Assessment of Adequacy of Public Services Report
3930 and 3960 Riverside Drive

CITY OF OTTAWA

Development Application File No. **D__-__-__-____**

Prepared for St. Mary's Corporation c/o Taggart Realty Management
By Arcadis - IBI Group
DECEMBER 22, 2022

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1 Introduction

1.1 Scope

IBI Group Professional Services (Canada) Inc. (hereinafter referred to as IBI, or Arcadis - IBI Group) has been retained by Taggart Realty Management (TRM) on behalf of St. Mary's Lands Corporation to prepare an Assessment of Adequacy of Public Services Report (APSR) in support of Zoning By-Law Amendment and Subdivision Draft Plan applications for the subject lands in accordance with the policies set out by the Planning and Development Branch of the City of Ottawa.

The purpose of this report is to investigate and confirm the adequacy of public services for the proposed site. More precisely, it will review major municipal infrastructure including water supply, wastewater collection and management of stormwater as a function of the proposed development. It will also include a Sedimentation and Erosion Control Plan.

Hence, this APSR will provide the stakeholders with a conceptual level servicing scheme demonstrating the subject lands can be developed as proposed.

1.2 Subject Site

The lands are known municipally as 3930 and 3960 Riverside Drive in the City of Ottawa. The development is bounded by Hunt Club Road to the south, Riverside Drive to the east, City of Ottawa Uplands-Riverside park to the north and undeveloped environmental lands, adjacent to the Rideau River, to the west, as shown on Figure 1- Location Plan.

This site is approximately 8.15 hectares in size and is currently zone "General Mixed-Use, Subzone1, Exception 1719, subject to Schedule 251, Maximum height of 137 above sea level (GM1[1719]S251 H(137 A.S.L.)) in the City's comprehensive Zoning By-Law..

1.3 Proposed Development

TRM is proposing to change the current zoning of the northern portion of the lands to "Residential Third density, Subzone Z (R3Z), to remove the Schedule 251, add a new height schedule for the apartment blocks and to amend the provisions to the GM1 subzone. Please refer to Planning Rational prepared by Fotenn dated December 22, 2022.

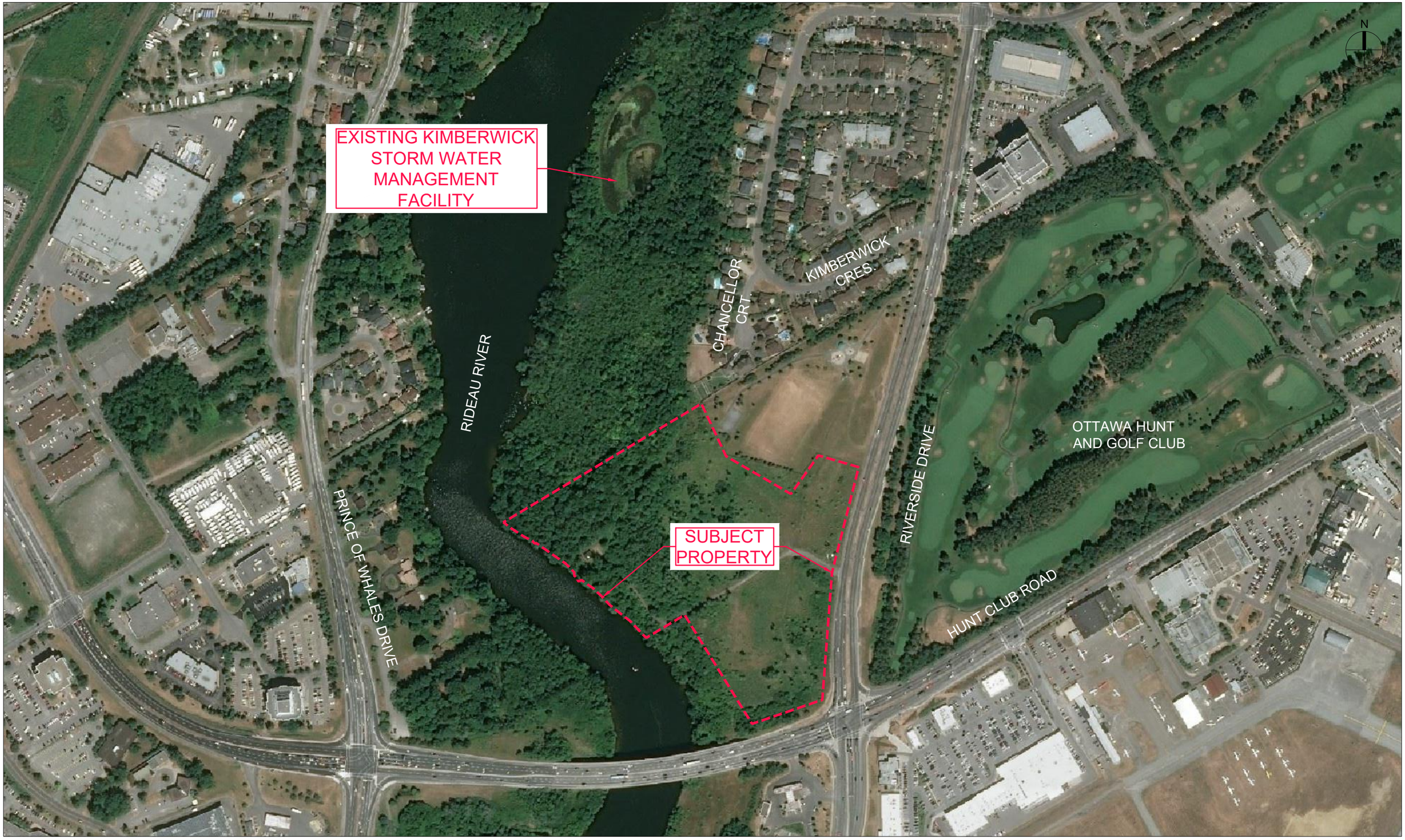
The proponent is also proposing a plan of subdivision that will create blocks and lots in support of the proposed development. Please refer to Figure 2 – Draft plan.

The current development concept plan identifies 24 single family lots, 53 townhouse units and 4 apartment buildings proposing a total of 580 rental units. The plan also proposes the creation of a 0.38ha public park. Please refer to Figure 3 for the Concept Plan.

1.4 Previous Studies

Design of this project has been undertaken in accordance with the following reports:

- Riverside Drive Land – Sanitary Sewer Servicing Study Update prepared by IBI Group, April 2022
- Riverside Drive Area – Brief in Support of Development of Lands Within the Riverside Drive Planning Area prepared by Cumming Cockburn & Associates Limited, May 1986



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IBI

Scale: N.T.S.

Project Title: ASSESSMENT OF ADEQUACY OF PUBIC SERVICES REPORT
3930 AND 3960 RIVERSIDE DRIVE

Drawing Title: LOCATION PLAN

Sheet No.: FIGURE 1

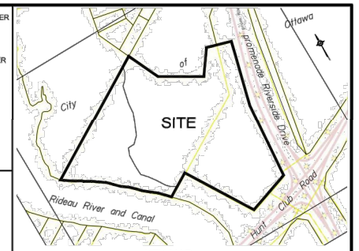
SUBJECT TO THE CONDITIONS, IF ANY, SET FORTH IN OUR LETTER DATED

_____.

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

_____

LILY XU, 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 LOT 5
CONCESSION 2 (RIDEAU FRONT)
Geographic Township of Gloucester
CITY OF OTTAWA
Prepared by Annis , O'Sullivan , Vollebekk Ltd.

Scale 1 : 750

30 22.5 15 7.5 0 15 30 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 Jeff Parkes, President
St. Mary's Lands Corporation
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) single and multi-family residential housing, park land, open space
(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

PROPOSED LAND USE TABLE

PROPOSED USE	LOTS/BLOCKS	AREA (sqm)
SINGLE FAMILY	1 - 24	10 219
TOWNHOMES	25 - 32, 34, 35, 36 42, 43, 44, 45	12 221
APARTMENTS	38, 39, 40, 41	13 192
PARK	46	3 851
	33	267
	37	168
	47	4 387
ENVIROMENTAL	48	19 892
STREETS	1 - 4	15 663
WIDENING	49, 50	386
EMBANKMENT	51	1 335

TOTAL SITE AREA = 81 581 sqm

NOTE: ENVIROMENTAL LIMIT DERIVED FROM CITY OF OTTAWA WEBSITE.

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: Nepean@aovltd.com

Ontario Land Surveyors

Job No. 22109-21 Topprs Pt Lt 5 C2 RF GL DPS D3 N

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Scale
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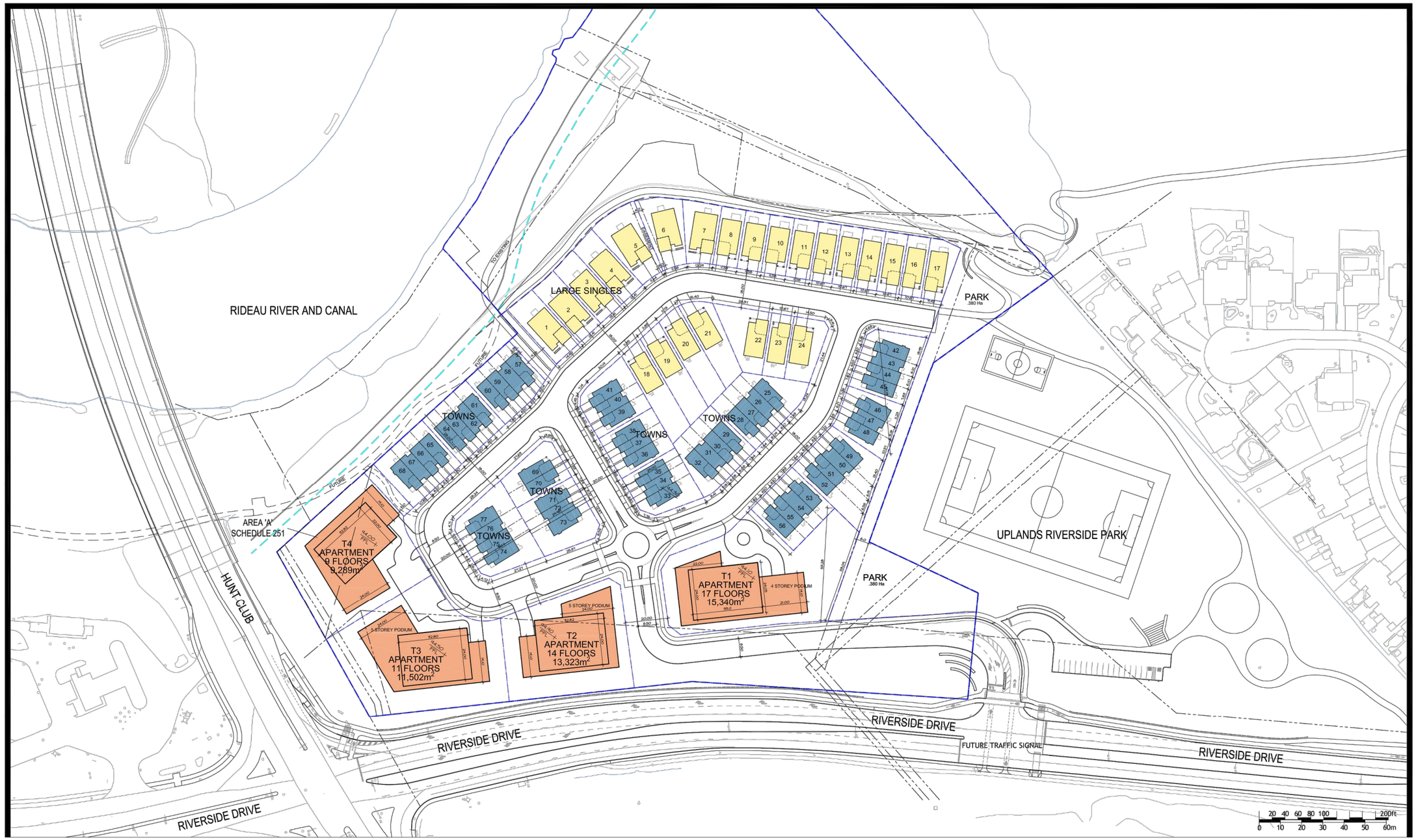
Project Title
ASSESSMENT OF ADEQUACY OF PUBIC SERVICES REPORT
3930 AND 3960 RIVERSIDE DRIVE

Drawing Title
DRAFT PLAN

Sheet No.
FIGURE 2



TAGGART REALTY MANAGEMENT

3930 & 3960 RIVERSIDE DRIVE

NEW RESIDENTIAL COMMUNITY SITEPLAN

SCALE 1:750

December 21, 2022

HOBIN ARCHITECTURE

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Scale	Project Title	Drawing Title	Sheet No.
N.T.S.	ASSESSMENT OF ADEQUACY OF PUBIC SERVICES REPORT 3930 AND 3960 RIVERSIDE DRIVE	CONCEPT PLAN	FIGURE 3

- Stormwater Management for Riverside Drive Lands prepared by Cumming Cockburn & Associates Limited, April 1987
- Riverwalk Park Stormwater Management Facility Update Stormwater Design Plan prepared by Novatech Engineering, June 1996

1.5 Geotechnical Considerations

The following is the most recent geotechnical investigation report prepared by WSP-Golder Associates:

- Geotechnical Assessment – Proposed Residential Development – Riverside Drive and Hunt Club Road, Ottawa, Ontario; Report No. 21482114-3000, dated December 22, 2022.

The site slopes generally from Riverside Drive down towards the Rideau Rive in a rough South-East to North-West direction. The site transitions from an elevation of approximately 104m at the Riverside Drive and Hunt Club Road intersection down to approximately 86m-88m along the western boundary of the proposed development.

The site was previously used as a granular extraction site and has subsequently been filled to reclaim land for development purposes. Generally, there is between 3m to 15m of fill across the site. Consequently, it is our understanding that a ground improvement program will be required to allow the development of the subject lands.

In regard to the site grading, although the placement of additional fill materials could add further load and increase the magnitude of potential long-term settlements, it is expected that this effect could be mitigated by the ground improvement program. From that perspective, there is not considered to be a restrictive limit on the permissible grade raise for this site.

It should also be noted that in designing the ground improvement program, the proposed grade raise will need to be considered. The geotechnical engineer will have to review the proposed grade raise for this project as part of the detail design to confirm that the geotechnical guidelines and recommendations have been adequately interpreted.

The proposed thickness of pavements elements noted in the report are the following:

Material		Thickness of Pavement Elements (mm)	
		Light Duty	Heavy Duty
Asphaltic Concrete OPSS.MUNI 1151	Superpave 12.5	40	50
	Superpave 19.0	50	70
Granular Material OPSS.MUNI 1010 or City of Ottawa specification F3147	Granular A Base	150	150
	Granular B, Type II Subbase	400	500

Among other items, the report comments on the following:

- Site grading
- Infrastructure construction
- Grade raise considerations
- Slope stability
- Design for earthquakes
- Foundation Design
- Sewer and watermain Construction
- Environmental considerations

1.6 Pre-consultation

An engineering pre-consultation with the city was held September 1, 2021 regarding the proposed development. Notes from this meeting may be found in **Appendix F**.

It should be noted that pre-consultation with the Ministry of the Environment, Conservation and Parks (MECP) will be arranged prior to detail design.

2 Water Supply

2.1 Existing Conditions

As previously noted, the eight-hectare Riverside Park site is located west of Riverside Drive and north of Hunt Club Road. An existing 406mm diameter watermain is located on Riverside Drive, in pressure district **Zone 2C** which will provide the water supply to the site.

2.2 Design Criteria

2.2.1 Water Demands

Water demands have been calculated for the full development. Per unit population density and consumption rates are taken from Tables 4.1 and 4.2 at the 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 1,540 l/cap/day
- ICI Average Day Demand 28,000 l/gross ha/day
- ICI Peak Daily Demand 42,000 l/gross ha/day
- ICI Peak Hour Demand 75,600 l/gross ha/day

A watermain demand calculation sheet is included in **Appendix A** and the total water demands are summarized as follows:

- Average Day 4.17 l/s
- Maximum Day 10.43 l/s
- Peak Hour 22.94 l/s

2.2.2 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 140 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.
Water Age	A total travel time of 5 days or less during basic day demand is reasonable. A residence time of 8 days should not be exceeded.

2.2.3 Fire Flow Rates

A Fire Underwriting Survey (FUS) calculation has been conducted for the apartment buildings. In the calculation the building is considered fire restive and in accordance with the FUS methodology the area of the 2 largest adjoining floors along with the 50% of the area of eight floors above are considered. Apartment T1 the largest and T3 with the most exposure were calculated resulting in a 6000 l/min for T1 and 9,000 l/min for T3. All the apartments will be evaluated with a 9,000 l/min (133.3 l/s) fire flow.

The majority of the single family lots and townhouse blocks meet the requirements of Item 4.1 and 4.2 at Technical Bulletin IDSTB-2014-02 revision to Ottawa Design Guidelines – Water in which the fire flow requirement is capped at 10,000 l/min (166.7 l/s). There are three locations where the rear of a unit is within 10 meters of the side of an adjacent unit which requires separate FUS calculations. Townhouse units 33 to 35 and units 39 to 41 back onto flanking units with less than 10 metres separation. As the townhouse blocks are separated by more than 3 meters, separate FUS calculations are done for wood frame construction, results give a required fire flow of 9,000 l/min for units 39 to 41 and 10,000 l/min for units 39 to 41. The other location is lot 23 backing onto the side of unit 25, as lots 22 to 24 are separated by less than 3 meters, the three buildings are considered a single fire unit in the FUS calculation which results in a required fire flow of 10,000 l/min. A copy of the FUS calculations are included in **Appendix A**.

2.2.4 Boundary Conditions

The City of Ottawa has provided a hydraulic boundary condition at Riverside Drive where the connection to the site will occur. A copy of the boundary conditions is included in **Appendix A** and summarized as follows:

Table 2. 1 Hydraulic Boundary Conditions at Riverside Drive

	RIVERSIDE DRIVE.
Max HGL (Basic Day)	133.1 m
Min HGL (Peak Hour)	124.1 m
Max Day + Fire Flow (183 l/s Fire Flow)	127.1 m

2.2.5 Hydraulic Model

A computer model for the subject development has been developed using the Infowater program produced by Innovyze. The model includes the existing watermain and boundary condition on Riverside Drive.

2.3 Proposed Water Plan

2.3.1 Watermain Layout

There are two connections proposed to the existing watermain with an isolation valve added between the connections. Watermains are located on both sides of the entrance road which connect to the looped system servicing the residential units. All watermains are 200 mm diameter except for a short section of 50 mm diameter located at the dead end at the north east corner of the site.

2.3.2 Modeling Results

The hydraulic model was run under basic day, maximum day with fire flows and under peak hour conditions. Results of the hydraulic model are included in **Appendix A** and summarized as follows:

Scenario	
Basic Day (Max HGL) Pressure Range	287.1 to 422.2 kPa
Peak Hour (Min HGL) Pressure Range	198.9 to 331.1 kPa
Max Day + 183 l/s Fire Flow Range	159.6 l/s 203.8 l/s

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

Maximum Pressure	All nodes have basic day pressures under 552 kPa, therefore pressure reducing control is not required for this development.
Minimum Pressure	Based on the boundary condition provided by the City for minimum pressure, the peak hour pressure at Riverside Drive is less than 276 kPa. As the elevation of the site is lower than Riverside Drive, the required pressure is met for the residential units.
Fire Flow	All nodes have design fire flows above the 133.3 l/s required for the apartment buildings and 166.7 l/s for singles and townhouses with the exception of node 11 which has a design fire flow of 159.6 l/s which is located on a short dead end main. The fire flow analysis was conducted with a boundary condition for a 183 l/s fire flow, a boundary condition for a 166.7 l/s flow would provide a higher fire flow at that node and the location of the hydrant can be changed at detailed design to provide more fire flow.
Water Age	There are no unlooped watermains except for a small dead end at lots 15 to 17 which is serviced with a 50 mm watermain in accordance with City detail W37.2. The water age analysis conducted under the basic day scenario shows the longest age of 9.28 hours at the dead end.

3 WASTEWATER DISPOSAL

3.1 Existing Conditions

In 1987 the J. Perez Corporation development, known as Riverwalk Park, included a 525 mm diameter sanitary sewer extension to the southern limits of its development and was designed to service the urban area between Riverside Drive and the Rideau River north and south of Hunt Club Road. This sewer currently terminates at the north limit of the existing City of Ottawa Uplands-Riverside Park. At its current terminus, the existing 525Ø sewer was sized for an external area of 39.42 hectares with a predicted peak flow 108.6 l/s based on now outdated City of Ottawa design guidelines. The existing trunk sewer has a capacity of 200 L/s.

Subsequent to the 1987 Riverwalk Park development, the City of Ottawa commissioned a report, completed by IBI Group in December 2007, to review the sanitary sewer requirements in the Riverside Drive corridor which was since updated by IBI Group in March 2022.

For reference, the original Riverwalk Park sanitary sewer design sheet and Drainage Area Plan #3675-501A are included in the 2022 Study report located in **Appendix B.**

That updated study identified a total of 26.45 ha of developable property south of Chancellor Court and west of Riverside Drive. The developable properties and flow estimates from the 2022 report were:

Table 3.1 Riverside Drive Lands – Ownership and Areas

PROPERTY	AREA (HA)		FLOW (L/S)
	GROSS (HA)	DEVELOPABLE (HA)	
- St. Mary's Riverside	8.58	6.35	13.70
- Transport Canada	3.65	0.00	0.00
- Dymon Management Ltd.	8.69	6.29	5.90
- City of Ottawa/Airport Authority	34.96	13.81	12.95
TOTAL	**55.88**	**26.45**	**32.55**

As result, the total sanitary flow from tributary areas south of St. Mary's Riverside is now only estimated at **32.55 L/s** which is significantly less than the available capacity of **108.6 l/s.** The March 2022 Updated report also reconfirms that, theoretically, additional external lands (+/- 65 Ha) upstream of the City of Ottawa/Airport Authority property could also develop as commercial/employment uses and outlet to the existing trunk sanitary sewer downstream of the St. Mary's Riverside development.

3.2 Design Criteria

The sanitary sewers for the subject site will ultimately be based on the following key City of Ottawa design criteria:

- Commercial/Institutional flow 28,000 l/ha/d
- Residential per capital 280 l/person/d
- Harmon – correction factor K=0.8
- Peaking factor 1.5 if ICI in contributing area >20%
  1.0 if ICI in contributing area <20%
- Infiltration allowance 0.33 l/s/ha
- Velocities 0.60 m/s min. to 3.0 m/s max.
- Populations:
  - 3.4 population per single family units
  - 2.7 population per townhouse units
  - 1.8 population per apartment unit

3.3 Recommended Wastewater Plan

Sanitary service for the subject site will be provided via the extension of the existing trunk sanitary sewer from the City of Ottawa Uplands-Riverside Park to the southern property boundary, where it can ultimately be extended by others to an south of the Hunt Club Bridge.

At this current stage, it is anticipated that a 450mm diameter trunk sewer will be extended across the subject site. The site will also be serviced via 200mm diameter local sewers. In areas where the depth of the trunk sanitary sewer is more than 5.0m, the local sewer will be a “High Level” and be place above the trunk in the same horizontal alignment. The exact locations of the High Level local sanitary sewers will be further refined at detail design.

The 2022 City of Ottawa report estimated that the peaked flow from the St. Mary’s Riverside site would be approximately 13.70 l/s. The conceptual Sanitary Sewer Design Sheet, found in **Appendix B** i based on the current site concept shown in Figure 3, estimates a total peaked total flow of 14.82 l/s, calculated using criteria identified in section 3.2.

Given that there is significant residual capacity at the proposed sanitary connection location, as demonstrated in the 2022 report and identified in section 3.1, the extra 1.12 L/s (14.82l/s – 13.70l/s) can be deemed negligible.

3.4 Hunt Club Road Watermain Crossing

It should be noted that at detail design, the extension of the trunk sanitary sewer under the Hunt Club bridge to service the lands to the south of the subject will need to be considered.

More precisely, the future trunk sanitary sewer will have to cross a City of Ottawa 610mm high-pressure watermain. Based on City of Ottawa mapping, the watermain, which crosses the Rideau River, runs more on less parallel with Hunt Club Road.

IBI Group obtained the City of Ottawa design drawing of the existing 600mm diameter watermain to ensure the watermain can be crossed with the sanitary sewer. In the general vicinity of the possible crossing, the watermain appears to be climbing at a slope of +/-24%. It can be said that

in a distance of 10m the watermain will change elevations by approximately 2.4m which will certainly allow a crossing to be made.

Hence, prior to detailed design of the trunk sanitary sewer extension southward the designer should obtain a survey of the of the watermain at the anticipated crossing location in order to ensure the proposed trunk can cross the existing watermain as per the City standards and that the trunk sewer is not constructed excessively deep within the St. Mary's Riverside site.

4 SITE STORMWATER MANAGEMENT

4.1 Background

The St. Mary's Riverside site falls within the drainage limits of the existing Riverwalk stormwater facility (henceforth referred to as the City of Ottawa Kimberwick Stormwater Management Facility). The design of that pond was outlined within the report "Stormwater Management for Riverside Drive Lands" completed by CCL in April of 1987. The drainage area plan (Drawing No. 3625-501) as well as the storm sewer design sheet prepared for the Riverwalk Park development in 1987 is included in **Appendix C**. The subject site is included south of the Riverwalk Park development in the area identified as St. Mary's Cement with a drainage area of 7.00 ha at a runoff coefficient of 0.70.

The facility was designed to meet criteria established by the MOEE, including fecal coliform and TSS reduction. An MOEE application for the facility was forwarded and on August 25, 1987, the MOEE provided the Certificate of Approval (certificate #3-0842-87-006) for the pond. However, before the pond was constructed, the City of Ottawa requested that the facility be slightly relocated. Accordingly, the C of A was amended by the Ministry of Environment on December 28, 1988 and the facility was eventually constructed in 1990.

Following the construction of the facility, the stormwater pond was updated as part of the development of adjacent lands by Claridge Homes in 1996. The report "Riverwalk Park Stormwater Management Facility Updated Stormwater Design Plan" was completed by Novatech Engineering (June 1996). That report outlined the strategy to rehabilitate the facility which had fallen into disrepair, operate, maintain and monitor performance up to the point of full assumption of the facility by the City of Ottawa in 1998. That report indicated that discussions with MOEE and the City of Ottawa confirmed that the developers will only be required to remediate and operate the pond as intended under the original Certificate of Approval. The original Certificate of Approval requires that the pond be operated efficiently to detain and treat both TSS and Fecal Coliforms. The optimization of the ponds performance would result in a substantial reduction in both concentrations but may not meet current criteria at all times. It should be noted that the MOEE has also stated that the owner of the facility would not be required to meet any other criteria in the future.

4.2 Proposed Stormwater Management Plan

The stormwater management system for the site incorporates standard urban drainage design and stormwater management features that can be summarized as follows:

- a dual drainage concept with surface storage; and,
- an end-of-pipe SWM facility (Kimberwick SWM Facility).

4.2.1 Dual Drainage Concept

The site will be designed with dual drainage features, accommodating minor and major system flow. The minor system is tributary to the existing City of Ottawa Kimberwick SWM Facility. In order to provide the subject site with an outlet to the existing pond, a new storm sewer is proposed. Storm runoff from the Uplands-Riverside Park site was included in the design of the existing downstream sewers. It should be noted that the ground surface of the inlet works to the Stormwater Management Facility is at or near the 80 meter contour while the lowest part of the upstream development site is close to the 89 meter contour.

The minor system restriction for the proposed apartment blocks will be limited to 2 year capture. These blocks will be provided with storage to contain the 100 year storm event. Alternatively, respecting the existing site topography, it is anticipated that major system surface flows from the

proposed apartment blocks could be directed to the adjacent Rideau River. Ultimately, the blocks will be provided with detailed Site Plan Applications with full stormwater management designs and plans.

The remainder of the site will be provided with minor system restriction limited to 100 year capture to respect the limited available major system outlet to the Rideau River. The roads through the site will generally be on continuous grade, but will provide with a low point to allow for limited ponding. The dual drainage system has been evaluated using the SWMHYMO hydrological model. Further details of the modelling completed for the site are provided in the below sections.

4.2.2 Existing Kimberwick Stormwater Management Facility

The existing Kimberwick SWM Facility was designed to service the drainage area of the subject site. As outlined within the above Section 4.1, the design of that pond was outlined within the report "Stormwater Management for Riverside Drive Lands" completed by CCL in April of 1987. The facility was designed to meet criteria established by the MOEE, including fecal coliform and TSS reduction.

Following the construction of the facility, the stormwater pond was updated as part of the development of adjacent lands by Claridge Homes in 1996. The report "Riverwalk Park Stormwater Management Facility Updated Stormwater Design Plan" was completed by Novatech Engineering (June 1996). That report outlined the strategy to rehabilitate the facility which had fallen into disrepair, operate, maintain and monitor performance up to the point of full assumption of the facility by the City of Ottawa in 1998.

While the previous commitments have been acknowledged by Rideau Valley Conservation Authority as part of a recent review of the site, they also strongly encourage the implementation of LID design measures in the future development where feasible to further promote improved water quality treatment. The enhancement of water quality at the lot level of control will be investigated further at the detailed design stage.

For comparison purposes, water quality calculations from the MOE Stormwater Management Planning and Design Manual (March, 2003) have been calculated. According to calculations, the treatment volume is a function of the drainage area, the urban imperviousness ratio and the level of protection. The calculations indicate that the permanent water quality volume for the approximate 22ha tributary drainage area would be approximately 1530m^3, and the extended detention storage would be 880m^3. This is based on Enhanced Level of Protection, or 80% removal of total suspended solids. Recent communications with the City of Ottawa SWM unit indicate that the estimated permanent volume within the facility is approximately 1100m^3, and the available extended detention volume is approximately 6100m^3.

Currently, discussions with the City of Ottawa stormwater unit indicate that the pond is generally performing well based on recent observations. The City has provided information regarding recent survey of the facility, and details of the upgrades to the facility. This information will be used to inform the detailed design stage of the project.

4.3 Minor Storm Sewer Design Criteria

The storm sewers in the Uplands-Riverside Park site are sized based on Standards of the City of Ottawa and the MOE. Rational Method Sewer Design Sheet and Drainage Area Plan are provided within **Appendix C.** Some of the key criteria include the following:

- Intensity — 2 year (Apartment Blocks)
  100 year (residential Area)
- Initial Time of Concentration — 10 min
- Approximate Average Runoff Coefficients used for this assessment:
  Average Singles — 0.70

Average Townhomes	0.75
Blocks	0.90
• Velocities	0.80 m/s to 6.0 m/s
• Manning roughness coefficient	0.013 (smooth wall pipes)
• Minimal allowable slopes	Refer to below table

Table 4-1 Minimal allowable slopes

DIAMETER (MM)	SLOPE (%)
250	0.432
300	0.340
375	0.250
450	0.195
525	0.160

- Minimum depth of cover of 2.0 m
- 100-year Hydraulic Grade Line (HGL) separation to be greater than 0.30 m from the underside of footing

4.4 Hydrological Analysis

Hydrological analysis of the proposed dual drainage system of the subject site was conducted using SWMHYMO. This technique offers a single storm event flow generation and routing. Land use, selected modeling routines, and input parameters are discussed in the following sections. A drainage area plan is presented in Figure 9 and model files are included in **Appendix C**. The main hydrological parameters used in the rational method spreadsheet and model are summarized in the following sections.

4.4.1 Design Storms

A detail design the site will be evaluated using the following storms:

- 2 year 3 hour Chicago storm event with a 10 minute time step (for dual drainage evaluation, specifically the minor system);
- 100 year 3 hour Chicago storm event with a 10 minute time step (for dual drainage evaluation, specifically major flow conveyance); and
- 100 year 3 hour Chicago storm event + 20% increase in intensity with a 10 minute time step (for a stress test on major flow conveyance as per the City of Ottawa Sewer Design Guidelines).

4.4.2 Drainage Area and Parameters

The catchment areas and imperviousness values are based on the rational method spreadsheet. The total and directly connected imperviousness rations will be based upon the previous and impervious areas for the front yard and rear yard catchment areas, to be calculated at detailed design.

- Area and imperviousness - Catchment areas and imperviousness values are based on the areas and runoff coefficients applied in the rational method spreadsheet.

