REPORT
Project: 121753-7.3

DESIGN BRIEF
COWAN'S GROVE MID-DENSITY
4791 BANK STREET
LEITRIM DEVELOPMENT AREA

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

Prepared for URBANDALE CORPORATION
by IBI GROUP
FEBRUARY 2020

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1 INTRODUCTION

1.1 Scope

IBI Group has been retained by Urbandale Corporation to prepare the necessary engineering plans, specifications and documents to support the proposed Site Plan Application for the subject lands in accordance with the policies set out by the Planning and Development Branch of the City of Ottawa. This Brief will present a detailed servicing scheme to support development of the properties, and will include sections on water supply, wastewater management, minor and major stormwater management along with erosion and sediment control.

1.2 Subject Property

The subject property, known as Cowan's Grove Mid-Density, is located within Urbandale's Cowan's Grove subdivision lands. The location of the Cowan's Grove subdivision within the Leitrim Development Area is shown on Figure 1 and the location of the within the Cowan's Grove subdivision is shown on Figure 2.

The proposed area to be developed as the Cowan's Grove Mid Density is approximately 1.39 Ha and is bound by Bank Street to the West, the Cowan's Grove commercial plaza and Longworth Avenue to the South, the Cowan's Grove subdivision to the east and development lands to the north.

The current architectural site plan, upon which this report is based, contains seven residential stacked townhouse blocks of various sizes for a total of 102 units along with associated landscaping, parking, vehicle access routes and pedestrian areas. The architectural site plan is shown on Figure 3.

1.3 Previous Studies

As noted above, the subject site is located within the Cowan's Grove subdivision area and as such the design on which numerous planning and engineering studies have been completed. Besides the Official Plan and zoning, significant to the subject site are the following:

- **Design Brief, Cowan's Grove, 4791 Bank Street, prepared by IBI Group May 2018** This approved report (*City File No. D07-16-13-0035*) demonstrates that storm, sanitary and water service allocations for the subject lands were included in the design of the subdivision.

It is the intention of this report to demonstrate that the proposed servicing for the subject lands will be completed in accordance with the approved Cowan's Grove subdivision report.

1.4 Geotechnical Considerations

One geotechnical report "Geotechnical Investigation, Proposed Residential Development, Kellam Lands, Ottawa, Ontario" dated December 2013, has been prepared by Golder Associates for the subject lands.

The objectives of the investigation were to prepare a report to:

- Determine the subsoil and groundwater conditions at the site by means of test pits and boreholes and;
- To provide geotechnical recommendations pertaining to design of the proposed development including construction considerations.

The report recommendations were based on the findings and observations from several boreholes and test pits. Among other items, the report recommendations deal with:

- Site grading;
- Foundation design;
- Pavement structure;
- Sewer and Watermain Construction;
- Groundwater Control;
- Grade Raises

The geotechnical investigation report confirmed that the site consists mostly of silt, sand, boulders and glacial till on top of limestone bedrock. These conditions will provide a suitable base for construction. No practical restrictions apply to grade raise thickness and service trench seepage barriers are recommended.

2 WATER SUPPLY

2.1 Existing Conditions

The primary source of water for the Leitrim Development Area (LDA) is the Ottawa South Pumping Station (OSPS) which is located approximately 1km north of Leitrim Road adjacent to the future rapid rail transit corridor.

Two watermains are located adjacent to the site, there is an existing 400mm diameter watermain on Bank Street west of the site which connects to the OSPS along Leitrim Road and through the existing Findlay Creek Village located west of the subject site. Additionally, as part of the Cowan's Grove subdivision works a 250mm dia watermain was installed within the Longworth Avenue ROW.

2.2 2016 Updated Serviceability Report

The preferred water distribution plan for the Leitrim Development Area was included in the 2016 USR. A copy of the recommended plan Figure 2.2 from that report, is included in **Appendix A**. Cowan's Grove is included in the OPA 76 Area 9b as shown on Figure 2.2. The recommended water plan for Area 9b includes a connection to the watermain on Bank Street and several connections to the Claridge OPA 76 Area 9a development to the north. A 250 mm diameter watermain is recommended to connect to the 400 mm diameter watermain on Bank Street and extend north adjacent to the mixed use and school site.

2.3 Design Criteria

2.3.1 Water Demands

The Cowan's Grove Mid-Density site consists of seven residential stacked townhouse blocks of various sizes for a total of 102 units. A water demand has been calculated using the following data as per table 4.2 of the Ottawa Design Guidelines – Water Distribution.

- Townhouse and Semi-Detached 2.7 person per unit
- Residential Average Day Demand 350 l/cap/day

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

- Average Day 1.12 l/s
- Maximum Day 2.79 l/s
- Peak Hour 6.14 l/s

Since the Leitrim Development Area has a population larger than 3,000 persons, the City of Ottawa has provided system level demands for large growth areas. The system level demands were used in the 2016 Updated Serviceability Report hydraulic analysis and is used in this analysis for all existing lands in the Leitrim Development Area. The system level demands are summarized in **Table 2.1**.

Table 2.1 LDA Unit Water Demands

	AVERAGE (l/Unit/Day)	OUTDOOR WATER DEMAND (l/Unit/Day)	MAX. DAY (l/Unit/Day)	PEAK DAY (l/Unit/Day)*
Single Family	567	1049	Average + OWD	2.1 x Max Day
Townhouse (Medium Density)	558	0	Average	1.6 x Max Day
Apartment (High Density)	400	0	Average	1.6 x Max Day
Employee* (ICI)	85	0	Average	1.5 x Max Day
Water Loss per Connection	80	N/A	Average	Average

** 100 employees/hectare assumed for ICI land use*

The City of Ottawa has also provided external water demand criteria for locations downstream of the LDA, summarized in **Table 2.2**.

Table 2.2 External Water Demand Criteria for Locations Downstream of the LDA

LOCATION	CRITERIA
Carlsbad Trickle Feed	829 Dwelling Units
Existing South of FCV	200 Dwelling Units
Russell	11.8 MLD pumped over 20 hours

The Russell demand will be added to the average and maximum day demand, but will not be included in the peak hour calculations because the pumping to Russell is stopped during the peak hour period. Correspondence from the City of Ottawa regarding the LDA water demands is included in **Appendix A**.

2.3.2 System Pressures

The 2010 City of Ottawa Water Distribution Guidelines 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 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 may be required for buildings where it is not possible/feasible to maintain the system pressure below 552 kPa.

