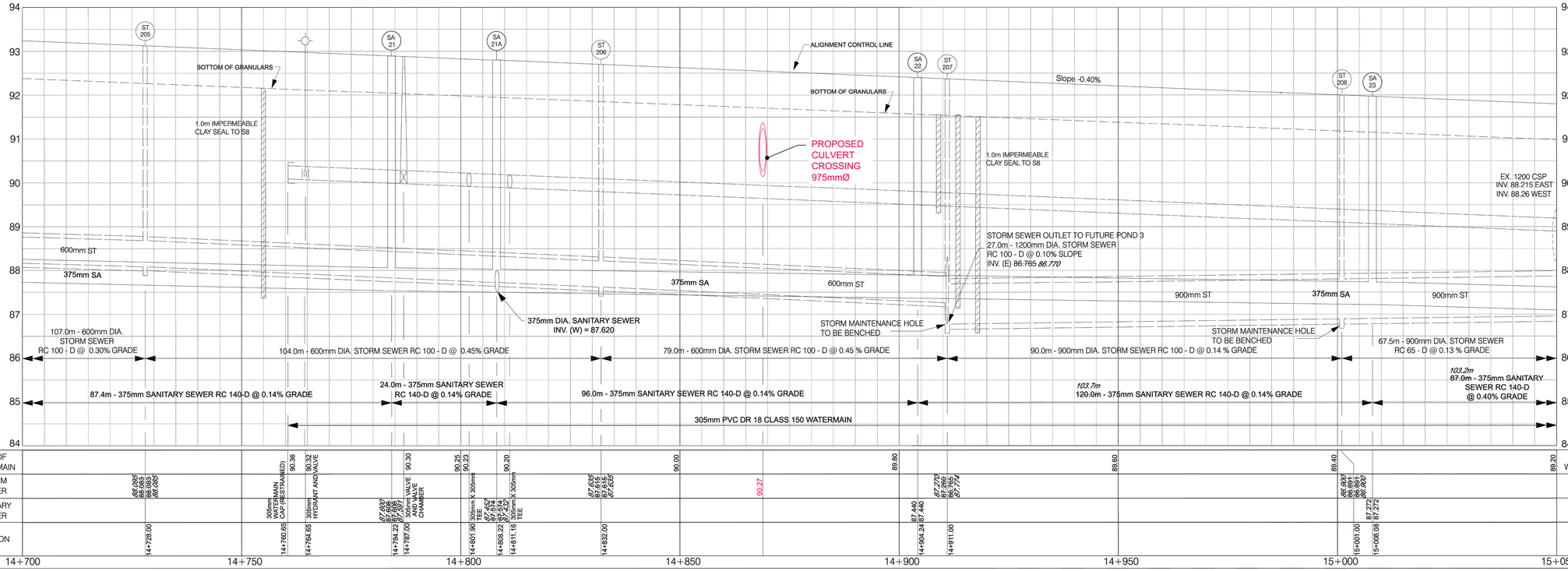
Dwn: MF , MQB | Chkd: PDR | Des: KD , JB | Chkd: PDR

Trans-Northern Pipeline Crossing
1) The Contractor shall comply with the "Pipeline Crossing Guidelines" document for all work within the pipeline easement. A copy of the said document can be obtained from Trans-Northern Pipelines Inc. (TNPI) at (905) 770-3353.
2) Locates of all other underground utilities within the work area near the pipeline must be obtained before commencement of any work. The locates reports obtained from the other utility companies must be kept on-site during construction.
3) A Pipeline Representative must be on-site before commencing any excavation near the existing pipeline. Contact TNPI Lancaster Field Services, phone: (613) 347-2463 at least three days before starting construction.
4) No excavation is allowed within the pipeline right-of-way or within 3m (10 feet) of the pipeline unless a pipeline inspector is present.
5) Hand digging/Vacuum excavation is required within 1 metre of the pipeline, or as instructed by the Pipeline Representative.
6) Minimum 750 mm clearance is required between the bottom of open ditches and the pipeline.
7) No blasting is permitted within 5 metres of an operating pipeline. If blasting within 30 metres of the pipeline is anticipated, detailed blasting procedures must be submitted to TNPI by the Contractor.
8) Representative readings shall be taken at the commencement of all pile driving/hoe ramming operations delivering more than 10,000 foot-pounds of energy on impact within 6 metres of the TNPI pipeline(s).
9) Snow fencing must be provided near and around the excavation area as directed by the Pipeline Representative.
10) No pipe joints shall be installed under the operating pipeline.
11) Approval for low pressure air testing of sewer mains within the pipeline ROW must first be obtained from TNPI by the Contractor.
12) All appurtenances (MHs, CBs, VCs, Fittings,etc.) must be outside the pipeline ROW.
13) Metallic installations must be wrapped with non-conductive insulating material for a distance of 8m on each side of the pipeline to mitigate interference with the pipeline's cathodic protection.
14) Minimum clearance of 30cm must be maintained between utility and pipeline.