- Infiltration - Infiltration losses were selected to be consistent with the OSDG. The Horton values are as follows: f_o = 76.2 mm/h, f_c = 13.2 mm/h, k = 0.00115 s^{-1}.
- Length Parameter - The length parameter (LGI) for the site are based on measured lengths.
- Slope - The ground slope was based upon the average slope for both impervious and pervious area. Generally, the slope is approximately 2% (0.02 m/m). This assumes a slope of approximately 1% for impervious or road surfaces and 3% for pervious surfaces (lot grading).
- Initial Abstraction (Detention Storage) - Detention storage depths of 1.57 mm and 4.67 mm were used for impervious and pervious areas, respectively.
- Manning's Roughness - Manning's roughness coefficients of 0.013 and 0.25 were used for impervious and pervious areas, respectively.

The main hydrological parameters used in the SWMHYMO model are summarized in **Table 4.2**. The corresponding drainage area plan (**Figure 9**) is provided in **Appendix C**, along with model files.

Table 4.2 SWMHYMO Hydrological Parameters

Area ID	Area (ha)	IMP (%)		LGI (m)	CONCEPTUAL STORAGE (cu-m)	MINOR SYSTEM CAPTURE (l/s)
		TIMP	XIMP			
T234	0.97	99	99	60	155*	187
T1	0.38	99	99	50	65*	76
UNITS	3.44	71	71	151	10*	1186
PARK	3.34	7	7	150	n/a	82

4.4.3 Results of the Hydrological Model

The results of the hydraulic model evaluation are summarized in the following sections. Output files are provided within **Appendix C** for reference.

Table 4.3 SWMHYMO Model Results: 2 Year Chicago

AREA ID	RUNOFF (L/S)	MINOR SYSTEM CAPTURE (L/S)	STORAGE UTILIZED (M3)	MAJOR SYSTEM CASCADING OVERFLOW (L/S)
T234	187	175	3	0
T1	76	70	2	0
UNITS	407	407	0	0
PARK	82	81	2	0
Total Minor Flow		713		

Table 4.4 SWMHYMO Model Results: 100 Year Chicago

AREA ID	RUNOFF (L/S)	MINOR SYSTEM CAPTURE (L/S)	STORAGE UTILIZED (M3)	MAJOR SYSTEM CASCADING OVERFLOW (L/S)
T234	465	187	154	0
T1	185	76	61	0
UNITS	1186	1180	2	0
PARK	715	82	2	633
Total Minor Flow		1523		

5 GRADING AND ROAD

The existing grades within portions of the proposed development lands vary significantly due to the existing topography of the site. The final grading plan will require the balancing of various requirements including but not limited to geotechnical and environmental constraints, connectivity to a proposed multi-use path network, access road and adjacent park, minimum/maximum slopes, overland routing of stormwater, all to ensure the site is graded in accordance with municipal standards.

The significant slope across the existing topography will most likely result in roadway slopes up to 5% and residential units with “Walk-Out” basements to reduce the need for retaining walls while minimizing the impact on the bordering lands. It is also anticipated that the structural elements of the apartment buildings will be designed and constructed to retain the abutting lands where applicable.

Due mostly in part to the extensive grade differential across the property, slope modifications along the western property boundary is proposed.

A conceptual macro grading plan has been prepared to identify the possible grading of the proposed development. A copy of the figure can be found in **Appendix D**.

6 SEDIMENT AND EROSION CONTROL PLAN

6.1 General

During construction, existing stream and conveyance systems can be exposed to significant sediment loadings. Although construction is only a temporary situation, it is proposed to possibly introduce a number of mitigative construction techniques to reduce unnecessary construction sediment loadings. These may include:

- Until the local storm sewer, groundwater in trenches will be pumped into a filter mechanism prior to release to the environment. bulkhead barriers will be installed at the nearest downstream manhole in each sewer which connects to an existing downstream sewer;
- seepage barriers will be constructed in any temporary drainage ditches (where applicable);
- sediment capture filter socks will remain on open surface structures such as maintenance holes and catchbasins until these structures are commissioned and put into use; and
- silt fence on the site perimeter will be installed.

6.2 Trench Dewatering

Any trench dewatering using pumps will be discharged into a filter trap made up of geotextile filters and straw bales similar in design to the OPSD 219.240 Dewatering Trap. These will be constructed in a bowl shape with the fabric forming the bottom and the straw bales forming the sides. Any pumped groundwater will be filtered prior to release to the existing surface runoff. The contractor will inspect and maintain the filters as needed, including sediment removal and disposal and material replacement as needed. It should be noted that that the contractor will be responsible for the design and management of the trap(s).

6.3 Bulkhead Barriers

Although the storm sewers eventually outlet into a sediment forebay, a ½ diameter bulkhead will be constructed over the lower half of the outletting sewers to reduce sediment loadings during construction. These bulkheads will trap any sediment laden flows, thus preventing any construction-related contamination into existing sewers. The bulkheads will be inspected and maintained including periodic sediment removal as needed.

6.4 Seepage Barriers

In order to further reduce sediment loading to the stormwater management facility, seepage barriers will be installed on any surface water courses at appropriate locations that may become evident during construction. These barriers will be Light Duty Straw Bale Barriers per OPSD 219.100 and Heavy Duty Silt Fence Barriers per OPSD 219.130. They are typically made of layers of straw bales or geotextile fabric staked in place. All seepage barriers will be inspected and maintained as needed.

6.5 Surface Structure Filters

All catchbasins, and to a lesser degree, manholes, convey surface water to sewers. Until streets are asphalted and curbed, all catchbasins and manholes will be constructed with sediment capture inserts or equivalent located between the structure frame and cover. These will stay in place and be maintained during construction and build until it is appropriate to remove same.

7 CONCLUSION

This report outlined a conceptual servicing scheme to support both the Zoning Bylaw amendment and the Plan of Subdivision applications and has illustrated that the proposed residential development at 3930 and 3960 Riverside Drive can be serviced by extending municipal services in an effective manner and in accordance with the City of Ottawa's current level of service requirements.

The water network will be extended to provide necessary service. All sanitary and storm sewer designs for this development will be completed in conformance with City of Ottawa standards while acknowledging downstream constraints.

Adherence to the Sediment and Erosion Control Plan during construction will minimize harmful impacts on surface water.

Detail design of the infrastructure would be completed upon issuance of draft plan approval and would be subject to various governmental approvals prior to construction, including but not limited to the following:

- MECP Certificate of Authorization (C of A) for sewers and SWM;
- Rideau Valley Conservation Authority;
- Commence Work Order: City of Ottawa.

Based on the information provided within this report, the plans prepared for the subject development can be serviced to meet City of Ottawa requirements.

Terry Brule, P. Eng.
Associate Director

Peter Deir, P. Eng.
Stormwater Management - Associate

https://ibigroup.sharepoint.com/sites/Projects3/140873/Internal Documents/6.0_Technical/6.04_Civil/03_Reports/Assessment of Public Services Report - November 2022/1st submission - November 2022/CTR-APSR-2022-12-12_tb.docx\2022-12-22

APPENDIX A

Lance Erion

From: Harrold, Eric <eric.harrold@ottawa.ca>
Sent: Thursday, December 1, 2022 12:36 PM
To: Terry Brule
Cc: Terry Brule; Lance Erion
Subject: RE: Request for Watermain Boundary Conditions - Taggart Realty St-Mary's development - 3930 Riverside Drive
Attachments: 3930 Riverside Drive November 2022.pdf

Hi Terry, I appreciate your patience.

The following are boundary conditions, HGL, for hydraulic analysis at 3930 Riverside Drive (zone 2W2C) assumed to be a dual connection to the 406 mm on Riverside Drive (see attached PDF for location):

Minimum HGL: 124.1 m
Maximum HGL: 133.1 m
Max Day + FF (183 L/s): 127.1 m

These are for current conditions and are based on computer model simulation.

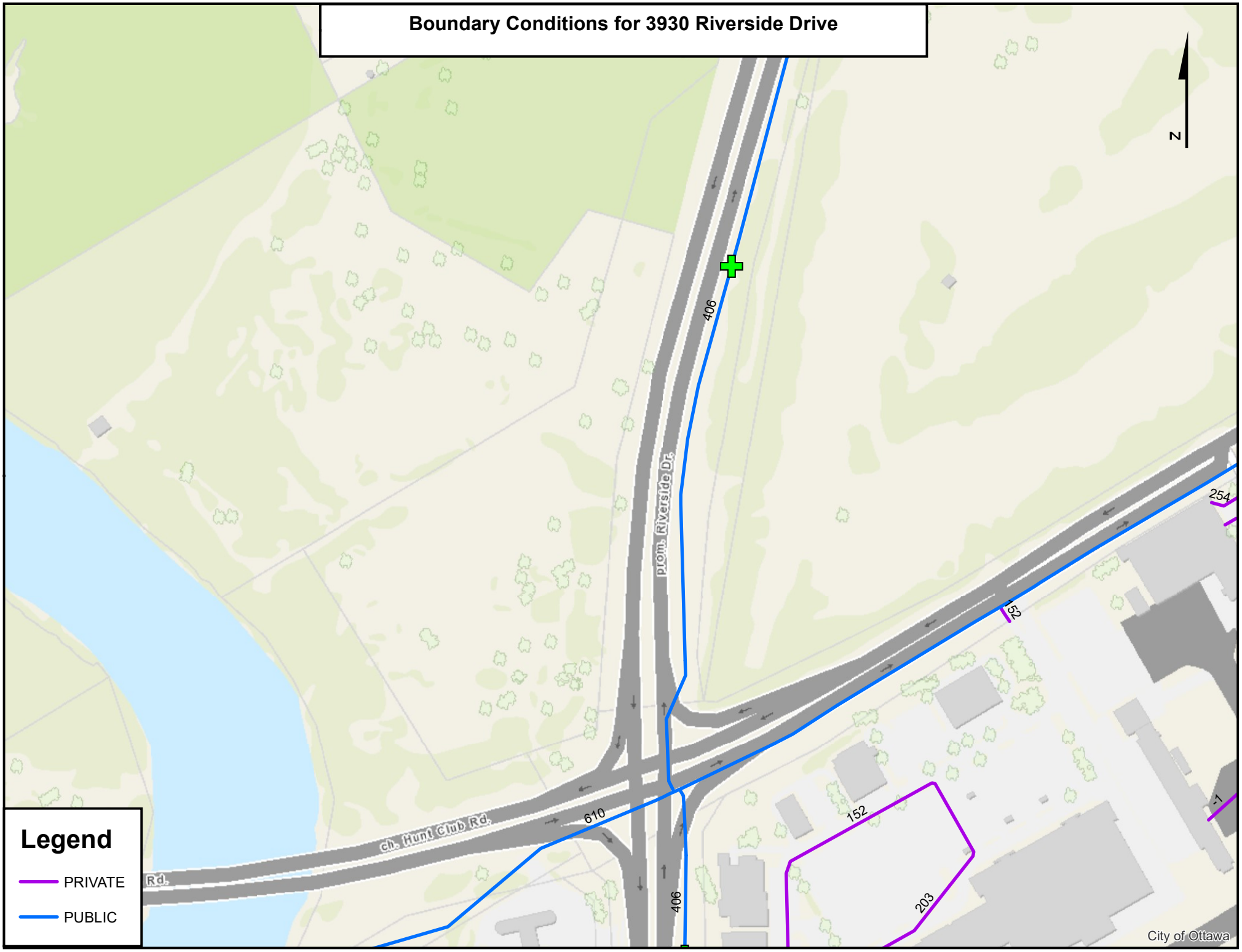
Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation 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.

Please let me know if you require anything further.

Best regards,
Eric
Eric Harrold, P.Eng
Project Manager, Infrastructure Approvals
Planning, Real Estate and Economic Development Department
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West, Ottawa, ON
613.580.2424 ext. 21447, eric.harrold@ottawa.ca

From: Terry Brule <tbrule@IBIGroup.com>
Sent: December 01, 2022 8:26 AM
To: Harrold, Eric <eric.harrold@ottawa.ca>
Cc: Terry Brule <tbrule@ibigroup.com>; Lance Erion <lerion@ibigroup.com>
Subject: RE: Request for Watermain Boundary Conditions - Taggart Realty St-Mary's development - 3930 Riverside Drive
Importance: High

Boundary Conditions for 3930 Riverside Drive



IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : Riverside and Huntclub
LOCATION : City of Ottawa
DEVELOPER : Taggart Realty Management

FILE: 140873
DATE PRINTED: 08-Dec-22
DESIGN: LE
PAGE : 1 OF 1

NODE	RESIDENTIAL UNITS SF	RESIDENTIAL UNITS SD & TH	RESIDENTIAL UNITS APT	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)
J4		7		19				0.06	0.00	0.06	0.15	0.00	0.15	0.34	0.00	0.34	9,000
J5			159	286				0.93	0.00	0.93	2.32	0.00	2.32	5.10	0.00	5.10	9,000
J6		2	137	252				0.82	0.00	0.82	2.04	0.00	2.04	4.49	0.00	4.49	9,000
J7		6	111	216				0.70	0.00	0.70	1.75	0.00	1.75	3.85	0.00	3.85	9,000
J8	2	15		47				0.15	0.00	0.15	0.38	0.00	0.38	0.84	0.00	0.84	10,000
J9	9			31				0.10	0.00	0.10	0.25	0.00	0.25	0.55	0.00	0.55	10,000
J10	9	4		41				0.13	0.00	0.13	0.34	0.00	0.34	0.74	0.00	0.74	10,000
J11	2			7				0.02	0.00	0.02	0.06	0.00	0.06	0.12	0.00	0.12	10,000
J12	2			7				0.02	0.00	0.02	0.06	0.00	0.06	0.12	0.00	0.12	
J13		11		30				0.10	0.00	0.10	0.24	0.00	0.24	0.53	0.00	0.53	10,000
J14		8	183	351				1.14	0.00	1.14	2.84	0.00	2.84	6.26	0.00	6.26	9,000
TOTALS	24	53	590	1,287						4.17			10.43			22.94	

ASSUMPTIONS

RESIDENTIAL DENSITIES
- Single Family (SF) 3.4 p / p / u
- Semi Detached (SD) & Townhouse (TH) 2.7 p / p / u
- Apartment (APT) 1.8 p / p / u

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
- APT 9,000 l / min

Fire Flow Requirement from Fire Underwriters Survey

Hunt Club at Riverside

Building Floor Area T1 17 Storey Apartment Fire Resitive

2 largest adjoining floors	2,522	m^2
50% of eight floors above	3,637	
Total Area	6,159	m^2

$F = 220C\sqrt{A}$

C	0.6		C =	1.5 wood frame
A	6,159	m^2		1.0 ordinary
				0.8 non-combustile
F	10,359	l/min		0.6 fire-resistive
use	10,000	l/min		

Occupancy Adjustment

Use	-15%	
Adjustment	-1500	l/min
Fire flow	8,500	l/min

-25% non-combustile
-15% limited combustile
0% combustile
+15% free burning
+25% rapid burning

Sprinkler Adjustment

Use	-30%	
Adjustment	-2550	l/min

Exposure Adjustment

Building Face	Separation (m)	Adjacent Exposed Wall			Exposure Charge *
		Length	Stories	L*H Factor	
north	> 45				
east	> 45				
south	> 45				
west	31.0	38.0	5	190	0%
Total					0%

Adjustment	-	l/min
Total adjustments	(2,550)	l/min
Fire flow	5,950	l/min
Use	**6,000**	**l/min**
	100.0	**l/s**

* Exposure charges from Table 6 of the FUS 2020 Guideline

Fire Flow Requirement from Fire Underwriters Survey

Hunt Club at Riverside

Building Floor Area T3 11 Storey Apartment Fire Resitive

2 largest adjoining floors	2,642	m^2
50% of eight floors above	3,952	
Total Area	6,594	m^2

F = 220C√A

C	0.6	C =	1.5	wood frame
A	6,594 m^2		1.0	ordinary
			0.8	non-combustile
F	10,719 l/min		0.6	fire-resistive
use	11,000 l/min			

Occupancy Adjustment

			-25%	non-combustile
			-15%	limited combustile
Use	-15%		0%	combustile
			+15%	free burning
Adjustment	-1650 l/min		+25%	rapid burning
Fire flow	9,350 l/min			

Sprinkler Adjustment

Use	-30%
Adjustment	-2805 l/min

Exposure Adjustment

Building Face	Separation (m)	Adjacent Exposed Wall			Exposure Charge *
		Length	Stories	L*H Factor	
north	16.0	24.0	5	120	8%
east	> 45				
south	10.5	24.0	5	120	8%
west	> 45				
Total					16%

Adjustment	1,496	l/min
Total adjustments	(1,309)	l/min
Fire flow	8,041	l/min
Use	**8,000**	**l/min**
	133.3	**l/s**

* Exposure charges from Table 6 of the FUS 2020 Guideline

Fire Flow Requirement from Fire Underwriters Survey

Hunt Club at Riverside

Building Floor Area	Units 33-35	
width	15.5	
length	18	
stories	2	
Area	558	m^2

$F = 220C\sqrt{A}$

C	1.5		C =	1.5 wood frame
A	558	m^2		1.0 ordinary
				0.8 non-combustile
F	7,795	l/min		0.6 fire-resistive
use	8,000	l/min		

Occupancy Adjustment			
		-25%	non-combustile
		-15%	limited combustile
Use	-15%	0%	combustile
		+15%	free burning
Adjustment	-1,200 l/min	+25%	rapid burning
Fire flow	6,800 l/min		

Sprinkler Adjustment

Use	0%
Adjustment	0 l/min

Exposure Adjustment

Building Face	Separation (m)	Adjacent Exposed Wall			Exposure Charge *
		Length	Stories	L*H Factor	
north	9.0	17.5	2	35	16%
east	30.0	23.0	4	92	8%
south	3.1	15.5	2	31	16%
west	30.5	18.0	2	36	0%
Total					40%

Adjustment	2,720	l/min
Total adjustments	2,720	l/min
Fire flow	9,520	l/min
Use	**10,000**	**l/min**
	166.7	**l/s**

* Exposure charges from Techinical Bulletin ISTB 2018-02 Appendix H (ISO Method)

Fire Flow Requirement from Fire Underwriters Survey

Hunt Club at Riverside

Building Floor Area Units 39-41

width	15.5	
length	18	
stories	2	
Area	558	m^2

$F = 220C\sqrt{A}$

C	1.5		C =	1.5	wood frame
A	558	m^2		1.0	ordinary
				0.8	non-combustile
F	7,795	l/min		0.6	fire-resistive
use	8,000	l/min			

Occupancy Adjustment

			-25%	non-combustile
			-15%	limited combustile
Use	-15%		0%	combustile
			+15%	free burning
Adjustment	-1,200	l/min	+25%	rapid burning
Fire flow	6,800	l/min		

Sprinkler Adjustment

Use	0%	
Adjustment	0	l/min

Exposure Adjustment

Building Face	Separation (m)	Adjacent Exposed Wall			Exposure Charge *
		Length	Stories	L*H Factor	
north	9.0	17.5	2	35	16%
east	3.1	15.5	2	31	16%
south	25.0	9.0	2	18	0%
west	30.5	12.5	2	25	0%
Total					32%

Adjustment	2,176	l/min
Total adjustments	2,176	l/min
Fire flow	8,976	l/min
Use	**9,000**	**l/min**
	150.0	**l/s**

* Exposure charges from Techinical Bulletin ISTB 2018-02 Appendix H (ISO Method)

Fire Flow Requirement from Fire Underwriters Survey

Hunt Club at Riverside

Building Floor Area	Lot22	Lot23	Lot 24	
width	9	8	9	
length	18	19	18	
stories	2	2	2	
Area	324	304	324	952 m^2

$F = 220C\sqrt{A}$

C	1.5	C =	1.5	wood frame
A	952 m^2		1.0	ordinary
			0.8	non-combustile
F	10,182 l/min		0.6	fire-resistive
use	10,000 l/min			

Occupancy Adjustment				
			-25%	non-combustile
			-15%	limited combustile
Use	-15%		0%	combustile
			+15%	free burning
Adjustment	-1,500	l/min	+25%	rapid burning
Fire flow	8,500	l/min		

Sprinkler Adjustment

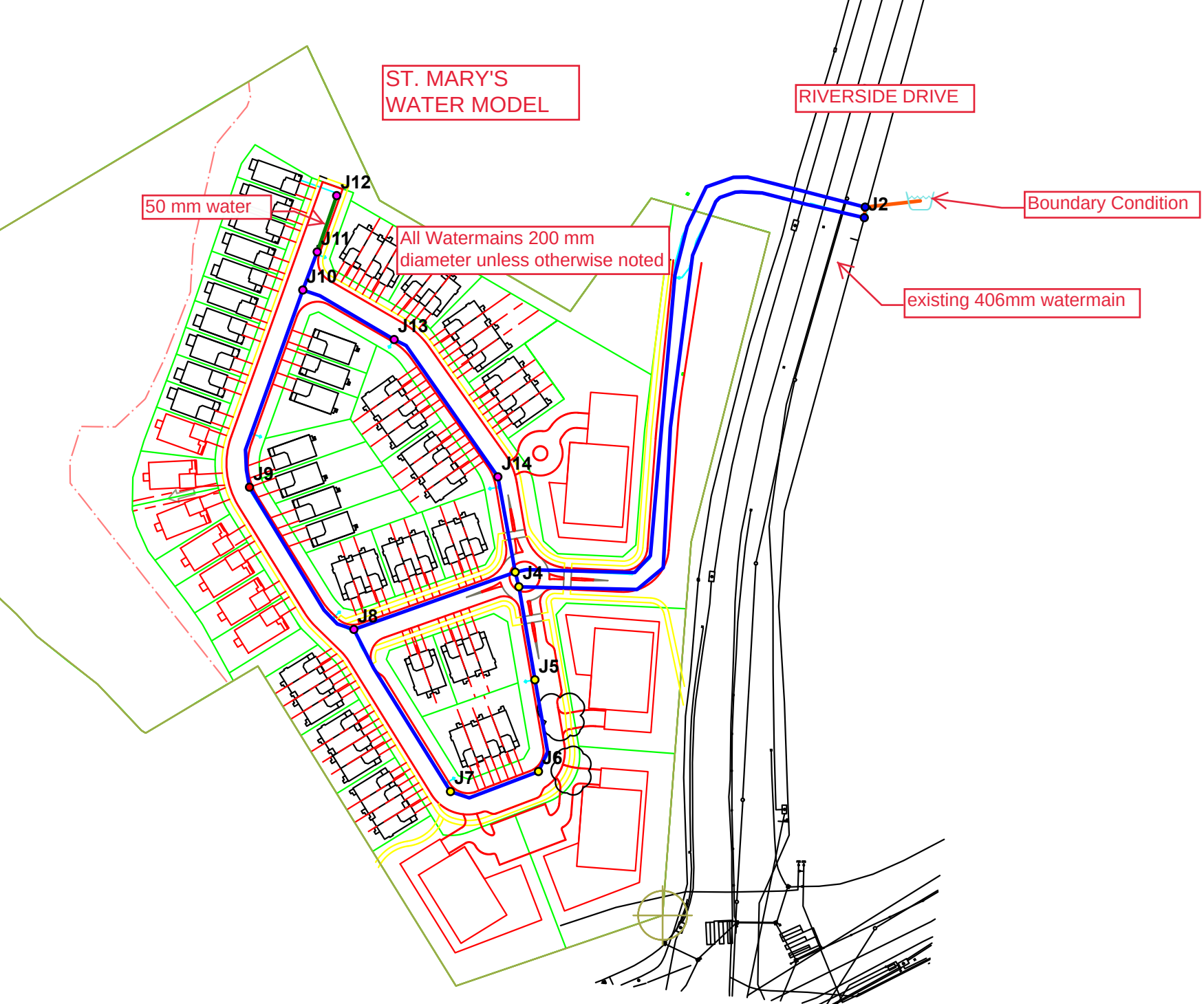
Use	0%	
Adjustment	0	l/min

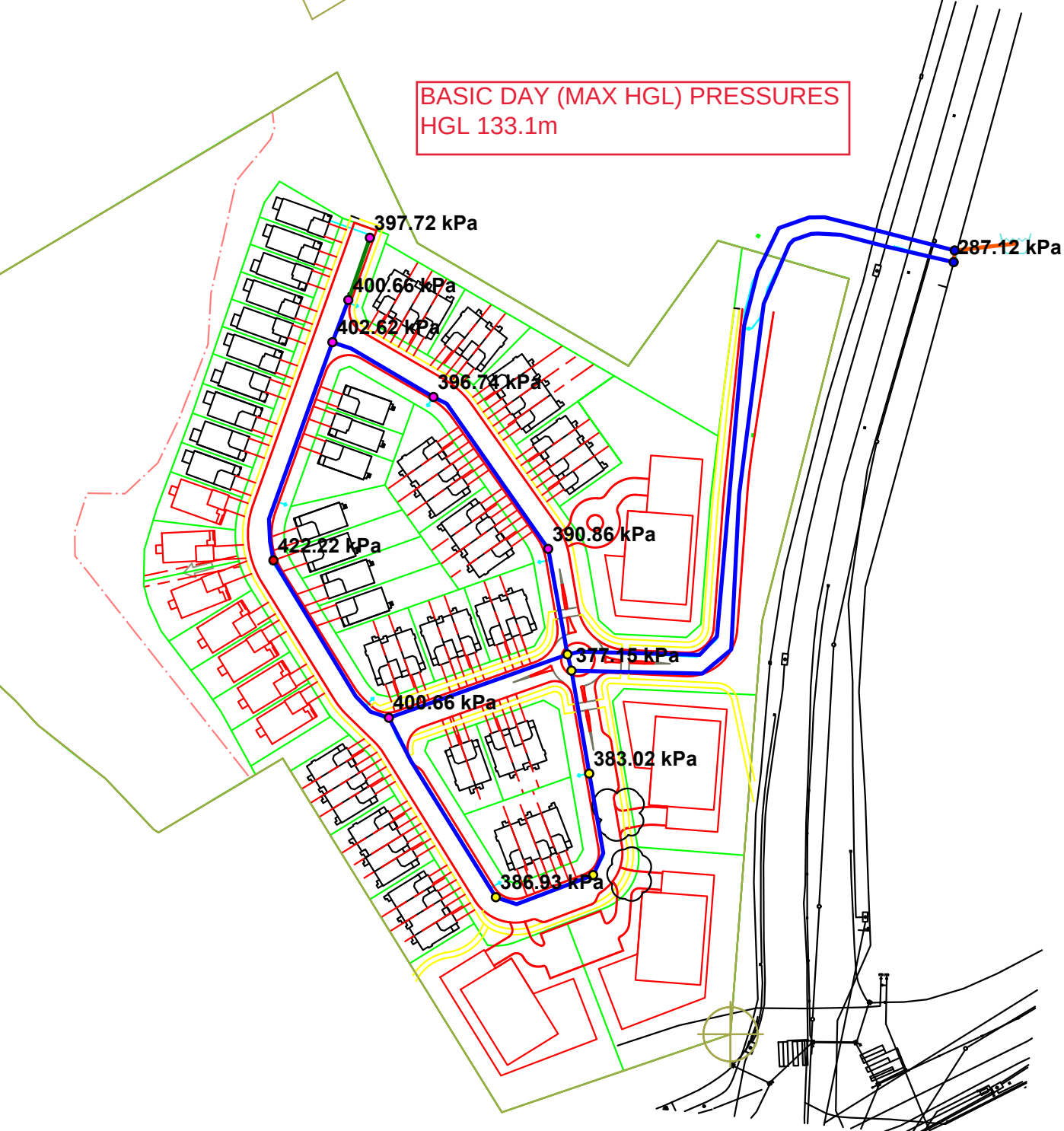
Exposure Adjustment

Building Face	Separation (m)	Adjacent Exposed Wall Length	Stories	L*H Factor	Exposure Charge *
north	27.0	24.5	2	49	2%
east	25.0	15.5	2	31	2%
south	27.0	8.0	2	16	0%
west	11.0	18.0	2	36	16%
Total					20%

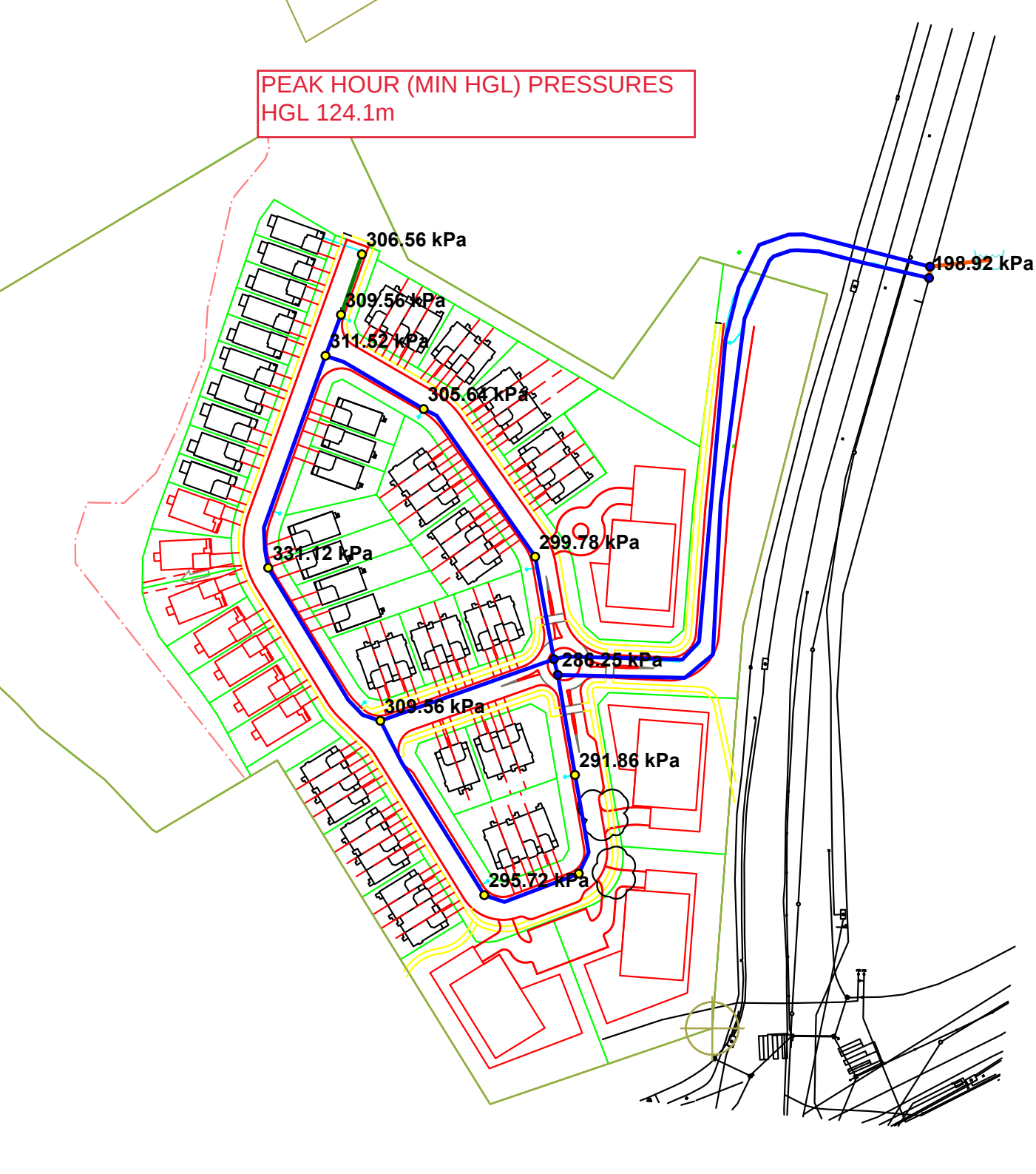
Adjustment	1,700	l/min
Total adjustments	1,700	l/min
Fire flow	10,200	l/min
Use	**10,000**	**l/min**
	166.7	**l/s**

* Exposure charges from Techinical Bulletin ISTB 2018-02 Appendix H (ISO Method)


ST. MARY'S
WATER MODEL
RIVERSIDE DRIVE
50 mm water
All Watermains 200 mm
diameter unless otherwise noted
Boundary Condition
existing 406mm watermain
J12
J11
J10
J13
J14
J9
J4
J8
J5
J6
J7
J2


BASIC DAY (MAX HGL) PRESSURES
HGL 133.1m
397.72 kPa
400.66 kPa
402.62 kPa
396.74 kPa
422.22 kPa
390.86 kPa
377.15 kPa
400.66 kPa
383.02 kPa
386.93 kPa
287.12 kPa