2.3.3 Fire Flow Rate

The Cowan's Grove Mid-Density site plan contains seven residential stacked townhouse blocks. Fire flow is determined by the Fire Underwriters Survey (FUS) method in which the building construction type, occupancy and separation from adjacent buildings is considered. A calculation has been conducted for Block 6 which is the biggest building with the most exposures, resulting in a fire flow rate of 17,000 litres per minute. A copy of the FUS calculation is included in *Appendix A*.

2.3.4 Hydraulic Model

A computer model for the Leitrim development area water distribution system has been developed using the H_20 map version 6.0 program produced by MWH Soft. The source of water is the Ottawa South Pumping Station (OSPS) which is located approximately 1 km north of Leitrim Road adjacent to the future rapid rail transit corridor.

The City of Ottawa has been supplying potable water to the Leitrim area for decades. Over time the City has made modifications and improvements to the delivery network. The Gloucester South Pump Station was decommissioned in 2005 and the Ottawa South Pumping Station (OSPS) was brought into service in 2001. The latter facility is currently delivering water to the downstream customers at the hydraulic grade line of about 155 m.

In an effort to better integrate the downstream areas including Riverside South, Longfields/Davidson Heights in Barrhaven and Leitrim, the City is planning to lower the hydraulic grade line at the Ottawa South station to about 146 m. For the hydraulic analysis of the water distribution system, a hydraulic boundary condition has been provided by the City at Leitrim Road and the rail corridor at the northwest corner of the LDA. A hydraulic grade line elevation of 144 meters is to be used for peak hour and maximum day plus fire analysis which represents the 146 meter level at the OSPS and the demands from the Riverside South community. For average day analysis the current level of 155 meters at the OSPS will be applied at the boundary condition to determine the maximum pressure in the water system. Correspondence from the City of Ottawa concerning boundary conditions is included in **Appendix A.**

2.4 Proposed Water Plan

Drawing 121753-C-100, located in **Appendix E**, shows the watermain layout. A 200mm watermain is connected to the 250mm in Longworth Avenue and crosses the site to connect to the 400mm watermain within Bank Street. This private watermain provides connections to the 2 on-site hydrants as well as providing a service to the single central water meter located in a heated enclosure within the garbage corral. From the water meter location a water service distribution network, varying in size from 150mm to 50mm, provides water services throughout the site to the various residential blocks. There is no connection between the 200mm watermain connected to the hydrants and the watermain servicing the buildings.

Results of the hydraulic analysis for Cowan's Grove Mid-Density are included in **Appendix A** and are summarized as follows:

Table 2.3 Results of Water Distribution Hydraulic Analysis for Cowan's Grove Plaza

SCENARIO	PLAZA
Basic Day (Max HGL) Pressure (kPa)	559.2 – 573.7
Peak Hour Pressure (kPa)	448.7 – 462.9
Design Fire flow @ 140 kPa Residual Pressure (l/s)	293.9 – 294.6

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

Maximum Pressure — Under Basic Day conditions with a hydraulic grade line elevation of 155 meters at the OSPS, all nodes in Cowan's Grove Plaza exceed 552 kPa (80 spi). Pressure reducing control, in the form of pressure reducing valves at the building, in accordance with Technical Bulletin ISDTB-2014-02, is therefore recommended for all buildidngs. There are no nodes where the pressure exceeds 689 kPa (100 psi).

Minimum Pressure — The lowest minimum pressure during peak hour conditions is 442.7 kPa which exceeds the minimum 276 kPa (40 psi) requirement.

Fire Flow — The minimum design fire flow under maximum day conditions with minimum system pressure of 140 kPa (20 psi) at the two hydrant locations are 293.9 and 294.6 L/s which exceeds the requirement of 283.3 l/s (17,000 l/min.) as discussed in Section 2.3.3.

3 WASTEWATER DISPOSAL

3.1 Existing Conditions

The Leitrim Pump Station is the wastewater outlet for all developed lands within the LDA, including the subject property. As noted in section 1.3 above the sanitary sewer design for the subject lands are to be in accordance with the approved Cowan's Grove subdivision servicing report. The sanitary drainage area plan and sanitary sewer design sheet from the Cowan's Grove subdivision has been included in **Appendix B**. The subject lands are identified as BLK13123A on the aforementioned subdivision documents. During construction of the Cowan's Grove subdivision a 200mm sanitary service stub from the sewer located within Longworth Avenue was left to service the subject lands.

3.2 Design Criteria

The sanitary sewers for the subject site will be based on the City of Ottawa design criteria. It should be noted that the sanitary sewer design for this study incorporates the latest City of Ottawa design parameters identified in Technical Bulletin ISTB-2018-01. Some of the key criteria will include the following:

- Demand per capital — 280 litres/person/day
- Peaking factor — Harmon formula where K=0.8
- Infiltration allowance — 0.33 l/s/ha
- Velocities — 0.60 m/s min. to 3.0 m/s max.

3.3 Recommended Wastewater Plan

The on-site sanitary system will consist of a network of 200mm PVC sewers installed at normal depth and slope and will provide a service connections to each vertical stack of 3 units. The sewers have been designed using the criteria noted above in section 3.2 and outlet via the connection to the sanitary sewer within the Longworth Avenue right of way. A copy of the sanitary drainage area plan 116871-C-400 and the sanitary sewer design sheet can be found in **Appendix B.** Please refer to the site servicing plan 121753-C-100 in **Appendix E** for further details.

4 SITE STORMWATER MANAGEMENT

4.1 Existing Conditions

The site was designed and included within the stormwater management strategy of the approved Cowan's Grove subdivision as noted in section 1.3.

Included in the Cowan's Grove subdivision stormwater management strategy was an allocation for lands tributary to the subdivision sewers that will require separate site stormwater management design, these allocations were included in that report's Table 5.4, a copy of which can be found in **Appendix C**. A copy of the Cowan's Grove storm drainage area plan 103557-500 has been included in **Appendix C** which identifies the subject lands as drainage area MU05. This drainage area is shown on the table 5.4 which specify the release rates used in this design.

4.2 Design Criteria

The stormwater system was designed following the principles of dual drainage, making accommodations for both major and minor flow.

Some of the key criteria include the following:

- Design Storm — 1:5 year return (Ottawa)
- Rational Method Sewer Sizing
- Initial Time of Concentration — 10 minutes
- Runoff Coefficients
  - Landscaped Areas — C = 0.30
  - Asphalt/Concrete — C = 0.90
  - Roof — C = 0.90
- Pipe Velocities — 0.80 m/s to 6.0 m/s
- Minimum Pipe Size — 250 mm diameter (200 mm CB Leads)

4.3 Proposed Minor System

Using the criteria identified in Section 4.2, the proposed on-site storm sewers were sized accordingly. A detailed storm sewer design sheet and the associated storm sewer drainage area plan is included in **Appendix C**. The General Plan of Services 121753-C-100, depicting all on-site storm sewers can be found in **Appendix E**.

