Kanata Lakes North

Serviceability Study

Prepared for
KNL Developments Inc.

June 2006

IBI GROUP

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1.0 INTRODUCTION

The Kanata Lakes North Serviceability Study deals with the stormwater system, wastewater system, water distribution system and utility servicing for the subject lands located on Figure No. 1. As shown, the Kanata Lakes North development is comprised of the remainder of the Kanata Lakes Golf Course Community and includes the realignment of the existing Goulbourn Forced Road which is upgraded to a full urban road section. An environmental assessment is currently being undertaken for the Goulbourn Forced Road and Kanata Avenue by Dillon Consulting. This serviceability study was prepared in conjunction with two other studies commissioned by KNL. The Kanata Lakes West NEA Boundary Definition, Shirley's Brook and Tree Cutting Mitigation prepared by ESG International dated Nov. 2002 and Kanata Lakes North Neighbourhood Park Facilities Program Update study prepared by Corush Sunderland Wright Limited dated Nov. 2002.

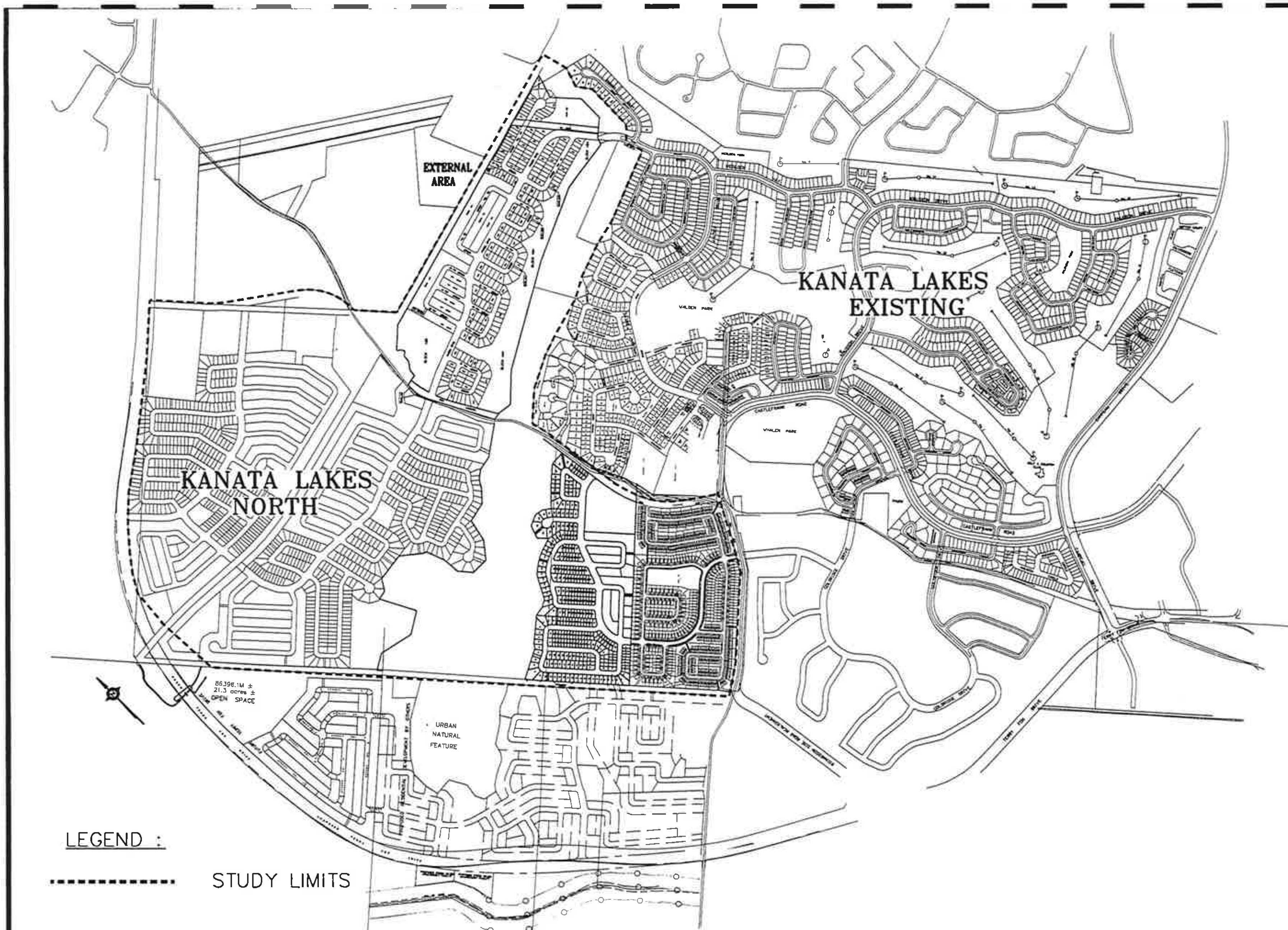
Topography of the site is very rugged with large rock outcrops throughout the site. The environmentally sensitive lands of the Kizell Pond and Beaver Pond Stormwater Management Facility are located in the centre of the site. A CNR railway line runs in an east west direction across the north portion of the subject lands.

A total of 225 hectares of developable land is included in the study area consisting of almost exclusively single family residential lots and townhouse blocks. On the west side of the development a large residential area is located north and south of the Kizell Pond and east of Terry Fox Drive while on the east side of the development a smaller residential area is located on the future extension of Solandt Drive north of the rail line.

2.0 CONSTRUCTION STAGING

Four major construction stages are identified on Figure 2. Phase 1 will proceed by extending the sanitary sewer from the recently constructed Beaver Pond trunk sanitary sewer and constructing a storm outlet into the Kizell Pond. Water service is provide by the existing main on Kanata Avenue at the Goulbourn Forced Road Intersection.

In Phase 2 an existing sanitary sewer and watermain is provided at the east end of Walden Drive. Storm drainage is provided in an outlet constructed in the Beaver Pond stormwater management facility. With the construction of the Goulbourn Forced Road Collector and trunk watermain looping of traffic and watermain is provided at the west end of Phase 2.



LEGEND :

STUDY LIMITS

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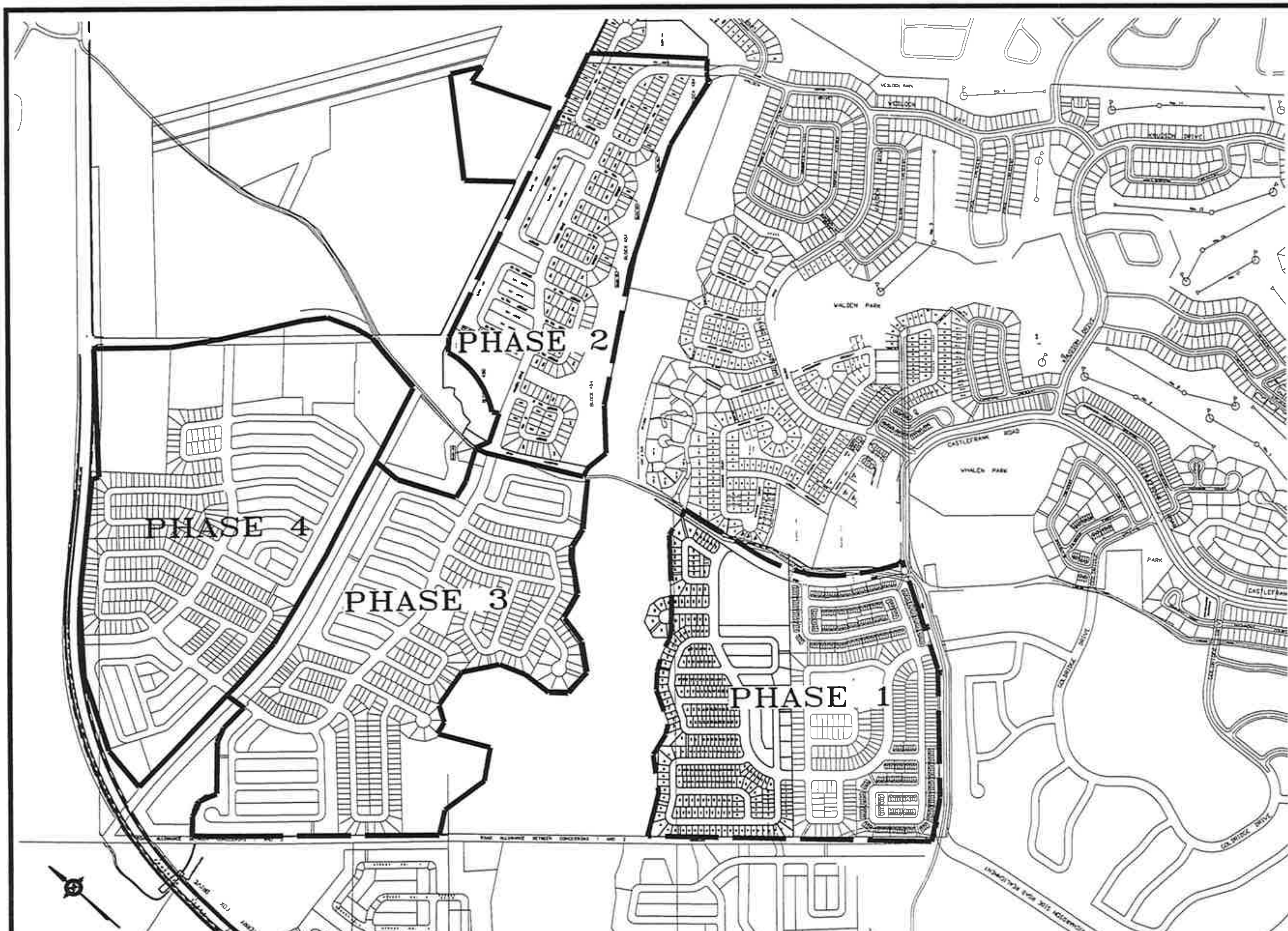
STUDY AREA
FIGURE 1

Construction of Phase 3 will proceed with the extension of the sanitary sewer from Phase 2 and the extension of the trunk watermain and Goulbourn Forced Road. Sanitary and watermain will be extended through Phase 3 to service Phase 4 while a single storm outlet will be constructed in the Kizell Pond to service both Phases.

This phasing proposal also recognizes the logical extension of recreational facilities to service the expanding urban area and the expansion of the urban areas in an orderly direction to avoid trapping wildlife between phases.



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PHASING PLAN
FIGURE 2

3.0 WASTEWATER SYSTEM (SANITARY SEWERS)

3.1 Sanitary Sewer Design Criteria

Sanitary flows used in the sizing of sewers are calculated using the following criteria:

Design Flow:

Average Residential Flow	-	350 l/cap/day
Average Commercial/Institution Flow	-	50,000 l/ha/day
Peak Residential Factor	-	Harmon Formula
Peak Commercial/Institution Factor	-	1.5
Infiltration Allowance	-	0.28 l/ha/Sec

Population Density:

Single Family	-	3.4 person/unit
Townhouse Units	-	2.7 person/unit
External Medium Density Land	-	25 units/ha
	-	3.4 person/unit

The external residential areas located west and east of the development are using a density of 25 units per hectare, which is considerably higher than the existing developments along Walden Drive and Wilder Village which has an average density of approximately 10.5 units per hectare.

3.2 Proposed System

Sanitary drainage for Phase 1 is provided in the existing trunk sanitary sewer located in the existing Goulbourn Forced Road near the Beaver Pond. An allowance for approximately 35 hectares of residential land to the west of Phase 1 is included in the sanitary sewer design. The 35 hectares represents the practical limit that the sanitary sewer can service due to the topography of the area. As shown in the sanitary sewer calculations in appendix A there is sufficient capacity in the existing sanitary sewer running adjacent to the south side of the Beaver Pond from the Goulbourn Forced Road to the intersection of Walden Drive and Hansen Avenue.

Phases 2, 3, and 4 outlet to the existing trunk sanitary sewer located at the north end of Kimmins Court at the east end of the development. As in Phase 1 an allowance for approximately 19 hectares at sanitary drainage from the residential lands to the west is included which represents a practical limit due to topography. Sanitary drainage for this area is in conformance with the Sanitary Sewer Master Drainage Plan for Kanata Lakes prepared by J.L. Richards & Associates Limited May 1986.

Allowance for sanitary drainage from a 9.5 hectare site located along the future Solandt Drive extension north of Phase 2. This land is currently in the urban area and is physically isolated from other potential drainage outlets by Shirley's Brook.

NO.	DATE	BY	REVISION
1	02:11:20		GENERAL REVISIONS
2	02:11:26		REVISED AS PER NEW CONCEPT PLAN
3	03:04:08		REVISED AS PER NEW CONCEPT PLAN
4	05:08:16		REVISED AS PER NEW CONCEPT PLAN
5	06:02:14		REVISED AS PER NEW CONCEPT PLAN
6	06:06:15		REVISED AS PER NEW CONCEPT PLAN

Legend:

- 11.7 — Area in hectares
- 5 — Area Number
- 310 — Tributary Node
- Proposed Trunk Sanitary Sewer
- Sanitary Identification Node
- Sanitary Drainage Area
- DEVELOPMENT LIMITS

KNL DEVELOPMENTS INC.

Ottawa

CCL/IBI
Cumming Cockburn Limited

KANATA LAKES NORTH
SANITARY DRAINAGE AREAS

SERVICEABILITY STUDY

SCALE:	1:5000		
DRAWN:	M.M.	DATE:	SEPT '02
DESIGN:	L.E.	DATE:	SEPT '02
CHECKED:	R.W.W.	DATE:	SEPT '02

PROJECT NO.	DRAWING NO.
3433-LD	5000

FIGURE 3

4.0 STORMWATER SYSTEMS

4.1 System Concept

The proposed stormwater system incorporates standard drainage and stormwater management features that can be summarized as follows:

- a dual drainage concept
- on-site detention
- an end of pipe stormwater management facility (Beaver Pond)

4.1.1. Dual Drainage Concept

The "dual drainage system" proposed for the KNL Lands accommodates both major and minor stormwater runoff. During frequent storms (approximately up to the 1:5 year return period), the effective runoff collected by catchment areas is directly released via catchbasin inlets into the network of storm sewers, called the "minor system". During less frequent storms, the balance of the flow in excess of the minor flow, is accommodated by a system of street segments called, the "major system".

The main advantage of this drainage arrangement is its ability to adjust the rate of total inflow into the minor system to satisfy the required levels of service. The required total inflow is typically maintained by the restriction of the capacity and the density of the inlets directly connected into this system. As noted above, during less frequent storms, the balance of the flow is accommodated by the major system. Typically, this accommodation is achieved by the "direct conveyance" of the excess flow to a recipient and/or attenuation area on catchment surfaces called "on-site detention". The levels of service for both the minor and major system proposed for the KNL Lands are summarized in Section 4.2.

4.1.2. Major System - Overflow to Shirley's Brook and On-site Detention (Surface Ponding)

It is recommended, where possible, that portions of KNL lands have direct flow conveyance to the realigned Shirley's Brook. The minor flow will be captured by the storm sewers and discharged into the Beaver Pond. The flow split between the major and minor systems will be at 85 l/s/ha.

On-site detention (or surface ponding) is recommended to be implemented within all portions of the KNL Lands where major flow cannot be conveyed to Shirley's Brook. It is proposed that the required storage be provided in distributed surface storage areas by utilizing a sawtooth road design. In determining this ponding, the main design parameters are the required surface storage per unit area and the maximum depth of ponding.

More specifically with respect to the attenuation on urban areas, the following drainage concept is proposed:

- Wherever possible the surface ponding will be provided via the sawtooth street design.
- The major flow trapped in the street low points will be released into the minor system via catchbasins protected by inlet control devices.
- The excess of the major flow (not trapped in the low points) will be routed and attenuated in the Beaver Pond and natural water courses (where possible).
- Rear yard storage is not to be considered as available storage for major system flow control.

With the on-site detention scenario, the majority of the total effective runoff is ultimately conveyed into the minor system, and to the Beaver Pond. This fact dictates that the volume of the end-of-pipe facility must also be sized to accommodate the total flow, both major and minor. This rationale was employed to confirm the operation of the Beaver Pond in relation to the surcharge of the proposed sewer system.

4.1.3. Beaver Pond – End-of-Pipe Stormwater Management Facility

The Beaver Pond is located in a ravine surrounding the upstream reaches of the Kizell Drain. This pond was constructed in the late eighties, in accordance with the approved Master Drainage Plan prepared for Kanata Lakes (then Marchwood Lakeside). A detailed description of this facility is also provided in the report entitled "Kanata Lakes Storm Drainage Report, Campeau Corporation, Oliver Mangione McCalla and Associates Limited, September 1986".

This stormwater management facility was originally designed to satisfy the design criteria in place at the time of construction. These criteria required that the facility be designed to attenuate peak post development flows to peak pre-development levels (provide quantity control). Since the construction of the initial stormwater management pond design criteria has changed to include the requirement to provide water quality control in addition to water quantity control. In 1994, a report was prepared by Cumming Cockburn Limited entitled, "Kanata Lakes, Beaver Pond, Urban Stormwater Quality Control". This report demonstrated that the Beaver Pond SWM facility will operate as a quantity/quality facility for all new phases of development with separate connections to the pond, including Kanata Lakes North.

Initial discussions with staff at the City suggest that the City may be interested in upgrading the Beaver Pond facility so it is fully functional as a quantity/quality facility. If the City does proceed with this proposal it can be carried out as a separate study with the cost of the works distributed equally over the total urban drainage area tributary to the Beaver Pond Stormwater Management facility, including Kanata Lakes North.

Urbanization of Kanata Lakes North will result in the re-alignment of Shirley's Brook west of Goulbourn Forced Road and the redirection of some pre-development flow from Shirley's Brook to the Kizell Drain via the Beaver Pond Stormwater Management Facility. The proposed concept plan recognizes the re-alignment of Shirley's Brook in a corridor which runs approximately parallel to the south side of the existing railway line. This corridor will allow the existing natural flow from the undeveloped tributary area west of Kanata Lakes North to pass through the proposed development in a naturalized channel without being contaminated by the untreated stormwater from the proposed urban area. The uncontaminated flow will re-enter existing Shirley's Brook at Goulbourn Forced Road.

Since the Beaver Pond SWM facility is currently designed to provide both water quality and water quantity control for the Kanata Lakes North lands the analysis in this study is focused to ensure optimal interaction between the existing facility and the proposed internal dual drainage system in accordance with the required levels of service and stormwater quantity control criteria.

4.2 Levels of Service

4.2.1 Minor System

I. **Lateral sewer system** to be designed using the Rational Method and the 5-year Intensity Duration Frequency Curve as per the City of Ottawa Sewer Design Guidelines (November 2004).

5 Year Intensity: $i = \dfrac{998.071}{(time\ in\ \min + 6.053)^{0.814}}$

I-a Rational Method time of concentration is 15 minutes long for drainage to rear yard catchbasins and 10 minutes for front yard drainage to street catchbasins.

I-b Controlled inlet capacity is 85 l/s/ha for all areas other than arterial roads.

I-c The 10 year design storm with 10 minute time step to be used for arterial roads.

I-d Minimum velocity in storm pipes is 0.8 m/s. Maximum velocity in storm pipes is 3.0 m/s

I-e Manning's roughness coefficient for all smooth wall pipes is 0.013

I-f Runoff Coefficients (C) calculated based on the impervious area

$C = (C_{imp} * I) + (C_{perv} * (1-I))$

Where $C_{imp} = 0.9$

$C_{perv} = 0.2$

I = Imperviousness Ratio

I-g Average runoff coefficient for residential areas (assuming 50% townhouses and single family units) does not exceed C_{max}=0.59 (asphalt=0.9, grass=0.2)

I-h Calculation of the hydraulic grade line to be conducted only for the surcharged lateral sewers that are connected to the trunk sewer at surcharged sections.

I-i Surcharge calculations (if applicable) to be based on the steady state Darcy-Weisbach formula using maximum water level in the trunk junction as the starting hydraulic grade line elevation.

I-j Maximum permitted hydraulic grade line elevation to be 0.30 m below the underside of footings (USF).

II. Rear yard and roadway catchbasins are to be equipped with Inlet Control Devices restricting flows to a maximum of 19.8 l/s or 13.4 l/s to achieve a minor system target of 85 l/s/ha ha for storms greater than 5 year event up to the 100 year event storm. Density of inlets connected to the minor system can be restricted to a maximum of 4.25 inlets per hectare with the equivalent capacity of Inlet Control Device IPEX type "A" – 20.0 l/s or the equivalent of 85 l/s/ha. These densities should be averaged over developed areas of 10 ha or larger.

III. Dual drainage modeling is encouraged if the inlet control densities and capacities (as specified in Point II) are not met.

IV. Storm trunk sewers are to be sized to free flow conditions for the design storm event using the Rational Method. Trunk sewer sizes are to be verified using an accepted computer hydrologic/hydraulic model assuming that the entire 5 year flow is captured by the catchbasins or conveyed to the minor system. Modeling with a hydrologic/hydraulic model is not mandatory for tributary areas less than 40 ha.

V. The directly connected imperviousness ratio used in the hydrologic/hydraulic model must include 50% of the total roof area for all subcatchments draining towards the roadway or other hard surfaces serviced by storm sewers. Roof areas draining into the rear yards are not considered as directly connected impervious areas.

VI. The Hydraulic Grade Line in the storm sewer must be computed using an acceptable computer model or steady state calculation accounting for minor losses, with a targeted inlet capture rate of 85 l/s/ha.

VII. Dynamic modeling is required for all submerged storm sewer outlets considering adequate minor losses in each of the upstream manholes.

VIII. If the trunk sewer is surcharged, the design of the **Trunk Sewer** should be based on the results of hydrological/hydrodynamic modeling using XPSWMM.

VII-a Modeling to be based on the 2, 5 and 100 year SCS Type II design storm of 24 hour duration and 12 minutes time step, derived from the Kanata IDF curves (see **Appendix B**). This design storm was used to model the existing KNL lands and Beaver Pond.

VII-b Modeling to be based on the inlet densities and restrictions specified in paragraph II and III above.

VII-c Hydraulic grade line modeling to be based on the hydrodynamic fluctuation of the water levels in the Beaver Pond SWM facility.

VII-d Maximum permitted hydraulic grade line elevation to be 0.30 m below the underside of footing.

4.2.2 Major system

I. Major flow is to be stored on the surface in road sags or conveyed by surface routing to a designated storage area or outlet.

II. As part of the subdivision design, storage of major storm event overflow volumes in parks will be reviewed on a case-by-case basis, with City of Ottawa approval depending on the intended park use. The subdivision designer will be required to address issues pertaining to the frequency (how often ponding will occur), duration (time in minutes), depth (ponding in m and mm) and volume (m^3) of water expected in park areas during both the 5 year through 100 year storm events.

III. Surface ponding in rear yards may occur during the 5 year storm event, but must be fully drained immediately after the event.

IV. As part of the subdivision design, ponding areas must be depicted on a plan based on the maximum possible ponding elevations (i.e., cascading elevation).

V. Modeling is not required for residential densities with an average runoff coefficient lower than C=0.59, and assuming that the following requirements are met:

V-a The maximum on-site detention storage requirement in urban areas during the 100 year storm is 141 m^3/ha assuming no overflow and that the average runoff coefficient does not exceed 0.59.

V-b On-site detention storage may be provided by fairly evenly distributed road sawtoothing design. Rear yard storage is not to be considered as available storage for major system flow control.

V-c Maximum hydrostatic depth in roadways sags = 0.3 m

V-d Calculation of the actual distributed on-site storage should be supported by a stage storage curve developed for a typical street low point.

VI Dual drainage modeling of the lateral system is encouraged if the requirements specified in Point V are not met on average for an area of 40 ha or more.

VII. The major system segments and corridors collecting flows from urban sub-areas with partial or no-ponding must safely convey the runoff into the next segment corridor, and ultimately into the adjacent areas.

VII-a Max. hydrodynamic flow depth of water on the street segments is 0.30 m.

VII-b Max. hydrodynamic flow depth of the corridors and easements is 0.30 m.

VIII. The minimum slope measured between consecutive high points (i.e., major overland flow direction) must be 0.1%.

IX. Maximum hydrodynamic water surface or any emergency overflow water surface to be minimum 0.30 m below the lowest building opening.

4.3 Hydrological and Hydraulic Modeling

Hydrological and hydraulic analysis of the proposed dual drainage system was conducted using the SWMMHYMO and XPSWMM modeling techniques. The selected modeling routines, hydrological and hydraulic input parameters and simulated results are discussed in the following sections. The model schematic is included in **Appendix C** and indicated on Drwg. 5004.

4.3.1 Design Storms

Based on our experience with similar types of urban watersheds, we judge the most critical runoff estimates to be generated by the summer-single event storms. There are two standard types of summer-single event design storms typically used for modeling in Eastern Ontario. The first SCS Type II design storm is typically used for watersheds characterized by the rural component being significantly greater than the urban component. The second design storm, the CHICAGO design storm is more critical for the modeling of fully urbanized watersheds.

The subject lands will be developed as predominantly low density residential units with limited medium density developments, complete with some neighborhood recreational park areas as shown in Figure 4. The simulations for determination of on-site detention requirements for the urban areas were therefore based on the CHICAGO design storm.

The precipitation intensities were derived from the standard City of Ottawa IDF curves using the standard Keifer and Chu regression formula. The developed synthetic hyetographs and the IDF curves are presented in **Appendix B**. In order to provide a fair basis for comparison with results obtained by the Rational Method the time step of the design storm was set to 15 minutes for rear yards and 10 minutes for front yards. This time step is equal to the time of concentration typically used in the City of Ottawa for the rational design of residential sewer systems. The duration of the storm was selected to be 3 hours (100 year 3 hour Chicago Design Storm).

Analysis of the whole Kanata Lakes North watershed including the Beaver Pond and upstream Shirley's Brook watershed was based on the 24 hour Type II SCS design storm. The total precipitation for the 2, 5 and 100 year events used predates the City of Ottawa Sewer Design Guidelines (November 2004). These total precipitation values were used to model and design the existing development as well as establishing the maximum water level (92.60 m) in the Beaver Pond. The outlet design and existing development HGL are based on these total precipitation values. The new City IDF total precipitation is approximately 20 mm greater than those previously used. Since approximately half of the development has been constructed, the impact will result in the re-design of the Beaver Pond outlet and analysis of the HGL for the existing KNL area. Under these circumstances, it is recommended to utilize the total precipitation values that predate the City of Ottawa Guidelines to complete the design.

4.3.2 Hydrological Input Parameters

The stormwater generation module selected for the modeling of the study area is based on the "HYMO" unit hydrograph method. This method is consistent with modeling procedures which have been used in past studies conducted in the Kanata area. The hydrological parameters required for the simulation include the sub-watershed drainage area, the imperviousness ratio and sub-catchment slope and length. Soil infiltration was modeled using the CN number which is consistent with the parameters in the previous studies. The main hydrological parameters are summarized in **Appendix B**.

4.3.3 Hydraulic Input Parameters

The hydraulic performance of the Beaver Pond was evaluated using the XPSWMM Model. The hydraulic parameters of the Beaver Pond were based on the previous design and updated topographical information. These parameters are related to the hydraulic characteristics of the outlet structure, the stage/storage curve of the facility and the water surface boundary condition in the outlet channel. For this analysis, the water level in the outlet channel was set to a constant value equal to the normal depth during the 100 year peak release flow rate.

4.3.4 Modeling Results - Minor System Simulation

The simulation was performed using the 1:5 and the 1:100 year design storms. The inflow rates into the receiving junctions were limited to 85 l/s/ha for the future development. The simulated results along the system including some basic sewer parameters are summarized in **Appendix B**. The SWMM computer outputs are enclosed in **Appendix C.**

The modeling results indicate that during the 1:100 year design storm event the trunk sewers connected into the Beaver Pond are partially submerged to about spring line and the minor system generally operates with full capacity and with no surcharge.

4.3.5 Modeling Results - Major System Simulation

The major system was designed to accommodate the surface runoff (those flows in excess of 85 l/s/ha). The simulations were focused on a land use corresponding to a typical residential development with an average imperviousness ratio less than 54%. The simulations conducted for this land use indicate that, in order to attenuate the surface runoff with no overflow, the total surface storage required is 141 m^3/ha.

In some cases cases the street low points will not provide the opportunity to store the target 141 m^3/ha, which will cause some overflows. In this situation, the dual drainage system should be modeled on a catchment-by-catchment basis to determine the overflow rate. Easements should be designed to accommodate these overflows. It should be noted that the overflows should be accommodated in the Beaver Pond or natural watercourses for the majority of the site.

4.4 Proposed Minor System (Storm Sewers)

Pre-design of the minor system was focused to determine alignment of the storm water trunk sewers with respect to the optimal serviceability of the subject lands. The alignment of the trunk was based on the topography and the most recent development plans. In addition, the trunk design was co-ordinated with the requirements of the other area services (particularly the sanitary trunk sewers) to facilitate economical staged development of the study area. As shown in Figure 4 and Drawing 5001, the proposed minor system consists of three trunk sewers.

Storm drainage from the Goulbourn Forced Road and a portion of Kanata Avenue have been included in the storm sewer design using a 10 year rational method storm. On the storm sewer designs sheets, which are included in **Appendix B**, the rational method peak flows are compared with the maximum allowable flow with the 85 l/s/ha inlet restriction. In all sewers, the rational method flows are higher than the maximum inlet flows.

The sewer trunks were generally designed to operate at full capacity with no surcharge. It is also proposed to maintain the partial submergence of the trunk outlets during the frequent storms to provide energy dissipation during treatment. The outlet manholes should be equipped by a flow splitter to direct flows up to 25 mm rainfall event into the energy dissipaters and the balance of flow directly to the Beaver Pond. Energy dissipaters should be long enough to slow down the velocity of the jet at the edge of the pond to 0.5 m/s. Due to the recreational value of the Beaver Pond as a natural area, the City does not wish to construct forebays to full MOE standards, but to use energy dissipaters combined with the extensive natural wet area to meet the forebay criteria. Flows diverted from the energy dissipaters during more infrequent rainfall events over 25 mm will pass through a bypass pipe or channel with erosion protection provided by a splash pad with large rocks. Design and layout of the energy dissipater and bypass channels will incorporate the recreational pathway system. An example of a typical energy dissipater is shown on Figures 5 and 6.

NO.	DATE	BY	REVISION
1.	02:11:20		GENERAL REVISIONS
2.	02:11:26		REVISED AS PER NEW CONCEPT PLAN
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4.	05:08:16		REVISED AS PER NEW CONCEPT PLAN
5.	06:02:14		REVISED AS PER NEW CONCEPT PLAN
6.	06:06:15		REVISED AS PER NEW CONCEPT PLAN

Legend:

- Area in hectares
- Tributary Node
- Runoff Coefficient
- Proposed Trunk Storm sewer
- Storm Coefficient Node
- Drainage Area Minor System
- Storm Headwall
- Storm Energy Dissapator
- DEVELOPMENT LIMITS

KNL DEVELOPMENTS INC.

Ottawa

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KANATA LAKES NORTH
STORM DRAINAGE AREAS

SERVICEABILITY STUDY

SCALE:	1:5000		
DRAWN:	M.M.	DATE:	SEPT '02
DESIGN:	L.E.	DATE:	SEPT '02
CHECKED:	R.W.W.	DATE:	SEPT '02
PROJECT NO.	3433-LD	DRAWING NO.	5001

FIGURE 4

4.5 Proposed Major System

4.5.1 Overflow to Shirley's Brook

Those sub-basins adjacent to the realigned Shirley's Brook will have their major flow conveyed to the brook. This clean major flow will supplement the flows in Shirley's Brook during less frequent events. The areas which will have the major flow conveyed to the brook are Areas 8A, 13 and 14 (Drwg 5004). Under this scenario, post-development flows in Shirley's Brook do not exceed pre-development flows (see **Appendix B**).

4.5.2 On-site Detention

The major flow resulting from some of the **residential development** is proposed to be attenuated on the surface within sub-basins. The overall major system drainage delineation and tributary areas to the suggested storage areas are presented on Drawing 5002. As mentioned previously, storage should be provided by sawtoothing of street segments. Drawing 5004 shows those subasins where storage can and should be provided. The sawtoothing design should be supported by stage storage curves which should be developed for typical street low points. For residential development with a runoff coefficient equal to or lower than C=59, the required surface storage is 141 m^3/ha.

The following example was created to demonstrate the calculation of the storage requirements and release flow rate for a neighborhood with sawtoothing design.

> The example neighborhood of 12 ha of urban development, assuming 50% townhouses and 50% single family units.
>
> Total required value:
> V=(141 m^3ha) x (12 ha) = 1,692 m^3
> If the total distributed storage (sawtoothing) is 1,692 m^3.
>
> Total release flow rate from the urban part of the neighborhood:
> Q=(12 ha) x (85 l/s/ha) =1,020 l/s.
>
> The release flow rate (1,020 l/s) from the urban area must be achieved by the restriction of the density and capacity of inlets connected into the sewer system:

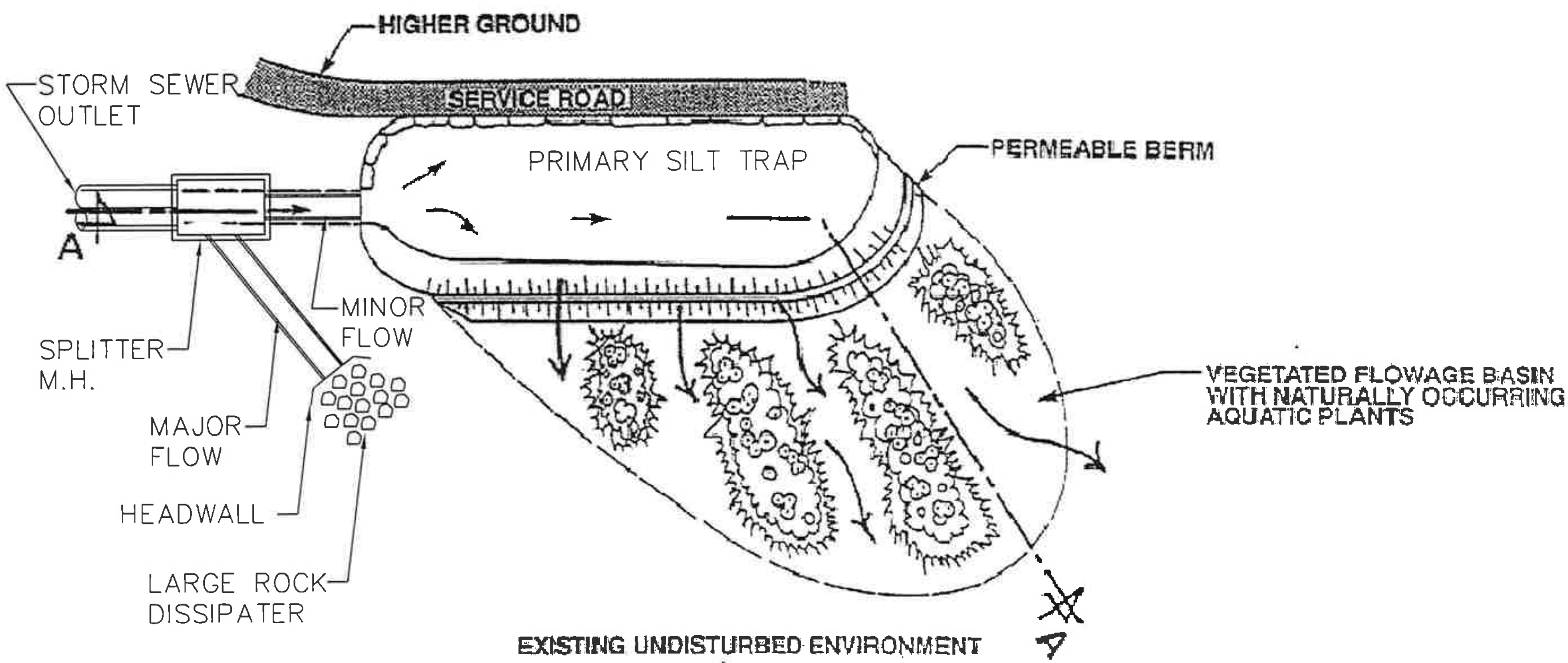

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FIGURE 5
SEWER OUTLET

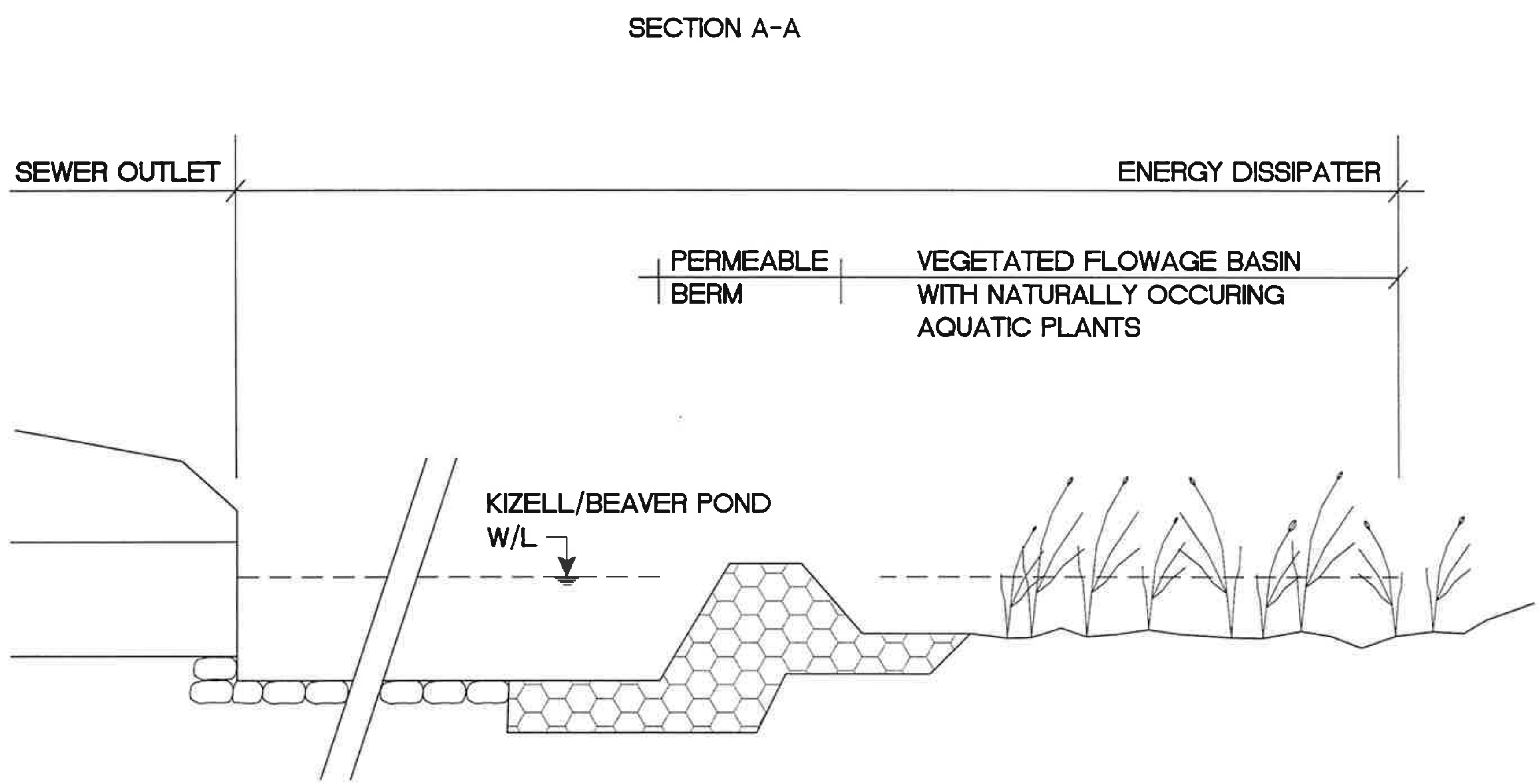

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FIGURE 6
ENERGY DISSIPATER

Capacity of one inlet = 20 l/s

Density of inlets = 4.25 ICD/ha

Total restricted flow = (20 l/s) x 4.25 ICD/ha) x (Area of 12 ha) = 1,020 l/s.

4.6 Emergency Overflow

In cases where the quantity of major flow is exceeded (e.g. clogged inlets caused by ice or debris or events in excess of the design storm) it is important that an emergency overflow route be provided wherever possible to avoid the potential for property damage. Roadway and lot grading designs should recognize this requirement.

5.0 WATER DISTRIBUTION SYSTEM

5.1 Water Demand Parameters

Water demand parameters have been provided by the City of Ottawa and are included in Appendix D. A summary of the parameters used are as follows:

Over 750 Dwellings

Average Density Demand		
- Residential		300 l/cap/day
- Industrial/Commercial/Institutional (ICI)		15,000 l/ha/day
Peak Daily Demand		
- Residential		800 l/cap/day
- ICI		35,000 l/ha/day
Peak Hourly Demand		
- Residential	2.63 x Peak Day =	2,104 l/cap/day
- ICI	1.62 x Peak Day =	56,700 l/ha/day

Less 750 Dwellings

Average Density Demand		
- Residential		300 l/cap/day
- Industrial/Commercial/Institutional (ICI)		15,000 l/ha/day
Peak Daily Demand		
- Residential		1,000 l/cap/day
- ICI		35,000 l/ha/day
Peak Hourly Demand		
- Residential	2.63 x Peak Day =	2,630 l/cap/day
- ICI	1.62 x Peak Day =	56,700 l/ha/day

Residential population densities are derived from the sanitary sewer design criteria in Section 3.1. Fire flow values of 100 l/s (6000 l/min) is used for single family, 125 l/s (7,500 l/min) is used for townhouses and 200 l/s (12,000 l/min) is used for industrial, commercial, institutional (ICI) lands north end of Goulbourn Forced Road for the Morgans Grant Community. Future watermains are shown at to service the external lands located west and east of the development.

The following is a summary of the number of dwelling units and water demands for each phase not including the external developments and Morgans Grant:

Phase	Dwelling Units		ICI (ha)	Water Demand (l/s)		
	Single Family	Townhouse		Average Daily	Maximum Daily	Maximum Hourly
1	471	477	3.0	10.03	27.97	72.33
2	240	278		5.44	14.51	38.15
3	350	969		3.22	35.24	92.69
4	325	698	11.75	12.42	32.44	80.51

5.4 Proposed System and Staging

Figure 7 shows the proposed water distribution system for the major watermain pipes. As required by the City, a 406mm watermain is extended from Kanata Avenue along the new Goulbourn Forced Road to the north limit of the development to provide water to the Morgans Grant Community. In Phase 1 an internal 406/305mm watermain loop is proposed. Another 305mm watermain loop is planned between Phases 3 and 4. In Phase 2 the 400mm watermain on Walden Drive is extended and connected to the 610mm watermain on the Goulbourn Forced Road.

Due to the physical constraints of the development, the Beaver/Kizell Pond and the railway, it is not possible to loop the trunk watermains in Phase 2, 3 and 4 during the staged construction of the major construction phases. Hydraulic modeling has shown that fire flows can be met during the construction stages. Should the concern for loss of service due to watermain breaks without the major loops in place become a critical factor, consideration could be given to shortening the spacing between hydrants to allow for interconnection with overland pipes while repairs are undertaken. The hydrant spacing reduction can also be implemented on local streets should phasing of the major phases be undertaken.

NO.	DATE	BY	REVISION
1.	02:11:20		GENERAL REVISIONS
2.	02:11:26		REVISIONS PER NEW CONCEPT PLAN
3.	03:04:08		REVISIONS PER NEW CONCEPT PLAN
4.	05:08:16		REVISED AS PER NEW CONCEPT PLAN
5.	06:02:14		REVISED AS PER NEW CONCEPT PLAN
6.	06:06:15		REVISED AS PER NEW CONCEPT PLAN

LEGEND :

- 610ø WATERMAIN
- 406ø WATERMAIN
- 305ø WATERMAIN
- 254ø WATERMAIN
- 203ø WATERMAIN
- 152ø WATERMAIN
- DEVELOPMENT LIMITS

KNL DEVELOPMENTS INC.

Ottawa

CCL/IBI

KANATA LAKES NORTH
WATER DISTRIBUTION PLAN

SERVICEABILITY STUDY

SCALE: 1:5000	
DRAWN: M.M.	DATE: SEPT '02
DESIGN: L.E.	DATE: SEPT '02
CHECKED: R.W.W.	DATE: SEPT '02
PROJECT NO. 3433-LD	DRAWING NO. 5003

FIGURE 7

6.0 UTILITY SERVICING

Proposed servicing at the study area for electrical power, natural gas, telephone and cable television has been determined through meetings and discussions with representative utility authorities. Currently there is a local overhead Hydro and Bell on the existing Goulbourn Forced Road alignment which will be incorporated into the new urban road alignment.

Hydro and Bell have major underground plant on Kanata Avenue at Goulbourn Forced Road. Gas, cable television, telephone and electrical power plant will be extended north with the phases of construction in the new urban Goulbourn Forced Road. Phase 2 will also extend the existing utility services on Walden Drive at the east end of the study area.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations may be drawn from the technical analysis contained in this report.

7.1 Wastewater System (Sanitary Sewer)

The sanitary sewer system detailed in this report can efficiently service all areas of the development without excessive depths or grade raises. Alignment of the sewer is parallel with the storm sewer system for the majority of the study area.

Allowance for sanitary drainage from potential development areas to the west of Phase 1 and 3 and to the north of Phase 2 have been included in the analysis.

7.2 Stormwater System

A dual drainage concept of stormwater conveyance with flexibility for future refinement has been defined in this report. The stormwater trunk sewers have been developed to effectively cover the Beaver Pond catchment areas and has been aligned with the sanitary trunks where possible.

Major system flows are evenly routed along streets to discharge points on the Beaver Pond, park areas and other natural drainage features. Routing is respective of the natural topography so that no extreme grading measures are required to efficiently and effectively complete the major system.

7.3 Water Distribution System

Development of the study area can proceed based on the staged watermain construction outlined in the report. Phases of watermain construction can proceed without the requirement for providing temporary watermain loops.