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)	Water Age (hrs)
1	☐	J1	0.00	103.80	133.10	287.12	1.00
2	☐	J10	0.34	92.00	133.03	402.04	7.03
3	☐	J11	0.06	92.20	133.03	400.08	8.28
4	☐	J12	0.06	92.50	133.03	397.13	9.28
5	☐	J13	0.24	92.60	133.03	396.16	4.34
6	☐	J14	2.84	93.20	133.03	390.29	3.29
7	☐	J2	0.00	103.80	133.10	287.12	2.00
8	☐	J3	0.00	94.60	133.03	376.61	2.29
9	☐	J4	0.15	94.60	133.03	376.61	3.00
10	☐	J5	2.32	94.00	133.03	382.43	4.00
11	☐	J6	2.04	94.30	133.03	379.48	5.12
12	☐	J7	1.75	93.60	133.03	386.34	4.29
13	☐	J8	0.38	92.20	133.03	400.08	3.29
14	☐	J9	0.25	90.00	133.03	421.64	5.26


PEAK HOUR (MIN HGL) PRESSURES
HGL 124.1m
306.56 kPa
309.56 kPa
311.52 kPa
305.64 kPa
331.12 kPa
299.78 kPa
286.25 kPa
309.56 kPa
291.86 kPa
295.72 kPa
198.92 kPa

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	☐	J1	0.00	103.80	124.10	198.92
2	☐	J10	0.74	92.00	123.79	311.52
3	☐	J11	0.12	92.20	123.79	309.56
4	☐	J12	0.12	92.50	123.78	306.56
5	☐	J13	0.53	92.60	123.79	305.64
6	☐	J14	6.26	93.20	123.79	299.78
7	☐	J2	0.00	103.80	124.10	198.92
8	☐	J3	0.00	94.60	123.81	286.24
9	☐	J4	0.34	94.60	123.81	286.25
10	☐	J5	5.10	94.00	123.78	291.86
11	☐	J6	4.49	94.30	123.78	288.86
12	☐	J7	3.85	93.60	123.78	295.72
13	☐	J8	0.84	92.20	123.79	309.56
14	☐	J9	0.55	90.00	123.79	331.12

		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	☐	11	J1	J2	4.31	406.00	120.00	11.48	0.09	0.00	0.03	Open	0
2	☐	13	J1	J3	278.87	204.00	110.00	11.46	0.35	0.29	1.04	Open	0
3	☐	15	J2	J4	277.26	204.00	110.00	11.48	0.35	0.29	1.04	Open	0
4	☐	17	J3	J4	6.15	204.00	110.00	-1.90	0.06	0.00	0.04	Open	0
5	☐	19	J4	J5	38.65	204.00	110.00	9.25	0.28	0.03	0.70	Open	0
6	☐	21	J5	J6	38.69	204.00	110.00	4.15	0.13	0.01	0.16	Open	0
7	☐	23	J6	J7	38.27	204.00	110.00	-0.34	0.01	0.00	0.00	Open	0
8	☐	25	J7	J8	77.12	204.00	110.00	-4.19	0.13	0.01	0.16	Open	0
9	☐	27	J8	J9	73.67	204.00	110.00	0.73	0.02	0.00	0.01	Open	0
10	☐	29	BC	J1	1.00	406.00	120.00	22.94	0.18	0.00	0.11	Open	0
11	☐	P11	J8	J3	69.92	204.00	110.00	-5.76	0.18	0.02	0.29	Open	0
12	☐	P13	J9	J10	84.81	204.00	110.00	0.18	0.01	0.00	0.00	Open	0
13	☐	P15	J10	J11	16.61	204.00	110.00	0.24	0.01	0.00	0.00	Open	0
14	☐	P17	J11	J12	24.32	50.00	100.00	0.12	0.06	0.01	0.25	Open	0
15	☐	P19	J10	J13	42.53	204.00	110.00	-0.80	0.02	0.00	0.01	Open	0
16	☐	P21	J13	J14	70.89	204.00	110.00	-1.33	0.04	0.00	0.02	Open	0
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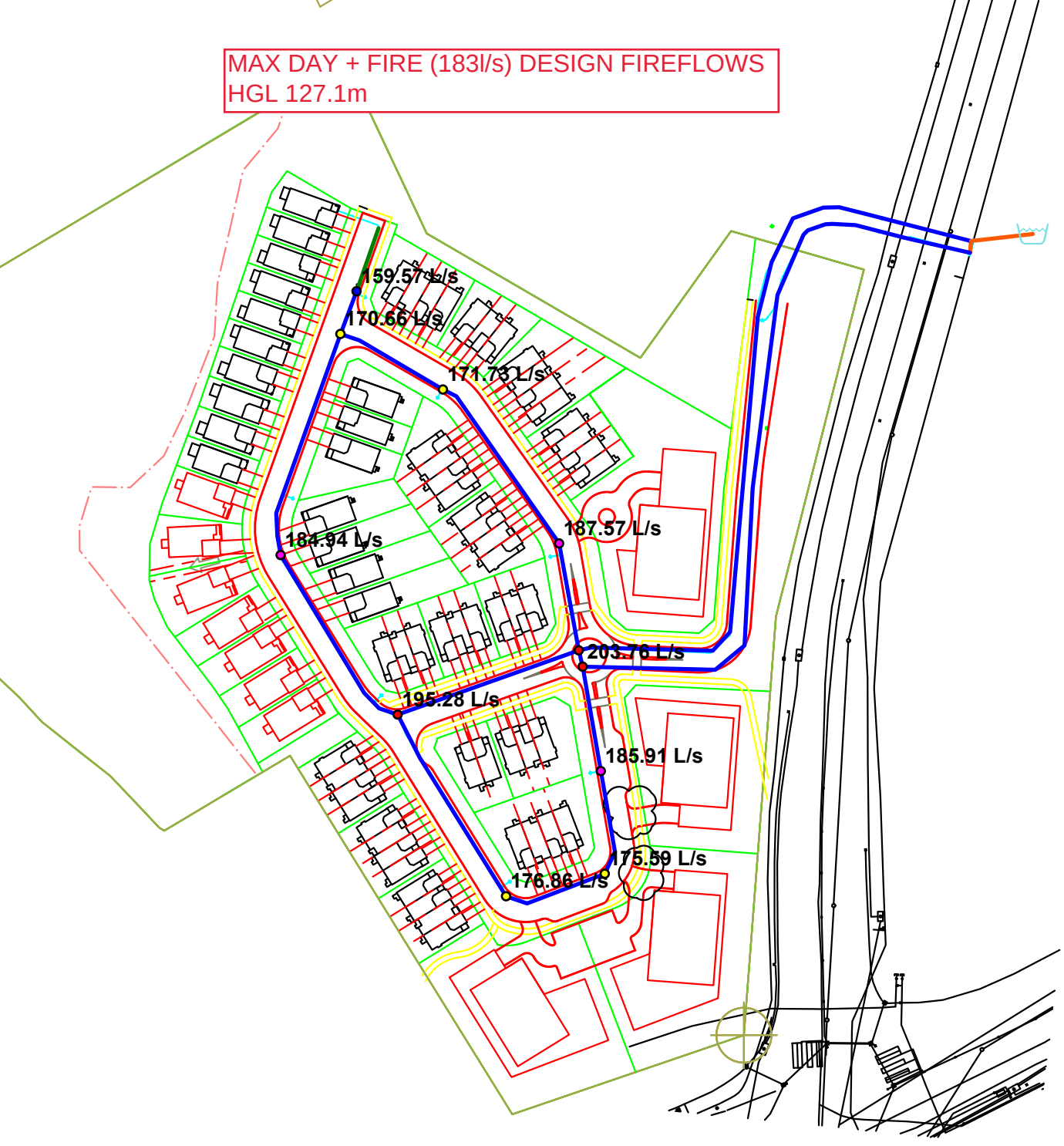
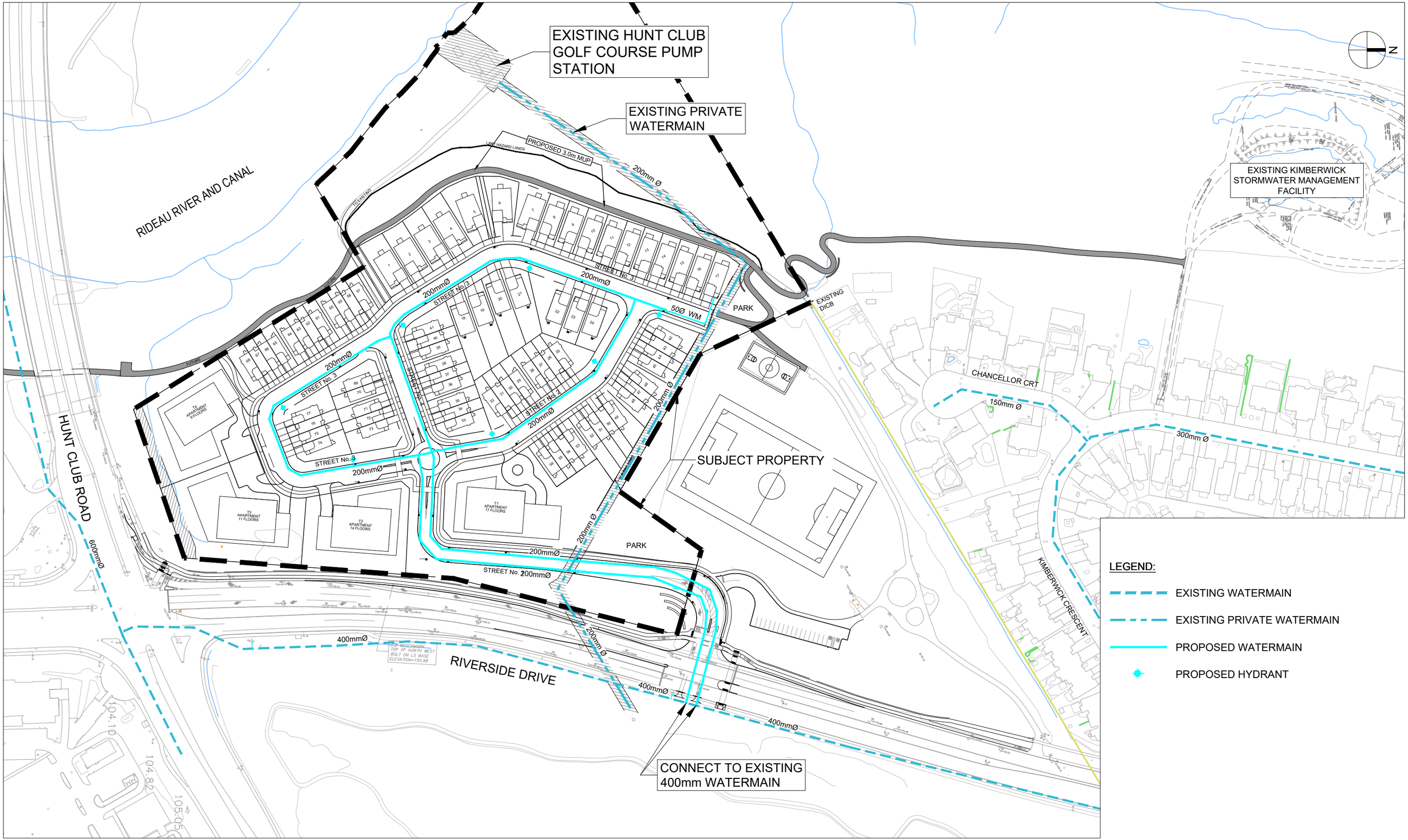

MAX DAY + FIRE (183l/s) DESIGN FIREFLOWS
HGL 127.1m
159.57 L/s
170.66 L/s
171.73 L/s
184.94 L/s
187.57 L/s
203.76 L/s
195.28 L/s
185.91 L/s
175.59 L/s
176.86 L/s

Max Day + Fire (183 l/s) - HGL 127.1m - Fireflow Design Report

		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	167.34	171.59	J11	138.00	106.28	170.66	139.96	141.92
2	☐	J11	167.06	159.57	J11	139.96	106.48	159.57	139.96	139.96
3	☐	J13	167.24	171.73	J13	139.96	106.88	171.73	139.96	139.96
4	☐	J14	136.14	187.57	J14	139.96	107.48	187.57	139.96	139.98
5	☐	J3	133.30	203.57	J3	139.96	108.88	203.58	139.96	139.96
6	☐	J4	133.45	203.76	J4	139.96	108.88	203.76	139.96	139.96
7	☐	J5	135.62	185.91	J5	139.96	108.28	185.91	139.96	139.98
8	☐	J6	135.34	175.59	J6	139.96	108.58	175.59	139.96	139.98
9	☐	J7	135.05	176.86	J7	139.96	107.88	176.86	139.96	139.98
10	☐	J8	167.38	195.28	J8	139.96	106.48	195.28	139.96	139.97
11	☐	J9	167.25	184.93	J9	139.96	104.28	184.94	139.96	139.96



J:\140873_St._Mary's_R\7.0_Production\7.03_Design\04_Civil_LAND\Draft Plan Report\140873-Fig-4-WATER.dwg Layout Name: CONCEPTUAL WATER PLAN Last Saved By: mmiline Last Saved At: Dec. 20, 22

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Scale: N.T.S.

Project Title: ASSESSMENT OF ADEQUACY OF PUBIC SERVICES REPORT
3930 AND 3960 RIVERSIDE DRIVE

Drawing Title: CONCEPTUAL WATER PLAN

Sheet No.: FIGURE 4

APPENDIX B

REPORT

RIVERSIDE DRIVE LANDS
SANITARY SEWER SERVICING STUDY UPDATE

Project: 126394-7.03.04

Prepared for City of Ottawa
by IBI Group

April 19, 2022

TABLE OF CONTENTS

PREAMBLE

This following report, initially prepared in 2007 has been updated as needed/where needed to bring the design up to current City of Ottawa standards and reflect the current development conditions. The four main areas that have been updated are;

- Sanitary sewer design flows have been updated to reflect the latest design parameters from the City of Ottawa as outlined in Technical Bulletin ISTB-2018-01
- Flows tributary from the Taggart Realty lands have been revised to conform to the current development concept
- Proposed sewer routing through the Taggart Realty lands has been revised to conform to the current development concept
- Construction cost estimates have been updated to reflect current market conditions

1.0 INTRODUCTION

1.1 Purpose

This report was prepared to review the feasibility of providing a sanitary sewer outlet for the study area which is identified in Figure 1 Study Area and Ownership and located in **Appendix A**. The area falls within the Riverside Drive corridor and includes lands both immediately north and south of the Hunt Club Bridge. The area is bounded by Riverside Drive to the west and the Rideau River to the east, the Quinterra/Riverwalk Park development to the north and on the south by the former municipal boundary between the former City of Ottawa and the former City of Gloucester. Pockets of residential uses along the river front south of the Hunt Bridge are excluded from the study area, as well as the City of Ottawa park lands adjacent to the Quinterra/Riverwalk neighbourhood. It is assumed that the property immediately south of the bridge, currently owned by Transport Canada, will remain undeveloped and, additionally, for the purposes of this report, the areas immediately adjacent to the Hunt Club Bridge are assumed to be undevelopable.

The principal land owners in the study area include Taggart Realty, which has land holdings north of Hunt Club Road; Transport Canada, Dymon Management Limited, the City of Ottawa and the Ottawa International Airport Authority, all of which own lands south of Hunt Club Road.

Most of the external major municipal services, including a trunk sanitary sewer, needed to support urbanization of the study area were constructed in the 1970's and 1980's.

1.2 Background

Prior to 1980, the former Regional Municipality of Ottawa Carleton extended a regional trunk sanitary system immediately adjacent to the Rideau River to a location about 700

meters north of the study area. In 1987, the J. Perez Corporation development, known as Riverwalk Park, included a 525 mm dia. extension of the trunk sanitary sewer to the south limits of its development. The existing outlet sewer for the study area currently is terminated at Point A (MH 17A, just south of Riverwalk Park), which is identified on Figure 2 Existing and Proposed Sewers, located in **Appendix A**. The invert elevation of the sewer at that location is 84.63 meters.

Also for reference, an existing 300 mm diameter sewer located in Riverside Drive and Hunt Club Road adjacent to the airport is included on Figure 2. That sewer was installed by the federal government in the mid 1970's to provide a wastewater outlet for federal buildings located on Limebank Road. The sewer outlets at Bowesville Road.

In 2001, the land owners to the south of the Hunt Club Bridge, including the City of Ottawa, the Ottawa International Airport Authority and the Newill Corporation, prepared a planning submission in support of proposed amendments to the Official Plan and zoning-by-law. The Newill Corporation property was subsequently purchased by Dymon Management Limited, which presently owns the property.

The following report sections will review the feasibility of the existing wastewater infrastructure to support development of the study area and present a servicing scheme to provide a development and conservation strategy for the study area.

2.0 WASTEWATER OUTLET

2.1 Existing Conditions

Prior to 1980, the former Regional Municipality of Ottawa-Carleton (RMOC) constructed a trunk sanitary sewer designed to service the study area and other adjacent areas. The 750mm dia. Riverside Drive Collector sewer terminated between the Urbandale Realty and DND properties north of the study area.

In the late 1980's, as part of its Riverwalk Park development, J. Perez Corporation constructed an extension to the regional trunk sewer which extended to the south limits of its property. At that location, the sewer was designed to provide a wastewater outlet for additional lands to the south. For reference, two documents from the Riverwalk Park development including the Riverwalk Park – Sanitary Sewer Design Sheet and Riverwalk Park – Sanitary Drainage Area Plan are both included in Appendix B.

At its termination (MH 17A on the Riverwalk Park design sheet), the sewer was sized for an external area of 39.42 hectares with a predicted peak flow of 108.6 l/s. The existing sewer has a capacity of 200 l/s.

2.2 Potential Development

Lands south of Riverwalk Park can outlet wastewater flows to the existing 525 mm dia. sewer presently terminated at the north limit of the study area. The potential future

developments include those lands within the study area. The gross and net areas for the various land parcels within the study area are indicated on Figure 3 Drainage Area Plan, which is included in **Appendix C**. The following table provides a breakdown of the areas for each land owner. It should be noted that only a portion of the gross study area can be developed.

TABLE 2.1 RIVERSIDE DRIVE LANDS – OWNERSHIP AND AREAS

LAND OWNER	AREAS (ha)	
	GROSS	DEVELOPABLE (NET)
Taggart Realty	8.58 ha	6.35 ha
Transport Canada	3.65 ha	0.00 ha
Dymon Management Ltd.	8.69 ha	6.29 ha
City of Ottawa/ Airport Authority	34.96 ha	13.81 ha
TOTAL	55.88 ha	26.45 ha

The City's Official Plan has identified the areas north of the Hunt Club Bridge as General Urban Area and those south of the bridge as Employment Area. Current City zoning identifies some of the lands as either Employment Centre or Light Industrial. It also identifies those lands adjacent to the Rideau River as Leisure/Open Space. It Is anticipated that Taggart Realty will approach the City of Ottawa requesting that their lands be re-zoned to allow residential uses. As a conservative approach, we have assumed residential flows from these lands in the updated analysis found below. Not all the study area will be urbanized and generate wastewater flows. This report assumes the Open Space areas will contribute no flows to the sanitary sewer extension. Therefore, although the total study area is over 55 hectares, only about 47% (26.45 ha) is considered for urbanization.

For the purposes of this report, with the exception of the Taggart Realty property, all developable lands within the study area will be considered as commercial developments. The wastewater flow estimate for the Taggart Realty property is based on the current concept plan shown in the report figures and unit types and totals provided by the owners which include 30 single units, 48 townhouse units and 490 apartments. The exact unit count will be verified through the Site Plan Application process. Using standard City of Ottawa design guidelines for estimating wastewater flow, it is estimated that the study area will generate a peak flow of 32.55 l/s. The flow estimate is based on the following criteria:

Total developable area	26.45 ha
Average Commercial Flow	28,000 l/ha/day
Commercial Peaking Factor	1.5
Residential Flow	280 l/cap/day
Residential Peaking Factor	Modified Harmon Formula
Infiltration Allowance	0.33 l/s/ha

Based on this analyses, the sewer extension though the study side would require new 250 mm dia to 300 mm dia pipes and the existing sub-trunk would have a spare capacity of over 168 l/s (200.6 – 32.6), which is more than adequate to accommodate development of the study area. In fact, a considerably larger area could develop and route wastewater flows to the existing outlet sewer.

The sanitary sewer design sheet for the proposed sewer extension is included in **Appendix C**. There are two designs included on the design sheet; one for the study area without any consideration for wastewater contributions from lands external to the study area, and another which includes a potential external drainage area of 65.0 ha.

The second design was included to take advantage of the available outlet capacity and provide other stakeholders, such as the Airport Authority, with wastewater options. The expected sanitary flow, including an external area of 65.0 hectares, is 93.49 l/s, which still results in 26.29 l/s theoretical available spare capacity in the proposed outlet sewer.

As expected, the sewers needed to carry the wastewater flows for the two models presented on the sewer spreadsheets are different sizes. A 250 mm and 300 mm diameter sewer system will be adequate for the study area needs and a larger sewer (375 mm and 450 mm diameter) would be needed if external areas to the study area are to be considered.

In keeping with good planning practice, this report assumes that areas external to the study area will eventually take advantage of the existing spare capacity in the outlet sewer. Accordingly, the larger 450 mm and 375 mm diameter sewers have been included in this report.

2.3 Sewer Route

Figure 4, Proposed Sanitary Sewer Plan and Profile, which is located contained in **Appendix D**, provides a potential sewer route for the extension of the outlet sewer needed to service the study area. This route is conceptual and is provided only to indicate the feasibility of providing a wastewater outlet for the study area. The conceptual design will require some refinements to meet the needs of future plans of development.

From its current terminus at Point A, the sewer could be constructed southward towards the Hunt Club Bridge through the existing park and the Taggart Realty property. As the concept development and feasibility analysis of the Taggart property is currently ongoing and Taggart is aware of the requirement for the subject sanitary sewer to cross their lands, it is anticipated that the landowner will propose a route for the sanitary sewer through their lands that is acceptable to both the City and Taggart Realty. The proposed routing of the sewer will be confirmed with the City through the development review application process.

There are two existing infrastructures which cross the Taggart Realty property. A small diameter watermain was constructed by the Hunt Golf and Country Club near the center

of the property and a gas main exists near the southern portion of the property. The exact location of those mains should be accurately determined prior to final designs of the sanitary sewer. Taggart Realty will construct the portion of the subject sanitary sewer downstream of and within their lands at the time of on-site site servicing works needed for the development of their parcel. It is anticipated that a cost sharing agreement, ultimately reimbursing Taggart Realty for all oversize/over depth costs, will be worked out with the City of Ottawa on behalf of the upstream landowners.

There is an opportunity to cross under the Hunt Club Bridge near the eastern abutment onto the lands south of the bridge. The sewer obvert elevation at the bridge should be adjusted near the 88.50 meter range since the crushed stone sheeting at the bridge is close to the 91.0 meter elevation. There will be about 5.5 meters of headroom under the bridge.

South of the bridge, the sewer could be constructed near the toe of an existing embankment on Transport Canada land, and east of the existing stormwater management facility which straddles the federal crown land and the property owned by Dymon Management Limited (DML). Final design of the sanitary sewer will have to take into account the locations of the existing storm sewers on the Transport Canada lands and the Dymon Management lands.

The sanitary sewer will also be designed for the lands owned by the City of Ottawa and the Airport Authority. While the Dymon Management lands are on relatively high terrain (between 102 and 106 meters), some of the more southern lands, owned by the City of Ottawa and the Airport Authority, are at lower elevations. Therefore, the sections of sanitary sewer between Points C and D located on the Dymon Management property should be relatively deep to ensure as much of the study area as possible can drain by gravity to the proposed sewer. It is therefore proposed that the sewer between about MH 12 and Point D be located about 10 meters below existing grade, terminating at point D at an obvert elevation of about 96 meters. As noted earlier in this section, the storm sewer location is conceptual only at this time. At the design stage of the sewer, other route locations, such as within the Riverside Drive public right-of-way, could be further investigated.

Based on that location, Figure 5, The City of Ottawa and the Ottawa International Airport Gravity Service Limits, which is located in **Appendix E** indicates the expected limit of the City of Ottawa property that can drain by gravity to the new sewer. About 7.8 ha of the 13.81 ha of the City's property can be expected to develop with a gravity outlet. The balance will require pumping facilities to connect to the new sewer.

3.0 COST OPINION AND EASEMENTS

3.1 Cost Opinion

The proposed sanitary sewer needed to provide the outlet service to the study area is indicated on Figure 4. That sewer includes about 800 meters of 450 mm dia and 280 meters of 375 mm dia sewer. The estimated cost opinion of that sewer is $1,608,750 and is summarized in Table 4.1.

TABLE 4.1 SANITARY SEWER COST OPINION

UNIT COST RATES ($/M) LENGTHS (m)	**SEWER SEGMENTS AND SIZES**			**COST SUMMARIES**
	A-B 450Ø	B-MH11 450Ø	MH11-D 375Ø	
Lengths (m)	490	310	280	
Base Unit Rate ($/m)	$ 750	$ 1,000	$ 2,000	
Base Construction Cost ($)	$367,500	$310,000	$560,000	$1,237,500
Contingency Allowance (15%)	$ 55,125	$ 46,500	$ 84,000	$ 185,625
Engineering Allowance (15%)	$ 55,125	$ 46,500	$ 84,000	$ 185,625
Total Cost Opinion ($)	$477,750	$403,000	$728,000	$1,608,750

This estimate is based on local knowledge and the City of Ottawa Cost Estimate Classification System. Specifically, the Contingency Engineering allowances are considered Planning Level Estimates Class C based on the functional level of detail as shown on Figure 4, proposed Sanitary Sewer Plan and Profile.

3.2 Easement Requirements

The City of Ottawa, in its 2012 Sewer Design Guidelines, includes a discussion regarding acceptable easement requirements for buried infrastructure such as the proposed sanitary sewer. These guidelines indicate that for a single sanitary sewer pipe, a minimum 6.0 meter wide easement for a shallow pipe is required by the City. For pipes greater than four meters in depth, then a minimum 9.0 meter wide easement is needed pending geotechnical consideration.

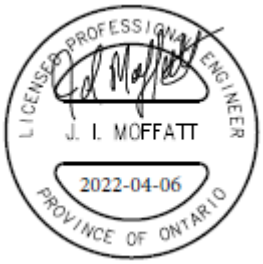
After a review of the actual easement requirements for the subject sewer which will be constructed in native sandy sails, a general rule of thumb is that for every meter of buried depth, two meters will be required for surface easements. For instance, for a five meter deep sewer, a ten meter wide easement would be necessary. From MH11 to MH14, as shown on Figure 4, the sewer is proposed to be about 10 meters deep. Therefore, in that situation, a 20 meter wide easement would be necessary to meet the City of Ottawa guidelines. A geotechnical review should be completed to confirm the feasibility of those requirements.

4.0 CONCLUSION

Development of the Riverside Drive Lands over the last 30 years has provided a wastewater outlet for the study area. An existing 525 mm diameter sanitary sewer, terminated at the northern limits of the study area, has about 108 l/s available capacity for future developments both north and south of the Hunt Club Bridge.

The estimated peak wastewater flow which could be generated from the study area, when fully developed, is in the order of 33 l/s. The existing outlet sewer can be readily extended southward through the study site and provide the necessary wastewater outlet to support development of the area. It is also recommended that the sewer extension be sized to provide as much spare capacity as possible to ensure other land owners in the adjacent areas have a wastewater outlet option. Although most of the study area can drain by gravity to the proposed outlet sewer extension, portions of the southern study area will require the use of pumping facilities.

