JOHNSTON ROAD LAND USE STUDY (JRLUS)

SERVICING FEASIBILITY STUDY

MARCH 23, 2011

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INTRODUCTION

The following report is a high-level servicing feasibility analysis for the Johnston Road Land Use Study (JRLUS) area. The approximately 120 ha subject property is currently located inside the urban development boundary of the City of Ottawa and is bounded by Albion Road to the west, Johnston Road to the south, Conroy Road to the east and an existing hydro corridor (approximately 0.6 km south of Walkley Road) to the north (see **Figure 1 – Study Area Limits**).

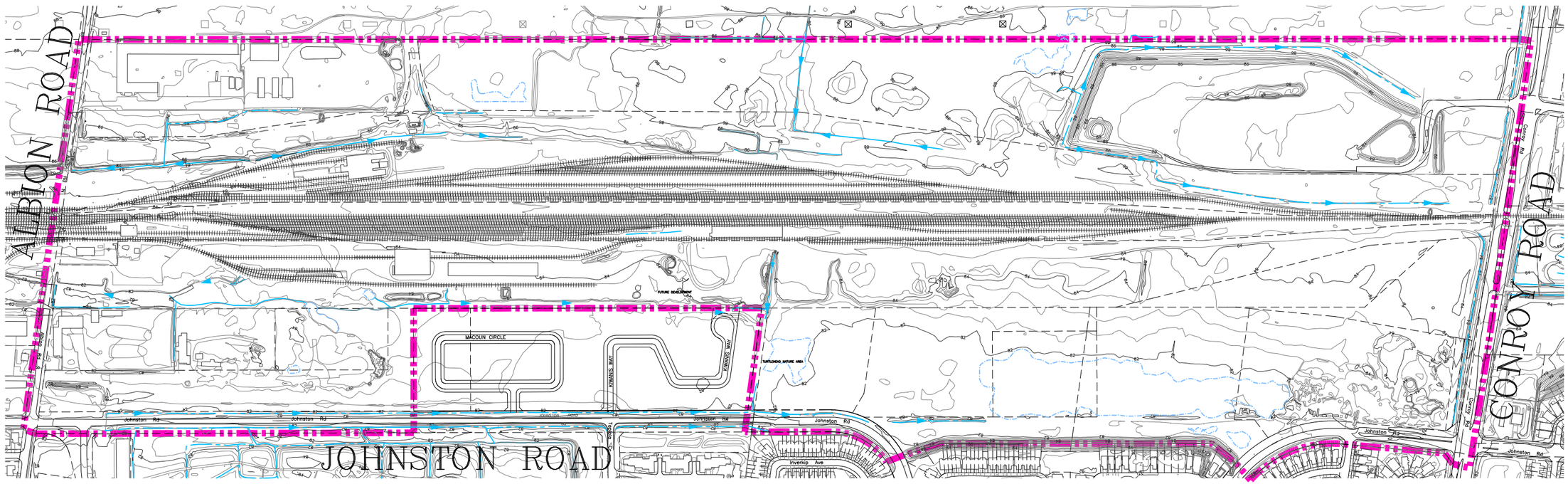
In the past, this area under the old City of Ottawa was zoned heavy and light industrial. Presently, it is mainly a mix of heavy, general and light industrial zoning with approximately 18 ha of the land zoned for environmental protection.

The intent of this report will be to highlight the opportunities and constraints in providing municipal servicing (sanitary sewers, storm sewers, stormwater management and, watermains) to the subject lands based on the availability (proximity, capacity, etc.) of those services.

The servicing feasibility analysis for the JRLUS has been based on the preferred land use Concept Plan (herein called the Concept Plan) developed as part of a City-initiated Land Use Study (see **Figure 2 - Concept Plan**). The Land Use Study was carried out concurrently with several supporting studies including geotechnical, servicing, noise and transportation, with the latter fulfilling Phases 1 and 2 of the Municipal Class Environmental Assessment (EA) process.

The Concept Plan was derived from four initial concepts developed by City planning staff and presented to the public for input at a public open house held in June, 2009. In general, the land use in the Concept Plan maintains industrial zoning with some changes from heavy industrial to light industrial zoning.

The JRLUS area is comprised of Canadian National (CN) and Canadian Pacific (CP) railroad lands, small pockets of industrial development along Albion Road and some undeveloped land. There is also a City-owned snow disposal facility, skateboard park, water tower, park and open space lands and two Urban Natural features, the Greenboro Turtlehead Nature Area (GTNA) and Conroy Woods. Existing topography appears to direct drainage south-easterly for a majority of the site and ultimately to McEwan Creek. A smaller portion, approximately ¼ of the westerly part of the JRLUS area, drains westerly and ultimately to Sawmill Creek.



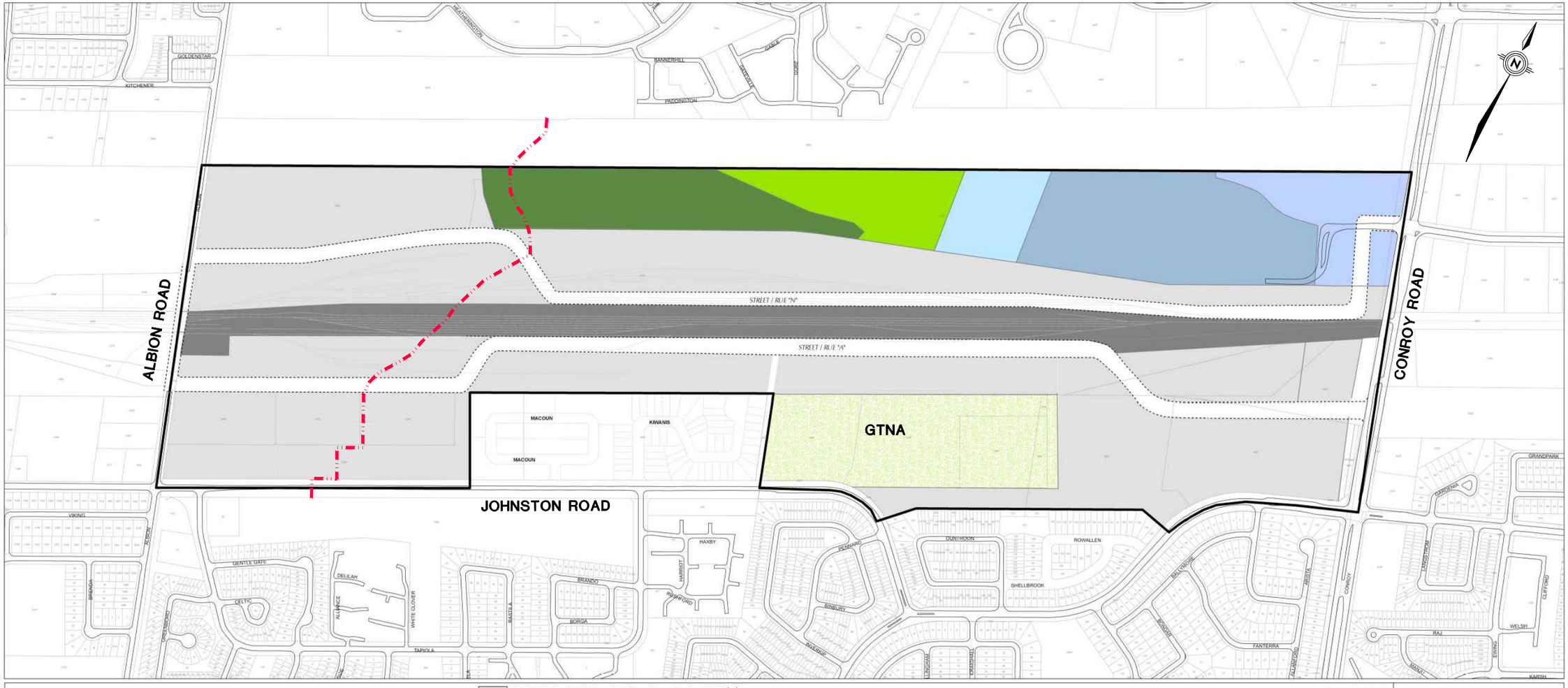
LEGEND

- STUDY AREA LIMIT
- EXISTING PROPERTY BOUNDARY
- EXISTING MARSH AREA
- EXISTING DITCH

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

SCALE	JOHNSTON ROAD LAND USE STUDY EXISTING CONDITIONS REPORT CITY OF OTTAWA	PROJECT No.
1:3000		SURVEY BY
		DATE SEPTEMBER 2008
	STUDY AREA LIMITS	DRAWING No. FIGURE 1



JOHNSTON ROAD LAND USE STUDY
ÉTUDE SUR L'UTILISATION DU SOL DU CHEMIN JOHNSTON

Proposed Concept Plan

- Light Industrial Use / Utilization d'industrie légère
- Heavy Industrial Use / Utilization d'industrie lourde
- Conroy Woods
- Open Space / Espace vert
- Elevated Water Tank / Réservoir surélevé
- Snow Disposal Facility / Dépôt de neige
- City Works Yard / Cour des Travaux publics
- GreenboroTurtlehead Nature Area / L'espace naturel Greenboro
- Study Area Boundary / Limites de l'étude

Scale 1 : 2,500

Ottawa

Produced by Infrastructure Services and Community Sustainability / Services d'infrastructure et Viabilité des collectivités
Development Approvals / Approbation des demandes d'aménagement
Mapping and Graphics / Carte et graphiques

June 2009

JOHNSTON ROAD LAND USE STUDY

CITY OF OTTAWA

CONCEPT PLAN – FIGURE 2

Based on the Concept Plan and the existing land uses which are to remain unchanged (water tower, snow disposal facility, CN rail line, GTNA, etc.), the surrounding existing municipal infrastructure will generally need to service approximately 64 ha of light industrial property as well as a future City of Ottawa works yard proposed for the northeast corner of the JRLUS lands (to be accessed off of Conroy Road). This proposed concept will constitute a change of approximately 50 ha of land from heavy industrial to a heavy industrial exception zone and to light industrial zoning.

It should be noted that staff of David MacManus Engineering Limited (DME) contributed in the preparation of this report.

