Northwoods Forest Subdivision
Phases 3 to 10
Preliminary Servicing Report & Stormwater Management Report

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1. Introduction

1.1 Background

This preliminary servicing report is prepared on behalf of KEM Development Corporation in support of a Draft Plan application for phases 3 through 10 of the Northwoods Forest Subdivision. The conceptual design for the entire subdivision was reviewed as part of the preliminary servicing report prepared by Genivar Inc. in August 2013, in support of phase 1 & 2 of the development. In addition, the "Northwoods Forest Subdivision - Stormwater Management & Servicing Report" completed by WSP Canada Inc. in April 2015 was completed in support of the execution of the subdivision agreement for phases 1 & 2. This preliminary servicing report is meant to supersede the referenced reports for phases 3 through 10 of the development.

1.2 General Location, Description & Phasing

The Northwoods Forest Subdivision is generally located east of Pitt Street, and south of South Branch Road and consists of approximately 21.61 hectares of land.

Phases 3 through 10 is proposed to consist of a mix of single detached dwellings and semi-detached dwellings on approximately 14.40 ha of land legally described as Lot 8 and 9, Concession 3 in the City of Cornwall and can be generally described as north of the existing phases 2/2B, east of Pitt St. North and south of South Branch Rd.

A total of 214 lots are proposed for phases 3 through 10, of which 166 will consist of single detached lots and 48 will consist of semi-detached lots, for a total of 214 dwelling units. More specifically, the developer is intending to develop 32, 30, 36, 30, 24, 23, 23, & 16 dwelling units for phases 3 through 10, respectively.

1.3 Zoning

Phases 3 through 10 of the development are currently zoned Residential 20 holding, which allows for the construction of single detached dwellings and semi-detached dwellings. The lands are proposed to be re-zoned Res 10 for all lots allocated as single detached lots and Res 15 for all lots allocated as semi-detached lots. All dwelling lots have been sized in accordance with the minimum standards of the corresponding zoning by-law. A holding removal will be required to allow for the development to proceed.

The development is also currently within the Urban Residential Area of the City of Cornwall's official plan (2005). The Urban Residential designation provides for servicing of municipal water supply and sewage disposal systems and allows for a full range of dwellings, including the proposed singles and semi-detached dwellings.

1.4 Preliminary Servicing Plans

The proposed rezoning of the development is illustrated on Figure 1, which can be found in Appendix "A". As can be seen, the total area of development for phases 1 through 10 is 21.61 ha of which 1.67 ha is zoned Open Space 10 for the existing stormwater

management facility and parkland for the entire development. Following the proposed re-zoning, the remaining 19.94 ha will be divided as 13.61 ha zoned as Residential 10 and 6.33 ha zoned as Residential 15.

Concept plans were also prepared for the servicing of the subdivision with sanitary and storm sewers. The proposed sanitary sewer network is shown on Figure 2, while the proposed storm sewer network is shown on Figure 3, both of which may be found in Appendix "A'. The plans were also updated to reflect the sanitary and storm sewers constructed in both phase 1 & 2 of the development.

2. Servicing

To satisfy requirements of the City for the proposed Draft Plan application, EVB has completed the current study which superseded previous studies prepared by Genivar Inc and WSP Canada Inc.

Full municipal services will be provided, including sanitary sewers, storm sewers, watermain, surface drainage (lot grading), asphalt roadways, street lighting and utilities.

2.1 Proposed Sanitary Collection System

A sanitary sewer system is proposed for the development to convey sewage to the City of Cornwall Wastewater Treatment Plant before being discharged into the St. Lawrence River.

The design of the sewer system will be consistent with the City of Cornwall's *Subdivision Manual,* the Ministry of the Environment, Conservation and Parks (MECP) *Design Guidelines for Sewage Works* (2008) and based on the following assumptions and criteria:

- 60 persons per hectare for RES10 zoning,
- 75 persons per hectare for RES15 zoning,
- Average daily flow of 340 L/person/day,
- Maximum day flow of 570 L/person/day,
- Peak rate flow of 1,300 L/person/day,
- Minimum hourly flow of 140 L/person/day,
- Peaking factor as calculated from Harmon formula (minimum of 2, maximum of 4),
- Infiltration & inflow allowance of 0.019 L/s/ha,
- Manning coefficient of 0.013,
- Minimum full flow velocity of 0.6 m/s,
- Maximum velocity of 3.0 m/s.

The proposed sanitary sewer network is shown on drawing Fig.2 found in Appendix "A". Sanitary sewers constructed as part of phase 1 & 2 of the development have been sized with capacity to accommodate the ultimate development, including phases 3 through 10. The sanitary sewer design sheet and associated sanitary catchment area drawing

completed by WSP Canada Inc. for the phase 1 and 2 development have been included in Appendix B.

Sanitary laterals will service each property and be installed from the main line sewer to the property boundary. Sanitary laterals are to be installed with minimum and maximum slopes of 2% and 8% respectively; consistent with provincial standards.

2.2 Existing Sanitary Sewer Allocation

As discussed in previous reports, the Northwoods Forest Development was allocated the equivalent of 15.378 ha of sewage capacity within the Northern Trunk Sanitary Sewer catchment area. The City of Cornwall Subdivision manual defines the methodology to be used to calculate the peak sewage flow rate for a sanitary catchment area. There are number of variables defined in the manual that effect the sewage flow rate calculation for a catchment area, as described as follows:

1. Design Population (P): Table 1 in section III.2 defines the population density based on the zoning. Zoning designations that permit higher density development have a higher population density factor.