4.4 Stormwater Management

The subject site will be limited to a release rate established using the criteria described in section 4.2. This will be achieved through a combination of inlet control devices (ICD's) at inlet locations or downstream manhole and surface and in-pipe storage.

Flows generated that are in excess of the site`s allowable release rate will be stored on site in strategic surface storage areas or within the underground pipes and structures and gradually released into the minor system so as not to exceed the site's allocation.

The maximum surface retention depth located within the developed areas will be limited to 350mm during a 1:100 year event. A copy of the Site Ponding Plan 121753-C-600 can be found in **Appendix C.**

Overland flow routes will be provided in the grading to permit emergency overland flow, in excess of the 100 year event, from the site.

At certain locations within the site, the opportunity to store runoff is limited due to grading constraints and building geometry. These locations are generally located at the perimeter of the site where it is necessary to tie into public boulevards and adjacent properties or in areas where ponding stormwater is undesirable. These “uncontrolled” areas – 0.13 hectares in total, have an average C value of 0.9. Based on 1:100 year storm uncontrolled flows, the uncontrolled areas generate 58.08 l/s runoff (refer to Section 4.5 for calculation).

The site grading and ponding has been designed to control water generated during the 1:100-year event, with no overflow leaving the site. Please refer to the SWM calculations in **Appendix C**.

4.5 Inlet Controls

The allowable release rate for the 1.39 Ha site is taken from the Cowan’s Grove subdivision table 5.4 (found in Appendix C) and is as follows:

$\mathbf{Q_{allowable}}$ = **281 L/s (drainage area MU05)**

As noted in Section 4.4, a portion of the site will be left to discharge offsite at an uncontrolled rate.

Based on a 1:100 year event, the flow from the 0.13 Ha uncontrolled area can be determined as:

$\mathbf{Q_{uncontrolled}}$ = **2.78** x **C** x $\mathbf{i_{100yr}}$ x **A** where:

C = Average runoff coefficient of uncontrolled area = 0.90

$\mathbf{i_{100yr}}$ = Intensity of 100-year storm event (mm/hr)

= $1735.688 \times (T_c + 6.014)^{0.820}$ = 178.56 mm/hr; where T_c = 10 minutes

A = Uncontrolled Area = 0.13 Ha

Therefore, the uncontrolled release rate can be determined as:

$\mathbf{Q_{uncontrolled}}$ = **2.78** x **C** x $\mathbf{i_{100yr}}$ x **A**

= 2.78 x 0.90 x 178.56 x 0.13

= 58.08 L/s

The maximum allowable release rate from the remainder of the site can then be determined as:

$\mathbf{Q_{max\ allowable}}$ = $\mathbf{Q_{restricted} - Q_{uncontrolled}}$

= 281.00 L/s – 58.08 L/s

= 222.92 L/s

Based on the flow allowance at the various inlet locations, a combination of various sizes of inlet control devices (ICDs) were chosen in the design. The design of the inlet control devices is unique to each drainage area and is determined based on a number of factors, including hydraulic head and allowable release rate. The inlet control devices were sized according to the manufacturer’s design charts. The restrictions will cause the on-site catchbasins, pipes and manholes to surcharge, generating surface ponding in the parking and landscaped areas. Ponding locations and elevations are summarized on the Ponding Plan 121753-C-600, and included in **Appendix C**.

4.6 On-Site Detention

Any excess storm water up to the 100-year event is to be stored on-site in order to not surcharge the downstream municipal storm sewer system. Detention will be provided in underground

structures, parking and landscape areas. As previously noted, the volume of storage is dependent on the characteristics of each individual drainage area and the ICD's were chosen accordingly. It should be noted that 0.30m of vertical separation has been provided from all maximum ponding elevations to lowest building openings.

The modified rational method was used to calculate maximum storage required for a given release rate. As per accepted convention, when underground storage is considered available storage within standard depth parking lot catchbasins and manholes the ICD release rate is to be reduced by 50% to account for the loss of head during the initial part of the rainfall event while the underground portion of the storage fills with runoff.

The stormwater management for the site has ensured that there will be no surface ponding during the 2 year storm event. To achieve sufficient underground storage, storm sewer segments have been oversized.

4.6.1 Site Inlet Control

The following Table summarizes the on-site storage requirements during both the 1:5-year and 1:100-year events.

DRAINAGE AREA(s)	TRIBUTARY AREA	AVAILABLE STORAGE (M^3)	100-YEAR STORM		5-YEAR STORM	
			RESTRICTED FLOW (L/S)	REQUIRED STORAGE (M^3)	RESTRICTED FLOW (L/S)	REQUIRED STORAGE (M^3)
P1, P2, P3, P4, P5	0.61	188.23	88	194.24	88	69.22
P6	0.13	4.53	6	51.35	6	20.79
P7, P8, P9	0.28	110.23	30	104.62	30	34.57
P10	0.06	3.57	25	4.64	25	0.33
P12	0.08	4.90	44	3.53	44	0
R1	0.09	57.83	29	4.96	29	0.09
TOTAL	**1.25**	**369.29**	**222**	**363.34**	**222**	**125**

In all instances the required storage is met with surface ponds and in pipe/structure storage which retain the stormwater and discharge at the restricted flow rate to the sewer system. Refer to the ponding plan in **Appendix C** for storage information.

4.6.2 Overall Release Rate

As demonstrated above, the site uses new inlet control devices to restrict the 100 year storm event to the criteria approved by the City of Ottawa. Restricted stormwater will be contained onsite by utilizing surface ponding and rooftop storage. In the 100 year event, there will be no overflow off-site from restricted areas.

The sum of restrictions on the site and uncontrolled flows is (222 l/s + 58.08 l/s) 280.08 l/s, which is less than the allowable release of 281.00 l/s noted in section 4.5.

4.7 Quality Control

As noted in the Design Brief for the Cowan's Grove subdivision (City File. No. D07-16-13-0035) the subject lands are tributary to the Expansion of Findlay Creek Village Stormwater facility. This facility has been designed to provide quality control for the tributary lands as approved by the City of Ottawa, Ministry of Environment, Conservation and Parks.

5 APPROVALS AND PERMIT REQUIREMENTS

5.1 City of Ottawa

The City of Ottawa reviews all development documents including this report and working drawings. Upon completion, the City will approve the local watermains, under Permit No. 008-202, and issue a Commence Work Notification.