1.0 BACKGROUND INFORMATION REVIEW

The following reports were reviewed in order to assess the feasibility of the JRLUS area:

- Report on Green Creek Collector, prepared for the City of Ottawa, prepared by Gore & Storrie, December 1956
- Report of preliminary Subsurface Investigation, Walkley Road Industrial; Area, prepared for National Capital Commission, prepared by John D. Paterson & Associates Ltd., May 23, 1968
- Report on First Stage of Soil Conditions Albion to Hawthorne Road, Hunt Club Road to C.N.R. Tracks, prepared for the City of Ottawa, prepared by McRostie Seto Genest, May 1, 1969
- Final Design Investigation Stage II – Eastern Community trunk Storm sewer, prepared for the City of Ottawa, prepared by Golder Associates, October 1976
- Subsurface Investigation Proposed Eastern Community Trunk Storm Sewer, prepared for the City of Ottawa, prepared by Golder Associates, February 1976
- Report on trunk Sewer Services for the Eastern community, prepared for the City of Ottawa, prepared by DeLeuw Cather and Gore & Storrie, March 12, 1976
- Subsurface Investigation Albion Road, Johnston Road to Bank Street, prepared for the City of Ottawa, prepared by Golder Associates, February 1985
- Preliminary Subsurface Investigation, Walkley Conroy Lands, prepared for the City of Ottawa, prepared by Golder Associates, April 1986
- Report of subsurface Investigation, Albion Road reconstruction from Kitchener Avenue to Walkley road, prepared for the City of Ottawa, prepared by John D. Paterson & Associates Ltd., April 24, 1987
- General Subsurface Conditions and Geotechnical Considerations, Conroy Road Snow Disposal Facility, prepared for A.J. Robinson and Associates Inc, prepared by Golder Associates Ltd., June 1989
- Report south Ottawa Collector Sewer Extension – 1990 Update, prepared for the Regional Municipality of Ottawa-Carleton, prepared by Delcan Corporation, September 1990
- Conroy Road Swamp Investigative Study, Final report, prepared for City of Ottawa,

prepared by Gore and Storrie Limited, October 1994

- Conroy Swamp Hydrologic Study, Final Report, prepared for the City of Ottawa, prepared by Gore & Storrie, October 1995
- Overview of Subsurface Conditions, proposed Conroy Road Upgrading, Walkley Road to Hunt Club Road, prepared for Delcan Corporation, prepared by Golder Associates, September 1995
- Phase II Environmental Site Assessment, Property at Conroy and Johnston Roads, prepared for Delcan Corporation, prepared by Golder Associates, March 1998
- Greenboro Turtlehead Nature Area Management Plan, prepared for the City of Ottawa, prepared by ESG International Inc., October 2000
- Final Report, McEwan Creek Water Quality & Erosion Control Study – Functional Design, prepared for Rideau Valley Conservation Authority (RVCA), prepared by CH2MHILL, February 2001
- Sawmill Creek Subwatershed Study Update, prepared for the City of Ottawa, prepared by CH2MHILL, May 2003
- Stormwater Management Report, Hunt Club Gate Residential Subdivision, submitted to the City of Ottawa, prepared by Novatech Engineering Consultants Ltd., Revised February 26, 2008
- JRLUS Existing Conditions Report Infrastructure, prepared by David McManus Engineering Ltd., revised February 2009
- McEwan Creek Stormwater Management Facility Design Brief, prepared for the City of Ottawa, prepared by the IBI Group, November 2009
- City of Ottawa Sewer Design Guidelines
- City of Ottawa Water Distribution Guidelines

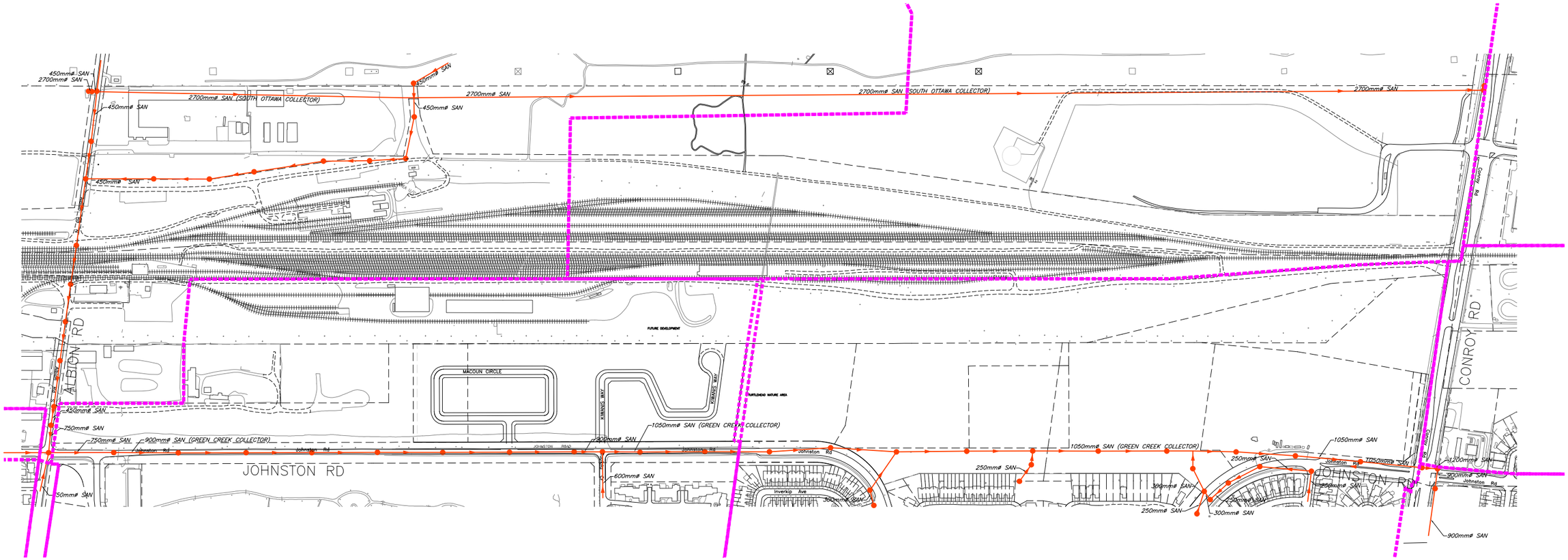
2.0 SANITARY SEWAGE SERVICING

As outlined previously in the JRLUS Existing Conditions Report (prepared by DME, revised February 2009), details regarding the existing sanitary sewer infrastructure found adjacent to the study lands were provided (see **Figure 3 – Existing Sanitary Infrastructure**).

For the purpose of this report, excess capacity was identified for the sanitary sewers in the immediate vicinity of the JRLUS area (South Ottawa Collector Trunk and Green Creek Collector) and did not incorporate any analysis of the downstream system as a whole.

It appears that the original sanitary drainage area limits within the JRLUS area were adjusted since the completion of the original design for the Green Creek Collector in 1976.

Establishing the actual sanitary drainage area, conducting a flow monitoring in the collector and determining the potential impact on the estimated sanitary flow from



LEGEND

- EXISTING SANITARY MANHOLE
- EXISTING SANITARY SEWER
- EXISTING SANITARY DRAINAGE AREA BOUNDARY (AS PER CITY DRAWING)

NOTE
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No.	REVISION	DATE	BY

SCALE	JOHNSTON ROAD LAND USE STUDY	PROJECT No.
1:3000	EXISTING CONDITIONS REPORT	SURVEY BY
	CITY OF OTTAWA	DATE DECEMBER 2009
	EXISTING SANITARY INFRASTRUCTURE AND DRAINAGE AREAS	DRAWING No. FIGURE 3

JRLUS area on to the downstream part of the system would be a separate task beyond the scope of this report.

Available excess capacity would need to be confirmed at the detailed design stage.

Table 1 summarizes the available information.

Table 1 - Existing Sanitary Sewer Infrastructure Adjacent to JRLUS

	Location	**Diameter (mm)**	**Available Capacity (L/s)** (1)	**Depth to Services (m)** (5)
South Ottawa Collector Trunk sewer	northern JRLUS boundary (approximately south of the existing Hydro corridor)	2700	6,000 (2)	23-25
Green Creek Collector Trunk sewer	southern JRLUS boundary (partially within the Johnston Road ROW)	750 - 1050	520 (3)	5.5-8
Albion Road sewer (tributary to Green Creek Collector)	western JRLUS boundary	450	63.8 (4)	3.5-4.5

Notes:

(1) *High level flow/capacity assessment of the main trunk sewers in the vicinity of the JRLUS*

(2) *Currently conveys a discharge of ~ 4,800 L/s but has a capacity in the order of 10,800 L/s*

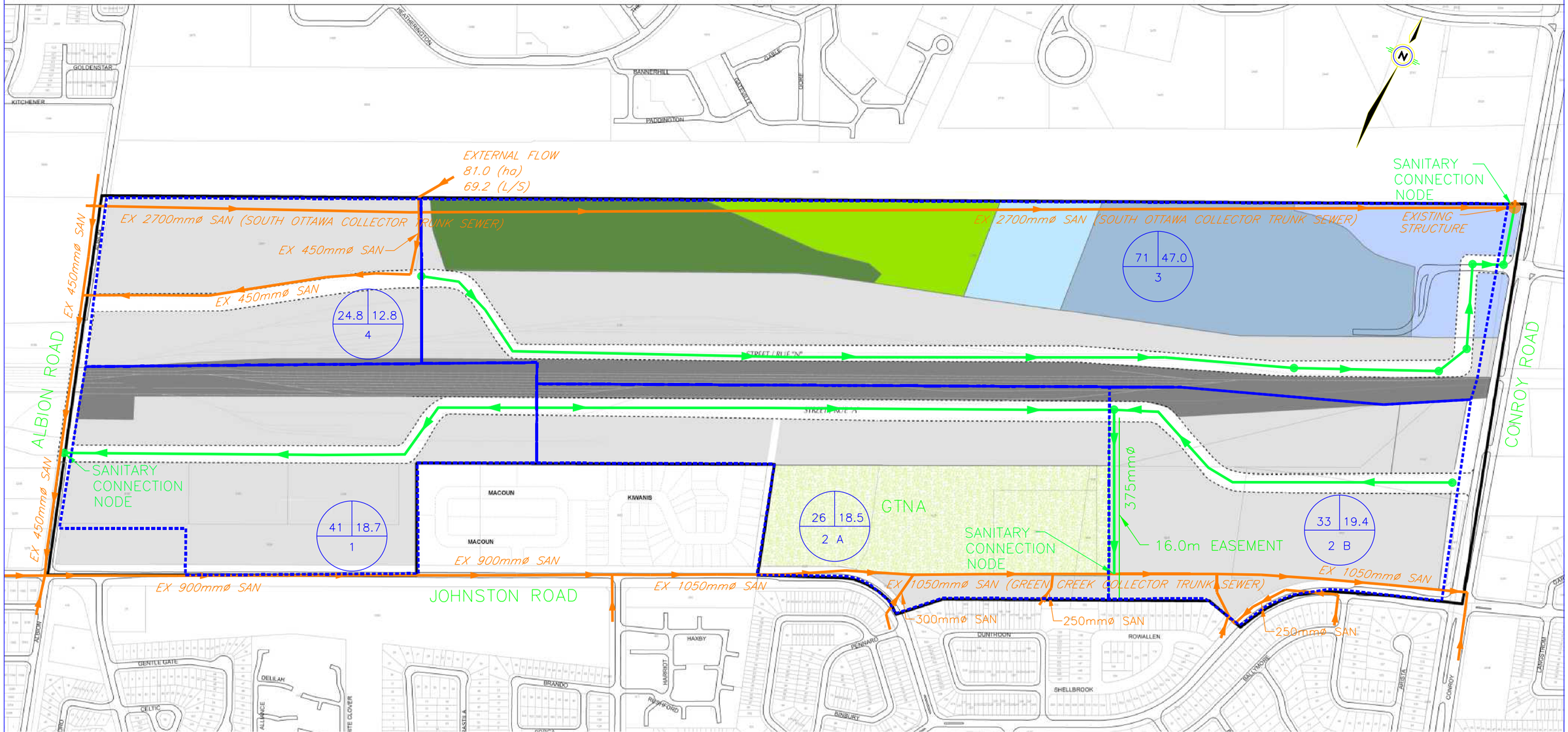
(3) *Currently conveys a discharge of 340 L/s (east of Albion Road) but has a capacity in the order of 860 L/s*