Prepared by:



James I. Moffatt, P. Eng.
Associate

APPENDIX A

- Figure 1 – Study Area and Ownership
- Figure 2 – Existing and Proposed Sanitary Sewers

N

OTTAWA HUNT AND GOLF CLUB

HUNT CLUB ROAD

MACDONALD CARTIER INTERNATIONAL AIRPORT

FORMER CITY OF GLOUCESTER

RIVERSIDE DRIVE

EXISTING PARK

TAGGART REALTY

TRANSPORT CANADA

DYMON MANAGEMENT LIMITED

EXISTING STORMWATER MANAGEMENT FACILITY

CITY OF OTTAWA

DYMON MANAGEMENT LIMITED

THE CITY OF OTTAWA AND THE OTTAWA INTERNATIONAL AIRPORT AUTHORITY

SHEFFLIN (HUNT CLUB) BRIDGE

QUINTERRA / RIVERWALK PARK

RIDEAU RIVER

WEST HUNT CLUB ROAD

RIDEAU RIVER

LEGEND

STUDY AREA

PROPERTY LIMITS

Scale	Project Title	Drawing Title	Sheet No.
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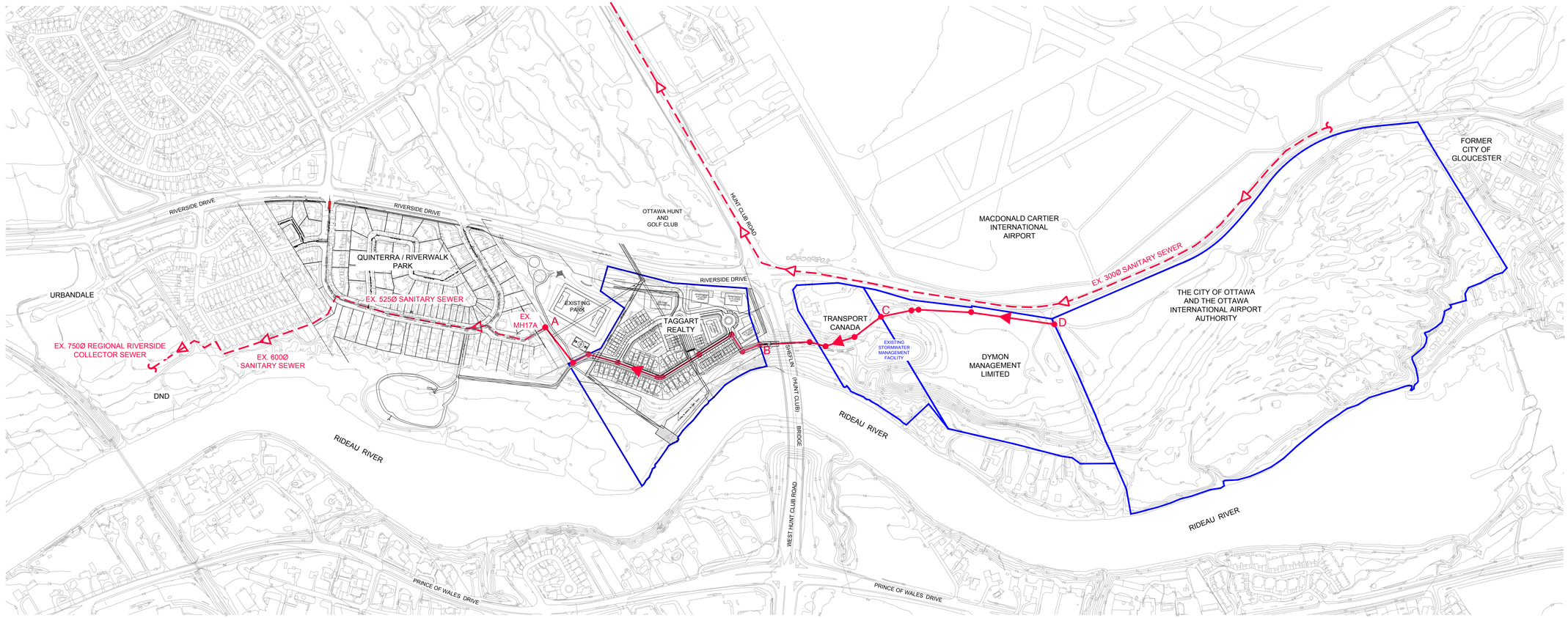


LEGEND

- EXISTING SANITARY SEWERS
- PROPOSED SANITARY SEWERS
- A — PROPOSED SEWER POINTS

Scale
IBI
1:4000

Project Title
RIVERSIDE DRIVE LANDS
SANITARY SEWER SERVICING STUDY
CITY OF OTTAWA

Drawing Title
EXISTING AND PROPOSED
SANITARY SEWERS

Sheet No.
FIGURE 2

APPENDIX B

- Riverwalk Park – Sanitary Sewer Design Sheet
- Riverwalk Park – Sanitary Drainage Area Plan

SANITARY SEWER DESIGN SHEET

Flow Per Person: 450 litres per day, or
.0052 litres per second
Infiltration: 0.20 litres per second per hectare
3.5 ppu single family
3.3 ppu townhouses
1.6 ppu apartments

DESIGN: J.I.M. | PROJECT: Riverwalk Park - | SHEET NO.
CHECKED: W.B. | J. Perez Corporation -
DATE: Oct. 86 | City of Ottawa 3625-3 | 1 of 2

Rev.: March 87

CUMMING-COCKBURN & ASSOCIATES LIMITED
Consulting Municipal Engineers
Toronto-Ottawa-Waterloo-London-Brockville

LOCATION	MANHOLE		INCREMENT					CUMULATIVE				INFILTRATION			TOTAL FLOW	PROFILE				
	FROM	TO	RES. UNITS	UNIT POP. DENSITY	POP.	OTHER AREAS (ha)	AVG. FLOW L/Sec.	POP.	AVG. FLOW L/Sec.	PEAK FACTOR	PEAK FLOW L/Sec.	INCR. OF AREA (ha)	TOTAL AREA	FLOW L/Sec.	L/Sec.	PIPE DIA. (mm)	GRADE (%)	VEL. M/Sec.	CAP. L/Sec.	LENGTH Metres
External (South)		17A			4842	-		4842	25.18	4.00	100.70	39.42	39.42	7.88	108.60	525	0.20	0.896	200.50	-
Street No. 2 (cul-de-sac)	17A	16A	5	3.5	18	39.42		4860	25.27	4.00	101.08	0.51	39.93	7.99	109.07	525	0.20	0.896	200.50	49.0
" " " "	16A	15A	3	3.5	10	39.93		4870	25.32	4.00	101.30	0.37	40.30	8.06	109.40	525	0.20	0.896	200.50	53.0
" " " "	15A	5A	2	3.5	7	40.30		4877	25.36	4.00	101.40	0.11	40.41	8.08	109.50	525	0.20	0.896	200.50	28.0
Street No. 1	2A	3A	hotel		365	0.21		365	1.90	6.00	11.40	1.15	1.36	0.27	11.65	250	0.50	0.863	43.61	59.5
	3A	4A	135	1.6	216	1.36		581	3.02	6.00	18.13	0.73	2.09	0.42	18.54	250	0.50	0.863	43.61	39.5
	4A	5A	-	-	-	2.09		581	3.02	6.00	18.13	0.06	2.15	0.43	18.55	250	2.80	1.929	97.70	31.0
	5A	6A	1	3.5	4	42.56		5462	28.40	4.00	113.60	0.10	42.66	8.53	122.10	525	0.20	0.896	200.50	38.5
	6A	7A	4 97	3.5 3.3	334	42.66		5796	30.14	4.00	120.60	1.09	43.75	8.75	129.30	525	0.20	0.896	200.50	80.0
	7A	8A	3 97	3.5 3.3	330	43.75		6126	31.86	4.00	127.40	1.29	45.04	9.01	136.40	525	0.20	0.896	200.50	76.5
	8A	9A	3	3.5	10	45.04		6136	31.91	4.00	127.60	0.24	45.28	9.06	136.70	525	0.20	0.896	200.50	74.0
	9A	10A	1 97	3.5 3.3	324	45.28		6460	33.59	4.00	134.40	1.01	46.29	9.26	143.60	525	0.20	0.896	200.50	31.5

SANITARY SEWER DESIGN SHEET

Flow Per Person: 450 litres per day, or
.0052 litres per second
Infiltration: 0.28 litres per second per hectare
3.5 ppu single family
3.3 ppu townhouses
1.6 ppu apartments

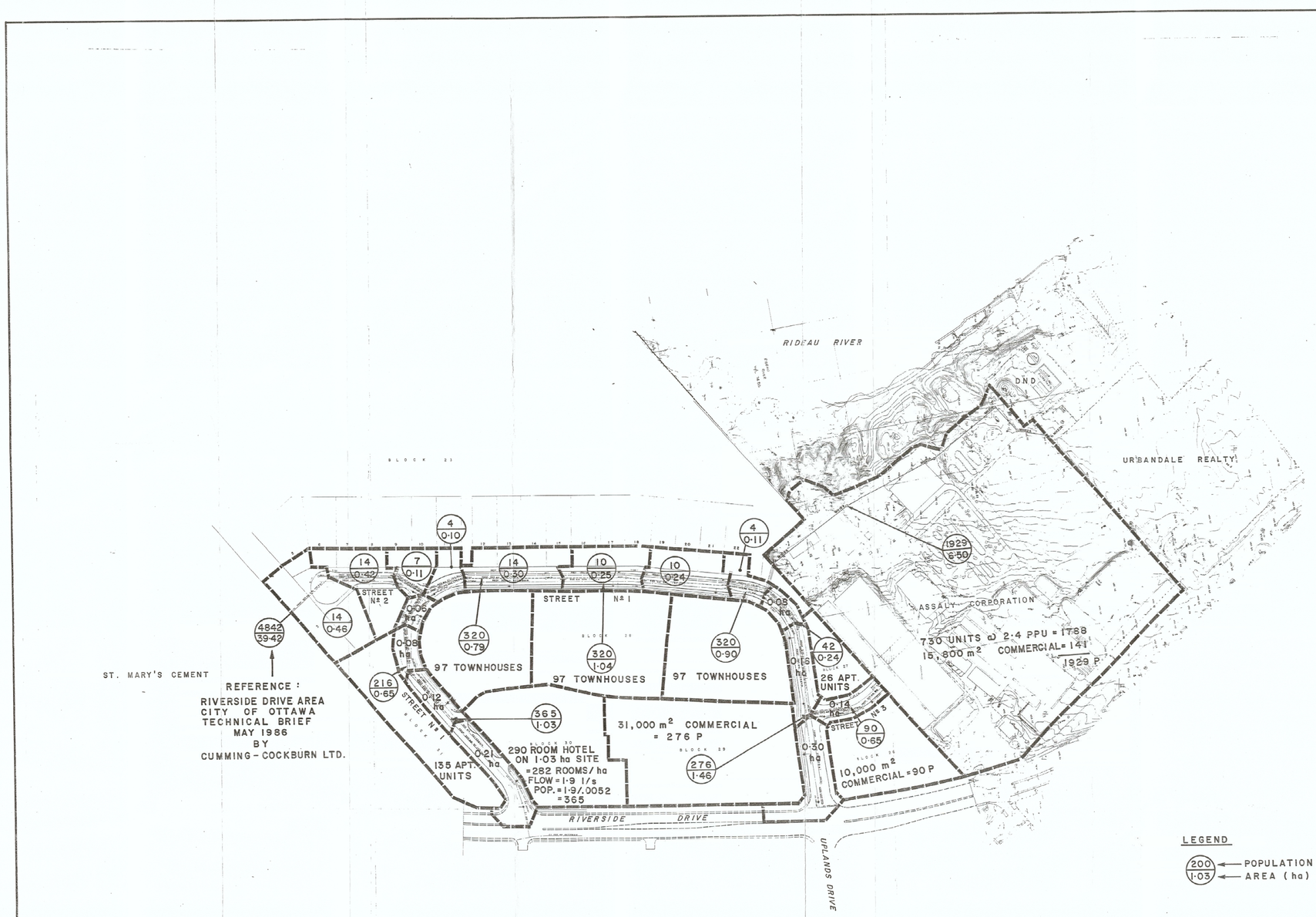
DESIGN: J.I.M.	PROJECT: Riverwalk Park -	SHEET NO.
CHECKED: W.B.	J. Perez Corporation -	
DATE: Oct. 86	City of Ottawa 3625-3	2 of 2

Rev.: Jan. 87

CUMMING-COCKBURN & ASSOCIATES LIMITED
Consulting Municipal Engineers
Toronto-Ottawa-Waterloo-London-Brockville

LOCATION	MANHOLE		INCREMENT					CUMULATIVE				INFILTRATION			TOTAL FLOW	PROFILE				
	FROM	TO	RES. UNITS	UNIT POP. DENSITY	POP.	OTHER AREAS (ha)	AVG. FLOW L/Sec.	POP.	AVG. FLOW L/Sec.	PEAK FACTOR	PEAK FLOW L/Sec.	INCR. OF AREA (ha)	TOTAL AREA	FLOW L/Sec.	L/Sec.	PIPE DIA. (mm)	GRADE (%)	VEL. M/Sec.	CAP. L/Sec.	LENGTH Metres
Street No. 3	14A	12A	Comm.		90	-		90	0.47	6.00	2.81	0.79	0.79	0.16	2.97	250	0.60	0.945	47.86	35.0
Street No. 1	12A	11A	Comm.		276	1.09		366	1.90	6.00	11.42	1.62	2.71	0.51	11.93	250	2.90	1.966	105.10	78.0
	11A	10A	26	1.6	42	2.71		408	2.12	6.00	12.73	0.32	3.03	0.59	13.32	250	2.90	1.966	105.10	37.5
Assaly Property	10A	19A	-	-	-	49.32		6868	35.70	4.00	142.80	-	49.32	9.86	152.60	525	0.20	0.896	200.50	110.0
" "	19A	23A	Mixed		1929	49.32		8797	45.70	4.00	183.00	6.50	55.92	11.18	194.18	600	0.20	0.981	286.00	219.0

3625 — 501 A



City Of Ottawa
Department Of Physical Environment
Engineering And Surveys Branch

Revisions:

No	Date	Description	Drawn By	Apprd By

LICENCE PROFESSIONAL ENGINEER J.I. McPHAIL ONTARIO

CUMMING - COCKBURN & ASSOCIATES LIMITED CONSULTING MUNICIPAL ENGINEERS WATERLOO - TORONTO - OTTAWA

Designed By J.I.M.	Date	Structural Check By	Date
Survey Detail By	Date	Checked By	Date
Drafting By	Date	Checked By	Date

Final Measurements :

Construction Type	Inspector
Work Commenced	Instrument man
Work Completed	Field Book #
Designer	Core
Drafting Revisions	Checked By

Design And Construction Division

C. Sim P. Eng. Commissioner — W.R. Cole P.Eng. Branch Director

Chief Design & Const. Eng. — Senior Const. Coord.

J. PEREZ CORPORATION - RIVERWALK PARK
SANITARY
DRAINAGE AREA PLAN

Contract No:	Survey Books:	Scales:	Plan No:
3625		HOR. 1/1250 VERT. -	501 A

Sheet 1 of 1

APPENDIX C

- Figure 3 – Drainage Area Plan
- Sanitary Sewer Design Sheet

N

OTTAWA HUNT AND GOLF CLUB

HUNT CLUB ROAD

MACDONALD CARTIER INTERNATIONAL AIRPORT

FORMER CITY OF GLOUCESTER

RIVERSIDE DRIVE

EXISTING PARK

6.35
8.58

TAGGART REALTY

0.00
3.65

TRANSPORT CANADA

EXISTING STORMWATER MANAGEMENT FACILITY

DYMON MANAGEMENT LIMITED

6.29
8.69

THE CITY OF OTTAWA AND THE OTTAWA INTERNATIONAL AIRPORT AUTHORITY

13.81
34.96

QUINTERRA / RIVERWALK PARK

SHEFLIN (HUNT CLUB) BRIDGE

RIDEAU RIVER

WEST HUNT CLUB ROAD

RIDEAU RIVER

LEGEND

13.81 / 34.96 — DEVELOPABLE AREA (Ha) / TOTAL PROPERTY AREA (Ha)

Scale	Project Title	Drawing Title	Sheet No.
1:5000	RIVERSIDE DRIVE LANDS SANITARY SEWER SERVICING STUDY CITY OF OTTAWA	DRAINAGE AREA PLAN	FIGURE 3

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

SANITARY SEWER DESIGN SHEET

Riverside Drive Lands
CITY OF OTTAWA
Sanitary Sewer Servicing Study

LOCATION			RESIDENTIAL										ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL	PROPOSED SEWER DESIGN						
													AREA (Ha)								AREA (Ha)		FLOW									
			AREA	UNIT TYPES				AREA	POPULATION		RES	PEAK	INSTITUTIONAL		COMMERCIAL		INDUSTRIAL		ICI	PEAK												
STREET	FROM	TO	w/ Units	SF	SD	TH	APT	w/o Units	IND	CUM	PEAK	FLOW	IND	CUM	IND	CUM	IND	CUM	PEAK	FLOW	IND	CUM	(L/s)	IND	CUM	FLOW	CAPACITY	LENGTH	DIA	SLOPE	VELOCITY	AVAILABLE CAPACITY	
	MH	MH	(Ha)					(Ha)			FACTOR	(L/s)							FACTOR	(L/s)							(L/s)	(m)	(mm)	(%)	(full) (m/s)	L/s	(%)
No External Drainage Areas		Point D - MH14																															
City of Ottawa/Airport Authority	Point D - MH14	MH11							0.0	0.0	3.80	0.00	0.00	0.00	0.00	0.00	13.81	13.81	1.50	8.39	13.81	13.81	4.56	0.00	0.00	12.95	39.24	280.00	250	0.40	0.774	26.29	67.00%
Dymon Management Limited	MH11	Point B - MH6							0.0	0.0	3.80	0.00	0.00	0.00	0.00	0.00	6.29	20.10	1.50	12.21	6.29	20.10	6.63	0.00	0.00	18.85	39.24	315.00	250	0.40	0.774	20.39	51.97%
Transport Canada/Hunt Club Road																																	
	Point B - MH6	MH2							0.0	0.0	3.80	0.00	0.00	0.00	0.00	0.00	0.00	20.10	1.50	12.21	0.00	20.10	6.63	0.00	0.00	18.85	39.24	355.00	250	0.40	0.774	20.39	51.97%
Taggart Realty	MH2	Point A Ex MH17A	6.35	30		48	490		1113.6	1113.6	3.22	11.60	0.00	0.00	0.00	0.00	0.00	20.10	1.50	12.21	6.35	26.45	8.73	0.00	0.00	32.55	55.26	130.00	300	0.30	0.757	22.71	41.10%
																											200.65	0.00	525	0.20	0.898	200.65	100.00%
External Drainage Areas		Point D - MH14							0.0	0.0	3.80	0.00	0.00	0.00	0.00	0.00	65.00	65.00	1.50	39.50	65.00	65.00	21.45	0.00	0.00	60.95							
City of Ottawa/Airport Authority	Point D - MH14	MH11							0.0	0.0	3.80	0.00	0.00	0.00	0.00	0.00	13.81	78.81	1.50	47.89	13.81	78.81	26.01	0.00	0.00	73.90	100.18	280.00	375	0.30	0.879	26.29	26.24%
Dymon Management Limited	MH11	Point B - MH6							0.0	0.0	3.80	0.00	0.00	0.00	0.00	0.00	6.29	85.10	1.50	51.71	6.29	85.10	28.08	0.00	0.00	79.79	162.91	315.00	450	0.30	0.992	83.12	51.02%
Transport Canada/Hunt Club Road																																	
	Point B - MH6	MH2							0.0	0.0	3.80	0.00	0.00	0.00	0.00	0.00	0.00	85.10	1.50	51.71	0.00	85.10	28.08	0.00	0.00	79.79	133.02	355.00	450	0.20	0.810	53.22	40.01%
Taggart Realty	MH2	Point A Ex MH17A	6.35	30		48	490		1113.6	1113.6	3.22	11.60	0.00	0.00	0.00	0.00	0.00	85.10	1.50	51.71	6.35	91.45	30.18	0.00	0.00	93.49	133.02	130.00	450	0.20	0.810	39.52	29.71%
																											200.65	0.00	525	0.20	0.898	200.65	100.00%

Design Parameters:

Residential					
SF	3.4	p/p/u			
TH/SD	2.7	p/p/u	INST	28,000	L/Ha/day
APT	1.8	p/p/u	COM	28,000	L/Ha/day
Other	60	p/p/Ha	IND	35,000	L/Ha/day
				17000	L/Ha/day

MOE Chart

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day 200 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.8
where K = 0.8 Correction Factor
5. Commercial and Institutional Peak Factors based on total area, 1.5 if greater than 20%, otherwise 1.0

Designed: JEB

Checked: JIM

Dwg. Reference: 126394

No.	Revision	Date
1.	Update to 2007 Study	2022-04-06

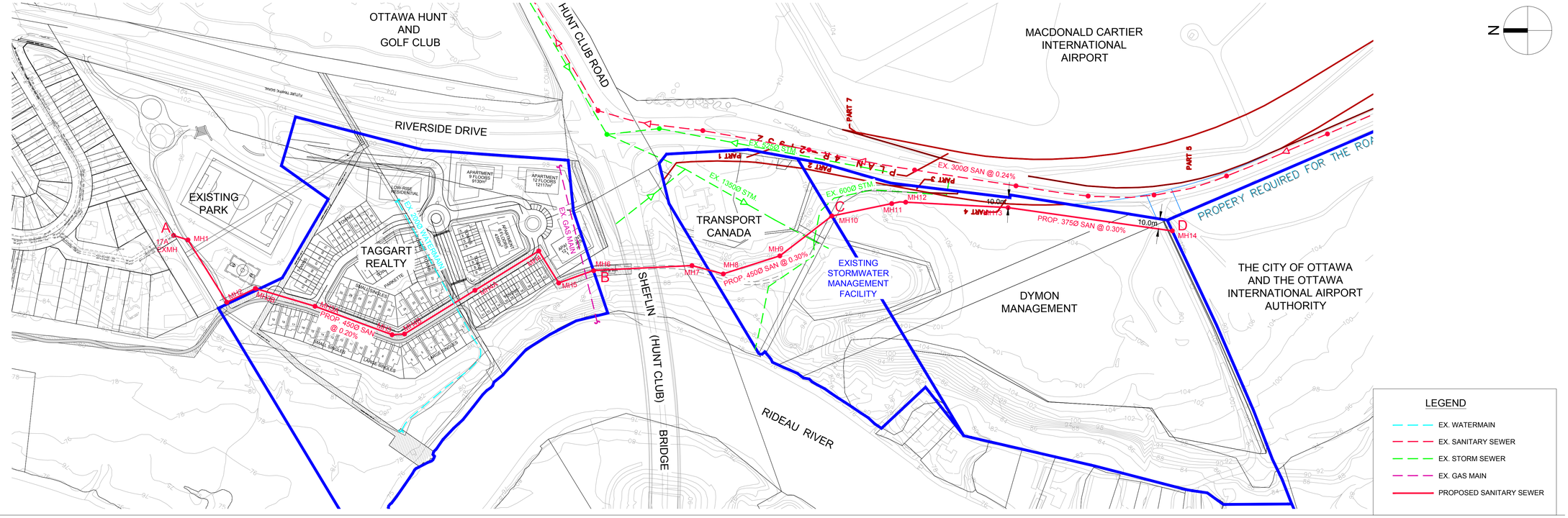
File Reference: 126394.7.1

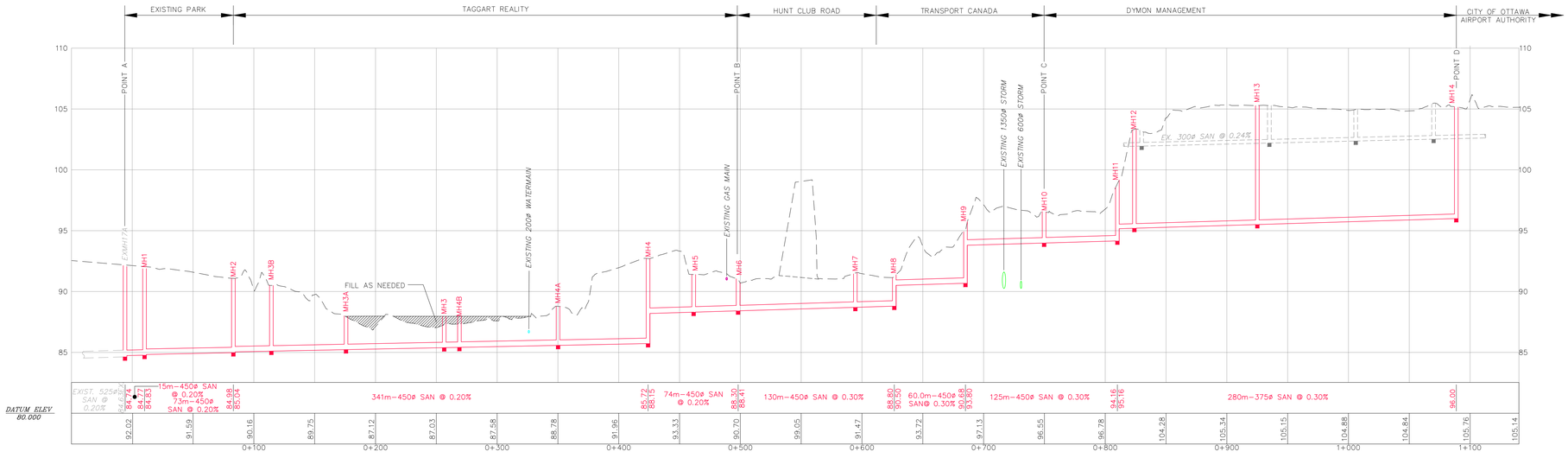
Date: 2022-04-06

Sheet No: 1 of 1

APPENDIX D

- Figure 4 – Proposed Sanitary Sewer Plan and Profile





Scale
1: 2000

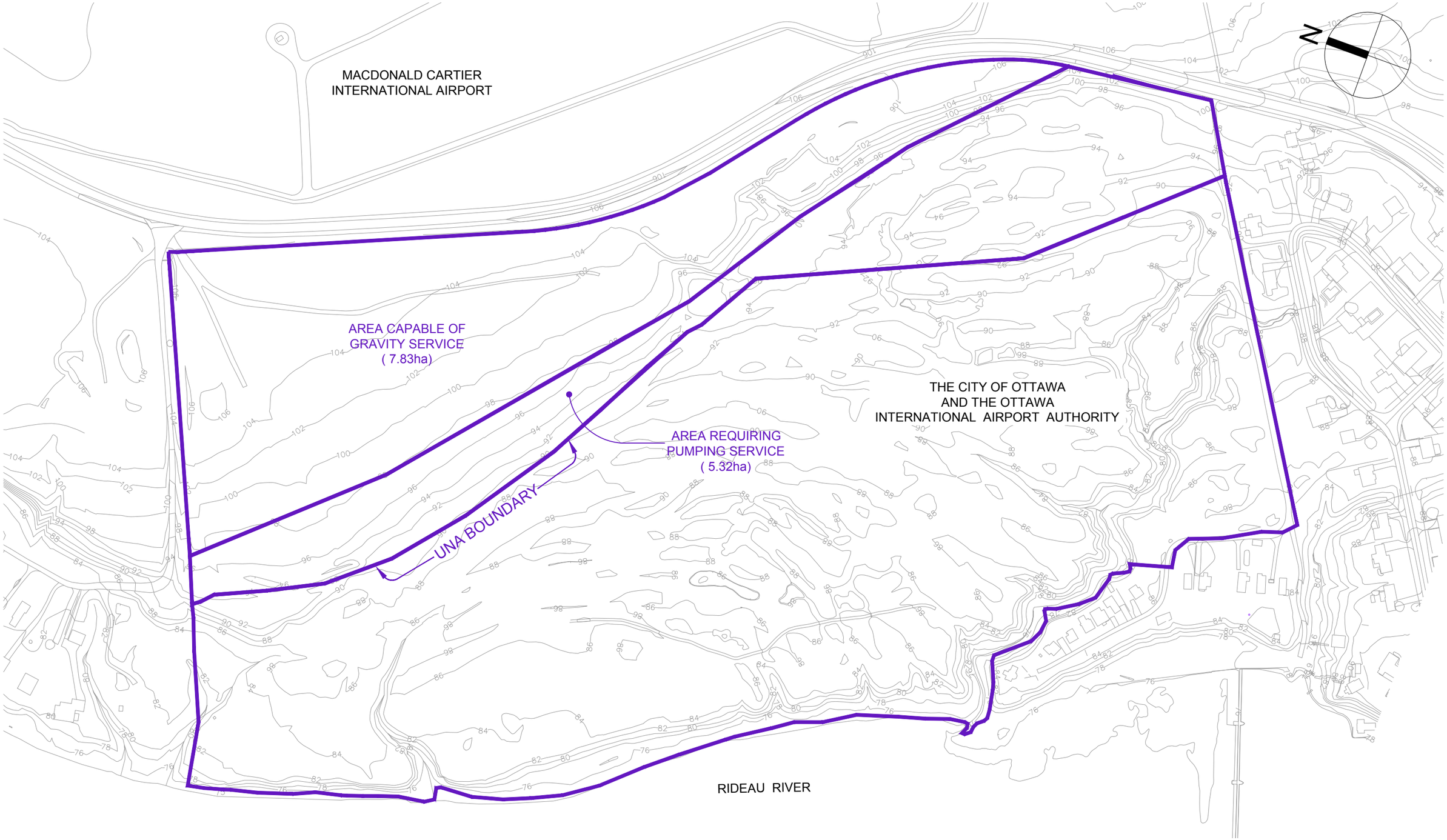
Project Title
RIVERSIDE DRIVE LANDS
SANITARY SEWER SERVICING STUDY
CITY OF OTTAWA

Drawing Title
PROPOSED SANITARY SEWER
PLAN AND PROFILE

Sheet No.
FIGURE 4

APPENDIX E

- Figure 5 – The City of Ottawa and The Ottawa International Airport Authority Gravity Service Limits



IBI

Scale

1:5000

Project Title

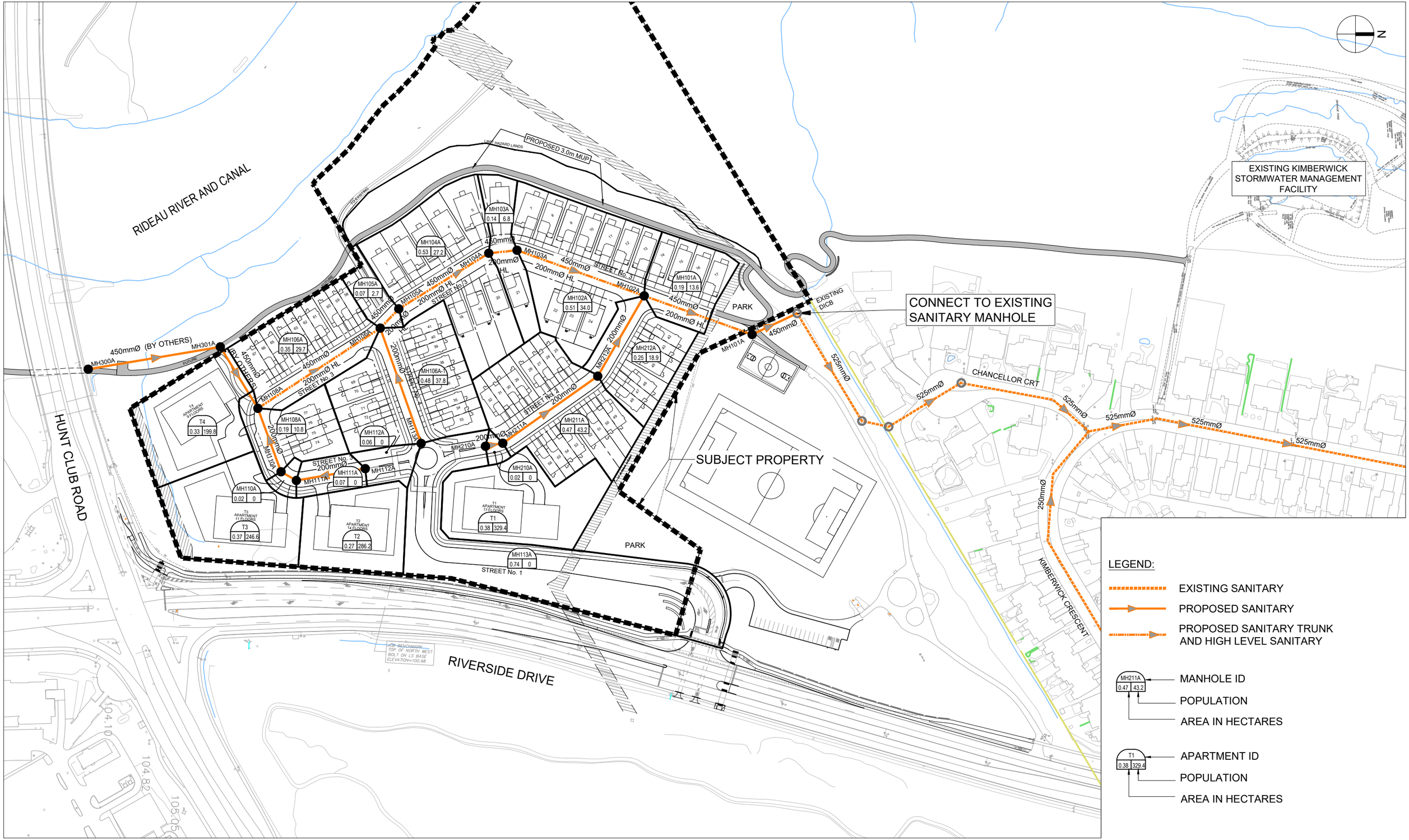
RIVERSIDE DRIVE LANDS
SANITARY SEWER SERVICING STUDY
CITY OF OTTAWA

Drawing Title

THE CITY OF OTTAWA AND THE OTTAWA INTERNATIONAL AIRPORT AUTHORITY
GRAVITY SERVICE LIMITS

Sheet No.

FIGURE 5



J:\140873_St._Mary's_R\7.0_Production\7.03_Design\04_Civil_LAND\Draft Plan Report\140873-Fig-5-SANITARY DRAINAGE.dwg Layout Name: CONCEPTUAL SANITARY DRAINAGE PLAN Last Saved By: mmilne Last Saved At: Dec. 21, 22

IBI

Scale
N.T.S.

Project Title
ASSESSMENT OF ADEQUACY OF PUBIC SERVICES REPORT
3930 AND 3960 RIVERSIDE DRIVE

Drawing Title
CONCEPTUAL SANITARY DRAINAGE PLAN

Sheet No.
FIGURE 5

J:\140873_St._Mary's_R\7.0_Production\7.03_Design\04_Civil_LAND\Draft Plan Report\140873-Fig-6-SANITARY.dwg Layout Name: CONCEPTUAL SANITARY PLAN Last Saved By: mmline Last Saved At: Dec. 21, 22

RIDEAU RIVER AND CANAL

HUNT CLUB ROAD

RIVERSIDE DRIVE

PROPOSED 3.0m MUP

LIMIT HAZARD LANDS

TOP OF BANK

TOE OF BANK

EXISTING KIMBERWICK STORMWATER MANAGEMENT FACILITY

CONNECT TO EXISTING SANITARY MANHOLE

EXISTING DICB

SUBJECT PROPERTY

PARK

STREET No. 1

STREET No. 2

STREET No. 3

T1 APARTMENT 17 FLOORS

T2 APARTMENT 14 FLOORS

T3 APARTMENT 11 FLOORS

T4 APARTMENT 9 FLOORS

450mmØ (BY OTHERS)

450mmØ

200mmØ HL

200mmØ

525mmØ

250mmØ

CHANCELLOR CRT

KIMBERWICK CRESCENT

VB-BENCHMARK
TOP OF NORTH WEST BOLT ON LS BASE
ELEVATION=100.98

104.10

104.82

105.05

N

LEGEND:

- EXISTING SANITARY
- PROPOSED SANITARY
- PROPOSED SANITARY TRUNK AND HIGH LEVEL SANITARY

IBI

Scale: N.T.S.