APPENDIX A

Sanitary Sewer Model (spread sheet)

IBI GROUP
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
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APPENDIX A - SANITARY SEWER DESIGN

KANATA LAKES NORTH
SERVICEABILITY STUDY

JOB #: 3343-LD
DATE: JUN 06
DESIGN: LME

LOCATION			INDIVIDUAL							CUM. RES. FLOW			CUM. COM. & INST. FLOW			INFILTRATION			TOTAL	PROPOSED SEWER						AREA
			RESID. UNITS			MEDIUM DEN.		TOTAL	COMM			PEAK			PEAK	INCR.	CUM.		DESIGN					VEL.	AVAIL.	ID
AREA	FROM MH	TO MH	Singles	Towns	POP	AREA (Ha)	POP	POP	INST (Ha)	POP.	PEAK FACT.	FLOW (l/s)	AREA (Ha)	PEAK FACT.	FLOW (l/s)	AREA (Ha)	AREA (Ha)	FLOW (l/s)	FLOW (l/s)	CAP. l/s	PIPE (mm)	LGTH. (m)	SLOPE %	(full) m/s	CAP. (%)	
PHASE 1	50	40	122		414.8	16.90	1,436.5	1,851.3		1,851.3	3.61	27.41		1.50		42.69	42.69	11.95	39.37	48.04	250	370.0	0.60	0.95	18.05%	EX 2, 4
	60	40	130	200	982.0	18.50	1,572.5	2,554.5		2,554.5	3.50	36.67		1.50		16.12	16.12	4.51	41.18	43.88	250	380.0	0.50	0.87	6.16%	EX 1, 1, 3
	40	20	73		248.2			248.2		4,654.0	3.27	62.47		1.50		4.77	63.58	17.80	80.27	91.44	375	300.0	0.25	0.80	12.21%	5
	30	20	100	277	1,087.9			1,087.9		1,087.9	3.78	16.84		1.50		16.81	16.81	4.71	21.55	39.01	200	250.0	1.30	1.20	44.76%	2, 6
	20	10	46		156.4			156.4	3.00	5,898.3	3.18	76.85	3.00	1.50	2.61	5.80	86.19	24.13	103.59	132.98	450	300.0	0.20	0.81	22.10%	7
	10	EX-A								5,898.3	3.18	76.85	3.00	1.50	2.61		86.19	24.13	103.59	132.98	450	300.0	0.20	0.81	22.10%	
	EX-A	EX-B	26		88.4			88.4		5,986.7	3.17	77.85	3.00	1.50	2.61	5.30	91.49	25.62	106.08	358.23	450	105.0	1.45	2.18	70.39%	
	EX-B	EX-C								5,986.7	3.17	77.85	3.00	1.50	2.61		91.49	25.62	106.08	197.01	500	450.0	0.25	0.97	46.16%	
	EX-C	EX-D			1,637.0			1,637.0	5.60	7,623.7	3.07	95.98	8.60	1.50	7.48	48.90	140.39	39.31	142.77	224.35	525	750.0	0.25	1.00	36.36%	
	EX-D	EX-E			17,313.0			17,313.0	9.80	24,936.7	2.56	261.39	18.40	1.50	16.01	253.20	393.59	110.21	387.61	480.21	675	500.0	0.30	1.30	19.28%	
																	Population and area data taken from the Cluster 9 Sanitary Sewer by J.L Richards Feb. 1987									
PHASE 4	310	300							6.40		4.00		6.40	1.50	5.57	6.40	6.40	1.79	7.36	26.49	200	180.0	0.60	0.82	72.22%	16
	300	280	34		115.6			115.6	5.35	115.6	4.00	1.90	11.75	1.50	10.22	8.41	14.81	4.15	16.27	26.49	200	260.0	0.60	0.82	38.61%	17
	290	280	94	108	611.2			611.2		611.2	3.93	9.84		1.50		10.50	10.50	2.94	12.78	26.49	200	170.0	0.60	0.82	51.75%	18
	280	260		165	445.5			445.5		1,172.3	3.75	18.05	11.75	1.50	10.22	4.95	30.26	8.47	36.74	43.88	250	290.0	0.50	0.87	16.27%	20
	270	260		215	580.5			580.5		580.5	3.94	9.38		1.50		6.95	6.95	1.95	11.32	26.49	200	320.0	0.60	0.82	57.26%	19
	260	190								1752.8	3.63	26.08	11.75	1.50	10.22		37.21	10.42	46.73	48.04	250	340.0	0.60	0.95	2.73%	
	250	240	197		669.8			669.8		669.8	3.91	10.73		1.50		15.30	15.30	4.28	15.01	26.49	200	310.0	0.60	0.82	43.35%	15
	240	230		210	567.0			567.0		1,236.8	3.74	18.96		1.50		9.10	24.40	6.83	25.79	26.49	200	230.0	0.60	0.82	2.66%	14
PHASE 3	230	210		300	810.0			810.0		2,046.8	3.58	30.03		1.50		11.26	35.66	9.98	40.01	43.88	250	240.0	0.50	0.87	8.82%	13
	220	210	77		261.8	19.3	1,636.3	1,898.1		1,898.1	3.60	28.04		1.50		24.36	24.36	6.82	34.86	43.88	250	430.0	0.50	0.87	20.55%	EX 3, 12
	210	200	81		275.4			275.4		4,220.3	3.31	57.31		1.50		6.34	66.36	18.58	75.90	115.72	375	170.0	0.40	1.02	34.41%	11
	200	190	117	352	1348.2			1,348.2		5,568.5	3.20	73.09		1.50		18.61	84.97	23.79	96.88	115.72	375	260.0	0.40	1.02	16.28%	10
	190	180								7,321.3	3.09	92.69	11.75	1.50	10.22		122.18	34.21	137.12	162.86	450	80.0	0.30	0.99	15.81%	

Average daily residential flow = 350 l/cap/day
Residential peaking factor = 1+(14/(4+P^0.5)) , where P = population in thousands
Commercial, Office and School average daily flow = 50,000 l/ha/day
Commercial, Office and School peaking factor = 1.5
Extraneous flow = 0.28 l/s/ha

RESIDENTIAL POPULATION DENSITIES

Residential Medium Density = 25 units/net hectare with 3.4 persons/unit = 85 persons/gross hectare

IBI GROUP
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
K2C OP8

APPENDIX A - SANITARY SEWER DESIGN

JOB #: 3343-LD

KANATA LAKES NORTH
SERVICEABILITY STUDY

DATE: JUN 06
DESIGN: LME

LOCATION			INDIVIDUAL							CUM. RES. FLOW			CUM. COM. & INST. FLOW			INFILTRATION			TOTAL	PROPOSED SEWER						AREA
			RESID. UNITS			MEDIUM DEN.		TOTAL	COMM			PEAK			PEAK	INCR.	CUM.		DESIGN					VEL.	AVAIL.	ID
STREET	FROM MH	TO MH	Singles	Towns	POP	AREA (Ha)	POP	POP	INST (Ha)	POP.	PEAK FACT.	FLOW (l/s)	AREA (Ha)	PEAK FACT.	FLOW (l/s)	AREA (Ha)	AREA (Ha)	FLOW (l/s)	FLOW (l/s)	CAP. l/s	PIPE (mm)	LGTH. (m)	SLOPE %	(full) m/s	CAP. (%)	
PHASE 2	180	170	75	116	568.2			568.2		7,889.5	3.06	98.86	11.75	1.50	10.22	9.73	131.91	36.93	**146.01**	**162.86**	450	160.0	0.30	0.99	10.34%	9
	170	160		130	351.0	2.25	191.3	542.3		8,431.7	3.03	104.67	11.75	1.50	10.22	8.81	140.72	39.40	**154.30**	**162.86**	450	160.0	0.30	0.99	5.26%	8
	160	150	37		125.8			125.8		8,557.5	3.02	106.01	11.75	1.50	10.22	3.75	144.47	40.45	**156.69**	**162.86**	450	270.0	0.30	0.99	3.79%	21
	150	140	41	138	512.0			512.0		9,069.5	3.00	111.43	11.75	1.50	10.22	8.24	152.71	42.76	**164.41**	**188.14**	450	260.0	0.40	1.15	12.61%	22
	140	130	56	140	568.4			568.4		9,637.9	2.97	117.38	11.75	1.50	10.22	9.22	161.93	45.34	**172.95**	**188.14**	450	340.0	0.40	1.15	8.08%	23
	130	110	106		360.4			360.4		9,998.3	2.95	121.12	11.75	1.50	10.22	8.60	170.53	47.75	**179.10**	**188.14**	450	80.0	0.40	1.15	4.81%	24
	120	110				9.5	807.5	807.5		807.5	3.86	12.77		1.50		9.50	9.50	2.66	**15.43**	**26.49**	200	320.0	0.60	0.82	41.75%	EX 4
	110	100								10,805.8	2.92	129.42	11.75	1.50	10.22		180.03	50.41	**190.05**	**210.31**	450	290.0	0.50	1.28	9.63%	
	100	EX-E								10,805.8	2.92	129.42	11.75	1.50	10.22		180.03	50.41	**190.05**	**210.31**	450	190.0	0.50	1.28	9.63%	

Average daily residential flow = 350 l/cap/day
Residential peaking factor = 1+(14/(4+P^0.5)) , where P = population in thousands
Commercial, Office and School average daily flow = 50,000 l/ha/day
Commercial, Office and School peaking factor = 1.5
Extraneous flow = 0.28 l/s/ha

RESIDENTIAL POPULATION DENSITIES

Residential Medium Density = 25 units/net hectare with 3.4 persons/unit = 85 persons/gross hectare

APPENDIX B

SWM Design Parameters

KANATA LAKES NORTH - SERVICEABILITY STUDY
SANITARY DRAINAGE AREAS

Area No.	Area (Ha)	Land Use	Population
1	11.46	Single Family - 98 Townhouse Units - 135	698
2	14.15	Single Family - 100 Townhouse Units - 187	845
3	4.66	Single Family - 32 Townhouse Units - 65	284
4	7.34	Single Family - 122	415
5	4.77	Single Family - 73	248
6	2.66	Townhouse Units - 90	243
7	5.80	Single Family - 46 Institutional - 3.0 ha	156
8	8.81	Medium Density - 2.25 Townhouse Units - 130	542
9	9.73	Single Family - 75 Townhouse Units - 116	568
10	18.61	Single Family - 117 Townhouse Units - 352	1,348
11	6.34	Single Family - 81	275
12	5.11	Single Family - 77	262
13	11.26	Townhouse Units - 300	810
14	9.10	Townhouse Units - 210	567
15	15.30	Single Family - 197	670
16	6.40	Institutional - 6.4 ha	
17	8.41	Single Family - 34 Institutional - 5.35 ha	116
18	10.50	Single Family - 94 Townhouse Units - 108	611
19	6.95	Townhouse Units - 215	581
20	4.95	Townhouse Units - 165	446
21	3.75	Single Family - 37	126
22	8.24	Single Family - 41 Townhouse Units - 138	512
23	9.22	Single Family - 56 Townhouse Units - 140	568
24	8.60	Single Family - 106	360
EX. 1	18.50	Medium Density	1,573
EX. 2	16.90	Medium Density	1,437
EX. 3	19.25	Medium Density	1,636
EX. 4	9.50	Medium Density	808

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APPENDIX B - STORM SEWER DESIGN

KANATA LAKES NORTH
SERVICEABILITY STUDY

JOB #: 3343-LD
DATE: JUN 06
DESIGN: LME

LOCATION			AREA (Ha.)								DESIGN FLOW - RATIONAL METHOD							DESIGN FLOW - MAX INLET			SEWER DATA							
AREA	FROM MH	TO MH	ICI C= 0.80	ROW C= 0.70	TOWNS C= 0.60	MED DEN C= 0.50	SING FAM C= 0.45	PARK C= 0.30	INDIV. 2.78AC	ACCUM. 2.78AC	INLET TIME (min.)	TIME IN PIPE	TOTAL	I 5 YEAR (mm/Hr)	I 10 YEAR (mm/Hr)	PEAK FLOW (l/s)	TOTAL PEAK FLOW (l/s)	TOTAL AREA (Ha.)	ACCUM AREA (Ha.)	TOTAL FLOW (l/s)	CAP. (l/s)	PIPE (mm)	LENGTH (M)	SLOPE (%)	n	VEL. (M/s)	RATIONAL AVAIL. CAP. (l/s)	MAX INLET AVAIL. CAP. (l/s)
OUTLET 1																												
	S10	S9			3.40	11.05			21.03	21.03	19.30	1.24	20.54	71.83		1,510.55	1,510.6	14.45	14.45	1,228.3	2,278.8	975	220.0	0.95	0.013	2.96	768.20	1050.50
	S9	S7					1.28		1.60	22.63	20.54	0.85	21.39	69.09		1,563.59	1,563.6	1.28	15.73	1,337.1	2,278.8	975	150.0	0.95	0.013	2.96	715.16	941.70
	S8	S7					7.34		9.18	9.18	15.00	4.91	19.91	83.56		767.25	767.3	7.34	7.34	623.9	821.2	750	530.0	0.50	0.013	1.80	53.99	197.34
	S7	S2					2.98		3.73	35.54	21.39	0.96	22.35	67.35		2,393.80	2,393.8	2.98	26.05	2,214.3	2,626.5	1050	170.0	0.85	0.013	2.94	232.66	412.21
	S5	S4							0.00	0.00	15.00	0.82	15.82	83.56		0.00		0.00										
				1.60					3.11	3.11	15.00				97.85	304.67	304.7	1.60	1.60	136.0	317.2	525	70.0	0.50	0.013	1.42	12.58	181.25
	S4	S3	3.00				4.10		11.80	11.80	15.82	2.11	17.93	80.99		955.80		7.10										
									0.00	3.11	15.82				94.84	295.28	1,251.1	0.00	8.70	739.5	1,280.5	975	210.0	0.30	0.013	1.66	29.47	541.05
	S6	S3			2.66	14.46			24.54	24.54	20.65	1.43	22.08	68.86		1,689.47		17.12										
				2.45					4.77	4.77	20.65				80.57	384.14	2,073.6	2.45	19.57	1,663.5	3,402.9	1200	250.0	0.70	0.013	2.92	1329.34	1739.50
	S3	S2					2.00		2.50	38.84	22.08	0.80	22.88	66.00		2,563.21		2.00										
									0.00	7.88	22.08				77.21	608.52	3,171.7	0.00	30.27	2,573.0	3,402.9	1200	140.0	0.70	0.013	2.92	231.21	830.00
	S2	S1							0.00	74.38	22.88	0.28	23.16	64.51		4,798.06		0.00										
									0.00	7.88	22.88				75.46	594.74	5,392.8	0.00	56.32	4,787.2	5,469.1	1500	50.0	0.55	0.013	3.00	76.29	681.88
												Areas and Tc taken from Castlefrank Subdivision Storm Sewer Design Sheet by Stantec August 2005																
OUTLET 2																												
	S29	S28	6.40						14.23	14.23	15.00	2.75	17.75	83.56		1,189.32	1,189.3	6.40	6.40	544.0	1,194.4	900	300.0	0.40	0.013	1.82	5.13	650.45
	S28	S26	5.17				2.86		15.08	29.31	17.75	1.89	19.64	75.61		2,216.19	2,216.2	8.03	14.43	1,226.6	2,572.4	1200	250.0	0.40	0.013	2.20	356.20	1345.84
	S27	S26			3.48		7.18		14.79	14.79	15.00	1.48	16.48	83.56		1,235.55	1,235.5	10.66	10.66	906.1	1,335.4	900	180.0	0.50	0.013	2.03	99.89	429.33
	S26	S23			4.88				8.14	52.24	19.64	1.81	21.45	71.05		3,711.45	3,711.5	4.88	29.97	2,547.5	3,937.3	1350	290.0	0.50	0.013	2.67	225.85	1389.85
	S25	S24						3.78	3.15	3.15	15.00	2.50	17.50	83.56		263.42		3.78										
				2.35					4.57	4.57	15.00				97.85	447.49	710.9	2.35	6.13	521.1	821.2	750	270.0	0.50	0.013	1.80	110.34	300.19
	S24	S23			7.23				12.06	15.21	17.50	2.65	20.15	76.27		1,160.17		7.23										
									0.00	4.57	17.50				89.28	408.28	1,568.5	0.00	13.36	1,135.6	1,801.7	1050	320.0	0.40	0.013	2.02	233.28	666.14
	S23	S22							0.00	67.45	21.45	0.47	21.92	67.21		4,533.42		0.00										
									0.00	4.57	21.45				78.64	359.64	4,893.1	0.00	43.33	3,683.1	5,214.6	1500	80.0	0.50	0.013	2.86	321.51	1531.52
	S22	S15							0.00	67.45	21.92	1.92	23.84	66.30		4,471.85		0.00										
									0.00	4.57	21.92				77.57	354.73	4,826.6	0.00	43.33	3,683.1	5,214.6	1500	330.0	0.50	0.013	2.86	387.98	1531.52

Q = 2.78AIC, where:
Q = Peak Flow in Litres per Second (l/s) INLET RESTRICTION 85 L/S/Ha
A = Area in Hectares (ha.)
I = Rainfall Intensity in Millimeters per Hour (mm/hr)
C = Runoff Coefficient

IBI GROUP
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
K2C OP8

APPENDIX B - STORM SEWER DESIGN

KANATA LAKES NORTH
SERVICEABILITY STUDY

JOB #: 3343-LD
DATE: JUN 06
DESIGN: LME

LOCATION			AREA (Ha.)								DESIGN FLOW - RATIONAL METHOD							DESIGN FLOW - MAX INLET			SEWER DATA							
STREET	FROM MH	TO MH	ICI C= 0.80	ROW C= 0.70	TOWNS C= 0.60	MED DEN C= 0.50	SING FAM C= 0.45	PARK C= 0.30	INDIV. 2.78AC	ACCUM. 2.78AC	INLET TIME (min.)	TIME IN PIPE	TOTAL	I 5 YEAR (mm/Hr)	I 10 YEAR (mm/Hr)	PEAK FLOW (l/s)	TOTAL PEAK FLOW (l/s)	TOTAL AREA (Ha.)	ACCUM AREA (Ha.)	TOTAL FLOW (l/s)	CAP. (l/s)	PIPE (mm)	LENGTH (M)	SLOPE (%)	n	VEL. (M/s)	RATI METH AVAIL. CAP. (l/s)	MAX INLET AVAIL. CAP. (l/s)
OUTLET 2 (Cont'd)																												
	S21	S20					8.08		10.11	10.11	15.00	2.72	17.72	83.56		844.60	**844.6**	8.08	8.08	**686.8**	**947.1**	825	280.0	0.40	0.013	1.72	102.50	260.30
	S20	S19					5.95		7.44	17.55	17.72	2.65	20.37	75.69		1,328.45	**1,328.4**	5.95	14.03	**1,192.6**	**1,801.7**	1050	320.0	0.40	0.013	2.02	473.29	609.19
	S19	S18			9.10				15.18	32.73	20.37	1.66	22.03	69.46		2,273.38	**2,273.4**	9.10	23.13	**1,966.1**	**2,572.4**	1200	220.0	0.40	0.013	2.20	299.01	606.34
	S18	S17			11.65				19.43	52.16	22.03	1.68	23.71	66.09		3,447.36	**3,447.4**	11.65	34.78	**2,956.3**	**3,521.6**	1350	240.0	0.40	0.013	2.38	74.26	565.33
	S17	S16					12.47		15.60	67.76	23.71	1.17	24.88	63.04		4,271.71	**4,271.7**	12.47	47.25	**4,016.3**	**4,664.0**	1500	180.0	0.40	0.013	2.56	392.34	647.80
	S16	S15			9.66		10.78		29.60	97.36	24.88	1.59	26.47	61.09		5,947.47	**5,947.5**	20.44	67.69	**5,753.7**	**6,013.7**	1650	260.0	0.40	0.013	2.73	66.26	260.08
	S15	S14							0.00	164.81	26.47	0.62	27.09	58.64		9,665.17		0.00										
									0.00	4.57	26.47				68.58	313.63	**9,978.8**	0.00	111.02	**9,436.7**	**10,002.3**	2400	80.0	0.15	0.013	2.14	23.47	565.57
	S14	S13			4.90		5.91		15.57	180.38	27.09	1.15	28.24	57.75		10,416.21		10.81										
									0.00	4.57	27.09				67.53	308.81	**10,725.0**	0.00	121.83	**10,355.6**	**11,549.6**	2400	170.0	0.20	0.013	2.47	824.61	1194.08
	S12	S13							0.00	0.00	15.00	1.84	16.84	83.56		0.00		0.00										
				1.30					2.53	2.53	15.00				97.85	247.55	**247.5**	1.30	1.30	**110.5**	**283.8**	525	140.0	0.40	0.013	1.27	36.21	173.26
	S13	S11			5.02	4.62			14.80	195.17	28.24	1.68	29.92	56.17		10,963.03		9.64										
									0.00	7.10	28.24				271.61	1,929.19	**12,892.2**	0.00	132.77	**11,285.5**	**13,907.6**	2400	300.0	0.29	0.013	2.98	1015.38	2622.15
OUTLET 3																												
	S36	S35					3.42		4.28	4.28	15.00	2.88	17.88	83.56		357.49	**357.5**	3.42	3.42	**290.7**	**405.1**	600	240.0	0.40	0.013	1.39	47.63	114.43
	S35	S34			4.12		4.46		12.45	16.73	17.88	2.26	20.14	75.27		1,259.41	**1,259.4**	8.58	12.00	**1,020.1**	**1,478.7**	975	260.0	0.40	0.013	1.92	219.24	458.57
	S34	S31			4.20		5.31		13.65	30.38	20.14	2.50	22.64	69.95		2,124.95	**2,124.9**	9.51	21.51	**1,828.4**	**2,572.4**	1200	330.0	0.40	0.013	2.20	447.44	743.95
	S33	S32				9.50			13.21	13.21	15.00	2.75	17.75	83.56		1,103.37	**1,103.4**	9.50	9.50	**807.5**	**1,194.4**	900	300.0	0.40	0.013	1.82	91.07	386.95
	S32	S31					4.60		5.75	18.96	17.75	0.66	18.41	75.61		1,433.60	**1,433.6**	4.60	14.10	**1,198.5**	**1,801.7**	1050	80.0	0.40	0.013	2.02	368.14	603.24
	S31	S30					5.71		7.14	56.48	22.64	1.04	23.68	64.95		3,668.69	**3,668.7**	5.71	41.32	**3,512.3**	**4,664.0**	1500	160.0	0.40	0.013	2.56	995.36	1151.76

Q = 2.78AIC, where:
Q = Peak Flow in Litres per Second (l/s) INLET RESTRICTION 85 L/S/Ha
A = Area in Hectares (ha.)
I = Rainfall Intensity in Millimeters per Hour (mm/hr)
C = Runoff Coefficient

Hydrological Parameters
Urban Subwatersheds

Sub-Area ID	Area (ha)	Hydrological Parameters		
		Total (%)	Directly Connected (%)	TP/CN
Urban Watersheds				
1A	42.0	38	27	75
1B	9.0	--	--	0.5/75
2A	27.0	35	24	75
2B	39.0	--	--	1.33/75
3A	31.9	42	30	75
3B	8.7	--	--	0.84/75
4	19.6	45	23	75
4A	25.4	54	43	75
5A	7.9	42	30	75
5B	9.3	--	--	0.83/75
6A	9.4	42	30	75
6B	8.2	--	--	0.77/75
7	21.6	45	31	75
8	37.3	44	32	75
8A	8.4	54	41	75
9	23.1	--	--	0.25/95
10	49.4	54	43	75
10A	7.5	51	38	75
11	25.0	--	--	0.4/95
12	63.3	48	36	75
12A	8.3	31	21	75
13	27.9	51	38	75
14	35.5	48	37	75
15	7.5	57	57	75
16	240.0	--	--	3.2/80

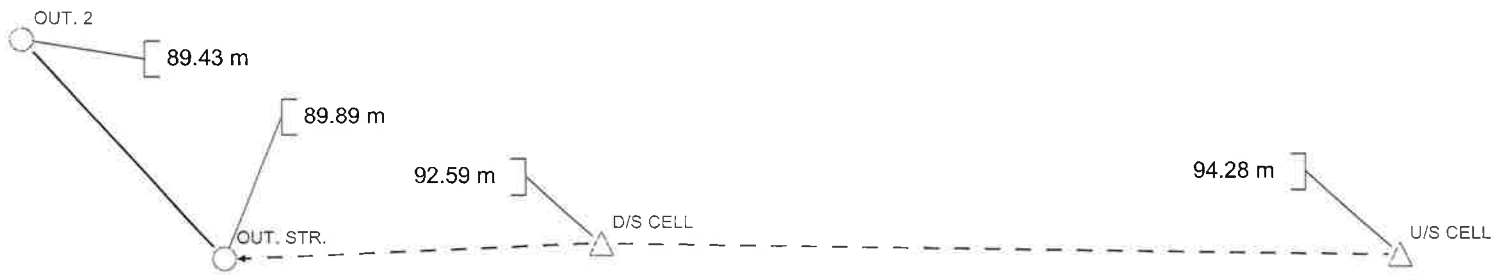
Shirley's Brook Diversion

	Peak Flow Comparison (cms)			
	25 mm Chicago	2 Year SCS	5 Year SCS	100 Year SCS
Pre-Development Flow	0.8	1.6	2.4	4.7
Post-Development Flow	0.6	1.4	2.0	4.0

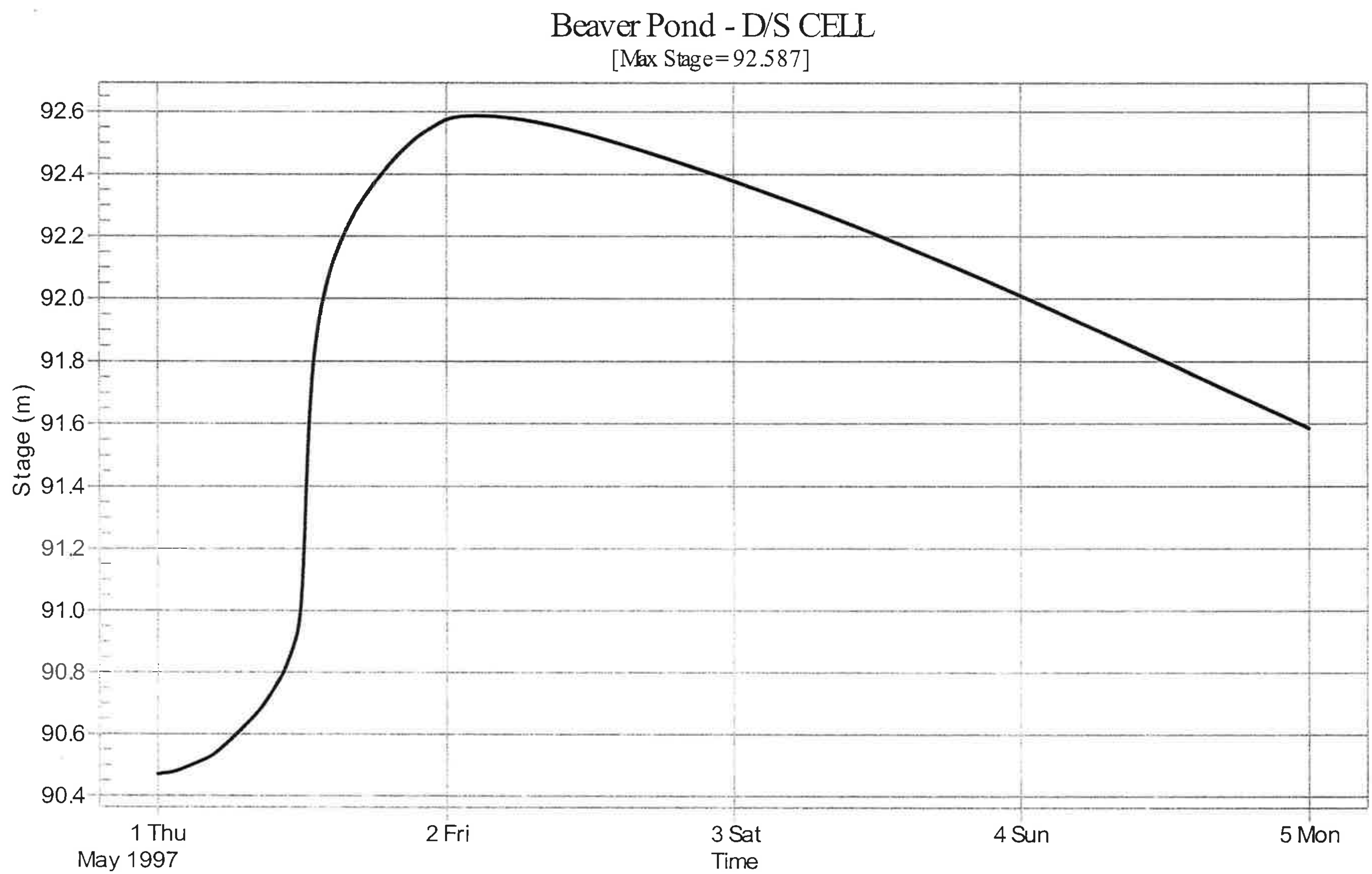
APPENDIX C

SWMM Computer Outputs

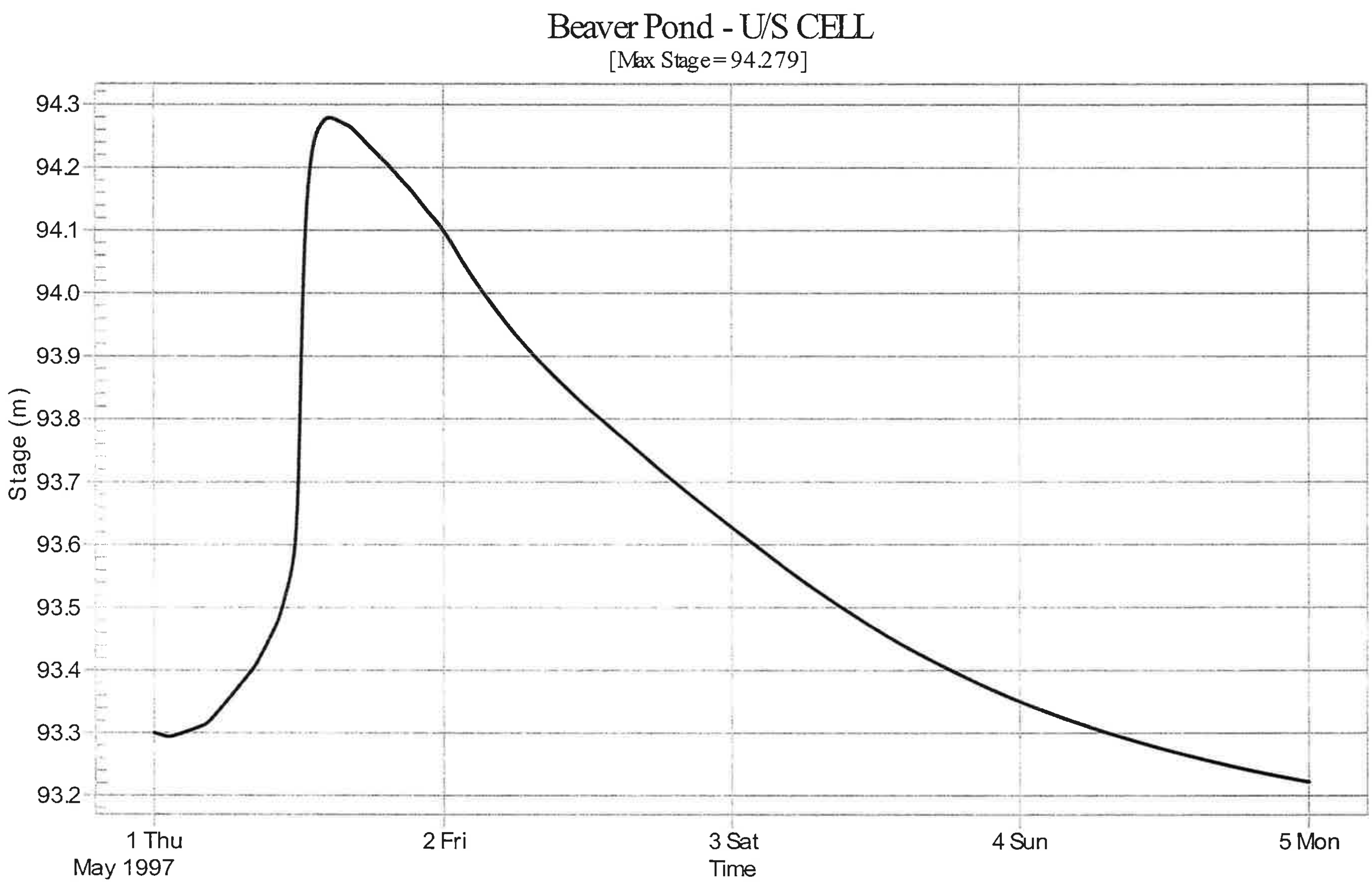
MODEL SCHEMATIC - KNL Lands Beaver Pond - 100 year 24 hour SCS Type II Storm



SWMM Version 9.12 Copyright (c) XP Software	KNL LANDS 3433-LD Licenced To: Cummings Cockburn Ltd [42-914-1763]	06/29/06 Page 1/1



Beaver Pond - D/S CELL
[Max Stage=92.587]
Stage (m)
92.6
92.4
92.2
92.0
91.8
91.6
91.4
91.2
91.0
90.8
90.6
90.4
1 Thu
May 1997
2 Fri
3 Sat
4 Sun
5 Mon
Time


Beaver Pond - U/S CELL
[Max Stage=94.279]
Stage (m)
94.3
94.2
94.1
94.0
93.9
93.8
93.7
93.6
93.5
93.4
93.3
93.2
1 Thu
May 1997
2 Fri
3 Sat
4 Sun
5 Mon
Time

SOME SECTIONS HAVE BEEN EXTRACTED

```
Input File : C:\KNL XPSWMM\knl\knl 100 85 june 06 2m.XP
 Current Directory:   C:\XPS91
 Engine Name: C:\XPS91\swmmengw.exe
 Read      0 line(s) and found    0 items(s) from your cfg file.
           *====================================================*
           |                       XP-SWMM                      |
           |    Storm and Wastewater Management Model           |
           |                    Version 9.10                    |
           |====================================================|
           |                   Developed by                     |
           |====================================================|
           |                                                    |
           |                    XP Software                     |
           |                                                    |
           |               Based on the U.S. EPA                |
           |   Storm Water Management Model Version 4.30        |
           |                                                    |
           |             Originally Developed by                |
           |              Metcalf & Eddy, Inc.                  |
           |             University of Florida                  |
           |           Camp Dresser & McKee Inc.                |
           |               September 1970                       |
           |                                                    |
           |             EPA-SWMM is maintained by              |
           |             Oregon State University                |
           |             Camp Dresser & McKee Inc.              |
           |====================================================|
           |    XP Software      October, 2003                  |
           |      Data File Version --->    11.7                |
           *====================================================*


 *==========================================================*
 |       Input and Output file names by SWMM Layer          |
 *==========================================================*

  Input File  to Layer #     1 JOT.US
  Output File to Layer #     1 JOT.US

 *============================================================*
 |   Special command line arguments in XP-SWMM2000. This      |
 |   now includes program defaults. $Keywords are the program|
 |   defaults.  Other Keywords are from the SWMMCOM.CFG file.|
 |   or the command line or any cfg file on the command line.|
 |   Examples include these in the file xpswm.bat under the   |
 |   section :solve or in the windows version XPSWMM32 in the|
 |   file solve.bat                                           |
 |                                                            |
 |   Note: the cfg file should be in the subdirectory swmxp   |
 |         or defined by the set variable in the xpswm.bat    |
 |         file.  Some examples of the command lines possible|
 |         are shown below:                                   |
 |                                                            |
 |   swmmd swmmcom.cfg                                        |
 |   swmmd my.cfg                                             |
 |   swmmd nokeys nconv5 perv extranwq                        |
 *============================================================*

  $powerstation                          0.0000         1          2
  $perv                                  0.0000         0          4
  $oldegg                                0.0000         0          7
```

$as	0.0000	0	11
$noflat	0.0000	0	21
$oldomega	0.0000	0	24
$oldvol	0.0000	1	28
$implicit	0.0000	1	29
$oldhot	0.0000	1	31
$oldscs	0.0000	0	33
$flood	0.0000	1	40
$nokeys	0.0000	0	42
$pzero	0.0000	0	55
$oldvol2	0.0000	2	59
$storage2	0.0000	3	62
$oldhot1	0.0000	1	63
$pumpwt	0.0000	1	70
$ecloss	0.0000	1	77
$exout	0.0000	0	97
$spatial = 0.90	0.9000	5	124
$djref = -1.0	-0.1000	3	143
$weirlen = 50	50.0000	1	153
$oldbnd	0.0000	1	154
$nogrelev	0.0000	1	161
$ncmid	0.0000	0	164
$new_nl_97	0.0000	2	290
$best97	0.0000	1	294
$newbound	0.0000	1	295
$q_tol = 0.1	0.0010	1	316
$new_storage	0.0000	1	322
$old_iteration	0.0000	1	333
$minlen=10.0	10.0000	1	346
$review_elevation	0.0000	1	383
$use_half_volume	0.0000	1	385
$min_ts = 0.5	0.5000	1	407
$design_restart = on	0.0000	1	412
$zero_value=1.e-05	0.0000	1	414

```
*============================================================*
| Parameter Values on the Tapes Common Block.These are the   |
| values read from the data file and dynamically allocated   |
| by the model for this simulation.                          |
*============================================================*
```

Number of Subcatchments in the Runoff Block (NW)....	0
Number of Channel/Pipes in the Runoff Block (NG)....	0
Runoff Water quality constituents (NRQ)............	0
Runoff Land Uses per Subcatchment (NLU)............	0
Number of Elements in the Transport Block (NET).....	0
Number of Storage Junctions in Transport (NTSE).....	0
Number of Input Hydrographs in Transport (NTH)......	0
Number of Elements in the Extran Block (NEE)........	6
Number of Groundwater Subcatchments in Runoff (NGW).	0
Number of Interface locations for all Blocks (NIE)..	6
Number of Pumps in Extran (NEP)....................	0
Number of Orifices in Extran (NEO).................	2
Number of Tide Gates/Free Outfalls in Extran (NTG)..	1
Number of Extran Weirs (NEW).......................	2
Number of scs hydrograph points....................	1
Number of Extran printout locations (NPO)..........	0
Number of Tide elements in Extran (NTE)............	1
Number of Natural channels (NNC)...................	0
Number of Storage junctions in Extran (NVSE).......	2
Number of Time history data points in Extran(NTVAL).	0
Number of Variable storage elements in Extran (NVST)	6
Number of Input Hydrographs in Extran (NEH)........	2

```
Number of Particle sizes in Transport Block (NPS)...       0
Number of User defined conduits (NHW)...............       6
Number of Connecting conduits in Extran (NECC)......      20
Number of Upstream elements in Transport (NTCC).....      10
Number of Storage/treatment plants (NSTU)...........       0
Number of Values for R1 lines in Transport (NR1)....       0
Number of Nodes to be allowed for (NNOD)............       6
Number of Plugs in a Storage Treatment Unit.........       1


#########################################################
#    Entry made to the HYDRAULIC Layer(Block) of SWMM  #
#    Last Updated October,2000 by XP Software          #
~~~ Extran - Get Cross Section

    KNL LANDS 3433-LD



*=============================================================*
|        HYDRAULICS TABLES IN THE OUTPUT FILE                 |
|  These are the more important tables in the output file.    |
|  You can use your editor to find the table numbers,         |
|  for example: search for Table E20 to check continuity.     |
|  This output file can be imported into a Word Processor     |
|  and printed on US letter or A4 paper using portrait        |
|  mode, courier font, a size of 8 pt. and margins of 0.75    |
|                                                             |
| Table E1   - Basic Conduit Data                             |
| Table E2   - Conduit Factor Data                            |
| Table E3a  - Junction Data                                  |
| Table E3b  - Junction Data                                  |
| Table E4   - Conduit Connectivity Data                      |
| Table E4a  - Dry Weather Flow Data                          |
| Table E4b  - Real Time Control Data                         |
| Table E5   - Junction Time Step Limitation Summary          |
| Table E5a  - Conduit Explicit Condition Summary             |
| Table E6   - Final Model Condition                          |
| Table E7   - Iteration Summary                              |
| Table E8   - Junction Time Step Limitation Summary          |
| Table E9   - Junction  Summary  Statistics                  |
| Table E10  - Conduit   Summary  Statistics                  |
| Table E11  - Area assumptions used in the analysis          |
| Table E12  - Mean conduit information                       |
| Table E13  - Channel losses(H) and culvert info             |
| Table E13a - Culvert Analysis Classification                |
| Table E14  - Natural Channel Overbank Flow Information      |
| Table E14a - Natural Channel Encroachment Information       |
| Table E14b - Floodplain Mapping                             |
| Table E15  - Spreadsheet Info List                          |
| Table E15a - Spreadsheet Reach List                         |
| Table E16  - New Conduit Output Section                     |
| Table E17  - Pump Operation                                 |
| Table E18  - Junction Continuity Error                      |
| Table E19  - Junction Inflow Sources                        |
| Table E20  - Junction Flooding and Volume List              |
| Table E21  - Continuity balance at simulation end           |
| Table E22  - Model Judgement Section                        |
*=============================================================*


Time Control from Hydraulics Job Control
Year.........    1997 Month.......        5
Day..........       1 Hour........        0
```

Minute....... 0 Second...... 0

Control information for simulation

```
Integration cycles................      69120
Length of integration step is......      5.00 seconds
Simulation length.................     96.00 hours
Create equivalent conduits based
on the COURANT condition..........         5

Use metric units for I/O..........         1
Printing starts in cycle..........         1
Intermediate printout intervals of.      500 cycles
Intermediate printout intervals of.     41.67 minutes
Summary printout intervals of......      500 cycles
Summary printout time interval of..     41.67 minutes
Hot start file parameter (REDO)....        0
Initial time......................      0.00 hours

Iteration variables: Flow Tolerance.   0.00010
                     Head Tolerance.   0.00005
    Minimum depth (m or ft).........   0.00001
    Underrelaxation parameter.......   0.85000
    Time weighting parameter........   0.85000
    Conduit roughness factor........   1.00000
    Flow adjustment factor..........   1.00000
    Initial Condition Smoothing.....         0
    Courant Time Step Factor........   1.00000
    Default Expansion/Contraction K.   0.00000
    Default Entrance/Exit K.........   0.00000
    Routing Method..................   Dynamic Wave
Default surface area of junctions...      1.22 square meters.
Minimum Junction/Conduit Depth......   0.00001 meter.
Ponding Area Coefficient...........  50000.00
Ponding Area Exponent..............    5.0000
Minimum Orifice Length.............      5.00 meters.
NJSW input hydrograph junctions.....     2
     or user defined hydrographs....
```

Table E1 - Conduit Data

Inp Num	Conduit Name	Length (mt)	Conduit Class	Area (m^2)	Manning Coef.	Max Width (mt)	Depth (mt)	Trapezoid Side Slopes
1	CULVERT	80.0000	Circular	1.1310	0.0130	1.2000	1.2000	

Total length of all conduits .... 80.0000 meters

Table E2 - Conduit Factor Data

Conduit Name	Number of Barrels	Entrance Loss Coef	Exit Loss Coef	Exp/Contc Coefficnt	Time Weighting Parameter	Low Flow Roughness Factor	Depth at Which n Changes	Flow Routing
CULVERT	1.0000	0.4000	0.6000	0.4000	0.9000	0.0240	0.1500	Standard - Dynamic Wave

```
*======================================================*
| If there are messages about (sqrt(g*d)*dt/dx), or   |
| the sqrt(wave celerity)*time step/conduit length     |
| in the output file all it means is that the          |
| program will lower the internal time step to         |
| satisfy this condition (explicit condition).         |
| You control the actual internal time step by         |
| using the minimum courant time step factor in the    |
| HYDRAULICS job control.  The message put in words    |
| states that the smallest conduit with the fastest    |
| velocity will control the time step selection.       |
| You have further control by using the modify         |
| conduit option in the HYDRAULICS Job Control.        |
*======================================================*
```

Conduit Name	Courant Ratio
CULVERT	0.21

```
*==============================================================*
|              Equivalent Conduit Volume Analysis              |
| A good guideline for this ratio is to not increase the       |
| overall volume of your system by more than 5 to 10 %         |
*==============================================================*
```

Input full depth volume............ 9.0478E+01 cubic meters
New full depth volume.............. 9.0478E+01 cubic meters
New volume / Old volume ratio...... 1.0000

```
*======================================================*
|            Table E3a - Junction Data                 |
*======================================================*
```

Inp Num	Junction Name	Ground Elevation	Crown Elevation	Invert Elevation	Qinst cms	Initial Depth-m	Interface Flow (%)
1	U/S CELL	96.0000	93.0000	93.0000	0.0000	0.3000	100.0000
2	OUT. STR.	94.0000	90.3000	89.0000	0.0000	0.0000	100.0000
3	OUT. 2	94.0000	90.2000	88.9000	0.0000	0.0000	100.0000
4	D/S CELL	94.0000	89.1000	89.1000	0.0000	1.3700	100.0000

```
*======================================================*
|            Table E3b - Junction Data                 |
*======================================================*
```

Inp Num	Junction Name	X Coord.	Y Coord.	Type of Manhole	Type of Inlet	Maximum Capacity	Pavement Shape	Pavement Slope
1	U/S CELL	152.9134	460.8503	No Ponding	Normal		0	0.0000
2	OUT. STR.	39.0866	460.4516	No Ponding	Normal		0	0.0000
3	OUT. 2	19.7364	481.6028	No Ponding	Normal		0	0.0000
4	D/S CELL	75.4670	461.9854	No Ponding	Normal		0	0.0000