' AS BUILT ' NOTE:
"ALL NUMERICAL VALUES THAT ARE NOT STROKED OUT AND REPLACED IN ITALICS ON ' AS BUILT' DRAWINGS ARE CONSIDERED TO BE DESIGN VALUES ONLY AND NOT MEASURED IN THE FIELD "

This drawing comprises the original design drawing updated to reflect information supplied by others as to the final 'AS CONSTRUCTED' conditions. The information supplied by others has not been verified and, as such, this drawing is not warranted by J.L. Richards and Associates Limited for completeness or accuracy.
Date of Issue: October 17, 2012



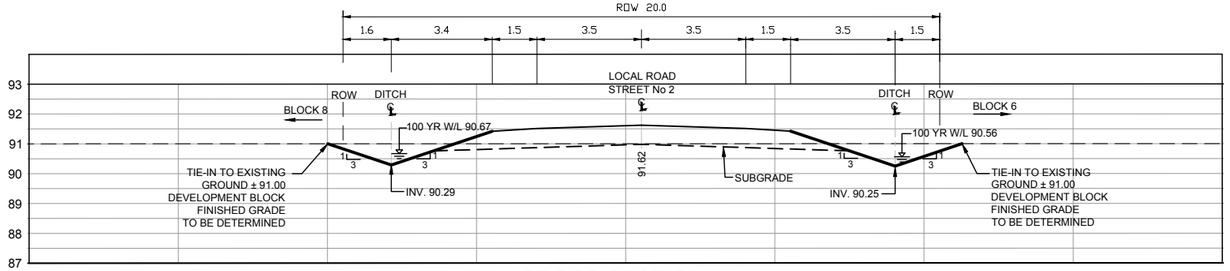
LEGEND:
PROPOSED CULVERT

Scale

Project Title
RIVERSIDE SOUTH
3700 TWIN FALLS PLACE

Drawing Title
PROPOSED LIMEBANK ROAD CROSSING (SOUTH)

Sheet No.
FIGURE 4.4



CROSS SECTION 1-1

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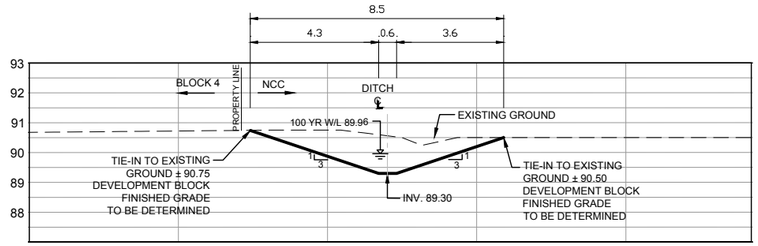