Project Title: ASSESSMENT OF ADEQUACY OF PUBIC SERVICES REPORT
3930 AND 3960 RIVERSIDE DRIVE

Drawing Title: CONCEPTUAL SANITARY PLAN

Sheet No.: FIGURE 6

IBI GROUP
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Ottawa, Ontario K1S 5N4 Canada
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ibigroup.com

SANITARY SEWER DESIGN SHEET

Riverside Park
City of Ottawa
St. Mary's Lands Corporation

LOCATION				RESIDENTIAL										ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA	UNIT TYPES				AREA	POPULATION		RES	PEAK	AREA (Ha)						ICI	PEAK	AREA (Ha)		FLOW				CAPACITY	LENGTH	DIA	SLOPE	VELOCITY	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH	w/ Units (Ha)	SF	TH/SD	Tower UNIT	2 Bed APT	w/o Units (Ha)	IND	CUM	PEAK FACTOR	FLOW (L/s)	INSTITUTIONAL IND	INSTITUTIONAL CUM	COMMERCIAL IND	COMMERCIAL CUM	INDUSTRIAL IND	INDUSTRIAL CUM	PEAK FACTOR	FLOW (L/s)	IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(m)	(mm)	(%)	(full) (m/s)	L/s	(%)
Street 3		MH112A	MH111A	0.27			159		0.13	286.2	286.2	3.47	3.22	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.40	0.4	0.13	0.00	0.0	3.35	34.22	39.44	200	1.00	1.055	30.87	90.21%
Street 3		MH111A	MH110A	0.37			137		0.02	246.6	532.8	3.37	5.82	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.39	0.8	0.26	0.00	0.0	6.08	34.22	9.97	200	1.00	1.055	28.14	82.24%
Street 3		MH110A	MH108A	0.52		4	111			210.6	743.4	3.30	7.96	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.52	1.3	0.43	0.00	0.0	8.39	34.22	38.11	200	1.00	1.055	25.83	75.48%
By Others		MH300A	MH301A							0.0	0.0	3.80	0.00	0.00	0.0	0.00	0.0	0.00	85.1	1.50	51.71	85.10	85.1	28.08	0.00	0.0	79.79	133.02	75.61	450	0.20	0.810	53.22	40.01%
By Others		MH301A	MH108A							0.0	0.0	3.80	0.00	0.00	0.0	0.00	0.0	0.00	85.1	1.50	51.71	0.00	85.1	28.08	0.00	0.0	79.79	133.02	40.62	450	0.20	0.810	53.22	40.01%
Street 3 - High Level		MH108A-1	MH106A-1	0.35		11				29.7	29.7	3.68	0.35	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.35	0.4	0.12	0.00	0.0	0.47	34.22	82.57	200	1.00	1.055	33.75	98.63%
Street 3		MH108A	MH106A							0.0	743.4	3.30	7.96	0.00	0.0	0.00	0.0	0.00	85.1	1.50	51.71	0.00	86.4	28.52	0.00	0.0	88.18	133.02	82.57	450	0.20	0.810	44.83	33.70%
Street 4		MH113A	MH106A	0.48		14				37.8	37.8	3.67	0.45	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.48	0.5	0.16	0.00	0.0	0.61	34.22	69.04	200	1.00	1.055	33.61	98.22%
Street 3 - High Level		MH106A-1	MH105A-1	0.07		1				2.7	2.7	3.76	0.03	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.07	0.1	0.02	0.00	0.0	0.06	34.22	15.09	200	1.00	1.055	34.16	99.84%
Street 3		MH106A	MH105A							0.0	810.9	3.29	8.63	0.00	0.0	0.00	0.0	0.00	85.1	1.50	51.71	0.00	87.2	28.79	0.00	0.0	89.13	133.02	15.09	450	0.20	0.810	43.88	32.99%
Street 3 - High Level		MH105A-1	MH104A-1	0.53	8					27.2	27.2	3.69	0.33	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.53	0.5	0.17	0.00	0.0	0.50	34.22	59.68	200	1.00	1.055	33.72	98.54%
Street 3		MH105A	MH104A							0.0	813.6	3.28	8.66	0.00	0.0	0.00	0.0	0.00	85.1	1.50	51.71	0.00	87.3	28.81	0.00	0.0	89.18	133.02	59.68	450	0.20	0.810	43.83	32.95%
Street 3 - High Level		MH104A-1	MH103A-1	0.14	2					6.8	6.8	3.74	0.08	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.14	0.1	0.05	0.00	0.0	0.13	34.22	16.05	200	1.00	1.055	34.09	99.62%
Street 3		MH104A	MH103A							0.0	840.8	3.28	8.93	0.00	0.0	0.00	0.0	0.00	85.1	1.50	51.71	0.00	87.8	28.99	0.00	0.0	89.63	133.02	16.05	450	0.20	0.810	43.39	32.62%
Street 3 - High Level		MH103A-1	MH102A-1	0.51	10					34.0	34.0	3.68	0.41	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.51	0.5	0.17	0.00	0.0	0.57	34.22	76.21	200	1.00	1.055	33.64	98.32%
Street 3		MH103A	MH102A							0.0	847.6	3.28	9.00	0.00	0.0	0.00	0.0	0.00	85.1	1.50	51.71	0.00	88.0	29.03	0.00	0.0	89.74	133.02	76.21	450	0.20	0.810	43.27	32.53%
Street 2		MH210A	MH211A	0.38			183		0.02	329.4	329.4	3.45	3.68	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.40	0.4	0.13	0.00	0.0	3.81	34.22	9.96	200	1.00	1.055	30.40	88.85%
Street 2		MH211A	MH212A	0.47		16				43.2	372.6	3.43	4.14	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.47	0.9	0.29	0.00	0.0	4.43	34.22	65.56	200	1.00	1.055	29.79	87.06%
Street 2		MH212A	MH102A	0.25		7				18.9	391.5	3.42	4.34	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.25	1.1	0.37	0.00	0.0	4.71	34.22	52.38	200	1.00	1.055	29.51	86.23%
Sani Outlet -High Level		MH102A-1	MH101A	0.19	4					13.6	13.6	3.72	0.16	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.19	0.2	0.06	0.00	0.0	0.23	34.22	64.68	200	1.00	1.055	33.99	99.34%
Sani Outlet		MH102A	MH101A							0.0	1273.1	3.18	13.14	0.00	0.0	0.00	0.0	0.00	85.1	1.50	51.71	0.00	89.6	29.57	0.00	0.0	94.42	133.02	64.68	450	0.20	0.810	38.60	29.02%
Sani Outlet		MH101A	EX. MH100A							0.0	1286.7	3.18	13.27	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.00	89.8	29.63	0.00	0.0	42.90	133.02	28.13	450	0.20	0.810	90.12	67.75%
Existing		EX. MH100A	EX MH3							0.0	1286.7	3.18	13.27	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.00	89.8	29.63	0.00	0.0	42.90	200.65	70.89	525	0.20	0.898	157.75	78.62%
Existing		EX MH3	EX MH2							0.0	1286.7	3.18	13.27	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.00	89.8	29.63	0.00	0.0	42.90	200.65	15.43	525	0.20	0.898	157.75	78.62%
Existing		EX MH2	EX MH1							0.0	1286.7	3.18	13.27	0.00	0.0	0.00	0.0	0.00	0.0	1.00	0.00	0.00	89.8	29.63	0.00	0.0	42.90	200.65	47.87	525	0.20	0.898	157.75	78.62%
																														525				

Design Parameters:

Residential			ICI Areas			
SF	3.4	p/p/u				
TH/SD	2.7	p/p/u	INST	28,000	L/Ha/day	
T.UNIT	1.8	p/p/u	COM	28,000	L/Ha/day	
2 Bed	2.1	p/p/u	IND	35,000	L/Ha/day	MOE Chart
Other	60	p/p/Ha		17000	L/Ha/day	

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day 200 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.8
where K = 0.8 Correction Factor
5. Commercial and Institutional Peak Factors based on total area, 1.5 if greater than 20%, otherwise 1.0

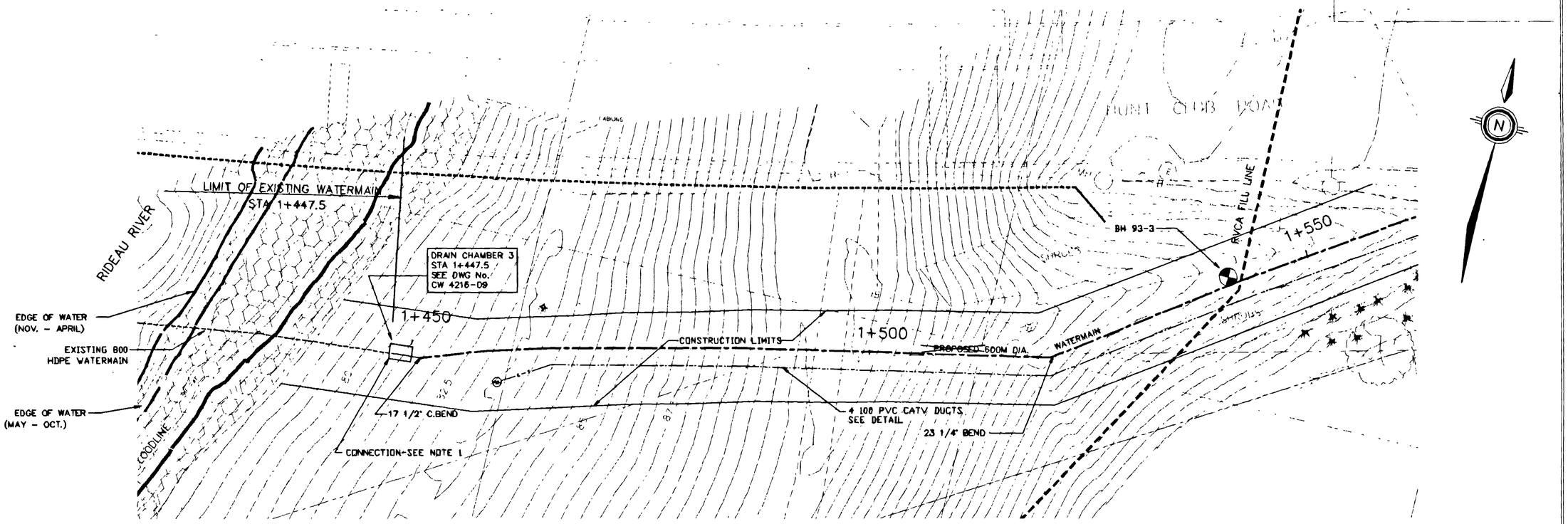
Designed: AB
Checked: TB
Dwg. Reference: 140873-400

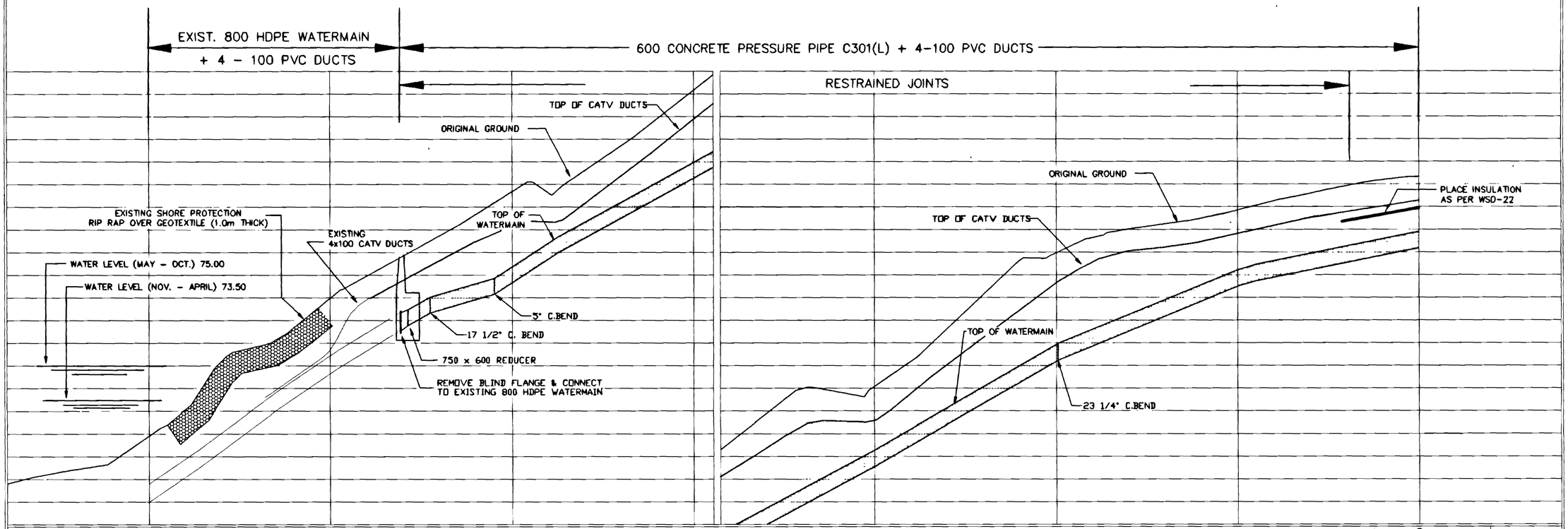
No.	Revision	Date
1.	Report Name (Master Servicing Study, Adequacy of Public Services, Servicing Brief, ect) - Submission No. 1	2022-12-06

File Reference: 140873-6.04.04 | **Date:** 2022-12-06 | **Sheet No:** 1 of 1

CAUTION

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE THE LOCATION AND STATUS OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION OF PLANT AND EQUIPMENT FROM DAMAGE.





GROUND ELEVATION OVER MAIN	79.00	80.25	81.40	82.60	82.80	84.15	85.40	87.15	88.95	90.45	91.90	91.05	92.50	94.30	96.25	96.95	97.70	98.15	98.35	98.85	99.30	99.75	100.15	100.30
TOP OF WATERMAIN	76.80	77.45 77.75 78.082		78.838	80.660			84.000	85.389			88.265			92.954					96.373				97.891
STATION (BASELINE)	1+420	1+440	REDUCER	17 1/2° C. BEND	5° C. BEND	1+460		1+480				1+500			23 1/4° C.BEND	1+520				1+540				1+560

OTTAWA-CARLETON ENVIRONMENT and TRANSPORTATION DEPARTMENT

M.J.E. SHEFLIN, P.Eng.
ENVIRONMENT and TRANSPORTATION COMMISSIONER

Ainley Graham and Associates Limited
Consulting Engineers and Planners Ottawa

Design by:	Date
CRG & GP	JUNE /95
Drawn by:	Date
CRG	JUNE /95

Notes.

1. THE CONTRACTOR SHALL EXPOSE AND VERIFY THE LOCATION AND ELEVATION OF EXISTING WATERMAINS AT POINTS OF CONNECTION PRIOR TO PREPARATION OF SHOP DRAWINGS.

2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF THRUST PROTECTION. SHOP DRAWINGS, SIGNED AND STAMPED BY AN ENGINEER, SHALL BE SUBMITTED FOR ALL THRUST PROTECTION.

SEE "AS BUILT" NOTE AT DWG.No. CW 4216-03

No	Revision	Date
1	AS PER "AS BUILT" INFO. (RMOC; Drawn by P.G.)	MAY/96

Scales HORIZ. 1:250
VERT. 1:100

Project Title.

WATERMAIN CROSSING
RIDEAU RIVER
AT HUNT CLUB BRIDGE
PHASE II

4343-5

PLAN AND PROFILE
STA. 1+420 - STA. 1+560

Drawing No.:	Rev. No.:
CW 4216 - 06	1

8477

APPENDIX C

STORM SEWER DESIGN SHEET

Q = 2.78 AIC
WHERE Q = Peak Flow in Litres Per Second (L/S)
A = Area in Hectares (ha)
I = Rainfall Intensity in Millimetres Per Hour (MM/HR)
C = Runoff Coefficient

DESIGN: J.I.M.	PROJECT: Riverwalk Park -	SHEET NO.
CHECKED: W.B.	J. Perez Corporation -	
DATE: Oct. 86	City of Ottawa 3625-3	1 of 2

DESIGN n = .013 Rev.: March 87
Sept. 87

CUMMING-COCKBURN & ASSOCIATES LIMITED
Consulting Municipal Engineers
Toronto-Ottawa-Waterloo-London-Brockville

LOCATION			INCR. AREA				CONCENTRATION TIME					SEWER DATA					
STREET	FROM M.H.	TO M.H.	HECTARE	"C"	2.78 Ac	ACCUM. 2.78 Ac	INLET	IN PIPE	TOTAL	RAINFALL INTENSITY I (MM/HR)	PEAK FLOW Q (L/S)	TYPE OF PIPE	PIPE SIZE	SLOPE %	LENGTH (M)	CAPACITY (L/S)	VELOCITY (M/S)
Street No. 1	1	2	0.12	0.80	0.27												
			0.20	0.70	0.39	0.66	15.00	0.26	15.26	80.00	52.80	Conc.	300	5.00	47.5	225.7	3.10
	2	3	1.34	0.70	2.61	3.27	15.26	0.43	15.69	79.50	260.00	Conc.	450	1.60	59.5	376.7	2.29
	3	4	0.43	0.70	0.84	4.11	15.69	0.29	15.98	78.00	320.60	Conc.	450	1.60	40.5	376.7	2.29
	4	5	0.06	0.70	0.12	4.23	15.98	0.18	16.16	77.00	325.70	Conc.	450	3.00	33.5	515.4	3.14
Street No. 2	17	15	0.88	0.45	1.10	1.10	15.00	0.95	15.95	80.00	88.00	Conc.	300	1.00	79.0	101.1	1.38
	15	5	0.11	0.45	0.14	1.24	15.95	0.31	16.26	78.00	96.72	Conc.	300	1.00	26.0	101.1	1.38
Street No. 1	5	6	0.10	0.45	0.13	5.60	16.26	0.21	16.47	77.00	431.20	Conc.	450	3.00	39.0	515.4	3.14
Assaly Property (Street No. 3)	-	14	3.41	0.62	5.87						T.C. = 19.87 min.						
Street No. 3	14	12	0.79	0.70	1.54	7.41	19.87	0.46	20.33	67.50	500.20	Conc.	750	0.25	35.0	580.6	1.27
Street No. 1	13	12	0.14	0.80	0.31												
			0.16	0.70	0.31	0.62	12.00	0.37	12.37	92.00	57.04	Conc.	300	4.00	62.0	201.9	2.77
	12	11	1.62	0.70	3.15	11.18	20.33	0.46	20.79	66.70	745.70	Conc.	750	1.20	77.5	1272.0	2.79

STORM SEWER DESIGN SHEET

Q = 2.78 AIC
WHERE Q = Peak Flow in Litres Per Second (L/S)
A = Area in Hectares (ha)
I = Rainfall Intensity in Millimetres Per Hour (MM/HR)
C = Runoff Coefficient

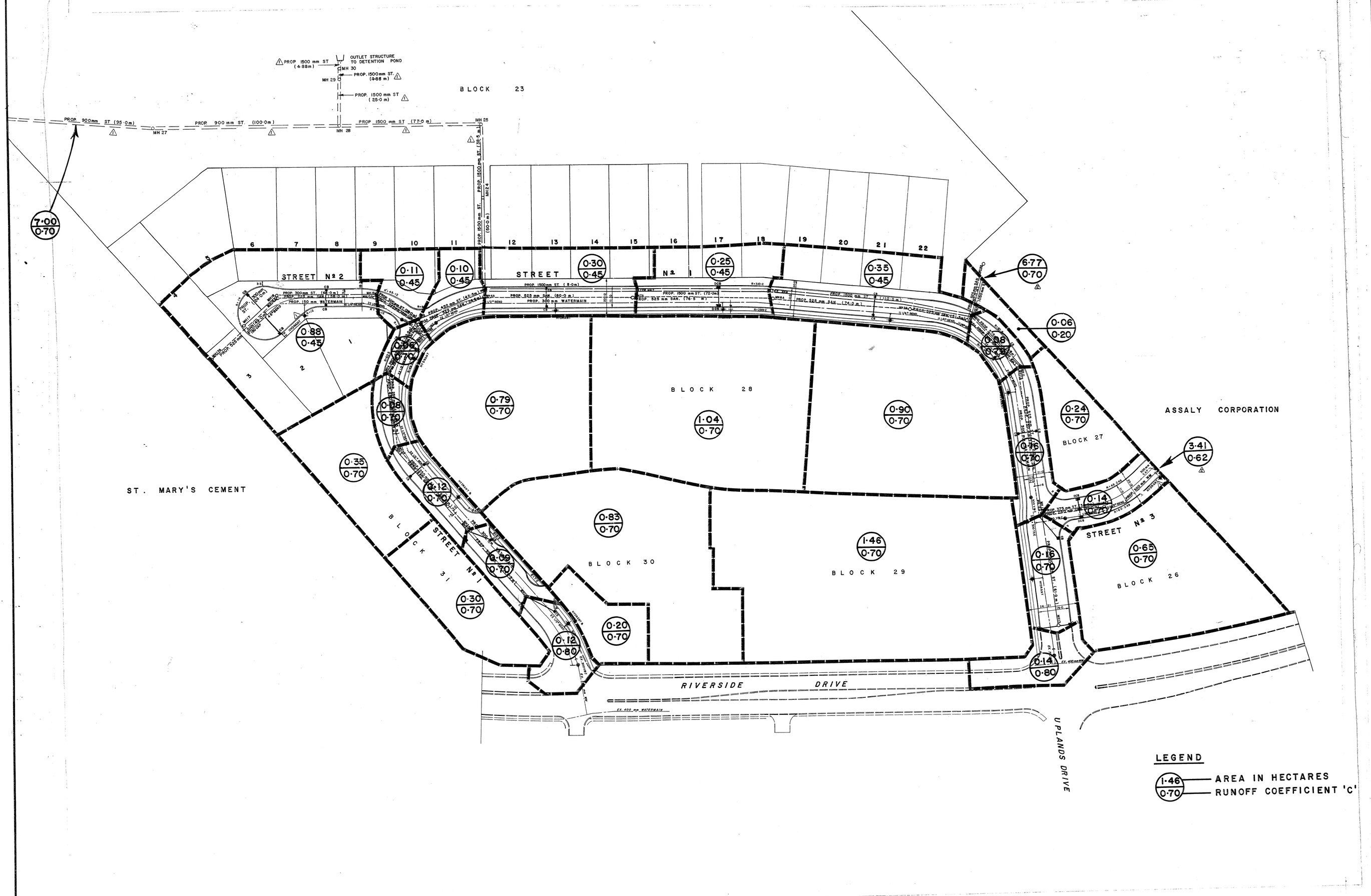
DESIGN: J.I.M.	PROJECT: Riverwalk Park -	SHEET NO.
CHECKED: W.B.	J. Perez Corporation -	
DATE: Oct. 86	City of Ottawa 3625-3	2 of 2

DESIGN n = .013

Rev.: March 87
March 31/87
Sept. 87

CUMMING-COCKBURN & ASSOCIATES LIMITED
Consulting Municipal Engineers
Toronto-Ottawa-Waterloo-London-Brockville

LOCATION			INCR. AREA				CONCENTRATION TIME					SEWER DATA					
STREET	FROM M.H.	TO M.H.	HECTARE	"C"	2.78 Ac	ACCUM. 2.78 Ac	INLET	IN PIPE	TOTAL	RAINFALL INTENSITY I (MM/HR)	PEAK FLOW Q (L/S)	TYPE OF PIPE	PIPE SIZE	SLOPE %	LENGTH (M)	CAPACITY (L/S)	VELOCITY (M/S)
	11	10	0.32	0.70	0.62	11.80	20.79	0.22	20.01	65.70	775.30	Conc.	750	1.20	37.5	1272.0	2.79
Assaly Property	North Bulkhead	10	6.77	0.70	13.17						T.C. = 23.13 min.						
			0.06	0.20	0.03	13.20	23.13	0.28	23.41	61.70	814.40	Conc.	1050	0.20	24.0	1274.0	1.43
Street No. 1	10	8	0.35	0.45	0.44												
			0.90	0.70	1.75	26.75	23.41	1.17	24.58	70.80	1894.00	Conc.	1500	0.15	110.0	2857.0	1.57
	8	7	0.25	0.45	0.31												
			1.04	0.70	2.02	29.08	24.58	0.76	25.34	68.60	1995.00	Conc.	1500	0.15	72.0	2857.0	1.57
	7	6	0.30	0.45	0.38	29.46	25.34	0.88	26.22	67.40	1986.00	Conc.	1500	0.15	82.5	2857.0	1.57
	6	28	0.79	0.70	1.54	36.60	26.22	1.52	27.74	66.00	2416.00	Conc.	1500	0.20	165.5	3296.0	1.81
St. Mary's Cement						T.C. = 15.00 + 300m/1.50m/sec. = 18.33 min.											
	26	28	7.00	0.70	13.62	13.62	18.33	2.08	20.41	71.00	967.00	Conc.	900	0.30	197.5	1034.0	1.58
	28	outlet	-	-	-	50.22	27.74	0.29	28.03	68.70	3450.00	Conc.	1500	0.25	34.8	3687.0	2.03



City Of Ottawa
Department Of Physical Environment
Engineering And Surveys Branch

Revisions:				
No	Date	Description	Drawn By	Appr'd By
1	87/03/30	REVISE AS PER R.M.O.C.	D.D.	
2	87/09/08	REVISE ASSALY AREAS	M.M.	

LICENCED PROFESSIONAL ENGINEER J.J.T. MOFFATT ONTARIO

CUMMING – COCKBURN LIMITED — CONSULTING MUNICIPAL ENGINEERS — 25 ASSOCIATES
WATERLOO – TORONTO – OTTAWA

Designed By J.I.M.	Date	Structures Check By	Date
Survey Detail By	Date	Checked By	Date
Drafting By	Date	Checked By	Date

Final Measurements :	
Construction Type	Inspector
Work Commenced	Instrumentman
Work Completed	Field Book #
Designer	Date
Drafting Revisions	Checked By

Design And Construction Division

C. Sim P. Eng. Commissioner — W.R. Cole P. Eng. Tech. Director

Chief Design & Constr. Engr. — Chief Const. & Constr. Engr. — Senior Const. Co-ord.

J. PEREZ CORPORATION – RIVERWALK PARK
STORM
DRAINAGE AREA PLAN

Contract No:	Survey Books:	Scales:	Plan No.
3625		HOR. 1:750 VERT.	501
			Sheet 1 of 1

Ontario

Ministry of the Environment

Ministère de l'Environnement

AMENDMENT TO CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 3-0842-87-006
Notice No. 1

Claridge Homes (Briar Ridge) Inc.
210 Gladstone Avenue, No. 201
Ottawa, Ontario
K4B 1H9

Site Location: Riverwalk Park Subdivision
Kimberwick Crescent
Ottawa City,

You are hereby notified that I have amended Certificate of Approval No. 3-0842-87-006 issued on December 28, 1988 for construction of stormwater management facilities consisting of a primary settling pond and secondary marsh treatment pond, as follows:

modification to raise the height of the overflow weir to an elevation of approximately 76.75 metres;

all in accordance with the application for approval dated December 12, 2001, and supporting information and documentation prepared by Novatech Engineering Ltd., Consulting Engineers and Planners.

This Notice shall constitute part of the approval issued under Certificate of Approval No. 3-0842-87-006 dated December 28, 1988

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

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

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., 12th Floor
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 7th day of February, 2002

THIS NOTICE WAS MAILED
ON Feb 11, 2002
DC
(Signed)

Mohamed Dhalla, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

AM/
c: District Manager, MOE Ottawa
Greg MacDonald, Novatech Engineering Consultants Ltd. √

AS-BUILT FINAL

2072 P

NOTES: GENERAL

1. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH CITY OF OTTAWA STANDARDS AND OPS DRAWINGS AND SPECIFICATIONS, UNLESS OTHERWISE NOTED.

2. CONTRACTOR IS TO PROCURE COPIES OF THE STANDARDS AND KEEP ON SITE.

3. DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.

4. THE ORIGINAL TOPOGRAPHY AND GROUND ELEVATIONS, SERVICING AND SURVEY INFORMATION SHOWN ON THIS PLAN ARE SUPPLIED FOR INFORMATION PURPOSES ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF ALL INFORMATION OBTAINED FROM THIS PLAN.

5. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.

6. BEFORE COMMENCING CONSTRUCTION, PROVIDE PROOF OF COMPREHENSIVE ALL RISK AND OPERATIONAL LIABILITY INSURANCE INCLUDING BLASTING. INSURANCE POLICY TO NAME THE OWNER, ENGINEER, MUNICIPALITY AND THE COUNTY AS CO-INSURED. AMOUNT OF INSURANCE TO BE SPECIFIED BY OWNER'S AGENT.

7. PRIOR TO ANY ROCK EXCAVATION, CONTRACTOR IS REQUIRED TO COMPLETE A PRE-CONSTRUCTION SURVEY.

8. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME ALL RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THESE DRAWINGS.

9. OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS FROM THE CIT OF OTTAWA BEFORE COMMENCING CONSTRUCTION.

10. RESTORE ALL SURFACE FEATURES TO EXISTING CONDITIONS OR BETTER AND TO THE SATISFACTION OF THE CITY OF OTTAWA.

11. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.

12. SIDE SLOPES FOR ALL EXCAVATIONS ARE TO BE IN ACCORDANCE WITH THE OCCUPATIONAL HEALTH AND SAFTY ACT (ONTARIO REGULATION 213/91).

13. THE OWNER AGREES TO PREARE AND IMPLEMENT AN EROSION AND SEDIMENT CONTROL PLAN TO THE SATISFACTION OF THE CITY OF OTTAWA, APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS AND DURING ALL PHASES OF THE SITE PREPARATION AND CONSTRUCTION IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL SUCH AS BUT NOT LIMITED TO INSTALLING FILTER CLOTHS ACROSS MH & CBS TO PREVENT SEDIMENT FROM ENTERING STRUCTURES AND INSTALL AND MAINTAIN A LIGHT DUTY SILT FENCE BARRIER AS REQUIRED.

NOTES: GRADING

1. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER.

2. GRADE AND/OR FILL WHERE REQUIRED.

3. MATCH EXISTING ELEVATIONS UNLESS OTHERWISE NOTED.

4. ENSURE POSITIVE DRAINAGE FROM SHORELINE AND BERM INTO STORMWATER PONDWHETHER INDICATED OR NOT.

5. MINIMUM OF 0.5% AND MAXIMUM OF 8% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.

6. MAXIMUM TERRACING GRADE IS 3:1.

NOTES: SOIL ANALYSIS

1. SOIL MATRIX INVESTIGATION - RIVERWALK STORM WATER FACILITY KIMBERWICK CRESCENT. OTTAWA, ONTARIO

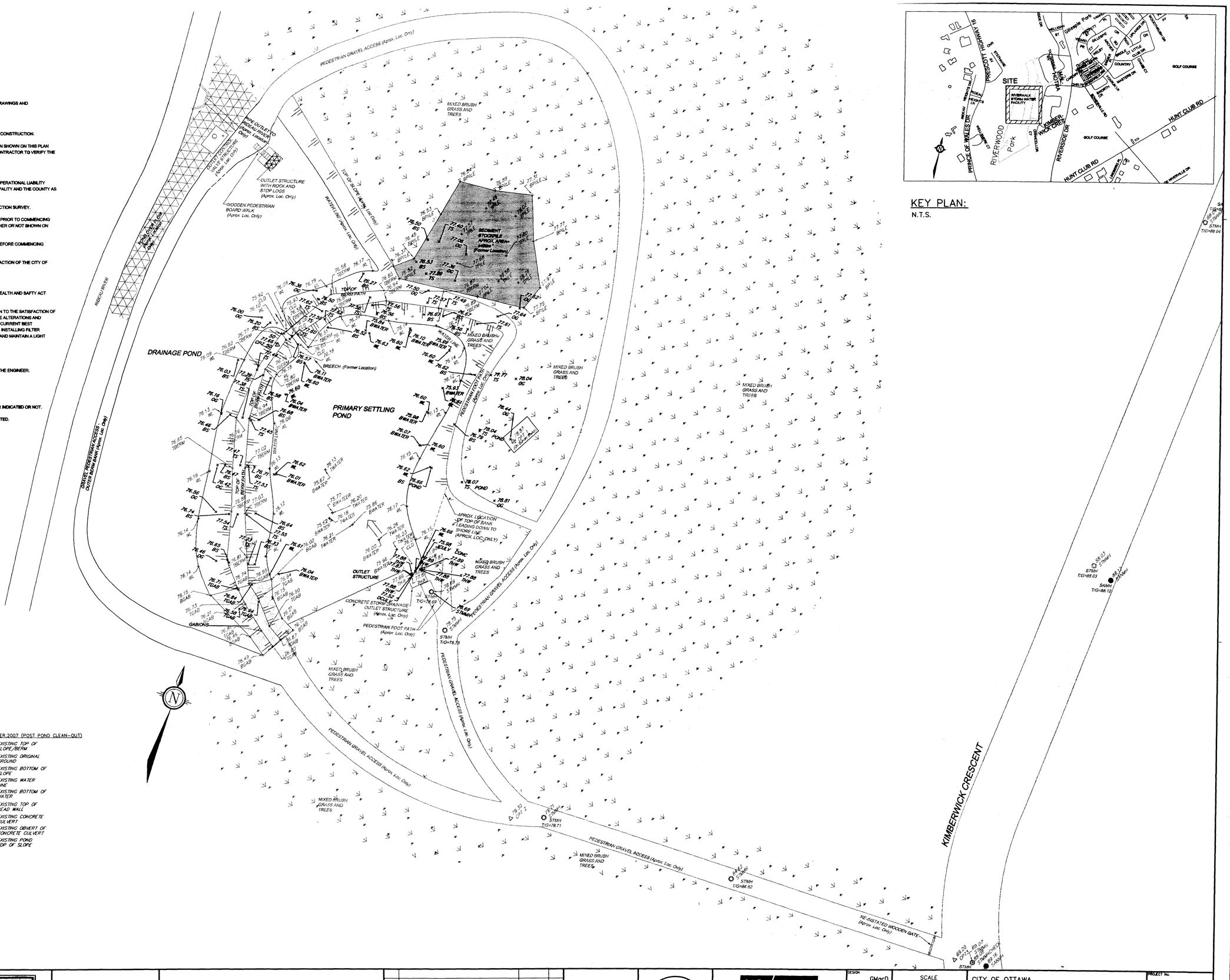
- ACCUTEST: REP.# 2709961. MAY, 2007.