```
*======================================================*
|            Table E4 - Conduit Connectivity           |
*======================================================*
```

Input Number	Conduit Name	Upstream Node	Downstream Node	Upstream Elevation	Downstream Elevation

1	CULVERT	OUT. STR.	OUT. 2	89.1000	89.0000	No Design

Storage Junction Data

STORAGE JUNCTION NUMBER OR NAME	JUNCTION TYPE	MAXIMUM OR CONSTANT SURFACE AREA (M2)	PEAK OR CONSTANT VOLUME (CUBIC MET.)	CROWN ELEVATION (M)	DEPTH STARTS FROM
U/S CELL	Stage/Area	122100.0000	171974.9002	96.0000	Node Invert
D/S CELL	Stage/Area	140000.0000	238479.3941	94.0000	Node Invert

Variable storage data for node |U/S CELL

Data Point	Elevation meters	Depth meters	Area m^2	Volume m^3
1	93.0000	0.0000	22500.0000	0.0000
2	93.0375	0.0375	25437.5000	898.2651
3	93.0750	0.0750	28375.0000	1906.7480
4	93.1125	0.1125	31312.5000	3025.4366
5	93.1500	0.1500	34250.0000	4254.3219
6	93.1875	0.1875	37187.5000	5593.3974
7	93.2250	0.2250	40125.0000	7042.6579
8	93.2625	0.2625	43062.5000	8602.0993
9	93.3000	0.3000	46000.0000	10271.7183
10	93.3875	0.3875	52687.5000	14585.9882
11	93.4750	0.4750	59375.0000	19485.8100
12	93.5625	0.5625	66062.5000	24971.0991
13	93.6500	0.6500	72750.0000	31041.7953
14	93.7375	0.7375	79437.5000	37697.8547
15	93.8250	0.8250	86125.0000	44939.2436
16	93.9125	0.9125	92812.5000	52765.9361
17	94.0000	1.0000	99500.0000	61177.9118
18	94.1250	1.1250	102325.0000	73791.5624
19	94.2500	1.2500	105150.0000	86758.3492
20	94.3750	1.3750	107975.0000	100078.2716
21	94.5000	1.5000	110800.0000	113751.3291
22	94.6250	1.6250	113625.0000	127777.5211
23	94.7500	1.7500	116450.0000	142156.8473
24	94.8750	1.8750	119275.0000	156889.3071
25	95.0000	2.0000	122100.0000	171974.9002
26	96.0000	3.0000	122100.0000	171974.9002

Variable storage data for node |D/S CELL

Data Point	Elevation meters	Depth meters	Area m^2	Volume m^3
1	89.1000	0.0000	10000.0000	0.0000
2	89.2712	0.1713	15000.0000	2126.2085
3	89.4425	0.3425	20000.0000	5112.8375
4	89.6137	0.5138	25000.0000	8958.0097
5	89.7850	0.6850	30000.0000	13660.8845
6	89.9562	0.8563	35000.0000	19221.0125
7	90.1275	1.0275	40000.0000	25638.1253
8	90.2987	1.1987	45000.0000	32912.0494
9	90.4700	1.3700	50000.0000	41042.6663

10	90.5362	1.4363	51750.0000	44412.9688
11	90.6025	1.5025	53500.0000	47899.2144
12	90.6687	1.5688	55250.0000	51501.4027
13	90.7350	1.6350	57000.0000	55219.5333
14	90.8012	1.7012	58750.0000	59053.6060
15	90.8675	1.7675	60500.0000	63003.6205
16	90.9337	1.8337	62250.0000	67069.5765
17	91.0000	1.9000	64000.0000	71251.4738
18	91.1250	2.0250	70750.0000	79669.8244
19	91.2500	2.1500	77500.0000	88932.2464
20	91.3750	2.2750	84250.0000	99038.6859
21	91.5000	2.4000	91000.0000	109989.1017
22	91.6250	2.5250	97750.0000	121783.4614
23	91.7500	2.6500	104500.0000	134421.7391
24	91.8750	2.7750	111250.0000	147903.9137
25	92.0000	2.9000	118000.0000	162229.9680
26	92.0625	2.9625	119812.5000	169661.5367
27	92.1250	3.0250	121625.0000	177206.3877
28	92.1875	3.0875	123437.5000	184864.5210
29	92.2500	3.1500	125250.0000	192635.9366
30	92.3125	3.2125	127062.5000	200520.6344
31	92.3750	3.2750	128875.0000	208518.6144
32	92.4375	3.3375	130687.5000	216629.8766
33	92.5000	3.4000	132500.0000	224854.4210
34	92.5125	3.4125	133437.5000	226516.5269
35	92.5250	3.4250	134375.0000	228190.3516
36	92.5375	3.4375	135312.5000	229875.8951
37	92.5500	3.4500	136250.0000	231573.1573
38	92.5625	3.4625	137187.5000	233282.1384
39	92.5750	3.4750	138125.0000	235002.8382
40	92.5875	3.4875	139062.5000	236735.2567
41	92.6000	3.5000	140000.0000	238479.3941
42	94.0000	4.9000	140000.0000	238479.3941

Orifice Data

Orifice Name	From Junction	To Junction	Type	Area (m2)	Depth (m)	Discharge Coefficient	Height Above Junction (m)
ORIF2	U/S CELL	D/S CELL	Circ Side	0.30	0.00	0.580	0.000
ORIF#5.1	D/S CELL	OUT. STR.	Circ Side	0.28	0.60	0.620	1.370

```
====> EQUIVALENT PIPE INFORMATION FOR ORIFICE          1
      CONDUIT NAME..........................        ORIF2
      Upstream node.........................     U/S CELL
      Downstream node.......................     D/S CELL
      PIPE DIAMETER.......................           0.62
      PIPE LENGTH.........................         300.00
      MANNINGS ROUGHNESS..................         0.0065
      INVERT ELEVATION AT UPSTREAM END.....       93.0000
      INVERT ELEVATION AT DOWNSTREAM END...       92.9970

====> EQUIVALENT PIPE INFORMATION FOR ORIFICE          2
      CONDUIT NAME..........................     ORIF#5.1
      Upstream node.........................     D/S CELL
      Downstream node.......................    OUT. STR.
      PIPE DIAMETER.......................           0.60
      PIPE LENGTH.........................         300.00
      MANNINGS ROUGHNESS..................         0.0059
      INVERT ELEVATION AT UPSTREAM END.....       90.4700
```

INVERT ELEVATION AT DOWNSTREAM END...   90.4670

Note: For a Bottom-outlet orifice the invert elevation of the downstream node will be adjusted to accomodate the equivalent conduit. Conduit grades are not affected.

==
| Weir Data |
==

Weir Name	From Junction	To Junction	Type	Crest Height(ft)	Weir Top (m)	Weir Length (m)	Discharge Coefficient	Weir Power
WEIR#1	U/S CELL	D/S CELL	1	0.80	3.00	2.00	1.7500	1.5000
OUTL.1	D/S CELL	OUT. STR.	1	3.50	4.90	2.00	1.8400	1.5000

==
| FREE OUTFALL DATA (DATA GROUP I1) |
| BOUNDARY CONDITION ON DATA GROUP J1 |
==

Outfall at Junction....OUT. 2   has boundary condition number...   1

==
| Weir Outfall Data |
| Boundary Condition on data group J1 |
==

==
| INTERNAL CONNECTIVITY INFORMATION |
==

CONDUIT	JUNCTION	JUNCTION
ORIF2	U/S CELL	D/S CELL
ORIF#5.1	D/S CELL	OUT. STR.
WEIR#1	U/S CELL	D/S CELL
OUTL.1	D/S CELL	OUT. STR.
FREE # 1	OUT. 2	BOUNDARY

==
| Boundary Condition Information |
| Data Groups J1-J4 |
==

BC NUMBER..   1 Control water surface elevation is..   89.400 meters.

==
| XP Note Field Summary |
==

================================
| Conduit Convergence Criteria |
================================

```
          Conduit         Full      Conduit
             Name         Flow        Slope
------------------  ----------  ----------
          CULVERT       1.3784      0.0012
            ORIF2       0.6058      0.0000
         ORIF#5.1       0.5941      0.0000
```

```
*==================================*
|    Initial Model Condition       |
| Initial Time =       0.00 hours  |
*==================================*
```

```
 Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
  U/S CELL/   0.30 /    93.30        OUT. STR./   0.40 /    89.40           OUT. 2/   0.50 /    89.40
  D/S CELL/   1.37 /    90.47

   Conduit/        FLOW   ===> "*" Conduit uses the normal flow option.
   CULVERT/        0.00             ORIF2/       0.00         ORIF#5.1/       0.00
    WEIR#1/        0.00            OUTL.1/       0.00         FREE # 1/       0.00

   Conduit/   Velocity
   CULVERT/        0.00             ORIF2/       0.00         ORIF#5.1/       0.00

   Conduit/ Cross Sectional Area
   CULVERT/        0.23             ORIF2/       0.13         ORIF#5.1/       0.00

   Conduit/ Hydraulic Radius
   CULVERT/        0.18             ORIF2/       0.14         ORIF#5.1/       0.00

   Conduit/ Upstream/ Downstream Elevation
   CULVERT/    89.40/    89.40            ORIF2/    93.30/    93.00        ORIF#5.1/    89.40/    89.40
```

EXTRACTED INFORMATION

```
*============================================================*
|         Table E7 -  Iteration Summary                      |
*============================================================*

Total number of time steps simulated...........       69120
Total number of passes in the simulation.......       69681
Total number of time steps during simulation....      69123
Ratio of actual # of time steps / NTCYC.........      1.000
Average number of iterations per time step......      1.008
Average  time step size(seconds)................      5.000
Smallest time step size(seconds)................      5.000
Largest  time step size(seconds)................      5.000
Average minimum Conduit Courant time step (sec).      5.000
Average minimum implicit time step (sec)........      1.000
Average minimum junction time step (sec)........      1.000
Average Courant Factor Tf.......................      1.000
Number of times omega reduced...................          0
```

```
*============================================================*
|     Table E8 - Junction Time Step Limitation Summary       |
*============================================================*
|   Not Convr = Number of times this junction did not        |
|               converge during the simulation.              |
|   Avg Convr = Average junction iterations.                 |
|   Conv err  = Mean convergence error.                      |
|   Omega Cng = Change of omega during iterations            |
|   Max Itern = Maximum number of iterations                 |
```

Junction	Not Convr	Avg Convr	Total Itt	Omega Cng	Max Itern	Ittrn >10	Ittrn >25	Ittrn >40
U/S CELL	0	1.00	69348	0	51	1	1	1
OUT. STR.	0	1.00	69416	0	3	0	0	0
OUT. 2	0	1.02	70232	0	3	0	0	0
D/S CELL	0	1.01	69990	0	5	0	0	0

Total number of iterations for all junctions.. 278986
Minimum number of possible iterations......... 276492
Efficiency of the simulation................. 1.01
Good Efficiency

Extran Efficiency is an indicator of the efficiency of the simulation. Ideal efficiency is one iteration per time step. Altering the underrelaxation parameter, lowering the time step, increasing the flow and head tolerance are good ways of improving the efficiency, another is lowering the internal time step. The lower the efficiency generally the faster your model will run. If your efficiency is less than 1.5 then you may try increasing your time step so that your overall simulation is faster. Ideal efficiency would be around 2.0

Good Efficiency	< 1.5	mean iterations
Excellent Efficiency	< 2.5 and > 1.5	mean iterations
Good Efficiency	< 4.0 and > 2.5	mean iterations
Fair Efficiency	< 7.5 and > 4.0	mean iterations
Poor Efficiency	> 7.5	mean iterations

Table E9 - JUNCTION SUMMARY STATISTICS

The Maximum area is only the area of the node, it does not include the area of the surrounding conduits

Junction Name	Ground Elevation meters	Uppermost PipeCrown Elevation meters	Maximum Junction Elevation meters	Time of Occurence Hr. Min.	Meters of Surcharge at Max Elevation	Freeboard of node meters	Maximum Junction Area m^2	Maximum Gutter Depth meters	Maximum Gutter Width meters	Maximum Gutter Velocity m/s
U/S CELL	96.0000	93.0000	94.2791	14 32	1.2791	1.7209	105806.99	0.0000	0.0000	0.0000
OUT. STR.	94.0000	90.3000	89.8859	26 31	0.0000	4.1141	1.2200	0.0000	0.0000	0.0000
OUT. 2	94.0000	90.2000	89.4302	26 31	0.0000	4.5698	1.2200	0.0000	0.0000	0.0000
D/S CELL	94.0000	89.1000	92.5872	26 29	3.4872	1.4128	139041.39	0.0000	0.0000	0.0000

Table E10 - CONDUIT SUMMARY STATISTICS

Note: The peak flow may be less than the design flow and the conduit may still surcharge because of the downstream boundary conditions.

* denotes an open conduit that has been overtopped this is a potential source of severe errors

Conduit Name	Design Flow (cms)	Conduit Design Velocity (m/s)	Maximum Vertical Depth (mm)	Maximum Computed Flow (cms)	Time of Occurence Hr. Min.	Maximum Computed Velocity (m/s)	Time of Occurence Hr. Min.	Ratio of Max. to Design Flow	Maximum Depth at Pipe Ends Upstream (m)	Dwnstrm (m)	Ratio d/D US	DS

CULVERT	1.3784	1.2188	1200.000	0.9596	26	31	1.2719	26	32	0.6962	89.8859	89.5302	.6550	.4418
ORIF2	0.6058	0.1418	618.0390	0.6766	14	33	2.2621	14	33	1.1169	94.2791	93.5245	2.069	.8535
ORIF#5.1	0.5941	0.1516	597.0824	0.9596	26	30	3.3779	26	30	1.6153	92.5872	91.0640	3.545	1.000
WEIR#1	Undefnd	Undefnd	Undefn	1.1606	14	33								
OUTL.1	Undefnd	Undefnd	Undefn	0.0000	0	0								
FREE # 1	Undefnd	Undefnd	Undefn	0.9596	26	31								

Table E11. Area assumptions used in the analysis
Subcritical and Critical flow assumptions from
Subroutine Head. See manual for more information.

Conduit Name	Duration of Dry Flow(min)	Duration of Sub-Critical Flow(min)	Durat. of Upstream Critical Flow(min)	Durat. of Downstream Critical Flow(min)	Maximum Hydraulic Radius-m	Maximum X-Sect Area(m^2)	Maximum Vel*D (m^2/s)
CULVERT	0.0000	744.7500	0.0000	5015.2500	0.3395	0.7544	0.8370
ORIF2	0.0000	0.0000	0.0000	5760.0000	0.1851	0.3043	2.0433
ORIF#5.1	0.5833	0.0000	0.0000	5759.4167	0.1790	0.2844	4.5843

Table E12. Mean Conduit Flow Information

Conduit Name	Mean Flow (cms)	Total Flow (m^3)	Mean Percent Change	Low Flow Weightng	Mean Froude Number	Mean Hydraulic Radius	Mean Cross Area	Mean Conduit Roughness
CULVERT	0.7361	254406.39	0.0004	1.0000	0.5015	0.3063	0.6221	0.0130
ORIF2	0.2933	101349.44	0.0004	1.0000	0.6302	0.1582	0.2237	0.0065
ORIF#5.1	0.7362	254423.12	0.0004	0.9997	1.1524	0.1417	0.2547	0.0059
WEIR#1	0.1375	47520.656						
OUTL.1	0.0000	0.0000						
FREE # 1	0.7361	254405.34						

Table E13. Channel losses(H), headwater depth (HW), tailwater
depth (TW), critical and normal depth (Yc and Yn).
Use this section for culvert comparisons

Conduit Name	Maximum Flow	Head Loss	Friction Loss	Critical Depth	Normal Depth	HW Elevat	TW Elevat	
CULVERT	0.9596	0.1511	0.0923	0.5302	0.7375	89.8859	89.5302	Max Flow
ORIF2	0.6766	0.0000	0.7543	0.5275	0.6180	94.2791	93.5245	Max Flow
ORIF#5.1	0.9596	0.0000	1.5135	3.4872	0.5971	92.5872	91.0640	Max Flow

Table E13a. CULVERT ANALYSIS CLASSIFICATION,
and the time the culvert was in a particular
classification during the simulation. The time is
in minutes. The Dynamic Wave Equation is used for
all conduit analysis but the culvert flow classification
condition is based on the HW and TW depths.

Conduit Name	Mild Slope Critical D Outlet Control	Mild Slope TW Control Outlet Control	Steep Slope TW Insignf Entrance Control	Slug Flow Outlet/ Entrance Control	Mild Slope TW > D Outlet Control	Mild Slope TW <= D Outlet Control	Outlet Control	Inlet Control	Inlet Configuration

CULVERT	846.7500	4911.7500	0.0000	1.5000	0.0000	0.0000	0.0000	0.0000 None
ORIF2	666.7500	4007.7500	0.0000	0.0000	0.0000	0.0000	1085.5000	0.0000 None
ORIF#5.1	723.5000	10.7500	1.5000	0.0000	0.0000	0.0000	5024.2500	0.0000 None

Kinematic Wave Approximations
Time in Minutes for Each Condition

Conduit Name	Duration of Normal Flow	Slope Criteria	Super-Critical	Roll Waves
CULVERT	0.0000	111.1667	0.0000	0.0000
ORIF2	0.0000	0.0000	0.0000	0.0000
ORIF#5.1	0.0000	0.0000	0.0000	0.0000

Table E15 - SPREADSHEET INFO LIST
Conduit Flow and Junction Depth Information for use in spreadsheets. The maximum values in this table are the true maximum values because they sample every time step. The values in the review results may only be the maximum of a subset of all the time steps in the run.
Note: These flows are only the flows in a single barrel.

Conduit Name	Maximum Flow (cms)	Total Flow (m^3)	Maximum Velocity (m/s)	Maximum Volume (m^3)	##	Junction Name	Invert Elevation (m)	Maximum Elevation (m)
CULVERT	0.9596	254406.3866	1.2719	50.1726	##	U/S CELL	93.0000	94.2791
ORIF2	0.6766	101349.4407	2.2621	86.1570	##	OUT. STR.	89.0000	89.8859
ORIF#5.1	0.9596	254423.1216	3.3779	84.6798	##	OUT. 2	88.9000	89.4302
WEIR#1	1.1606	47520.6560	0.0000	0.0000	##	D/S CELL	89.1000	92.5872
OUTL.1	0.0000	0.0000	0.0000	0.0000	##			
FREE # 1	0.9596	254405.3399	0.0000	0.0000	##			

Table E15a - SPREADSHEET REACH LIST
Peak flow and Total Flow listed by Reach or those conduits or diversions having the same upstream and downstream nodes.

Upstream Node	Downstream Node	Maximum Flow (cms)	Total Flow (m^3)
OUT. STR.	OUT. 2	0.9596	254406.387
U/S CELL	D/S CELL	1.8371	148870.097
D/S CELL	OUT. STR.	0.9596	254423.122

Table E16. New Conduit Information Section
Conduit Invert (IE) Elevation and Conduit Maximum Water Surface (WS) Elevations

Conduit Name	Upstream Node	Downstream Node	IE Up	IE Dn	WS Up	WS Dn	Conduit Type
CULVERT	OUT. STR.	OUT. 2	89.1000	89.0000	89.8859	89.5302	Circular

ORIF2	U/S CELL	D/S CELL	93.0000	92.9970	94.2791	93.5245	Circ Orif
ORIF#5.1	D/S CELL	OUT. STR.	90.4700	90.4670	92.5872	91.0640	Circ Orif

```
*=========================================================================*
|   Table E18 - Junction Continuity Error.   Division by Volume added 11/96  |
|                                                                            |
|  Continuity Error = Net Flow + Beginning Volume - Ending Volume            |
|                     --------------------------------------------------    |
|                     Total Flow + (Beginning Volume + Ending Volume)/2      |
|                                                                            |
|  Net Flow   = Node Inflow - Node Outflow                                   |
|  Total Flow = absolute (Inflow + Outflow                                   |
|  Intermediate column is a judgement on the node continuity error.          |
|                                                                            |
|  Excellent  < 1 percent    Great  1 to  2 percent  Good  2 to  5 percent   |
|  Fair   5 to 10  percent   Poor  10 to 25 percent  Bad  25 to 50 percent   |
|  Terrible > 50  percent                                                    |
*=========================================================================*
```

Junction Name	<------Continuity Error -------> Volume	% of Node	% of Inflow	Remaining Volume	Beginning Volume	Net Flow Thru Node	Total Flow Thru Node	Failed to Converge
U/S CELL	-1456.5146	-0.4830	0.4366	6934.6074	10278.9998	-4800.9070	292934.7167	0
OUT. STR.	-30.5324	-0.0060	0.0092	58.7387	11.4480	16.7583	508829.5083	0
OUT. 2	-6.0105	-0.0012	0.0018	18.4608	11.5685	0.8818	508811.7265	0
D/S CELL	6932.2831	1.0310	2.0782	118075.7397	41049.9493	83958.0735	592799.7384	0

The total continuity error was   5439.2   cubic meters
The remaining total volume was 1.25088E+05 cubic meters
Your mean node continuity error was   Excellent
Your worst node continuity error was   Good

```
*=====================================================*
|  Table E19 - Junction Inflow Sources                |
|              Units are either ft^3 or m^3           |
|              depending on the units in your model.|
*=====================================================*
```

Junction Name	Constant Inflow to Node	User Inflow to Node	Interface Inflow to Node	DWF Inlow to Node	Inflow through Outfall	RNF Layer Inflow to Node	Outflow from Node	Evaporation from Node
U/S CELL	0.0000	144064.6200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
OUT. 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	254405.3399	0.0000
D/S CELL	0.0000	189506.5200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

```
*======================================================*
| Table E20 - Junction Flooding and Volume Listing.    |
|             The maximum volume is the total volume   |
|             in the node including the volume in the |
|             flooded storage area. This is the max    |
|             volume at any time. The volume in the    |
|             flooded storage area is the total volume|
|             above the ground elevation, where the    |
|             flooded pond storage area starts.        |
| The fourth column is instantaneous, the fifth is the|
| sum of the flooded volume over the entire simulation|
| Units are either ft^3 or m^3 depending on the units.|
*======================================================*
```

Junction Name	Surcharged Time (min)	Flooded Time(min)	Out of System Flooded Volume	Maximum Volume	Stored in System Ponding Allowed Flood Pond Volume

U/S CELL	5760.0000	0.0000	0.0000	89824.6505	0.0000
OUT. STR.	0.0000	0.0000	0.0000	1.0809	0.0000
OUT. 2	0.0000	0.0000	0.0000	0.6468	0.0000
D/S CELL	5760.0000	0.0000	0.0000	236696.1262	0.0000

```
*===================================*
| Simulation Specific Information  |
*===================================*
Number of Input Conduits..........     1 Number of Simulated Conduits......      6
Number of Natural Channels........     0 Number of Junctions...............      4
Number of Storage Junctions.......     2 Number of Weirs...................      2
Number of Orifices................     2 Number of Pumps...................      0
Number of Free Outfalls...........     1 Number of Tide Gate Outfalls......      0
```

```
*==========================================================*
| Average % Change in Junction or Conduit is defined as:  |
| Conduit  % Change ==> 100.0 ( Q(n+1) - Q(n) ) / Qfull   |
| Junction  Change ==> 100.0 ( Y(n+1) - Y(n) ) / Yfull    |
*==========================================================*

The Conduit with the largest average change was..WEIR#1     with     0.001 percent
The Junction with the largest average change was.D/S CELL   with     0.005 percent
The Conduit with the largest sinuosity was.......ORIF#5.1   with     2.208
```

```
*=====================================================================*
| Table E21. Continuity balance at the end of the simulation          |
|            Junction Inflow, Outflow or Street Flooding              |
| Error = Inflow  + Initial Volume - Outflow - Final   Volume         |
*=====================================================================*
```

Inflow Junction	Inflow Volume, m^3	Average Inflow, cms
U/S CELL	144064.6200	0.4169
D/S CELL	189506.5200	0.5483
OUT. 2	-254405.3399	-0.7361

Outflow Junction	Outflow Volume m^3	Average Outflow, cms
OUT. 2	254405.3399	0.7361

```
*=====================================================*
| Initial system volume        =     51351.9656 Cu M  |
| Total system inflow volume   =    333571.1400 Cu M  |
| Inflow + Initial volume      =    384923.1056 Cu M  |
*=====================================================*
| Total system outflow         =    254405.3399 Cu M  |
| Volume left in system        =    125087.5466 Cu M  |
| Evaporation                  =         0.0000 Cu M  |
| Outflow + Final Volume       =    379492.8864 Cu M  |
*=====================================================*
```

```
*==============================================*
| Total Model Continuity Error                 |
| Error in Continuity, Percent =        1.4107 |
| Error in Continuity, m^3     =      5430.219 |
| + Error means a continuity loss, - a gain    |
*==============================================*
```

```
###################################################
# Table E22. Numerical Model judgement section    #
###################################################

Your overall error was                                          1.4107 percent
Worst nodal error was in node D/S CELL         with         1.1303 percent
Of the total inflow this loss was                               2.0782 percent
Your overall continuity error was                   Great
                                                   Excellent Efficiency
Efficiency of the simulation                        1.01
Most Number of Non Convergences at one Node         0.
Total Number Non Convergences at all Nodes          0.
Total Number of Nodes with Non Convergences         0.

===> Hydraulic model simulation ended normally.
===> XP-SWMM Simulation ended normally.
===> Your input file was named  : C:\KNL XPSWMM\knl\knl 100 85 june 06 2m.DAT
===> Your output file was named : C:\KNL XPSWMM\knl\knl 100 85 june 06 2m.out

*=================================================================*
|             SWMM Simulation Date and Time Summary               |
*=================================================================*
| Starting Date... June       29, 2006  Time...   12:27:36:76  |
|   Ending Date... June       29, 2006  Time...   12:28:39:33  |
|  Elapsed Time...    1.04283 minutes or     62.57000 seconds  |
*=================================================================*
```

```
==================================================================================

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999     999  ==========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O     9   9   9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9   9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O       9999    9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO           9       9 ==========
                                                      9   9   9   9 # 3699242
       StormWater Management HYdrologic Model          999     999  ==========

 **************************************************************************
 *************************** SWMHYMO-99 Ver/4.02 **************************
 *******  A single event and continuous hydrologic simulation model  *******
 *******     based on the principles of HYMO and its successors      *******
 *******                 OTTHYMO-83 and OTTHYMO-89.                  *******
 **************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.           *******
 *******                 Ottawa,  Ontario: (613) 727-5199            *******
 *******                 Gatineau, Quebec: (819) 243-6858            *******
 *******                 E-Mail: swmhymo@jfsa.Com                    *******
 **************************************************************************

 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: Cumming Cockburn Limited                    +++++++
 +++++++                Ottawa                SERIAL#:3699242       +++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 **************************************************************************
 *******          ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *******
 *******          Maximum value for ID numbers  :     10            *******
 *******          Max. number of rainfall points:  15000            *******
 *******          Max. number of flow points    :  15000            *******
 **************************************************************************

 *** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in START) ***
 ***-------------------------------------------------------------------***
 ***     ID:  Hydrograph IDentification numbers, (1-10).                ***
 ***   NHYD:  Hydrograph reference numbers, (6 digits or characters).   ***
 ***   AREA:  Drainage area associated with hydrograph, (ac.) or (ha.). ***
 *** QPEAK:  Peak flow of simulated hydrograph, (ft^3/s) or (m^3/s).    ***
 *** TpeakDate_hh:mm is the date and time of the peak flow.             ***
 ***  R.V.:  Runoff Volume of simulated hydrograph, (in) or (mm).       ***
 ***  R.C.:  Runoff Coefficient of simulated hydrograph, (ratio).       ***
 ***     *:  see WARNING or NOTE message printed at end of run.         ***
 ***    **:  see  ERROR  message printed at end of run.                 ***
 **************************************************************************
 **************************************************************************

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

 **************************************************************************

 *********************   S U M M A R Y   O U T P U T   ********************
 **************************************************************************
 *       DATE: 2006-06-29     TIME: 12:34:39     RUN COUNTER: 004808      *
 **************************************************************************
 * Input   filename: C:\PROGRA~1\SWMHYMO\projects\KNL\KNLJN06.DAT         *
 * Output  filename: C:\PROGRA~1\SWMHYMO\projects\KNL\KNLJN06.out         *
 * Summary filename: C:\PROGRA~1\SWMHYMO\projects\KNL\KNLJN06.sum         *
 * User comments:                                                         *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 **************************************************************************

```

```

 RUN:COMMAND#
 001:0001------------------------------------------------------------------------------
     START
       [TZERO =    .00 hrs on        0]
       [METOUT=   2    (1=imperial, 2=metric output)]
       [NSTORM=   0 ]
       [NRUN  =   1 ]
#=========================
#   KNL.DAT          ||
#   xxxxx-RS-21            ||
#=========================
#=========================================================
#
#       ====              KNL LANDS                     ====
#       ====        KANATA (CITY OF OTTAWA)             ====
#       ====        SWM (EXISTING CONDITIONS)           ====
#=========================================================
#=========================================================
#       ====         CUMMING COCKBURN LTD               ====
#=========================================================
#                   2 YEAR STM SCS II 24 HRS 12 MIN
#                        SEPTEMBER 2002                 ====
#=========================================================
 001:0002-------------------------------------------------------------------------------
     MASS STORM
      Filename = C:\PROGRA~1\SWMHYMO\projects\KNL\SCS12.24H
      Comment  = SCS TYPE II - 24 HOURS DURATION, 12 MIN. TIME STEP
      [SDT=12.00:SDUR=  24.00:PTOT=  45.50]
#=================================
# AREA   (TOTAL Area)             ||
#=================================
 001:0003---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        02:000100   360.00    1.647 No_date   17:06   18.01 .396
      [CN= 80.0: N= 3.00]
      [Tp= 4.40:DT= 6.00]
#=========================================================
#=========================================================
#       ====        SWM (FUTURE   CONDITIONS)           ====
#=========================================================
#                   2 YEAR STM SCS II 24 HRS 12 MIN
#                        SEPTEMBER 2002                 ====
#=========================================================
#============================================================
# AREA 3A (URBAN PORTION of Area North of Campeau Drive)      ||
#============================================================
 001:0004---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      01:000100    31.90     .760 No_date   12:36   25.39 .558
      [XIMP=.30:TIMP=.42]
      [LOSS= 2 :CN= 75.0]
      [Pervious    area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious  area: IAimp=  .80:SLPI= .20:LGI=1760.:MNI=.013:SCI=   .0]
#============================================================
# AREA 3B (GOLF PORTION of Area North of Campeau Drive)      ||
#============================================================
 001:0005---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        02:000100     8.70     .117 No_date   12:48   15.05 .331
      [CN= 75.0: N= 3.00]
      [Tp=  .84:DT= 3.00]
 001:0006---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             01:000100    31.90     .760 No_date   12:36   25.39  n/a
                       + 02:000100     8.70     .117 No_date   12:48   15.05  n/a
      [DT= 3.00]  SUM=   03:000321    40.60     .872 No_date   12:36   23.18  n/a
#============================================================
# AREA 2A (URBAN PORTION of Area North of Campeau Drive)      ||
```

```
#=============================================================================
 001:0007---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000100    27.00      .767 No_date   12:21   23.47 .516
       [XIMP=.24:TIMP=.35]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 920.:MNI=.013:SCI=    .0]
#=============================================================================
# AREA 2B (GOLF PORTION of Area North of Campeau Drive)       ||
#=============================================================================
 001:0008---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       02:000100    39.00      .370 No_date   13:21   15.05 .331
       [CN= 75.0: N= 3.00]
       [Tp= 1.33:DT= 3.00]
 001:0009---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:000100    27.00      .767 No_date   12:21   23.47  n/a
                      + 02:000100    39.00      .370 No_date   13:21   15.05  n/a
       [DT= 3.00]  SUM= 04:000321    66.00      .962 No_date   12:27   18.49  n/a
 001:0010---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:000321    66.00      .962 No_date   12:27   18.49  n/a
                      + 03:000321    40.60      .872 No_date   12:36   23.18  n/a
       [DT= 3.00]  SUM= 05:000321   106.60     1.818 No_date   12:33   20.28  n/a
#=============================================================================
# AREA 1A (URBAN PORTION of Area North of Campeau Drive)      ||
#=============================================================================
 001:0011---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000100    42.00     1.113 No_date   12:27   24.36 .535
       [XIMP=.27:TIMP=.38]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI=1280.:MNI=.013:SCI=    .0]
#=============================================================================
# AREA 1B (GOLF PORTION of Area North of Campeau Drive)       ||
#=============================================================================
 001:0012---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       02:000100     9.00      .177 No_date   12:24   15.05 .331
       [CN= 75.0: N= 3.00]
       [Tp=  .50:DT= 3.00]
 001:0013---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:000100    42.00     1.113 No_date   12:27   24.36  n/a
                      + 02:000100     9.00      .177 No_date   12:24   15.05  n/a
       [DT= 3.00]  SUM= 03:000321    51.00     1.289 No_date   12:27   22.72  n/a
 001:0014---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            05:000321   106.60     1.818 No_date   12:33   20.28  n/a
                      + 03:000321    51.00     1.289 No_date   12:27   22.72  n/a
       [DT= 3.00]  SUM= 04:000321   157.60     3.081 No_date   12:30   21.07  n/a
 001:0015---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SHIFT HYD         -> 04:000321   157.60     3.081 No_date   12:30   21.07  n/a
       [LAG=  5.0 min]<- 05:000100   157.60     3.081 No_date   12:33   21.07  n/a
#=============================================================================
# AREA 5A (URBAN PORTION of Area North of Knudson Drive)      ||
#=============================================================================
 001:0016---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000100     7.90      .262 No_date   12:15   25.39 .558
       [XIMP=.30:TIMP=.42]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 840.:MNI=.013:SCI=    .0]
#=============================================================================
# AREA 5B (GOLF PORTION of Area North of Knudson Drive)       ||
#=============================================================================
 001:0017---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       02:000100     9.30      .126 No_date   12:48   15.05 .331
       [CN= 75.0: N= 3.00]
       [Tp=  .83:DT= 3.00]
```

```
 001:0018---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD              01:000100     7.90      .262 No_date   12:15   25.39  n/a
                       + 02:000100     9.30      .126 No_date   12:48   15.05  n/a
      [DT= 3.00]  SUM=  03:000321    17.20      .352 No_date   12:18   19.80  n/a
 001:0019---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD              05:000100   157.60     3.081 No_date   12:33   21.07  n/a
                       + 03:000321    17.20      .352 No_date   12:18   19.80  n/a
      [DT= 3.00]  SUM=  04:000321   174.80     3.418 No_date   12:30   20.94  n/a
 001:0020---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD          -> 04:000321   174.80     3.418 No_date   12:30   20.94  n/a
      [LAG=  5.0 min]<- 05:000100   174.80     3.418 No_date   12:33   20.94  n/a
#=================================================================
# AREA 6A (URBAN PORTION of Area North of Knudson Drive)       ||
#=================================================================
 001:0021---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD       01:000100     9.40      .278 No_date   12:21   25.39 .558
      [XIMP=.30:TIMP=.42]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI=1120.:MNI=.013:SCI=    .0]
#=================================================================
# AREA 6B (GOLF PORTION of Area North of Knudson Drive)       ||
#=================================================================
 001:0022---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD         02:000100     8.20      .117 No_date   12:42   15.05 .331
      [CN= 75.0: N= 3.00]
      [Tp=  .77:DT= 3.00]
 001:0023---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD              01:000100     9.40      .278 No_date   12:21   25.39  n/a
                       + 02:000100     8.20      .117 No_date   12:42   15.05  n/a
      [DT= 3.00]  SUM=  03:000321    17.60      .380 No_date   12:24   20.57  n/a
 001:0024---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD              05:000100   174.80     3.418 No_date   12:33   20.94  n/a
                       + 03:000321    17.60      .380 No_date   12:24   20.57  n/a
      [DT= 3.00]  SUM=  04:000321   192.40     3.791 No_date   12:33   20.91  n/a
 001:0025---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD          -> 04:000321   192.40     3.791 No_date   12:33   20.91  n/a
      [LAG=  5.0 min]<- 05:000100   192.40     3.791 No_date   12:36   20.91  n/a
#==========================================
# AREA 7       (Adjacent to Beawer Pond)  ||
#==========================================
 001:0026---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD       01:000204    21.60      .745 No_date   12:15   25.97 .571
      [XIMP=.31:TIMP=.45]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 800.:MNI=.013:SCI=    .0]
#==========================================
# TOTAL FLOW - AT EXISTING 2700 MM OULTLET ||
#==========================================
 001:0027---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD              05:000100   192.40     3.791 No_date   12:36   20.91  n/a
                       + 01:000204    21.60      .745 No_date   12:15   25.97  n/a
      [DT= 3.00]  SUM=  02:000231   214.00     4.361 No_date   12:33   21.42  n/a
#==============================================
# AREA 4A - OSD WITH MINOR FLOW THROUGH AREA 4)
#==============================================
 001:0028---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD       03:000204    25.38     1.195 No_date   12:09   29.15 .641
      [XIMP=.43:TIMP=.54]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 566.:MNI=.013:SCI=    .0]
# OSD  85 L/S/HA
# 85 L/S/HA * 25.38 = 2157.3 L/S
```

```
 001:0029---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 03:000204    25.38    1.195 No_date   12:09   29.15  n/a
      [RDT= 3.00] out<- 04:000100    25.38    1.194 No_date   12:09   29.15  n/a
     {MxStoUsed=.1208E-03}
#==============================================
# AREA 4        (Adjacent to Beawer Pond)  ||
#==============================================
 001:0030---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      01:000204    19.62     .607 No_date   12:21   24.77 .544
      [XIMP=.23:TIMP=.45]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 950.:MNI=.013:SCI=   .0]
# ADDITION OF MINOR FLOW AT 4A TO AREA 4
 001:0031---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:000100    25.38    1.194 No_date   12:09   29.15  n/a
                       + 01:000204    19.62     .607 No_date   12:21   24.77  n/a
      [DT= 3.00]  SUM=  06:000231    45.00    1.718 No_date   12:12   27.24  n/a
 001:0032---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             02:000231   214.00    4.361 No_date   12:33   21.42  n/a
                       + 06:000231    45.00    1.718 No_date   12:12   27.24  n/a
      [DT= 3.00]  SUM=  07:000231   259.00    5.649 No_date   12:27   22.43  n/a
#==============================================
# AREA 8        (OUTLET - S3)              ||
#==============================================
 001:0033---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      01:000204    37.25    1.354 No_date   12:12   25.99 .571
      [XIMP=.32:TIMP=.44]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 729.:MNI=.013:SCI=   .0]
# AREA 8A - MINOR FLOW TO AREA 8, MAJOR FLOW TO SHIRLEY'S BROOK
 001:0034---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      02:000204     8.35     .455 No_date   12:06   28.83 .634
      [XIMP=.41:TIMP=.54]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 318.:MNI=.013:SCI=   .0]
# SPLIT MAJOR AND MINOR FLOW FOR AREA 8A AT 85 L/S/HA
# 85 * 8.35 = 709.75 L/S
 001:0035---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  COMPUTE DUHYD       02:000204     8.35     .455 No_date   12:06   28.83  n/a
        Major System /  05:000100      .00     .000 No_date    0:00     .00  n/a
        Minor System \  06:100100     8.35     .455 No_date   12:06   28.83  n/a
# ADD 8A MINOR FLOW TO AREA 8
 001:0036---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             06:100100     8.35     .455 No_date   12:06   28.83  n/a
                       + 01:000204    37.25    1.354 No_date   12:12   25.99  n/a
      [DT= 3.00]  SUM=  03:000231    45.60    1.753 No_date   12:09   26.51  n/a
 001:0037---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             07:000231   259.00    5.649 No_date   12:27   22.43  n/a
                       + 03:000231    45.60    1.753 No_date   12:09   26.51  n/a
      [DT= 3.00]  SUM=  04:000231   304.60    7.045 No_date   12:24   23.04  n/a
#================================================================
# AREA 9             (RURAL)                               ||
#================================================================
 001:0038---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        02:000100    23.10    1.690 No_date   12:06   33.75 .742
      [CN= 95.0: N= 3.00]
      [Tp=  .25:DT= 3.00]
#================================================================
#    BEAVER POND PORTION #1                                ||
#================================================================
 001:0039---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:000231   304.60    7.045 No_date   12:24   23.04  n/a
```

```
                        +  02:000100    23.10     1.690 No_date    12:06    33.75  n/a
        [DT= 3.00]  SUM=  09:000321   327.70     8.279 No_date    12:15    23.80  n/a
#=======================================================================
# AREA 10A - MINOR FLOW TO AREA 10, MAJOR FLOW TO CARP RIVER WATERSHED
#=======================================================================
 001:0040---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      02:000204     7.50      .385 No_date   12:06    27.93 .614
      [XIMP=.38:TIMP=.51]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 342.:MNI=.013:SCI=    .0]
# SPLIT OF MAJOR AND MINOR FLOW AT 85 L/S/HA
# 85 * 7.5 = 637.5 L/S
 001:0041---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  COMPUTE DUHYD       02:000204     7.50      .385 No_date   12:06    27.93  n/a
        Major System /  10:000100      .00      .000 No_date    0:00      .00  n/a
        Minor System \  03:100100     7.50      .385 No_date   12:06    27.93  n/a
#========================================
# AREA 10        (OUTLET S2)            ||
#========================================
 001:0042---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      01:000204    49.40     1.887 No_date   12:18    29.15 .641
      [XIMP=.43:TIMP=.54]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 977.:MNI=.013:SCI=    .0]
# ADDITION OF 10A MINOR FLOW TO AREA 10
 001:0043---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             03:100100     7.50      .385 No_date   12:06    27.93  n/a
                      +  01:000204    49.40     1.887 No_date    12:18    29.15  n/a
      [DT= 3.00]  SUM=  06:000321    56.90     2.177 No_date    12:15    28.99  n/a
#========================================
# AREA 11        (RURAL)                ||
#========================================
 001:0044---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        02:000100    25.00     1.361 No_date   12:15    33.75 .742
      [CN= 95.0: N= 3.00]
      [Tp=  .40:DT= 3.00]
 001:0045---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             06:000321    56.90     2.177 No_date   12:15    28.99  n/a
                      +  02:000100    25.00     1.361 No_date    12:15    33.75  n/a
      [DT= 3.00]  SUM=  03:000317    81.90     3.538 No_date    12:15    30.44  n/a
#========================================
# AREA 13       (N/E OF CNR)            ||
#========================================
 001:0046---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      01:000204    27.90     1.229 No_date   12:09    27.93 .614
      [XIMP=.38:TIMP=.51]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 556.:MNI=.013:SCI=    .0]
# MINOR FLOW TO U/S CELL AND MAJOR FLOW TO SHIRLEY'S BROOK
# 85 L/S/HA * 27.90 HA = 2371.5 L/S
 001:0047---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  COMPUTE DUHYD       01:000204    27.90     1.229 No_date   12:09    27.93  n/a
        Major System /  08:000100      .00      .000 No_date    0:00      .00  n/a
        Minor System \  02:100100    27.90     1.229 No_date   12:09    27.93  n/a
#================================
# AREA 15   (ON-SITE DETENTION)    ||
#================================
 001:0048---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      01:000204     7.50      .473 No_date   12:06    32.54 .715
      [XIMP=.59:TIMP=.59]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
```

```
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 392.:MNI=.013:SCI=   .0]
#=====================
# OSD 85 L/S/HA
# 85*7.5 = 637.5 L/S
# GOULBOURN 10YR RATIONAL = 209 L/S
# TOTAL = 847 L/S
#=====================
 001:0049---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 01:000204     7.50      .473 No_date   12:06   32.54  n/a
      [RDT= 3.00] out<- 04:000100     7.50      .473 No_date   12:06   32.54  n/a
     {MxStoUsed=.1193E-03}
#======================================
# AREA 14      (M/W OF CNR)           ||
#======================================
 001:0050---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      01:000204    35.50     1.447 No_date   12:12   27.35 .601
      [XIMP=.37:TIMP=.48]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 613.:MNI=.013:SCI=   .0]
#==========================================================
# MINOR FLOW TO U/S CELL, MAJOR FLOW TO SHIRLEY'S BROOK
# 85 L/S/HA * 33.9 = 2881.5 L/S
# GOULBOURN 10 YR RATIONAL = 380.3 L/S
# TOTAL 3262 L/S
#==========================================================
 001:0051---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  COMPUTE DUHYD       01:000204    35.50     1.447 No_date   12:12   27.35  n/a
        Major System /  10:000100      .00      .000 No_date    0:00     .00  n/a
        Minor System \  07:100100    35.50     1.447 No_date   12:12   27.35  n/a
 001:0052---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:000100     7.50      .473 No_date   12:06   32.54  n/a
                       + 07:100100    35.50     1.447 No_date   12:12   27.35  n/a
      [DT= 3.00]  SUM=  06:000317    43.00     1.868 No_date   12:09   28.26  n/a
 001:0053---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             02:100100    27.90     1.229 No_date   12:09   27.93  n/a
                       + 06:000317    43.00     1.868 No_date   12:09   28.26  n/a
      [DT= 3.00]  SUM=  04:000317    70.90     3.097 No_date   12:09   28.13  n/a
#==============================================================
# AREA 12A  (SMALL URBAN AND NATURAL AREA NORTHEAST CORNER) ||
#==============================================================
 001:0054---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      01:000204     8.25      .309 No_date   12:06   22.45 .493
      [XIMP=.21:TIMP=.31]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 257.:MNI=.013:SCI=   .0]
# MAJOR FLOW TO SHIRLEY'S BROOK, MINOR TO AREA 12
# 85 * 7.52 = 639.5 L/S
# GOULBOURN 10 YR RATIONAL = 173 L/S
# TOTAL 812.5 L/S
 001:0055---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  COMPUTE DUHYD       01:000204     8.25      .309 No_date   12:06   22.45  n/a
        Major System /  02:000100      .00      .000 No_date    0:00     .00  n/a
        Minor System \  06:100100     8.25      .309 No_date   12:06   22.45  n/a
#======================================
# AREA 12      (SOUTH OF CNR)         ||
#======================================
 001:0056---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      01:000204    63.25     2.071 No_date   12:21   27.19 .598
      [XIMP=.36:TIMP=.48]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI=1095.:MNI=.013:SCI=   .0]
# ADDITION OF MINOR FLOW FROM 12A TO AREA 12
```

```
 001:0057---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:000204    63.25    2.071 No_date   12:21   27.19  n/a
                      + 06:100100     8.25     .309 No_date   12:06   22.45  n/a
       [DT= 3.00]  SUM= 07:000317    71.50    2.302 No_date   12:21   26.64  n/a
#==================================
#  TOTAL FLOW TO OUTLET - S2     ||
#==================================
 001:0058---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:000317    70.90    3.097 No_date   12:09   28.13  n/a
                      + 07:000317    71.50    2.302 No_date   12:21   26.64  n/a
       [DT= 3.00]  SUM= 01:000317   142.40    5.163 No_date   12:12   27.38  n/a
#=======================================
#  TOTAL FLOW TO BEAVER POND          ||
#=======================================
 001:0059---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:000317   142.40    5.163 No_date   12:12   27.38  n/a
                      + 03:000317    81.90    3.538 No_date   12:15   30.44  n/a
       [DT= 3.00]  SUM= 04:000312   224.30    8.661 No_date   12:15   28.50  n/a
#=======================================
#  TOTAL FLOW TO BEAVER POND          ||
#=======================================
 001:0060---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:000312   224.30    8.661 No_date   12:15   28.50  n/a
                      + 09:000321   327.70    8.279 No_date   12:15   23.80  n/a
       [DT= 3.00]  SUM= 01:000312   552.00   16.940 No_date   12:15   25.71  n/a
 001:0061---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 01:000312   552.00   16.940 No_date   12:15   25.71  n/a
   *   [RDT= 3.00] out<- 04:000100   552.00    8.972 No_date   12:57   25.71  n/a
     {MxStoUsed=.3494E+01}
#=====================================================
# FLOWS INTO SHIRLEY'S BROOK THROUGH KNL LANDS
#=====================================================
#=========================================
# AREA 16         (External Area)       ||
#=========================================
 001:0062---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       03:000100   240.00    1.406 No_date   15:36   18.01 .396
      [CN= 80.0: N= 3.00]
      [Tp= 3.20:DT= 3.00]
#==================================
#  MAJOR FLOW FROM AREA 13       ||
#==================================
 001:0063---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            03:000100   240.00    1.406 No_date   15:36   18.01  n/a
                      + 08:000100      .00     .000 No_date    0:00     .00  n/a
       [DT= 3.00]  SUM= 09:000317   240.00    1.406 No_date   15:36   18.01  n/a
#=======================================
#  MAJOR FLOW FROM AREA 12A           ||
#=======================================
 001:0064---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            02:000100      .00     .000 No_date    0:00     .00  n/a
                      + 09:000317   240.00    1.406 No_date   15:36   18.01  n/a
       [DT= 3.00]  SUM= 07:000312   240.00    1.406 No_date   15:36   18.01  n/a
#=======================================
#  MAJOR FLOW FROM AREA 14            ||
#=======================================
 001:0065---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            07:000312   240.00    1.406 No_date   15:36   18.01  n/a
                      + 10:000100      .00     .000 No_date    0:00     .00  n/a
       [DT= 3.00]  SUM= 06:000312   240.00    1.406 No_date   15:36   18.01  n/a
#=======================================
#  MAJOR FLOW FROM AREA 8A            ||
#=======================================
 001:0066---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            06:000312   240.00    1.406 No_date   15:36   18.01  n/a
```