(4) *Currently conveys a discharge of 69.2 L/s (east of Albion Road) but has a capacity in the order of 133 L/s*

(5) Approximate depth to invert(s)

Based on the Concept Plan and the high level preliminary sanitary drainage area plan, the on-site sewage can be conveyed to the existing adjacent servicing infrastructure (see **Figure 4 –Conceptual Sanitary Infrastructure and Drainage Areas**) in the following manner:

- Sanitary sewer ranging from 250 to 300mm diameter within the ROW of the proposed street located in the south-western portion of the JRLUS area. This



FLOW (L/S) | DRAINAGE AREA (Ha)

23 | 41.8 | 2

DRAINAGE AREA NUMBER

LEGEND

- EXISTING SANITARY SEWER
- EXISTING SANITARY DRAINAGE AREA
- CONCEPTUAL SANITARY SEWER
- CONCEPTUAL SANITARY DRAINAGE AREA
- EXISTING STRUCTURE

NOTE
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No.	REVISION	DATE	BY

SCALE	1:6000
	JOHNSTON ROAD LAND USE STUDY SERVICING FEASIBILITY STUDY CITY OF OTTAWA
	CONCEPTUAL SANITARY INFRASTRUCTURE AND SANITARY DRAINAGE AREAS
PROJECT No.	
SURVEY BY	
DATE	DECEMBER 2009
DRAWING No.	FIGURE 4

sewer then connects to the existing Green Creek Collector via the existing 450 mm diameter sanitary sewer within the Albion Road ROW.

- Sanitary sewer ranging from 250 to 300 mm diameter within the ROW of the proposed street located in the south-eastern portion of the JRLUS area. This sewer has conceptually been shown to connect to the existing Green Creek Collector via a 375 mm diameter sanitary sewer within an approximately 16 metre wide easement (the exact width of the easement to be determined based on the detailed design for this area; a concept cross-section sketch is shown in Appendix B).
- Sanitary sewer from 250 to 375mm diameter within the ROW of the proposed street within the northern portion of the JRLUS area. This sewer has conceptually been shown to connect to the existing South Ottawa Collector via an existing sanitary access structure (located at the NE corner of the JRLUS area). Given the excessively large depth of the existing South Ottawa Collector, this proposed connection may be infeasible and various alternative construction techniques should be investigated at the detailed design stage. In addition, future studies should investigate the feasibility of alternative connection points (i.e. possible crossing under the railroad tracks and a connection to the Green Creek Collector).

A sanitary sewer design sheet supporting the proposed conceptual sanitary sewer network including the required diameter sewer and approximate pipe grades has been provided in Appendix B and it indicates that the proposed network can sufficiently service the JRLUS area as proposed in the Concept Plan. It is anticipated that total peak flows for the JRLUS area will be approximately 187.8 L/s from which 116.8 L/s discharges to the Greens Creek Collector and 71 L/s discharges to South Ottawa Collector. The flows, while felt to be conservative, are based on planning level information only.

The following servicing constraints, previously identified, will also have to be taken into account once development commences:

Table 2 – Sanitary Servicing Constraints

Constraints
• During a review of the background information, poor soils conditions were encountered during construction of the existing servicing infrastructure. It is recommended that a more detailed soils investigation be completed as part of the future work. This work should include the identification of grade raise restrictions, recommendations for foundation depths, groundwater table identification and any special provisions to servicing infrastructure (i.e. service

locations, depths, materials, and construction techniques, etc.).

- Some of the existing sanitary trunk sewer infrastructure is located at large depths which may require high level services and minimization of connection points. Specifically, the South Ottawa Collector is excessively deep and requires further investigation to determine if high level sewer connections can be made economically or can be made to the existing on-site structures/chambers.
- The length of the future sanitary sewer connecting to the existing 450 mm diameter sanitary pipe on Albion Road may be limited as there is a relative shallow depth of the existing sewer at connection location.
- High water table and Leda clay concerns may require clay dikes in sewer service trenches to prevent draw down of groundwater. This will be subject to the recommendations determined as part of any future detailed geotechnical investigations.

The following additional analyses of the downstream receiving trunk sewer should be completed prior to commencement of development or as part of a detailed Master Servicing design of the future development or part of it:

- infiltration rates and flow rates in the existing trunk sewers via monitoring,
- confirmation of the trunk sewers drainage areas,
- confirmation of downstream residual capacity,
- downstream surcharging issues,
- any other downstream infrastructure improvements if required.

It is recommended that, unless future detailed studies dictate otherwise, three connection points be utilized as generally shown on Figure 4. These proposed sanitary servicing connection points were based on the following:

- Minimizing the potential future fill requirements and reducing any potential geotechnical concerns (i.e. grade raise restrictions) by maintaining the pre-development topography
- Minimizing the impact to transportation corridors by making as many connections as possible on the JRLUS land and not within existing municipal ROWs
- Minimizing the number of connection points to the deep existing sanitary trunk sewers

In conclusion, the study area can be serviced by an internal sanitary sewer network and can be connected to the existing City's infrastructures.

There is available capacity in the adjacent existing sanitary trunk sewer infrastructure to incorporate the additional flows from the JRLUS area with no future capacity constraints anticipated. This conclusion has been reached given the sanitary peak flow from the

JRLUS area does not exceed the available unused/excess capacity in the existing sanitary sewer infrastructure (as identified in Table 1).

As mentioned previously, this analysis was completed based on the excess capacity identified for the sanitary sewers in the immediate vicinity of the JRLUS area and did not incorporate any analysis of the downstream system as a whole. Available excess capacity would need to be confirmed at the detailed design stage.

3.0 STORM DRAINAGE AND STORMWATER MANAGEMENT

3.1 Storm Drainage

Similar to the work completed on the existing sanitary sewer infrastructure, the Existing Conditions Report also identified details regarding the existing storm infrastructure found adjacent to the study lands.

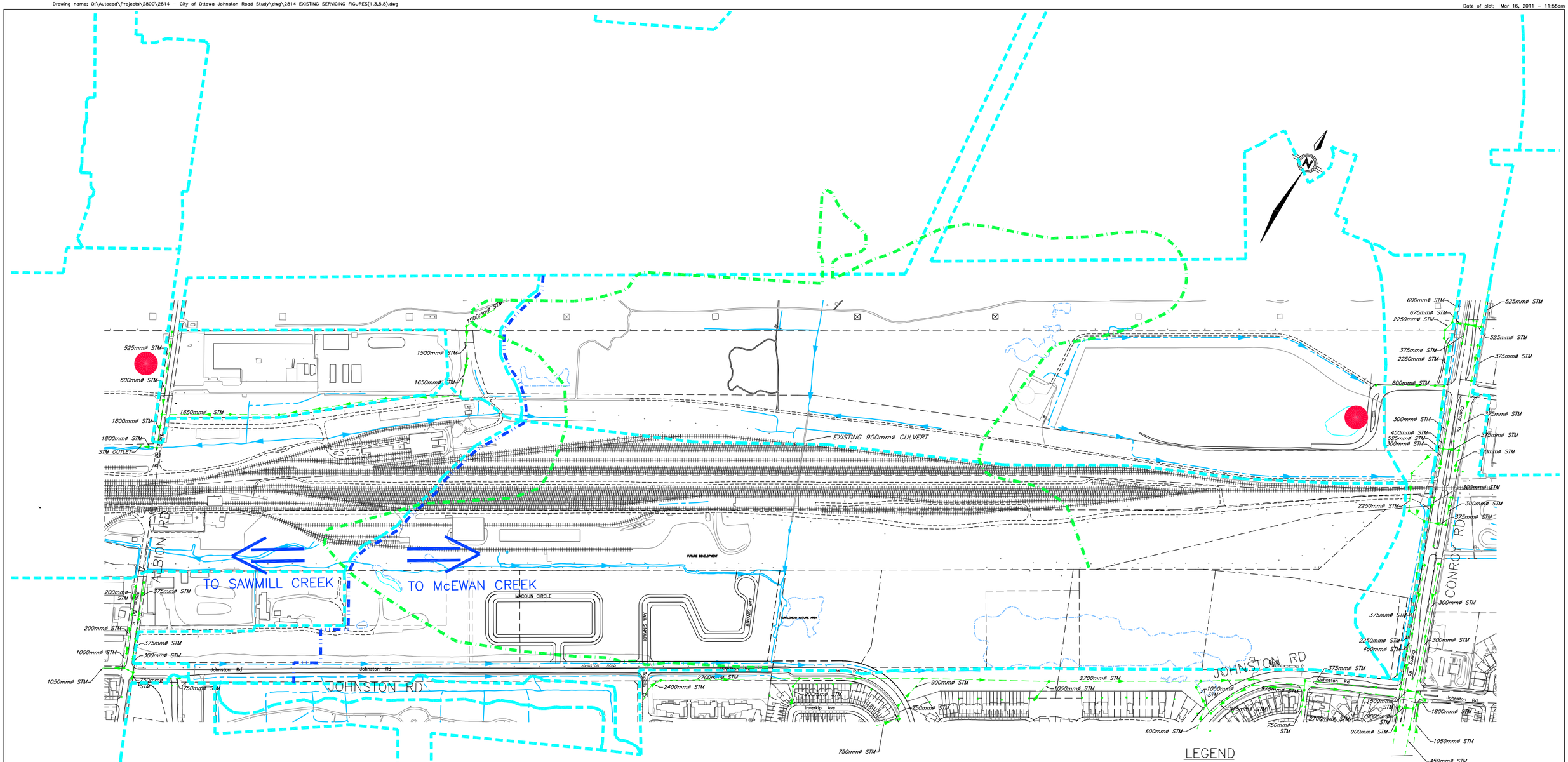
Information and details pertaining to capacity and the risk of surcharge of the existing Eastern Community Storm Trunk Sewer and two existing Conroy Road Storm Sewers in the vicinity of the JRLUS area were not available from the accessible reference material.