SITE BENCHMARK:

EXISTING FIRE HYDRANT - TOP OF FLANGE. EAST SIDE OF MALHOTRA CRESCENT, SIX HOUSES NORTH OF CUL-DU-SAC.

DERIVED FROM:

NOVATECH ENGINEERING AS-BUILTS
PLAN 95023 P2. RIVERWOOD
LANDINGS (STA 1+400 TO 1+503.93)



KEY PLAN:
N.T.S.

LEGEND

- ℄ BREECH AND DIRECTION OF FLOW
- GENERAL POND FLOW DIRECTION
- EXISTING CONCRETE HEADWALL
- EXISTING STORM MANHOLE
- EXISTING SANITARY MANHOLE
- SIDESLOPES
- GABIONS

SURVEY - MAY,2007

- 76.61 TBERM — EXISTING TOP OF BERM ELEVATION
- 76.14 WL — EXISTING POND WATER LINE
- 75.92 CLD — EXISTING CENTRE LINE OF BREECH
- 76.05 CLD 1 — EXISTING CENTRE LINE OF CONCRETE FLOOR OF HEAD WALL
- 77.57 TPILE — EXISTING TOP OF SEDIMENT STOCK PILE
- 77.57 BPILE — EXISTING BOTTOM OF SEDIMENT STOCK PILE
- 76.21 TWATER — EXISTING WATER LEVEL - TOP
- 75.67 BWATER — EXISTING WATER LEVEL - BOTTOM
- 77.87 THW — EXISTING TOP OF HEAD WALL
- 78.87 CP1 1 — SURVEY CONTROL POINT

SURVEY - NOVEMBER,2007 (POST POND CLEAN-OUT)

- 76.81 TS — EXISTING TOP OF SLOPE/BERM
- 76.81 OG — EXISTING ORIGINAL GROUND
- 76.81 BS — EXISTING BOTTOM OF SLOPE
- 76.81 WL — EXISTING WATER LINE
- 76.81 BWATER — EXISTING BOTTOM OF WATER
- 76.81 THW — EXISTING TOP OF HEAD WALL
- 76.81 CULV CONC — EXISTING CONCRETE CULVERT
- 76.81 OCULV — EXISTING OBVERT OF CONCRETE CULVERT
- 76.81 TS POND — EXISTING POND TOP OF SLOPE

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
2	ISSUED FOR FINAL APPROVAL AND TAKE OVER BY CITY	JAN, 08	GMacD
1	ISSUED FOR SWF TAKE OVER BY CITY	JUN , 07	GMacD

LICENCED PROFESSIONAL ENGINEER — G.J. MACDONALD — PROVINCE OF ONTARIO

NOVATECH ENGINEERING CONSULTANTS LTD.
ENGINEERS & PLANNERS
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada
K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Email: novatech@novatech-eng.com

DESIGN	GMacD
CHECKED	GMacD
DRAWN	MWC
CHECKED	GMacD
APPROVED	GMacD
SCALE	1 : 300

CITY OF OTTAWA
RIVER WALK STORM WATER - FACILITY (Kimberwick Cres.)
GRADING AND SERVICING PLAN: CLEAN OUT AND BERM REPAIRS, 2007

PROJECT No. 95023SWF
DATE MAY, 2007
DRAWING No. 95023SWF-GS

PLAN2DWG - 600mm X 70.7mm

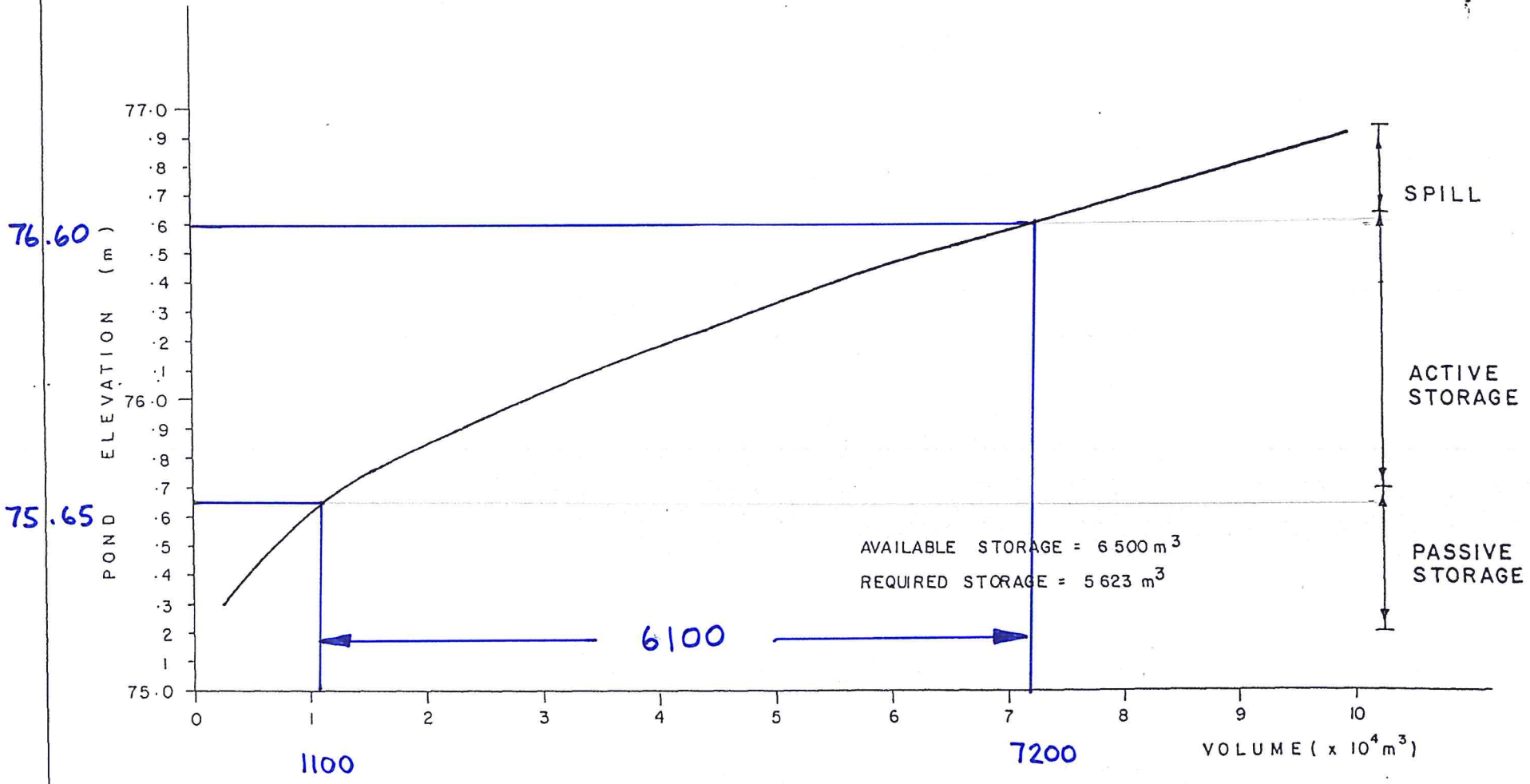
2072 P

Drawing M:\1995\95023\200\Riverwalk\RiverWalkSWF-GR.dwg Layout: GS-300 Updated NOV 7, 2007 at 9:28am by mconnolly

NOVATECH SWM REPORT
05-JUNE-1996

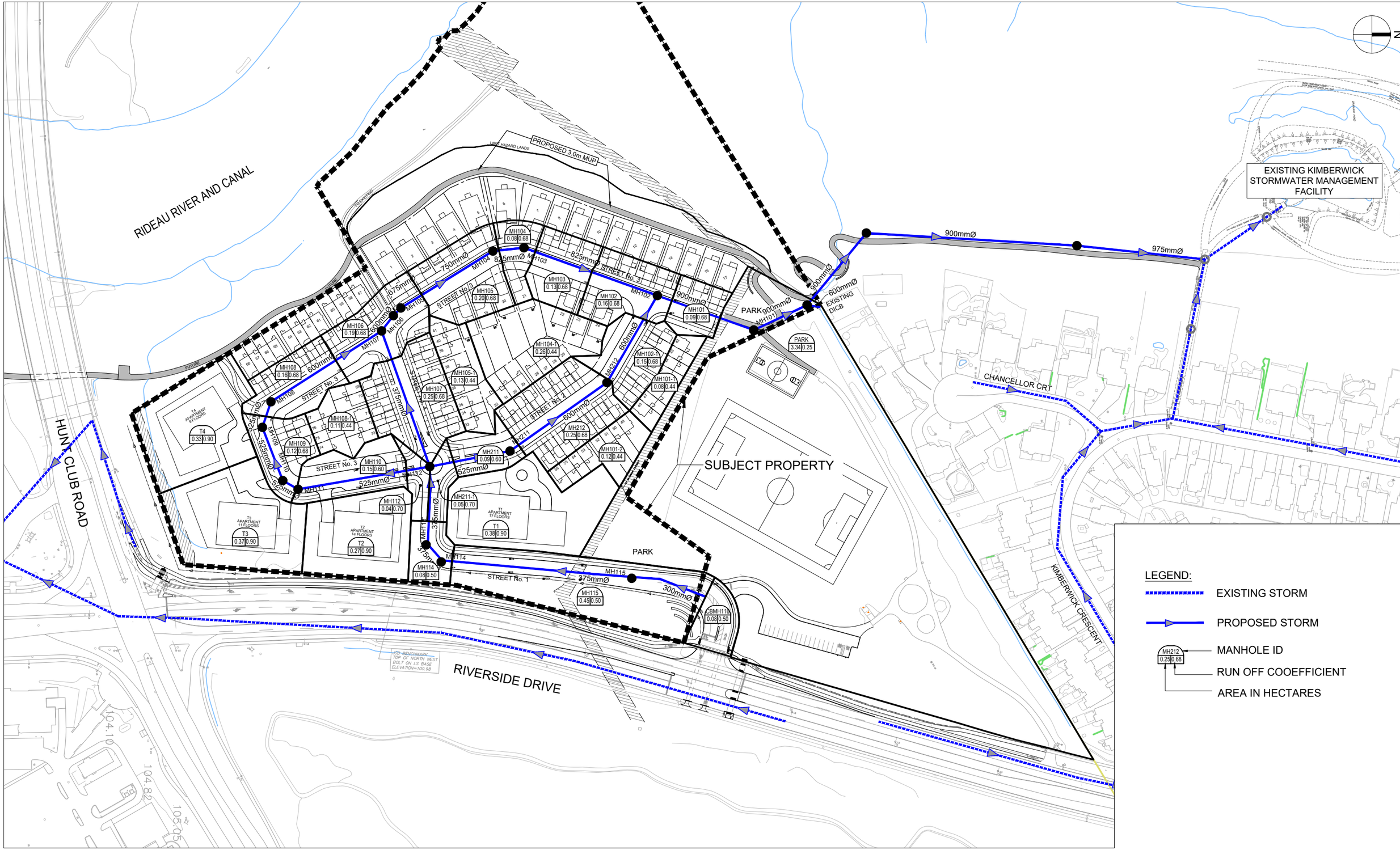
FIGURE 7

STORM WATER POND
ELEVATION STORAGE CURVE



DRAINAGE AREA = 25·5 ha.
DETENTION TIME = 3 DAYS
BASE FLOW = 10 m^3 / ha / day

CUMMING – COCKBURN & ASSOCIATES LIMITED
CONSULTING MUNICIPAL ENGINEERS
WATERLOO - TORONTO - OTTAWA



J:\140873_St._Mary's_R\7.0_Production\7.03_Design\04_Civil_LAND\Draft Plan Report\140873-Fig-7-STORM DRAINAGE.dwg Layout Name: CONCEPTUAL STORM DRAINAGE PLAN Last Saved By: mmline Last Saved At: Dec. 21, 22

IBI

Scale
N.T.S.

Project Title
ASSESSMENT OF ADEQUACY OF PUBIC SERVICES REPORT
3930 AND 3960 RIVERSIDE DRIVE

Drawing Title
CONCEPTUAL STORM
DRAINAGE PLAN

Sheet No.
FIGURE 7

J:\140873_St._Mary's_R\7.0_Production\7.03_Design\04_Civil_LAND\Draft Plan Report\140873-Fig-8-STORM.dwg Layout Name: FIGURE x.x CONCEPTUAL STORM PLAN Last Saved By: mmilne Last Saved At: Dec. 21, 22

RIDEAU RIVER AND CANAL

HUNT CLUB ROAD

RIVERSIDE DRIVE

CHANCELLOR CRT

KIMBERWICK CRESCENT

PROPOSED 3.0m MUP

LIMIT HAZARD LANDS

EXISTING KIMBERWICK STORMWATER MANAGEMENT FACILITY

EXISTING HEADWALL

EXISTING DICB

SUBJECT PROPERTY

PARK

STREET No. 1

STREET No. 2

STREET No. 3

T1 APARTMENT 17 FLOORS

T2 APARTMENT 14 FLOORS

T3 APARTMENT 11 FLOORS

T4 APARTMENT 8 FLOORS

VCP BENCHMARK TOP OF NORTH WEST BOLT ON LS BASE ELEVATION=100.98

104.10

104.82

105.05

900mmØ

975mmØ

1500mmØ

600mmØ

825mmØ

750mmØ

675mmØ

525mmØ

450mmØ

375mmØ

300mmØ

LEGEND:

EXISTING STORM

PROPOSED STORM

Scale	Project Title	Drawing Title	Sheet No.
N.T.S.	ASSESSMENT OF ADEQUACY OF PUBIC SERVICES REPORT 3930 AND 3960 RIVERSIDE DRIVE	CONCEPTUAL STORM PLAN	FIGURE 8

IBI GROUP
500-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

STORM SEWER DESIGN SHEET

Riverside Park
City of Ottawa
St. Mary's Lands Corporation

100 YR

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW														SEWER DATA									
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.25	C= 0.44	C= 0.50	C= 0.60	C= 0.68	C= 0.70	C= 0.76	C= 0.80	C= 0.90	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW IND	FIXED FLOW CUM	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	PIPE SIZE (mm) W	PIPE SIZE (mm) H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (100yr) (L/s)	AVAIL CAP (100yr) (%)
Street 1		CBMH116	MH115				0.08							0.11	0.11	**10.00**	0.35	10.35	76.81	104.19	122.14	178.56	8.54	11.59	13.58	19.86	0.00	0.00	19.86	142.67	41.03	300			2.00	1.955	122.81	86.08%
Street 1		MH115	MH114				0.45							0.63	0.74	10.35	0.78	11.13	75.49	102.38	120.01	175.42	55.61	75.42	88.41	129.23	0.00	0.00	129.23	258.68	106.63	375			2.00	2.269	129.44	50.04%
Street 1		MH114	MH113				0.08							0.11	0.85	11.13	0.09	11.23	72.71	98.57	115.52	168.83	61.65	83.57	97.95	143.15	0.00	0.00	143.15	258.68	12.71	375			2.00	2.269	115.53	44.66%
Street 1		MH113	**MH112**							0.04				0.08	**0.93**	11.23	0.32	**11.55**	72.40	98.13	115.00	168.08	67.02	90.85	106.46	155.59	0.00	0.00	155.59	258.68	43.67	375			2.00	2.269	103.08	39.85%
Street 3		MH112	MH111					0.15					0.27	0.93	0.93	**10.00**	0.62	10.62	76.81	104.19	122.14	178.56	71.10	96.46	113.07	165.30	0.00	0.00	165.30	448.66	74.49	525			1.00	2.008	283.36	63.16%
Street 3		MH111	MH110											0.00	0.93	10.62	0.08	10.70	74.51	101.04	118.42	173.10	68.98	93.53	109.63	160.24	0.00	0.00	160.24	448.66	9.83	525			1.00	2.008	288.41	64.28%
Street 3		MH110	MH109						0.12				0.37	1.15	2.08	10.70	0.22	10.92	74.22	100.64	117.95	172.40	154.25	209.15	245.14	358.31	0.00	0.00	358.31	549.49	31.78	525			1.50	2.459	191.18	34.79%
Street 3		MH109	MH108										0.33	0.83	2.90	10.92	0.10	11.02	73.46	99.59	116.73	170.60	213.33	289.22	338.97	495.43	0.00	0.00	495.43	549.49	15.04	525			1.50	2.459	54.06	9.84%
Street 3		MH108	**MH107**			0.11			0.16					0.44	**3.34**	11.02	0.45	**11.47**	73.11	99.11	116.16	169.77	244.25	331.13	388.08	567.19	0.00	0.00	567.19	784.52	73.27	600			1.50	2.688	217.34	27.70%
Street 4		MH112	**MH107**						0.25					0.47	0.47	**10.00**	0.59	**10.59**	76.81	104.19	122.14	178.56	36.30	49.24	57.72	84.39	0.00	0.00	84.39	258.68	80.31	375			2.00	2.269	174.29	67.38%
Street 3		MH107	MH106						0.19					0.36	4.17	**11.47**	0.06	11.53	71.58	97.01	113.69	166.14	298.70	404.82	474.39	693.27	0.00	0.00	693.27	859.40	10.74	600			1.80	2.945	166.13	19.33%
Street 3		MH106	MH105			0.13								0.16	4.33	11.53	0.04	11.57	71.38	96.74	113.37	165.67	309.22	419.06	491.07	717.64	0.00	0.00	717.64	876.93	5.97	675			1.00	2.374	159.29	18.16%
Street 3		MH105	MH104						0.20					0.38	4.71	11.57	0.56	12.13	71.25	96.55	113.14	165.34	335.56	454.75	532.90	778.75	0.00	0.00	778.75	821.24	60.37	750			0.50	1.801	42.49	5.17%
Street 3		MH104	MH103			0.26			0.08					0.47	5.18	12.13	0.15	12.28	69.48	94.13	110.29	161.16	359.86	487.52	571.23	834.66	0.00	0.00	834.66	1,058.89	17.42	825			0.50	1.919	224.23	21.18%
Street 3		MH103	**MH102**						0.29					0.55	**5.73**	12.28	0.69	**12.97**	69.02	93.50	109.55	160.06	395.31	535.50	627.43	916.75	0.00	0.00	916.75	1,058.89	78.97	825			0.50	1.919	142.15	13.42%
Street 2		MH112	MH211					0.09		0.05			0.38	1.20	2.12	**10.00**	0.38	10.38	76.81	104.19	122.14	178.56	163.13	221.30	259.42	379.25	0.00	0.00	379.25	448.66	45.57	525			1.00	2.008	69.41	15.47%
Street 2		MH211	MH212			0.12			0.25					0.62	2.74	10.38	0.50	10.88	75.38	102.24	119.84	175.17	206.80	280.47	328.75	480.55	0.00	0.00	480.55	640.56	66.22	600			1.00	2.195	160.01	24.98%
Street 2		MH212	**MH102**			0.08			0.15					0.38	**3.12**	10.88	0.43	**11.31**	73.58	99.76	116.92	170.89	229.92	311.72	365.34	533.97	0.00	0.00	533.97	640.56	56.04	600			1.00	2.195	106.59	16.64%
Storm Outlet		MH102	MH101						0.09					0.17	9.02	**12.97**	0.33	13.30	67.01	90.75	106.31	155.31	604.62	818.73	959.14	1,401.21	0.00	0.00	1,401.21	1,888.58	57.12	900			1.00	2.876	487.37	25.81%
Storm Outlet		MH101	**MH100**											0.00	9.02	13.30	0.19	**13.49**	66.09	89.48	104.82	153.12	596.29	807.31	945.71	**1,381.49**	0.00	0.00	1,381.49	1,888.58	32.85	900			1.00	2.876	507.09	26.85%
Ex. Park		D INLET	**MH100**		3.34									2.32	2.32	**15.00**	0.06	**15.06**	61.77	83.56	97.85	142.89	143.38	193.96	227.14	331.70	0.00	0.00	331.70	640.56	7.38	600			1.00	2.195	308.86	48.22%
Storm Outlet		MH100	MH99											0.00	11.34	**15.06**	0.30	15.36	61.64	83.38	97.64	142.58	699.16	945.78	1,107.57	1,617.39	0.00	0.00	1,617.39	1,888.58	52.00	900			1.00	2.876	271.20	14.36%
Storm Outlet		MH99	MH98											0.00	11.34	15.36	0.68	16.04	60.94	82.42	96.51	140.93	691.24	934.93	1,094.81	1,598.66	0.00	0.00	1,598.66	1,888.58	117.57	900			1.00	2.876	289.92	15.35%
Storm Outlet		MH98	**EXMH3**											0.00	11.34	16.04	0.39	**16.43**	59.42	80.34	94.07	137.35	674.03	911.39	1,067.13	1,558.04	0.00	0.00	1,558.04	2,337.95	71.78	975			1.00	3.034	779.91	33.36%
MODEL FLOW (1)																													1,523.00								
Ex. Kimberwock Cresc.(2)		*EXMH2*	***EXMH3***											*0.00*	*36.60*														*2,416.00*	*3,214.47*	*39.60*	*1500*			*0.19*	*1.762*	*798.47*	*24.84%*
Outlet to Existing Pond		***EXMH3***	***EXMH4***											***0.00***	***47.94***														***3,939.00***	***4,300.04***	***41.88***	***1500***			***0.34***	***2.357***	***361.04***	***8.40%***
																															1500					
				0.00	3.34	0.70	0.61	0.24	1.78	0.09	0.00	0.00	1.35	**11.34**																							

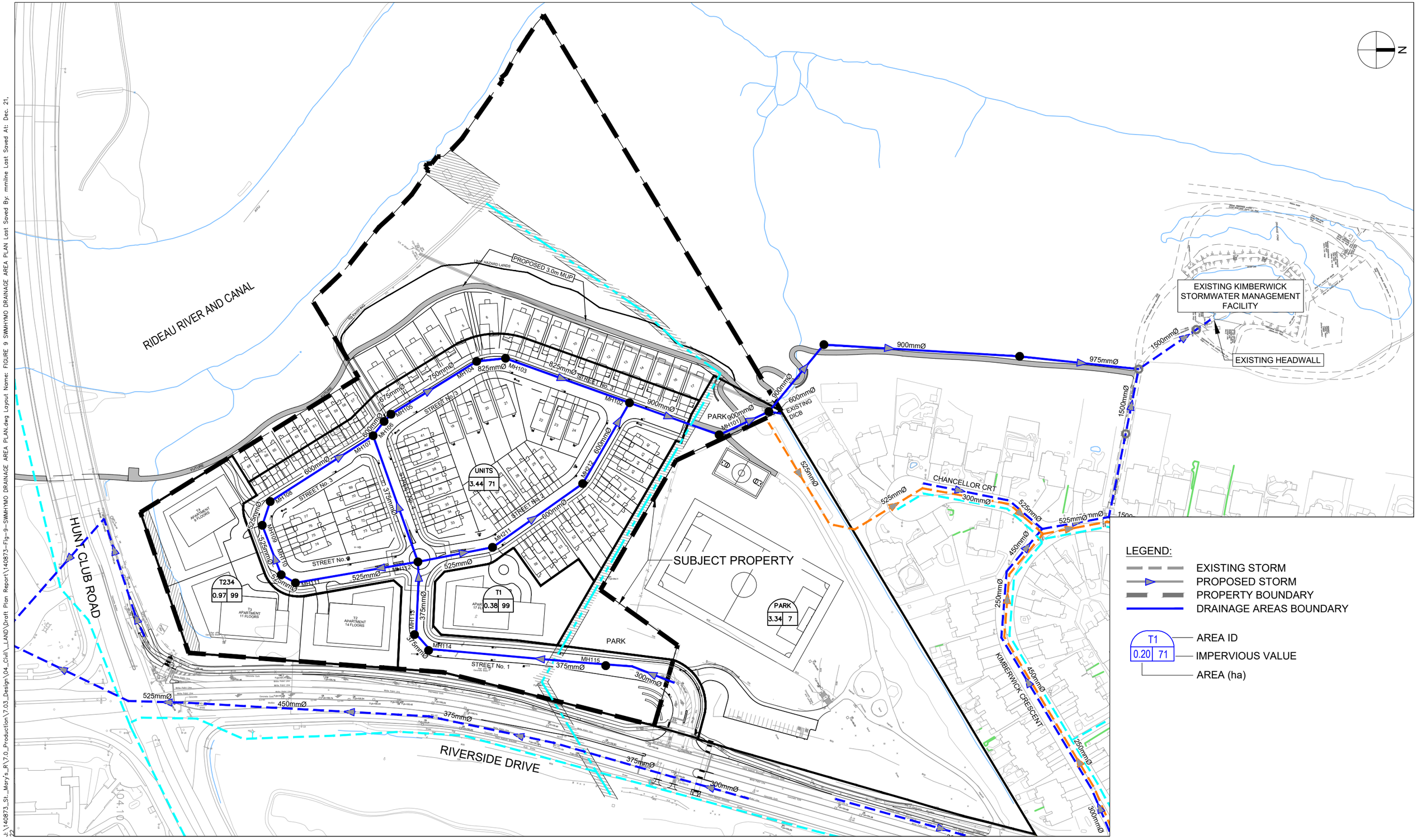
Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 732.951 / (TC+6.199)^0.810] 2 YEAR
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

Designed: AB
Checked: TB
Dwg. Reference: 140873-500

No.	Revision	Date
1.	Report Name (Master Servicing Study, Adequacy of Public Services, Servicing Brief, ect) - Submission No. 1	2022-12-06

File Reference: 140873-6.04.04
Date: 2022-12-06
Sheet No: 1 of 1



J:\140873_St._Mary's_R\7.0_Production\7.03_Design\04_Civil_LAND\Draft Plan Report\140873-Fig-9-SWMHYMO DRAINAGE AREA PLAN.dwg Layout Name: FIGURE 9 SWMHYMO DRAINAGE AREA PLAN Last Saved By: mmilne Last Saved At: Dec. 21,