```
                      +  05:000100      .00      .000 No_date    0:00     .00  n/a
      [DT= 3.00]  SUM=  03:000312   240.00     1.406 No_date   15:36   18.01  n/a
#============================================================
#                          EXISTING CONDITIONS
#                       5 YEAR STM SCS II 24 HRS 12 MIN
#                            SEPTEMBER 2002
#============================================================
 001:0067-------------------------------------------------------------------------------
    MASS STORM
      Filename = C:\PROGRA~1\SWMHYMO\projects\KNL\SCS12.24H
      Comment  = SCS TYPE II - 24 HOURS DURATION, 12 MIN. TIME STEP
      [SDT=12.00:SDUR=  24.00:PTOT=  57.10]
#===================================
# AREA   (TOTAL Area)             ||
#===================================
 001:0068---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        02:000100   360.00     2.388 No_date   17:00   25.96 .455
      [CN= 80.0: N= 3.00]
      [Tp= 4.40:DT= 6.00]
#============================================================
#============================================================
#       ====        SWM (FUTURE   CONDITIONS)            ====
#============================================================
#                       5 YEAR STM SCS II 24 HRS 12 MIN
#                            SEPTEMBER 2002              ====
#============================================================
#===============================================================
# AREA 3A (URBAN PORTION of Area North of Campeau Drive)       ||
#===============================================================
 001:0069---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD      01:000100    31.90     1.137 No_date   12:30   34.22 .599
      [XIMP=.30:TIMP=.42]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI=1760.:MNI=.013:SCI=   .0]
#===============================================================
# AREA 3B (GOLF PORTION of Area North of Campeau Drive)       ||
#===============================================================
 001:0070---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        02:000100     8.70      .173 No_date   12:48   22.04 .386
      [CN= 75.0: N= 3.00]
      [Tp=  .84:DT= 3.00]
 001:0071---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             01:000100    31.90     1.137 No_date   12:30   34.22  n/a
                      +  02:000100     8.70      .173 No_date   12:48   22.04  n/a
      [DT= 3.00]  SUM=  03:000321    40.60     1.294 No_date   12:30   31.61  n/a
#===============================================================
# AREA 2A (URBAN PORTION of Area North of Campeau Drive)       ||
#===============================================================
 001:0072---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD      01:000100    27.00     1.152 No_date   12:18   31.98 .560
      [XIMP=.24:TIMP=.35]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 920.:MNI=.013:SCI=   .0]
#===============================================================
# AREA 2B (GOLF PORTION of Area North of Campeau Drive)       ||
#===============================================================
 001:0073---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        02:000100    39.00      .547 No_date   13:21   22.04 .386
      [CN= 75.0: N= 3.00]
      [Tp= 1.33:DT= 3.00]
 001:0074---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             01:000100    27.00     1.152 No_date   12:18   31.98  n/a
                      +  02:000100    39.00      .547 No_date   13:21   22.04  n/a
```

```
     [DT= 3.00]  SUM=  04:000321    66.00    1.417 No_date   12:21   26.10  n/a
 001:0075---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            04:000321    66.00    1.417 No_date   12:21   26.10  n/a
                     + 03:000321    40.60    1.294 No_date   12:30   31.61  n/a
     [DT= 3.00]  SUM=  05:000321   106.60    2.684 No_date   12:27   28.20  n/a
#================================================================
# AREA 1A (URBAN PORTION of Area North of Campeau Drive)       ||
#================================================================
 001:0076---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD     01:000100    42.00    1.656 No_date   12:24   33.01 .578
     [XIMP=.27:TIMP=.38]
     [LOSS= 2 :CN= 75.0]
     [Pervious    area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
     [Impervious  area: IAimp=  .80:SLPI= .20:LGI=1280.:MNI=.013:SCI=   .0]
#================================================================
# AREA 1B (GOLF PORTION of Area North of Campeau Drive)       ||
#================================================================
 001:0077---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       02:000100     9.00     .261 No_date   12:24   22.04 .386
     [CN= 75.0: N= 3.00]
     [Tp=  .50:DT= 3.00]
 001:0078---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            01:000100    42.00    1.656 No_date   12:24   33.01  n/a
                     + 02:000100     9.00     .261 No_date   12:24   22.04  n/a
     [DT= 3.00]  SUM=  03:000321    51.00    1.917 No_date   12:24   31.08  n/a
 001:0079---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            05:000321   106.60    2.684 No_date   12:27   28.20  n/a
                     + 03:000321    51.00    1.917 No_date   12:24   31.08  n/a
     [DT= 3.00]  SUM=  04:000321   157.60    4.584 No_date   12:24   29.13  n/a
 001:0080---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD       -> 04:000321   157.60    4.584 No_date   12:24   29.13  n/a
     [LAG=  5.0 min]<- 05:000100   157.60    4.584 No_date   12:27   29.13  n/a
#================================================================
# AREA 5A (URBAN PORTION of Area North of Knudson Drive)       ||
#================================================================
 001:0081---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD     01:000100     7.90     .374 No_date   12:15   34.22 .599
     [XIMP=.30:TIMP=.42]
     [LOSS= 2 :CN= 75.0]
     [Pervious    area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
     [Impervious  area: IAimp=  .80:SLPI= .20:LGI= 840.:MNI=.013:SCI=   .0]
#================================================================
# AREA 5B (GOLF PORTION of Area North of Knudson Drive)       ||
#================================================================
 001:0082---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       02:000100     9.30     .186 No_date   12:48   22.04 .386
     [CN= 75.0: N= 3.00]
     [Tp=  .83:DT= 3.00]
 001:0083---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            01:000100     7.90     .374 No_date   12:15   34.22  n/a
                     + 02:000100     9.30     .186 No_date   12:48   22.04  n/a
     [DT= 3.00]  SUM=  03:000321    17.20     .500 No_date   12:21   27.63  n/a
 001:0084---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            05:000100   157.60    4.584 No_date   12:27   29.13  n/a
                     + 03:000321    17.20     .500 No_date   12:21   27.63  n/a
     [DT= 3.00]  SUM=  04:000321   174.80    5.075 No_date   12:27   28.98  n/a
 001:0085---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD       -> 04:000321   174.80    5.075 No_date   12:27   28.98  n/a
     [LAG=  5.0 min]<- 05:000100   174.80    5.075 No_date   12:30   28.98  n/a
#================================================================
# AREA 6A (URBAN PORTION of Area North of Knudson Drive)       ||
#================================================================
 001:0086---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD     01:000100     9.40     .411 No_date   12:21   34.22 .599
     [XIMP=.30:TIMP=.42]
```

```
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI=1120.:MNI=.013:SCI=   .0]
#================================================================
# AREA 6B (GOLF PORTION of Area North of Knudson Drive)      ||
#================================================================
 001:0087---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       02:000100     8.20     .174 No_date  12:42   22.04 .386
       [CN= 75.0: N= 3.00]
       [Tp=  .77:DT= 3.00]
 001:0088---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:000100     9.40     .411 No_date  12:21   34.22  n/a
                      + 02:000100     8.20     .174 No_date  12:42   22.04  n/a
       [DT= 3.00] SUM=  03:000321    17.60     .555 No_date  12:21   28.55  n/a
 001:0089---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            05:000100   174.80    5.075 No_date  12:30   28.98  n/a
                      + 03:000321    17.60     .555 No_date  12:21   28.55  n/a
       [DT= 3.00] SUM=  04:000321   192.40    5.616 No_date  12:30   28.94  n/a
 001:0090---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SHIFT HYD       -> 04:000321   192.40    5.616 No_date  12:30   28.94  n/a
       [LAG=  5.0 min]<- 05:000100  192.40    5.616 No_date  12:33   28.94  n/a
#============================================
# AREA 7       (Adjacent to Beawer Pond)  ||
#============================================
 001:0091---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000204    21.60    1.095 No_date  12:12   34.93 .612
       [XIMP=.31:TIMP=.45]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 800.:MNI=.013:SCI=   .0]
#=============================================
# TOTAL FLOW - AT EXISTING 2700 MM OULTLET ||
#=============================================
 001:0092---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            05:000100   192.40    5.616 No_date  12:33   28.94  n/a
                      + 01:000204    21.60    1.095 No_date  12:12   34.93  n/a
       [DT= 3.00] SUM=  02:000231   214.00    6.419 No_date  12:30   29.55  n/a
#================================================
# AREA 4A - OSD WITH MINOR FLOW THROUGH AREA 4)
#================================================
 001:0093---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     03:000204    25.38    1.655 No_date  12:09   38.54 .675
       [XIMP=.43:TIMP=.54]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 566.:MNI=.013:SCI=   .0]
# OSD  85 L/S/HA
# 85 L/S/HA * 25.38 = 2157.3 L/S
 001:0094---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 03:000204    25.38    1.655 No_date  12:09   38.54  n/a
       [RDT= 3.00] out<- 04:000100   25.38    1.655 No_date  12:09   38.54  n/a
      {MxStoUsed=.1677E-03}
#============================================
# AREA 4       (Adjacent to Beawer Pond)  ||
#============================================
 001:0095---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000204    19.62     .884 No_date  12:18   33.70 .590
       [XIMP=.23:TIMP=.45]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 950.:MNI=.013:SCI=   .0]
# ADDITION OF MINOR FLOW AT 4A TO AREA 4
 001:0096---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:000100    25.38    1.655 No_date  12:09   38.54  n/a
                      + 01:000204    19.62     .884 No_date  12:18   33.70  n/a
```

```
      [DT= 3.00]  SUM=  06:000231    45.00    2.456 No_date   12:12   36.43  n/a
 001:0097---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            02:000231   214.00    6.419 No_date   12:30   29.55  n/a
                      + 06:000231    45.00    2.456 No_date   12:12   36.43  n/a
      [DT= 3.00]  SUM=  07:000231   259.00    8.288 No_date   12:24   30.74  n/a
#==============================================
# AREA 8        (OUTLET - S3)               ||
#==============================================
 001:0098---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000204    37.25    1.931 No_date   12:12   34.91 .611
      [XIMP=.32:TIMP=.44]
      [LOSS= 2 :CN= 75.0]
      [Pervious    area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious  area: IAimp=  .80:SLPI= .20:LGI= 729.:MNI=.013:SCI=   .0]
# AREA 8A - MINOR FLOW TO AREA 8, MAJOR FLOW TO SHIRLEY'S BROOK
 001:0099---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     02:000204     8.35     .636 No_date   12:03   38.22 .669
      [XIMP=.41:TIMP=.54]
      [LOSS= 2 :CN= 75.0]
      [Pervious    area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious  area: IAimp=  .80:SLPI= .20:LGI= 318.:MNI=.013:SCI=   .0]
# SPLIT MAJOR AND MINOR FLOW FOR AREA 8A AT 85 L/S/HA
# 85 * 8.35 = 709.75 L/S
 001:0100---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
   *  COMPUTE DUHYD     02:000204     8.35     .636 No_date   12:03   38.22  n/a
        Major System /  05:000100      .00     .000 No_date    0:00     .00  n/a
        Minor System \  06:100100     8.35     .636 No_date   12:03   38.22  n/a
# ADD 8A MINOR FLOW TO AREA 8
 001:0101---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            06:100100     8.35     .636 No_date   12:03   38.22  n/a
                      + 01:000204    37.25    1.931 No_date   12:12   34.91  n/a
      [DT= 3.00]  SUM=  03:000231    45.60    2.434 No_date   12:12   35.52  n/a
 001:0102---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            07:000231   259.00    8.288 No_date   12:24   30.74  n/a
                      + 03:000231    45.60    2.434 No_date   12:12   35.52  n/a
      [DT= 3.00]  SUM=  04:000231   304.60   10.310 No_date   12:21   31.46  n/a
#==================================================================
# AREA 9            (RURAL)                                     ||
#==================================================================
 001:0103---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       02:000100    23.10    2.226 No_date   12:06   44.82 .785
      [CN= 95.0: N= 3.00]
      [Tp=  .25:DT= 3.00]
#==================================================================
#    BEAVER POND PORTION #1                                     ||
#==================================================================
 001:0104---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:000231   304.60   10.310 No_date   12:21   31.46  n/a
                      + 02:000100    23.10    2.226 No_date   12:06   44.82  n/a
      [DT= 3.00]  SUM=  09:000321   327.70   12.018 No_date   12:15   32.40  n/a
#========================================================================
# AREA 10A - MINOR FLOW TO AREA 10, MAJOR FLOW TO CARP RIVER WATERSHED
#========================================================================
 001:0105---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     02:000204     7.50     .540 No_date   12:03   37.18 .651
      [XIMP=.38:TIMP=.51]
      [LOSS= 2 :CN= 75.0]
      [Pervious    area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious  area: IAimp=  .80:SLPI= .20:LGI= 342.:MNI=.013:SCI=   .0]
# SPLIT OF MAJOR AND MINOR FLOW AT 85 L/S/HA
# 85 * 7.5 = 637.5 L/S
 001:0106---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
   *  COMPUTE DUHYD     02:000204     7.50     .540 No_date   12:03   37.18  n/a
        Major System /  10:000100      .00     .000 No_date    0:00     .00  n/a
        Minor System \  03:100100     7.50     .540 No_date   12:03   37.18  n/a
```

```
#========================================
# AREA 10        (OUTLET S2)           ||
#========================================
 001:0107---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000204    49.40    2.698 No_date   12:15   38.54 .675
       [XIMP=.43:TIMP=.54]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 977.:MNI=.013:SCI=    .0]
# ADDITION OF 10A MINOR FLOW TO AREA 10
 001:0108---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            03:100100     7.50     .540 No_date   12:03   37.18  n/a
                      + 01:000204    49.40    2.698 No_date   12:15   38.54  n/a
       [DT= 3.00]  SUM= 06:000321    56.90    3.103 No_date   12:15   38.36  n/a
#========================================
# AREA 11        (RURAL)               ||
#========================================
 001:0109---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       02:000100    25.00    1.796 No_date   12:15   44.82 .785
       [CN= 95.0: N= 3.00]
       [Tp=  .40:DT= 3.00]
 001:0110---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            06:000321    56.90    3.103 No_date   12:15   38.36  n/a
                      + 02:000100    25.00    1.796 No_date   12:15   44.82  n/a
       [DT= 3.00]  SUM= 03:000317    81.90    4.898 No_date   12:15   40.33  n/a
#========================================
# AREA 13       (N/E OF CNR)           ||
#========================================
 001:0111---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000204    27.90    1.724 No_date   12:09   37.18 .651
       [XIMP=.38:TIMP=.51]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 556.:MNI=.013:SCI=    .0]
# MINOR FLOW TO U/S CELL AND MAJOR FLOW TO SHIRLEY'S BROOK
# 85 L/S/HA * 27.90 HA = 2371.5 L/S
 001:0112---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  COMPUTE DUHYD      01:000204    27.90    1.724 No_date   12:09   37.18  n/a
        Major System /  08:000100      .00     .000 No_date    0:00     .00  n/a
        Minor System \  02:100100    27.90    1.724 No_date   12:09   37.18  n/a
#===================================
# AREA 15  (ON-SITE DETENTION)    ||
#===================================
 001:0113---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000204     7.50     .638 No_date   12:06   42.25 .740
       [XIMP=.59:TIMP=.59]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 392.:MNI=.013:SCI=    .0]
#=====================
# OSD 85 L/S/HA
# 85*7.5 = 637.5 L/S
# GOULBOURN 10YR RATIONAL = 209 L/S
# TOTAL = 847 L/S
#=====================
 001:0114---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 01:000204     7.50     .638 No_date   12:06   42.25  n/a
       [RDT= 3.00] out<- 04:000100     7.50     .638 No_date   12:06   42.25  n/a
     {MxStoUsed=.1610E-03}
#========================================
# AREA 14       (M/W OF CNR)           ||
#========================================
 001:0115---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000204    35.50    2.101 No_date   12:09   36.47 .639
       [XIMP=.37:TIMP=.48]
```

```
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 613.:MNI=.013:SCI=   .0]
#==========================================================
# MINOR FLOW TO U/S CELL, MAJOR FLOW TO SHIRLEY'S BROOK
# 85 L/S/HA * 33.9 = 2881.5 L/S
# GOULBOURN 10 YR RATIONAL = 380.3 L/S
# TOTAL 3262 L/S
#==========================================================
 001:0116---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  COMPUTE DUHYD      01:000204    35.50    2.101 No_date   12:09   36.47  n/a
       Major System /   10:000100      .00     .000 No_date    0:00     .00  n/a
       Minor System \   07:100100    35.50    2.101 No_date   12:09   36.47  n/a
 001:0117---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:000100     7.50     .638 No_date   12:06   42.25  n/a
                      + 07:100100    35.50    2.101 No_date   12:09   36.47  n/a
      [DT= 3.00]  SUM=  06:000317    43.00    2.702 No_date   12:09   37.47  n/a
 001:0118---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            02:100100    27.90    1.724 No_date   12:09   37.18  n/a
                      + 06:000317    43.00    2.702 No_date   12:09   37.47  n/a
      [DT= 3.00]  SUM=  04:000317    70.90    4.425 No_date   12:09   37.36  n/a
#===============================================================
# AREA 12A  (SMALL URBAN AND NATURAL AREA NORTHEAST CORNER) ||
#===============================================================
 001:0119---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000204     8.25     .457 No_date   12:06   30.78 .539
      [XIMP=.21:TIMP=.31]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 257.:MNI=.013:SCI=   .0]
# MAJOR FLOW TO SHIRLEY'S BROOK, MINOR TO AREA 12
# 85 * 7.52 = 639.5 L/S
# GOULBOURN 10 YR RATIONAL = 173 L/S
# TOTAL 812.5 L/S
 001:0120---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  COMPUTE DUHYD      01:000204     8.25     .457 No_date   12:06   30.78  n/a
       Major System /   02:000100      .00     .000 No_date    0:00     .00  n/a
       Minor System \   06:100100     8.25     .457 No_date   12:06   30.78  n/a
#==========================================
# AREA 12      (SOUTH OF CNR)          ||
#==========================================
 001:0121---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000204    63.25    3.015 No_date   12:18   36.30 .636
      [XIMP=.36:TIMP=.48]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI=1095.:MNI=.013:SCI=   .0]
# ADDITION OF MINOR FLOW FROM 12A TO AREA 12
 001:0122---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:000204    63.25    3.015 No_date   12:18   36.30  n/a
                      + 06:100100     8.25     .457 No_date   12:06   30.78  n/a
      [DT= 3.00]  SUM=  07:000317    71.50    3.374 No_date   12:18   35.66  n/a
#==================================
#  TOTAL FLOW TO OUTLET - S2    ||
#==================================
 001:0123---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:000317    70.90    4.425 No_date   12:09   37.36  n/a
                      + 07:000317    71.50    3.374 No_date   12:18   35.66  n/a
      [DT= 3.00]  SUM=  01:000317   142.40    7.534 No_date   12:12   36.51  n/a
#=========================================
#  TOTAL FLOW TO BEAVER POND           ||
#=========================================
 001:0124---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:000317   142.40    7.534 No_date   12:12   36.51  n/a
                      + 03:000317    81.90    4.898 No_date   12:15   40.33  n/a
```

```
        [DT= 3.00]  SUM=  04:000312   224.30   12.394 No_date   12:12   37.90  n/a
#=======================================
#  TOTAL FLOW TO BEAVER POND          ||
#=======================================
 001:0125---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:000312   224.30   12.394 No_date   12:12   37.90  n/a
                       + 09:000321   327.70   12.018 No_date   12:15   32.40  n/a
       [DT= 3.00]  SUM=  01:000312   552.00   24.276 No_date   12:15   34.64  n/a
 001:0126---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 01:000312   552.00   24.276 No_date   12:15   34.64  n/a
  *    [RDT= 3.00] out<- 04:000100   552.00   12.429 No_date   12:54   34.64  n/a
     {MxStoUsed=.4877E+01}
#=======================================================
# FLOWS INTO SHIRLEY'S BROOK THROUGH KNL LANDS
#=======================================================
#=======================================
# AREA 16        (External Area)        ||
#=======================================
 001:0127---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        03:000100   240.00    2.041 No_date   15:33   25.96 .455
       [CN= 80.0: N= 3.00]
       [Tp= 3.20:DT= 3.00]
#=================================
#  MAJOR FLOW FROM AREA 13       ||
#=================================
 001:0128---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             03:000100   240.00    2.041 No_date   15:33   25.96  n/a
                       + 08:000100      .00     .000 No_date    0:00     .00  n/a
       [DT= 3.00]  SUM=  09:000317   240.00    2.041 No_date   15:33   25.96  n/a
#=======================================
#  MAJOR FLOW FROM AREA 12A           ||
#=======================================
 001:0129---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             02:000100      .00     .000 No_date    0:00     .00  n/a
                       + 09:000317   240.00    2.041 No_date   15:33   25.96  n/a
       [DT= 3.00]  SUM=  07:000312   240.00    2.041 No_date   15:33   25.96  n/a
#=======================================
#  MAJOR FLOW FROM AREA 14            ||
#=======================================
 001:0130---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             07:000312   240.00    2.041 No_date   15:33   25.96  n/a
                       + 10:000100      .00     .000 No_date    0:00     .00  n/a
       [DT= 3.00]  SUM=  06:000312   240.00    2.041 No_date   15:33   25.96  n/a
#=======================================
#  MAJOR FLOW FROM AREA 8A            ||
#=======================================
 001:0131---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             06:000312   240.00    2.041 No_date   15:33   25.96  n/a
                       + 05:000100      .00     .000 No_date    0:00     .00  n/a
       [DT= 3.00]  SUM=  03:000312   240.00    2.041 No_date   15:33   25.96  n/a
#============================================================
#                    100 YEAR STM SCS II 24 HRS 12 MIN
#                         AUG 2002
#============================================================
 001:0132-----------------------------------------------------------------------
     MASS STORM
       Filename = C:\PROGRA~1\SWMHYMO\projects\KNL\SCS12.24H
       Comment  = SCS TYPE II - 24 HOURS DURATION, 12 MIN. TIME STEP
       [SDT=12.00:SDUR=  24.00:PTOT=  88.60]
#==================================
# AREA   (TOTAL Area)            ||
#==================================
 001:0133---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        02:000100   360.00    4.683 No_date   16:54   50.37 .569
       [CN= 80.0: N= 3.00]
```

```
      [Tp= 4.40:DT= 6.00]
#=================================================================
#                    100 YEAR STM SCS II 24 HRS 12 MIN      =====
#                       FUTURE CONDITIONS                   =====
#                         AUG 2002                          =====
#=================================================================
#=================================================================
# AREA 3A (URBAN PORTION of Area North of Campeau Drive)        ||
#=================================================================
 001:0134---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD      01:000100    31.90    2.423 No_date   12:24   60.25 .680
      [XIMP=.30:TIMP=.42]
      [LOSS= 2 :CN= 75.0]
      [Pervious    area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious  area: IAimp=  .80:SLPI= .20:LGI=1760.:MNI=.013:SCI=   .0]
#=================================================================
# AREA 3B (GOLF PORTION of Area North of Campeau Drive)         ||
#=================================================================
 001:0135---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        02:000100     8.70     .352 No_date   12:45   44.17 .498
      [CN= 75.0: N= 3.00]
      [Tp=  .84:DT= 3.00]
 001:0136---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             01:000100    31.90    2.423 No_date   12:24   60.25  n/a
                      + 02:000100     8.70     .352 No_date   12:45   44.17  n/a
      [DT= 3.00]  SUM=  03:000321    40.60    2.719 No_date   12:24   56.81  n/a
#=================================================================
# AREA 2A (URBAN PORTION of Area North of Campeau Drive)        ||
#=================================================================
 001:0137---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD      01:000100    27.00    2.408 No_date   12:15   57.35 .647
      [XIMP=.24:TIMP=.35]
      [LOSS= 2 :CN= 75.0]
      [Pervious    area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious  area: IAimp=  .80:SLPI= .20:LGI= 920.:MNI=.013:SCI=   .0]
#=================================================================
# AREA 2B (GOLF PORTION of Area North of Campeau Drive)         ||
#=================================================================
 001:0138---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        02:000100    39.00    1.115 No_date   13:18   44.17 .498
      [CN= 75.0: N= 3.00]
      [Tp= 1.33:DT= 3.00]
 001:0139---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             01:000100    27.00    2.408 No_date   12:15   57.35  n/a
                      + 02:000100    39.00    1.115 No_date   13:18   44.17  n/a
      [DT= 3.00]  SUM=  04:000321    66.00    2.900 No_date   12:15   49.56  n/a
 001:0140---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             04:000321    66.00    2.900 No_date   12:15   49.56  n/a
                      + 03:000321    40.60    2.719 No_date   12:24   56.81  n/a
      [DT= 3.00]  SUM=  05:000321   106.60    5.539 No_date   12:21   52.32  n/a
#=================================================================
# AREA 1A (URBAN PORTION of Area North of Campeau Drive)        ||
#=================================================================
 001:0141---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD      01:000100    42.00    3.506 No_date   12:18   58.67 .662
      [XIMP=.27:TIMP=.38]
      [LOSS= 2 :CN= 75.0]
      [Pervious    area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious  area: IAimp=  .80:SLPI= .20:LGI=1280.:MNI=.013:SCI=   .0]
#=================================================================
# AREA 1B (GOLF PORTION of Area North of Campeau Drive)         ||
#=================================================================
 001:0142---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        02:000100     9.00     .533 No_date   12:24   44.17 .498
      [CN= 75.0: N= 3.00]
```

```
      [Tp=  .50:DT= 3.00]
 001:0143---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:000100    42.00    3.506 No_date   12:18   58.67  n/a
                      + 02:000100     9.00     .533 No_date   12:24   44.17  n/a
      [DT= 3.00]  SUM=  03:000321    51.00    4.025 No_date   12:18   56.11  n/a
 001:0144---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            05:000321   106.60    5.539 No_date   12:21   52.32  n/a
                      + 03:000321    51.00    4.025 No_date   12:18   56.11  n/a
      [DT= 3.00]  SUM=  04:000321   157.60    9.526 No_date   12:18   53.55  n/a
 001:0145---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SHIFT HYD       -> 04:000321   157.60    9.526 No_date   12:18   53.55  n/a
      [LAG=  5.0 min]<- 05:000100   157.60    9.526 No_date   12:21   53.55  n/a
#================================================================
# AREA 5A (URBAN PORTION of Area North of Knudson Drive)        ||
#================================================================
 001:0146---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000100     7.90     .790 No_date   12:12   60.25 .680
      [XIMP=.30:TIMP=.42]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 840.:MNI=.013:SCI=    .0]
#================================================================
# AREA 5B (GOLF PORTION of Area North of Knudson Drive)        ||
#================================================================
 001:0147---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       02:000100     9.30     .380 No_date   12:45   44.17 .498
      [CN= 75.0: N= 3.00]
      [Tp=  .83:DT= 3.00]
 001:0148---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:000100     7.90     .790 No_date   12:12   60.25  n/a
                      + 02:000100     9.30     .380 No_date   12:45   44.17  n/a
      [DT= 3.00]  SUM=  03:000321    17.20    1.024 No_date   12:12   51.56  n/a
 001:0149---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            05:000100   157.60    9.526 No_date   12:21   53.55  n/a
                      + 03:000321    17.20    1.024 No_date   12:12   51.56  n/a
      [DT= 3.00]  SUM=  04:000321   174.80   10.503 No_date   12:21   53.35  n/a
 001:0150---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SHIFT HYD       -> 04:000321   174.80   10.503 No_date   12:21   53.35  n/a
      [LAG=  5.0 min]<- 05:000100   174.80   10.503 No_date   12:24   53.35  n/a
#================================================================
# AREA 6A (URBAN PORTION of Area North of Knudson Drive)        ||
#================================================================
 001:0151---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000100     9.40     .859 No_date   12:15   60.25 .680
      [XIMP=.30:TIMP=.42]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI=1120.:MNI=.013:SCI=    .0]
#================================================================
# AREA 6B (GOLF PORTION of Area North of Knudson Drive)        ||
#================================================================
 001:0152---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       02:000100     8.20     .354 No_date   12:42   44.17 .498
      [CN= 75.0: N= 3.00]
      [Tp=  .77:DT= 3.00]
 001:0153---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:000100     9.40     .859 No_date   12:15   60.25  n/a
                      + 02:000100     8.20     .354 No_date   12:42   44.17  n/a
      [DT= 3.00]  SUM=  03:000321    17.60    1.116 No_date   12:15   52.76  n/a
 001:0154---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            05:000100   174.80   10.503 No_date   12:24   53.35  n/a
                      + 03:000321    17.60    1.116 No_date   12:15   52.76  n/a
      [DT= 3.00]  SUM=  04:000321   192.40   11.573 No_date   12:24   53.30  n/a
 001:0155---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SHIFT HYD       -> 04:000321   192.40   11.573 No_date   12:24   53.30  n/a
```

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      [LAG=  5.0 min]<- 05:000100   192.40    11.573 No_date   12:27   53.30  n/a
#==========================================
# AREA 7        (Adjacent to Beawer Pond)  ||
#==========================================
 001:0156---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      01:000204    21.60     2.223 No_date   12:12   61.25 .691
      [XIMP=.31:TIMP=.45]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 800.:MNI=.013:SCI=   .0]
#============================================
# TOTAL FLOW - AT EXISTING 2700 MM OULTLET ||
#============================================
 001:0157---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             05:000100   192.40    11.573 No_date   12:27   53.30  n/a
                       + 01:000204    21.60     2.223 No_date   12:12   61.25  n/a
      [DT= 3.00]  SUM=  02:000231   214.00    13.163 No_date   12:24   54.10  n/a
#==============================================
# AREA 4A - OSD WITH MINOR FLOW THROUGH AREA 4)
#==============================================
 001:0158---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      03:000204    25.38     3.205 No_date   12:06   65.71 .742
      [XIMP=.43:TIMP=.54]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 566.:MNI=.013:SCI=   .0]
# OSD  85 L/S/HA
# 85 L/S/HA * 25.38 = 2157.3 L/S
 001:0159---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 03:000204    25.38     3.205 No_date   12:06   65.71  n/a
      [RDT= 3.00] out<- 04:000100    25.38     2.053 No_date   12:21   65.84  n/a
     {MxStoUsed=.1136E+00}
#==========================================
# AREA 4        (Adjacent to Beawer Pond)  ||
#==========================================
 001:0160---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      01:000204    19.62     1.909 No_date   12:15   60.05 .678
      [XIMP=.23:TIMP=.45]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 950.:MNI=.013:SCI=   .0]
# ADDITION OF MINOR FLOW AT 4A TO AREA 4
 001:0161---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:000100    25.38     2.053 No_date   12:21   65.84  n/a
                       + 01:000204    19.62     1.909 No_date   12:15   60.05  n/a
      [DT= 3.00]  SUM=  06:000231    45.00     3.957 No_date   12:15   63.32  n/a
 001:0162---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             02:000231   214.00    13.163 No_date   12:24   54.10  n/a
                       + 06:000231    45.00     3.957 No_date   12:15   63.32  n/a
      [DT= 3.00]  SUM=  07:000231   259.00    16.812 No_date   12:24   55.70  n/a
#==========================================
# AREA 8        (OUTLET - S3)             ||
#==========================================
 001:0163---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      01:000204    37.25     3.883 No_date   12:12   61.14 .690
      [XIMP=.32:TIMP=.44]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 729.:MNI=.013:SCI=   .0]
# AREA 8A - MINOR FLOW TO AREA 8, MAJOR FLOW TO SHIRLEY'S BROOK
 001:0164---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      02:000204     8.35     1.233 No_date   12:03   65.39 .738
      [XIMP=.41:TIMP=.54]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
```

```
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 318.:MNI=.013:SCI=    .0]
# SPLIT MAJOR AND MINOR FLOW FOR AREA 8A AT 85 L/S/HA
# 85 * 8.35 = 709.75 L/S
 001:0165---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  COMPUTE DUHYD       02:000204     8.35    1.233 No_date   12:03    65.39  n/a
        Major System /   05:000100      .67     .523 No_date   12:03    65.39  n/a
        Minor System \   06:100100     7.68     .710 No_date   11:54    65.39  n/a
# ADD 8A MINOR FLOW TO AREA 8
 001:0166---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             06:100100     7.68     .710 No_date   11:54    65.39  n/a
                       + 01:000204    37.25    3.883 No_date   12:12    61.14  n/a
       [DT= 3.00]  SUM=  03:000231    44.93    4.593 No_date   12:12    61.86  n/a
 001:0167---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             07:000231   259.00   16.812 No_date   12:24    55.70  n/a
                       + 03:000231    44.93    4.593 No_date   12:12    61.86  n/a
       [DT= 3.00]  SUM=  04:000231   303.93   20.566 No_date   12:18    56.61  n/a
#===============================================================
# AREA 9            (RURAL)                                  ||
#===============================================================
 001:0168---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        02:000100    23.10    3.677 No_date   12:06    75.51 .852
       [CN= 95.0: N= 3.00]
       [Tp=  .25:DT= 3.00]
#===============================================================
#    BEAVER POND PORTION #1                                  ||
#===============================================================
 001:0169---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:000231   303.93   20.566 No_date   12:18    56.61  n/a
                       + 02:000100    23.10    3.677 No_date   12:06    75.51  n/a
       [DT= 3.00]  SUM=  09:000321   327.03   23.451 No_date   12:18    57.95  n/a
#=====================================================================
# AREA 10A - MINOR FLOW TO AREA 10, MAJOR FLOW TO CARP RIVER WATERSHED
#=====================================================================
 001:0170---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      02:000204     7.50    1.014 No_date   12:03    64.06 .723
       [XIMP=.38:TIMP=.51]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 342.:MNI=.013:SCI=    .0]
# SPLIT OF MAJOR AND MINOR FLOW AT 85 L/S/HA
# 85 * 7.5 = 637.5 L/S
 001:0171---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  COMPUTE DUHYD       02:000204     7.50    1.014 No_date   12:03    64.06  n/a
        Major System /   10:000100      .50     .376 No_date   12:03    64.06  n/a
        Minor System \   03:100100     7.00     .638 No_date   11:54    64.06  n/a
#========================================
# AREA 10       (OUTLET S2)           ||
#========================================
 001:0172---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      01:000204    49.40    5.211 No_date   12:12    65.71 .742
       [XIMP=.43:TIMP=.54]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 977.:MNI=.013:SCI=    .0]
# ADDITION OF 10A MINOR FLOW TO AREA 10
 001:0173---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             03:100100     7.00     .638 No_date   11:54    64.06  n/a
                       + 01:000204    49.40    5.211 No_date   12:12    65.71  n/a
       [DT= 3.00]  SUM=  06:000321    56.40    5.849 No_date   12:12    65.50  n/a
#========================================
# AREA 11       (RURAL)               ||
#========================================
 001:0174---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        02:000100    25.00    2.973 No_date   12:15    75.51 .852
       [CN= 95.0: N= 3.00]
```

```
      [Tp=  .40:DT= 3.00]
 001:0175---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            06:000321    56.40    5.849 No_date   12:12   65.50  n/a
                     + 02:000100    25.00    2.973 No_date   12:15   75.51  n/a
      [DT= 3.00]  SUM= 03:000317    81.40    8.773 No_date   12:12   68.58  n/a
#=========================================
# AREA 13       (N/E OF CNR)               ||
#=========================================
 001:0176---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD     01:000204    27.90    3.391 No_date   12:06   64.06 .723
      [XIMP=.38:TIMP=.51]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 556.:MNI=.013:SCI=   .0]
# MINOR FLOW TO U/S CELL AND MAJOR FLOW TO SHIRLEY'S BROOK
# 85 L/S/HA * 27.90 HA = 2371.5 L/S
 001:0177---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  COMPUTE DUHYD     01:000204    27.90    3.391 No_date   12:06   64.06  n/a
       Major System /  08:000100     1.40    1.019 No_date   12:06   64.06  n/a
       Minor System \  02:100100    26.50    2.372 No_date   11:57   64.06  n/a
#====================================
# AREA 15  (ON-SITE DETENTION)    ||
#====================================
 001:0178---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD     01:000204     7.50    1.166 No_date   12:03   69.91 .789
      [XIMP=.59:TIMP=.59]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 392.:MNI=.013:SCI=   .0]
#======================
# OSD 85 L/S/HA
# 85*7.5 = 637.5 L/S
# GOULBOURN 10YR RATIONAL = 209 L/S
# TOTAL = 847 L/S
#======================
 001:0179---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 01:000204     7.50    1.166 No_date   12:03   69.91  n/a
      [RDT= 3.00] out<- 04:000100     7.50     .812 No_date   12:12   69.91  n/a
    {MxStoUsed=.2334E-01}
#=========================================
# AREA 14       (M/W OF CNR)               ||
#=========================================
 001:0180---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD     01:000204    35.50    4.155 No_date   12:06   63.06 .712
      [XIMP=.37:TIMP=.48]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 613.:MNI=.013:SCI=   .0]
#==========================================================
# MINOR FLOW TO U/S CELL, MAJOR FLOW TO SHIRLEY'S BROOK
# 85 L/S/HA * 33.9 = 2881.5 L/S
# GOULBOURN 10 YR RATIONAL = 380.3 L/S
# TOTAL 3262 L/S
#==========================================================
 001:0181---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  COMPUTE DUHYD     01:000204    35.50    4.155 No_date   12:06   63.06  n/a
       Major System /  10:000100     1.06     .893 No_date   12:06   63.06  n/a
       Minor System \  07:100100    34.44    3.262 No_date   12:00   63.06  n/a
 001:0182---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            04:000100     7.50     .812 No_date   12:12   69.91  n/a
                     + 07:100100    34.44    3.262 No_date   12:00   63.06  n/a
      [DT= 3.00]  SUM= 06:000317    41.94    4.074 No_date   12:12   64.29  n/a
 001:0183---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            02:100100    26.50    2.372 No_date   11:57   64.06  n/a
                     + 06:000317    41.94    4.074 No_date   12:12   64.29  n/a
```

```
        [DT= 3.00]  SUM=  04:000317    68.44    6.446 No_date   12:12   64.20  n/a
#===========================================================================
# AREA 12A  (SMALL URBAN AND NATURAL AREA NORTHEAST CORNER) ||
#===========================================================================
 001:0184---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB STANDHYD     01:000204     8.25     .985 No_date   12:03   55.77 .629
        [XIMP=.21:TIMP=.31]
        [LOSS= 2 :CN= 75.0]
        [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
        [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 257.:MNI=.013:SCI=    .0]
# MAJOR FLOW TO SHIRLEY'S BROOK, MINOR TO AREA 12
# 85 * 7.52 = 639.5 L/S
# GOULBOURN 10 YR RATIONAL = 173 L/S
# TOTAL 812.5 L/S
 001:0185---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
   *  COMPUTE DUHYD      01:000204     8.25     .985 No_date   12:03   55.77  n/a
          Major System /  02:000100      .15     .172 No_date   12:03   55.77  n/a
          Minor System \  06:100100     8.10     .813 No_date   12:00   55.77  n/a
#=======================================
# AREA 12      (SOUTH OF CNR)         ||
#=======================================
 001:0186---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB STANDHYD     01:000204    63.25    6.123 No_date   12:15   62.90 .710
        [XIMP=.36:TIMP=.48]
        [LOSS= 2 :CN= 75.0]
        [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
        [Impervious   area: IAimp=  .80:SLPI= .20:LGI=1095.:MNI=.013:SCI=    .0]
# ADDITION OF MINOR FLOW FROM 12A TO AREA 12
 001:0187---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ADD HYD            01:000204    63.25    6.123 No_date   12:15   62.90  n/a
                       + 06:100100     8.10     .813 No_date   12:00   55.77  n/a
        [DT= 3.00]  SUM=  07:000317    71.35    6.918 No_date   12:12   62.09  n/a
#================================
#  TOTAL FLOW TO OUTLET - S2    ||
#================================
 001:0188---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ADD HYD            04:000317    68.44    6.446 No_date   12:12   64.20  n/a
                       + 07:000317    71.35    6.918 No_date   12:12   62.09  n/a
        [DT= 3.00]  SUM=  01:000317   139.79   13.363 No_date   12:12   63.12  n/a
#=====================================
#  TOTAL FLOW TO BEAVER POND        ||
#=====================================
 001:0189---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ADD HYD            01:000317   139.79   13.363 No_date   12:12   63.12  n/a
                       + 03:000317    81.40    8.773 No_date   12:12   68.58  n/a
        [DT= 3.00]  SUM=  04:000312   221.19   22.136 No_date   12:12   65.13  n/a
#=====================================
#  TOTAL FLOW TO BEAVER POND        ||
#=====================================
 001:0190---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ADD HYD            04:000312   221.19   22.136 No_date   12:12   65.13  n/a
                       + 09:000321   327.03   23.451 No_date   12:18   57.95  n/a
        [DT= 3.00]  SUM=  01:000312   548.23   45.415 No_date   12:15   60.84  n/a
 001:0191---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ROUTE RESERVOIR -> 01:000312   548.23   45.415 No_date   12:15   60.84  n/a
   *   [RDT= 3.00] out<- 04:000100   548.23   22.608 No_date   12:48   60.84  n/a
      {MxStoUsed=.8957E+01}
#==================================================
# FLOWS INTO SHIRLEY'S BROOK THROUGH KNL LANDS
#==================================================
#=======================================
# AREA 16       (External Area)       ||
#=======================================
 001:0192---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB NASHYD       03:000100   240.00    4.011 No_date   15:27   50.37 .569
```

```
        [CN= 80.0: N= 3.00]
        [Tp= 3.20:DT= 3.00]
#================================
#  MAJOR FLOW FROM AREA 13       ||
#================================
 001:0193---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             03:000100   240.00    4.011 No_date   15:27    50.37  n/a
                       + 08:000100     1.40    1.019 No_date   12:06    64.06  n/a
       [DT= 3.00]  SUM=  09:000317   241.40    4.011 No_date   15:27    50.45  n/a
#======================================
#  MAJOR FLOW FROM AREA 12A             ||
#======================================
 001:0194---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             02:000100      .15     .172 No_date   12:03    55.77  n/a
                       + 09:000317   241.40    4.011 No_date   15:27    50.45  n/a
       [DT= 3.00]  SUM=  07:000312   241.55    4.011 No_date   15:27    50.46  n/a
#======================================
#  MAJOR FLOW FROM AREA 14              ||
#======================================
 001:0195---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             07:000312   241.55    4.011 No_date   15:27    50.46  n/a
                       + 10:000100     1.06     .893 No_date   12:06    63.06  n/a
       [DT= 3.00]  SUM=  06:000312   242.61    4.011 No_date   15:27    50.51  n/a
#======================================
#  MAJOR FLOW FROM AREA 8A              ||
#======================================
 001:0196---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             06:000312   242.61    4.011 No_date   15:27    50.51  n/a
                       + 05:000100      .67     .523 No_date   12:03    65.39  n/a
       [DT= 3.00]  SUM=  03:000312   243.28    4.011 No_date   15:27    50.55  n/a
#============================================================
# ====   25 mm CHICAGO STORM      4 HRS 12 MIN TIME STEP ====
#============================================================
 001:0197------------------------------------------------------------------------
     CHICAGO STORM
       [SDT=12.00:SDUR=   4.00:PTOT=  25.01]
       [A/B/C= 510.000/   5.100/    .800]
#================================
# AREA    (TOTAL Area)            ||
#================================
 001:0198---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        02:000100   360.00     .760 No_date    6:18     6.35 .254
       [CN= 80.0: N= 3.00]
       [Tp= 4.40:DT= 6.00]
#===============================================================
# ====   25 mm CHICAGO STORM      4 HRS 12 MIN TIME STEP ====
#                       FUTURE CONDITIONS                  =====
#                         AUG 2002                         =====
#===============================================================
#===============================================================
# AREA 3A (URBAN PORTION of Area North of Campeau Drive)       ||
#===============================================================
 001:0199---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      01:000100    31.90     .475 No_date    2:03    11.47 .459
       [XIMP=.30:TIMP=.42]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI=1760.:MNI=.013:SCI=    .0]
#===============================================================
# AREA 3B (GOLF PORTION of Area North of Campeau Drive)       ||
#===============================================================
 001:0200---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        02:000100     8.70     .053 No_date    2:27     5.11 .204
       [CN= 75.0: N= 3.00]
       [Tp=  .84:DT= 3.00]
```

```
 001:0201---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:000100    31.90     .475 No_date    2:03   11.47  n/a
                      + 02:000100     8.70     .053 No_date    2:27    5.11  n/a
       [DT= 3.00]  SUM= 03:000321    40.60     .521 No_date    2:03   10.11  n/a
#================================================================
# AREA 2A (URBAN PORTION of Area North of Campeau Drive)       ||
#================================================================
 001:0202---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000100    27.00     .465 No_date    1:45   10.26 .410
       [XIMP=.24:TIMP=.35]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 920.:MNI=.013:SCI=    .0]
#================================================================
# AREA 2B (GOLF PORTION of Area North of Campeau Drive)       ||
#================================================================
 001:0203---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       02:000100    39.00     .172 No_date    3:06    5.11 .204
       [CN= 75.0: N= 3.00]
       [Tp= 1.33:DT= 3.00]
 001:0204---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:000100    27.00     .465 No_date    1:45   10.26  n/a
                      + 02:000100    39.00     .172 No_date    3:06    5.11  n/a
       [DT= 3.00]  SUM= 04:000321    66.00     .512 No_date    1:54    7.22  n/a
 001:0205---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:000321    66.00     .512 No_date    1:54    7.22  n/a
                      + 03:000321    40.60     .521 No_date    2:03   10.11  n/a
       [DT= 3.00]  SUM= 05:000321   106.60    1.027 No_date    2:03    8.32  n/a
#================================================================
# AREA 1A (URBAN PORTION of Area North of Campeau Drive)       ||
#================================================================
 001:0206---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000100    42.00     .677 No_date    1:54   10.84 .433
       [XIMP=.27:TIMP=.38]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI=1280.:MNI=.013:SCI=    .0]
#================================================================
# AREA 1B (GOLF PORTION of Area North of Campeau Drive)       ||
#================================================================
 001:0207---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       02:000100     9.00     .079 No_date    2:00    5.11 .204
       [CN= 75.0: N= 3.00]
       [Tp=  .50:DT= 3.00]
 001:0208---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:000100    42.00     .677 No_date    1:54   10.84  n/a
                      + 02:000100     9.00     .079 No_date    2:00    5.11  n/a
       [DT= 3.00]  SUM= 03:000321    51.00     .754 No_date    1:54    9.83  n/a
 001:0209---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            05:000321   106.60    1.027 No_date    2:03    8.32  n/a
                      + 03:000321    51.00     .754 No_date    1:54    9.83  n/a
       [DT= 3.00]  SUM= 04:000321   157.60    1.764 No_date    2:00    8.81  n/a
 001:0210---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SHIFT HYD       -> 04:000321   157.60    1.764 No_date    2:00    8.81  n/a
       [LAG=  5.0 min]<- 05:000100  157.60    1.764 No_date    2:03    8.81  n/a
#================================================================
# AREA 5A (URBAN PORTION of Area North of Knudson Drive)       ||
#================================================================
 001:0211---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000100     7.90     .166 No_date    1:45   11.47 .459
       [XIMP=.30:TIMP=.42]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 840.:MNI=.013:SCI=    .0]
#================================================================
```

```
# AREA 5B (GOLF PORTION of Area North of Knudson Drive)       ||
#============================================================================
 001:0212---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       02:000100     9.30      .057 No_date    2:27    5.11 .204
      [CN= 75.0: N= 3.00]
      [Tp=  .83:DT= 3.00]
 001:0213---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:000100     7.90      .166 No_date    1:45   11.47  n/a
                      + 02:000100     9.30      .057 No_date    2:27    5.11  n/a
      [DT= 3.00]  SUM=  03:000321    17.20      .197 No_date    1:45    8.03  n/a
 001:0214---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            05:000100   157.60     1.764 No_date    2:03    8.81  n/a
                      + 03:000321    17.20      .197 No_date    1:45    8.03  n/a
      [DT= 3.00]  SUM=  04:000321   174.80     1.952 No_date    2:03    8.73  n/a
 001:0215---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SHIFT HYD       -> 04:000321   174.80     1.952 No_date    2:03    8.73  n/a
      [LAG=  5.0 min]<- 05:000100   174.80     1.952 No_date    2:06    8.73  n/a
#============================================================================
# AREA 6A (URBAN PORTION of Area North of Knudson Drive)       ||
#============================================================================
 001:0216---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000100     9.40      .174 No_date    1:51   11.47 .459
      [XIMP=.30:TIMP=.42]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI=1120.:MNI=.013:SCI=   .0]
#============================================================================
# AREA 6B (GOLF PORTION of Area North of Knudson Drive)       ||
#============================================================================
 001:0217---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       02:000100     8.20      .053 No_date    2:21    5.11 .204
      [CN= 75.0: N= 3.00]
      [Tp=  .77:DT= 3.00]
 001:0218---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:000100     9.40      .174 No_date    1:51   11.47  n/a
                      + 02:000100     8.20      .053 No_date    2:21    5.11  n/a
      [DT= 3.00]  SUM=  03:000321    17.60      .213 No_date    1:54    8.51  n/a
 001:0219---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            05:000100   174.80     1.952 No_date    2:06    8.73  n/a
                      + 03:000321    17.60      .213 No_date    1:54    8.51  n/a
      [DT= 3.00]  SUM=  04:000321   192.40     2.159 No_date    2:06    8.71  n/a
 001:0220---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SHIFT HYD       -> 04:000321   192.40     2.159 No_date    2:06    8.71  n/a
      [LAG=  5.0 min]<- 05:000100   192.40     2.159 No_date    2:09    8.71  n/a
#==============================================
# AREA 7       (Adjacent to Beawer Pond)  ||
#==============================================
 001:0221---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000204    21.60      .488 No_date    1:42   11.79 .471
      [XIMP=.31:TIMP=.45]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 800.:MNI=.013:SCI=   .0]
#===============================================
# TOTAL FLOW - AT EXISTING 2700 MM OULTLET ||
#===============================================
 001:0222---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            05:000100   192.40     2.159 No_date    2:09    8.71  n/a
                      + 01:000204    21.60      .488 No_date    1:42   11.79  n/a
      [DT= 3.00]  SUM=  02:000231   214.00     2.526 No_date    2:03    9.02  n/a
#===================================================
# AREA 4A - OSD WITH MINOR FLOW THROUGH AREA 4)
#===================================================
 001:0223---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     03:000204    25.38      .860 No_date    1:36   13.91 .556
```

```
        [XIMP=.43:TIMP=.54]
        [LOSS= 2 :CN= 75.0]
        [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
        [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 566.:MNI=.013:SCI=   .0]
# OSD  85 L/S/HA
# 85 L/S/HA * 25.38 = 2157.3 L/S
 001:0224---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 03:000204    25.38      .860 No_date    1:36   13.91  n/a
       [RDT= 3.00] out<- 04:000100    25.38      .859 No_date    1:36   13.91  n/a
      {MxStoUsed=.8798E-04}
#===========================================
# AREA 4        (Adjacent to Beawer Pond)  ||
#===========================================
 001:0225---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      01:000204    19.62      .340 No_date    1:45   10.80 .432
       [XIMP=.23:TIMP=.45]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 950.:MNI=.013:SCI=   .0]
# ADDITION OF MINOR FLOW AT 4A TO AREA 4
 001:0226---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:000100    25.38      .859 No_date    1:36   13.91  n/a
                      +  01:000204    19.62      .340 No_date    1:45   10.80  n/a
       [DT= 3.00]  SUM=  06:000231    45.00     1.167 No_date    1:39   12.55  n/a
 001:0227---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             02:000231   214.00     2.526 No_date    2:03    9.02  n/a
                      +  06:000231    45.00     1.167 No_date    1:39   12.55  n/a
       [DT= 3.00]  SUM=  07:000231   259.00     3.368 No_date    1:57    9.63  n/a
#===========================================
# AREA 8        (OUTLET - S3)              ||
#===========================================
 001:0228---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      01:000204    37.25      .878 No_date    1:42   11.86 .474
       [XIMP=.32:TIMP=.44]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 729.:MNI=.013:SCI=   .0]
# AREA 8A - MINOR FLOW TO AREA 8, MAJOR FLOW TO SHIRLEY'S BROOK
 001:0229---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      02:000204     8.35      .341 No_date    1:30   13.66 .546
       [XIMP=.41:TIMP=.54]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 318.:MNI=.013:SCI=   .0]
# SPLIT MAJOR AND MINOR FLOW FOR AREA 8A AT 85 L/S/HA
# 85 * 8.35 = 709.75 L/S
 001:0230---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
   * COMPUTE DUHYD       02:000204     8.35      .341 No_date    1:30   13.66  n/a
        Major System /   05:000100      .00      .000 No_date    0:00     .00  n/a
        Minor System \   06:100100     8.35      .341 No_date    1:30   13.66  n/a
# ADD 8A MINOR FLOW TO AREA 8
 001:0231---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             06:100100     8.35      .341 No_date    1:30   13.66  n/a
                      +  01:000204    37.25      .878 No_date    1:42   11.86  n/a
       [DT= 3.00]  SUM=  03:000231    45.60     1.145 No_date    1:39   12.19  n/a
 001:0232---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             07:000231   259.00     3.368 No_date    1:57    9.63  n/a
                      +  03:000231    45.60     1.145 No_date    1:39   12.19  n/a
       [DT= 3.00]  SUM=  04:000231   304.60     4.278 No_date    1:54   10.02  n/a
#============================================================
# AREA 9            (RURAL)                                ||
#============================================================
 001:0233---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        02:000100    23.10     1.046 No_date    1:36   14.99 .599
       [CN= 95.0: N= 3.00]
```

```
      [Tp=  .25:DT= 3.00]
#=================================================================
#    BEAVER POND PORTION #1                                     ||
#=================================================================
 001:0234---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            04:000231   304.60    4.278 No_date    1:54   10.02  n/a
                     + 02:000100    23.10    1.046 No_date    1:36   14.99  n/a
      [DT= 3.00]  SUM= 09:000321   327.70    5.110 No_date    1:45   10.37  n/a
#=======================================================================
# AREA 10A - MINOR FLOW TO AREA 10, MAJOR FLOW TO CARP RIVER WATERSHED
#=======================================================================
 001:0235---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD     02:000204     7.50     .281 No_date    1:30   13.08 .523
      [XIMP=.38:TIMP=.51]
      [LOSS= 2 :CN= 75.0]
      [Pervious    area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious  area: IAimp=  .80:SLPI= .20:LGI= 342.:MNI=.013:SCI=   .0]
# SPLIT OF MAJOR AND MINOR FLOW AT 85 L/S/HA
# 85 * 7.5 = 637.5 L/S
 001:0236---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  COMPUTE DUHYD     02:000204     7.50     .281 No_date    1:30   13.08  n/a
        Major System / 10:000100      .00     .000 No_date    0:00     .00  n/a
        Minor System \ 03:100100     7.50     .281 No_date    1:30   13.08  n/a
#========================================
# AREA 10       (OUTLET S2)            ||
#========================================
 001:0237---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD     01:000204    49.40    1.302 No_date    1:45   13.91 .556
      [XIMP=.43:TIMP=.54]
      [LOSS= 2 :CN= 75.0]
      [Pervious    area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious  area: IAimp=  .80:SLPI= .20:LGI= 977.:MNI=.013:SCI=   .0]
# ADDITION OF 10A MINOR FLOW TO AREA 10
 001:0238---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            03:100100     7.50     .281 No_date    1:30   13.08  n/a
                     + 01:000204    49.40    1.302 No_date    1:45   13.91  n/a
      [DT= 3.00]  SUM= 06:000321    56.90    1.494 No_date    1:45   13.80  n/a
#========================================
# AREA 11       (RURAL)                ||
#========================================
 001:0239---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       02:000100    25.00     .828 No_date    1:48   14.99 .599
      [CN= 95.0: N= 3.00]
      [Tp=  .40:DT= 3.00]
 001:0240---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            06:000321    56.90    1.494 No_date    1:45   13.80  n/a
                     + 02:000100    25.00     .828 No_date    1:48   14.99  n/a
      [DT= 3.00]  SUM= 03:000317    81.90    2.314 No_date    1:45   14.17  n/a
#========================================
# AREA 13      (N/E OF CNR)            ||
#========================================
 001:0241---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD     01:000204    27.90     .877 No_date    1:33   13.08 .523
      [XIMP=.38:TIMP=.51]
      [LOSS= 2 :CN= 75.0]
      [Pervious    area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious  area: IAimp=  .80:SLPI= .20:LGI= 556.:MNI=.013:SCI=   .0]
# MINOR FLOW TO U/S CELL AND MAJOR FLOW TO SHIRLEY'S BROOK
# 85 L/S/HA * 27.90 HA = 2371.5 L/S
 001:0242---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  COMPUTE DUHYD     01:000204    27.90     .877 No_date    1:33   13.08  n/a
        Major System / 08:000100      .00     .000 No_date    0:00     .00  n/a
        Minor System \ 02:100100    27.90     .877 No_date    1:33   13.08  n/a
#==================================
# AREA 15  (ON-SITE DETENTION)    ||
```

```
#====================================
 001:0243---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000204     7.50      .400 No_date    1:30   16.38 .655
       [XIMP=.59:TIMP=.59]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 392.:MNI=.013:SCI=    .0]
#======================
# OSD 85 L/S/HA
# 85*7.5 = 637.5 L/S
# GOULBOURN 10YR RATIONAL = 209 L/S
# TOTAL = 847 L/S
#======================
 001:0244---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 01:000204     7.50      .400 No_date    1:30   16.38  n/a
       [RDT= 3.00] out<- 04:000100     7.50      .399 No_date    1:30   16.38  n/a
      {MxStoUsed=.1027E-03}
#========================================
# AREA 14       (M/W OF CNR)            ||
#========================================
 001:0245---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000204    35.50     1.022 No_date    1:36   12.76 .510
       [XIMP=.37:TIMP=.48]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 613.:MNI=.013:SCI=    .0]
#==========================================================
# MINOR FLOW TO U/S CELL, MAJOR FLOW TO SHIRLEY'S BROOK
# 85 L/S/HA * 33.9 = 2881.5 L/S
# GOULBOURN 10 YR RATIONAL = 380.3 L/S
# TOTAL 3262 L/S
#==========================================================
 001:0246---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
   *  COMPUTE DUHYD     01:000204    35.50     1.022 No_date    1:36   12.76  n/a
         Major System / 10:000100      .00      .000 No_date    0:00     .00  n/a
         Minor System \ 07:100100    35.50     1.022 No_date    1:36   12.76  n/a
 001:0247---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:000100     7.50      .399 No_date    1:30   16.38  n/a
                      + 07:100100    35.50     1.022 No_date    1:36   12.76  n/a
       [DT= 3.00]  SUM= 06:000317    43.00     1.367 No_date    1:36   13.39  n/a
 001:0248---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            02:100100    27.90      .877 No_date    1:33   13.08  n/a
                      + 06:000317    43.00     1.367 No_date    1:36   13.39  n/a
       [DT= 3.00]  SUM= 04:000317    70.90     2.241 No_date    1:33   13.27  n/a
#===============================================================
# AREA 12A  (SMALL URBAN AND NATURAL AREA NORTHEAST CORNER) ||
#===============================================================
 001:0249---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000204     8.25      .196 No_date    1:27    9.63 .385
       [XIMP=.21:TIMP=.31]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 257.:MNI=.013:SCI=    .0]
# MAJOR FLOW TO SHIRLEY'S BROOK, MINOR TO AREA 12
# 85 * 7.52 = 639.5 L/S
# GOULBOURN 10 YR RATIONAL = 173 L/S
# TOTAL 812.5 L/S
 001:0250---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
   *  COMPUTE DUHYD     01:000204     8.25      .196 No_date    1:27    9.63  n/a
         Major System / 02:000100      .00      .000 No_date    0:00     .00  n/a
         Minor System \ 06:100100     8.25      .196 No_date    1:27    9.63  n/a
#========================================
# AREA 12       (SOUTH OF CNR)          ||
#========================================
 001:0251---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
```

```
     CALIB STANDHYD      01:000204    63.25    1.397 No_date    1:48   12.63 .505
      [XIMP=.36:TIMP=.48]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI=1095.:MNI=.013:SCI=   .0]
# ADDITION OF MINOR FLOW FROM 12A TO AREA 12
 001:0252---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             01:000204    63.25    1.397 No_date    1:48   12.63  n/a
                       + 06:100100     8.25     .196 No_date    1:27    9.63  n/a
      [DT= 3.00]  SUM=   07:000317    71.50    1.527 No_date    1:48   12.28  n/a
#=================================
#  TOTAL FLOW TO OUTLET - S2    ||
#=================================
 001:0253---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:000317    70.90    2.241 No_date    1:33   13.27  n/a
                       + 07:000317    71.50    1.527 No_date    1:48   12.28  n/a
      [DT= 3.00]  SUM=   01:000317   142.40    3.546 No_date    1:39   12.77  n/a
#======================================
#  TOTAL FLOW TO BEAVER POND         ||
#======================================
 001:0254---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             01:000317   142.40    3.546 No_date    1:39   12.77  n/a
                       + 03:000317    81.90    2.314 No_date    1:45   14.17  n/a
      [DT= 3.00]  SUM=   04:000312   224.30    5.764 No_date    1:42   13.28  n/a
#======================================
#  TOTAL FLOW TO BEAVER POND         ||
#======================================
 001:0255---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:000312   224.30    5.764 No_date    1:42   13.28  n/a
                       + 09:000321   327.70    5.110 No_date    1:45   10.37  n/a
      [DT= 3.00]  SUM=   01:000312   552.00   10.850 No_date    1:42   11.55  n/a
 001:0256---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR ->  01:000312   552.00   10.850 No_date    1:42   11.55  n/a
   *   [RDT= 3.00] out<- 04:000100   552.00    5.683 No_date    2:33   11.55  n/a
     {MxStoUsed=.2178E+01}
#=======================================================
# FLOWS INTO SHIRLEY'S BROOK THROUGH KNL LANDS
#=======================================================
#========================================
# AREA 16         (External Area)      ||
#========================================
 001:0257---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        03:000100   240.00     .677 No_date    5:12    6.35 .254
      [CN= 80.0: N= 3.00]
      [Tp= 3.20:DT= 3.00]
#=================================
#  MAJOR FLOW FROM AREA 13      ||
#=================================
 001:0258---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             03:000100   240.00     .677 No_date    5:12    6.35  n/a
                       + 08:000100      .00     .000 No_date    0:00     .00  n/a
      [DT= 3.00]  SUM=   09:000317   240.00     .677 No_date    5:12    6.35  n/a
#======================================
#  MAJOR FLOW FROM AREA 12A          ||
#======================================
 001:0259---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             02:000100      .00     .000 No_date    0:00     .00  n/a
                       + 09:000317   240.00     .677 No_date    5:12    6.35  n/a
      [DT= 3.00]  SUM=   07:000312   240.00     .677 No_date    5:12    6.35  n/a
#======================================
#  MAJOR FLOW FROM AREA 14           ||
#======================================
 001:0260---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             07:000312   240.00     .677 No_date    5:12    6.35  n/a
                       + 10:000100      .00     .000 No_date    0:00     .00  n/a
```

```
      [DT= 3.00]  SUM=  06:000312   240.00     .677 No_date    5:12     6.35  n/a
#=======================================
#  MAJOR FLOW FROM AREA 8A            ||
#=======================================
 001:0261---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            06:000312   240.00     .677 No_date    5:12     6.35  n/a
                      + 05:000100      .00     .000 No_date    0:00      .00  n/a
      [DT= 3.00]  SUM=  03:000312   240.00     .677 No_date    5:12     6.35  n/a
#===============================================================
# ==== 100 YR CHICAGO STORM      3 HRS 10 MIN TIME STEP    =====
#                       FUTURE CONDITIONS                  =====
#                         JUNE 2006                        =====
#===============================================================
 001:0262-----------------------------------------------------------------------
     READ STORM
      Filename = CHI310M1.STM
      Comment  = CHICAGO 3 HOUR 10 MIN 100 YEAR STORM
      [SDT=10.00:SDUR=   3.00:PTOT=  71.68]
#===============================================================
# AREA 3A (URBAN PORTION of Area North of Campeau Drive)      ||
#===============================================================
 001:0263---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000100    31.90    3.293 No_date    1:20    45.96 .641
      [XIMP=.30:TIMP=.42]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI=1760.:MNI=.013:SCI=    .0]
#===============================================================
# AREA 3B (GOLF PORTION of Area North of Campeau Drive)       ||
#===============================================================
 001:0264---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       02:000100     8.70     .371 No_date    2:00    31.80 .444
      [CN= 75.0: N= 3.00]
      [Tp=  .84:DT=10.00]
 001:0265---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:000100    31.90    3.293 No_date    1:20    45.96  n/a
                      + 02:000100     8.70     .371 No_date    2:00    31.80  n/a
      [DT=10.00]  SUM=  03:000321    40.60    3.519 No_date    1:20    42.93  n/a
#===============================================================
# AREA 2A (URBAN PORTION of Area North of Campeau Drive)      ||
#===============================================================
 001:0266---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     01:000100    27.00    3.349 No_date    1:10    43.38 .605
      [XIMP=.24:TIMP=.35]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 920.:MNI=.013:SCI=    .0]
#===============================================================
# AREA 2B (GOLF PORTION of Area North of Campeau Drive)       ||
#===============================================================
 001:0267---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       02:000100    39.00    1.176 No_date    2:30    31.80 .444
      [CN= 75.0: N= 3.00]
      [Tp= 1.33:DT=10.00]
 001:0268---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:000100    27.00    3.349 No_date    1:10    43.38  n/a
                      + 02:000100    39.00    1.176 No_date    2:30    31.80  n/a
      [DT=10.00]  SUM=  04:000321    66.00    3.557 No_date    1:10    36.54  n/a
 001:0269---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:000321    66.00    3.557 No_date    1:10    36.54  n/a
                      + 03:000321    40.60    3.519 No_date    1:20    42.93  n/a
      [DT=10.00]  SUM=  05:000321   106.60    6.728 No_date    1:10    38.97  n/a
#===============================================================
# AREA 1A (URBAN PORTION of Area North of Campeau Drive)      ||
#===============================================================
```