5.2 Province of Ontario

It is not anticipated that an Environmental Compliance Approval from the Ministry of Environment, Conservation and Parks (MECP) will be necessary for this site. The Ministry has already issued a Permit To Take Water that covered this block.

5.3 Federal Government

There are no required permits, authorizations or approvals needed expressly for this development from the federal government.

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 is constructed, groundwater in trenches will be pumped into a filter mechanism prior to release to the environment;
- 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 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; locations are shown on the Sediment and Erosion Control Plan included in **Appendix D**. 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.

6.4 Surface Structure Filters

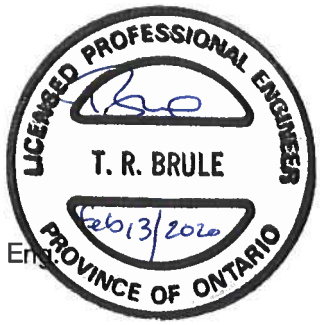
All catchbasins, and to a lesser degree, manholes, convey surface water to sewers. Until streets are asphalted and curbed, all catchbasins and manholes will be constructed with sediment capture inserts or equivalent located between the structure frame and cover. These will stay in place and be maintained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

7 CONCLUSION

This report has illustrated that the proposed Cowan's Grove Mid-Density block can be serviced via existing municipal services. 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.

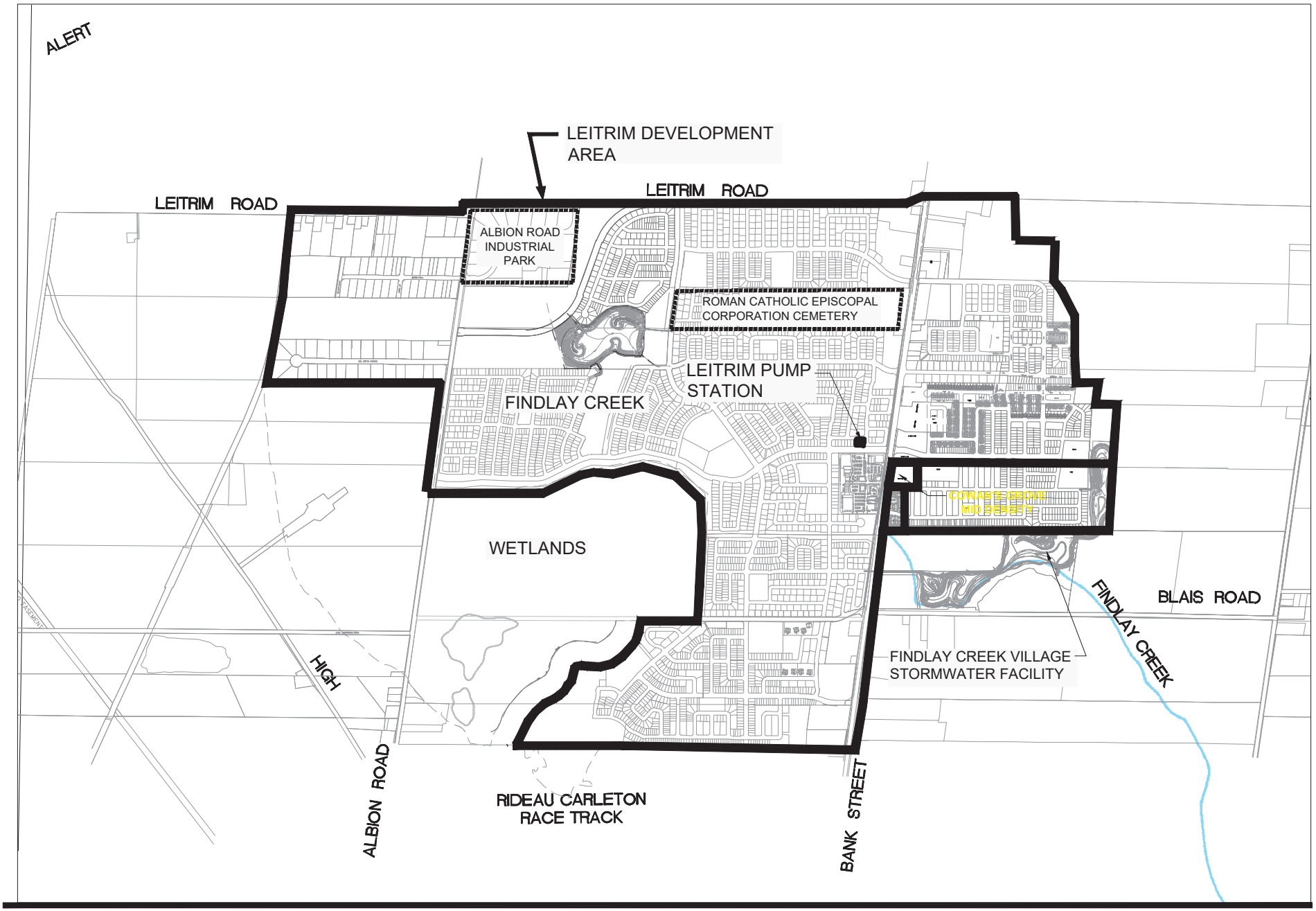
By limiting flow into the minor storm sewer system as per the applicable local stormwater management criteria and allowing for excess surface storage on-site, all stormwater management requirements will be met. Adherence to the Sediment and Erosion Control Plan during construction will minimize harmful impacts on surface water.

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

James Battison, C.E.T.



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Project Title

COWAN'S GROVE MID DENSITY

4791 BANK STREET

Drawing Title

LOCATION WITHIN LEITRIM DEVELOPMENT AREA

Sheet No.

FIGURE 1

Sheet No.