CROSS SECTION 2-2

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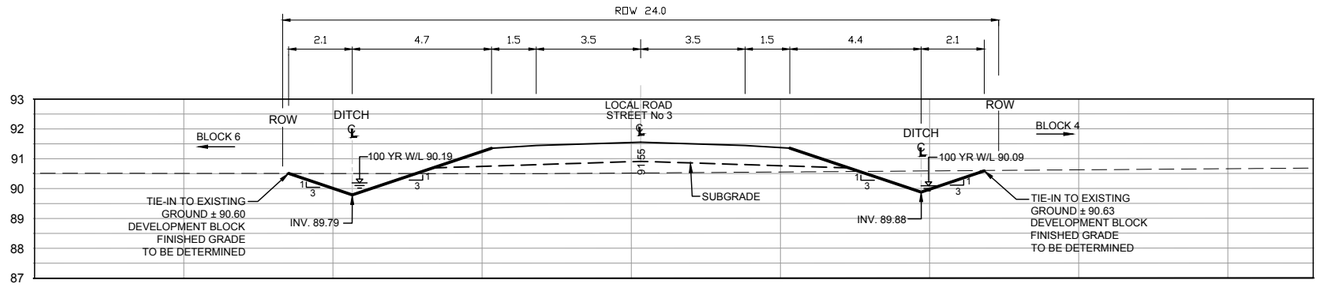

CROSS SECTION 3-3

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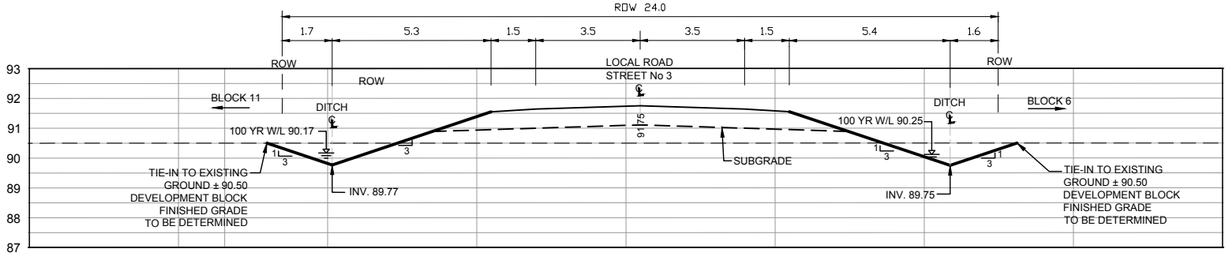

CROSS SECTION 4-4

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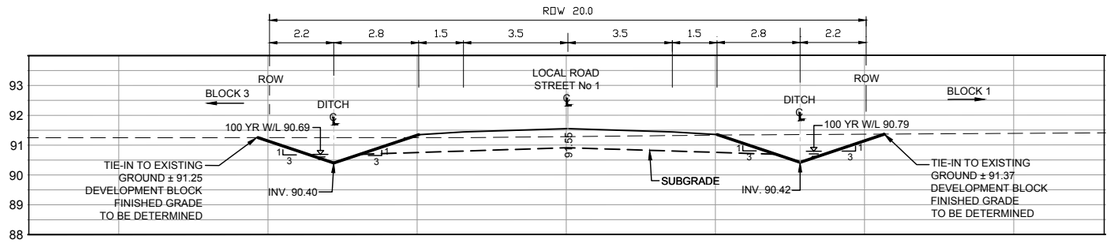

CROSS SECTION 5-5

SCALE: 1:200.

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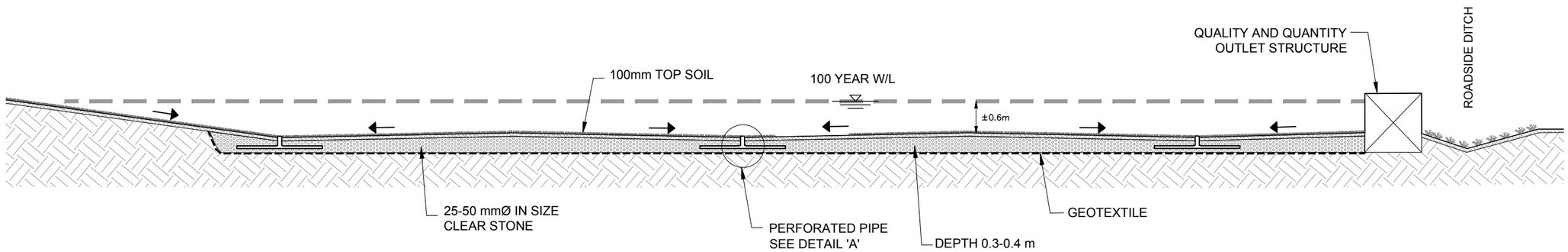
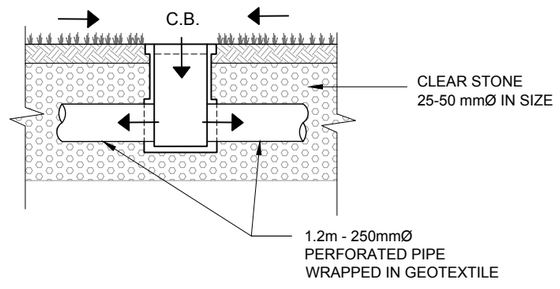
Scale: N.T.S