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 001:0270---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD      01:000100    42.00    4.443 No_date    1:20    44.56 .622
     [XIMP=.27:TIMP=.38]
     [LOSS= 2 :CN= 75.0]
     [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
     [Impervious   area: IAimp=  .80:SLPI= .20:LGI=1280.:MNI=.013:SCI=    .0]
#==================================================================
# AREA 1B (GOLF PORTION of Area North of Campeau Drive)        ||
#==================================================================
 001:0271---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        02:000100     9.00     .561 No_date    1:30    31.80 .444
     [CN= 75.0: N= 3.00]
     [Tp=  .50:DT=10.00]
 001:0272---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             01:000100    42.00    4.443 No_date    1:20    44.56  n/a
                      + 02:000100     9.00     .561 No_date    1:30    31.80  n/a
     [DT=10.00]  SUM=   03:000321    51.00    4.965 No_date    1:20    42.31  n/a
 001:0273---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             05:000321   106.60    6.728 No_date    1:10    38.97  n/a
                      + 03:000321    51.00    4.965 No_date    1:20    42.31  n/a
     [DT=10.00]  SUM=   04:000321   157.60   11.565 No_date    1:20    40.05  n/a
 001:0274---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD        -> 04:000321   157.60   11.565 No_date    1:20    40.05  n/a
     [LAG= 10.0 min]<- 05:000100   157.60   11.565 No_date    1:30    40.05  n/a
#==================================================================
# AREA 5A (URBAN PORTION of Area North of Knudson Drive)       ||
#==================================================================
 001:0275---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD      01:000100     7.90    1.066 No_date    1:10    45.96 .641
     [XIMP=.30:TIMP=.42]
     [LOSS= 2 :CN= 75.0]
     [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
     [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 840.:MNI=.013:SCI=    .0]
#==================================================================
# AREA 5B (GOLF PORTION of Area North of Knudson Drive)       ||
#==================================================================
 001:0276---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        02:000100     9.30     .399 No_date    2:00    31.80 .444
     [CN= 75.0: N= 3.00]
     [Tp=  .83:DT=10.00]
 001:0277---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             01:000100     7.90    1.066 No_date    1:10    45.96  n/a
                      + 02:000100     9.30     .399 No_date    2:00    31.80  n/a
     [DT=10.00]  SUM=   03:000321    17.20    1.215 No_date    1:10    38.31  n/a
 001:0278---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             05:000100   157.60   11.565 No_date    1:30    40.05  n/a
                      + 03:000321    17.20    1.215 No_date    1:10    38.31  n/a
     [DT=10.00]  SUM=   04:000321   174.80   12.497 No_date    1:30    39.88  n/a
 001:0279---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD        -> 04:000321   174.80   12.497 No_date    1:30    39.88  n/a
     [LAG= 10.0 min]<- 05:000100   174.80   12.497 No_date    1:40    39.88  n/a
#==================================================================
# AREA 6A (URBAN PORTION of Area North of Knudson Drive)       ||
#==================================================================
 001:0280---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD      01:000100     9.40    1.057 No_date    1:20    45.96 .641
     [XIMP=.30:TIMP=.42]
     [LOSS= 2 :CN= 75.0]
     [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
     [Impervious   area: IAimp=  .80:SLPI= .20:LGI=1120.:MNI=.013:SCI=    .0]
#==================================================================
# AREA 6B (GOLF PORTION of Àrea North of Knudson Drive)       ||
#==================================================================
 001:0281---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        02:000100     8.20     .374 No_date    1:50    31.80 .444
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```
         [CN= 75.0: N= 3.00]
         [Tp=  .77:DT=10.00]
  001:0282---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ADD HYD              01:000100     9.40    1.057 No_date    1:20   45.96  n/a
                         + 02:000100     8.20     .374 No_date    1:50   31.80  n/a
        [DT=10.00]  SUM=   03:000321    17.60    1.307 No_date    1:20   39.37  n/a
  001:0283---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ADD HYD              05:000100   174.80   12.497 No_date    1:40   39.88  n/a
                         + 03:000321    17.60    1.307 No_date    1:20   39.37  n/a
        [DT=10.00]  SUM=   04:000321   192.40   13.542 No_date    1:40   39.84  n/a
  001:0284---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      SHIFT HYD         -> 04:000321   192.40   13.542 No_date    1:40   39.84  n/a
        [LAG= 10.0 min]<- 05:000100   192.40   13.542 No_date    1:50   39.84  n/a
#==============================================
# AREA 7       (Adjacent to Beawer Pond)  ||
#==============================================
  001:0285---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB STANDHYD       01:000204    21.60    3.002 No_date    1:10   46.82 .653
        [XIMP=.31:TIMP=.45]
        [LOSS= 2 :CN= 75.0]
        [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
        [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 800.:MNI=.013:SCI=   .0]
#===============================================
# TOTAL FLOW - AT EXISTING 2700 MM OULTLET ||
#===============================================
  001:0286---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ADD HYD              05:000100   192.40   13.542 No_date    1:50   39.84  n/a
                         + 01:000204    21.60    3.002 No_date    1:10   46.82  n/a
        [DT=10.00]  SUM=   02:000231   214.00   14.757 No_date    1:40   40.54  n/a
#==================================================
# AREA 4A - OSD WITH MINOR FLOW THROUGH AREA 4)
#==================================================
  001:0287---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
   *  CALIB STANDHYD       03:000204    25.38    4.650 No_date    1:00   50.87 .710
        [XIMP=.43:TIMP=.54]
        [LOSS= 2 :CN= 75.0]
        [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
        [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 566.:MNI=.013:SCI=   .0]
# OSD  85 L/S/HA
# 85 L/S/HA * 25.38 = 2157.3 L/S
  001:0288---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ROUTE RESERVOIR -> 03:000204    25.38    4.650 No_date    1:00   50.87  n/a
   *    [RDT=10.00] out<- 04:000100    25.38    2.136 No_date    1:30   51.68  n/a
      {MxStoUsed=.3057E+00}
#==============================================
# AREA 4       (Adjacent to Beawer Pond)  ||
#==============================================
  001:0289---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB STANDHYD       01:000204    19.62    2.599 No_date    1:10   45.59 .636
        [XIMP=.23:TIMP=.45]
        [LOSS= 2 :CN= 75.0]
        [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
        [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 950.:MNI=.013:SCI=   .0]
# ADDITION OF MINOR FLOW AT 4A TO AREA 4
  001:0290---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ADD HYD              04:000100    25.38    2.136 No_date    1:30   51.68  n/a
                         + 01:000204    19.62    2.599 No_date    1:10   45.59  n/a
        [DT=10.00]  SUM=   06:000231    45.00    4.696 No_date    1:10   49.02  n/a
  001:0291---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ADD HYD              02:000231   214.00   14.757 No_date    1:40   40.54  n/a
                         + 06:000231    45.00    4.696 No_date    1:10   49.02  n/a
        [DT=10.00]  SUM=   07:000231   259.00   18.071 No_date    1:40   42.01  n/a
#==============================================
# AREA 8       (OUTLET - S3)              ||
#==============================================
```

```
 001:0292---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      01:000204    37.25    5.210 No_date    1:10    46.75 .652
      [XIMP=.32:TIMP=.44]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 729.:MNI=.013:SCI=    .0]
# AREA 8A - MINOR FLOW TO AREA 8, MAJOR FLOW TO SHIRLEY'S BROOK
 001:0293---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  CALIB STANDHYD      02:000204     8.35    2.058 No_date    1:00    50.54 .705
      [XIMP=.41:TIMP=.54]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 318.:MNI=.013:SCI=    .0]
# SPLIT MAJOR AND MINOR FLOW FOR AREA 8A AT 85 L/S/HA
# 85 * 8.35 = 709.75 L/S
 001:0294---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  COMPUTE DUHYD       02:000204     8.35    2.058 No_date    1:00    50.54  n/a
         Major System /  05:000100     2.33    1.348 No_date    1:00    50.54  n/a
         Minor System \  06:100100     6.02     .710 No_date    1:00    50.54  n/a
# ADD 8A MINOR FLOW TO AREA 8
 001:0295---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             06:100100     6.02     .710 No_date    1:00    50.54  n/a
                       + 01:000204    37.25    5.210 No_date    1:10    46.75  n/a
      [DT=10.00]  SUM=   03:000231    43.27    5.920 No_date    1:10    47.28  n/a
 001:0296---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             07:000231   259.00   18.071 No_date    1:40    42.01  n/a
                       + 03:000231    43.27    5.920 No_date    1:10    47.28  n/a
      [DT=10.00]  SUM=   04:000231   302.27   20.505 No_date    1:40    42.77  n/a
#=================================================================
# AREA 9          (RURAL)                                       ||
#=================================================================
 001:0297---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  CALIB NASHYD        02:000100    23.10    4.730 No_date    1:10    58.95 .822
      [CN= 95.0: N= 3.00]
      [Tp=  .25:DT=10.00]
#=================================================================
#    BEAVER POND PORTION #1                                     ||
#=================================================================
 001:0298---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:000231   302.27   20.505 No_date    1:40    42.77  n/a
                       + 02:000100    23.10    4.730 No_date    1:10    58.95  n/a
      [DT=10.00]  SUM=   09:000321   325.37   22.193 No_date    1:40    43.92  n/a
#========================================================================
# AREA 10A - MINOR FLOW TO AREA 10, MAJOR FLOW TO CARP RIVER WATERSHED
#========================================================================
 001:0299---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  CALIB STANDHYD      02:000204     7.50    1.754 No_date    1:00    49.35 .689
      [XIMP=.38:TIMP=.51]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 342.:MNI=.013:SCI=    .0]
# SPLIT OF MAJOR AND MINOR FLOW AT 85 L/S/HA
# 85 * 7.5 = 637.5 L/S
 001:0300---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  COMPUTE DUHYD       02:000204     7.50    1.754 No_date    1:00    49.35  n/a
         Major System /  10:000100     2.00    1.116 No_date    1:00    49.35  n/a
         Minor System \  03:100100     5.50     .638 No_date    1:00    49.35  n/a
#=========================================
# AREA 10       (OUTLET S2)            ||
#=========================================
 001:0301---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      01:000204    49.40    7.746 No_date    1:00    50.87 .710
      [XIMP=.43:TIMP=.54]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=    .0]
```

```
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 977.:MNI=.013:SCI=   .0]
# ADDITION OF 10A MINOR FLOW TO AREA 10
 001:0302---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             03:100100     5.50     .638 No_date    1:00   49.35  n/a
                      + 01:000204    49.40    7.746 No_date    1:00   50.87  n/a
      [DT=10.00]  SUM=  06:000321    54.90    8.384 No_date    1:00   50.72  n/a
#=========================================
# AREA 11       (RURAL)                 ||
#=========================================
 001:0303---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        02:000100    25.00    3.673 No_date    1:20   58.95 .822
      [CN= 95.0: N= 3.00]
      [Tp=  .40:DT=10.00]
 001:0304---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             06:000321    54.90    8.384 No_date    1:00   50.72  n/a
                      + 02:000100    25.00    3.673 No_date    1:20   58.95  n/a
      [DT=10.00]  SUM=  03:000317    79.90   11.313 No_date    1:10   53.29  n/a
#=========================================
# AREA 13      (N/E OF CNR)             ||
#=========================================
 001:0305---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  * CALIB STANDHYD      01:000204    27.90    4.725 No_date    1:00   49.35 .689
      [XIMP=.38:TIMP=.51]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 556.:MNI=.013:SCI=   .0]
# MINOR FLOW TO U/S CELL AND MAJOR FLOW TO SHIRLEY'S BROOK
# 85 L/S/HA * 27.90 HA = 2371.5 L/S
 001:0306---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  * COMPUTE DUHYD       01:000204    27.90    4.725 No_date    1:00   49.35  n/a
       Major System /   08:000100     5.88    2.353 No_date    1:00   49.35  n/a
       Minor System \   02:100100    22.02    2.372 No_date    1:00   49.35  n/a
#==================================
# AREA 15  (ON-SITE DETENTION)    ||
#==================================
 001:0307---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  * CALIB STANDHYD      01:000204     7.50    1.871 No_date    1:00   54.86 .765
      [XIMP=.59:TIMP=.59]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 392.:MNI=.013:SCI=   .0]
#====================
# OSD 85 L/S/HA
# 85*7.5 = 637.5 L/S
# GOULBOURN 10YR RATIONAL = 209 L/S
# TOTAL = 847 L/S
#====================
 001:0308---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 01:000204     7.50    1.871 No_date    1:00   54.86  n/a
      [RDT=10.00] out<- 04:000100     7.50     .843 No_date    1:20   54.95  n/a
     {MxStoUsed=.8746E-01}
#=========================================
# AREA 14      (M/W OF CNR)             ||
#=========================================
 001:0309---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  * CALIB STANDHYD      01:000204    35.50    5.714 No_date    1:00   48.50 .677
      [XIMP=.37:TIMP=.48]
      [LOSS= 2 :CN= 75.0]
      [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
      [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 613.:MNI=.013:SCI=   .0]
#=========================================================
# MINOR FLOW TO U/S CELL, MAJOR FLOW TO SHIRLEY'S BROOK
# 85 L/S/HA * 33.9 = 2881.5 L/S
# GOULBOURN 10 YR RATIONAL = 380.3 L/S
# TOTAL 3262 L/S
```

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#=========================================================
 001:0310---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  COMPUTE DUHYD       01:000204     35.50     5.714 No_date     1:00    48.50  n/a
         Major System /  10:000100      6.10     2.452 No_date     1:00    48.50  n/a
         Minor System \  07:100100     29.40     3.262 No_date     1:00    48.50  n/a
 001:0311---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:000100      7.50      .843 No_date     1:20    54.95  n/a
                       + 07:100100     29.40     3.262 No_date     1:00    48.50  n/a
       [DT=10.00]  SUM=  06:000317     36.90     4.105 No_date     1:20    49.81  n/a
 001:0312---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             02:100100     22.02     2.372 No_date     1:00    49.35  n/a
                       + 06:000317     36.90     4.105 No_date     1:20    49.81  n/a
       [DT=10.00]  SUM=  04:000317     58.92     6.477 No_date     1:20    49.64  n/a
#=================================================================
# AREA 12A  (SMALL URBAN AND NATURAL AREA NORTHEAST CORNER) ||
#=================================================================
 001:0313---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  CALIB STANDHYD      01:000204      8.25     1.558 No_date     1:00    41.99 .586
       [XIMP=.21:TIMP=.31]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI= 257.:MNI=.013:SCI=   .0]
# MAJOR FLOW TO SHIRLEY'S BROOK, MINOR TO AREA 12
# 85 * 7.52 = 639.5 L/S
# GOULBOURN 10 YR RATIONAL = 173 L/S
# TOTAL 812.5 L/S
 001:0314---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  COMPUTE DUHYD       01:000204      8.25     1.558 No_date     1:00    41.99  n/a
         Major System /  02:000100      1.41      .745 No_date     1:00    41.99  n/a
         Minor System \  06:100100      6.84      .813 No_date     1:00    41.99  n/a
#========================================
# AREA 12      (SOUTH OF CNR)           ||
#========================================
 001:0315---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      07:000204     63.25     9.034 No_date     1:10    48.33 .674
       [XIMP=.36:TIMP=.48]
       [LOSS= 2 :CN= 75.0]
       [Pervious     area: IAper= 1.50:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
       [Impervious   area: IAimp=  .80:SLPI= .20:LGI=1095.:MNI=.013:SCI=   .0]
# ADDITION OF MINOR FLOW FROM 12A TO AREA 12
 001:0316---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             01:000204      8.25     1.558 No_date     1:00    41.99  n/a
                       + 06:100100      6.84      .813 No_date     1:00    41.99  n/a
       [DT=10.00]  SUM=  07:000317     15.09     2.371 No_date     1:00    41.99  n/a
#=================================
#  TOTAL FLOW TO OUTLET - S2    ||
#=================================
 001:0317---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:000317     58.92     6.477 No_date     1:20    49.64  n/a
                       + 07:000317     15.09     2.371 No_date     1:00    41.99  n/a
       [DT=10.00]  SUM=  01:000317     74.02     8.821 No_date     1:00    48.08  n/a
#=====================================
#  TOTAL FLOW TO BEAVER POND        ||
#=====================================
 001:0318---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             01:000317     74.02     8.821 No_date     1:00    48.08  n/a
                       + 03:000317     79.90    11.313 No_date     1:10    53.29  n/a
       [DT=10.00]  SUM=  04:000312    153.92    19.649 No_date     1:10    50.79  n/a
#=====================================
#  TOTAL FLOW TO BEAVER POND        ||
#=====================================
 001:0319---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:000312    153.92    19.649 No_date     1:10    50.79  n/a
                       + 09:000321    325.37    22.193 No_date     1:40    43.92  n/a
       [DT=10.00]  SUM=  01:000312    479.28    39.589 No_date     1:10    46.12  n/a
```

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 001:0320---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 01:000312   479.28   39.589 No_date    1:10   46.12  n/a
  *    [RDT=10.00] out<- 04:000100   479.28   21.555 No_date    2:10   46.12  n/a
     {MxStoUsed=.8572E+01}
#=======================================================
# FLOWS INTO SHIRLEY'S BROOK THROUGH KNL LANDS
#=======================================================
#==========================================
# AREA 16        (External Area)        ||
#==========================================
 001:0321---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        03:000100   240.00    4.027 No_date    4:30   36.84 .514
       [CN= 80.0: N= 3.00]
       [Tp= 3.20:DT=10.00]
#==================================
#  MAJOR FLOW FROM AREA 13       ||
#==================================
 001:0322---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             03:000100   240.00    4.027 No_date    4:30   36.84  n/a
                       + 08:000100     5.88    2.353 No_date    1:00   49.35  n/a
       [DT=10.00]  SUM=  09:000317   245.88    4.027 No_date    4:30   37.14  n/a
#=======================================
#  MAJOR FLOW FROM AREA 12A           ||
#=======================================
 001:0323---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             02:000100     1.41     .745 No_date    1:00   41.99  n/a
                       + 09:000317   245.88    4.027 No_date    4:30   37.14  n/a
       [DT=10.00]  SUM=  07:000312   247.28    4.027 No_date    4:30   37.17  n/a
#=======================================
#  MAJOR FLOW FROM AREA 14            ||
#=======================================
 001:0324---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             07:000312   247.28    4.027 No_date    4:30   37.17  n/a
                       + 10:000100     6.10    2.452 No_date    1:00   48.50  n/a
       [DT=10.00]  SUM=  06:000312   253.38    5.598 No_date    1:00   37.44  n/a
#=======================================
#  MAJOR FLOW FROM AREA 8A            ||
#=======================================
 001:0325---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             06:000312   253.38    5.598 No_date    1:00   37.44  n/a
                       + 05:000100     2.33    1.348 No_date    1:00   50.54  n/a
       [DT=10.00]  SUM=  03:000312   255.71    6.946 No_date    1:00   37.56  n/a
 001:0326-----------------------------------------------------------------------
      FINISH
--------------------------------------------------------------------------------
********************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
 001:0035 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                can enter NHYD values for both the major and
                minor hydrographs.  A variable for the use of
                major system storage is also available.
 001:0041 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                can enter NHYD values for both the major and
                minor hydrographs.  A variable for the use of
                major system storage is also available.
 001:0047 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                can enter NHYD values for both the major and
                minor hydrographs.  A variable for the use of
                major system storage is also available.
 001:0051 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
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                 can enter NHYD values for both the major and
                 minor hydrographs.  A variable for the use of
                 major system storage is also available.
 001:0055 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                 can enter NHYD values for both the major and
                 minor hydrographs.  A variable for the use of
                 major system storage is also available.
 001:0061 ROUTE RESERVOIR
      *** WARNING: STORAGE-Q values were extrapolated.
                    Increase curve or use overflow option.
 001:0100 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                 can enter NHYD values for both the major and
                 minor hydrographs.  A variable for the use of
                 major system storage is also available.
 001:0106 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                 can enter NHYD values for both the major and
                 minor hydrographs.  A variable for the use of
                 major system storage is also available.
 001:0112 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                 can enter NHYD values for both the major and
                 minor hydrographs.  A variable for the use of
                 major system storage is also available.
 001:0116 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                 can enter NHYD values for both the major and
                 minor hydrographs.  A variable for the use of
                 major system storage is also available.
 001:0120 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                 can enter NHYD values for both the major and
                 minor hydrographs.  A variable for the use of
                 major system storage is also available.
 001:0126 ROUTE RESERVOIR
      *** WARNING: STORAGE-Q values were extrapolated.
                    Increase curve or use overflow option.
 001:0165 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                 can enter NHYD values for both the major and
                 minor hydrographs.  A variable for the use of
                 major system storage is also available.
 001:0171 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                 can enter NHYD values for both the major and
                 minor hydrographs.  A variable for the use of
                 major system storage is also available.
 001:0177 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                 can enter NHYD values for both the major and
                 minor hydrographs.  A variable for the use of
                 major system storage is also available.
 001:0181 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                 can enter NHYD values for both the major and
                 minor hydrographs.  A variable for the use of
                 major system storage is also available.
 001:0185 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                 can enter NHYD values for both the major and
                 minor hydrographs.  A variable for the use of
                 major system storage is also available.
 001:0191 ROUTE RESERVOIR
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      *** WARNING: STORAGE-Q values were extrapolated.
                   Increase curve or use overflow option.
 001:0230 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                can enter NHYD values for both the major and
                minor hydrographs.  A variable for the use of
                major system storage is also available.
 001:0236 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                can enter NHYD values for both the major and
                minor hydrographs.  A variable for the use of
                major system storage is also available.
 001:0242 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                can enter NHYD values for both the major and
                minor hydrographs.  A variable for the use of
                major system storage is also available.
 001:0246 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                can enter NHYD values for both the major and
                minor hydrographs.  A variable for the use of
                major system storage is also available.
 001:0250 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                can enter NHYD values for both the major and
                minor hydrographs.  A variable for the use of
                major system storage is also available.
 001:0256 ROUTE RESERVOIR
      *** WARNING: STORAGE-Q values were extrapolated.
                   Increase curve or use overflow option.
 001:0287 CALIB STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 001:0288 ROUTE RESERVOIR
      *** WARNING: Outflow volume is less than inflow volume.
 001:0293 CALIB STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 001:0294 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                can enter NHYD values for both the major and
                minor hydrographs.  A variable for the use of
                major system storage is also available.
 001:0297 CALIB NASHYD
      *** WARNING: Time step is too large for value of TP.
                   R.V. may be ok.  Peak flow could be off.
 001:0299 CALIB STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 001:0300 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                can enter NHYD values for both the major and
                minor hydrographs.  A variable for the use of
                major system storage is also available.
 001:0305 CALIB STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 001:0306 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                can enter NHYD values for both the major and
                minor hydrographs.  A variable for the use of
                major system storage is also available.
 001:0307 CALIB STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
```

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001:0309 CALIB STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
001:0310 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                can enter NHYD values for both the major and
                minor hydrographs.  A variable for the use of
                major system storage is also available.
001:0313 CALIB STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
001:0314 COMPUTE DUHYD
      *** NOTE: Use the new COMPUTE DUALHYD command and you
                can enter NHYD values for both the major and
                minor hydrographs.  A variable for the use of
                major system storage is also available.
001:0320 ROUTE RESERVOIR
      *** WARNING: STORAGE-Q values were extrapolated.
                   Increase curve or use overflow option.
  Simulation ended on 2006-06-29     at 12:34:47
==============================================================================
```

APPENDIX D

Water Model Schematics and Design

Water Demand

	Peak Day Residential (For Over 750 Dwellings)	Normal Residential (For Over 750 Dwellings)	Peak Day ICI (For Over 750 Dwellings)	Normal ICI (For Over 750 Dwellings)	Peak Day Residential (Less Than 750 dwellings)	Normal Residential (Less Than 750 dwellings)	Peak Day ICI (Less Than 750 dwellings)
5 year return period							
lpcd	800	300			1000	300	
l/ha/day			35,000	15,000			35,000
l/employee/day			450	200			450

Dimensionless Demand

Hour	Peak Day Residential (For Over 750 Dwellings)	Normal Residential (For Over 750 Dwellings)	Peak Day ICI (For Over 750 Dwellings)	Normal ICI (For Over 750 Dwellings)	Peak Day Residential (Less Than 750 dwellings)	Normal Residential (Less Than 750 dwellings)	Peak Day ICI (Less Than 750 dwellings)
1	0.24	0.29	0.75	0.77	0.24	0.29	0.75
2	0.19	0.20	0.51	0.73	0.19	0.20	0.51
3	0.22	0.18	0.32	0.87	0.22	0.18	0.32
4	0.24	0.16	0.25	0.79	0.24	0.16	0.25
5	0.21	0.19	0.37	0.79	0.21	0.19	0.37
6	0.42	0.62	0.59	0.89	0.42	0.62	0.59
7	1.00	2.16	0.86	0.81	1.00	2.16	0.86
8	1.21	2.40	1.12	1.13	1.21	2.40	1.12
9	0.98	1.57	1.34	1.16	0.98	1.57	1.34
10	0.92	1.33	1.50	1.10	0.92	1.33	1.50
11	0.88	0.96	1.60	1.36	0.88	0.96	1.60
12	0.84	1.06	1.62	1.20	0.84	1.06	1.62
13	0.81	0.92	1.58	1.30	0.81	0.92	1.58
14	0.81	0.74	1.49	1.44	0.81	0.74	1.49
15	0.93	0.74	1.37	1.07	0.93	0.74	1.37
16	0.93	0.85	1.22	1.07	0.93	0.85	1.22
17	1.10	1.00	1.08	1.09	1.10	1.00	1.08
18	1.39	1.24	0.96	0.95	1.39	1.24	0.96
19	1.66	1.55	0.87	1.05	1.66	1.55	0.87
20	2.21	1.56	0.83	0.98	2.21	1.56	0.83
21	2.63	1.40	0.84	0.89	2.63	1.40	0.84
22	2.21	1.23	0.89	1.01	2.21	1.23	0.89
23	1.26	1.00	0.99	0.73	1.26	1.00	0.99
24	0.70	0.63	1.06	0.82	0.70	0.63	1.06
Average	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Boundary HGL - Metres

Location	Max Day	Peak Hour	Max day with Fire (7500 lpm)
Richardson Side Rd at Goulborn Forced Rd.	159.6	150	158
Knudson @ Weslock	159.6	150	158

Note:
Morgan's Grant pumped area, population 5000, to be supplied through Kanata Lakes with a 600 mm pipe