FIGURE 2

Drawing Title

LOCATION WITHIN
COWAN'S GROVE SUBDIVISION

Project Title

COWAN'S GROVE
MID DENSITY
4791 BANK STREET

Scale

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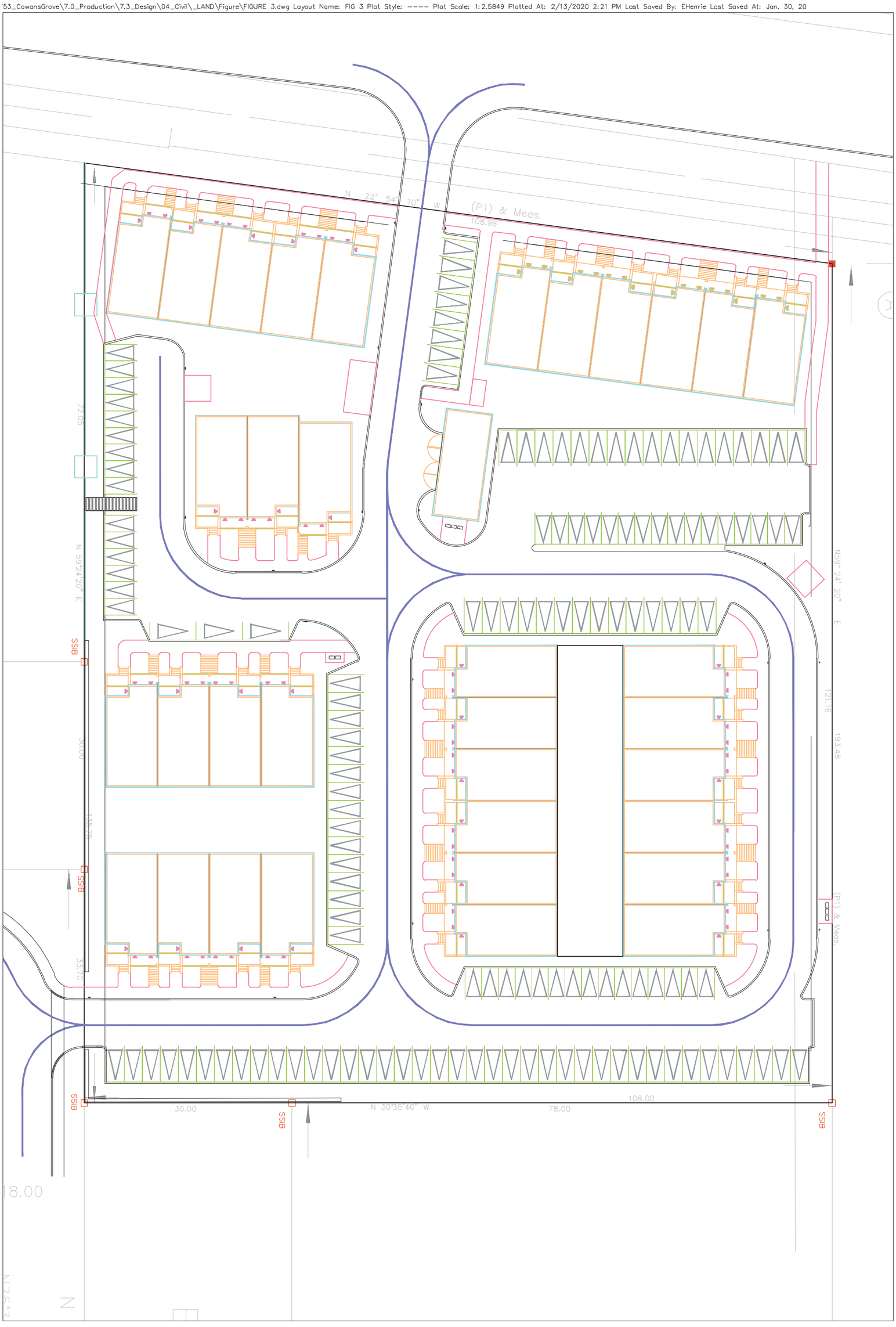

Sheet No.	Drawing Title	Project Title	Scale
FIGURE 3	ARCHITECTURAL SITE PLAN	COWAN'S GROVE MID DENSITY	N.T.S.

IBI

APPENDIX A

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Sheet No.	Drawing Title	Project Title	Scale
FIGURE 2.2	PREFERRED WATER DISTRIBUTION PLAN	UPDATED SERVICEABILITY PLAN (CLASS EA OPA76 AREAS 8a, 9a and 9b) LEITRIM DEVELOPMENT AREA	N.T.S.

IBI

Lance Erion

Subject: FW: Leitrim Serviceability Update, September 2014

From: Rogers, Christopher [mailto:Christopher.Rogers@ottawa.ca]
Sent: Friday, October 24, 2014 11:10 AM
To: Bob Wingate
Cc: Zagorski, Joseph; Diduch, Roman
Subject: Leitrim Serviceability Update, September 2014

Bob,

Comments on the draft report are as follows:

- An introduction is needed to explain the purpose of the report, as this strongly influences the level of detail expected.
- Construction of the new 610mm main on Leitrim was completed in 2014. The project limits included Leitrim Road, from the CPR corridor to Albion, and on Albion from Leitrim to Fenton. This project provides a redundant supply to the majority of the existing Zone 3C, including LDA, via Albion and Findlay Creek.
- The information used for the analysis is dated. Please note the following:

- System-level demands for large growth areas are now estimated as given in the table below. The numbers used in your analysis are conservative, except for the unit demands for apartments. These numbers should only be used for establishing the backbone of the proposed distribution system. Design guideline demands should be used for local system designs.
- The post zone reconfiguration OSPS HGL is currently expected to be 146m. Note that the current Zone 3C remains at 155m. The plan should consider post-reconfiguration boundary conditions for pressure minima, and pre-reconfiguration conditions for pressure maxima.
- Zone 3C will be supplied by two pumping facilities, the OSPS and the Barrhaven PS. Rather that updating the Riverside South development numbers, we propose using our estimated future boundary conditions at Leitrim/CPR = 144m for peak hour and max day + fire (i.e. no need to consider RS development in your model). The development downstream of FCV can be represented as given in Table 2.2, but consider 829 units for Carlsbad.

- Provide figure clearly illustrating existing and proposed service areas, sub-areas identified in OPA 76, existing watermains (including new 610), proposed future watermains. Watermains should be colour-coded to emphasize mains larger than 200mm (nominal).
- Figure 2.2 as referenced in Section 2.4 was not provided in my copy of the report. Review of proposed network cannot be completed without figure as requested above. Focus should be on backbone of network and connection points to existing system.
- Review of alternatives would be better focussed on viable options, such as sizing and configuration of backbone distribution system. For example, if the second E-W main from the north (pipe 1557) were to be sized at 305mm, could this potentially allow for downsizing of downstream mains, to increase number of 6" mains? The City's interest here is to ensure design demands will be met with minimum network pipe sizing, so as to avoid high water age in the system.
- Provide figure illustrating distribution of residual pressure at model nodes under various design conditions, employing a suitable colour-coding scheme.
- Notwithstanding the above point, local sizing and fire demands will need to be reviewed for each plan of subdivision and site plan, and local system sizing will need to be finalized based on the City's design guideline demands, rather than the system-level demands considered in this report.