Project Title: RIVERSIDE SOUTH
3700 TWIN FALLS PLACE

Drawing Title: CROSS - SECTIONS

Sheet No.: FIGURE 4.5





DETAIL 'A'

J:\136974_RSS_Employme\7.0_Production\7.03_Design\27_Water\Sheets\136974-Figure 4.6 Business Park Ltd Conceptual Profile.dwg Layout Name: 4.6 Plot Scale: 1:8.704 Plotted At: 3/29/2023 Last Saved By: svukic Last Saved At: Mar. 9, 23

Scale	Project Title	Drawing Title	Sheet No.
N.T.S	RIVERSIDE SOUTH 3700 TWIN FALLS PLACE	EMPLOYMENT LANDS ON-SITE SWM MEASURE CONCEPTUAL PROFILE	FIGURE 4.6

Appendix D LIDs 3700 Twin Falls Place

1. Overview of LIDs

As noted in report **Section 4.3**, the development will be provided with LIDs in addition to the conventional SWM infrastructure. An overview of the LID design is provided in this section. The drainage system (the ditch network and associated culverts) was designed assuming that the LID features are fully saturated with groundwater and therefore no benefit was applied in the sizing of the conventional SWM infrastructure.

In the Employment Lands at the northwestern part of the CDP lands, on-site infiltration measures are proposed in conjunction with on-site water quality and quantity treatment on the private development blocks. This area is proposed to be provided with a rural road cross-section serviced with road-side ditches, save for the ultimate Leitrim Road ROW, which will be urbanized and provided with a storm sewer. The on-site SWM measures are proposed to outlet overland through a shallow depression with a maximum 100 year depth of ponding of approximately 0.7 m. This would tie-in to the proposed conveyance network (either ditches or storm sewer). The proposed profile of the SWM measure is presented on report **Figure 4.6**. The topography throughout the Employment Lands generally falls from east to west, which facilitates surface drainage to Mosquito Creek. The localized frequent ponding (during the 13 mm event) must be designed with a maximum drawdown time of 48 hours. This approach satisfies Transport Canada and the Airport Authority's preference for no ponds in the Primary Bird Hazard Zone (refer to **Section 4.2**).

The delineation of the subject employment lands subcatchments has been refined to reflect the legal plan. The lands are considered employment and special district (ESD). Under ultimate build out conditions, lands to the east will drain towards the subject site. The delineation of these lands, as well as of lands to the north that will also outlet to Tributary 4, has been refined to reflect the latest secondary plan land use designation. These external lands to the east and north of the subject site are considered ESD with a natural environment area (NEA) towards the northeast. The on-site SWM measures have been updated accordingly and a conceptual conveyance network (comprised of roadside ditches and a storm sewer) for all CDP lands draining to Tributary 4 has been developed.

2. Overview of LID Hydrological and Hydraulic Evaluation

LID performance has been evaluated using single storm events. The following storm events have been simulated, with file names noted:

- 13 mm 4 hour Chicago storm – EMP-RSDC-AAPSR_4H13MM_V03-1-LID.PCZ
- 25 mm 4 hour Chicago storm – EMP-RSDC-AAPSR_4H25MM_V03-1-LID.PCZ
- 2 year 12 hour SCS Type II – EMP-RSDC-AAPSR_12H2SCS_V03-1-LID.PCZ
- 100 year 12 hour SCS Type II – EMP-RSDC-AAPSR_12H100SCS_V03-1-LID.PCZ

In the employment lands, the approach to combined SWM measures on each development block remains consistent with the MDP Update. The on-site LID measure is accommodated within the development block, and the on-site storage requirement is 600 cu-m/ha. The combined SWM measure outlined in the MDP Update has been carried forward, with refinements to account for site specific servicing and infiltration values from geotechnical testing at the subject site. Refer to the conceptual profile on **Figure 4.6**. Surface area and provided water quantity storage are summarized in the below table.