IBI GROUP
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
K2C OP8

APPENDIX D - WATERMAIN DEMAND CALCULATION SHEET

PROJECT : KANATA LAKES NORTH
SERVICEABILITY STUDY

FILE: 3433-LD
DATE: JUN 06
DESIGN: LE

NODE	RESIDENTIAL UNITS			MEDIUM DENSITY		TOTAL	NON-RESIDENTIAL	BASIC DAY DEMAND (l/s)			PEAK DAY DEMAND (l/s)			PEAK HOUR DEMAND (l/s)			FIRE
	SINGLE FAMILY	TOWN HOUSE	POPULATION	AREA (Ha)	POPULATION	POPULATION	ICI (Ha)	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	DEMAND (l/s)
PHASE 1																	
J6							3.80		0.66	0.66		1.54	1.54		2.49	2.49	200
J8				2.50	212.5	212.5		0.74		0.74	1.97		1.97	5.17		5.17	125
J17	8	10	54.2			54.2		0.19		0.19	0.50		0.50	1.32		1.32	125
J18	11		37.4			37.4		0.13		0.13	0.35		0.35	0.91		0.91	100
J19	17		57.8			57.8		0.20		0.20	0.54		0.54	1.41		1.41	100
J20	10	14	71.8			71.8		0.25		0.25	0.66		0.66	1.75		1.75	125
J21	4		13.6			13.6		0.05		0.05	0.13		0.13	0.33		0.33	100
J22	14		47.6			47.6		0.17		0.17	0.44		0.44	1.16		1.16	100
J23	12		40.8			40.8		0.14		0.14	0.38		0.38	0.99		0.99	100
J24	21	20	125.4			125.4		0.44		0.44	1.16		1.16	3.05		3.05	125
J25	15	6	67.2			67.2		0.23		0.23	0.62		0.62	1.64		1.64	125
J26	8	12	59.6			59.6		0.21		0.21	0.55		0.55	1.45		1.45	125
J27	7	12	56.2			56.2		0.20		0.20	0.52		0.52	1.37		1.37	125
J28	6	16	63.6			63.6		0.22		0.22	0.59		0.59	1.55		1.55	125
J29	7	22	83.2			83.2		0.29		0.29	0.77		0.77	2.03		2.03	125
J30	4		13.6			13.6		0.05		0.05	0.13		0.13	0.33		0.33	100
J31	3		10.2			10.2	3.00	0.04	0.52	0.56	0.09	1.22	1.31	0.25	1.97	2.22	200
J32	6		20.4			20.4		0.07		0.07	0.19		0.19	0.50		0.50	100
J33		34	91.8			91.8		0.32		0.32	0.85		0.85	2.24		2.24	125
J34		30	81.0			81.0		0.28		0.28	0.75		0.75	1.97		1.97	125
J35		30	81.0			81.0		0.28		0.28	0.75		0.75	1.97		1.97	125
J36		27	72.9			72.9		0.25		0.25	0.68		0.68	1.78		1.78	125
J37		25	67.5			67.5		0.23		0.23	0.63		0.63	1.64		1.64	125
J38		28	75.6			75.6		0.26		0.26	0.70		0.70	1.84		1.84	125
J39	24		81.6			81.6		0.28		0.28	0.76		0.76	1.99		1.99	100
J40	11	25	104.9			104.9		0.36		0.36	0.97		0.97	2.55		2.55	125
J41		24	64.8			64.8		0.23		0.23	0.60		0.60	1.58		1.58	125
J42		22	59.4			59.4		0.21		0.21	0.55		0.55	1.45		1.45	125
J43		30	81.0			81.0		0.28		0.28	0.75		0.75	1.97		1.97	125
J44		24	64.8			64.8		0.23		0.23	0.60		0.60	1.58		1.58	125
J45	24		81.6			81.6		0.28		0.28	0.76		0.76	1.99		1.99	100
J46	12		40.8			40.8		0.14		0.14	0.38		0.38	0.99		0.99	100
J47	11		37.4			37.4		0.13		0.13	0.35		0.35	0.91		0.91	100
J48	10		34.0			34.0		0.12		0.12	0.31		0.31	0.83		0.83	100
J49	13		44.2			44.2		0.15		0.15	0.41		0.41	1.08		1.08	100
J50	9		30.6			30.6		0.11		0.11	0.28		0.28	0.75		0.75	100
J51	8		27.2			27.2		0.09		0.09	0.25		0.25	0.66		0.66	100
J52	31		105.4			105.4		0.37		0.37	0.98		0.98	2.57		2.57	100
J53	50		170.0			170.0		0.59		0.59	1.57		1.57	4.14		4.14	
J54	14		47.6			47.6		0.17		0.17	0.44		0.44	1.16		1.16	100
J55	13		44.2			44.2		0.15		0.15	0.41		0.41	1.08		1.08	100

WATER DEMAND		BASIC DAY	PEAK DAY
Residential	l/cap/day	300	800
Non-Residential	l/ha/day	15,000	35,000

RESIDENTIAL DENSITIES	
Single Family	3.4 persons per unit
Townhouse	2.7 persons per unit
Medium Density	85 persons per gross hectare

FIRE DEMAND		
Single Family	6,000 l/min =	100 l/s
Row House	7,500 l/min =	125 l/s
ICI	12,000 l/min =	200 l/s

IBI GROUP
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
K2C OP8

APPENDIX D - WATERMAIN DEMAND CALCULATION SHEET

PROJECT : KANATA LAKES NORTH
SERVICEABILITY STUDY

FILE: 3433-LD
DATE: JUN 06
DESIGN: LE

NODE	RESIDENTIAL UNITS			MEDIUM DENSITY		TOTAL	NON-RESIDENTIAL	BASIC DAY DEMAND (l/s)			PEAK DAY DEMAND (l/s)			PEAK HOUR DEMAND (l/s)			FIRE
	SINGLE FAMILY	TOWN HOUSE	POPULATION	AREA (Ha)	POPULATION	POPULATION	ICI (Ha)	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	DEMAND (l/s)
PHASE 1 (Cont'd)																	
J56	16		54.4			54.4		0.19		0.19	0.50		0.50	1.32		1.32	100
J57	20		68.0			68.0		0.24		0.24	0.63		0.63	1.66		1.66	100
J58		32	86.4			86.4		0.30		0.30	0.80		0.80	2.10		2.10	125
J59	18		61.2			61.2		0.21		0.21	0.57		0.57	1.49		1.49	100
J60	11		37.4			37.4		0.13		0.13	0.35		0.35	0.91		0.91	100
J61	13		44.2			44.2		0.15		0.15	0.41		0.41	1.08		1.08	100
J62	17		57.8			57.8		0.20		0.20	0.54		0.54	1.41		1.41	100
J63	10		34.0			34.0		0.12		0.12	0.31		0.31	0.83		0.83	100
J64		34	91.8			91.8		0.32		0.32	0.85		0.85	2.24		2.24	125
J65	15		51.0			51.0		0.18		0.18	0.47		0.47	1.24		1.24	100
J66	18		61.2			61.2		0.21		0.21	0.57		0.57	1.49		1.49	100
J3	50		170.0			170.0		0.59		0.59	1.57		1.57	4.14		4.14	
J4	50		170.0			170.0		0.59		0.59	1.57		1.57	4.14		4.14	
PHASE 2																	
J67	15		51.0			51.0		0.18		0.18	0.47		0.47	1.24		1.24	100
J68	14		47.6			47.6		0.17		0.17	0.44		0.44	1.16		1.16	100
J69	13		44.2			44.2		0.15		0.15	0.41		0.41	1.08		1.08	100
J70	4	12	46.0			46.0		0.16		0.16	0.43		0.43	1.12		1.12	125
J71	4	16	56.8			56.8		0.20		0.20	0.53		0.53	1.38		1.38	125
J72	5	15	57.5			57.5		0.20		0.20	0.53		0.53	1.40		1.40	125
J73	6	12	52.8			52.8		0.18		0.18	0.49		0.49	1.29		1.29	125
J74	5	12	49.4			49.4		0.17		0.17	0.46		0.46	1.20		1.20	125
J75	4	14	51.4			51.4		0.18		0.18	0.48		0.48	1.25		1.25	125
J76	4	18	62.2			62.2		0.22		0.22	0.58		0.58	1.51		1.51	125
J78	17		57.8			57.8		0.20		0.20	0.54		0.54	1.41		1.41	100
J79	13		44.2			44.2		0.15		0.15	0.41		0.41	1.08		1.08	100
J80	22		74.8			74.8		0.26		0.26	0.69		0.69	1.82		1.82	100
J81	16		54.4			54.4		0.19		0.19	0.50		0.50	1.32		1.32	100
J82	50		170.0			170.0		0.59		0.59	1.57		1.57	4.14		4.14	
J83	17		57.8			57.8		0.20		0.20	0.54		0.54	1.41		1.41	100
J84	20		68.0			68.0		0.24		0.24	0.63		0.63	1.66		1.66	100
J85		34	91.8			91.8		0.32		0.32	0.85		0.85	2.24		2.24	125
J86		35	94.5			94.5		0.33		0.33	0.88		0.88	2.30		2.30	125
J87		26	70.2			70.2		0.24		0.24	0.65		0.65	1.71		1.71	125
J88		28	75.6			75.6		0.26		0.26	0.70		0.70	1.84		1.84	125
J89		24	64.8			64.8		0.23		0.23	0.60		0.60	1.58		1.58	125
J90		32	86.4			86.4		0.30		0.30	0.80		0.80	2.10		2.10	125
J91	8		27.2			27.2		0.09		0.09	0.25		0.25	0.66		0.66	100
J92	10		34.0			34.0		0.12		0.12	0.31		0.31	0.83		0.83	100

WATER DEMAND		BASIC DAY	PEAK DAY
Residential	l/cap/day	300	800
Non-Residential	l/ha/day	15,000	35,000

RESIDENTIAL DENSITIES	
Single Family	3.4 persons per unit
Townhouse	2.7 persons per unit
Medium Density	85 persons per gross hectare

FIRE DEMAND		
Single Family	6,000 l/min =	100 l/s
Row House	7,500 l/min =	125 l/s
ICI	12,000 l/min =	200 l/s

IBI GROUP
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APPENDIX D - WATERMAIN DEMAND CALCULATION SHEET

PROJECT : KANATA LAKES NORTH
SERVICEABILITY STUDY

FILE: 3433-LD
DATE: JUN 06
DESIGN: LE

NODE	RESIDENTIAL UNITS			MEDIUM DENSITY		TOTAL	NON-RESIDENTIAL	BASIC DAY DEMAND (l/s)			PEAK DAY DEMAND (l/s)			PEAK HOUR DEMAND (l/s)			FIRE
	SINGLE FAMILY	TOWN HOUSE	POPULATION	AREA (Ha)	POPULATION	POPULATION	ICI (Ha)	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	DEMAND (l/s)
PHASE 3 (Cont'd)																	
J139		36	97.2			97.2		0.34		0.34	0.90		0.90	2.37		2.37	125
J140		28	75.6			75.6		0.26		0.26	0.70		0.70	1.84		1.84	125
J141		34	91.8			91.8		0.32		0.32	0.85		0.85	2.24		2.24	125
J142		28	75.6			75.6		0.26		0.26	0.70		0.70	1.84		1.84	125
J143		32	86.4			86.4		0.30		0.30	0.80		0.80	2.10		2.10	125
J144		30	81.0			81.0		0.28		0.28	0.75		0.75	1.97		1.97	125
J145		32	86.4			86.4		0.30		0.30	0.80		0.80	2.10		2.10	125
J146	12		40.8			40.8		0.14		0.14	0.38		0.38	0.99		0.99	100
J147	14		47.6			47.6		0.17		0.17	0.44		0.44	1.16		1.16	100
J148		30	81.0			81.0		0.28		0.28	0.75		0.75	1.97		1.97	125
J149		30	81.0			81.0		0.28		0.28	0.75		0.75	1.97		1.97	125
J150		36	97.2			97.2		0.34		0.34	0.90		0.90	2.37		2.37	125
J151		32	86.4			86.4		0.30		0.30	0.80		0.80	2.10		2.10	125
J152		31	83.7			83.7		0.29		0.29	0.78		0.78	2.04		2.04	125
J153		33	89.1			89.1		0.31		0.31	0.83		0.83	2.17		2.17	125
J154		33	89.1			89.1		0.31		0.31	0.83		0.83	2.17		2.17	125
J155		33	89.1			89.1		0.31		0.31	0.83		0.83	2.17		2.17	125
J156		32	86.4			86.4		0.30		0.30	0.80		0.80	2.10		2.10	125
J157		30	81.0			81.0		0.28		0.28	0.75		0.75	1.97		1.97	125
PHASE 4																	
J13							5.35		0.93	0.93		2.17	2.17		3.51	3.51	200
J14							6.40		1.11	1.11		2.59	2.59		4.20	4.20	200
J15			5,000.0			5,000.0		17.36		17.36	46.30		46.30	121.76		121.76	
J107	12	25	108.3			108.3		0.38		0.38	1.00		1.00	2.64		2.64	125
J108	9	22	90.0			90.0		0.31		0.31	0.83		0.83	2.19		2.19	125
J109	8		27.2			27.2		0.09		0.09	0.25		0.25	0.66		0.66	100
J110	11		37.4			37.4		0.13		0.13	0.35		0.35	0.91		0.91	100
J111	16		54.4			54.4		0.19		0.19	0.50		0.50	1.32		1.32	100
J112	9	12	63.0			63.0		0.22		0.22	0.58		0.58	1.53		1.53	125
J113	3	22	69.6			69.6		0.24		0.24	0.64		0.64	1.69		1.69	125
J114	8	22	86.6			86.6		0.30		0.30	0.80		0.80	2.11		2.11	125
J115	6	24	85.2			85.2		0.30		0.30	0.79		0.79	2.07		2.07	125
J116	7	25	91.3			91.3		0.32		0.32	0.85		0.85	2.22		2.22	125
J117		32	86.4			86.4		0.30		0.30	0.80		0.80	2.10		2.10	125
J158		36	97.2			97.2		0.34		0.34	0.90		0.90	2.37		2.37	125
J159		28	75.6			75.6		0.26		0.26	0.70		0.70	1.84		1.84	125
J160		26	70.2			70.2		0.24		0.24	0.65		0.65	1.71		1.71	125

WATER DEMAND		BASIC DAY	PEAK DAY
Residential	l/cap/day	300	800
Non-Residential	l/ha/day	15,000	35,000

RESIDENTIAL DENSITIES	
Single Family	3.4 persons per unit
Townhouse	2.7 persons per unit
Medium Density	85 persons per gross hectare

FIRE DEMAND		
Single Family	6,000 l/min =	100 l/s
Row House	7,500 l/min =	125 l/s
ICI	12,000 l/min =	200 l/s

IBI GROUP
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
K2C OP8

APPENDIX D - WATERMAIN DEMAND CALCULATION SHEET

PROJECT : KANATA LAKES NORTH
SERVICEABILITY STUDY

FILE: 3433-LD
DATE: JUN 06
DESIGN: LE

NODE	RESIDENTIAL UNITS			MEDIUM DENSITY		TOTAL	NON-RESIDENTIAL	BASIC DAY DEMAND (l/s)			PEAK DAY DEMAND (l/s)			PEAK HOUR DEMAND (l/s)			FIRE
	SINGLE FAMILY	TOWN HOUSE	POPULATION	AREA (Ha)	POPULATION	POPULATION	ICI (Ha)	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	DEMAND (l/s)
PHASE 4 (Cont'd)																	
J161		30	81.0			81.0		0.28		0.28	0.75		0.75	1.97		1.97	125
J162		24	64.8			64.8		0.23		0.23	0.60		0.60	1.58		1.58	125
J163		22	59.4			59.4		0.21		0.21	0.55		0.55	1.45		1.45	125
J164		25	67.5			67.5		0.23		0.23	0.63		0.63	1.64		1.64	125
J165	18		61.2			61.2		0.21		0.21	0.57		0.57	1.49		1.49	100
J166	19		64.6			64.6		0.22		0.22	0.60		0.60	1.57		1.57	100
J167	20		68.0			68.0		0.24		0.24	0.63		0.63	1.66		1.66	100
J168	17		57.8			57.8		0.20		0.20	0.54		0.54	1.41		1.41	100
J169	15		51.0			51.0		0.18		0.18	0.47		0.47	1.24		1.24	100
J170	16		54.4			54.4		0.19		0.19	0.50		0.50	1.32		1.32	100
J171	19		64.6			64.6		0.22		0.22	0.60		0.60	1.57		1.57	100
J172	15		51.0			51.0		0.18		0.18	0.47		0.47	1.24		1.24	100
J173	23		78.2			78.2		0.27		0.27	0.72		0.72	1.90		1.90	100
J174	30		102.0			102.0		0.35		0.35	0.94		0.94	2.48		2.48	100
J175	22		74.8			74.8		0.26		0.26	0.69		0.69	1.82		1.82	100
J176	22		74.8			74.8		0.26		0.26	0.69		0.69	1.82		1.82	100
J177		24	64.8			64.8		0.23		0.23	0.60		0.60	1.58		1.58	125
J178		28	75.6			75.6		0.26		0.26	0.70		0.70	1.84		1.84	125
J179		25	67.5			67.5		0.23		0.23	0.63		0.63	1.64		1.64	125
J180		19	51.3			51.3		0.18		0.18	0.48		0.48	1.25		1.25	125
J181		24	64.8			64.8		0.23		0.23	0.60		0.60	1.58		1.58	125
J182		29	78.3			78.3		0.27		0.27	0.73		0.73	1.91		1.91	125
J183		24	64.8			64.8		0.23		0.23	0.60		0.60	1.58		1.58	125
J184		32	86.4			86.4		0.30		0.30	0.80		0.80	2.10		2.10	125
J185		24	64.8			64.8		0.23		0.23	0.60		0.60	1.58		1.58	125
J186		34	91.8			91.8		0.32		0.32	0.85		0.85	2.24		2.24	125
J187		26	70.2			70.2		0.24		0.24	0.65		0.65	1.71		1.71	125
J188		34	91.8			91.8		0.32		0.32	0.85		0.85	2.24		2.24	125

WATER DEMAND		BASIC DAY	PEAK DAY
Residential	l/cap/day	300	800
Non-Residential	l/ha/day	15,000	35,000

RESIDENTIAL DENSITIES	
Single Family	3.4 persons per unit
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Medium Density	85 persons per gross hectare

FIRE DEMAND		
Single Family	6,000 l/min =	100 l/s
Row House	7,500 l/min =	125 l/s
ICI	12,000 l/min =	200 l/s

KLN1

Prepared By:

Date: Wednesday, July 05, 2006

Basic Day All Phases

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		J-3	0.59	112.70	157.95	443.40
2		J-4	0.59	117.60	157.95	395.44
3		J10	0.00	97.75	157.93	589.67
4		J100	0.20	101.50	157.84	552.05
5		J101	0.22	101.60	157.83	551.03
6		J102	0.29	101.70	157.83	550.01
7		J103	0.19	101.80	157.82	548.99
8		J104	0.19	101.90	157.82	547.98
9		J105	0.31	102.00	157.82	546.97
10		J106	0.24	102.30	157.81	544.00
11		J107	0.38	103.50	157.80	532.12
12		J108	0.31	104.80	157.80	519.35
13		J109	0.09	106.00	157.80	507.56
14		J11	0.00	101.40	157.87	553.38
15		J110	0.13	107.00	157.79	497.75
16		J111	0.19	108.00	157.79	487.94
17		J112	0.22	107.00	157.79	497.72
18		J113	0.24	106.50	157.79	502.61
19		J114	0.30	106.00	157.79	507.51
20		J115	0.30	105.00	157.79	517.31
21		J116	0.32	103.50	157.79	532.01
22		J117	0.28	100.80	157.86	559.11
23		J118	0.45	102.00	157.86	547.35
24		J119	0.32	100.50	157.86	562.05
25		J12	0.66	100.00	157.86	566.95
26		J120	0.18	103.50	157.85	532.55
27		J121	0.18	104.20	157.84	525.66
28		J122	0.21	104.00	157.84	527.61
29		J123	0.12	103.50	157.84	532.51
30		J124	0.24	104.50	157.84	522.70
31		J125	0.15	104.80	157.84	519.77
32		J126	0.19	104.50	157.84	522.72

Basic Day All Phases

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
33		J127	0.18	103.00	157.84	537.40
34		J128	0.13	106.00	157.83	507.89
35		J129	0.12	105.00	157.83	517.68
36		J13	0.93	105.80	157.79	509.48
37		J130	0.17	106.00	157.82	507.82
38		J131	0.12	107.00	157.82	498.02
39		J132	0.28	111.00	157.82	458.81
40		J133	0.59	116.50	157.82	404.91
41		J134	0.24	116.50	157.82	404.91
42		J135	0.26	109.00	157.82	478.40
43		J136	0.30	105.00	157.84	517.84
44		J137	0.33	102.50	157.84	542.31
45		J138	0.24	104.00	157.84	527.60
46		J139	0.34	102.00	157.84	547.17
47		J14	1.11	101.00	157.77	556.33
48		J140	0.26	103.00	157.84	537.37
49		J141	0.32	101.70	157.84	550.08
50		J142	0.26	102.00	157.83	547.14
51		J143	0.30	102.00	157.83	547.11
52		J144	0.28	102.30	157.83	544.17
53		J145	0.30	102.20	157.83	545.13
54		J146	0.14	102.20	157.82	545.05
55		J147	0.17	102.50	157.82	542.10
56		J148	0.28	108.00	157.82	488.16
57		J149	0.28	111.00	157.82	458.75
58		J15	17.36	99.00	157.76	575.85
59		J150	0.34	114.00	157.81	429.35
60		J151	0.30	105.50	157.81	512.64
61		J152	0.29	107.00	157.81	497.94
62		J153	0.31	108.50	157.81	483.24
63		J154	0.31	103.50	157.81	532.24
64		J155	0.31	103.30	157.81	534.20

Basic Day All Phases

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
65		J156	0.30	103.20	157.81	535.18
66		J157	0.28	103.00	157.81	537.14
67		J158	0.34	104.50	157.80	522.29
68		J159	0.26	106.50	157.80	502.68
69		J16	0.00	107.80	157.98	491.73
70		J160	0.24	107.00	157.80	497.78
71		J161	0.28	107.50	157.80	492.88
72		J162	0.23	106.50	157.80	502.68
73		J163	0.21	105.50	157.80	512.48
74		J164	0.23	105.00	157.80	517.38
75		J165	0.21	110.00	157.80	468.38
76		J166	0.22	109.50	157.80	473.28
77		J167	0.24	109.00	157.80	478.16
78		J168	0.20	108.50	157.79	483.05
79		J169	0.18	109.20	157.79	476.19
80		J17	0.19	108.50	157.98	484.83
81		J170	0.19	110.00	157.79	468.34
82		J171	0.22	109.00	157.79	478.14
83		J172	0.18	108.00	157.79	487.95
84		J173	0.27	108.00	157.79	487.91
85		J174	0.35	109.00	157.79	478.11
86		J175	0.26	111.00	157.79	458.51
87		J176	0.26	106.90	157.79	498.69
88		J177	0.23	105.50	157.79	512.40
89		J178	0.26	104.50	157.79	522.20
90		J179	0.23	104.00	157.79	527.10
91		J18	0.13	111.60	157.97	454.37
92		J180	0.18	105.00	157.79	517.30
93		J181	0.23	103.50	157.79	532.00
94		J182	0.27	105.00	157.79	517.30
95		J183	0.23	103.00	157.79	536.89
96		J184	0.30	104.50	157.79	522.20

Basic Day All Phases

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
97		J185	0.23	102.50	157.79	541.79
98		J186	0.32	103.80	157.79	529.06
99		J187	0.24	102.40	157.79	542.77
100		J188	0.32	102.00	157.79	546.70
101		J19	0.20	115.00	157.96	421.01
102		J20	0.25	112.00	157.96	450.34
103		J21	0.05	111.60	157.95	454.24
104		J22	0.17	111.30	157.95	457.15
105		J23	0.14	110.80	157.95	462.03
106		J24	0.44	110.60	157.95	463.96
107		J25	0.23	109.80	157.95	471.79
108		J26	0.21	109.50	157.94	474.72
109		J27	0.20	108.50	157.94	484.52
110		J28	0.22	105.20	157.94	516.85
111		J29	0.29	103.50	157.94	533.51
112		J30	0.05	104.90	157.94	519.79
113		J31	0.56	104.80	157.94	520.77
114		J32	0.07	104.20	157.94	526.65
115		J33	0.32	108.60	157.98	483.88
116		J34	0.28	107.00	157.97	499.51
117		J35	0.28	105.50	157.97	514.19
118		J36	0.25	104.80	157.97	521.05
119		J37	0.23	108.00	157.98	489.74
120		J38	0.26	110.00	157.99	470.23
121		J39	0.28	111.00	157.96	460.21
122		J40	0.36	112.30	157.96	447.40
123		J41	0.23	115.70	157.95	414.07
124		J42	0.21	117.60	157.95	395.44
125		J43	0.28	113.50	157.95	435.62
126		J44	0.23	113.30	157.95	437.58
127		J45	0.28	112.70	157.95	443.40
128		J46	0.14	111.40	157.95	456.17

Basic Day All Phases

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
129		J47	0.13	115.40	157.95	416.98
130		J48	0.12	115.80	157.95	413.06
131		J49	0.15	111.20	157.95	458.15
132		J5	0.00	107.60	158.00	493.88
133		J50	0.11	108.60	157.96	483.67
134		J51	0.09	109.80	157.96	471.95
135		J52	0.37	108.30	157.94	486.48
136		J53	0.59	105.00	157.94	518.81
137		J54	0.17	105.00	157.94	518.81
138		J55	0.15	103.50	157.94	533.51
139		J56	0.19	104.00	157.94	528.61
140		J57	0.24	105.00	157.94	518.82
141		J58	0.30	111.70	157.94	453.16
142		J59	0.21	103.50	157.94	533.51
143		J6	0.66	106.70	157.98	502.54
144		J60	0.13	101.10	157.94	557.03
145		J61	0.15	104.80	157.94	520.77
146		J62	0.20	100.00	157.94	567.80
147		J63	0.12	103.80	157.94	530.57
148		J64	0.32	104.60	157.94	522.73
149		J65	0.18	104.50	157.94	523.71
150		J66	0.21	102.60	157.94	542.32
151		J67	0.18	98.00	158.00	587.95
152		J68	0.17	96.50	157.98	602.48
153		J69	0.15	94.60	157.96	620.91
154		J7	0.00	105.10	157.97	518.08
155		J70	0.16	95.00	157.95	616.88
156		J71	0.20	96.00	157.94	606.99
157		J72	0.20	97.50	157.93	592.20
158		J73	0.18	98.50	157.93	582.32
159		J74	0.17	101.00	157.92	557.73
160		J75	0.18	101.40	157.91	553.72

Basic Day All Phases

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
161		J76	0.22	101.80	157.90	549.73
162		J77	0.00	103.50	157.89	532.95
163		J78	0.20	94.50	157.97	622.00
164		J79	0.15	98.60	157.96	581.71
165		J8	0.74	104.80	157.96	520.92
166		J80	0.26	95.40	157.96	613.07
167		J81	0.19	95.30	157.96	614.05
168		J82	0.59	95.50	157.96	612.09
169		J83	0.20	95.50	157.95	611.93
170		J84	0.24	102.00	157.93	548.05
171		J85	0.32	96.30	157.94	604.03
172		J86	0.33	98.00	157.93	587.29
173		J87	0.24	99.50	157.93	572.54
174		J88	0.26	101.40	157.91	553.75
175		J89	0.23	101.80	157.91	549.80
176		J9	0.00	104.00	157.94	528.61
177		J90	0.30	102.00	157.90	547.80
178		J91	0.09	104.00	157.90	528.20
179		J92	0.12	106.00	157.91	508.64
180		J93	0.09	104.00	157.91	528.27
181		J94	0.21	103.80	157.89	530.00
182		J95	0.20	104.20	157.89	526.08
183		J96	0.00	101.00	157.86	557.16
184		J97	0.34	101.20	157.85	555.13
185		J98	0.30	101.30	157.85	554.10
186		J99	0.25	101.40	157.84	553.07

Basic Day All Phases

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness
1		101	J9	J10	174.64	406.00	120.00
2		103	J10	J11	498.93	406.00	120.00
3		105	J77	J11	159.88	406.00	120.00
4		107	J77	J76	126.98	406.00	120.00
5		109	J76	J75	85.93	406.00	120.00
6		111	J75	J74	91.83	406.00	120.00
7		113	J74	J73	87.01	406.00	120.00
8		115	J73	J72	82.23	406.00	120.00
9		117	J72	J71	83.64	406.00	120.00
10		119	J71	J70	83.70	406.00	120.00
11		121	J70	J69	87.04	406.00	120.00
12		123	J69	J68	143.86	406.00	120.00
13		127	J69	J81	87.21	305.00	110.00
14		129	J81	J82	94.32	305.00	110.00
15		131	J67	J78	198.44	152.00	100.00
16		133	J78	J69	116.18	152.00	100.00
17		135	J81	J80	143.62	203.00	110.00
18		137	J70	J83	127.56	152.00	100.00
19		139	J71	J83	131.06	152.00	100.00
20		141	J84	J72	150.99	152.00	100.00
21		143	J73	J84	154.14	152.00	100.00
22		145	J73	J87	90.98	152.00	100.00
23		149	J74	J93	123.11	152.00	100.00
24		151	J92	J91	83.35	152.00	100.00
25		153	J76	J90	141.21	152.00	100.00
26		155	J88	J89	94.50	152.00	100.00
27		157	J89	J75	136.42	152.00	100.00
28		159	J75	J92	102.20	152.00	100.00
29		161	J77	J94	57.89	152.00	100.00
30		163	J95	J94	155.27	152.00	100.00
31		165	J95	J94	170.06	152.00	100.00
32		167	J11	J12	156.93	406.00	120.00

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness
33		169	J13	J14	245.28	406.00	120.00
34		171	J96	J11	137.16	406.00	120.00
35		173	J96	J97	76.93	406.00	120.00
36		175	J97	J98	81.29	406.00	120.00
37		177	J99	J98	84.60	406.00	120.00
38		179	J99	J100	83.42	406.00	120.00
39		181	J101	J100	85.39	406.00	120.00
40		183	J101	J102	92.52	406.00	120.00
41		185	J102	J103	87.14	406.00	120.00
42		187	J103	J104	93.58	406.00	120.00
43		189	J104	J105	77.34	406.00	120.00
44		191	J105	J106	153.47	406.00	120.00
45		193	J106	J107	143.53	305.00	110.00
46		195	J107	J108	84.19	305.00	110.00
47		197	J108	J109	121.66	305.00	110.00
48		199	J109	J110	110.89	305.00	110.00
49		201	J110	J111	84.87	305.00	110.00
50		203	J111	J112	82.53	305.00	110.00
51		205	J112	J113	90.54	305.00	110.00
52		207	J113	J114	83.16	305.00	110.00
53		209	J114	J115	88.75	305.00	110.00
54		211	J115	J116	85.65	305.00	110.00
55		213	J116	J13	209.45	305.00	110.00
56		215	J120	J97	200.23	203.00	110.00
57		217	J121	J120	139.59	203.00	110.00
58		219	J122	J121	116.07	203.00	110.00
59		221	J122	J124	176.53	203.00	110.00
60		223	J124	J127	136.56	203.00	110.00
61		225	J127	J99	170.73	203.00	110.00
62		227	J103	J130	121.14	254.00	110.00
63		229	J132	J130	179.74	254.00	110.00
64		23	J5	J6	140.07	406.00	120.00

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness
65		231	J135	J134	167.60	254.00	110.00
66		233	J134	J133	77.70	254.00	110.00
67		235	J148	J105	74.44	254.00	110.00
68		237	J148	J149	85.08	254.00	110.00
69		239	J150	J149	100.56	254.00	110.00
70		241	J150	J153	102.13	254.00	110.00
71		243	J156	J155	84.72	254.00	110.00
72		245	J155	J154	83.57	254.00	110.00
73		247	J154	J106	138.77	254.00	110.00
74		249	J136	J97	142.46	203.00	110.00
75		25	J7	J8	84.15	406.00	120.00
76		251	J138	J140	87.39	203.00	110.00
77		253	J140	J142	82.82	203.00	110.00
78		255	J142	J144	87.11	203.00	110.00
79		257	J145	J144	110.13	203.00	110.00
80		259	J117	J96	60.23	203.00	110.00
81		261	J119	J117	174.40	203.00	110.00
82		265	J98	J126	202.45	152.00	100.00
83		267	J126	J121	109.51	152.00	100.00
84		269	J126	J125	101.87	152.00	100.00
85		271	J125	J124	97.63	152.00	100.00
86		273	J123	J122	151.25	203.00	110.00
87		275	J138	J137	93.89	152.00	100.00
88		277	J137	J98	87.24	152.00	100.00
89		279	J140	J139	105.21	152.00	100.00
90		281	J139	J99	82.82	152.00	100.00
91		283	J142	J141	107.58	152.00	100.00
92		285	J141	J100	90.85	152.00	100.00
93		287	J144	J143	95.77	152.00	100.00
94		289	J143	J101	85.67	152.00	100.00
95		29	J16	J17	61.26	305.00	110.00
96		291	J130	J131	98.39	152.00	100.00

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness
97		293	J101	J128	126.13	152.00	100.00
98		295	J129	J128	90.92	152.00	100.00
99		297	J103	J146	130.31	152.00	100.00
100		299	J147	J146	92.57	152.00	100.00
101		301	J148	J151	113.51	152.00	100.00
102		303	J151	J154	118.61	152.00	100.00
103		305	J149	J152	121.92	152.00	100.00
104		307	J152	J155	112.68	152.00	100.00
105		309	J156	J157	63.53	203.00	110.00
106		31	J17	J18	84.10	305.00	110.00
107		311	J135	J104	175.82	254.00	110.00
108		313	J132	J134	186.63	254.00	110.00
109		315	J107	J158	213.14	203.00	110.00
110		317	J159	J158	80.13	203.00	110.00
111		321	J162	J164	134.72	203.00	110.00
112		323	J164	J108	55.41	203.00	110.00
113		325	J107	J165	150.30	203.00	110.00
114		327	J165	J167	101.68	203.00	110.00
115		329	J167	J111	177.23	203.00	110.00
116		33	J18	J19	95.50	305.00	110.00
117		331	J164	J163	104.94	152.00	100.00
118		333	J163	J162	99.82	152.00	100.00
119		335	J163	J158	91.23	152.00	100.00
120		337	J108	J166	139.88	203.00	110.00
121		341	J166	J110	121.76	152.00	100.00
122		343	J109	J168	167.76	203.00	110.00
123		345	J168	J169	80.80	203.00	110.00
124		347	J169	J170	88.83	203.00	110.00
125		349	J171	J111	129.49	203.00	110.00
126		35	J20	J21	56.43	305.00	110.00
127		351	J110	J172	98.34	152.00	100.00
128		353	J165	J166	80.14	203.00	110.00

Basic Day All Phases

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness
129		355	J172	J169	135.17	152.00	100.00
130		357	J112	J177	90.93	203.00	110.00
131		359	J178	J179	103.49	203.00	110.00
132		361	J179	J181	84.34	203.00	110.00
133		363	J181	J183	84.00	203.00	110.00
134		365	J183	J185	83.68	203.00	110.00
135		367	J185	J187	87.43	203.00	110.00
136		369	J188	J116	214.22	203.00	110.00
137		37	J22	J23	85.71	305.00	110.00
138		371	J177	J178	89.14	203.00	110.00
139		373	J112	J173	140.03	203.00	110.00
140		375	J173	J174	205.58	203.00	110.00
141		377	J174	J175	200.86	203.00	110.00
142		379	J175	J114	151.98	203.00	110.00
143		381	J115	J176	148.67	152.00	100.00
144		383	J176	J116	152.82	152.00	100.00
145		385	J115	J186	154.17	152.00	100.00
146		387	J186	J185	183.45	152.00	100.00
147		389	J114	J184	147.99	152.00	100.00
148		39	J23	J24	79.44	305.00	110.00
149		391	J184	J183	136.83	152.00	100.00
150		393	J113	J182	128.39	152.00	100.00
151		395	J182	J181	100.82	152.00	100.00
152		397	J179	J180	96.00	152.00	100.00
153		399	J180	J177	82.24	152.00	100.00
154		401	J23	J45	154.59	152.00	100.00
155		403	J22	J45	156.18	152.00	100.00
156		405	J46	J23	89.30	203.00	110.00
157		407	J46	J49	83.50	203.00	110.00
158		409	J49	J50	107.40	203.00	110.00
159		41	J24	J25	94.89	305.00	110.00
160		411	J50	J51	101.39	203.00	110.00

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness
161	☐	413	J18	J51	125.69	203.00	110.00
162	☐	415	J48	J49	119.34	152.00	100.00
163	☐	417	J47	J48	83.14	152.00	100.00
164	☐	419	J20	J40	104.02	203.00	110.00
165	☐	421	J40	J41	84.54	203.00	110.00
166	☐	423	J41	J42	82.77	203.00	110.00
167	☐	425	J44	J43	90.33	203.00	110.00
168	☐	427	J40	J39	134.39	152.00	100.00
169	☐	429	J39	J17	142.82	152.00	100.00
170	☐	43	J25	J26	66.61	305.00	110.00
171	☐	431	J21	J22	75.57	305.00	110.00
172	☐	433	J41	J44	119.50	152.00	100.00
173	☐	435	J21	J44	58.44	203.00	110.00
174	☐	437	J5	J38	75.44	203.00	110.00
175	☐	439	J38	J33	82.89	203.00	110.00
176	☐	441	J33	J17	84.49	203.00	110.00
177	☐	443	J33	J34	145.35	152.00	100.00
178	☐	445	J34	J35	124.94	152.00	100.00
179	☐	447	J36	J35	86.65	152.00	100.00
180	☐	449	J36	J7	58.26	152.00	100.00
181	☐	45	J26	J27	82.48	305.00	110.00
182	☐	451	J37	J36	111.75	152.00	100.00
183	☐	453	J38	J37	130.21	152.00	100.00
184	☐	455	J42	J43	119.43	203.00	110.00
185	☐	457	J46	J47	115.51	152.00	100.00
186	☐	461	J61	J60	84.94	152.00	100.00
187	☐	463	J63	J62	73.93	152.00	100.00
188	☐	465	J6	J7	128.42	406.00	120.00
189	☐	467	J8	J9	145.24	406.00	120.00
190	☐	469	J119	J118	154.32	203.00	110.00
191	☐	47	J27	J28	86.96	305.00	110.00
192	☐	471	J118	J117	164.42	203.00	110.00

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness
193		473	J129	J102	150.48	152.00	100.00
194		477	J102	J145	119.26	203.00	110.00
195		479	J138	J136	122.54	203.00	110.00
196		481	J104	J147	146.06	152.00	100.00
197		485	J159	J160	109.65	203.00	110.00
198		487	J161	J162	82.87	203.00	110.00
199		489	J170	J171	140.09	203.00	110.00
200		49	J28	J29	89.86	305.00	110.00
201		491	J187	J188	155.35	203.00	110.00
202		493	J90	J89	89.20	152.00	100.00
203		495	J88	J74	81.31	152.00	100.00
204		497	J91	J76	86.26	152.00	100.00
205		499	J92	J93	83.54	152.00	100.00
206		501	J86	J87	118.42	152.00	100.00
207		503	J70	J85	90.92	152.00	100.00
208		505	J86	J85	111.82	152.00	100.00
209		507	J67	J68	132.16	406.00	120.00
210		509	J80	J79	128.76	203.00	110.00
211		51	J29	J30	80.10	305.00	110.00
212		511	J160	J161	99.40	203.00	110.00
213		513	J153	J156	110.22	254.00	110.00
214		515	J19	J20	131.54	305.00	110.00
215		517	J12	J13	697.51	406.00	120.00
216		519	J14	J15	126.96	406.00	120.00
217		521	7002	J5	0.10	900.00	100.00
218		525	J45	J-3	49.95	203.00	110.00
219		527	J42	J-4	50.12	203.00	110.00
220		529	J5	J16	230.11	305.00	110.00
221		53	J30	J31	78.53	305.00	110.00
222		531	J67	7006	0.10	900.00	100.00
223		55	J31	J32	61.00	305.00	110.00
224		57	J32	J9	52.64	305.00	110.00

Basic Day All Phases

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness
225	☐	59	J24	J52	196.64	203.00	110.00
226	☐	61	J52	J54	182.13	203.00	110.00
227	☐	63	J54	J53	47.61	203.00	110.00
228	☐	65	J55	J54	104.18	203.00	110.00
229	☐	67	J55	J56	104.52	152.00	100.00
230	☐	69	J56	J52	158.19	152.00	100.00
231	☐	71	J57	J55	141.60	203.00	110.00
232	☐	73	J57	J25	140.53	203.00	110.00
233	☐	75	J24	J58	167.38	152.00	100.00
234	☐	77	J58	J27	106.79	152.00	100.00
235	☐	79	J26	J59	118.24	152.00	100.00
236	☐	81	J60	J59	115.97	152.00	100.00
237	☐	83	J62	J60	85.14	152.00	100.00
238	☐	85	J29	J62	157.03	152.00	100.00
239	☐	87	J27	J61	92.95	152.00	100.00
240	☐	89	J28	J63	75.98	152.00	100.00
241	☐	91	J64	J28	161.41	152.00	100.00
242	☐	93	J64	J29	192.08	152.00	100.00
243	☐	95	J30	J65	123.52	203.00	110.00
244	☐	97	J31	J66	111.28	152.00	100.00
245	☐	99	J32	J66	159.23	152.00	100.00

Max Day All Phases

		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Residual Head (m)	Available Flow @Hydrant (L/s)	Available Flow Pressure (kPa)	Available Flow Head (m)
1		J10	0.00	585.95	157.55	100.00	575.36	156.46	1,249.40	139.98	112.03
2		J100	0.53	543.90	157.00	125.00	512.69	153.82	684.64	139.97	115.78
3		J101	0.60	542.68	156.98	125.00	510.17	153.66	662.12	139.97	115.88
4		J102	0.78	541.47	156.96	125.00	507.73	153.51	642.39	139.97	115.98
5		J103	0.50	540.23	156.93	100.00	514.03	154.26	620.32	139.97	116.08
6		J104	0.50	539.06	156.91	100.00	512.04	154.15	603.65	139.97	116.18
7		J105	0.81	537.92	156.89	125.00	500.51	153.08	589.25	139.97	116.28
8		J106	0.63	534.78	156.87	125.00	495.91	152.91	568.59	139.97	116.58
9		J107	1.00	522.27	156.80	125.00	477.08	152.19	497.82	139.96	117.78
10		J108	0.83	509.34	156.78	125.00	461.91	151.94	469.50	139.96	119.08
11		J109	0.25	497.44	156.76	100.00	461.04	153.05	441.23	139.96	120.28
12		J11	0.00	547.00	157.22	100.00	532.71	155.76	988.95	139.97	115.68
13		J110	0.35	487.56	156.75	100.00	451.08	153.03	434.67	139.96	121.28
14		J111	0.50	477.69	156.75	100.00	441.69	153.07	434.77	139.96	122.28
15		J112	0.58	487.38	156.74	125.00	437.39	151.64	438.89	139.96	121.28
16		J113	0.64	492.25	156.73	125.00	440.99	151.50	433.83	139.96	120.78
17		J114	0.80	497.13	156.73	125.00	446.44	151.56	442.21	139.96	120.28
18		J117	0.75	551.99	157.13	125.00	473.22	149.09	329.40	139.96	115.08
19		J118	1.20	540.22	157.13	125.00	405.91	143.42	234.25	139.96	116.28
20		J119	0.85	554.91	157.13	125.00	419.54	143.31	237.48	139.96	114.78
21		J12	1.77	559.80	157.13	100.00	541.05	155.21	829.60	139.97	114.28
22		J120	0.47	524.88	157.06	100.00	460.30	150.47	284.70	139.96	117.78
23		J121	0.47	517.87	157.05	100.00	449.80	150.10	273.27	139.96	118.48
24		J122	0.57	519.76	157.04	100.00	440.15	148.92	248.29	139.96	118.28
25		J123	0.31	524.66	157.04	100.00	357.57	139.99	160.14	139.96	117.78
26		J124	0.63	514.82	157.04	100.00	445.26	149.94	268.66	139.96	118.78

Max Day All Phases

		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Residual Head (m)	Available Flow @Hydrant (L/s)	Available Flow Pressure (kPa)	Available Flow Head (m)
27		J125	0.41	511.91	157.04	100.00	372.65	142.83	174.74	139.96	119.08
28		J126	0.50	514.91	157.05	100.00	416.04	146.96	215.23	139.96	118.78
29		J127	0.47	529.48	157.03	100.00	466.82	150.64	293.08	139.96	117.28
30		J128	0.31	499.44	156.97	100.00	341.98	140.90	159.61	139.96	120.28
31		J129	0.31	509.18	156.96	100.00	344.27	140.13	157.74	139.96	119.28
32		J130	0.44	499.01	156.92	100.00	459.46	152.89	397.02	139.96	120.28
33		J131	0.31	489.20	156.92	100.00	171.75	124.53	105.75	139.96	121.28
34		J132	0.76	449.94	156.92	100.00	401.85	152.01	314.42	139.96	125.28
35		J133	1.57	395.99	156.91	0.00	395.99	156.91	230.16	139.96	130.78
36		J134	0.63	395.99	156.91	100.00	346.82	151.89	277.06	139.96	130.78
37		J135	0.69	469.48	156.91	100.00	426.12	152.48	352.19	139.96	123.28
38		J136	0.80	510.11	157.06	125.00	440.44	149.95	336.17	139.96	119.28
39		J137	0.88	534.46	157.04	125.00	392.21	142.52	224.19	139.96	116.78
40		J138	0.65	519.69	157.03	125.00	455.55	150.49	361.79	139.96	118.28
41		J139	0.90	539.14	157.02	125.00	394.19	142.23	223.40	139.96	116.28
42		J140	0.70	529.30	157.02	125.00	467.23	150.68	376.44	139.96	117.28
43		J141	0.85	541.87	157.00	125.00	388.94	141.39	217.38	139.96	115.98
44		J142	0.70	538.92	157.00	125.00	476.38	150.61	380.53	139.96	116.28
45		J143	0.80	538.75	156.98	125.00	393.93	142.20	223.56	139.96	116.28
46		J144	0.75	535.81	156.98	125.00	471.22	150.39	370.94	139.96	116.58
47		J145	0.80	536.66	156.97	125.00	468.25	149.98	357.11	139.96	116.48
48		J146	0.38	536.19	156.92	100.00	374.60	140.43	166.29	139.96	116.48
49		J147	0.44	533.20	156.91	100.00	366.63	139.91	162.78	139.96	116.78
50		J148	0.75	479.02	156.88	125.00	429.34	151.81	420.85	139.96	122.28
51		J149	0.75	449.57	156.88	125.00	390.60	150.86	350.49	139.96	125.28
52		J150	0.90	420.14	156.88	125.00	352.59	149.98	299.98	139.96	128.28

Max Day All Phases

		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Residual Head (m)	Available Flow @Hydrant (L/s)	Available Flow Pressure (kPa)	Available Flow Head (m)
53		J151	0.80	503.43	156.87	125.00	319.04	138.06	184.76	139.96	119.78
54		J152	0.78	488.71	156.87	125.00	295.49	137.15	175.73	139.96	121.28
55		J153	0.83	474.02	156.87	125.00	403.62	149.69	323.08	139.96	122.78
56		J154	0.83	523.01	156.87	125.00	468.00	151.26	418.44	139.96	117.78
57		J155	0.83	524.97	156.87	125.00	463.57	150.61	387.20	139.96	117.58
58		J156	0.80	525.95	156.87	125.00	458.25	149.96	361.45	139.96	117.48
59		J157	0.75	527.90	156.87	125.00	404.36	144.26	243.68	139.96	117.28
60		J158	0.90	512.28	156.78	125.00	410.93	146.43	271.64	139.96	118.78
61		J159	0.70	492.66	156.78	125.00	370.25	144.28	233.43	139.96	120.78
62		J160	0.65	487.75	156.77	125.00	355.84	143.31	221.05	139.96	121.28
63		J161	0.75	482.85	156.77	125.00	358.61	144.10	227.64	139.96	121.78
64		J162	0.60	492.65	156.77	125.00	388.86	146.18	259.04	139.96	120.78
65		J163	0.55	502.46	156.78	125.00	372.63	143.53	228.10	139.96	119.78
66		J164	0.63	507.36	156.78	125.00	432.37	149.12	329.45	139.96	119.28
67		J165	0.57	458.33	156.77	100.00	411.90	152.03	333.52	139.96	124.28
68		J166	0.60	463.23	156.77	100.00	415.04	151.85	327.04	139.96	123.78
69		J167	0.63	468.02	156.76	100.00	409.50	150.79	285.41	139.96	123.28
70		J168	0.54	472.85	156.75	100.00	405.23	149.85	261.31	139.96	122.78
71		J17	0.50	483.63	157.85	125.00	469.53	156.41	814.86	139.97	122.78
72		J171	0.60	467.89	156.75	100.00	400.28	149.85	259.09	139.96	123.28
73		J172	0.47	477.73	156.75	100.00	347.59	143.47	173.42	139.96	122.28
74		J177	0.60	501.99	156.73	125.00	416.44	148.00	300.15	139.96	119.78
75		J178	0.70	511.76	156.72	125.00	407.42	146.08	267.10	139.96	118.78
76		J179	0.63	516.65	156.72	125.00	419.98	146.86	283.29	139.96	118.28
77		J18	0.35	452.80	157.81	100.00	439.79	156.48	657.17	139.97	125.88
78		J180	0.48	506.86	156.72	125.00	321.00	137.76	185.19	139.96	119.28