	Average (L/unit/day)	Outdoor Water Demand (L/unit/day)	Max Day (L/unit/day)	Peak Hour
SFH (OGB)	567	1049	Average + OWD	2.1 x Max Day
MLT (OGB)	558	0	Average	1.6 x Max Day
APT (OGB)	400	0	Average	1.6 x Max Day
EMP (OGB)	85	0	Average	1.5 x Max Day
Water Loss per connection	80	N/A	Average	Average
	Sum above for total Average Day		Sum above for total Max Day	Sum above for tc Peak Hour

Regards,

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Senior Project Manager
Policy Development and Urban Design Branch
Gestionnaire principal de projet
Direction de l'élaboration des politiques et de l'esthétique urbaine

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WATERMAIN DEMAND CALCULATION SHEET

IBI GROUP
333 PRESTON STREET
OTTAWA, ONTARIO
K1S 5N4

PROJECT : **Cowan's Grove Mid Density Block**
CLIENT : **Urbandale**

FILE: 121753
DATE PRINTED: 30-Jan-20
DESIGN: JB
PAGE: 1 OF 1

NODE	RESIDENTIAL				NON-RESIDENTIAL (ICI)			AVERAGE DAILY DEMAND (l/s)			MAXIMUM DAILY DEMAND (l/s)			MAXIMUM HOURLY DEMAND (l/s)			FIRE DEMAND (l/min)
	SINGLE FAMILY UNITS	TOWN HOUSE UNITS	MEDIUM DENSITY (ha)	POPULATION	INDUST. (ha)	COMM. (ha)	INSTIT. (ha)	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	
T14 (Block 1)		18		49				0.20		0.20	0.49		0.49	1.08		1.08	
T20 (Blocks 2 and 3)		24		65				0.26		0.26	0.66		0.66	1.44		1.44	
T22 (Blocks 4 and 5)		24		65				0.26		0.26	0.66		0.66	1.44		1.44	
T16 (Blocks 6 and 7)		36		97				0.39		0.39	0.98		0.98	2.17		2.17	
T-3																	17,000
T-4																	17,000
Totals		102		275						1.12			2.79			6.14	

POPULATION DENSITY

Single Family	3.4 persons/unit
Semi Detached & Townhouse	2.7 persons/unit
Medium Density	1.8 persons/unit

WATER DEMAND RATES

Residential	350 l/cap/day
Commercial Shopping Center	2,500 $L/(1000m2)/day$

PEAKING FACTORS

Maximum Daily	
Residential	2.5 x avg. day
Commercial	1.5 x avg. day
Maximum Hourly	
Residential	2.2 x avg. day
Commercial	1.8 x avg. day

FIRE DEMANDS

Single Family	10,000 l/min (166.7 l/s)
Semi Detached & Townhouse	10,000 l/min (166.7 l/s)
Stacked towns	17,000 l/min (283.3 l/s)

Fire Flow Requirement from Fire Underwriters Survey

Block 6 - 3 Storey Stacked Townhouse Block

Floor Area	650	m^2
Total Floor Area	1,950	m^2

$F = 220C\sqrt{A}$

C	1.5		C =	1.5 wood frame
A	1,950	m^2		1.0 ordinary
				0.8 non-combustible
F	14,572	l/min		0.6 fire-resistive
use	15,000	l/min		

Occupancy Adjustment

		-25%	non-combustible
		-15%	limited combustible
Use	-15%	0%	combustible
		+15%	free burning
Adjustment	-2250 l/min	+25%	rapid burning
Fire flow	12,750 l/min		

Sprinkler Adjustment

		-30%	system conforming to NFPA 13
		-50%	complete automatic system
Use	0%		
Adjustment	0 l/min		

Building Face	Separation (m)	Adjacent Exposed Wall			Exposure Charge *
		Length	Stories	L*H Factor	
north	9.5	45.0	3	135	20%
east	> 45				
south	20.5	26.0	3	78	9%
west	35.0				5%
Total					34%

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

Adjustment	4,335	l/min
Fire flow	17,085	l/min
Use	**17,000**	**l/min**
	283.3	**l/s**