It appears that the storm drainage area limits related to the Eastern Community Storm trunk sewer within the JRLUS area were adjusted since the year 1976, when the original design for the collector pipe was conducted. Also, there is no information available for the residual capacity in the existing 1650 mm storm sewer located within the Sawmill Creek subwatershed.

Establishing the actual storm drainage area and flow monitoring in the collector and consequently finding the residual capacity in the collector pipe would be a separate task beyond the scope of this report.

These details are summarized in Table 3 below and are shown on **Figure 5 – Existing Storm Infrastructure**.

Table 3 - Existing Storm Sewer Infrastructure Adjacent to JRLUS



LEGEND

- EXISTING STORM MANHOLE
- EXISTING STORM SEWER
- EXISTING MARSH AREA
- EXISTING DITCH AND FLOW DIRECTION
- EXISTING STORM DRAINAGE AREA
- EXISTING SAWMILL CREEK/McEWAN CREEK DRAINAGE BOUNDARY
- EXISTING SURFACE DRAINAGE TO CONROY SWAMP
- EXISTING SWM FACILITY

NOTE
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SCALE	1:3000

JOHNSTON ROAD LAND USE STUDY
EXISTING CONDITIONS REPORT
CITY OF OTTAWA

EXISTING STORM INFRASTRUCTURE AND DRAINAGE AREAS

PROJECT No.	
SURVEY BY	
DATE	SEPTEMBER 2008
DRAWING No.	FIGURE 5

	Location	**Diameter (mm)**	**Available Capacity (L/s)**	**Depth to Services (m)** [(1)]
On-site storm sewer	north-west quadrant of the JRLUS. Tributary to Sawmill Creek Watershed	1650	unknown	5
Eastern Community Storm Trunk sewer	southern JRLUS boundary (partially within the Johnston Road ROW from Tapiola Crescent to Conroy Road). Tributary to McEwan Creek Watershed.	2700	unknown	5-7
Conroy Road ROW	eastern JRLUS boundary (western edge of the Conroy Road ROW at rail line). Tributary to McEwan Creek Watershed.	2250	unknown	7-9
Conroy Road ROW (high level)	eastern JRLUS boundary (westerly and easterly portion of the Conroy Road ROW). Tributary to McEwan Creek Watershed.	300 - 525	unknown	2-4
Albion Road ROW	north western JRLUS boundary (sewers do not connect through the rail line with the storm sewers in the southern portion of Albion Road but outlet to an open ditch running westerly). Tributary to Sawmill Creek Watershed.	600 - 1800	unknown	2-4
Albion Road ROW	south western JRLUS boundary (storm sewer connects to a 1050mm diameter storm sewer which runs westerly from the Albion and Johnston Road intersection) Tributary to Sawmill Creek Watershed.	375	unknown	1.2-2

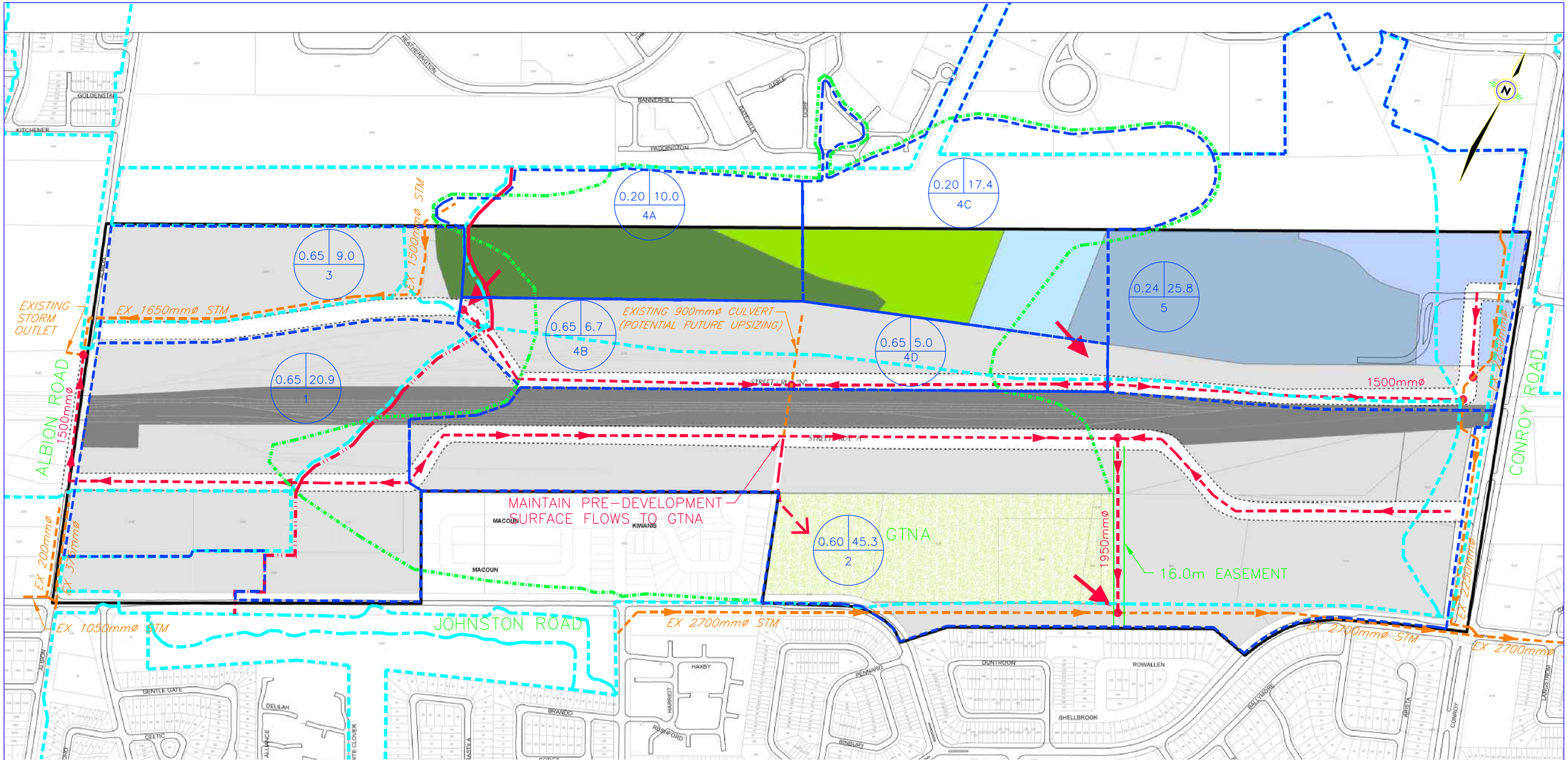
Notes:

[(1)] Approximate depth to invert(s)

Based on the Concept Plan and a preliminary high-level storm drainage area plan (copy provided in Appendix C), the surface flows generated on-site can be conveyed to the existing adjacent servicing infrastructure (see **Figure 6 –Conceptual Storm Infrastructure and Drainage Areas).** The surface flows will follow the drainage area divide (between the Sawmill Creek and McEwan Creek Subwatersheds) and also generally follow the existing pre-development drainage boundary. The drainage boundary divide was compiled from the information contained in the 2003 Sawmill Creek Subwatershed Report Update (herein referred to as the 2003 Sawmill Creek Report), the 2001 McEwan Creek Water Quality and Erosion Control Study (herein referred to as the 2001 McEwan Creek Report) and contour mapping. A more recent report entitled "McEwan Creek Stormwater Management Facility Design Brief" (prepared by the IBI Group, November 2009, herein refereed as the 2009 McEwan Creek Report) was not referenced in the determination of the drainage boundary divide as it was found that there are differences in the watershed limits between what is shown in the 2009 McEwan Creek Report and the 2001 McEwan Creek Report. As the discrepancy was noted, a further review of the watershed boundary between the two reports and the implications on the sizing of the proposed McEwan Creek Stormwater Management Facility will need to occur but it will not be resolved prior to the finalization of this report.

Therefore, based on the 2001 McEwan Creek Report and the 2003 Sawmill Creek Report, contour mapping information, the land use as per the Concept Plan and the City of Ottawa Sewer Design Guidelines the following storm servicing infrastructure within the JRLUS area is proposed:

- A 1500 mm diameter storm sewer within the ROW of the proposed street located in the south-western portion of the JRLUS area which will drain to the Sawmill Creek Subwatershed.
- The north-western portion of the JRLUS area will drain to the Sawmill Creek Subwatershed via an existing 1650 mm diameter storm sewer.
- Storm sewers ranging from 300 to 1650 mm within the ROW of the proposed street located in the mid-northern and north-eastern portion of the JRLUS area. These areas form part of the GTNA pre-development contributing drainage area (as per previous studies) and are directed to the GTNA via an existing 900mm culvert underneath the rail tracks. Additional site investigations (that take into account previous studies for the area) will be required at the detailed design stage. The intent for the area is to maintain but not exceed the pre-development flow (and cause restriction/backwater of flow) in the post-development scenario.