Max Day All Phases

		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Residual Head (m)	Available Flow @Hydrant (L/s)	Available Flow Pressure (kPa)	Available Flow Head (m)
79		J181	0.60	521.54	156.72	125.00	430.58	147.44	297.57	139.96	117.78
80		J182	0.73	506.85	156.72	125.00	313.93	137.04	181.38	139.96	119.28
81		J183	0.60	526.44	156.72	125.00	434.09	147.30	296.77	139.96	117.28
82		J184	0.80	511.74	156.72	125.00	285.65	133.65	166.72	139.96	118.78
83		J185	0.60	531.34	156.72	125.00	432.00	146.59	284.58	139.96	116.78
84		J186	0.85	518.60	156.72	125.00	262.70	130.61	156.94	139.96	118.08
85		J187	0.65	532.32	156.72	125.00	418.20	145.08	260.09	139.96	116.68
86		J188	0.85	536.25	156.72	125.00	422.00	145.06	261.23	139.96	116.28
87		J19	0.54	419.18	157.78	100.00	403.47	156.17	545.73	139.97	129.28
88		J20	0.66	448.19	157.74	125.00	423.74	155.24	550.60	139.97	126.28
89		J21	0.13	451.98	157.72	100.00	434.51	155.94	548.93	139.97	125.88
90		J22	0.44	454.77	157.71	100.00	436.97	155.89	548.54	139.97	125.58
91		J23	0.38	459.54	157.70	100.00	441.91	155.90	561.17	139.97	125.08
92		J24	1.16	461.33	157.68	125.00	435.27	155.02	552.54	139.97	124.88
93		J25	0.62	469.08	157.67	125.00	442.17	154.92	548.47	139.97	124.08
94		J26	0.55	471.98	157.67	125.00	445.28	154.94	554.06	139.97	123.78
95		J27	0.52	481.76	157.66	125.00	455.91	155.03	576.61	139.97	122.78
96		J28	0.59	514.07	157.66	125.00	489.28	155.13	624.50	139.97	119.48
97		J29	0.77	530.72	157.66	125.00	507.74	155.31	675.27	139.97	117.78
98		J30	0.13	517.00	157.66	100.00	502.44	156.17	720.41	139.97	119.18
99		J31	1.31	517.98	157.66	200.00	483.16	154.11	831.32	139.97	119.08
100		J32	0.19	523.86	157.66	100.00	513.45	156.60	988.60	139.97	118.48
101		J33	0.85	482.84	157.87	125.00	455.55	155.09	514.03	139.96	122.88
102		J34	0.75	498.22	157.84	125.00	267.09	134.26	159.61	139.96	121.28
103		J35	0.75	512.81	157.83	125.00	303.48	136.47	172.20	139.96	119.78
104		J36	0.68	519.66	157.83	125.00	431.86	148.87	280.64	139.96	119.08

Max Day All Phases

		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Residual Head (m)	Available Flow @Hydrant (L/s)	Available Flow Pressure (kPa)	Available Flow Head (m)
105		J37	0.63	488.61	157.86	125.00	316.63	140.31	184.51	139.96	122.28
106		J38	0.70	469.56	157.92	125.00	446.38	155.55	544.32	139.97	124.28
107		J39	0.76	458.39	157.78	100.00	335.08	145.19	169.23	139.96	125.28
108		J40	0.97	445.22	157.73	125.00	394.60	152.57	347.30	139.96	126.58
109		J41	0.60	411.82	157.73	125.00	349.38	151.35	287.99	139.96	129.98
110		J42	0.55	393.17	157.72	125.00	313.39	149.58	240.28	139.96	131.88
111		J43	0.75	433.35	157.72	125.00	356.04	149.83	265.37	139.96	127.78
112		J44	0.60	435.32	157.72	125.00	385.29	152.62	343.74	139.96	127.58
113		J45	0.76	440.86	157.69	100.00	297.90	143.10	152.22	139.96	126.98
114		J46	0.38	453.78	157.71	100.00	413.69	153.62	319.71	139.96	125.68
115		J47	0.35	414.59	157.71	100.00	258.33	141.76	136.70	139.96	129.68
116		J48	0.31	410.69	157.71	100.00	252.64	141.58	134.74	139.96	130.08
117		J49	0.41	455.84	157.72	100.00	408.24	152.86	289.29	139.96	125.48
118		J50	0.28	481.57	157.74	100.00	430.21	152.50	288.16	139.96	122.88
119		J51	0.25	470.08	157.77	100.00	425.91	153.26	308.79	139.96	124.08
120		J52	0.98	483.73	157.66	100.00	418.83	151.04	258.17	139.96	122.58
121		J54	0.44	516.04	157.66	100.00	435.11	149.40	238.29	139.96	119.28
122		J55	0.41	530.74	157.66	100.00	460.58	150.50	264.30	139.96	117.78
123		J56	0.50	525.84	157.66	100.00	367.99	141.55	164.57	139.96	118.28
124		J57	0.63	516.07	157.66	100.00	458.74	151.81	290.63	139.96	119.28
125		J58	0.80	450.41	157.66	125.00	270.19	139.27	169.58	139.96	125.98
126		J59	0.57	530.73	157.66	100.00	407.31	145.07	189.67	139.96	117.78
127		J6	1.54	501.74	157.90	200.00	492.70	156.98	2,012.63	140.00	120.99
128		J60	0.35	554.24	157.66	100.00	474.09	149.48	250.17	139.96	115.38
129		J61	0.41	517.99	157.66	100.00	415.15	147.17	206.14	139.96	119.08
130		J62	0.54	565.02	157.66	100.00	493.62	150.37	271.35	139.96	114.28

Max Day All Phases

		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Residual Head (m)	Available Flow @Hydrant (L/s)	Available Flow Pressure (kPa)	Available Flow Head (m)
131		J63	0.31	527.78	157.66	100.00	439.09	148.61	227.14	139.96	118.08
132		J64	0.85	519.93	157.66	125.00	288.07	134.00	164.91	139.96	118.88
133		J65	0.47	520.91	157.66	100.00	434.70	148.86	228.48	139.96	118.78
134		J66	0.57	539.53	157.66	100.00	425.23	145.99	200.19	139.96	116.88
135		J67	0.47	587.95	158.00	100.00	587.95	158.00	196,718.89	526.85	151.76
136		J68	0.44	601.60	157.89	100.00	597.69	157.49	2,196.59	140.01	110.79
137		J69	0.41	619.09	157.78	100.00	612.21	157.08	1,665.63	139.99	108.89
138		J7	0.00	516.58	157.82	125.00	509.18	157.06	1,638.28	139.99	119.39
139		J70	0.43	614.49	157.71	125.00	603.35	156.57	1,473.46	139.98	109.29
140		J71	0.53	604.15	157.65	125.00	591.55	156.37	1,347.98	139.98	110.28
141		J72	0.53	588.89	157.60	125.00	575.07	156.18	1,249.15	139.98	111.78
142		J73	0.49	578.59	157.54	125.00	563.84	156.04	1,184.93	139.98	112.78
143		J74	0.46	553.51	157.49	125.00	537.77	155.88	1,098.24	139.97	115.28
144		J75	0.48	549.08	157.43	125.00	532.56	155.75	1,056.57	139.97	115.68
145		J76	0.58	544.71	157.39	125.00	527.59	155.64	1,029.81	139.97	116.08
146		J77	0.00	527.32	157.31	100.00	513.61	155.91	976.41	139.97	117.78
147		J78	0.54	620.75	157.85	100.00	501.70	145.70	214.33	139.96	108.78
148		J79	0.41	579.86	157.77	100.00	406.80	140.11	167.37	139.96	112.88
149		J8	1.97	518.93	157.76	125.00	510.02	156.85	1,484.28	139.98	119.09
150		J80	0.69	611.22	157.77	100.00	512.77	147.73	238.69	139.96	109.68
151		J81	0.50	612.22	157.78	100.00	598.04	156.33	810.57	139.97	109.58
152		J82	1.57	610.26	157.78	0.00	610.26	157.78	592.66	139.97	109.78
153		J83	0.54	609.26	157.67	100.00	499.24	146.45	223.53	139.96	109.78
154		J84	0.63	544.47	157.56	100.00	414.03	144.25	187.97	139.96	116.28
155		J85	0.85	601.09	157.64	125.00	405.22	137.65	201.64	139.96	110.58
156		J86	0.88	583.91	157.59	125.00	325.33	131.20	169.34	139.96	112.28

Max Day All Phases

		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Residual Head (m)	Available Flow @Hydrant (L/s)	Available Flow Pressure (kPa)	Available Flow Head (m)
157		J87	0.65	568.91	157.56	125.00	372.64	137.53	193.40	139.96	113.78
158		J88	0.70	549.27	157.45	125.00	407.88	143.02	227.09	139.96	115.68
159		J89	0.60	545.12	157.43	125.00	430.70	145.75	255.12	139.96	116.08
160		J9	0.00	525.82	157.66	100.00	517.67	156.83	1,354.67	139.98	118.28
161		J90	0.80	542.92	157.40	125.00	364.34	139.18	197.41	139.96	116.28
162		J91	0.25	523.35	157.41	100.00	431.53	148.04	222.83	139.96	118.28
163		J92	0.31	503.98	157.43	100.00	436.67	150.56	260.18	139.96	120.28
164		J93	0.25	523.77	157.45	100.00	417.02	146.56	204.36	139.96	118.28
165		J94	0.57	524.34	157.31	100.00	344.75	138.98	153.33	139.96	118.08
166		J95	0.54	520.41	157.31	100.00	213.22	125.96	113.08	139.96	118.48
167		J96	0.00	550.08	157.14	125.00	525.82	154.66	833.69	139.97	115.28
168		J97	0.91	547.69	157.09	125.00	521.09	154.38	778.42	139.97	115.48
169		J98	0.80	546.40	157.06	125.00	518.03	154.16	740.27	139.97	115.58
170		J99	0.66	545.14	157.03	125.00	515.34	153.99	711.22	139.97	115.68

Peak Hour All Phases

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		J10	0.00	97.75	147.36	486.14
2		J100	1.38	101.50	144.20	418.40
3		J101	1.57	101.60	144.05	416.00
4		J102	2.06	101.70	143.91	413.66
5		J103	1.32	101.80	143.76	411.22
6		J104	1.32	101.90	143.65	409.10
7		J105	2.14	102.00	143.55	407.19
8		J106	1.65	102.30	143.44	403.11
9		J107	2.64	103.50	143.00	387.08
10		J108	2.19	104.80	142.89	373.24
11		J109	0.66	106.00	142.81	360.69
12		J11	0.00	101.40	145.47	431.81
13		J110	0.91	107.00	142.76	350.46
14		J111	1.32	108.00	142.73	340.29
15		J112	1.53	107.00	142.67	349.50
16		J113	1.69	106.50	142.65	354.22
17		J114	2.11	106.00	142.64	359.05
18		J115	2.07	105.00	142.64	368.85
19		J116	2.22	103.50	142.64	383.56
20		J117	1.97	100.80	144.93	432.48
21		J118	3.16	102.00	144.92	420.60
22		J119	2.24	100.50	144.92	435.30
23		J12	4.66	100.00	144.93	440.25
24		J120	1.24	103.50	144.54	402.15
25		J121	1.24	104.20	144.45	394.41
26		J122	1.49	104.00	144.41	395.98
27		J123	0.83	103.50	144.41	400.87

Peak Hour All Phases

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
28		J124	1.66	104.50	144.38	390.83
29		J125	1.08	104.80	144.40	388.04
30		J126	1.32	104.50	144.44	391.37
31		J127	1.24	103.00	144.36	405.33
32		J128	0.83	106.00	143.98	372.14
33		J129	0.83	105.00	143.94	381.61
34		J13	3.51	105.80	142.67	361.33
35		J130	1.16	106.00	143.72	369.65
36		J131	0.83	107.00	143.72	359.81
37		J132	1.99	111.00	143.68	320.23
38		J133	4.14	116.50	143.65	266.00
39		J134	1.66	116.50	143.65	266.05
40		J135	1.82	109.00	143.65	339.53
41		J136	2.10	105.00	144.50	387.06
42		J137	2.30	102.50	144.41	410.68
43		J138	1.71	104.00	144.37	395.58
44		J139	2.37	102.00	144.28	414.30
45		J14	4.20	101.00	142.03	402.08
46		J140	1.84	103.00	144.26	404.28
47		J141	2.24	101.70	144.15	416.01
48		J142	1.84	102.00	144.15	413.01
49		J143	2.10	102.00	144.04	411.99
50		J144	1.97	102.30	144.05	409.08
51		J145	2.10	102.20	143.97	409.29
52		J146	0.99	102.20	143.69	406.57
53		J147	1.16	102.50	143.66	403.36
54		J148	1.97	108.00	143.50	347.83

Peak Hour All Phases

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
55		J149	1.97	111.00	143.46	318.10
56		J15	121.76	99.00	141.72	418.62
57		J150	2.37	114.00	143.44	288.52
58		J151	2.10	105.50	143.44	371.78
59		J152	2.04	107.00	143.43	356.99
60		J153	2.17	108.50	143.43	342.32
61		J154	2.17	103.50	143.43	391.30
62		J155	2.17	103.30	143.43	393.24
63		J156	2.10	103.20	143.43	394.22
64		J157	1.97	103.00	143.43	396.15
65		J158	2.37	104.50	142.89	376.16
66		J159	1.84	106.50	142.87	356.44
67		J16	0.00	107.80	149.33	406.92
68		J160	1.71	107.00	142.87	351.49
69		J161	1.97	107.50	142.87	346.59
70		J162	1.58	106.50	142.87	356.41
71		J163	1.45	105.50	142.87	366.24
72		J164	1.64	105.00	142.88	371.18
73		J165	1.49	110.00	142.86	321.99
74		J166	1.57	109.50	142.86	326.89
75		J167	1.66	109.00	142.80	331.19
76		J168	1.41	108.50	142.76	335.71
77		J169	1.24	109.20	142.75	328.72
78		J17	1.32	108.50	149.15	398.30
79		J170	1.32	110.00	142.73	320.77
80		J171	1.57	109.00	142.73	330.49
81		J172	1.24	108.00	142.75	340.50

Peak Hour All Phases

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
82		J173	1.90	108.00	142.64	339.48
83		J174	2.48	109.00	142.63	329.58
84		J175	1.82	111.00	142.63	309.99
85		J176	1.82	106.90	142.63	350.16
86		J177	1.58	105.50	142.61	363.69
87		J178	1.84	104.50	142.60	373.33
88		J179	1.64	104.00	142.59	378.16
89		J18	0.91	111.60	148.87	365.26
90		J180	1.25	105.00	142.60	368.40
91		J181	1.58	103.50	142.59	383.03
92		J182	1.91	105.00	142.59	368.39
93		J183	1.58	103.00	142.59	387.91
94		J184	2.10	104.50	142.59	373.24
95		J185	1.58	102.50	142.59	392.81
96		J186	2.24	103.80	142.59	380.09
97		J187	1.71	102.40	142.59	393.80
98		J188	2.24	102.00	142.60	397.82
99		J19	1.41	115.00	148.70	330.20
100		J20	1.75	112.00	148.47	357.33
101		J21	0.33	111.60	148.39	360.50
102		J22	1.16	111.30	148.30	362.58
103		J23	0.99	110.80	148.23	366.74
104		J24	3.05	110.60	148.13	367.73
105		J25	1.64	109.80	148.08	375.07
106		J26	1.45	109.50	148.06	377.81
107		J27	1.37	108.50	148.04	387.46
108		J28	1.55	105.20	148.03	419.69

Peak Hour All Phases

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
109		J29	2.03	103.50	148.02	436.30
110		J-3	4.14	112.70	148.18	347.68
111		J30	0.33	104.90	148.02	422.57
112		J31	2.22	104.80	148.02	423.54
113		J32	0.50	104.20	148.02	429.42
114		J33	2.24	108.60	149.26	398.45
115		J34	1.97	107.00	149.09	412.42
116		J35	1.97	105.50	149.03	426.52
117		J36	1.78	104.80	149.02	433.30
118		J37	1.64	108.00	149.20	403.70
119		J38	1.84	110.00	149.52	387.28
120		J39	1.99	111.00	148.70	369.48
121		J-4	4.14	117.60	148.37	301.54
122		J40	2.55	112.30	148.45	354.23
123		J41	1.58	115.70	148.40	320.43
124		J42	1.45	117.60	148.38	301.62
125		J43	1.97	113.50	148.38	341.80
126		J44	1.58	113.30	148.39	343.81
127		J45	1.99	112.70	148.19	347.76
128		J46	0.99	111.40	148.29	361.52
129		J47	0.91	115.40	148.30	322.38
130		J48	0.83	115.80	148.31	318.60
131		J49	1.08	111.20	148.36	364.09
132		J5	0.00	107.60	150.00	415.49
133		J50	0.75	108.60	148.51	391.05
134		J51	0.66	109.80	148.66	380.83
135		J52	2.57	108.30	148.04	389.45

Peak Hour All Phases

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
136		J53	4.14	105.00	148.02	421.53
137		J54	1.16	105.00	148.02	421.61
138		J55	1.08	103.50	148.03	436.35
139		J56	1.32	104.00	148.03	431.45
140		J57	1.66	105.00	148.04	421.80
141		J58	2.10	111.70	148.05	356.17
142		J59	1.49	103.50	148.03	436.32
143		J6	2.49	106.70	149.44	418.81
144		J60	0.91	101.10	148.02	459.81
145		J61	1.08	104.80	148.03	423.57
146		J62	1.41	100.00	148.02	470.57
147		J63	0.83	103.80	148.02	433.34
148		J64	2.24	104.60	148.01	425.42
149		J65	1.24	104.50	148.02	426.46
150		J66	1.49	102.60	148.02	445.06
151		J67	1.24	98.00	150.00	509.56
152		J68	1.16	96.50	149.37	518.13
153		J69	1.08	94.60	148.70	530.16
154		J7	0.00	105.10	148.94	429.59
155		J70	1.12	95.00	148.30	522.27
156		J71	1.38	96.00	147.98	509.33
157		J72	1.40	97.50	147.64	491.38
158		J73	1.29	98.50	147.34	478.63
159		J74	1.20	101.00	147.00	450.76
160		J75	1.25	101.40	146.70	443.88
161		J76	1.51	101.80	146.43	437.35
162		J77	0.00	103.50	145.99	416.41

Peak Hour All Phases

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
163	☐	J78	1.41	94.50	149.10	535.09
164	☐	J79	1.08	98.60	148.68	490.76
165	☐	J8	5.17	104.80	148.59	429.11
166	☐	J80	1.82	95.40	148.68	522.13
167	☐	J81	1.32	95.30	148.70	523.23
168	☐	J82	4.14	95.50	148.69	521.25
169	☐	J83	1.41	95.50	148.10	515.43
170	☐	J84	1.66	102.00	147.45	445.35
171	☐	J85	2.24	96.30	147.90	505.67
172	☐	J86	2.30	98.00	147.59	485.98
173	☐	J87	1.71	99.50	147.42	469.54
174	☐	J88	1.84	101.40	146.81	444.94
175	☐	J89	1.58	101.80	146.67	439.71
176	☐	J9	0.00	104.00	148.02	431.39
177	☐	J90	2.10	102.00	146.53	436.37
178	☐	J91	0.66	104.00	146.55	416.93
179	☐	J92	0.83	106.00	146.68	398.68
180	☐	J93	0.66	104.00	146.80	419.37
181	☐	J94	1.49	103.80	145.97	413.24
182	☐	J95	1.41	104.20	145.97	409.28
183	☐	J96	0.00	101.00	144.96	430.79
184	☐	J97	2.39	101.20	144.70	426.31
185	☐	J98	2.09	101.30	144.52	423.49
186	☐	J99	1.75	101.40	144.35	420.89

KLN123

Prepared By:

Date: Wednesday, July 05, 2006

Basic Day Phase 1, 2 & 3

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		J10	0.00	97.75	157.98	590.23
2		J100	0.20	101.50	157.96	553.30
3		J101	0.22	101.60	157.96	552.32
4		J102	0.29	101.70	157.96	551.33
5		J103	0.19	101.80	157.96	550.34
6		J104	0.19	101.90	157.96	549.35
7		J105	0.31	102.00	157.96	548.37
8		J106	0.24	102.30	157.96	545.43
9		J11	0.00	101.40	157.98	554.41
10		J117	0.28	100.80	157.97	560.23
11		J118	0.45	102.00	157.97	548.46
12		J119	0.32	100.50	157.97	563.16
13		J120	0.18	103.50	157.97	533.73
14		J121	0.18	104.20	157.97	526.86
15		J122	0.21	104.00	157.97	528.82
16		J123	0.12	103.50	157.97	533.72
17		J124	0.24	104.50	157.97	523.92
18		J125	0.15	104.80	157.97	520.98
19		J126	0.19	104.50	157.97	523.92
20		J127	0.18	103.00	157.97	538.62
21		J128	0.13	106.00	157.96	509.19
22		J129	0.12	105.00	157.96	518.99
23		J130	0.17	106.00	157.96	509.18
24		J131	0.12	107.00	157.96	499.38
25		J132	0.28	111.00	157.96	460.18
26		J133	0.59	116.50	157.96	406.28
27		J134	0.24	116.50	157.96	406.28
28		J135	0.26	109.00	157.96	479.78
29		J136	0.30	105.00	157.97	519.03
30		J137	0.33	102.50	157.97	543.52
31		J138	0.24	104.00	157.96	528.81
32		J139	0.34	102.00	157.96	548.40

Basic Day Phase 1, 2 & 3

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
33		J140	0.26	103.00	157.96	538.60
34		J141	0.32	101.70	157.96	551.34
35		J142	0.26	102.00	157.96	548.39
36		J143	0.30	102.00	157.96	548.39
37		J144	0.28	102.30	157.96	545.45
38		J145	0.30	102.20	157.96	546.43
39		J146	0.14	102.20	157.96	546.41
40		J147	0.17	102.50	157.96	543.47
41		J148	0.28	108.00	157.96	489.57
42		J149	0.28	111.00	157.96	460.17
43		J150	0.34	114.00	157.96	430.77
44		J151	0.30	105.50	157.96	514.06
45		J152	0.29	107.00	157.96	499.36
46		J153	0.31	108.50	157.96	484.66
47		J154	0.31	103.50	157.96	533.66
48		J155	0.31	103.30	157.96	535.62
49		J156	0.30	103.20	157.96	536.60
50		J157	0.28	103.00	157.96	538.56
51		J16	0.00	107.80	157.99	491.84
52		J17	0.19	108.50	157.99	484.96
53		J18	0.13	111.60	157.99	454.55
54		J19	0.20	115.00	157.98	421.21
55		J20	0.25	112.00	157.98	450.58
56		J21	0.05	111.60	157.98	454.49
57		J22	0.17	111.30	157.98	457.43
58		J23	0.14	110.80	157.98	462.32
59		J24	0.44	110.60	157.98	464.28
60		J25	0.23	109.80	157.98	472.12
61		J26	0.21	109.50	157.98	475.06
62		J27	0.20	108.50	157.98	484.86
63		J28	0.22	105.20	157.98	517.20
64		J29	0.29	103.50	157.98	533.86

Basic Day Phase 1, 2 & 3

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
65		J-3	0.59	112.70	157.98	443.68
66		J30	0.05	104.90	157.98	520.15
67		J31	0.56	104.80	157.98	521.14
68		J32	0.07	104.20	157.98	527.03
69		J33	0.32	108.60	157.99	483.99
70		J34	0.28	107.00	157.99	499.67
71		J35	0.28	105.50	157.99	514.36
72		J36	0.25	104.80	157.99	521.23
73		J37	0.23	108.00	157.99	489.88
74		J38	0.26	110.00	157.99	470.31
75		J39	0.28	111.00	157.98	460.40
76		J-4	0.59	117.60	157.98	395.69
77		J40	0.36	112.30	157.98	447.64
78		J41	0.23	115.70	157.98	414.31
79		J42	0.21	117.60	157.98	395.69
80		J43	0.28	113.50	157.98	435.87
81		J44	0.23	113.30	157.98	437.83
82		J45	0.28	112.70	157.98	443.69
83		J46	0.14	111.40	157.98	456.45
84		J47	0.13	115.40	157.98	417.25
85		J48	0.12	115.80	157.98	413.33
86		J49	0.15	111.20	157.98	458.41
87		J5	0.00	107.60	158.00	493.88
88		J50	0.11	108.60	157.98	483.90
89		J51	0.09	109.80	157.98	472.16
90		J52	0.37	108.30	157.98	486.80
91		J53	0.59	105.00	157.98	519.13
92		J54	0.17	105.00	157.98	519.13
93		J55	0.15	103.50	157.98	533.83
94		J56	0.19	104.00	157.98	528.93
95		J57	0.24	105.00	157.98	519.14
96		J58	0.30	111.70	157.98	453.50

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
97		J59	0.21	103.50	157.98	533.85
98		J6	0.66	106.70	158.00	502.65
99		J60	0.13	101.10	157.98	557.37
100		J61	0.15	104.80	157.98	521.11
101		J62	0.20	100.00	157.98	568.15
102		J63	0.12	103.80	157.98	530.92
103		J64	0.32	104.60	157.98	523.08
104		J65	0.18	104.50	157.98	524.07
105		J66	0.21	102.60	157.98	542.70
106		J67	0.18	98.00	158.00	587.95
107		J68	0.17	96.50	158.00	602.61
108		J69	0.15	94.60	157.99	621.19
109		J7	0.00	105.10	157.99	518.29
110		J70	0.16	95.00	157.99	617.24
111		J71	0.20	96.00	157.99	607.43
112		J72	0.20	97.50	157.99	592.71
113		J73	0.18	98.50	157.98	582.90
114		J74	0.17	101.00	157.98	558.38
115		J75	0.18	101.40	157.98	554.45
116		J76	0.22	101.80	157.98	550.52
117		J77	0.00	103.50	157.98	533.85
118		J78	0.20	94.50	157.99	622.19
119		J79	0.15	98.60	157.99	581.98
120		J8	0.74	104.80	157.99	521.20
121		J80	0.26	95.40	157.99	613.34
122		J81	0.19	95.30	157.99	614.32
123		J82	0.59	95.50	157.99	612.36
124		J83	0.20	95.50	157.99	612.33
125		J84	0.24	102.00	157.98	548.60
126		J85	0.32	96.30	157.99	604.47
127		J86	0.33	98.00	157.98	587.80
128		J87	0.24	99.50	157.98	573.10

Basic Day Phase 1, 2 & 3

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
129		J88	0.26	101.40	157.98	554.45
130		J89	0.23	101.80	157.98	550.53
131		J9	0.00	104.00	157.98	529.01
132		J90	0.30	102.00	157.98	548.56
133		J91	0.09	104.00	157.98	528.97
134		J92	0.12	106.00	157.98	509.37
135		J93	0.09	104.00	157.98	528.97
136		J94	0.21	103.80	157.98	530.90
137		J95	0.20	104.20	157.98	526.98
138		J96	0.00	101.00	157.97	558.27
139		J97	0.34	101.20	157.97	556.29
140		J98	0.30	101.30	157.97	555.29
141		J99	0.25	101.40	157.97	554.30

Max Day Phase 1, 2 & 3

		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Residual Head (m)	Available Flow @Hydrant (L/s)	Available Flow Pressure (kPa)	Available Flow Head (m)
1		J10	0.00	589.36	157.89	100.00	583.09	157.25	1,306.60	139.98	112.03
2		J100	0.53	551.51	157.78	125.00	524.99	155.08	652.11	139.97	115.78
3		J101	0.60	550.47	157.78	125.00	521.77	154.85	619.18	139.97	115.88
4		J102	0.78	549.44	157.77	125.00	518.54	154.62	589.87	139.97	115.98
5		J103	0.50	548.41	157.77	100.00	524.55	155.33	557.87	139.97	116.08
6		J104	0.50	547.40	157.76	100.00	521.96	155.17	533.57	139.97	116.18
7		J105	0.81	546.41	157.76	125.00	508.29	153.87	512.34	139.96	116.28
8		J106	0.63	543.46	157.76	125.00	502.14	153.54	482.77	139.96	116.58
9		J11	0.00	553.25	157.86	100.00	544.67	156.98	1,068.65	139.97	115.68
10		J117	0.75	558.75	157.82	125.00	487.23	150.52	339.06	139.96	115.08
11		J118	1.20	546.97	157.82	125.00	419.92	144.85	240.29	139.96	116.28
12		J119	0.85	561.67	157.82	125.00	433.54	144.74	243.43	139.96	114.78
13		J120	0.47	532.06	157.80	100.00	473.00	151.77	291.61	139.96	117.78
14		J121	0.47	525.14	157.79	100.00	462.48	151.40	279.81	139.96	118.48
15		J122	0.57	527.08	157.79	100.00	452.81	150.21	254.04	139.96	118.28
16		J123	0.31	531.98	157.79	100.00	370.23	141.28	163.48	139.96	117.78
17		J124	0.63	522.18	157.79	100.00	457.89	151.23	274.83	139.96	118.78
18		J125	0.41	519.24	157.79	100.00	385.30	144.12	178.58	139.96	119.08
19		J126	0.50	522.20	157.79	100.00	428.69	148.25	220.14	139.96	118.78
20		J127	0.47	536.88	157.79	100.00	479.40	151.92	299.15	139.96	117.28
21		J128	0.31	507.32	157.77	100.00	353.52	142.08	162.25	139.96	120.28
22		J129	0.31	517.11	157.77	100.00	355.74	141.30	160.25	139.96	119.28
23		J130	0.44	507.23	157.76	100.00	469.90	153.95	382.56	139.96	120.28
24		J131	0.31	497.42	157.76	100.00	182.19	125.59	107.46	139.96	121.28
25		J132	0.76	458.21	157.76	100.00	412.22	153.07	308.84	139.96	125.28
26		J133	1.57	404.30	157.76	0.00	404.30	157.76	230.68	139.96	130.78
27		J134	0.63	404.31	157.76	100.00	357.11	152.94	274.03	139.96	130.78
28		J135	0.69	477.81	157.76	100.00	436.31	153.52	341.39	139.96	123.28
29		J136	0.80	517.33	157.79	125.00	453.93	151.32	344.35	139.96	119.28
30		J137	0.88	541.77	157.79	125.00	405.56	143.89	228.93	139.96	116.78
31		J138	0.65	527.05	157.78	125.00	468.82	151.84	369.15	139.96	118.28

Max Day Phase 1, 2 & 3

		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Residual Head (m)	Available Flow @Hydrant (L/s)	Available Flow Pressure (kPa)	Available Flow Head (m)
32		J139	0.90	546.60	157.78	125.00	407.17	143.55	227.63	139.96	116.28
33		J140	0.70	536.79	157.78	125.00	480.25	152.01	382.28	139.96	117.28
34		J141	0.85	549.49	157.78	125.00	401.45	142.67	220.99	139.96	115.98
35		J142	0.70	546.55	157.77	125.00	489.07	151.91	384.41	139.96	116.28
36		J143	0.80	546.52	157.77	125.00	405.89	143.42	226.67	139.96	116.28
37		J144	0.75	543.58	157.77	125.00	483.52	151.64	373.07	139.96	116.58
38		J145	0.80	544.54	157.77	125.00	480.08	151.19	357.58	139.96	116.48
39		J146	0.38	544.46	157.76	100.00	384.98	141.49	167.95	139.96	116.48
40		J147	0.44	541.52	157.76	100.00	376.93	140.96	164.42	139.96	116.78
41		J148	0.75	487.57	157.76	125.00	436.96	152.59	388.89	139.96	122.28
42		J149	0.75	458.14	157.75	125.00	398.10	151.63	331.91	139.96	125.28
43		J150	0.90	428.73	157.75	125.00	360.04	150.74	288.96	139.96	128.28
44		J151	0.80	512.04	157.75	125.00	326.49	138.82	185.10	139.96	119.78
45		J152	0.78	497.32	157.75	125.00	302.91	137.91	176.37	139.96	121.28
46		J153	0.83	482.62	157.75	125.00	411.03	150.45	310.22	139.96	122.78
47		J154	0.83	531.64	157.75	125.00	475.08	151.98	387.58	139.96	117.78
48		J155	0.83	533.59	157.75	125.00	470.82	151.35	364.29	139.96	117.58
49		J156	0.80	534.56	157.75	125.00	465.59	150.71	343.90	139.96	117.48
50		J157	0.75	536.52	157.75	125.00	411.70	145.01	240.82	139.96	117.28
51		J17	0.50	484.43	157.94	125.00	471.13	156.58	819.48	139.97	122.78
52		J18	0.35	453.86	157.92	100.00	441.55	156.66	661.73	139.97	125.88
53		J19	0.54	420.41	157.90	100.00	405.37	156.37	550.16	139.97	129.28
54		J20	0.66	449.64	157.89	125.00	426.03	155.48	555.06	139.97	126.28
55		J21	0.13	453.52	157.88	100.00	436.71	156.17	553.54	139.97	125.88
56		J22	0.44	456.42	157.88	100.00	439.33	156.13	553.52	139.97	125.58
57		J23	0.38	461.30	157.88	100.00	444.45	156.16	566.70	139.97	125.08
58		J24	1.16	463.24	157.87	125.00	438.36	155.33	558.51	139.97	124.88
59		J25	0.62	471.08	157.87	125.00	445.51	155.26	554.73	139.97	124.08
60		J26	0.55	474.02	157.87	125.00	448.78	155.30	560.72	139.97	123.78
61		J27	0.52	483.83	157.87	125.00	459.67	155.41	584.01	139.97	122.78
62		J28	0.59	516.19	157.88	125.00	493.33	155.54	632.82	139.97	119.48

		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Residual Head (m)	Available Flow @Hydrant (L/s)	Available Flow Pressure (kPa)	Available Flow Head (m)
63		J29	0.77	532.88	157.88	125.00	512.08	155.76	685.04	139.97	117.78
64		J30	0.13	519.22	157.89	100.00	506.68	156.61	732.95	139.97	119.18
65		J31	1.31	520.26	157.89	200.00	489.89	154.79	849.16	139.97	119.08
66		J32	0.19	526.21	157.90	100.00	518.54	157.12	1,014.88	139.97	118.48
67		J33	0.85	483.55	157.95	125.00	456.84	155.22	515.89	139.96	122.88
68		J34	0.75	499.18	157.94	125.00	268.70	134.42	160.04	139.96	121.28
69		J35	0.75	513.88	157.94	125.00	305.34	136.66	172.76	139.96	119.78
70		J36	0.68	520.77	157.94	125.00	434.01	149.09	282.12	139.96	119.08
71		J37	0.63	489.46	157.95	125.00	318.22	140.47	185.07	139.96	122.28
72		J38	0.70	470.02	157.97	125.00	447.28	155.64	545.76	139.97	124.28
73		J39	0.76	459.57	157.90	100.00	336.74	145.36	169.82	139.96	125.28
74		J40	0.97	446.68	157.88	125.00	396.81	152.79	349.55	139.96	126.58
75		J41	0.60	413.32	157.88	125.00	351.64	151.58	289.96	139.96	129.98
76		J42	0.55	394.68	157.88	125.00	315.67	149.81	241.91	139.96	131.88
77		J43	0.75	434.86	157.88	125.00	358.34	150.07	267.01	139.96	127.78
78		J44	0.60	436.84	157.88	125.00	387.61	152.86	346.16	139.96	127.58
79		J45	0.76	442.58	157.86	100.00	300.36	143.35	153.04	139.96	126.98
80		J46	0.38	455.44	157.88	100.00	415.91	153.84	321.86	139.96	125.68
81		J47	0.35	416.25	157.88	100.00	260.52	141.99	137.38	139.96	129.68
82		J48	0.31	412.33	157.88	100.00	254.82	141.80	135.41	139.96	130.08
83		J49	0.41	457.44	157.88	100.00	410.36	153.08	291.04	139.96	125.48
84		J50	0.28	483.01	157.89	100.00	432.20	152.71	289.66	139.96	122.88
85		J51	0.25	471.35	157.90	100.00	427.83	153.46	310.45	139.96	124.08
86		J52	0.98	485.67	157.86	100.00	421.71	151.34	260.06	139.96	122.58
87		J54	0.44	517.99	157.86	100.00	437.99	149.70	239.83	139.96	119.28
88		J55	0.41	532.70	157.86	100.00	463.47	150.80	266.03	139.96	117.78
89		J56	0.50	527.80	157.86	100.00	370.87	141.85	165.42	139.96	118.28
90		J57	0.63	518.04	157.87	100.00	461.66	152.11	292.71	139.96	119.28
91		J58	0.80	452.45	157.87	125.00	273.63	139.62	170.78	139.96	125.98
92		J59	0.57	532.81	157.87	100.00	410.73	145.41	190.92	139.96	117.78
93		J6	1.54	502.41	157.97	200.00	496.02	157.32	2,049.41	140.00	120.99

Max Day Phase 1, 2 & 3

		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Residual Head (m)	Available Flow @Hydrant (L/s)	Available Flow Pressure (kPa)	Available Flow Head (m)
94		J60	0.35	556.33	157.87	100.00	477.61	149.84	252.02	139.96	115.38
95		J61	0.41	520.07	157.87	100.00	418.61	147.52	207.63	139.96	119.08
96		J62	0.54	567.12	157.87	100.00	497.25	150.74	273.43	139.96	114.28
97		J63	0.31	529.89	157.87	100.00	442.71	148.98	228.90	139.96	118.08
98		J64	0.85	522.06	157.88	125.00	292.31	134.43	166.07	139.96	118.88
99		J65	0.47	523.12	157.88	100.00	160.68	120.90	103.55	139.96	118.78
100		J66	0.57	541.83	157.89	100.00	430.19	146.50	202.15	139.96	116.88
101		J67	0.47	587.95	158.00	100.00	587.95	158.00	196,725.19	526.87	151.77
102		J68	0.44	602.40	157.97	100.00	599.85	157.71	2,238.95	140.01	110.79
103		J69	0.41	620.75	157.95	100.00	616.56	157.52	1,711.78	139.99	108.89
104		J7	0.00	517.84	157.95	125.00	513.10	157.46	1,680.33	139.99	119.39
105		J70	0.43	616.69	157.93	125.00	609.77	157.23	1,521.65	139.99	109.29
106		J71	0.53	606.79	157.92	125.00	598.96	157.12	1,397.38	139.98	110.29
107		J72	0.53	591.99	157.91	125.00	583.37	157.03	1,300.92	139.98	111.78
108		J73	0.49	582.09	157.90	125.00	572.86	156.96	1,239.37	139.98	112.78
109		J74	0.46	557.50	157.89	125.00	547.59	156.88	1,155.67	139.98	115.28
110		J75	0.48	553.50	157.88	125.00	543.04	156.82	1,116.63	139.97	115.68
111		J76	0.58	549.52	157.88	125.00	538.67	156.77	1,093.33	139.97	116.08
112		J77	0.00	532.77	157.87	100.00	524.55	157.03	1,046.17	139.97	117.78
113		J78	0.54	621.86	157.96	100.00	503.64	145.90	215.08	139.96	108.78
114		J79	0.41	581.52	157.94	100.00	411.15	140.56	168.64	139.96	112.88
115		J8	1.97	520.63	157.93	125.00	514.98	157.35	1,529.53	139.99	119.09
116		J80	0.69	612.88	157.94	100.00	517.12	148.17	240.71	139.96	109.68
117		J81	0.50	613.88	157.95	100.00	602.39	156.77	823.88	139.97	109.58
118		J82	1.57	611.92	157.95	0.00	611.92	157.95	600.58	139.97	109.78
119		J83	0.54	611.71	157.92	100.00	505.12	147.05	225.80	139.96	109.78
120		J84	0.63	547.81	157.90	100.00	421.59	145.02	190.52	139.96	116.28
121		J85	0.85	603.75	157.91	125.00	411.86	138.33	203.64	139.96	110.58
122		J86	0.88	587.00	157.90	125.00	332.36	131.92	171.04	139.96	112.28
123		J87	0.65	572.29	157.90	125.00	380.25	138.30	195.67	139.96	113.78
124		J88	0.70	553.50	157.88	125.00	417.80	144.04	231.16	139.96	115.68

Max Day Phase 1, 2 & 3

		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Residual Head (m)	Available Flow @Hydrant (L/s)	Available Flow Pressure (kPa)	Available Flow Head (m)
125		J89	0.60	549.55	157.88	125.00	440.81	146.78	260.16	139.96	116.08
126		J9	0.00	528.23	157.91	100.00	523.29	157.40	1,407.11	139.98	118.29
127		J90	0.80	547.56	157.88	125.00	374.62	140.23	200.84	139.96	116.28
128		J91	0.25	527.98	157.88	100.00	440.96	149.00	227.24	139.96	118.28
129		J92	0.31	508.42	157.88	100.00	445.88	151.50	266.03	139.96	120.28
130		J93	0.25	528.04	157.89	100.00	426.03	147.48	208.06	139.96	118.28
131		J94	0.57	529.79	157.86	100.00	355.68	140.10	156.26	139.96	118.08
132		J95	0.54	525.87	157.86	100.00	224.15	127.07	114.96	139.96	118.48
133		J96	0.00	556.84	157.82	125.00	539.83	156.09	863.52	139.97	115.28
134		J97	0.91	554.72	157.81	125.00	534.89	155.79	785.55	139.97	115.48
135		J98	0.80	553.63	157.80	125.00	531.44	155.53	732.10	139.97	115.58
136		J99	0.66	552.56	157.79	125.00	528.27	155.31	690.45	139.97	115.68

Peak Hour Phase 1, 2 & 3

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		J10	0.00	97.75	149.37	505.85
2		J100	1.38	101.50	148.70	462.51
3		J101	1.57	101.60	148.66	461.17
4		J102	2.06	101.70	148.63	459.87
5		J103	1.32	101.80	148.60	458.61
6		J104	1.32	101.90	148.58	457.45
7		J105	2.14	102.00	148.57	456.37
8		J106	1.65	102.30	148.57	453.39
9		J11	0.00	101.40	149.16	468.01
10		J117	1.97	100.80	148.93	471.64
11		J118	3.16	102.00	148.92	459.76
12		J119	2.24	100.50	148.92	474.46
13		J120	1.24	103.50	148.79	443.78
14		J121	1.24	104.20	148.75	436.58
15		J122	1.49	104.00	148.74	438.41
16		J123	0.83	103.50	148.74	443.30
17		J124	1.66	104.50	148.74	433.49
18		J125	1.08	104.80	148.74	430.56
19		J126	1.32	104.50	148.75	433.61
20		J127	1.24	103.00	148.74	448.19
21		J128	0.83	106.00	148.64	417.81
22		J129	0.83	105.00	148.63	427.55
23		J130	1.16	106.00	148.58	417.29
24		J131	0.83	107.00	148.58	407.45
25		J132	1.99	111.00	148.57	368.16
26		J133	4.14	116.50	148.56	314.18
27		J134	1.66	116.50	148.57	314.22
28		J135	1.82	109.00	148.57	387.76
29		J136	2.10	105.00	148.77	428.89
30		J137	2.30	102.50	148.73	453.05
31		J138	1.71	104.00	148.72	438.22
32		J139	2.37	102.00	148.69	457.56

Peak Hour Phase 1, 2 & 3

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
33		J140	1.84	103.00	148.69	447.68
34		J141	2.24	101.70	148.66	460.19
35		J142	1.84	102.00	148.66	457.22
36		J143	2.10	102.00	148.64	457.04
37		J144	1.97	102.30	148.64	454.10
38		J145	2.10	102.20	148.63	454.98
39		J146	0.99	102.20	148.58	454.51
40		J147	1.16	102.50	148.58	451.55
41		J148	1.97	108.00	148.54	397.31
42		J149	1.97	111.00	148.53	367.75
43		J150	2.37	114.00	148.52	338.28
44		J151	2.10	105.50	148.53	421.67
45		J152	2.04	107.00	148.52	406.85
46		J153	2.17	108.50	148.52	392.16
47		J154	2.17	103.50	148.53	441.29
48		J155	2.17	103.30	148.52	443.15
49		J156	2.10	103.20	148.52	444.09
50		J157	1.97	103.00	148.52	446.03
51		J16	0.00	107.80	149.70	410.60
52		J17	1.32	108.50	149.62	402.96
53		J18	0.91	111.60	149.50	371.41
54		J19	1.41	115.00	149.42	337.32
55		J20	1.75	112.00	149.33	365.76
56		J21	0.33	111.60	149.30	369.41
57		J22	1.16	111.30	149.28	372.15
58		J23	0.99	110.80	149.26	376.91
59		J24	3.05	110.60	149.25	378.75
60		J25	1.64	109.80	149.25	386.59
61		J26	1.45	109.50	149.25	389.55
62		J27	1.37	108.50	149.26	399.40
63		J28	1.55	105.20	149.27	431.87
64		J29	2.03	103.50	149.29	448.75

Peak Hour Phase 1, 2 & 3

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
65		J-3	4.14	112.70	149.19	357.59
66		J30	0.33	104.90	149.33	435.39
67		J31	2.22	104.80	149.37	436.77
68		J32	0.50	104.20	149.41	443.00
69		J33	2.24	108.60	149.68	402.56
70		J34	1.97	107.00	149.65	417.98
71		J35	1.97	105.50	149.65	432.68
72		J36	1.78	104.80	149.67	439.73
73		J37	1.64	108.00	149.70	408.66
74		J38	1.84	110.00	149.80	389.97
75		J39	1.99	111.00	149.40	376.33
76		J-4	4.14	117.60	149.26	310.27
77		J40	2.55	112.30	149.31	362.65
78		J41	1.58	115.70	149.28	329.10
79		J42	1.45	117.60	149.27	310.35
80		J43	1.97	113.50	149.27	350.56
81		J44	1.58	113.30	149.28	352.62
82		J45	1.99	112.70	149.20	357.67
83		J46	0.99	111.40	149.28	371.16
84		J47	0.91	115.40	149.28	331.97
85		J48	0.83	115.80	149.28	328.08
86		J49	1.08	111.20	149.30	373.31
87		J5	0.00	107.60	150.00	415.49
88		J50	0.75	108.60	149.35	399.34
89		J51	0.66	109.80	149.41	388.18
90		J52	2.57	108.30	149.19	400.67
91		J53	4.14	105.00	149.17	432.81
92		J54	1.16	105.00	149.18	432.88
93		J55	1.08	103.50	149.18	447.66
94		J56	1.32	104.00	149.18	442.74
95		J57	1.66	105.00	149.21	433.19
96		J58	2.10	111.70	149.25	367.93