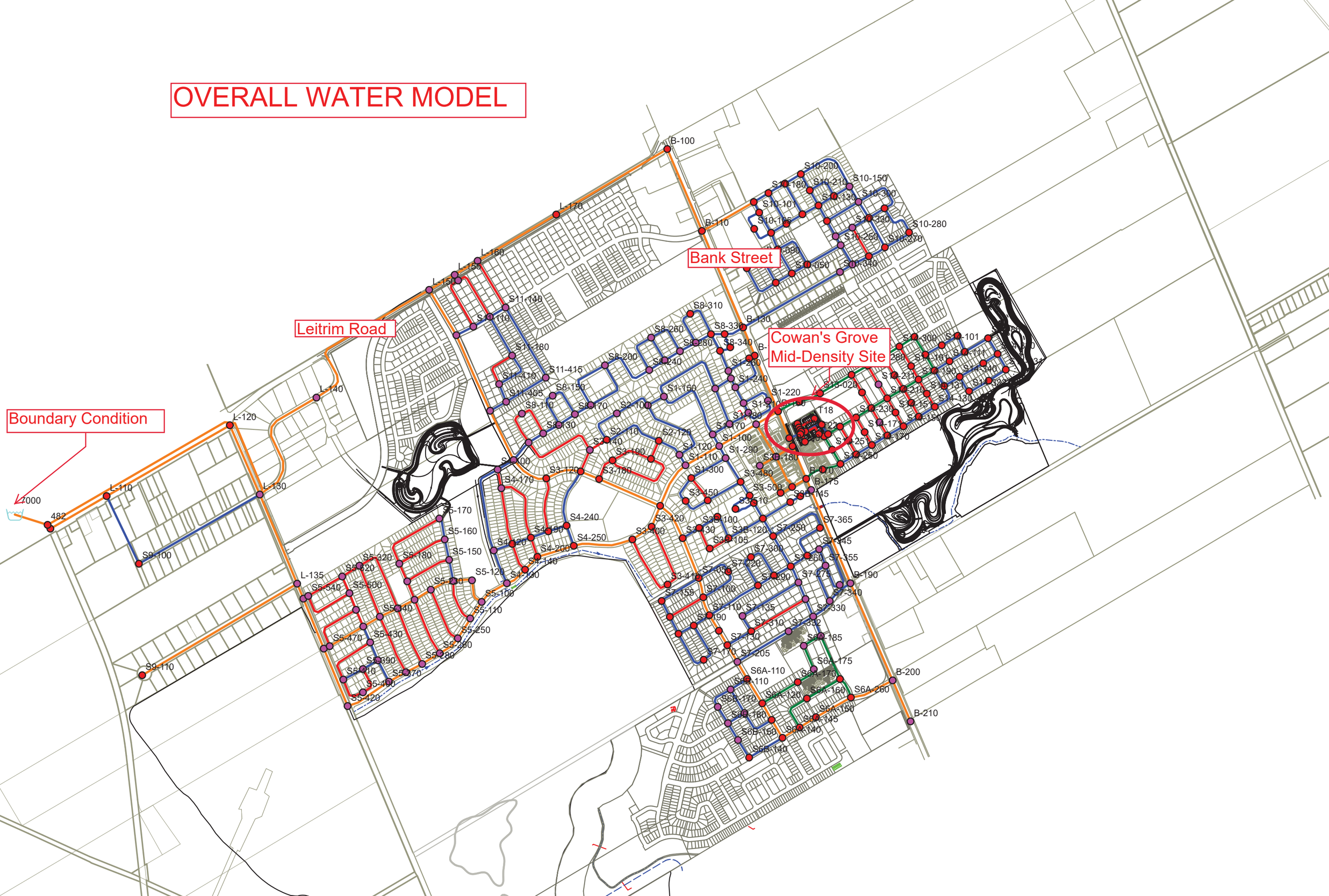
OVERALL WATER MODEL

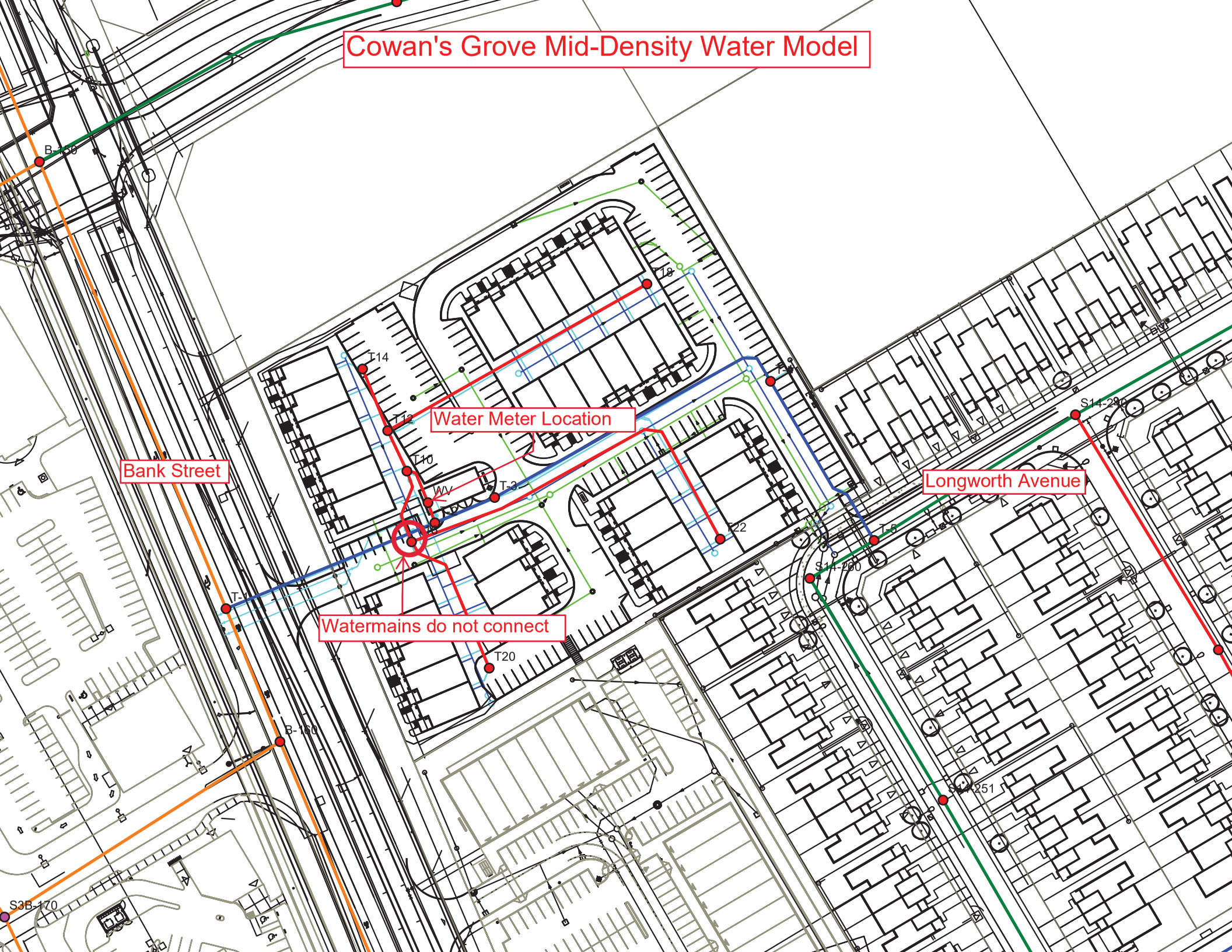
Boundary Condition

Leitrim Road

Bank Street

Cowan's Grove
Mid-Density Site




Cowan's Grove Mid-Density Water Model
Water Meter Location
Bank Street
Longworth Avenue
Watermains do not connect
T14
T12
T10
T-3
T18
T22
T20
T-1
T-5
WV
B-160
S3B-170
S14-290
S14-280
S14-251

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
251	☐	S7-360	0.16	94.65	151.30	555.13
252	☐	S7-365	0.24	94.60	151.34	555.98
253	☐	S8-100	0.09	94.90	152.36	563.09
254	☐	S8-110	0.13	95.50	152.34	556.97
255	☐	S8-130	0.10	95.30	152.32	558.72
256	☐	S8-140	0.13	95.38	152.25	557.30
257	☐	S8-150	0.22	95.70	152.23	553.99
258	☐	S8-170	0.15	95.50	152.22	555.80
259	☐	S8-180	0.33	95.50	152.16	555.20
260	☐	S8-200	0.43	95.69	152.11	552.83
261	☐	S8-240	0.49	96.28	151.93	545.36
262	☐	S8-260	0.47	96.70	151.91	541.06
263	☐	S8-270	0.16	96.19	151.91	546.05
264	☐	S8-280	0.16	96.58	151.90	542.07
265	☐	S8-300	0.16	98.40	151.86	523.85
266	☐	S8-310	0.31	99.80	151.85	510.03
267	☐	S8-330	0.13	100.83	151.84	499.86
268	☐	S8-340	0.18	99.05	151.83	517.19
269	☐	S8-350	0.28	99.70	151.83	510.84
270	☐	S8-360	0.00	101.30	151.83	495.20
271	☐	S9-100	1.46	101.00	154.63	525.53
272	☐	S9-110	0.83	101.50	154.26	516.97
273	☐	T-1	0.00	93.45	151.58	569.68
274	☐	T-2	0.00	94.35	151.57	560.69
275	☐	T-3	0.00	94.15	151.56	562.61
276	☐	T-4	0.00	93.00	151.55	573.72
277	☐	T-5	0.00	93.10	151.54	572.64
278	☐	T10	0.00	94.50	151.57	559.21
279	☐	T12	0.00	94.20	151.57	562.15
280	☐	T14	0.20	94.00	151.57	564.11
281	☐	T16	0.39	94.05	151.57	563.61
282	☐	T18	0.00	93.90	151.57	565.09
283	☐	T20	0.26	94.10	151.57	563.12
284	☐	T22	0.26	93.35	151.57	570.46
285	☐	WV	0.00	94.35	151.57	560.68