RUNOFF COEFFICIENT 0.60 | 41.8 DRAINAGE AREA (Ha)
2
DRAINAGE AREA NUMBER

LEGEND

- EXISTING STORM SEWER
- CONCEPTUAL STORM SEWER
- CONCEPTUAL POST-DEVELOPMENT STORM DRAINAGE AREA
- EXISTING SURFACE DRAINAGE BOUNDARY TO GTNA
- DRAINAGE AREA BOUNDARY
- EXISTING STORM DRAINAGE AREA
- STORM CONNECTION NODE
- DRAINAGE DIRECTED TO STORM CONNECTION NODE

NOTE
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No.	REVISION	DATE	BY

SCALE 1:6000

JOHNSTON ROAD LAND USE STUDY
SERVICING FEASIBILITY STUDY
CITY OF OTTAWA

CONCEPTUAL STORM INFRASTRUCTURE AND STORM DRAINAGE AREAS

PROJECT No.
SURVEY BY
DATE DECEMBER 2009
DRAWING No. FIGURE 6

- Storm sewers ranging from 300 to 1950 mm in diameter within the ROW of the proposed street located in the mid-southern and south-eastern portion of the JRLUS area. This area will drain to a proposed 16 m wide easement and ultimately McEwan Creek via a connection to the existing 2700 mm diameter storm trunk sewer at the southern JRLUS boundary.

Details regarding the residual capacity of the existing storm infrastructure or an understanding of the risk of surcharge of the main storm trunk sewers in the vicinity of the JRLUS were not available from the accessible reference material

A conceptual storm sewer design sheet, based on the 5 year design storm, to size the main on-site storm sewers has been prepared (see Appendix C). The flows are based on planning level information only and should be verified at a more detailed design stage. It is anticipated that total minor system flows (based on the 5 year design storm and the conceptual plan) will be approximately 10,942 L/s for the area of the JRLUS that is the tributary to McEwan Creek Subwatershed and will be approximately 5,629 L/s for the area of the JRLUS that is the tributary to the Sawmill Creek Subwatershed.

The storm quantity control measures for this area are discussed in the following Section 4.2.

Constraints to development of the JRLUS (from a storm and stormwater management infrastructure servicing perspective) was also completed. The following opportunities and constraints were felt to be applicable:

Table 4 – Storm Sewer Servicing Constraints

Constraints
• During a review of the background information, poor soils conditions were encountered in the area during construction of the various existing servicing infrastructure. It recommended that a more detailed soils investigation be completed as part of the future work. This work should include the identification of: grade raise restrictions, recommendations for foundation depths (as it applies to the storm services), groundwater table identification and any special provisions to servicing infrastructure (i.e. service locations, depths, materials, and construction techniques, etc.). • Greenboro Turtle Natural Area (GTNA) is identified as an Urban Natural Feature. Given the need to maintain surface water and groundwater contributions to the (GTNA), further hydrogeological studies are recommended. Specifically, the studies should provide base flow value and investigate the impact of development from the JRLUS area as whole on the GTNA. This in turn may impact the type of stormwater management required (i.e. infiltrative measures rather than end-of-pipe

measures, etc.). Water balance calculations should be included, as well as maintaining the existing drainage patterns to/from this area. Any environmental concerns of the GTNA as it relates to servicing should also be addressed with further studies. Lastly, the proposed storm drainage servicing strategy will need to be confirmed only after the hydrogeological studies have been completed and will provide detailed recommendations on how the surface and subsurface drainage to the GTNA will be maintained.

- High level services may be required as well as minimization/optimization of the number of connection points to the existing 1650 mm storm sewer in the NW part of the site.
- Upstream sections of the sewer conveying flow from the SW part of the JRLUS area may need to be placed at a substandard depth (less than 2.0 m) as the outlet depth is 3.6 m deep.
- High water table and Leda clay concerns may require clay dikes in sewer service trenches to prevent draw down of groundwater. This will be subject to the recommendations determined as part of any future detailed geotechnical investigations.

It is recommended that, unless future detailed studies dictate otherwise, two connection points to the existing infrastructure (see Figure 6) be utilized. In addition, the existing 900 mm diameter culvert under the rail tracks will need to be maintained and possibly extended in order to provide conveyance of the pre-development surface flows to the GTNA. Similar to the proposed sanitary servicing strategy, these proposed storm servicing connection points were based on the following:

- Minimizing the potential future fill requirements and reducing any potential geotechnical concerns (i.e. grade raise restrictions) by maintaining the pre-development topography
- Minimizing the impact to transportation corridors by making as many connections as possible on the JRLUS land and not within existing municipal ROWs
- Minimizing the number of connection points to the deeper existing storm sewers

In conclusion, the JRLUS area can be serviced by an internal storm sewer network and can be connected to the existing City's infrastructure. However, the available capacity in the existing storm trunk sewer infrastructure is unknown and will need to be verified in a separate study which is outside of the scope of this report. Findings from that separate report would be able to determine the post-development quantity control criteria required for the JRLUS area draining to the McEwen Creek sub-watershed.

Prior to these findings, based on the existing drainage pattern, the post-development peak flows needs to be controlled to the pre-development level for range of return periods from 2 years to 100 years,

Surface and groundwater baseflows to the GTNA will also be a requirement for development at least within the present GTNA surface drainage area (see Appendix C, Oct. 2000 Figure 1, Greenboro Turtlehead Area, *Surface Drainage Area Pattern* drawing).

3.2 Stormwater Management

In addition to outlining the existing storm infrastructure, the Existing Conditions Report identified only the following two SWM facilities (see **Figure 5 – Existing Storm Infrastructure and Drainage Areas**) within and close to the JRLUS area:

- Generally located northwest of the site in the vicinity of the Albion Road and Kitchener Avenue intersection.
- Generally located in the north east quadrant of the JRLUS boundary within the City of Ottawa snow disposal facility.

Background information regarding the tributary drainage area for the existing ponds was not available for review. However, from a review of the storm drainage area plan, it can be conservatively assumed that neither of these facilities has been sized to accommodate post development flows from any portion of the JRLUS area. Therefore, stormwater management criteria for the JRLUS area will be need to be in keeping with the governing reports prepared for the subwatersheds to which they are tributary (i.e. in this case it is based on the 2001 McEwan Creek Report and the 2003 Sawmill Creek Report). As indicated in the previous section, the more recent 2009 McEwan Creek Report prepared by the IBI Group will not be used as a reference until a further review of the differing watershed boundary location and the implications on the sizing of the proposed McEwan Creek Stormwater Management Facility is resolved. However, it should be noted that the SWM criteria in the 2009 McEwan Creek Report is generally the same as the 2001 McEwan Creek Report.

3.2.1 Land Tributary to McEwan Creek

As outlined in the preceding section, the governing stormwater management design details for the JRLUS were included in the 2001 McEwan Creek Report. The proposed off-site stormwater management measures consist of one downstream end-of-pipe stormwater management facility to service all the lands located within the McEwan Creek subwatershed boundary (which included the

portion of the JRLUS area not tributary to the Sawmill Creek subwatershed). More specifically, the 2001 McEwan Creek Report established that the preferred and accepted quality and quantity control SWM measures were based on a "watershed" approach which would maintain the current TSS loadings in the watercourse through the implementation of the end-of-pipe SWM facility along with some channel protection works. Presently, the McEwan Creek Stormwater Management facility is being constructed near the future extension of Hunt Club Road to Highway 417 as per the 2009 McEwan Creek Stormwater Management Facility Design Brief.

Quality Control

The proposed facility would provide the following quality control and erosion control measures:

- 70% TSS removal (Normal level). However, only 60% of removal is required.
- Diversion of the first flush flow (25 mm 4 hour Chicago storm event) to the facility.

Since this part of the JRLUS area is within the McEwan Creek subwatershed it has been assumed that it can be serviced by the proposed McEwan Creek SWM facility.

As mentioned previously, the drainage boundary defined in the 2009 McEwan Creek Report needs to be confirmed prior to use of this assumption.

A temporary or permanent quality control SWM solution that does not depend on the proposed McEwan SWM Pond will be required for individual sites if development on these sites precedes construction of the McEwan Creek SWM facility or precedes confirmation of the drainage boundary discharging to the facility.

One special area of note is in regard to the GTNA. The background studies for the area (1994 Conroy Swamp Investigative Study, 1995 Conroy Swamp Hydrologic Study and 2000 Greenboro Turtlehead Nature Area Management Plan, referenced in Section 2.0, Background Information Review) have been clear in outlining the objectives for protection, conservation and enhancement of this Urban Natural Feature.

As indicated in the Table 4, the need to maintain surface water and groundwater contributions surface and groundwater flow feeding the GTNA should be maintained at the present level. (see Appendix C, Oct. 2000 Figure 1, Greenboro Turtlehead Area, *Surface Drainage Area Pattern* drawing). A separate study is required to quantify the flow which needs to be diverted from the future storm system to the GTNA to maintain it at the pre-development level. Based on these findings further recommendations could be provided.
Any post-development flow directed to the GTNA will require a quality treatment of the 60% TSS removal prior to entering the natural area.

Quantity Control
Findings from a separate report would be able to determine the post-development quantity control criteria required for the JRLUS area draining to the McEwen Creek sub-watershed.
Prior to these findings the post-development peak flows need to be controlled to the pre-development level for range of return periods from 2 years to 100 years.

3.2.2 Land Tributary to Sawmill Creek

The portion of the JRLUS area tributary to Sawmill Creek subwatershed will need to be in keeping with the recommendations outlined in 2003 Sawmill Creek Report. SWM measures for this portion of the JRLUS lands were initially (in 1997) to be provided within the proposed Sawmill Creek SWM facility. As part of the work completed for the updated report (i.e. 2003 Sawmill Creek Report), it was determined that this was no longer feasible. However, given the existing health of Sawmill Creek the Watermanagement Strategy adopted in 1994 and included in the Sawmill Creek Subwatershed Study Update should apply.

- Maintain water table recharge,
- Control pollutants at source (quality control 80% TSS removal),
- Maintain the pre-development peak flow level for return periods of 2 years to 100 years,
- Erosion control measures that ensure that there is no increase in long term erosive forces for the receiving watercourse

Each individual development will require direct consultation with the Rideau Valley Conservation Authority to determine the details related to the quality control for this area.