Table D2.1 Employment Lands Summary of LID Surface Area and Water Quantity Storage

Subcatchment Area ID	Area (ha)	LID Surface Area (ha) 7.7%	Required Water Quantity Storage (m^3) 600 m^3/ha
4_B1	4.21	0.32	2526

Subcatchment Area ID	Area (ha)	LID Surface Area (ha) 7.7%	Required Water Quantity Storage (m^3) 600 m^3/ha
4_B2	2.56	0.20	1536
4_B3	4.28	0.33	2568
4_B4	3.16	0.24	1896
4_B5	1.71	0.13	1026
4_B6	3.17	0.24	1902
4_B7	2.09	0.16	1254
4_B8	4.19	0.32	2514
4_B9	1.23	0.09	738
4_B10	2.49	0.19	1494
4_B11	2.24	0.17	1344
4_B13	7.27	0.56	4362
4_S12	4.09	0.31	2454
4_S13	8.19	0.63	4914
4_S14	11.55	0.89	6930
4_S15	3.75	0.29	2250
4_S16	15.88	1.22	9528
4_S17	14.52	1.12	8712
4_S18	20.38	1.57	12228
4_S21	11.03	0.85	6618

3. Results of Hydrological and Hydraulic Evaluation – LIDs

In the Employment Lands, the MDP Update set a target to limit the drawdown time of frequent ponding (considered during the 13 mm storm event) to a maximum of 48 hours to satisfy Transport Canada and the Airport Authority's preference for no ponds in this area, considered part of the Primary Bird Hazard Zone. At all locations there is no surface storage utilized during the 13 mm storm event.

A comparison of runoff volume has been completed for the different types of LIDs on different land uses within Phase 1 and is summarized in the below tables. Note that RV_1 represents runoff volume generated on the catchment without LIDs and RV_2 represents runoff volume generated on the catchment with LIDs.

Table D3.1 Employment Lands LIDs – Runoff volume reduction

AREA ID	25 MM 4 HOUR CHICAGO			2 YEAR 12 HOUR SCS TYPE II			100 YEAR 12 HOUR SCS TYPE II		
	RV_1 (mm)	Rv_2 (mm)	% REDUCTION	RV_1 (mm)	Rv_2 (mm)	% REDUCTION	RV_1 (mm)	Rv_2 (mm)	% REDUCTION
4_B1	22.02	0	100%	38	7.39	81%	90.53	59.35	34%

AREA ID	25 MM 4 HOUR CHICAGO			2 YEAR 12 HOUR SCS TYPE II			100 YEAR 12 HOUR SCS TYPE II		
	RV_1 (mm)	Rv_2 (mm)	% REDUCTION	RV_1 (mm)	Rv_2 (mm)	% REDUCTION	RV_1 (mm)	Rv_2 (mm)	% REDUCTION
4_B2	21.83	0	100%	37.81	7.2	81%	90.25	59.07	35%
4_B3	22.02	0	100%	38.03	7.42	80%	90.54	59.35	34%
4_B4	22	0	100%	37.98	7.4	81%	90.51	59.38	34%
4_B5	22.02	0	100%	38.04	7.45	80%	90.54	59.42	34%
4_B6	22.43	0	100%	38.03	7.45	80%	90.54	59.39	34%
4_B7	22.02	0	100%	38.02	7.42	80%	90.54	59.38	34%
4_B8	22	0	100%	37.97	7.37	81%	90.5	59.33	34%
4_B9	22.02	0	100%	38.02	7.38	81%	90.53	59.37	34%
4_B10	22.02	0	100%	38.01	7.41	81%	90.53	59.38	34%
4_B11	22.01	0	100%	37.99	7.47	80%	90.51	59.46	34%
4_B13	21.64	0	100%	37.65	6.86	82%	89.95	58.57	35%
4_S12	21.97	2.71	88%	38.04	8.67	77%	90.49	58.66	35%
4_S13	21.76	2.35	89%	37.67	8.3	78%	89.92	58.04	35%
4_S14	19.75	0.91	95%	34.2	5.43	84%	84.56	53.17	37%
4_S15	21.98	0	100%	37.95	7.3	81%	90.47	59.26	34%
4_S16	21.97	2.29	90%	38.04	8.52	78%	90.49	58.41	35%
4_S17	21.46	1.96	91%	37.16	7.8	79%	89.14	57.22	36%
4_S18	21.97	2.19	90%	38.04	8.48	78%	90.49	58.34	36%
4_S21	21.97	2.41	89%	38.04	8.56	77%	90.49	58.48	35%