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
251	☐	S7-360	0.25	94.65	140.46	448.93
252	☐	S7-365	0.36	94.60	140.47	449.47
253	☐	S8-100	0.48	94.90	141.06	452.29
254	☐	S8-110	0.72	95.50	141.02	446.04
255	☐	S8-130	0.52	95.30	141.00	447.81
256	☐	S8-140	0.43	95.38	140.93	446.33
257	☐	S8-150	0.45	95.70	140.91	443.01
258	☐	S8-170	0.34	95.50	140.89	444.83
259	☐	S8-180	0.51	95.50	140.84	444.26
260	☐	S8-200	0.65	95.69	140.79	441.93
261	☐	S8-240	0.75	96.28	140.64	434.67
262	☐	S8-260	0.72	96.70	140.62	430.39
263	☐	S8-270	0.25	96.19	140.62	435.39
264	☐	S8-280	0.25	96.58	140.61	431.45
265	☐	S8-300	0.25	98.40	140.58	413.34
266	☐	S8-310	0.47	99.80	140.57	399.55
267	☐	S8-330	0.20	100.83	140.57	389.42
268	☐	S8-340	0.27	99.05	140.56	406.79
269	☐	S8-350	0.45	99.70	140.56	400.43
270	☐	S8-360	0.00	101.30	140.57	384.77
271	☐	S9-100	3.03	101.00	143.51	416.60
272	☐	S9-110	1.24	101.50	143.10	407.67
273	☐	T-1	0.00	93.45	140.41	460.22
274	☐	T-2	0.00	94.35	140.31	450.38
275	☐	T-3	0.00	94.15	140.30	452.23
276	☐	T-4	0.00	93.00	140.24	462.93
277	☐	T-5	0.00	93.10	140.21	461.61
278	☐	T10	0.00	94.50	140.29	448.68
279	☐	T12	0.00	94.20	140.29	451.62
280	☐	T14	1.08	94.00	140.29	453.57
281	☐	T16	2.17	94.05	140.27	452.90
282	☐	T18	0.00	93.90	140.29	454.56
283	☐	T20	1.44	94.10	140.26	452.37
284	☐	T22	1.44	93.35	140.26	459.66
285	☐	WV	0.00	94.35	140.30	450.31

		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)
259	☐	S8-270	166.83	207.00	S8-270	139.96	110.47	207.00	139.96	139.96
260	☐	S8-280	166.83	217.35	S8-280	139.96	110.86	217.35	139.96	139.96
261	☐	S8-300	166.83	244.76	S8-300	139.96	112.68	244.76	139.96	139.97
262	☐	S8-310	166.98	203.55	S8-310	139.96	114.08	203.55	139.96	139.96
263	☐	S8-330	166.80	264.30	S8-330	139.96	115.11	264.30	139.96	139.97
264	☐	S8-340	166.85	288.70	S8-340	139.96	113.33	288.70	139.96	139.98
265	☐	S8-350	166.95	261.88	S8-350	139.96	113.98	261.88	139.96	139.97
266	☐	S8-360	166.67	279.08	S8-360	139.96	115.58	279.08	139.96	139.98
267	☐	S9-100	251.46	212.31	S9-100	139.96	115.28	212.31	139.96	139.96
268	☐	S9-110	250.83	215.29	S9-110	139.96	115.78	215.29	139.96	139.97
269	☐	T-3	283.30	294.64	T-3	139.96	108.43	294.64	139.96	139.97
270	☐	T-4	283.30	293.94	T-4	139.96	107.28	293.94	139.96	139.97

		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
386		1069	S8-340	S8-350	47.07	204.00	110.00	-1.11	0.03	0.00	0.01	Open	0
387		1073	S8-360	S8-330	58.07	204.00	110.00	-2.74	0.08	0.00	0.07	Open	0
388		1075	S8-360	S8-350	61.66	204.00	110.00	1.56	0.05	0.00	0.03	Open	0
389		1167	S9-100	L-110	318.80	204.00	110.00	-9.89	0.30	0.25	0.79	Open	0
390		P15	T-1	T-2	57.54	204.00	110.00	15.44	0.47	0.10	1.80	Open	0
391		P11	T-1	B-150	123.59	393.00	120.00	-27.77	0.23	0.02	0.19	Open	0
392		P27	T10	T12	11.41	155.00	100.00	1.08	0.06	0.00	0.06	Open	0
393		P39	T12	T18	75.94	155.00	100.00	0.00	0.00	0.00	0.00	Open	0
394		P25	T14	T12	17.01	155.00	100.00	-1.08	0.06	0.00	0.06	Open	0
395		P37	T16	T22	101.71	155.00	100.00	1.44	0.08	0.01	0.10	Open	0
396		P33	T16	T10	19.38	155.00	100.00	-5.05	0.27	0.02	1.03	Open	0
397		P17	T-2	T-3	16.55	204.00	110.00	9.31	0.28	0.01	0.71	Open	0
398		P29	T-2	WV	5.46	155.00	100.00	6.13	0.32	0.01	1.48	Open	0
399		P35	T20	T16	39.56	155.00	100.00	-1.44	0.08	0.00	0.10	Open	0
400		P19	T-3	T-4	82.98	204.00	110.00	9.31	0.28	0.06	0.71	Open	0
401		P21	T-4	T-5	49.08	204.00	110.00	9.31	0.28	0.03	0.71	Open	0
402		P13	T-5	S14-260	19.00	250.00	110.00	-3.75	0.08	0.00	0.05	Open	0
403		P31	WV	T10	10.47	155.00	100.00	6.13	0.32	0.02	1.48	Open	0

APPENDIX B