3.2.3 Overall Recommendations

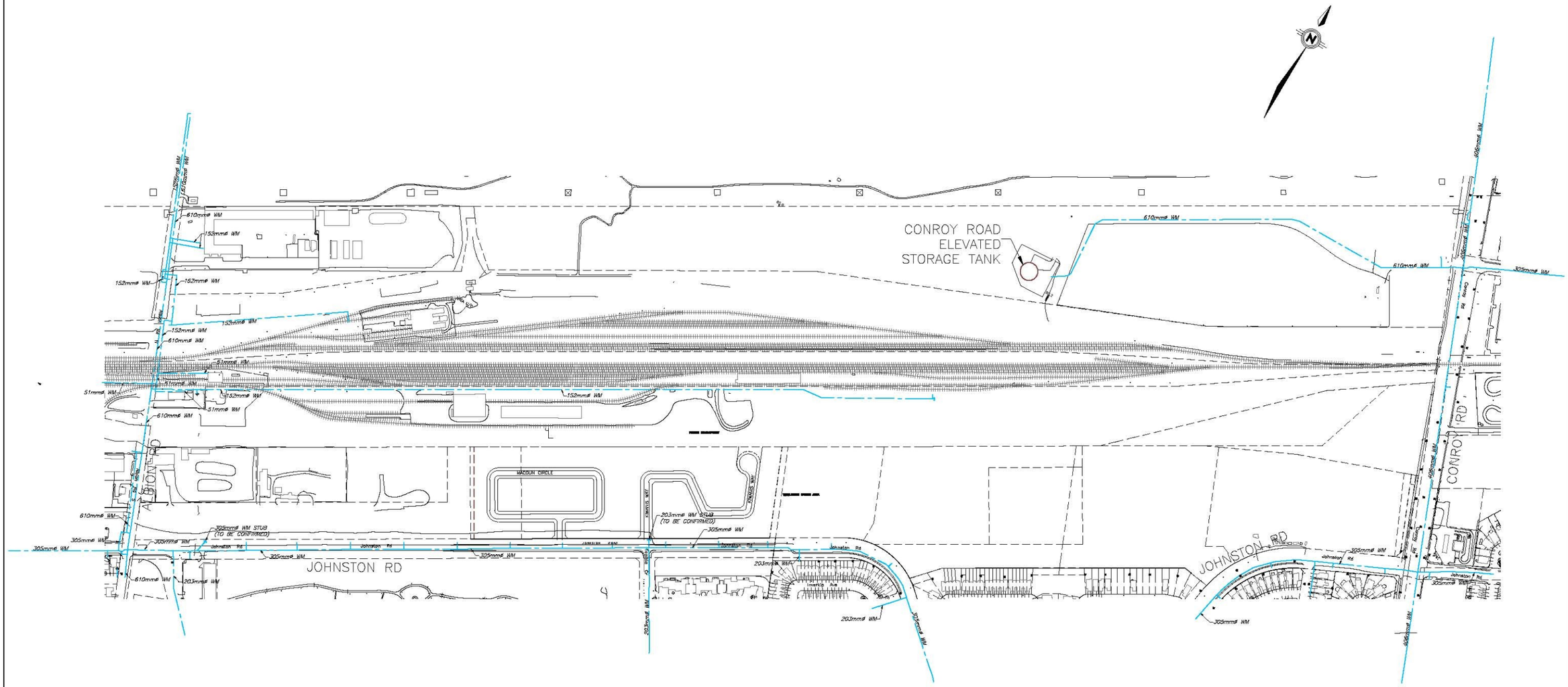
Based on the reviewed studies, it has become apparent that no single end-of-pipe technique will address the SWM requirements for the overall JRLUS area.
In addition, some surface flow and the groundwater level need to be maintained, due to presence of the sensitive soil and environmentally protected area.

The following general SWM measures could be applied for individual sites if and where appropriate

- Roof leaders directed to grassed areas and/or rooftop storage (where available)
- Swales and ditch-inlet catchbasins (with inlet controls) to collect runoff from undeveloped adjacent areas
- Inlet control devices in the parking lot catch basins to provide parking lot storage and potentially reduce the required size or impacts to the downstream stormwater management facilities
- Reduction in lot grading to less than 2% to promote infiltration
- Provision of shallow infiltrative measures (ponds, trenches, etc.)
- Provision of shallow pervious pipe systems (i.e. Etobicoke system)
- Provision of bioretention areas
- Minimization of directly connected imperviousness in industrial areas
- On-site end-of-pipe facilities
- Use of rural road cross-sections with ditches for infiltration

4.0 WATER SERVICING

As part of the work completed for the Existing Conditions Report, details regarding the existing water infrastructure found adjacent to the study lands were investigated. In addition, the JRLUS area is within the 2C pressure zone. The existing infrastructure details are summarized below and are shown on **Figure 7 – Existing Water Infrastructure**.



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

SCALE	JOHNSTON ROAD LAND USE STUDY EXISTING CONDITIONS REPORT CITY OF OTTAWA	PROJECT No.
1:3000		SURVEY BY
		DATE DECEMBER 2009
	EXISTING WATER SUPPLY INFRASTRUCTURE	DRAWING No. FIGURE 7

Table 5 - Existing Water Infrastructure Adjacent to JRLUS

	Location	**Diameter (mm)**
To City owned snow disposal facility from Conroy Road ROW	Westerly from Conroy Road to the existing Conroy Road elevated water tank (northeast quadrant of the study area)	610
Johnston Road ROW	southern JRLUS boundary (partially within the Johnston Road ROW)	300
Albion Road ROW	western JRLUS boundary (crosses under the existing rail line)	610
Johnston Road	southern JRLUS boundary (~ at the most westerly Tapiola Crescent and Johnston Road intersection)	300 (1)
Johnston Road	southern JRLUS boundary (~ at the easterly Tapiola Crescent and Johnston Road intersection)	200 (1)
Albion Road ROW	western JRLUS boundary (runs southerly along the Albion Road ROW and then turns easterly, before the rail line, to mid way between Albion and Conroy Road) (2)	150
Conroy Road ROW	eastern JRLUS boundary	400

Notes:

(1) Watermain stub(s) which may exist on the north side of the Johnston Road ROW (verification of the existence of these watermain stubs will need to be verified via field investigations)

(2) To service three buildings in the northwest quadrant of the study area

In terms of the adequacy of water pressure for the JRLUS area, for a majority of the site, adequate water pressure will be available (ranging from 40 to 60 psi). However, a small section (north-west quadrant of the site) may encounter less than ideal water pressure (ranging from 35 to 40 psi). This will have to be confirmed and any mitigative measures

will need to be prescribed once a detailed water model (based on detailed grading and geotechnical design) at the site plan or subdivision application stage has been completed.

Assuming that adequate water pressure is available for the JRLUS area, water servicing, based on the Concept Plan, can be provided via connections to the following existing water servicing infrastructure (see **Figure 8 –Conceptual Water Infrastructure**):

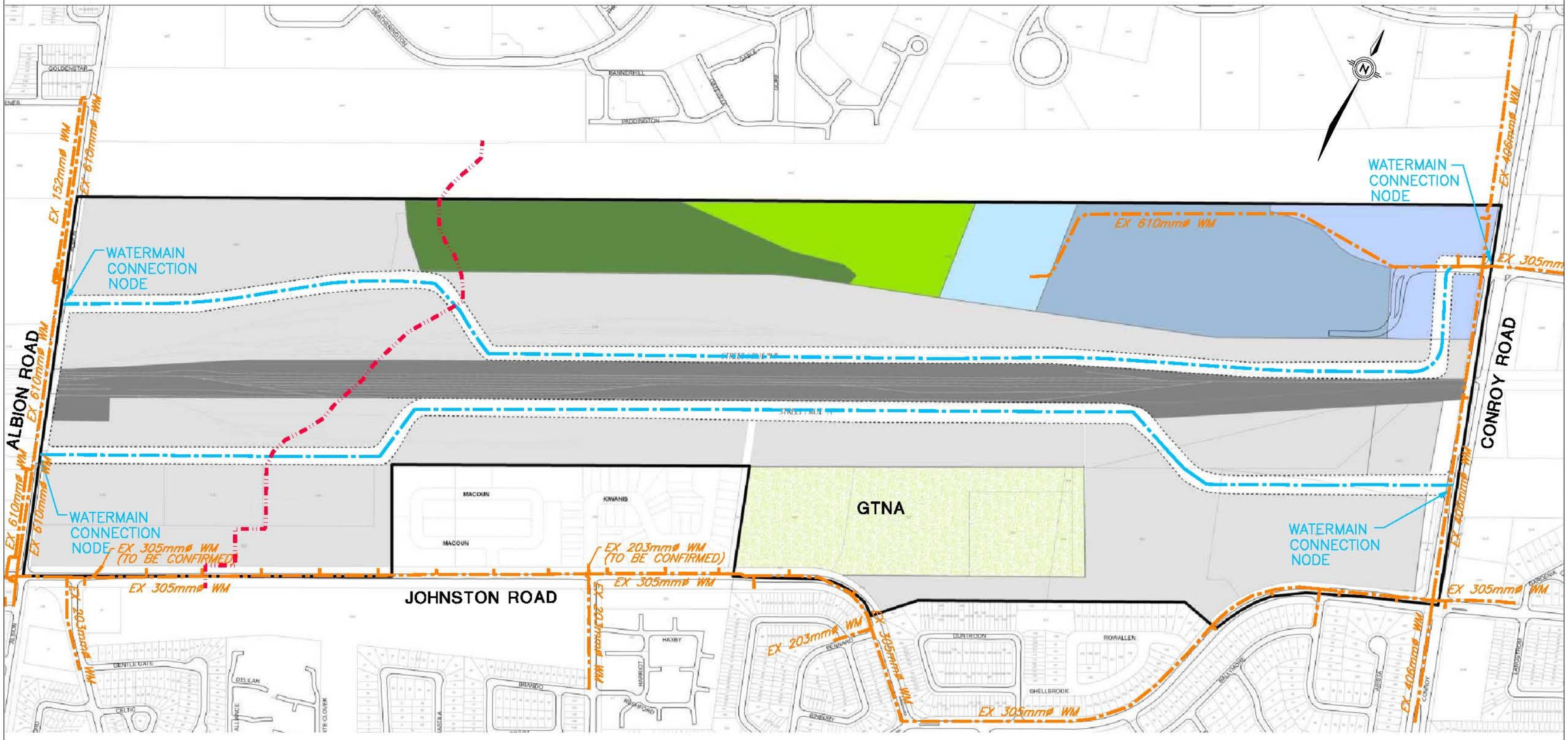
- A 300 mm diameter watermain within the ROW of the proposed street located in the southern portion of the JRLUS area which should connect to the existing watermains within the Albion and Conroy Road ROWs.
- A 300 mm diameter watermain within the ROW of the proposed street within the northern portion of the JRLUS area which should connect to the existing watermains within the Albion and Conroy Road ROWs.

It should be noted that a minimum 300 mm diameter watermain will be required to service the site as per current City standards for industrial/commercial developments.