IBI	Scale: N.T.S.	Project Title: ASSESSMENT OF ADEQUACY OF PUBIC SERVICES REPORT 3930 AND 3960 RIVERSIDE DRIVE	Drawing Title: SWMHYMO DRAINAGE AREA PLAN
			Sheet No.: FIGURE 9

```
00001> ================================================================================
00002>
00003>    SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO         999    999    =========
00004>    S      W W W  MM MM  H   H   Y Y   MM MM  O   O       9   9  9   9
00005>    SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##   9   9  9   9   Ver  4.05
00006>        S  W W W  M   M  H   H    Y    M   M  O   O        9999   9999   Sept 2011
00007>    SSSSS   W W   M   M  H   H    Y    M   M   OOO            9      9    =========
00008>                                                           9   9  9   9   # 3699242
00009>          StormWater Management HYdrologic Model            999    999    =========
00010>
00011>  ********************************************************************************
00012>  ***************************** SWMHYMO Ver/4.05  ***************************
00013>  *********  A single event and continuous hydrologic simulation model  *********
00014>  *********     based on the principles of HYMO and its successors      *********
00015>  *********                    OTTHYMO-83 and OTTHYMO-89.                *********
00016>  ********************************************************************************
00017>  ******** Distributed by:  J.F. Sabourin and Associates Inc.           *********
00018>  *********                    Ottawa,  Ontario: (613) 836-3884         *********
00019>  *********                    Gatineau, Quebec: (819) 243-6858         *********
00020>  *********                    E-Mail: swmhymo@jfsa.Com                 *********
00021>  ********************************************************************************
00022>
00023>  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00024>  +++++++++ Licensed user: Cumming Cockburn Limited                    +++++++++
00025>  +++++++++                    Ottawa              SERIAL#:3699242     +++++++++
00026>  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00027>
00028>  ********************************************************************************
00029>  *********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++             *********
00030>  *********           Maximum value for ID numbers  :     10            *********
00031>  *********           Max. number of rainfall points: 105408            *********
00032>  *********           Max. number of flow points    : 105408            *********
00033>  ********************************************************************************
00034>
00035>
00036>  **********************   D E T A I L E D   O U T P U T   **********************
00037>  ********************************************************************************
00038>  *         DATE: 2022-12-08     TIME: 11:29:38     RUN COUNTER: 000008          *
00039>  ********************************************************************************
00040>  * Input   filename: C:\IBI\SWMHYMO\projects\140873\140873-H.dat               *
00041>  * Output  filename: C:\IBI\SWMHYMO\projects\140873\140873-H.out               *
00042>  * Summary filename: C:\IBI\SWMHYMO\projects\140873\140873-H.sum               *
00043>  * User comments:                                                             *
00044>  * 1:_____________________________________________________________________    *
00045>  * 2:_____________________________________________________________________    *
00046>  * 3:_____________________________________________________________________    *
00047>  ********************************************************************************
00048>
00049> --------------------------------------------------------------------------------
00050> 001:0001-----------------------------------------------------------------------
00051> *#*****************************************************************************
00052> *#  Project Name: [St.Mary's]    Project Number: [140873]
00053> *#  Date       :
00054> *#  Modeller    : [MG]
00055> *#  Company     : Cumming Cockburn Limited
00056> *#  License #   : 3699242
00057> *#*****************************************************************************
00058> *#
00059> *# POST-DEVELOPMENT CONDITIONS
00060> *#=============================================================
00061> *
00062>   ** END OF RUN :  39
00063>
00064>  ********************************************************************************
00065>
00066>
00067>
00068>
00069>
00070>  --------------------
00071> | START            |  Project  dir.: C:\IBI\SWMHYMO\projects\140873\
00072>  --------------------  Rainfall dir.: C:\IBI\SWMHYMO\projects\140873\
00073>     TZERO =   .00 hrs on        0
00074>     METOUT=   2 (output = METRIC)
00075>     NRUN  = 040
00076>     NSTORM=   1
00077>               #  1=C3H00210.STM
00078> --------------------------------------------------------------------------------
00079> 040:0002-----------------------------------------------------------------------
00080> *#*****************************************************************************
00081> *#  Project Name: [St.Mary's]    Project Number: [140873]
00082> *#  Date       :
00083> *#  Modeller    : [MG]
00084> *#  Company     : Cumming Cockburn Limited
00085> *#  License #   : 3699242
00086> *#*****************************************************************************
00087> *#
00088> *# POST-DEVELOPMENT CONDITIONS
00089> *#=============================================================
00090> *
00091> --------------------------------------------------------------------------------
00092> 040:0002-----------------------------------------------------------------------
00093>  --------------------
00094> | READ STORM       |    Filename: 2 YEAR 3 HOUR CHICAGO - 10 MIN TIME STEP
00095> | Ptotal=  31.86 mm|    Comments: 2 YEAR 3 HOUR CHICAGO - 10 MIN TIME STEP
00096>  --------------------
00097>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00098>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00099>                .17   2.815 |   1.00  76.805 |   1.83   5.095 |   2.67   2.684
00100>                .33   3.498 |   1.17  24.079 |   2.00   4.291 |   2.83   2.463
00101>                .50   4.687 |   1.33  12.364 |   2.17   3.718 |   3.00   2.279
00102>                .67   7.305 |   1.50   8.324 |   2.33   3.288 |
00103>                .83  18.209 |   1.67   6.303 |   2.50   2.953 |
00104>
00105> --------------------------------------------------------------------------------
00106> 040:0003-----------------------------------------------------------------------
00107> *
00108> *#=============================================================
00109> *# DRAINAGE AREA T2T3T4 - RESIDENTIAL                ||
00110> *# 0.97 HA
00111> *# 2 Year Minor System Capture
00112> *# up to 100 year on-site storage
00113> *#=============================================================
00114>  ----------------------
00115> | CALIB STANDHYD    |   Area    (ha)=     .97
00116> | 01:T234   DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
00117>  ----------------------
00118>                                IMPERVIOUS    PERVIOUS (i)
00119>      Surface Area     (ha)=        .96          .01
00120>      Dep. Storage     (mm)=        .80         1.50
00121>      Average Slope     (%)=        .15         2.00
00122>      Length            (m)=      60.00        40.00
00123>      Mannings n            =       .013         .250
00124>
00125>      Max.eff.Inten.(mm/hr)=      76.80        15.18
00126>                 over (min)        4.00        19.00
00127>      Storage Coeff.  (min)=        3.69 (ii)   18.69 (ii)
00128>      Unit Hyd. Tpeak (min)=        4.00        19.00
00129>      Unit Hyd. peak  (cms)=         .30          .06
00130>                                                          *TOTALS*
00131>      PEAK FLOW       (cms)=         .19          .00          .187 (iii)
00132>      TIME TO PEAK    (hrs)=        1.00         1.25         1.000
00133>      RUNOFF VOLUME    (mm)=       31.06         4.81        30.797
00134>      TOTAL RAINFALL   (mm)=       31.86        31.86        31.860
00135>      RUNOFF COEFFICIENT   =         .97          .15          .967
00136>
00137>        (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
00138>              Fo   (mm/hr)= 76.20          K  (1/hr)=  4.14
00139>              Fc   (mm/hr)= 13.20     Cum.Inf.   (mm)=   .00
00140>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00141>            THAN THE STORAGE COEFFICIENT.
00142>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00143>
00144> --------------------------------------------------------------------------------
00145> 040:0004-----------------------------------------------------------------------
00146> **#=============================================
00147> *# Up to 100 year on-site storage - Minor system Capture flow 2 year CHI
00148> *#=============================================
00149>  ---------------------
00150> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
00151> |  IN>01:(T234  )   |
00152> | OUT<03:(T234MI)   |    =========  OUTFLOW STORAGE TABLE  =========
00153>  ---------------------   OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00154>                            (cms)     (ha.m.)   |    (cms)    (ha.m.)
00155>                            .000  .0000E+00   |     .187  .1550E-01
00156>                            .175  .1000E-03   |     .000  .0000E+00
00157>
00158>      ROUTING RESULTS           AREA     QPEAK     TPEAK       R.V.
00159>      --------------------      (ha)     (cms)     (hrs)       (mm)
00160>      INFLOW >01: (T234  )       .97      .187     1.000     30.797
00161>      OUTFLOW<03: (T234MI)       .97      .175     1.033     30.797
00162>     OVERFLOW<08: (T234MA)       .00      .000      .000       .000
00163>
00164>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00165>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
00166>                    PERCENTAGE OF TIME OVERFLOWING    (%)=       .00
00167>
00168>
00169>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   93.448
00170>                    TIME SHIFT OF PEAK FLOW         (min)=    2.00
00171>                    MAXIMUM  STORAGE   USED       (ha.m.)=.2869E-03
00172>
00173> --------------------------------------------------------------------------------
00174> 040:0005-----------------------------------------------------------------------
00175> *
00176> *#=============================================================
00177> *# DRAINAGE AREA T1 - RESIDENTIAL                ||
00178> *# 0.38 HA
00179> *# 2 Year Minor System Capture
00180> *# up to 100 year on-site storage
00181> *#=============================================================
00182>  ----------------------
00183> | CALIB STANDHYD    |   Area    (ha)=     .38
00184> | 05:T1     DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
00185>  ----------------------
00186>                                IMPERVIOUS    PERVIOUS (i)
00187>      Surface Area     (ha)=        .38          .00
00188>      Dep. Storage     (mm)=        .80         1.50
00189>      Average Slope     (%)=        .15         2.00
00190>      Length            (m)=      50.00        40.00
00191>      Mannings n            =       .013         .250
00192>
00193>      Max.eff.Inten.(mm/hr)=      76.80        16.03
00194>                 over (min)        3.00        18.00
00195>      Storage Coeff.  (min)=        3.31 (ii)   17.99 (ii)
00196>      Unit Hyd. Tpeak (min)=        3.00        18.00
00197>      Unit Hyd. peak  (cms)=         .35          .06
00198>                                                          *TOTALS*
00199>      PEAK FLOW       (cms)=         .08          .00          .076 (iii)
00200>      TIME TO PEAK    (hrs)=        1.00         1.23         1.000
00201>      RUNOFF VOLUME    (mm)=       31.06         4.81        30.797
00202>      TOTAL RAINFALL   (mm)=       31.86        31.86        31.860
00203>      RUNOFF COEFFICIENT   =         .97          .15          .967
00204>
00205>        (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
00206>              Fo   (mm/hr)= 76.20          K  (1/hr)=  4.14
00207>              Fc   (mm/hr)= 13.20     Cum.Inf.   (mm)=   .00
00208>         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00209>              THAN THE STORAGE COEFFICIENT.
00210>       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00211>
00212> --------------------------------------------------------------------------------
00213> 040:0006-----------------------------------------------------------------------
00214> **#=============================================
00215> *# Up to 100 year on-site storage - Minor system Capture flow 2 year CHI
00216> *#=============================================
00217>  ---------------------
00218> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
00219> |  IN>05:(T1    )   |
00220> | OUT<02:(T1MIN )   |    =========  OUTFLOW STORAGE TABLE  =========
00221>  ---------------------   OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00222>                            (cms)     (ha.m.)   |    (cms)    (ha.m.)
00223>                            .000  .0000E+00   |     .076  .6500E-02
00224>                            .070  .1000E-03   |     .000  .0000E+00
00225>
00226>      ROUTING RESULTS           AREA     QPEAK     TPEAK       R.V.
00227>      --------------------      (ha)     (cms)     (hrs)       (mm)
00228>      INFLOW >05: (T1    )       .38      .076     1.000     30.797
00229>      OUTFLOW<02: (T1MIN )       .38      .070     1.017     30.797
00230>     OVERFLOW<06: (T1MAJ )       .00      .000      .000       .000
00231>
00232>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00233>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
00234>                    PERCENTAGE OF TIME OVERFLOWING    (%)=       .00
00235>
00236>
00237>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   92.303
00238>                    TIME SHIFT OF PEAK FLOW         (min)=    1.00
00239>                    MAXIMUM  STORAGE   USED       (ha.m.)=.1947E-03
00240>
00241> --------------------------------------------------------------------------------
00242> 040:0007-----------------------------------------------------------------------
00243> *#=============================================================
00244> *# DRAINAGE AREA UNITS - RESIDENTIAL                ||
00245> *# 3.44 HA
00246> *# 100 Year Minor System Capture
00247> *# No on-site storage
00248> *#=============================================================
00249>  ----------------------
00250> | CALIB STANDHYD    |   Area    (ha)=    3.44
00251> | 04:UNITS  DT= 1.00 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   71.00
00252>  ----------------------
00253>                                IMPERVIOUS    PERVIOUS (i)
00254>      Surface Area     (ha)=       2.44         1.00
00255>      Dep. Storage     (mm)=        .80         1.50
00256>      Average Slope     (%)=        .15         2.00
00257>      Length            (m)=     151.00        40.00
00258>      Mannings n            =       .013         .250
00259>
00260>      Max.eff.Inten.(mm/hr)=      76.80        13.11
00261>                 over (min)        6.00        22.00
00262>      Storage Coeff.  (min)=        6.42 (ii)   22.33 (ii)
00263>      Unit Hyd. Tpeak (min)=        6.00        22.00
00264>      Unit Hyd. peak  (cms)=         .18          .05
00265>                                                          *TOTALS*
00266>      PEAK FLOW       (cms)=         .40          .02          .407 (iii)
00267>      TIME TO PEAK    (hrs)=        1.03         1.30         1.033
00268>      RUNOFF VOLUME    (mm)=       31.06         4.81        23.447
00269>      TOTAL RAINFALL   (mm)=       31.86        31.86        31.860
00270>      RUNOFF COEFFICIENT   =         .97          .15          .736
```

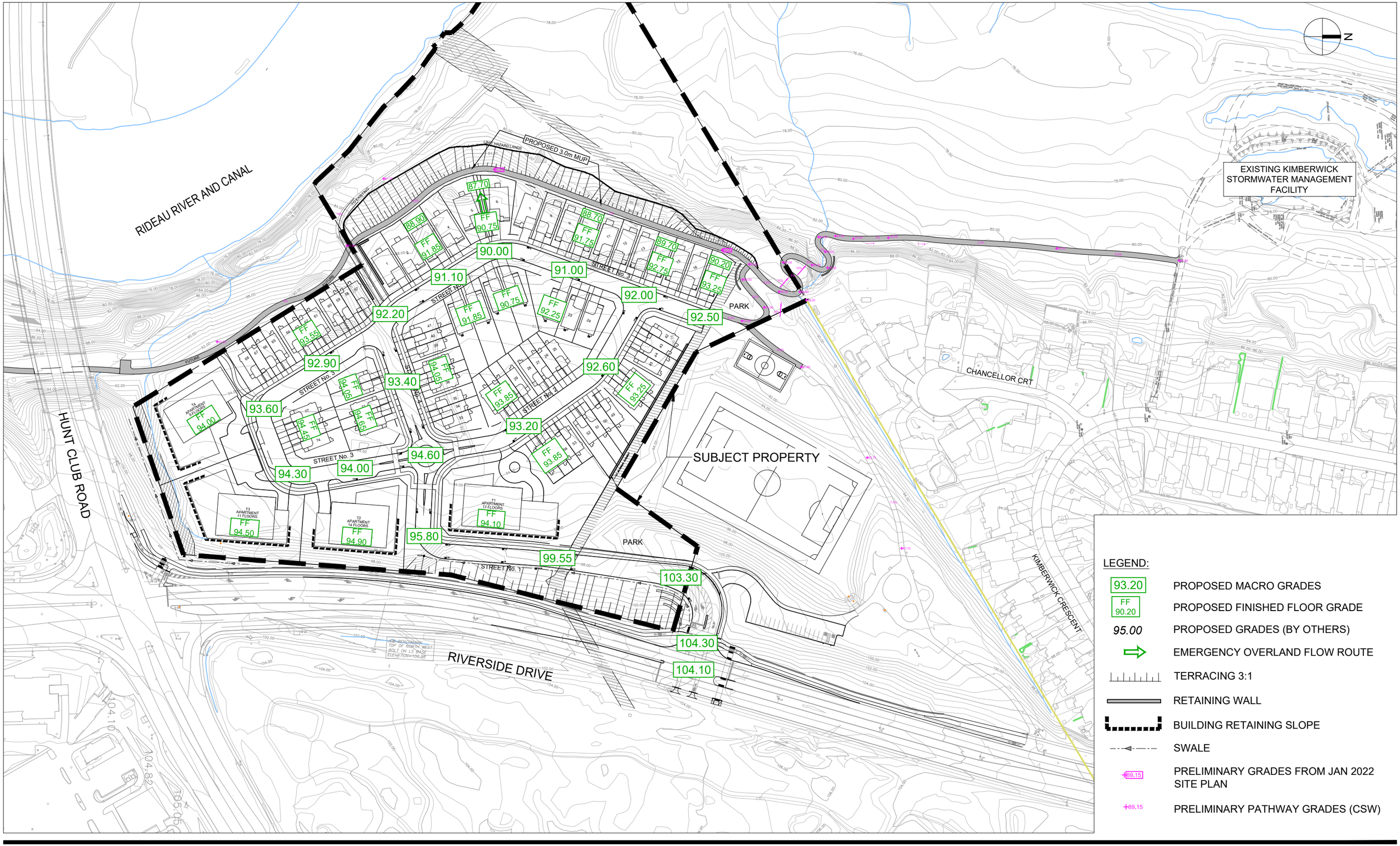
```
00271>
00272>       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
00273>            Fo   (mm/hr)= 76.20          K  (1/hr)=  4.14
00274>            Fc   (mm/hr)= 13.20     Cum.Inf.   (mm)=   .00
00275>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00276>           THAN THE STORAGE COEFFICIENT.
00277>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00278>
00279> ---------------------------------------------------------------------------
00280> 040:0008-----------------------------------------------------------------
00281> *
00282> **#================================================
00283> *# No on-site storage - Minor system Capture flow 100 year CHI
00284> *#================================================
00285> ---------------------
00286> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
00287> |  IN>04:(UNITS )   |
00288> | OUT<07:(UNITSM)   |    =========  OUTLFOW STORAGE TABLE  =========
00289> ---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00290>                            (cms)     (ha.m.)   |    (cms)    (ha.m.)
00291>                             .000  .0000E+00   |   1.186  .1000E-02
00292>                            1.180  .1000E-03   |    .000  .0000E+00
00293>
00294>     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00295>     --------------------       (ha)     (cms)     (hrs)        (mm)
00296>     INFLOW >04: (UNITS )       3.44      .407     1.033      23.447
00297>     OUTFLOW<07: (UNITSM)       3.44      .407     1.033      23.447
00298>    OVERFLOW<09: (UNITSM)        .00      .000      .000        .000
00299>
00300>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00301>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
00302>                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
00303>
00304>
00305>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   99.974
00306>                    TIME SHIFT OF PEAK FLOW          (min)=      .00
00307>                    MAXIMUM  STORAGE   USED       (ha.m.)=.3482E-04
00308>
00309> ---------------------------------------------------------------------------
00310> 040:0009-----------------------------------------------------------------
00311> *
00312> *# Adding T1 and T234 and UNITS major flow to Rideau River
00313> -------------------------
00314> | ADD HYD (       100) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00315> -------------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
00316>                          ID1 08:T234MAJ      .00      .000    .00    .00     .000
00317>                        +ID2 06:T1MAJ         .00      .000    .00    .00     .000
00318>                        +ID3 09:UNITSMAJ      .00      .000    .00    .00     .000
00319>                         ==========================================================
00320>                         SUM 10:       100      .00     .000     .00    .00     .000
00321> ---------------------------------------------------------------------------
00322> 040:0010-----------------------------------------------------------------
00323> *
00324> *#============================================================
00325> *# DRAINAGE AREA Upland Riverside Park - Park                ||
00326> *# 3.34 HA
00327> *# 2 Year Minor System Capture
00328> *# No on-site storage
00329> *#============================================================
00330> ----------------------
00331> | CALIB STANDHYD     |   Area    (ha)=    3.34
00332> | 08:PARK   DT= 1.00 |   Total Imp(%)=    7.00   Dir. Conn.(%)=    7.00
00333> ----------------------
00334>                              IMPERVIOUS    PERVIOUS (i)
00335>     Surface Area     (ha)=        .23          3.11
00336>     Dep. Storage     (mm)=        .80          1.50
00337>     Average Slope     (%)=        .15          2.00
00338>     Length            (m)=     150.00         40.00
00339>     Mannings n             =      .013          .250
00340>
00341>     Max.eff.Inten.(mm/hr)=      76.80         13.11
00342>                 over (min)        6.00         22.00
00343>     Storage Coeff.  (min)=       6.40 (ii)    22.30 (ii)
00344>     Unit Hyd. Tpeak (min)=       6.00         22.00
00345>     Unit Hyd. peak  (cms)=        .18           .05
00346>                                                          *TOTALS*
00347>     PEAK FLOW       (cms)=        .04           .07          .082 (iii)
00348>     TIME TO PEAK    (hrs)=       1.03          1.30         1.267
00349>     RUNOFF VOLUME    (mm)=      31.06          4.81         6.646
00350>     TOTAL RAINFALL   (mm)=      31.86         31.86        31.860
00351>     RUNOFF COEFFICIENT   =        .97           .15          .209
00352>      *** WARNING: For areas with impervious ratios below
00353>                   20%, this routine may not be applicable.
00354>
00355>       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
00356>            Fo   (mm/hr)= 76.20          K  (1/hr)=  4.14
00357>            Fc   (mm/hr)= 13.20     Cum.Inf.   (mm)=   .00
00358>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00359>           THAN THE STORAGE COEFFICIENT.
00360>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00361>
00362> ---------------------------------------------------------------------------
00363> 040:0011-----------------------------------------------------------------
00364> **#================================================
00365> *# No on-site storage - Minor system Capture flow 2 year CHI
00366> *#================================================
00367> ---------------------
00368> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
00369> |  IN>08:(PARK  )   |
00370> | OUT<06:(PARKMI)   |    =========  OUTLFOW STORAGE TABLE  =========
00371> ---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00372>                            (cms)     (ha.m.)   |    (cms)    (ha.m.)
00373>                             .000  .0000E+00   |     .082  .2000E-03
00374>                             .077  .1000E-03   |     .000  .0000E+00
00375>
00376>     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00377>     --------------------       (ha)     (cms)     (hrs)        (mm)
00378>     INFLOW >08: (PARK  )       3.34      .082     1.267      6.646
00379>     OUTFLOW<06: (PARKMI)       3.34      .081     1.300      6.646
00380>    OVERFLOW<09: (PARKMA)        .00      .000      .000        .000
00381>
00382>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00383>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
00384>                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
00385>
00386>
00387>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   98.321
00388>                    TIME SHIFT OF PEAK FLOW          (min)=     2.00
00389>                    MAXIMUM  STORAGE   USED       (ha.m.)=.1807E-03
00390>
00391> ---------------------------------------------------------------------------
00392> 040:0012-----------------------------------------------------------------
00393> *
00394> *# Adding T1 and T234 UNITS and Park minor flow
00395> -------------------------
00396> | ADD HYD (       100) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00397> -------------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
00398>                          ID1 03:T234MIN       .97      .175    1.03  30.80    .000
00399>                        +ID2 02:T1MIN         .38      .070    1.02  30.80    .000
00400>                        +ID3 07:UNITSMIN     3.44      .407    1.03  23.45    .000
00401>                        +ID4 06:PARKMIN      3.34      .081    1.30   6.65    .000
00402>                         ==========================================================
00403>                         SUM 01:       100     8.13     .713    1.05  17.77    .000
00404>
00405>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00406>
00407> ---------------------------------------------------------------------------
00408> 040:0013-----------------------------------------------------------------
00409>   ** END OF RUN :  44
00410>
00411> ***************************************************************************
00412>
00413>
00414>
00415>
00416>
00417> --------------------
00418> | START            |  Project  dir.: C:\IBI\SWMHYMO\projects\140873\
00419> --------------------  Rainfall dir.: C:\IBI\SWMHYMO\projects\140873\
00420>     TZERO =   .00 hrs on        0
00421>     METOUT=   2 (output = METRIC)
00422>     NRUN  = 045
00423>     NSTORM=   1
00424>              #  1=C3H10010.STM
00425> ---------------------------------------------------------------------------
00426> 045:0002-----------------------------------------------------------------
00427> *#*************************************************************************
00428> *#  Project Name: [St.Mary's]    Project Number: [140873]
00429> *#  Date         :
00430> *#  Modeller     : [MG]
00431> *#  Company      : Cumming Cockburn Limited
00432> *#  License #    : 3699242
00433> *#*************************************************************************
00434> *#
00435> *# POST-DEVELOPMENT CONDITIONS
00436> *#============================================================
00437> *
00438> ---------------------------------------------------------------------------
00439> 045:0002-----------------------------------------------------------------
00440> --------------------
00441> | READ STORM       |    Filename: 100 YEAR 3 HOUR CHICAGO - 10 MIN TIME ST
00442> | Ptotal=  71.66 mm|    Comments: 100 YEAR 3 HOUR CHICAGO - 10 MIN TIME ST
00443> --------------------
00444>                TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00445>                 hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00446>                 .17   6.046 |   1.00 178.559 |   1.83  11.059 |   2.67   5.760
00447>                 .33   7.542 |   1.17  54.049 |   2.00   9.285 |   2.83   5.280
00448>                 .50  10.159 |   1.33  27.319 |   2.17   8.024 |   3.00   4.879
00449>                 .67  15.969 |   1.50  18.240 |   2.33   7.080 |
00450>                 .83  40.655 |   1.67  13.737 |   2.50   6.347 |
00451>
00452> ---------------------------------------------------------------------------
00453> 045:0003-----------------------------------------------------------------
00454> *
00455> *#============================================================
00456> *# DRAINAGE AREA T2T3T4 - RESIDENTIAL                ||
00457> *# 0.97 HA
00458> *# 2 Year Minor System Capture
00459> *# up to 100 year on-site storage
00460> *#============================================================
00461> ----------------------
00462> | CALIB STANDHYD     |   Area    (ha)=     .97
00463> | 01:T234   DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
00464> ----------------------
00465>                              IMPERVIOUS    PERVIOUS (i)
00466>     Surface Area     (ha)=        .96          .01
00467>     Dep. Storage     (mm)=        .80         1.50
00468>     Average Slope     (%)=        .15         2.00
00469>     Length            (m)=      60.00        40.00
00470>     Mannings n             =      .013         .250
00471>
00472>     Max.eff.Inten.(mm/hr)=     178.56       147.80
00473>                 over (min)        3.00         9.00
00474>     Storage Coeff.  (min)=       2.63 (ii)    8.67 (ii)
00475>     Unit Hyd. Tpeak (min)=       3.00         9.00
00476>     Unit Hyd. peak  (cms)=        .41          .13
00477>                                                          *TOTALS*
00478>     PEAK FLOW       (cms)=        .46          .00          .465 (iii)
00479>     TIME TO PEAK    (hrs)=       1.00         1.08         1.000
00480>     RUNOFF VOLUME    (mm)=      70.86        31.87        70.475
00481>     TOTAL RAINFALL   (mm)=      71.66        71.66        71.665
00482>     RUNOFF COEFFICIENT   =        .99          .44          .983
00483>
00484>       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
00485>            Fo   (mm/hr)= 76.20          K  (1/hr)=  4.14
00486>            Fc   (mm/hr)= 13.20     Cum.Inf.   (mm)=   .00
00487>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00488>           THAN THE STORAGE COEFFICIENT.
00489>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00490>
00491> ---------------------------------------------------------------------------
00492> 045:0004-----------------------------------------------------------------
00493> **#================================================
00494> *# Up to 100 year on-site storage - Minor system Capture flow 2 year CHI
00495> *#================================================
00496> ---------------------
00497> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
00498> |  IN>01:(T234  )   |
00499> | OUT<03:(T234MI)   |    =========  OUTLFOW STORAGE TABLE  =========
00500> ---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00501>                            (cms)     (ha.m.)   |    (cms)    (ha.m.)
00502>                             .000  .0000E+00   |     .187  .1550E-01
00503>                             .175  .1000E-03   |     .000  .0000E+00
00504>
00505>     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00506>     --------------------       (ha)     (cms)     (hrs)        (mm)
00507>     INFLOW >01: (T234  )        .97      .465     1.000      70.475
00508>     OUTFLOW<03: (T234MI)        .97      .187     1.117      70.475
00509>    OVERFLOW<08: (T234MA)        .00      .000      .000        .000
00510>
00511>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00512>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
00513>                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
00514>
00515>
00516>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   40.231
00517>                    TIME SHIFT OF PEAK FLOW          (min)=     7.00
00518>                    MAXIMUM  STORAGE   USED       (ha.m.)=.1540E-01
00519>
00520> ---------------------------------------------------------------------------
00521> 045:0005-----------------------------------------------------------------
00522> *
00523> *#============================================================
00524> *# DRAINAGE AREA T1 - RESIDENTIAL                ||
00525> *# 0.38 HA
00526> *# 2 Year Minor System Capture
00527> *# up to 100 year on-site storage
00528> *#============================================================
00529> ----------------------
00530> | CALIB STANDHYD     |   Area    (ha)=     .38
00531> | 05:T1     DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
00532> ----------------------
00533>                              IMPERVIOUS    PERVIOUS (i)
00534>     Surface Area     (ha)=        .38          .00
00535>     Dep. Storage     (mm)=        .80         1.50
00536>     Average Slope     (%)=        .15         2.00
00537>     Length            (m)=      50.00        40.00
00538>     Mannings n             =      .013         .250
00539>
00540>     Max.eff.Inten.(mm/hr)=     178.56       148.46
```

```
00541>                over (min)        2.00         8.00
00542>     Storage Coeff.  (min)=       2.36 (ii)    8.39 (ii)
00543>     Unit Hyd. Tpeak (min)=       2.00         8.00
00544>     Unit Hyd. peak  (cms)=        .50          .14
00545>                                                        *TOTALS*
00546>     PEAK FLOW       (cms)=        .18          .00          .185 (iii)
00547>     TIME TO PEAK    (hrs)=       1.00         1.07         1.000
00548>     RUNOFF VOLUME    (mm)=      70.86        31.87        70.475
00549>     TOTAL RAINFALL   (mm)=      71.66        71.66        71.665
00550>     RUNOFF COEFFICIENT   =        .99          .44          .983
00551>
00552>       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
00553>            Fo   (mm/hr)= 76.20          K  (1/hr)=  4.14
00554>            Fc   (mm/hr)= 13.20     Cum.Inf.   (mm)=   .00
00555>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00556>           THAN THE STORAGE COEFFICIENT.
00557>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00558>
00559> ------------------------------------------------------------------------------
00560> 045:0006----------------------------------------------------------------------
00561> **#================================================
00562> *# Up to 100 year on-site storage - Minor system Capture flow 2 year CHI
00563> *#================================================
00564> ----------------------
00565> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
00566> |  IN>05:(T1    )   |
00567> | OUT<02:(T1MIN )   |    =========  OUTLFOW STORAGE TABLE  =========
00568> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00569>                             (cms)     (ha.m.)   |    (cms)    (ha.m.)
00570>                              .000  .0000E+00   |     .076  .6500E-02
00571>                              .070  .1000E-03   |     .000  .0000E+00
00572>
00573>     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00574>     ---------------------      (ha)     (cms)     (hrs)       (mm)
00575>     INFLOW >05: (T1    )        .38      .185     1.000     70.475
00576>     OUTFLOW<02: (T1MIN )        .38      .076     1.083     70.475
00577>    OVERFLOW<06: (T1MAJ )        .00      .000      .000       .000
00578>
00579>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00580>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
00581>                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
00582>
00583>
00584>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   40.941
00585>                    TIME SHIFT OF PEAK FLOW         (min)=     5.00
00586>                    MAXIMUM  STORAGE   USED       (ha.m.)=.6072E-02
00587>
00588> ------------------------------------------------------------------------------
00589> 045:0007----------------------------------------------------------------------
00590> *#================================================================
00591> *# DRAINAGE AREA UNITS - RESIDENTIAL                ||
00592> *# 3.44 HA
00593> *# 100 Year Minor System Capture
00594> *# No on-site storage
00595> *#================================================================
00596> ----------------------
00597> | CALIB STANDHYD    |   Area    (ha)=    3.44
00598> | 04:UNITS  DT= 1.00 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   71.00
00599> ----------------------
00600>                              IMPERVIOUS    PERVIOUS (i)
00601>     Surface Area     (ha)=       2.44         1.00
00602>     Dep. Storage     (mm)=        .80         1.50
00603>     Average Slope     (%)=        .15         2.00
00604>     Length            (m)=     151.00        40.00
00605>     Mannings n             =       .013         .250
00606>
00607>     Max.eff.Inten.(mm/hr)=     178.56       136.35
00608>               over (min)          5.00        11.00
00609>     Storage Coeff.  (min)=       4.58 (ii)   10.82 (ii)
00610>     Unit Hyd. Tpeak (min)=       5.00        11.00
00611>     Unit Hyd. peak  (cms)=        .24          .10
00612>                                                        *TOTALS*
00613>     PEAK FLOW       (cms)=       1.04          .21         1.186 (iii)
00614>     TIME TO PEAK    (hrs)=       1.02         1.12         1.033
00615>     RUNOFF VOLUME    (mm)=      70.86        31.87        59.556
00616>     TOTAL RAINFALL   (mm)=      71.66        71.66        71.665
00617>     RUNOFF COEFFICIENT   =        .99          .44          .831
00618>
00619>       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
00620>            Fo   (mm/hr)= 76.20          K  (1/hr)=  4.14
00621>            Fc   (mm/hr)= 13.20     Cum.Inf.   (mm)=   .00
00622>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00623>           THAN THE STORAGE COEFFICIENT.
00624>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00625>
00626> ------------------------------------------------------------------------------
00627> 045:0008----------------------------------------------------------------------
00628> *
00629> **#================================================
00630> *# No on-site storage - Minor system Capture flow 100 year CHI
00631> *#================================================
00632> ----------------------
00633> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
00634> |  IN>04:(UNITS )   |
00635> | OUT<07:(UNITSM)   |    =========  OUTLFOW STORAGE TABLE  =========
00636> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00637>                             (cms)     (ha.m.)   |    (cms)    (ha.m.)
00638>                              .000  .0000E+00   |    1.186  .1000E-02
00639>                             1.180  .1000E-03   |     .000  .0000E+00
00640>
00641>     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00642>     ---------------------      (ha)     (cms)     (hrs)       (mm)
00643>     INFLOW >04: (UNITS )       3.44     1.186     1.033     59.556
00644>     OUTFLOW<07: (UNITSM)       3.44     1.180     1.033     59.556
00645>    OVERFLOW<09: (UNITSM)        .00      .000      .000       .000
00646>
00647>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00648>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
00649>                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
00650>
00651>
00652>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   99.503
00653>                    TIME SHIFT OF PEAK FLOW         (min)=      .00
00654>                    MAXIMUM  STORAGE   USED       (ha.m.)=.1654E-03
00655>
00656> ------------------------------------------------------------------------------
00657> 045:0009----------------------------------------------------------------------
00658> *
00659> *# Adding T1 and T234 and UNITS major flow to Rideau River
00660> ------------------------
00661> | ADD HYD (       100) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00662> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00663>                      ID1 08:T234MAJ         .00      .000     .00    .00    .000
00664>                     +ID2 06:T1MAJ           .00      .000     .00    .00    .000
00665>                     +ID3 09:UNITSMAJ        .00      .000     .00    .00    .000
00666>                      ================================================================
00667>                      SUM 10:       100      .00      .000     .00    .00    .000
00668> ------------------------------------------------------------------------------
00669> 045:0010----------------------------------------------------------------------
00670> *
00671> *#================================================================
00672> *# DRAINAGE AREA Upland Riverside Park - Park              ||
00673> *# 3.34 HA
00674> *# 2 Year Minor System Capture
00675> *# No on-site storage
00676> *#================================================================
00677> ----------------------
00678> | CALIB STANDHYD     |   Area    (ha)=    3.34
00679> | 08:PARK   DT= 1.00 |   Total Imp(%)=    7.00   Dir. Conn.(%)=    7.00
00680> ----------------------
00681>                              IMPERVIOUS    PERVIOUS (i)
00682>     Surface Area     (ha)=        .23         3.11
00683>     Dep. Storage     (mm)=        .80         1.50
00684>     Average Slope     (%)=        .15         2.00
00685>     Length            (m)=     150.00        40.00
00686>     Mannings n             =       .013         .250
00687>
00688>     Max.eff.Inten.(mm/hr)=     178.56       136.35
00689>               over (min)          5.00        11.00
00690>     Storage Coeff.  (min)=       4.57 (ii)   10.80 (ii)
00691>     Unit Hyd. Tpeak (min)=       5.00        11.00
00692>     Unit Hyd. peak  (cms)=        .24          .10
00693>                                                        *TOTALS*
00694>     PEAK FLOW       (cms)=        .10          .65          .715 (iii)
00695>     TIME TO PEAK    (hrs)=       1.02         1.12         1.117
00696>     RUNOFF VOLUME    (mm)=      70.86        31.87        34.599
00697>     TOTAL RAINFALL   (mm)=      71.66        71.66        71.665
00698>     RUNOFF COEFFICIENT   =        .99          .44          .483
00699>      *** WARNING: For areas with impervious ratios below
00700>                   20%, this routine may not be applicable.
00701>
00702>       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
00703>            Fo   (mm/hr)= 76.20          K  (1/hr)=  4.14
00704>            Fc   (mm/hr)= 13.20     Cum.Inf.   (mm)=   .00
00705>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00706>           THAN THE STORAGE COEFFICIENT.
00707>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00708>
00709> ------------------------------------------------------------------------------
00710> 045:0011----------------------------------------------------------------------
00711> **#================================================
00712> *# No on-site storage - Minor system Capture flow 2 year CHI
00713> *#================================================
00714> ----------------------
00715> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
00716> |  IN>08:(PARK  )   |
00717> | OUT<06:(PARKMI)   |    =========  OUTLFOW STORAGE TABLE  =========
00718> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00719>                             (cms)     (ha.m.)   |    (cms)    (ha.m.)
00720>                              .000  .0000E+00   |     .082  .2000E-03
00721>                              .077  .1000E-03   |     .000  .0000E+00
00722>
00723>     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00724>     ---------------------      (ha)     (cms)     (hrs)       (mm)
00725>     INFLOW >08: (PARK  )       3.34      .715     1.117     34.599
00726>     OUTFLOW<06: (PARKMI)        .97      .082      .900     34.599
00727>    OVERFLOW<09: (PARKMA)       2.37      .633     1.117     34.599
00728>
00729>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        1
00730>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .77
00731>                    PERCENTAGE OF TIME OVERFLOWING    (%)=    14.15
00732>
00733>
00734>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   11.471
00735>                    TIME SHIFT OF PEAK FLOW         (min)=   -13.00
00736>                    MAXIMUM  STORAGE   USED       (ha.m.)=.1823E-03
00737>
00738> ------------------------------------------------------------------------------
00739> 045:0012----------------------------------------------------------------------
00740> *
00741> *# Adding T1 and T234 UNITS and Park minor flow
00742> ------------------------
00743> | ADD HYD (       100) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00744> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00745>                      ID1 03:T234MIN         .97      .187    1.12   70.47    .000
00746>                     +ID2 02:T1MIN           .38      .076    1.08   70.47    .000
00747>                     +ID3 07:UNITSMIN       3.44    1.180    1.03   59.56    .000
00748>                     +ID4 06:PARKMIN         .97      .082     .90   34.60    .000
00749>                      ================================================================
00750>                      SUM 01:       100     5.76    1.523    1.03   57.92    .000
00751>
00752>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00753>
00754> ------------------------------------------------------------------------------
00755> 045:0013----------------------------------------------------------------------
00756> ------------------------------------------------------------------------------
00757> 045:0002----------------------------------------------------------------------
00758>   ** END OF RUN :  89
00759>
00760> ****************************************************************************
00761>
00762>
00763>
00764>
00765>
00766> --------------------
00767> | START            |  Project  dir.: C:\IBI\SWMHYMO\projects\140873\
00768> --------------------  Rainfall dir.: C:\IBI\SWMHYMO\projects\140873\
00769>     TZERO =   .00 hrs on       0
00770>     METOUT=   2 (output = METRIC)
00771>     NRUN  = 090
00772>     NSTORM=   1
00773>               #  1=C3H12010.STM
00774> ------------------------------------------------------------------------------
00775> 090:0002----------------------------------------------------------------------
00776> *#****************************************************************************
00777> *#  Project Name: [St.Mary's]    Project Number: [140873]
00778> *#  Date        :
00779> *#  Modeller    : [MG]
00780> *#  Company     : Cumming Cockburn Limited
00781> *#  License #   : 3699242
00782> *#****************************************************************************
00783> *#
00784> *# POST-DEVELOPMENT CONDITIONS
00785> *#================================================================
00786> *
00787> ------------------------------------------------------------------------------
00788> 090:0002----------------------------------------------------------------------
00789> --------------------
00790> | READ STORM        |    Filename: CHICAGO 3 HOUR 10 MIN 100 YEAR STORM - I
00791> | Ptotal=  86.00 mm|    Comments: CHICAGO 3 HOUR 10 MIN 100 YEAR STORM - I
00792> --------------------
00793>                TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00794>                 hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00795>                 .17   7.255 |   1.00 214.271 |   1.83  13.271 |   2.67   6.912
00796>                 .33   9.050 |   1.17  64.859 |   2.00  11.142 |   2.83   6.336
00797>                 .50  12.191 |   1.33  32.783 |   2.17   9.628 |   3.00   5.855
00798>                 .67  19.163 |   1.50  21.888 |   2.33   8.496 |
00799>                 .83  48.786 |   1.67  16.484 |   2.50   7.616 |
00800>
00801> ------------------------------------------------------------------------------
00802> 090:0003----------------------------------------------------------------------
00803> *
00804> *#================================================================
00805> *# DRAINAGE AREA T2T3T4 - RESIDENTIAL                ||
00806> *# 0.97 HA
00807> *# 2 Year Minor System Capture
00808> *# up to 100 year on-site storage
00809> *#================================================================
00810> ----------------------
```

```
00811> | CALIB STANDHYD     |   Area    (ha)=     .97
00812> | 01:T234   DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
00813> ----------------------
00814>                              IMPERVIOUS    PERVIOUS (i)
00815>      Surface Area     (ha)=        .96          .01
00816>      Dep. Storage     (mm)=        .80         1.50
00817>      Average Slope     (%)=        .15         2.00
00818>      Length            (m)=      60.00        40.00
00819>      Mannings n             =      .013         .250
00820>
00821>      Max.eff.Inten.(mm/hr)=     214.27       186.35
00822>                  over (min)        2.00         8.00
00823>      Storage Coeff.  (min)=       2.45 (ii)    7.95 (ii)
00824>      Unit Hyd. Tpeak (min)=       2.00         8.00
00825>      Unit Hyd. peak  (cms)=        .49          .14
00826>                                                          *TOTALS*
00827>      PEAK FLOW       (cms)=        .56          .00          .565 (iii)
00828>      TIME TO PEAK    (hrs)=       1.00         1.07         1.000
00829>      RUNOFF VOLUME    (mm)=      85.20        43.09        84.777
00830>      TOTAL RAINFALL   (mm)=      86.00        86.00        85.998
00831>      RUNOFF COEFFICIENT   =        .99          .50          .986
00832>
00833>        (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
00834>             Fo   (mm/hr)= 76.20          K  (1/hr)=  4.14
00835>             Fc   (mm/hr)= 13.20     Cum.Inf.   (mm)=   .00
00836>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00837>            THAN THE STORAGE COEFFICIENT.
00838>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00839>
00840> --------------------------------------------------------------------------------
00841> 090:0004--------------------------------------------------------------------------
00842> **#=============================================
00843> *# Up to 100 year on-site storage - Minor system Capture flow 2 year CHI
00844> *#=============================================
00845> ---------------------
00846> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
00847> |  IN>01:(T234  )   |
00848> | OUT<03:(T234MI)   |    =========  OUTLFOW STORAGE TABLE  =========
00849> ---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00850>                            (cms)     (ha.m.)   |    (cms)    (ha.m.)
00851>                             .000  .0000E+00   |     .187  .1550E-01
00852>                             .175  .1000E-03   |     .000  .0000E+00
00853>
00854>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00855>      ---------------------      (ha)     (cms)     (hrs)        (mm)
00856>      INFLOW >01: (T234  )        .97      .565     1.000      84.777
00857>      OUTFLOW<03: (T234MI)        .89      .187     1.000      84.909
00858>     OVERFLOW<08: (T234MA)        .08      .375     1.000      84.777
00859>
00860>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        3
00861>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .12
00862>                     PERCENTAGE OF TIME OVERFLOWING    (%)=     2.86
00863>
00864>
00865>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=   33.122
00866>                     TIME SHIFT OF PEAK FLOW         (min)=      .00
00867>                     MAXIMUM  STORAGE   USED       (ha.m.)=.1547E-01
00868>
00869> --------------------------------------------------------------------------------
00870> 090:0005--------------------------------------------------------------------------
00871> *
00872> *#================================================================
00873> *# DRAINAGE AREA T1 - RESIDENTIAL                ||
00874> *# 0.38 HA
00875> *# 2 Year Minor System Capture
00876> *# up to 100 year on-site storage
00877> *#================================================================
00878> ---------------------
00879> | CALIB STANDHYD     |   Area    (ha)=     .38
00880> | 05:T1     DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
00881> ---------------------
00882>                              IMPERVIOUS    PERVIOUS (i)
00883>      Surface Area     (ha)=        .38          .00
00884>      Dep. Storage     (mm)=        .80         1.50
00885>      Average Slope     (%)=        .15         2.00
00886>      Length            (m)=      50.00        40.00
00887>      Mannings n             =      .013         .250
00888>
00889>      Max.eff.Inten.(mm/hr)=     214.27       186.35
00890>                  over (min)        2.00         8.00
00891>      Storage Coeff.  (min)=       2.20 (ii)    7.70 (ii)
00892>      Unit Hyd. Tpeak (min)=       2.00         8.00
00893>      Unit Hyd. peak  (cms)=        .53          .15
00894>                                                          *TOTALS*
00895>      PEAK FLOW       (cms)=        .22          .00          .223 (iii)
00896>      TIME TO PEAK    (hrs)=       1.00         1.07         1.000
00897>      RUNOFF VOLUME    (mm)=      85.20        43.09        84.777
00898>      TOTAL RAINFALL   (mm)=      86.00        86.00        85.998
00899>      RUNOFF COEFFICIENT   =        .99          .50          .986
00900>
00901>        (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
00902>             Fo   (mm/hr)= 76.20          K  (1/hr)=  4.14
00903>             Fc   (mm/hr)= 13.20     Cum.Inf.   (mm)=   .00
00904>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00905>            THAN THE STORAGE COEFFICIENT.
00906>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00907>
00908> --------------------------------------------------------------------------------
00909> 090:0006--------------------------------------------------------------------------
00910> **#=============================================
00911> *# Up to 100 year on-site storage - Minor system Capture flow 2 year CHI
00912> *#=============================================
00913> ---------------------
00914> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
00915> |  IN>05:(T1    )   |
00916> | OUT<02:(T1MIN )   |    =========  OUTLFOW STORAGE TABLE  =========
00917> ---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00918>                            (cms)     (ha.m.)   |    (cms)    (ha.m.)
00919>                             .000  .0000E+00   |     .076  .6500E-02
00920>                             .070  .1000E-03   |     .000  .0000E+00
00921>
00922>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00923>      ---------------------      (ha)     (cms)     (hrs)        (mm)
00924>      INFLOW >05: (T1    )        .38      .223     1.000      84.777
00925>      OUTFLOW<02: (T1MIN )        .36      .076     1.017      84.777
00926>     OVERFLOW<06: (T1MAJ )        .02      .135     1.017      84.777
00927>
00928>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        2
00929>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .10
00930>                     PERCENTAGE OF TIME OVERFLOWING    (%)=     2.54
00931>
00932>
00933>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=   34.152
00934>                     TIME SHIFT OF PEAK FLOW         (min)=     1.00
00935>                     MAXIMUM  STORAGE   USED       (ha.m.)=.6500E-02
00936>
00937> --------------------------------------------------------------------------------
00938> 090:0007--------------------------------------------------------------------------
00939> *#================================================================
00940> *# DRAINAGE AREA UNITS - RESIDENTIAL              ||
00941> *# 3.44 HA
00942> *# 100 Year Minor System Capture
00943> *# No on-site storage
00944> *#================================================================
00945> ---------------------
00946> | CALIB STANDHYD     |   Area    (ha)=    3.44
00947> | 04:UNITS  DT= 1.00 |   Total Imp(%)=   71.00   Dir. Conn.(%)=   71.00
00948> ---------------------
00949>                              IMPERVIOUS    PERVIOUS (i)
00950>      Surface Area     (ha)=       2.44         1.00
00951>      Dep. Storage     (mm)=        .80         1.50
00952>      Average Slope     (%)=        .15         2.00
00953>      Length            (m)=     151.00        40.00
00954>      Mannings n             =      .013         .250
00955>
00956>      Max.eff.Inten.(mm/hr)=     214.27       185.18
00957>                  over (min)        4.00        10.00
00958>      Storage Coeff.  (min)=       4.26 (ii)    9.78 (ii)
00959>      Unit Hyd. Tpeak (min)=       4.00        10.00
00960>      Unit Hyd. peak  (cms)=        .27          .11
00961>                                                          *TOTALS*
00962>      PEAK FLOW       (cms)=       1.29          .29         1.505 (iii)
00963>      TIME TO PEAK    (hrs)=       1.00         1.10         1.017
00964>      RUNOFF VOLUME    (mm)=      85.20        43.09        72.986
00965>      TOTAL RAINFALL   (mm)=      86.00        86.00        85.998
00966>      RUNOFF COEFFICIENT   =        .99          .50          .849
00967>
00968>        (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
00969>             Fo   (mm/hr)= 76.20          K  (1/hr)=  4.14
00970>             Fc   (mm/hr)= 13.20     Cum.Inf.   (mm)=   .00
00971>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00972>            THAN THE STORAGE COEFFICIENT.
00973>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00974>
00975> --------------------------------------------------------------------------------
00976> 090:0008--------------------------------------------------------------------------
00977> *
00978> **#=============================================
00979> *# No on-site storage - Minor system Capture flow 100 year CHI
00980> *#=============================================
00981> ---------------------
00982> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
00983> |  IN>04:(UNITS )   |
00984> | OUT<07:(UNITSM)   |    =========  OUTLFOW STORAGE TABLE  =========
00985> ---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00986>                            (cms)     (ha.m.)   |    (cms)    (ha.m.)
00987>                             .000  .0000E+00   |    1.186  .1000E-02
00988>                            1.180  .1000E-03   |     .000  .0000E+00
00989>
00990>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00991>      ---------------------      (ha)     (cms)     (hrs)        (mm)
00992>      INFLOW >04: (UNITS )       3.44     1.505     1.017      72.986
00993>      OUTFLOW<07: (UNITSM)       3.32     1.186      .983      72.986
00994>     OVERFLOW<09: (UNITSM)        .12      .307     1.017      72.986
00995>
00996>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        1
00997>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .10
00998>                     PERCENTAGE OF TIME OVERFLOWING    (%)=     1.98
00999>
01000>
01001>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=   78.810
01002>                     TIME SHIFT OF PEAK FLOW         (min)=    -2.00
01003>                     MAXIMUM  STORAGE   USED       (ha.m.)=.9493E-03
01004>
01005> --------------------------------------------------------------------------------
01006> 090:0009--------------------------------------------------------------------------
01007> *
01008> *# Adding T1 and T234 and UNITS major flow to Rideau River
01009> ------------------------
01010> | ADD HYD (       100) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01011> ------------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
01012>                         ID1 08:T234MAJ      .08     .375    1.00  84.78    .000
01013>                        +ID2 06:T1MAJ        .02     .135    1.02  84.78    .000
01014>                        +ID3 09:UNITSMAJ     .12     .307    1.02  72.99    .000
01015>                         ======================================================
01016>                         SUM 10:       100    .22     .793    1.02  78.51    .000
01017>
01018>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01019>
01020> --------------------------------------------------------------------------------
01021> 090:0010--------------------------------------------------------------------------
01022> *
01023> *#================================================================
01024> *# DRAINAGE AREA Upland Riverside Park - Park              ||
01025> *# 3.34 HA
01026> *# 2 Year Minor System Capture
01027> *# No on-site storage
01028> *#================================================================
01029> ---------------------
01030> | CALIB STANDHYD     |   Area    (ha)=    3.34
01031> | 08:PARK   DT= 1.00 |   Total Imp(%)=    7.00   Dir. Conn.(%)=    7.00
01032> ---------------------
01033>                              IMPERVIOUS    PERVIOUS (i)
01034>      Surface Area     (ha)=        .23         3.11
01035>      Dep. Storage     (mm)=        .80         1.50
01036>      Average Slope     (%)=        .15         2.00
01037>      Length            (m)=     150.00        40.00
01038>      Mannings n             =      .013         .250
01039>
01040>      Max.eff.Inten.(mm/hr)=     214.27       185.18
01041>                  over (min)        4.00        10.00
01042>      Storage Coeff.  (min)=       4.24 (ii)    9.76 (ii)
01043>      Unit Hyd. Tpeak (min)=       4.00        10.00
01044>      Unit Hyd. peak  (cms)=        .27          .12
01045>                                                          *TOTALS*
01046>      PEAK FLOW       (cms)=        .12          .89          .969 (iii)
01047>      TIME TO PEAK    (hrs)=       1.00         1.10         1.083
01048>      RUNOFF VOLUME    (mm)=      85.20        43.09        46.037
01049>      TOTAL RAINFALL   (mm)=      86.00        86.00        85.998
01050>      RUNOFF COEFFICIENT   =        .99          .50          .535
01051>       *** WARNING: For areas with impervious ratios below
01052>                    20%, this routine may not be applicable.
01053>
01054>        (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
01055>             Fo   (mm/hr)= 76.20          K  (1/hr)=  4.14
01056>             Fc   (mm/hr)= 13.20     Cum.Inf.   (mm)=   .00
01057>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01058>            THAN THE STORAGE COEFFICIENT.
01059>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01060>
01061> --------------------------------------------------------------------------------
01062> 090:0011--------------------------------------------------------------------------
01063> **#=============================================
01064> *# No on-site storage - Minor system Capture flow 2 year CHI
01065> *#=============================================
01066> ---------------------
01067> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
01068> |  IN>08:(PARK  )   |
01069> | OUT<06:(PARKMI)   |    =========  OUTLFOW STORAGE TABLE  =========
01070> ---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
01071>                            (cms)     (ha.m.)   |    (cms)    (ha.m.)
01072>                             .000  .0000E+00   |     .082  .2000E-03
01073>                             .077  .1000E-03   |     .000  .0000E+00
01074>
01075>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
01076>      ---------------------      (ha)     (cms)     (hrs)        (mm)
01077>      INFLOW >08: (PARK  )       3.34      .969     1.083      46.037
01078>      OUTFLOW<06: (PARKMI)        .79      .082      .883      46.036
01079>     OVERFLOW<09: (PARKMA)       2.55      .887     1.100      46.037
01080>
```

```
                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        2
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .85
                    PERCENTAGE OF TIME OVERFLOWING    (%)=    16.24


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    8.465
                    TIME SHIFT OF PEAK FLOW         (min)=   -12.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.1930E-03

 ------------------------------------------------------------------------------
 090:0012------------------------------------------------------------------------
 *
 *# Adding T1 and T234 UNITS and Park minor flow
 ------------------------
 | ADD HYD (       100) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 03:T234MIN         .89     .187    1.00  84.91    .000
                      +ID2 02:T1MIN           .36     .076    1.02  84.78    .000
                      +ID3 07:UNITSMIN       3.32    1.186     .98  72.99    .000
                      +ID4 06:PARKMIN         .79     .082     .88  46.04    .000
                       ================================================================
                       SUM 01:       100     5.36    1.531    1.02  71.79    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 090:0013------------------------------------------------------------------------
 ------------------------------------------------------------------------------
 090:0002------------------------------------------------------------------------
 ------------------------------------------------------------------------------
 090:0002------------------------------------------------------------------------
 *
       FINISH
 ------------------------------------------------------------------------------
 ******************************************************************************
      WARNINGS / ERRORS / NOTES
      -------------------------
  040:0010 CALIB STANDHYD
       *** WARNING: For areas with impervious ratios below
                    20%, this routine may not be applicable.
       *** WARNING: For areas with impervious ratios below
                    20%, this routine may not be applicable.
       *** WARNING: For areas with impervious ratios below
                    20%, this routine may not be applicable.
    Simulation ended on 2022-12-08     at 11:29:41
 ==============================================================================