Table D3.2 Employment Lands LIDs – Average runoff volume reduction

Storm Event	MDP Update		Current Evaluation	
	% Reduction	Corresponding RV (mm)	% Reduction	Corresponding RV (mm)
25 mm	85%	21	93%	23
2 year	76%	32	79%	33
100 year	32%	30	35%	34

The runoff volume reduction is 93% for the 25 mm storm, corresponding to 23 mm of runoff volume; 79% for the 2 year storm, corresponding to 33 mm of runoff volume; and 35% for the 100 year storm, corresponding to 34 mm of runoff volume. Results are consistent with those of the 2021 MDP Update.

These average reduction values represent the runoff volumes for LID implementation for these land uses. As noted above, the performance of LID features was evaluated using more detailed geotechnical

investigation, applying the updated infiltration rates. It is recommended that these rates be further refined during the detailed design stage.

4. Update to Water Budget

An update to the water budget was prepared in support of the 2021 MDP Update, in which the simulation results related to average runoff volume reduction per land use during the 25 mm storm event were incorporated into the volumetric runoff water budget calculation. It should be noted that the runoff volume reductions associated with the 25 mm storm are considered conservative. Based on statistical analysis of 35 years of rainfall, rainfall corresponding to the 13 mm storm (and less) occurs 95% of the time. And therefore, the 25 mm storm theoretically does not occur each year. In other words, the return period is estimated to be between one and two years. This implies that the volumetric water budget calculation based on the 25 mm storm would include close to 100% of storm events during a typical year.

The procedure outlined by Environment Canada for the water budget calculations attributes 100% effective runoff to anthropogenic sources, or, in other words, 0% infiltration. The use of LIDs in the form of a treatment train provides opportunity to direct runoff from hard surfaces to permeable surfaces and to the LID features. This provides additional opportunity for infiltration and runoff volume reduction.