The following servicing constraints, previously identified as part of the Existing Conditions analysis, will also have to be taken into account once development commences:

Table 6 – Water Servicing Constraints

Constraints
• Soil and water table issues may impact service locations, depths, and construction techniques. In addition, corrosive soils have been encountered along the southern JRLUS boundary. This will dictate the type of watermain pipe and appurtenance material to be used. • North-eastern portion of site is a considerable distance from the nearest existing watermain. A connection to the 600 mm diameter feeder main from the on-site elevated storage tank is not recommended or currently endorsed by City staff. • Minor pressure concerns exist in the developed area to the north-west of the study area. A detailed water modelling analysis will need to be completed to determine if adequate water pressure can be provided for the entire study area. • Other required infrastructure improvements within this pressure district are uncertain at this point • High water table and Leda clay concerns may require clay dikes in sewer service trenches to prevent draw down of groundwater. This will be subject to the recommendations determined as part of any future detailed geotechnical investigations.



LEGEND

- EXISTING WATERMAIN
- CONCEPTUAL 305mmø WATERMAIN

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

SCALE	JOHNSTON ROAD LAND USE STUDY SERVICING FEASIBILITY STUDY CITY OF OTTAWA	PROJECT No.
1:5000		SURVEY BY
		DATE: DECEMBER 2009
	CONCEPTUAL WATER SUPPLY INFRASTRUCTURE	DRAWING No.: FIGURE 8

In addition to examining the above noted constraints in more detail at a later design stage, the following detailed water servicing analyses will also need to be completed:

- completion of a thorough modelling analysis of capacity of the water supply to:
  - ensure that adequate pressure (including fire flow requirements) can be provided
  - identify limitations to the provision of adequate water service to the subject lands
  - identify opportunities for system looping to provide redundancy and to meet water quality objectives
  - identify mitigative measures, if a substandard water pressure is encounterd for individual development (water service pipe size increase or installation of a booster pump)
  - identify mitigative measures, if required, for adjacent areas that may experience less than ideal water pressure as a result of the new service demands form the JRLUS area

5.0 CONCLUSIONS AND RECOMMENDATIONS

This Servicing Feasibility Report has been prepared, based on the review of available information and documents, to demonstrate that servicing connections to the existing municipal water, sanitary and storm sewer infrastructure can be provided to municipally service the lands found within the JRLUS area. This servicing analysis has been based on the preferred Concept Plan. Capacity issues, where they are currently known, have been identified as well as any additional constraints to development that require further study.

This servicing concept should be treated as a general servicing model with understanding that modifications can be applied to it, depending on the actual type of development and where and what size of parcel of land is being developed.

It is recommended that, prior to any development of the JRLUS area proceeding, the following tasks be completed to confirm the servicing feasibility of the entire JRLUS area lands:

- Confirm if the ultimate sanitary discharge from JRLUS area has any negative impact on the downstream existing infrastructure.

- Confirm the available capacity of the existing storm sewer infrastructure in the vicinity of the JRLUS area to be able to finalize the flow quantity control criteria for the developable lands.
- Retention of a Hydrogeological and Environmental Consultant in order to complete a comprehensive water balance model (as it pertains to the impact on the Greenboro Turtle Natural Area and the adjacent lands). This model should include recommendation in respect to the amount of the base flow discharged to the GTNA. Also, it should recommend stormwater management solutions in respect to maintaining the groundwater level at the existing level. In addition, the Geotechnical investigation has recommended that site specific hydrogeological investigations will be required for individual, proposed developments to protect both the proposed developments and the surrounding properties from ground water lowering resulting in the settlement of the native soils and potential impacts to existing foundations and trees.
- Review and if required, revise the proposed storm sewer infrastructure to comply with the recommendations of the comprehensive water balance report.
- Preparation of a detailed water model for proposed developments at the Site Plan and/or Subdivision Application stage to confirm that the existing water system is able to provide adequate pressure and fire flows to the particular site.
- Preparation of site specific geotechnical investigations are recommended for individual, proposed developments to address the existing soil conditions present throughout the study area as it relates to the impact on future servicing infrastructure, material recommendations and construction related recommendations (dewatering, grade raise restriction, clay seals, etc.).

Prepared by:

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Sr. Infrastructure Approvals Engineer

City of Ottawa
Development Review (Suburban Services)
Planning and Growth Management Department

APPENDIX A

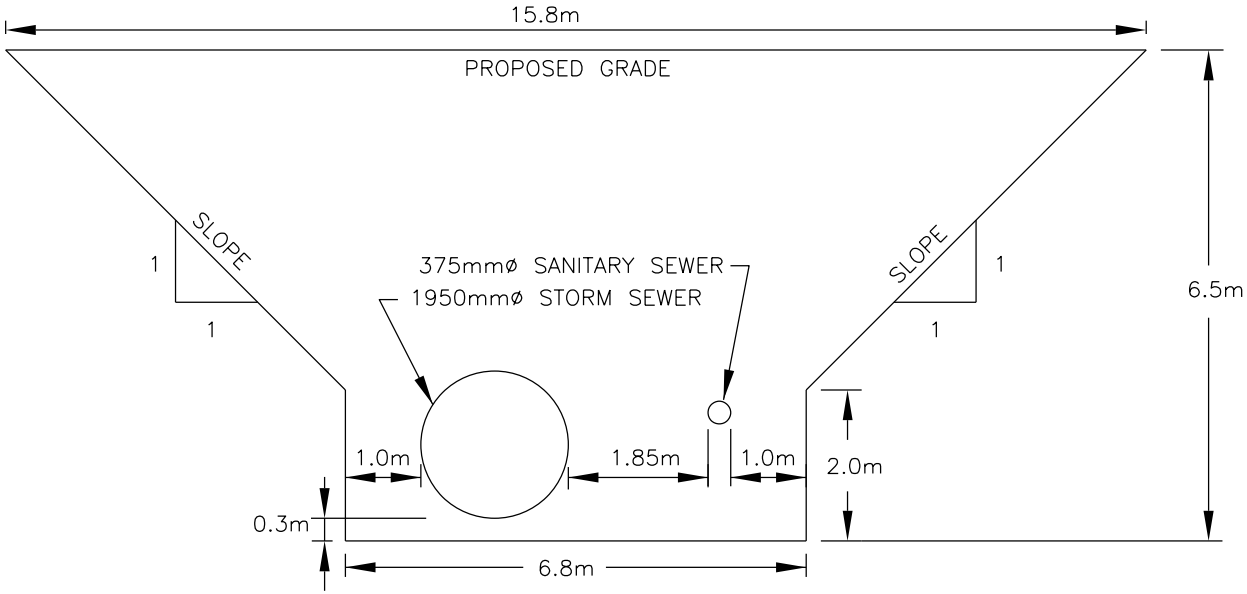
Land Use Servicing Evaluation Criteria Table

Project: Johnston Road Land Use Study - Servicing
Subject: Proposed Evaluation Criteria

Servicing	Option A	Option B	Option C	Concept Plan	Do Nothing	Special Notes
Potential for making efficient use of existing service infrastructure	H	H	H	H	H	Capacity of the existing infrastructure has to be confirmed.
Ability to accommodate Storm Water Management measures, including innovative design concepts.	Y	Y	Y	Y	Y	
Constructability - Infrastructure	M	H	H	H	H	Option with apartment component yields higher sanitary flow.
Phasing Opportunities	H	H	H	H	M	
	2H, 1M	3H	3H	3H	2H, 1M	

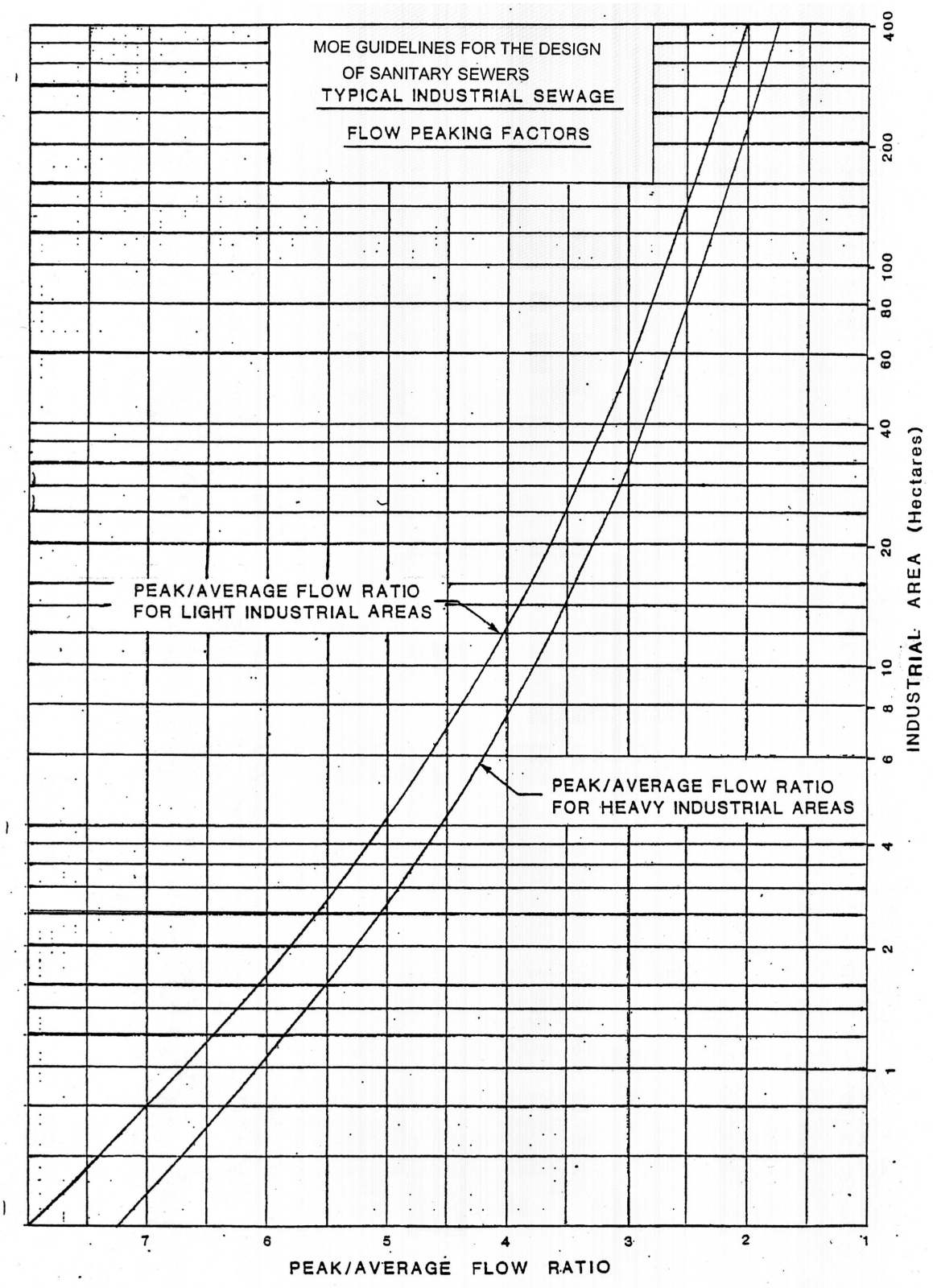
APPENDIX B

CONCEPTUAL SANITARY SEWER DESIGN CALCULATIONS
CONCEPTUAL EASEMENT WIDTH CALCULATIONS



CONCEPTUAL CROSS SECTION
TO DETERMINE EASEMENT WIDTH

APPENDIX 4-B PEAKING FACTOR FOR INDUSTRIAL AREAS



Johnston Road Land Use Study
External sanitary flow from existing Heatherington Road Development.
Flow estimated using Ottawa Sewer Guidelines, Monitoring Data Parameters