```

APPENDIX D



LEGEND:

- 93.20 — PROPOSED MACRO GRADES
- FF 90.20 — PROPOSED FINISHED FLOOR GRADE
- *95.00* — PROPOSED GRADES (BY OTHERS)
- EMERGENCY OVERLAND FLOW ROUTE
- TERRACING 3:1
- RETAINING WALL
- BUILDING RETAINING SLOPE
- SWALE
- 89.15 — PRELIMINARY GRADES FROM JAN 2022 SITE PLAN
- 89.15 — PRELIMINARY PATHWAY GRADES (CSW)

J:\140873_St._Mary's_R\7.0_Production\7.03_Design\04_Civil_LAND\Draft Plan Report\140873-Fig-10-GRADING.dwg Layout Name: CONCEPTUAL MACRO GRADING PLAN Last Saved By: mmline Last Saved At: Dec. 21, 22

IBI

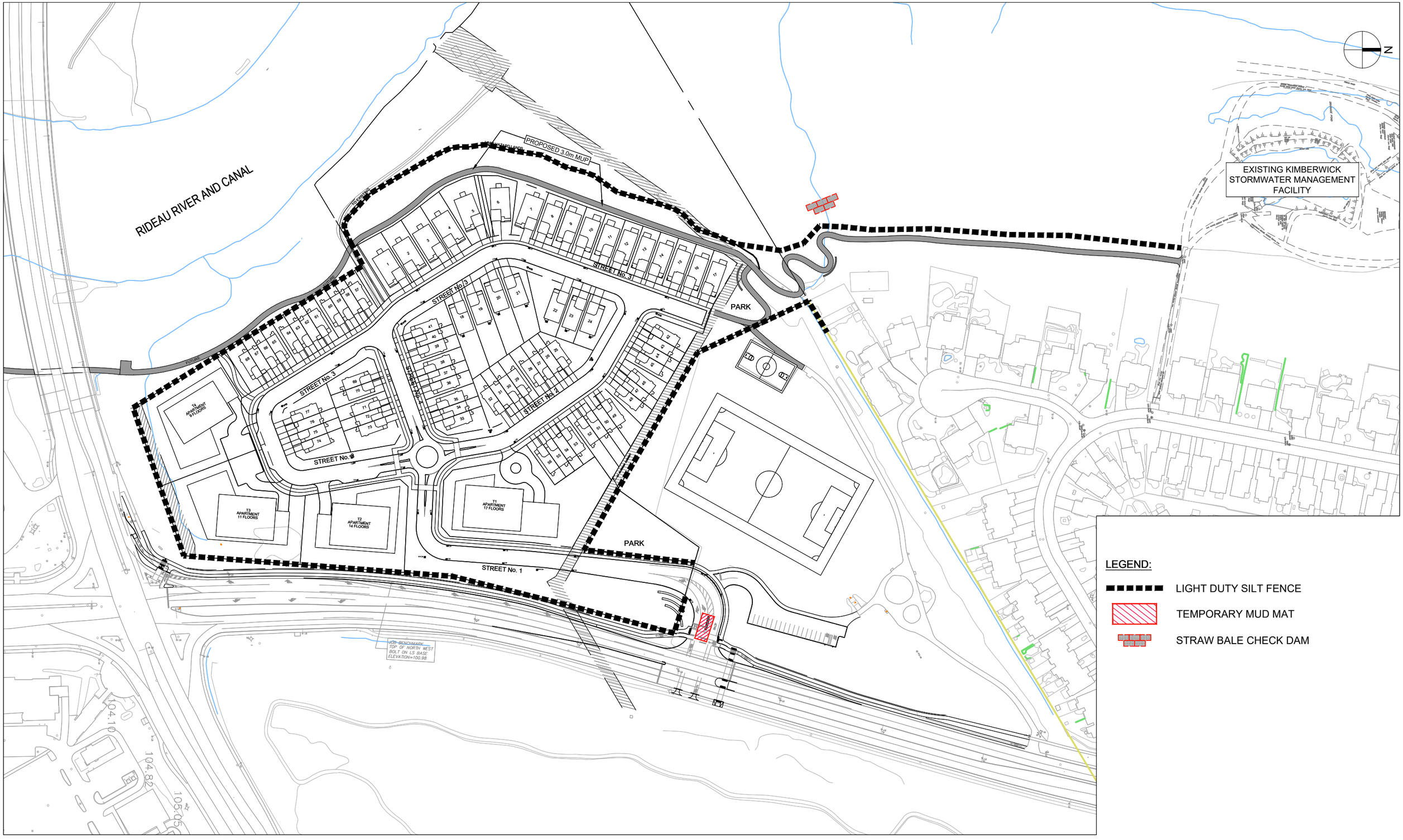
Scale: N.T.S.

Project Title: ASSESSMENT OF ADEQUACY OF PUBIC SERVICES REPORT 3930 AND 3960 RIVERSIDE DRIVE

Drawing Title: CONCEPTUAL MACRO GRADING PLAN

Sheet No.: FIGURE 10

APPENDIX E



J:\140873_St._Mary's_R\7.0_Production\7.03_Design\04_Civil_LAND\Draft Plan Report\140873-Fig-11-EROSION SEDIMENTATION PLAN.dwg Layout Name: FIGURE x.x EROSION SEDIMENTATION PLAN Last Saved By: mmiline Last Saved At: Dec. 21, 22

IBI

Scale

N.T.S.

Project Title

ASSESSMENT OF ADEQUACY OF PUBIC SERVICES REPORT
3930 AND 3960 RIVERSIDE DRIVE

Drawing Title

EROSION AND SEDIMENT CONTROL PLAN

Sheet No.

FIGURE 11

APPENDIX F

MEMO

Date: September 2nd, 2021

To / Destinataire	**Kelby Lodoen Unseth, Planner**
From / Expéditeur	**Eric Harrold, Project Manager, Infrastructure Approvals**
Subject / Objet	**Pre-Application Consultation** **3930 Riverside Drive, Ward 16** **Plan of Subdivision**

File No. PC2021-0282

The following are the engineering comments pertaining to the Pre-Consultation meeting for 3930 & 3960 Riverside Drive (Major and Minor Re-Zoning and Plan of Subdivision) which was held on September 2nd.

List of Reports and Plans (Plan of Subdivision and Re-zoning):

1. Conceptual Grading and Servicing Plan
2. Storm Drainage / Ponding Plan
3. Stormwater Management and Site Servicing Feasibility Study
4. Geotechnical Investigation and Slope Stability Assessment Report (including delineation of limit of hazard lands)
5. Geomorphological Study for the adjacent section of the Rideau River

The feasibility study must look at the assessment of adequacy of public services, as well as how the internal subdivision will function. The report should include, at a minimum, the following:

- Conceptual Level Master Grading Plan – to confirm feasibility of proposed stormwater management and drainage
- Conceptual Level Master Servicing Plan – that is supported by a high-level analysis for the storm sewers, sanitary sewers and watermain design.
- Stormwater management modeling for both the existing pond and the future development
- Road cross section with draft submission

The aforementioned reports, studies and plans are required to support the proposed Re-zoning and Plan of Subdivision applications. If the applicant elects to apply for the re-zoning in advance of the Plan of Subdivision process, additional / alternative submissions may be required.

Please note the following information regarding the engineering design submissions for the above noted site:

1. The Servicing Study Guidelines for Development Applications are available at the following address:

https://ottawa.ca/en/city-hall/planning-and-development/how-develop-property/development-application-review-process-2/guide-preparing-studies-and-plans

2. Servicing and site works shall be in accordance with the following documents:
   - Ottawa Sewer Design Guidelines (October 2012) and all the Technical Bulletins including, Technical Bulletin PIEDTB-2016-01 and ISTB-2018-01
   - Ottawa Design Guidelines – Water Distribution (2010) and Technical Bulletins ISD-2010-2, ISDTB-2014-02 and ISTB-2018-02
   - Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
   - City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
   - City of Ottawa Environmental Noise Control Guidelines (January, 2016)
   - City of Ottawa Park and Pathway Development Manual (2012)
   - City of Ottawa Accessibility Design Standards (2012)
   - Ottawa Standard Tender Documents (latest version)
   - Ontario Provincial Standards for Roads & Public Works (2013)

3. Record drawings and utility plans are available for purchase from the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x 44455

4. The Stormwater Management Criteria, for the subject site, is to be based on the following:
   - Design of this project must be undertaken in accordance with the following reports:
     - Riverside Drive Land – Sanitary Sewer Servicing Study prepared by IBI Group, May 2021
     - Riverside Drive Area – Brief in Support of Development of Lands Within the Riverside Drive Planning Area prepared by Cumming Cockburn & Associates Limited, May 1986
     - Stormwater Management for Riverside Drive Lands prepared by Cumming Cockburn & Associates Limited, April 1987
     - Riverwalk Park Stormwater Management Facility Update Stormwater Design Plan prepared by Novatech Engineering, June 1996
   - There may be area specific SWM Criteria within SWM and/or Sub-watershed studies that may apply, please check.
   - Quality control requirements to be provided by Rideau Valley Conservation Authority (RVCA).
   - The applicant has indicated that they intend to connect to the existing River Walk Stormwater Management Pond, located to the north of the site. The Stormwater Management Report must discuss the capacity and design of the existing pond and confirm that the additional flows will not adversely affect the function of the pond. The minor system capture must be limited to the allocated capacity of the existing SWM facility. The original design report for the pond indicates that only approximately 50% of the subject site is included within the drainage area for the pond. The Consultant must review whether the pond drainage area still meets the design intent to assess whether the pond can accept the proposed drainage area.

5. Deep Services:

    i. A plan view of the approximate services may be seen above. Services should ideally be grouped in a common trench to minimize the number of road cuts. The sizing of available future services is:

        a. Connections:

            i. Existing 900 mm dia. STM (Conc.) (to be extended to the property line)
            ii. Existing 406 mm dia. Watermain (PVC)
            iii. Existing 525 mm dia. SAN (Conc.) (may need to be extended beneath City park – to be confirmed by the civil consultant)

    ii. The designer should be aware there may be limited capacity in the downstream sanitary sewer system. The sanitary demand needs to be coordinated with the City Planning Dept. to determine if the existing sanitary sewer system has sufficient capacity to support a rezoning. Please provide sanitary demands to the City project manager for coordination. The proposed flows should not exceed those accounted for in the 2021 update of the Riverside Drive Lands – Sanitary Sewer Servicing Study Update by IBI.

    iii. As identified in the Sanitary Sewer Servicing Study by IBI (2021), the proposed sanitary sewer will be extended to the south, beneath the Hunt Club Bridge, to service properties along Riverside Drive. The location, depth and size of the sewer must be in accordance with the servicing study. The sewer may qualify as a Development Charge project however that won't be determined until mid-2022 and the DC by-law update is scheduled for +/- 2024. Per Infrastructure Planning, a cost sharing agreement between the City and all benefitting parties would be preferred. Development Review would be managing this and would need support from CREO and Legal. CREO has indicated that they have been in talks with Taggart and Dymon, and are prepared to enter into some form of agreement for the sanitary sewer extension.

6. Civil consultant must request boundary conditions from the City's assigned Project Manager prior to first submission. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:

    i. Location of connection(s)

    ii. Type of development and the amount of fire flow required, as per FUS (1999), including calculations.

    iii. Average daily demand: ___ l/s.

    iv. Maximum daily demand: ___l/s.

    v. Maximum hourly daily demand: ___ l/s.

    vi. Hydrant location and spacing to meet City's Water Design guidelines.

vii. Water supply redundancy will be required for more than 50 m3/day water demand. Provide watermain looped connection or with isolation valve to meet this requirement.

7. If required, Phase 1 Environmental Site Assessment (ESA) and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04. The ESA may provide recommendations where site contamination may be present. The recommendations from the ESA need to be coordinated with the servicing report to ensure compliance with the Sewer Use By-Law.

8. MECP ECA Requirements – All development applications should be considered for an Environmental Compliance Approval (ECA) by the Ministry of the Environment, Conservation, and Parks (MECP);

    a. The consultants determine if an approval for sewage works under Section 53 of OWRA is required and determines what type of application. The City's project manager may help confirm and coordinate with the MECP as required.

    b. The project will be either transfer of review (standard), transfer of review (additional), direct submission, or exempt as per O. Reg. 525/98.

    c. Pre-consultation is not required if applying for standard or additional works (Schedule A of the Agreement) under Transfer Review.

    d. Pre-consultation with local District office of MECP is recommended for direct submission.

    e. Consultant completes an MECP request form for a pre-consultation. Send request to moeccottawasewage@ontario.ca

    f. ECA applications are required to be submitted online through the MECP portal. A business account required to submit ECA application. For more information visit https://www.ontario.ca/page/environmental-compliance-approval

    NOTE: Site Plan Approval, or Draft Approval, is required before an application is sent to the MECP.

9. There are significant geotechnical considerations for this site due to the proximity to the Rideau River. The geotechnical report must thoroughly consider the slope stability of the site and establish the limits of hazard lands, per the Ministry and City's guidelines.

10. General Engineering Submission requirements:

    a. As per section 53 of the Professional Engineers Act, O. Reg 941/40, R.S.O. 1990, all documents prepared by engineers must be signed and dated on the seal.

    b. All required plans are to be submitted on standard A1 size sheets (594mm x 841mm) sheets, utilizing a reasonable and appropriate metric scale as per City of Ottawa Servicing and Grading Plan Requirements: title blocks are to be placed on the right of the sheets and not along the bottom. Engineering plans may be combined, but the Site Plans must be provided separately. Plans shall include the survey monument used to confirm datum. Information shall be provided to enable a non-surveyor to locate the survey monument presented by the consultant.

    c. All required plans & reports are to be provided in *.pdf format (at application submission and for any, and all, re-submissions)

Should you have any questions or require additional information, please contact me directly at (613) 580-2424, ext. 21447 or by email at eric.harrold@ottawa.ca.