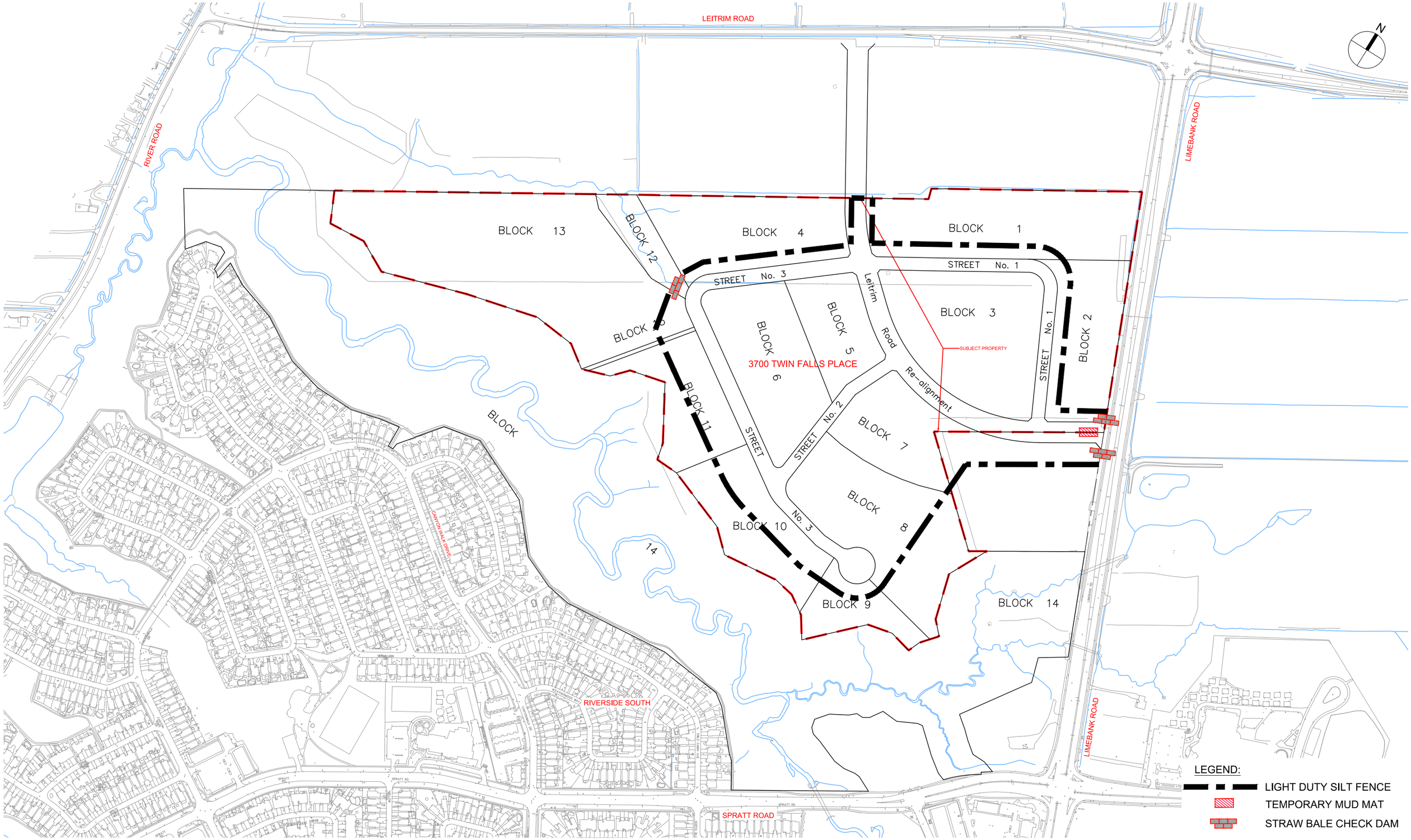
The volumetric runoff calculation was summarized in Table C10 of Paterson Group's 'Hydrogeological Review and Water Budget Update,' prepared in support of the 2021 MDP Update. The table has been updated to reflect the refinement of the Phase 1 ISSU design as well as refinements for the subject 3700 Twin Falls Place site, refer to the below table. The runoff volume reduction associated with LID applications at different land uses has been proportionally pro-rated on an area basis. It is concluded that with such refinements, the LIDs would reduce the volumetric runoff on an annual basis, from 101% to 61%.

Table D4.1 Update to Table C10 in 'Hydrogeological Review and Water Budget Update,' prepared by Paterson Group in support of the 2021 MDP Update

LIDs Implemented in Model	**Area (m2)**	**% Runoff Volume Reduction (25 mm storm)**
Total LID Area (updated for Phase 1 ISSU & 3700 Twin Falls Place)	5,412,382	31%
Total Development Area	8,440,880	
Calculated Weighted Average Runoff Volume Reduction for Proposed Development		20%
Summary		
Total Runoff Volume Without LIDs (L)	2,694,658,679	
Total Runoff Volume With LIDs Reduction (L)	2,160,005,814	
Total Runoff Volume With LIDs Reduction and SWMP3 Infiltration (L)	2,146,565,814	
Increase in Runoff from Pre-Development Conditions Without LIDs	101%	
Increase in Runoff from Pre-Development Conditions With LIDs	61%	

Appendix E

- Figure 6.1 - Erosion and Sedimentation Control Plan



J:\136974_RSS_Employme\7.0_Production\7.03_Design\04_Civil_LAND_Adequacy Report\FIGURE 6.1 EROSION & SEDIMENTATION Last Saved By: Chris.Cormier Last Saved At: Mar. 14, 23

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Scale
N.T.S.

Project Title
RIVERSIDE SOUTH
3700 TWIN FALLS PLACE

Drawing Title
EROSION & SEDIMENTATION CONTROL PLAN

Sheet No.
FIGURE 6.1