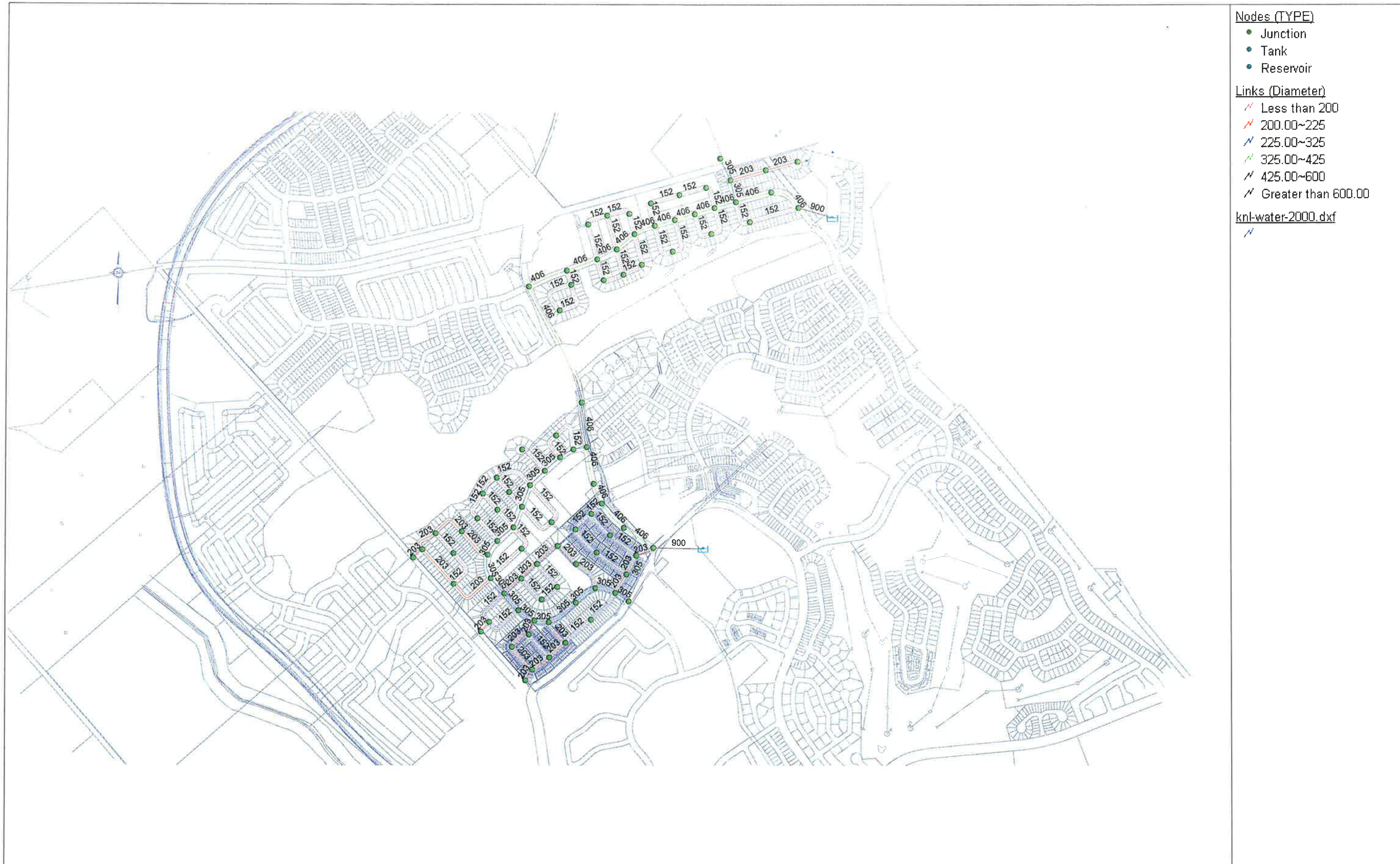
Peak Hour Phase 1, 2 & 3

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
97		J59	1.49	103.50	149.25	448.29
98		J6	2.49	106.70	149.83	422.63
99		J60	0.91	101.10	149.25	471.84
100		J61	1.08	104.80	149.25	435.59
101		J62	1.41	100.00	149.26	482.71
102		J63	0.83	103.80	149.26	445.49
103		J64	2.24	104.60	149.27	437.71
104		J65	1.24	104.50	149.32	439.21
105		J66	1.49	102.60	149.37	458.35
106		J67	1.24	98.00	150.00	509.56
107		J68	1.16	96.50	149.85	522.77
108		J69	1.08	94.60	149.69	539.80
109		J7	0.00	105.10	149.68	436.86
110		J70	1.12	95.00	149.60	535.05
111		J71	1.38	96.00	149.54	524.63
112		J72	1.40	97.50	149.47	509.31
113		J73	1.29	98.50	149.42	498.96
114		J74	1.20	101.00	149.36	473.91
115		J75	1.25	101.40	149.32	469.53
116		J76	1.51	101.80	149.28	465.24
117		J77	0.00	103.50	149.22	448.04
118		J78	1.41	94.50	149.76	541.54
119		J79	1.08	98.60	149.67	500.40
120		J8	5.17	104.80	149.59	438.89
121		J80	1.82	95.40	149.67	531.78
122		J81	1.32	95.30	149.68	532.88
123		J82	4.14	95.50	149.68	530.89
124		J83	1.41	95.50	149.55	529.67
125		J84	1.66	102.00	149.43	464.74
126		J85	2.24	96.30	149.48	521.12
127		J86	2.30	98.00	149.42	503.90
128		J87	1.71	99.50	149.42	489.14

Peak Hour Phase 1, 2 & 3

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
129		J88	1.84	101.40	149.31	469.49
130		J89	1.58	101.80	149.29	465.41
131		J9	0.00	104.00	149.45	445.33
132		J90	2.10	102.00	149.28	463.28
133		J91	0.66	104.00	149.29	443.79
134		J92	0.83	106.00	149.31	424.38
135		J93	0.66	104.00	149.32	444.13
136		J94	1.49	103.80	149.20	444.87
137		J95	1.41	104.20	149.19	440.90
138		J96	0.00	101.00	148.96	469.96
139		J97	2.39	101.20	148.86	467.05
140		J98	2.09	101.30	148.80	465.42
141		J99	1.75	101.40	148.74	463.91

KLN12



Prepared By:

Date: Wednesday, July 05, 2006

Basic Day Phase 1 & 2

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		J-3	0.59	112.70	157.98	443.75
2		J-4	0.59	117.60	157.99	395.75
3		J10	0.00	97.75	158.00	590.36
4		J11	0.00	101.40	158.00	554.59
5		J16	0.00	107.80	157.99	491.86
6		J17	0.19	108.50	157.99	484.99
7		J18	0.13	111.60	157.99	454.59
8		J19	0.20	115.00	157.99	421.26
9		J20	0.25	112.00	157.99	450.64
10		J21	0.05	111.60	157.99	454.55
11		J22	0.17	111.30	157.99	457.49
12		J23	0.14	110.80	157.99	462.39
13		J24	0.44	110.60	157.99	464.35
14		J25	0.23	109.80	157.99	472.19
15		J26	0.21	109.50	157.99	475.13
16		J27	0.20	108.50	157.99	484.93
17		J28	0.22	105.20	157.99	517.28
18		J29	0.29	103.50	157.99	533.95
19		J30	0.05	104.90	157.99	520.24
20		J31	0.56	104.80	157.99	521.24
21		J32	0.07	104.20	157.99	527.14
22		J33	0.32	108.60	157.99	484.02
23		J34	0.28	107.00	157.99	499.70
24		J35	0.28	105.50	157.99	514.40
25		J36	0.25	104.80	158.00	521.28
26		J37	0.23	108.00	158.00	489.92
27		J38	0.26	110.00	158.00	470.33
28		J39	0.28	111.00	157.99	460.45
29		J40	0.36	112.30	157.99	447.69
30		J41	0.23	115.70	157.99	414.37
31		J42	0.21	117.60	157.99	395.75
32		J43	0.28	113.50	157.99	435.92

Max Day Phase 1 & 2

		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Residual Head (m)	Available Flow @Hydrant (L/s)	Available Flow Pressure (kPa)	Available Flow Head (m)
1		J10	0.00	590.15	157.97	100.00	585.38	157.49	1,330.93	139.98	112.03
2		J11	0.00	554.39	157.97	100.00	548.51	157.37	1,103.69	139.97	115.68
3		J17	0.50	484.63	157.96	125.00	471.61	156.63	821.05	139.97	122.78
4		J18	0.35	454.11	157.94	100.00	442.09	156.71	663.26	139.97	125.88
5		J19	0.54	420.70	157.93	100.00	405.96	156.43	551.61	139.97	129.28
6		J20	0.66	449.98	157.92	125.00	426.72	155.55	556.55	139.97	126.28
7		J21	0.13	453.88	157.92	100.00	437.39	156.23	555.09	139.97	125.88
8		J22	0.44	456.80	157.92	100.00	440.06	156.21	555.20	139.97	125.58
9		J23	0.38	461.69	157.92	100.00	445.23	156.24	568.60	139.97	125.08
10		J24	1.16	463.65	157.91	125.00	439.29	155.43	560.59	139.97	124.88
11		J25	0.62	471.49	157.92	125.00	446.50	155.36	556.94	139.97	124.08
12		J26	0.55	474.45	157.92	125.00	449.83	155.40	563.08	139.97	123.78
13		J27	0.52	484.27	157.92	125.00	460.78	155.52	586.68	139.97	122.78
14		J28	0.59	516.66	157.92	125.00	494.53	155.67	635.89	139.97	119.48
15		J29	0.77	533.39	157.93	125.00	513.37	155.89	688.71	139.97	117.78
16		J30	0.13	519.77	157.94	100.00	507.96	156.74	737.76	139.97	119.18
17		J31	1.31	520.86	157.95	200.00	491.92	155.00	856.19	139.97	119.08
18		J32	0.19	526.84	157.96	100.00	520.07	157.27	1,025.52	139.97	118.48
19		J33	0.85	483.73	157.96	125.00	457.23	155.26	516.45	139.96	122.88
20		J34	0.75	499.40	157.96	125.00	269.23	134.47	160.18	139.96	121.28
21		J35	0.75	514.12	157.97	125.00	305.98	136.72	172.94	139.96	119.78
22		J36	0.68	521.06	157.97	125.00	434.79	149.17	282.58	139.96	119.08
23		J37	0.63	489.70	157.97	125.00	318.77	140.53	185.26	139.96	122.28
24		J38	0.70	470.15	157.98	125.00	447.55	155.67	546.18	139.97	124.28
25		J39	0.76	459.86	157.93	100.00	337.25	145.42	169.99	139.96	125.28
26		J40	0.97	447.01	157.92	125.00	397.48	152.86	350.23	139.96	126.58
27		J41	0.60	413.67	157.91	125.00	352.32	151.65	290.54	139.96	129.98
28		J42	0.55	395.03	157.91	125.00	316.36	149.88	242.38	139.96	131.88
29		J43	0.75	435.21	157.91	125.00	359.04	150.14	267.49	139.96	127.78
30		J44	0.60	437.19	157.91	125.00	388.32	152.93	346.89	139.96	127.58
31		J45	0.76	442.96	157.90	100.00	301.11	143.43	153.29	139.96	126.98

Max Day Phase 1 & 2

		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Residual Head (m)	Available Flow @Hydrant (L/s)	Available Flow Pressure (kPa)	Available Flow Head (m)
32		J46	0.38	455.82	157.92	100.00	416.60	153.91	322.50	139.96	125.68
33		J47	0.35	416.62	157.92	100.00	261.20	142.06	137.58	139.96	129.68
34		J48	0.31	412.71	157.92	100.00	255.49	141.87	135.61	139.96	130.08
35		J49	0.41	457.80	157.92	100.00	411.01	153.14	291.55	139.96	125.48
36		J50	0.28	483.34	157.92	100.00	432.82	152.77	290.10	139.96	122.88
37		J51	0.25	471.65	157.93	100.00	428.43	153.52	310.94	139.96	124.08
38		J52	0.98	486.09	157.90	100.00	422.59	151.43	260.63	139.96	122.58
39		J54	0.44	518.40	157.90	100.00	438.87	149.79	240.29	139.96	119.28
40		J55	0.41	533.12	157.90	100.00	464.35	150.89	266.55	139.96	117.78
41		J56	0.50	528.21	157.90	100.00	371.75	141.94	165.67	139.96	118.28
42		J57	0.63	518.46	157.91	100.00	462.54	152.20	293.35	139.96	119.28
43		J58	0.80	452.87	157.92	125.00	274.65	139.73	171.13	139.96	125.98
44		J59	0.57	533.24	157.92	100.00	411.76	145.52	191.29	139.96	117.78
45		J6	1.54	502.61	157.99	200.00	497.01	157.42	2,064.41	140.00	120.99
46		J60	0.35	556.78	157.92	100.00	478.67	149.95	252.58	139.96	115.38
47		J61	0.41	520.52	157.92	100.00	419.66	147.63	208.07	139.96	119.08
48		J62	0.54	567.59	157.92	100.00	498.34	150.86	274.08	139.96	114.28
49		J63	0.31	530.36	157.92	100.00	443.80	149.09	229.43	139.96	118.08
50		J64	0.85	522.54	157.92	125.00	293.56	134.56	166.41	139.96	118.88
51		J65	0.47	523.67	157.94	100.00	161.96	121.03	103.74	139.96	118.78
52		J66	0.57	542.43	157.95	100.00	431.68	146.65	202.75	139.96	116.88
53		J67	0.47	587.95	158.00	100.00	587.95	158.00	196,727.50	526.88	151.77
54		J68	0.44	602.58	157.99	100.00	600.73	157.80	2,256.54	140.01	110.79
55		J69	0.41	621.12	157.99	100.00	617.99	157.67	1,731.11	139.99	108.89
56		J7	0.00	518.21	157.98	125.00	514.33	157.59	1,697.68	139.99	119.39
57		J70	0.43	617.17	157.98	125.00	611.68	157.42	1,541.90	139.99	109.29
58		J71	0.53	607.35	157.98	125.00	601.13	157.34	1,418.19	139.98	110.29
59		J72	0.53	592.64	157.98	125.00	585.81	157.28	1,322.80	139.98	111.78
60		J73	0.49	582.82	157.98	125.00	575.55	157.23	1,262.46	139.98	112.78
61		J74	0.46	558.32	157.98	125.00	550.57	157.19	1,180.13	139.98	115.28
62		J75	0.48	554.39	157.98	125.00	546.28	157.15	1,142.33	139.98	115.68

Max Day Phase 1 & 2

		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Residual Head (m)	Available Flow @Hydrant (L/s)	Available Flow Pressure (kPa)	Available Flow Head (m)
63		J76	0.58	550.47	157.97	125.00	542.17	157.13	1,120.64	139.97	116.08
64		J77	0.00	533.81	157.97	100.00	527.94	157.38	1,076.43	139.97	117.78
65		J78	0.54	622.12	157.99	100.00	504.32	145.97	215.30	139.96	108.78
66		J79	0.41	581.89	157.98	100.00	412.58	140.70	169.01	139.96	112.88
67		J8	1.97	521.11	157.98	125.00	516.47	157.51	1,548.31	139.99	119.09
68		J80	0.69	613.25	157.98	100.00	518.55	148.32	241.34	139.96	109.68
69		J81	0.50	614.25	157.98	100.00	603.81	156.92	829.08	139.97	109.58
70		J82	1.57	612.29	157.98	0.00	612.29	157.98	603.55	139.97	109.78
71		J83	0.54	612.25	157.98	100.00	506.87	147.23	226.52	139.96	109.78
72		J84	0.63	548.52	157.98	100.00	423.80	145.25	191.35	139.96	116.28
73		J85	0.85	604.34	157.97	125.00	413.87	138.53	204.29	139.96	110.58
74		J86	0.88	587.66	157.97	125.00	334.45	132.13	171.56	139.96	112.28
75		J87	0.65	572.98	157.97	125.00	382.50	138.53	196.40	139.96	113.78
76		J88	0.70	554.36	157.97	125.00	420.90	144.35	232.59	139.96	115.68
77		J89	0.60	550.44	157.97	125.00	443.98	147.11	261.99	139.96	116.08
78		J9	0.00	528.90	157.97	100.00	525.00	157.58	1,429.15	139.98	118.29
79		J90	0.80	548.48	157.97	125.00	377.84	140.56	202.03	139.96	116.28
80		J91	0.25	528.91	157.97	100.00	443.80	149.29	228.81	139.96	118.28
81		J92	0.31	509.31	157.97	100.00	448.67	151.79	268.16	139.96	120.28
82		J93	0.25	528.91	157.97	100.00	428.76	147.75	209.35	139.96	118.28
83		J94	0.57	530.83	157.97	100.00	359.07	140.44	157.26	139.96	118.08
84		J95	0.54	526.90	157.97	100.00	227.54	127.42	115.56	139.96	118.48

Peak Hour Phase 1 & 2

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		J10	0.00	97.75	149.85	510.55
2		J11	0.00	101.40	149.85	474.80
3		J16	0.00	107.80	149.79	411.49
4		J17	1.32	108.50	149.74	404.09
5		J18	0.91	111.60	149.65	372.89
6		J19	1.41	115.00	149.60	339.03
7		J20	1.75	112.00	149.53	367.76
8		J21	0.33	111.60	149.51	371.52
9		J22	1.16	111.30	149.50	374.37
10		J23	0.99	110.80	149.50	379.23
11		J24	3.05	110.60	149.50	381.17
12		J25	1.64	109.80	149.50	389.03
13		J26	1.45	109.50	149.51	392.07
14		J27	1.37	108.50	149.53	402.04
15		J28	1.55	105.20	149.56	434.67
16		J29	2.03	103.50	149.60	451.75
17		J-3	4.14	112.70	149.42	359.86
18		J30	0.33	104.90	149.66	438.66
19		J31	2.22	104.80	149.73	440.32
20		J32	0.50	104.20	149.79	446.77
21		J33	2.24	108.60	149.79	403.60
22		J34	1.97	107.00	149.78	419.24
23		J35	1.97	105.50	149.80	434.07
24		J36	1.78	104.80	149.84	441.39
25		J37	1.64	108.00	149.84	410.04
26		J38	1.84	110.00	149.87	390.69
27		J39	1.99	111.00	149.57	377.98
28		J-4	4.14	117.60	149.47	312.32
29		J40	2.55	112.30	149.51	364.64
30		J41	1.58	115.70	149.49	331.14
31		J42	1.45	117.60	149.48	312.40
32		J43	1.97	113.50	149.48	352.61

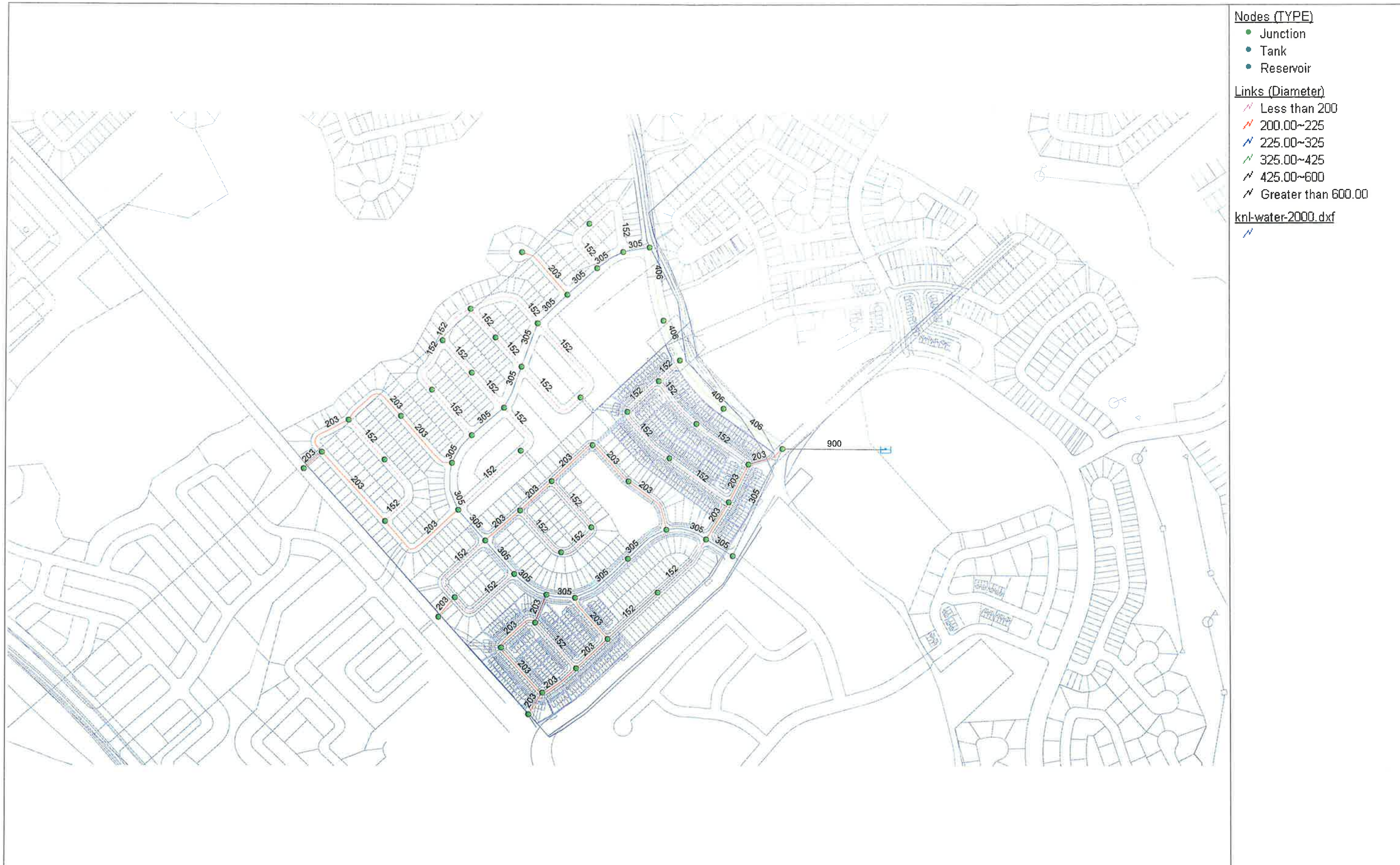
Peak Hour Phase 1 & 2

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
33		J44	1.58	113.30	149.50	354.69
34		J45	1.99	112.70	149.43	359.94
35		J46	0.99	111.40	149.50	373.39
36		J47	0.91	115.40	149.50	334.18
37		J48	0.83	115.80	149.50	330.28
38		J49	1.08	111.20	149.52	375.46
39		J5	0.00	107.60	150.00	415.49
40		J50	0.75	108.60	149.55	401.28
41		J51	0.66	109.80	149.59	389.93
42		J52	2.57	108.30	149.44	403.10
43		J53	4.14	105.00	149.42	435.24
44		J54	1.16	105.00	149.42	435.31
45		J55	1.08	103.50	149.43	450.09
46		J56	1.32	104.00	149.43	445.17
47		J57	1.66	105.00	149.46	435.63
48		J58	2.10	111.70	149.50	370.40
49		J59	1.49	103.50	149.51	450.87
50		J6	2.49	106.70	149.95	423.79
51		J60	0.91	101.10	149.52	474.49
52		J61	1.08	104.80	149.52	438.23
53		J62	1.41	100.00	149.54	485.48
54		J63	0.83	103.80	149.55	448.28
55		J64	2.24	104.60	149.56	440.55
56		J65	1.24	104.50	149.65	442.48
57		J66	1.49	102.60	149.74	461.95
58		J67	1.24	98.00	150.00	509.56
59		J68	1.16	96.50	149.96	523.84
60		J69	1.08	94.60	149.91	542.02
61		J7	0.00	105.10	149.90	439.04
62		J70	1.12	95.00	149.89	537.93
63		J71	1.38	96.00	149.88	528.01
64		J72	1.40	97.50	149.87	513.21

Peak Hour Phase 1 & 2

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
65	☐	J73	1.29	98.50	149.86	503.33
66	☐	J74	1.20	101.00	149.86	478.78
67	☐	J75	1.25	101.40	149.86	474.83
68	☐	J76	1.51	101.80	149.85	470.89
69	☐	J77	0.00	103.50	149.85	454.22
70	☐	J78	1.41	94.50	149.92	543.12
71	☐	J79	1.08	98.60	149.89	502.62
72	☐	J8	5.17	104.80	149.88	441.76
73	☐	J80	1.82	95.40	149.89	533.99
74	☐	J81	1.32	95.30	149.91	535.09
75	☐	J82	4.14	95.50	149.90	533.11
76	☐	J83	1.41	95.50	149.88	532.91
77	☐	J84	1.66	102.00	149.86	469.01
78	☐	J85	2.24	96.30	149.84	524.64
79	☐	J86	2.30	98.00	149.83	507.87
80	☐	J87	1.71	99.50	149.83	493.23
81	☐	J88	1.84	101.40	149.84	474.65
82	☐	J89	1.58	101.80	149.84	470.72
83	☐	J9	0.00	104.00	149.85	449.30
84	☐	J90	2.10	102.00	149.83	468.74
85	☐	J91	0.66	104.00	149.85	449.32
86	☐	J92	0.83	106.00	149.85	429.72
87	☐	J93	0.66	104.00	149.85	449.32
88	☐	J94	1.49	103.80	149.83	451.05
89	☐	J95	1.41	104.20	149.82	447.08

KLN1A



Prepared By:

Date: Wednesday, July 05, 2006

Basic Day Phase 1

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		J-3	0.59	112.70	157.98	443.75
2		J-4	0.59	117.60	157.99	395.74
3		J16	0.00	107.80	157.99	491.86
4		J17	0.19	108.50	157.99	484.99
5		J18	0.13	111.60	157.99	454.59
6		J19	0.20	115.00	157.99	421.25
7		J20	0.25	112.00	157.99	450.63
8		J21	0.05	111.60	157.99	454.55
9		J22	0.17	111.30	157.99	457.49
10		J23	0.14	110.80	157.99	462.38
11		J24	0.44	110.60	157.99	464.34
12		J25	0.23	109.80	157.99	472.18
13		J26	0.21	109.50	157.99	475.12
14		J27	0.20	108.50	157.99	484.93
15		J28	0.22	105.20	157.99	517.27
16		J29	0.29	103.50	157.99	533.94
17		J30	0.05	104.90	157.99	520.24
18		J31	0.56	104.80	157.99	521.24
19		J32	0.07	104.20	157.99	527.13
20		J33	0.32	108.60	157.99	484.02
21		J34	0.28	107.00	157.99	499.70
22		J35	0.28	105.50	157.99	514.40
23		J36	0.25	104.80	158.00	521.27
24		J37	0.23	108.00	158.00	489.92
25		J38	0.26	110.00	158.00	470.33
26		J39	0.28	111.00	157.99	460.45
27		J40	0.36	112.30	157.99	447.69
28		J41	0.23	115.70	157.99	414.37
29		J42	0.21	117.60	157.99	395.74
30		J43	0.28	113.50	157.99	435.92
31		J44	0.23	113.30	157.99	437.88
32		J45	0.28	112.70	157.98	443.75

Basic Day Phase 1

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
33		J46	0.14	111.40	157.99	456.51
34		J47	0.13	115.40	157.99	417.31
35		J48	0.12	115.80	157.99	413.39
36		J49	0.15	111.20	157.99	458.47
37		J5	0.00	107.60	158.00	493.88
38		J50	0.11	108.60	157.99	483.96
39		J51	0.09	109.80	157.99	472.21
40		J52	0.37	108.30	157.98	486.86
41		J53	0.59	105.00	157.98	519.20
42		J54	0.17	105.00	157.98	519.20
43		J55	0.15	103.50	157.98	533.90
44		J56	0.19	104.00	157.98	529.00
45		J57	0.24	105.00	157.98	519.21
46		J58	0.30	111.70	157.99	453.56
47		J59	0.21	103.50	157.99	533.92
48		J6	0.66	106.70	158.00	502.68
49		J60	0.13	101.10	157.99	557.44
50		J61	0.15	104.80	157.99	521.18
51		J62	0.20	100.00	157.99	568.23
52		J63	0.12	103.80	157.99	530.99
53		J64	0.32	104.60	157.99	523.15
54		J65	0.18	104.50	157.99	524.16
55		J66	0.21	102.60	157.99	542.80
56		J7	0.00	105.10	158.00	518.35
57		J8	0.74	104.80	158.00	521.28
58		J9	0.00	104.00	158.00	529.11

Max Day Phase 1

		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Residual Head (m)	Available Flow @Hydrant (L/s)	Available Flow Pressure (kPa)	Available Flow Head (m)
1		J17	0.50	484.62	157.95	125.00	471.26	156.59	811.69	139.97	122.78
2		J18	0.35	454.10	157.94	100.00	441.73	156.68	654.87	139.97	125.88
3		J19	0.54	420.69	157.93	100.00	405.53	156.38	544.52	139.97	129.28
4		J20	0.66	449.97	157.92	125.00	426.02	155.48	548.68	139.97	126.28
5		J21	0.13	453.86	157.92	100.00	436.84	156.18	546.62	139.97	125.88
6		J22	0.44	456.78	157.91	100.00	439.44	156.14	545.45	139.97	125.58
7		J23	0.38	461.68	157.91	100.00	444.53	156.16	556.72	139.97	125.08
8		J24	1.16	463.63	157.91	125.00	438.12	155.31	546.91	139.97	124.88
9		J25	0.62	471.47	157.91	125.00	445.17	155.23	541.78	139.97	124.08
10		J26	0.55	474.43	157.92	125.00	448.38	155.26	546.08	139.97	123.78
11		J27	0.52	484.25	157.92	125.00	459.15	155.36	565.81	139.97	122.78
12		J28	0.59	516.64	157.92	125.00	492.67	155.48	608.64	139.97	119.48
13		J29	0.77	533.36	157.93	125.00	511.27	155.67	652.01	139.97	117.78
14		J30	0.13	519.75	157.94	100.00	506.25	156.56	684.40	139.97	119.18
15		J31	1.31	520.83	157.95	200.00	485.40	154.33	764.00	139.97	119.08
16		J32	0.19	526.81	157.96	100.00	517.72	157.03	862.71	139.97	118.48
17		J33	0.85	483.72	157.96	125.00	456.99	155.24	514.79	139.96	122.88
18		J34	0.75	499.39	157.96	125.00	268.84	134.43	160.05	139.96	121.28
19		J35	0.75	514.11	157.96	125.00	305.44	136.67	172.72	139.96	119.78
20		J36	0.68	521.04	157.97	125.00	434.05	149.09	281.45	139.96	119.08
21		J37	0.63	489.69	157.97	125.00	318.36	140.49	185.04	139.96	122.28
22		J38	0.70	470.14	157.98	125.00	447.42	155.66	545.17	139.97	124.28
23		J39	0.76	459.84	157.93	100.00	336.92	145.38	169.79	139.96	125.28
24		J40	0.97	447.00	157.92	125.00	396.83	152.80	348.12	139.96	126.58
25		J41	0.60	413.65	157.91	125.00	351.64	151.58	289.04	139.96	129.98
26		J42	0.55	395.01	157.91	125.00	315.67	149.81	241.37	139.96	131.88

Max Day Phase 1

		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Residual Head (m)	Available Flow @Hydrant (L/s)	Available Flow Pressure (kPa)	Available Flow Head (m)
27		J43	0.75	435.20	157.91	125.00	358.33	150.07	266.33	139.96	127.78
28		J44	0.60	437.17	157.91	125.00	387.60	152.85	344.55	139.96	127.58
29		J45	0.76	442.95	157.90	100.00	300.45	143.36	152.93	139.96	126.98
30		J46	0.38	455.81	157.91	100.00	416.04	153.86	320.52	139.96	125.68
31		J47	0.35	416.61	157.91	100.00	260.65	142.00	137.35	139.96	129.68
32		J48	0.31	412.69	157.91	100.00	254.96	141.82	135.38	139.96	130.08
33		J49	0.41	457.78	157.92	100.00	410.50	153.09	290.19	139.96	125.48
34		J50	0.28	483.32	157.92	100.00	432.36	152.72	288.99	139.96	122.88
35		J51	0.25	471.63	157.93	100.00	428.00	153.48	309.64	139.96	124.08
36		J52	0.98	486.07	157.90	100.00	421.72	151.34	258.95	139.96	122.58
37		J54	0.44	518.39	157.90	100.00	437.99	149.70	239.04	139.96	119.28
38		J55	0.41	533.10	157.90	100.00	463.47	150.80	264.96	139.96	117.78
39		J56	0.50	528.19	157.90	100.00	370.88	141.85	165.22	139.96	118.28
40		J57	0.63	518.44	157.91	100.00	461.66	152.11	291.18	139.96	119.28
41		J58	0.80	452.85	157.91	125.00	273.24	139.58	170.44	139.96	125.98
42		J59	0.57	533.22	157.91	100.00	410.59	145.40	190.41	139.96	117.78
43		J6	1.54	502.60	157.99	200.00	495.28	157.24	1,788.61	139.99	120.99
44		J60	0.35	556.76	157.92	100.00	477.44	149.82	250.71	139.96	115.38
45		J61	0.41	520.50	157.92	100.00	418.46	147.50	206.89	139.96	119.08
46		J62	0.54	567.57	157.92	100.00	497.04	150.72	271.67	139.96	114.28
47		J63	0.31	530.34	157.92	100.00	442.50	148.96	227.81	139.96	118.08
48		J64	0.85	522.52	157.92	125.00	291.55	134.35	165.66	139.96	118.88
49		J65	0.47	523.66	157.94	100.00	438.51	149.25	229.01	139.96	118.78
50		J66	0.57	542.40	157.95	100.00	429.44	146.42	200.76	139.96	116.88
51		J7	0.00	518.19	157.98	125.00	512.55	157.40	1,374.26	139.98	119.38
52		J8	1.97	521.09	157.98	125.00	513.87	157.24	1,201.55	139.98	119.08

Max Day Phase 1

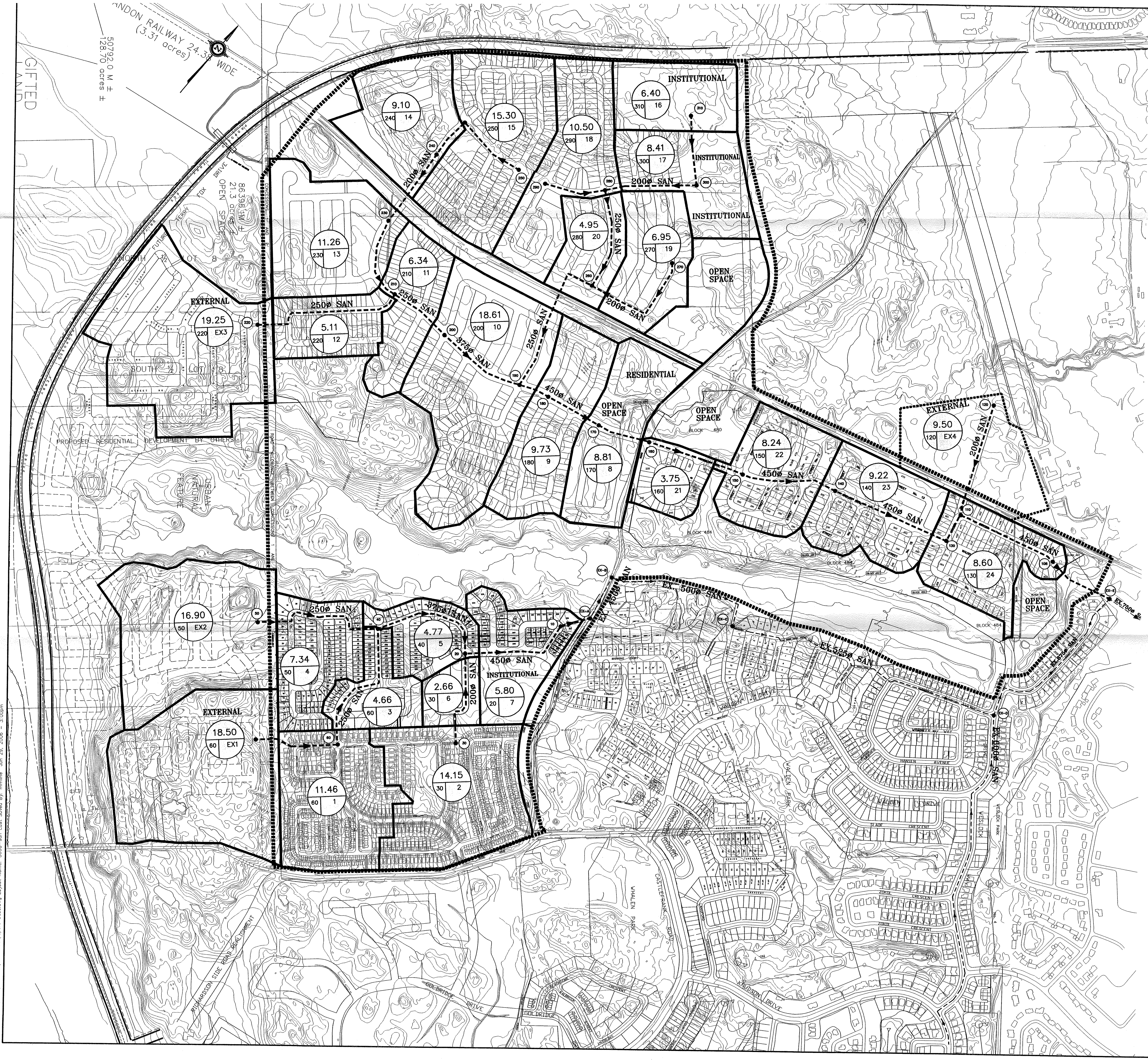
		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Residual Head (m)	Available Flow @Hydrant	Available Flow Pressure	Available Flow Head (m)
53		J9	0.00	528.87	157.97	100.00	522.17	157.29	1,030.11	139.97	118.28

Peak Hour Phase 1

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		J16	0.00	107.80	149.79	411.46
2		J17	1.32	108.50	149.73	404.05
3		J18	0.91	111.60	149.65	372.83
4		J19	1.41	115.00	149.59	338.96
5		J20	1.75	112.00	149.52	367.68
6		J21	0.33	111.60	149.51	371.44
7		J22	1.16	111.30	149.50	374.29
8		J23	0.99	110.80	149.49	379.14
9		J24	3.05	110.60	149.49	381.08
10		J25	1.64	109.80	149.49	388.94
11		J26	1.45	109.50	149.50	391.98
12		J27	1.37	108.50	149.52	401.94
13		J28	1.55	105.20	149.55	434.57
14		J29	2.03	103.50	149.59	451.64
15		J-3	4.14	112.70	149.42	359.78
16		J30	0.33	104.90	149.65	438.53
17		J31	2.22	104.80	149.72	440.18
18		J32	0.50	104.20	149.78	446.62
19		J33	2.24	108.60	149.78	403.56
20		J34	1.97	107.00	149.78	419.20
21		J35	1.97	105.50	149.79	434.02
22		J36	1.78	104.80	149.84	441.33
23		J37	1.64	108.00	149.84	409.98
24		J38	1.84	110.00	149.87	390.66
25		J39	1.99	111.00	149.57	377.92
26		J-4	4.14	117.60	149.46	312.25
27		J40	2.55	112.30	149.50	364.57
28		J41	1.58	115.70	149.48	331.06
29		J42	1.45	117.60	149.47	312.33
30		J43	1.97	113.50	149.48	352.54
31		J44	1.58	113.30	149.49	354.61
32		J45	1.99	112.70	149.42	359.86

Peak Hour Phase 1

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
33		J46	0.99	111.40	149.50	373.31
34		J47	0.91	115.40	149.49	334.10
35		J48	0.83	115.80	149.50	330.19
36		J49	1.08	111.20	149.51	375.38
37		J5	0.00	107.60	150.00	415.49
38		J50	0.75	108.60	149.54	401.21
39		J51	0.66	109.80	149.59	389.87
40		J52	2.57	108.30	149.43	403.01
41		J53	4.14	105.00	149.41	435.15
42		J54	1.16	105.00	149.41	435.23
43		J55	1.08	103.50	149.42	450.00
44		J56	1.32	104.00	149.42	445.08
45		J57	1.66	105.00	149.45	435.54
46		J58	2.10	111.70	149.49	370.31
47		J59	1.49	103.50	149.50	450.77
48		J6	2.49	106.70	149.94	423.74
49		J60	0.91	101.10	149.51	474.39
50		J61	1.08	104.80	149.51	438.14
51		J62	1.41	100.00	149.53	485.37
52		J63	0.83	103.80	149.54	448.17
53		J64	2.24	104.60	149.55	440.44
54		J65	1.24	104.50	149.65	442.43
55		J66	1.49	102.60	149.73	461.80
56		J7	0.00	105.10	149.89	438.95
57		J8	5.17	104.80	149.87	441.64
58		J9	0.00	104.00	149.83	449.15



NO.	DATE	BY	REVISION
1.	02:11:20		GENERAL REVISIONS
2.	02:11:26		REVISED AS PER NEW CONCEPT PLAN
3.	03:04:08		REVISED AS PER NEW CONCEPT PLAN
4.	05:08:16		REVISED AS PER NEW CONCEPT PLAN
5.	06:02:14		REVISED AS PER NEW CONCEPT PLAN
6.	06:06:15		REVISED AS PER NEW CONCEPT PLAN

Legend:

- 11.7 — Area in hectares
- 5 — Area Number
- 310 — Tributary Node
- Proposed Trunk Sanitary Sewer
- Sanitary Identification Node
- Sanitary Drainage Area
- DEVELOPMENT LIMITS

KNL DEVELOPMENTS INC.

Ottawa

CCL/IBI
Cumming Cockburn Limited
1770 WOODWARD DR., OTTAWA (613)225-1311

KANATA LAKES NORTH SANITARY DRAINAGE AREAS

SERVICEABILITY STUDY

SCALE:	1:5000		
DRAWN:	M.M.	DATE:	SEPT '02
DESIGN:	L.E.	DATE:	SEPT '02
CHECKED:	R.W.W.	DATE:	SEPT '02

PROJECT NO.	DRAWING NO.
3433-LD	5000

NO.	DATE	BY	REVISION
1.	02:11:20		GENERAL REVISIONS
2.	02:11:26		REVISED AS PER NEW CONCEPT PLAN
3.	03:04:08		REVISED AS PER NEW CONCEPT PLAN
4.	05:08:16		REVISED AS PER NEW CONCEPT PLAN
5.	06:02:14		REVISED AS PER NEW CONCEPT PLAN
6.	06:06:15		REVISED AS PER NEW CONCEPT PLAN

KNL DEVELOPMENTS INC.

Ottawa

CCL/IBI
Cumming Cockburn Limited
1770 WOODWARD DR., OTTAWA (613)225-1311

KANATA LAKES NORTH STORM DRAINAGE AREAS

SERVICEABILITY STUDY

SCALE:	1:5000		
DRAWN:	M.M.	DATE:	SEPT '02
DESIGN:	L.E.	DATE:	SEPT '02
CHECKED:	R.W.W.	DATE:	SEPT '02

PROJECT NO.	DRAWING NO.
3433-LD	5001

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NO.	DATE	BY	REVISION
1.	02:11:20		GENERAL REVISIONS
2.	02:11:26		REVISED AS PER NEW CONCEPT PLAN
3.	05:08:16		REVISED AS PER NEW CONCEPT PLAN
4.	06:02:14		REVISED AS PER NEW CONCEPT PLAN
5.	06:06:15		REVISED AS PER NEW CONCEPT PLAN

Legend:

(100.0) Proposed Centreline Profile Grade

Major Overland Flow Direction

Major Flow Outlet

DEVELOPMENT LIMITS

KNL DEVELOPMENTS INC.

Ottawa

CCL/IBI
Cumming Cockburn Limited
1770 WOODWARD DR., OTTAWA (613)225-1311

KANATA LAKES NORTH MASTER GRADING PLAN

SERVICEABILITY STUDY

SCALE: 1:5000			
DRAWN: M.M.		DATE:	SEPT '02
DESIGN: L.E.		DATE:	SEPT '02
CHECKED: R.W.W.		DATE:	SEPT '02
PROJECT NO.	3433–LD	DRAWING NO.	5002

NO.	DATE	BY	REVISION
1.	02:11:20		GENERAL REVISIONS
2.	02:11:26		REVISIONS PER NEW CONCEPT PLAN
3.	03:04:08		REVISIONS PER NEW CONCEPT PLAN
4.	05:08:16		REVISED AS PER NEW CONCEPT PLAN
5.	06:02:14		REVISED AS PER NEW CONCEPT PLAN
6.	06:06:15		REVISED AS PER NEW CONCEPT PLAN

LEGEND :

610ø WATERMAIN
406ø WATERMAIN
305ø WATERMAIN
254ø WATERMAIN
203ø WATERMAIN
152ø WATERMAIN
DEVELOPMENT LIMITS

KNL DEVELOPMENTS INC.

Ottawa

CCL Cumming Cockburn Limited / IBI

1770 WOODWARD DR., OTTAWA (613)225-1311

KANATA LAKES NORTH
WATER DISTRIBUTION PLAN

SERVICEABILITY STUDY

SCALE: 1:5000	
DRAWN: M.M.	DATE: SEPT '02
DESIGN: L.E.	DATE: SEPT '02
CHECKED: R.W.W.	DATE: SEPT '02
PROJECT NO. 3433-LD	DRAWING NO. 5003

NO.	DATE	BY	REVISION
1.	02:11:20		GENERAL REVISIONS
2.	02:11:26		REVISED AS PER NEW CONCEPT PLAN
3.	05:08:16		REVISED AS PER NEW CONCEPT PLAN
4.	06:02:14		REVISED AS PER NEW CONCEPT PLAN
5.	06:06:15		REVISED AS PER NEW CONCEPT PLAN

94.1 (OVERFLOW)
93.0
WATER LEVEL 93.3

Berm Detail

Legend:

- On–Site Storage
- S2 Sewer Outlet
- 9 Drainage Area ID
- Drainage Area Boundary
- Major Flow
- Minor Flow

KNL DEVELOPMENTS INC.

Ottawa

CCL/IBI
Cumming Cockburn Limited
1770 WOODWARD DR., OTTAWA (613)225-1311

KANATA LAKES NORTH
MODEL SCHEMATIC

SERVICEABILITY
STUDY

SCALE:	1:6000		
DRAWN:	M.M.	DATE:	SEPT '02
DESIGN:	L.E.	DATE:	SEPT '02
CHECKED:	R.W.W.	DATE:	SEPT '02

PROJECT NO.	DRAWING NO.
3433–LD	5004