Population = 6240 people

Flow = 6240x300 l/s/d x 1/86,400 = 21.66 l/s x P = 45.0 l/s

P = 1+ {14/(4+(6240/1000)^0.5)} x 0.5 =1 + 1.08 = 2.08

Industrial Lands = 11.5 ha

Flow = 11.5 ha x 10,000 l/ha/d x 1/86,400 x P = 1.3 l/s

P = 1.0

Institutional Lands = 1.9 ha

Flow = 1.9 ha x 10,000 l/ha/d x 1/86,400 x P = 0.2 l/s

Total Drainage Area = 81 ha

Extraneous Flow = 81 ha x 0.28 l/s/ha = 22.7 l/s

Total External Flow = **69.2 l/s**

SANITARY SEWER CALCULATIONS
FOR
JRLUS

2011/03/22

LOCATION	Notes	Light Industrial		Heavy Industrial		EXTRAN.	PEAK	PEAK	PROPOSED SEWER DATA					EXCESS
		Flow	Accu. Area	Flow	Accu. Area	GROSS	EXTRAN.	DESIGN	LENGTH	PIPE	GRADE	CAPACITY	VELOCITY	CAPACITY
		L/s	(Ha)	L/s	(Ha)	AREA (Ha)	FLOW (l/s)	FLOW (l/s)	(m)	SIZE (mm)	(%)	(l/s)	(m/s)	(l/s)
Northern Section														
Area 3		44.93	32.62	13.05	4.88	47.00	13	71	2000.0	381.00	0.20	81.88	0.72	10.75
Area 4	External Flow 69.2 l/s	20.74	12.80		0.0	12.80	4	94	505*	457.00	0.20	133.00	0.81	39.47
Southern Section														
Area 1		23.50	14.50	12.57	4.20	18.71	5	41	800.0	304.00	0.28	53.06	0.73	11.76
Area 1, 4 and External		38.71	27.30	12.57	4.20	31.51	9	129	175*	457.00	0.40	188.08	1.15	58.79
Area 2A		14.38	8.07	6.92	2.13	18.50	5	26	890.0	254.00	0.25	31.05	0.61	4.57
Area 2B		25.92	18.82	1.81	0.58	19.40	5	33	650.0	301.00	0.20	43.68	0.61	10.51
Easement		38.13	26.89	8.45	2.71	37.90	11	57	250.0	381.00	0.15	70.91	0.62	13.72
TOTAL														

Notes: * Existing sanitary sewer

Light Industrial Avg. Flow (l/s) = Gross Area (ha) x 35,000 l/gross ha/d x peaking factor / 86400 sec/day — Peaking factor = per Figure in Appendix 4-B in City of Ottawa Sewer Design Guidelines

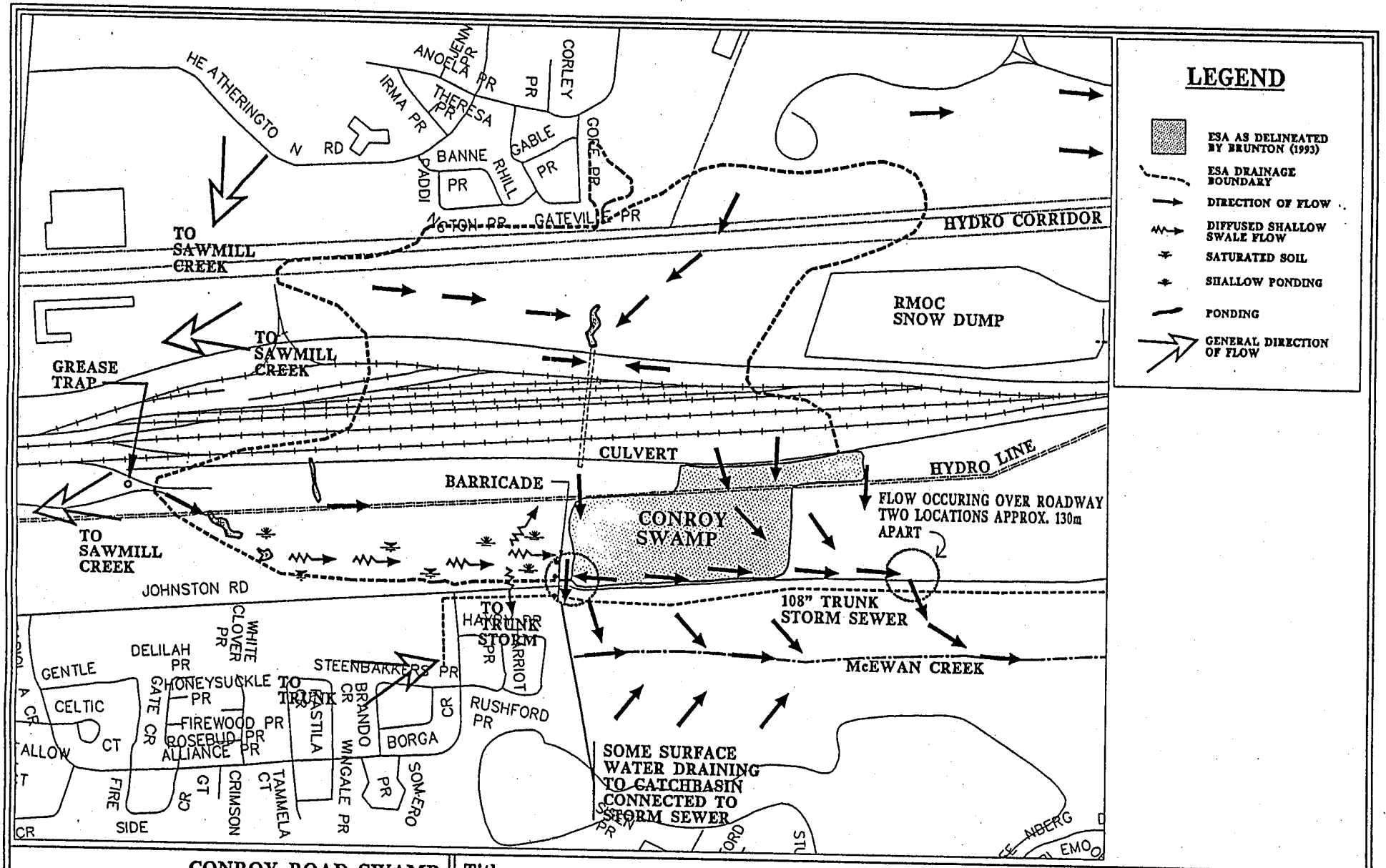
Heavy Industrial Avg. Flow (l/s) = Gross Area (ha) x 55,000 l/gross ha/d x peaking factor / 86400 sec/day — Peaking factor = per Figure in Appendix 4-B in City of Ottawa Sewer Design Guidelines

Peak Extraneous Flow (l/hr) = pipe leakage = 0.28 l/s/effective gross ha

Peak Design Flow (l/s) = Average Flow(l/s) x Peaking Factor + Peak Extraneous Flow (l/s)

APPENDIX C

CONCEPTUAL STORM SEWER DESIGN CALCULATIONS
Oct. 2000 Figure 1, Greenboro Turtlehead Area, Surface Drainage Area Pattern



CONROY ROAD SWAMP
HYDROLOGIC STUDY

Gore & Storrie Limited G&S
Consulting Engineers

Title:

SURFACE DRAINAGE PATTERNS

Figure 1 (Figure 3 from Gore & Storrie (1995))

Storm Sewer Design Sheet

JRLUS

LOCATION	Area (Ha)			Flow					PROPOSED SEWER						
Drainage Area	R= 0.65	R= 0.2	R= 0.24	INDIV 2.78 AR	ACCUM 2.78 AR	TIME OF CONC.	RAINFALL INTENSITY I	PEAK FLOW Q (l/s)	PIPE SIZE (mm)	PIPE SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min.)	EXCESS CAPACITY (l/s)
4 (A,B)	6.70	10.00		17.67	17.67	10.00	104.19	1840.77	1350	0.15	600.0	2069.25	1.44	6.92	228.49
4 (C,D)	5.00	17.40		18.71	18.71	10.00	104.19	1949.39	1350	0.15	600.0	2069.25	1.44	6.92	119.86
Culvert	0.00			0.00	36.38	16.92	77.81	2830.62	1676.4	0.10	30.5	3009.90	1.36	0.37	179.28
2	45.30			81.86	118.23	16.92	77.83	9201.75	1981.2	0.40	500.0	9398.32	3.05	2.74	196.57
Easement	0.00			0.00	118.23	17.09	77.37	9147.69	1981.2	0.40	30.5	9398.32	3.05	0.17	250.63
5			25.80	17.21	17.21	10.00	104.19	1793.55	1524	0.38	46.5	4550.54	2.49	0.31	2756.99
3 [*1]	9.00			16.26	16.26	10.00	104.19	1694.49	1650.0	0.7	[*1]	7355.72	[*1]	[*1]	[*1]
1 [*2]	20.90			37.77	37.77	10.00	104.19	3934.99	1524	0.31	24.5	4110.10	2.25	0.18	175.11

Notes:

[*1] Existing 1650 mm diameter storm sewer

[*2] Via exiting 1800 mm storm to existing ditch system east of Albion Road