2. Infiltration Rate (I): Section III.2 defines the infiltration rate to be used for new subdivisions and older tributary areas, that latter having a higher valued as the inflow and infiltration rates are expected to be higher.

To calculate the sewage flow rate associated with the 15.378 ha catchment area that would have formed the basis of the original Northern Trunk Sanitary Sewer design we have assumed the following:

1. Design Population of 85 Ppha (RES 20)

2. Peak Infiltration rate of 0.28 l/s/ha (representative of construction practices in the 1960s & 1970s when the trunk sewer design was completed)

Using these variables, the peak discharge rate from the allocated catchment is 23.45 l/s, as shown in the attached Sanitary Sewer Design Sheet.

Additionally, 1.25 ha of the subdivision that was previously classified as VLA lands already has allocated sewage capacity and should not be included in the 15.378 ha allocation. Using the methodology described above, this would equate to a peak sewage discharge of 2.02 l/s, which would be in addition to the 23.45 l/s associated with the 15.376 ha, bringing the total allocated peak sewage flowrate from the development to 25.47 l/s.

2.3 Proposed Sanitary Sewage Generation

As shown in Figure 1, the total catchment area of the Northwoods Forest Subdivision (phases 1 through 10) is 21.61 ha and will be comprised of 1.67 ha of OSP 10, 6.33 ha of Residential 15 and 13.61 ha of Residential 10 zoned areas. Using the design population values for these zoning designations and using the peak infiltration rate associated with new construction, the total peak discharge rate for the development is 23.19 l/s, which is less than the allocated peak discharge rate of 25.47 l/s.

Therefore, based on this analysis, the entire 21.61 ha Northwoods Forest development, as currently proposed to be zoned, will have sewage flow rates that are below the allocated sewage capacity for the development in the Northern Trunk Sanitary Sewer.

2.4 Existing Sanitary Sewer on Pitt St.

The previous servicing report prepared by Genivar titled "Preliminary Servicing Report – Northwoods Forest Subdivision" and dated August 2013 also identified a 137m section of 250mm diameter sanitary sewer on Pitt St. between existing manholes g8-4-1 and f8-2-1 that would exceed capacity should the full development of the Northwood Forest Subdivision occur. It was discussed and agreed upon by both KEM Developments and the City of Cornwall that the developer would pay for the upgrades to this section of the sanitary sewer on Pitt St. A clause was added to the Phase 2 subdivider's agreement to this effect, and the City of Cornwall is currently withholding $150k from the Phase 2 letter of credit for this work. It is our understanding that the City intends to tender the Pitt St. sewer upgrades shortly, and once the actual cost of the upgrades is determined, the letter of credit will be adjusted accordingly.

2.5 Water Supply

A water distribution system is proposed for the development consistent with MOE standards. The proposed watermain network was previously modeled using WaterCAD V8i as part of the "Northwoods Forest Subdivision - Stormwater Management & Servicing Report" completed by WSP Canada Inc. and dated April 2015.

Updated theoretical water demands were calculated based on the proposed rezoning of the development and are very similar to the water demands the were used in the previous water model referenced above, as can be seen in Table 2-1 below.

Table 2-1: Updated Water Demands

Scenario	Flow used in WSP Model (Phase 1-10) (L/s)	Updated Flow (Phase 1-10) (L/s)	Difference (L/s)
Average Day Demand	6.10	5.09	-1.01
Maximum Day Demand	10.23	8.53	-1.70
Peak Rate Flow	23.33	19.45	-3.88
Minimum Hourly Flow	2.51	2.09	-0.42

As the flows are slightly less than those originally estimated, then the watermain sizing completed as part of the Phase 1 & 2 *Stormwater Management and Servicing Report* is still valid. A new 200mm diameter watermain is therefore proposed for all road networks within the proposed phases 3 through 10 of the development aligning with the previous model completed.

Refer to Appendix "C" for updated water demand calculations.

2.6 Asphalt Roadways & Sidewalks

All roadways within phases 3 through 10 of the development are proposed to be constructed to a 20.0 m local street corridor, with an 8.0 m wide asphalt roadway and a 1.5 m wide sidewalk located on the north/east side of the road.

The pavement structure is proposed to match the criteria outlined in the City design manual for a local roadway. More specifically, this consists of 40 mm of HL-3 asphalt, 50 mm of HL-8 asphalt, 150 mm of Granular "A" and 300 mm of Granular "B".

As second entrance into the subdivision is proposed to be installed as part of Phase 4 of the development with a connection to the South Branch Road.

2.7 Utilities & Street Lighting

As per the City's standards, utility corridors located within the road allowance will accommodate street lighting, Cornwall Electric, Bell Canada, Cogeco and Union Gas.

2.8 Park Land

As detailed in the "Northwoods Forest Subdivision - Stormwater Management & Servicing Report" completed by WSP Canada Inc., approximately 1.67 ha of Block 1 (Phase 1 & 2 registered plan) will be allocated as usable parkland for the entire development. This value represents 7.8% of the total area of the development, exceeding the minimum 5% required in the Planning Act.

3. Stormwater Management

Stormwater runoff from the proposed phases 3 through 10 of the development will be conveyed to the existing stormwater management facility constructed in phase 1 of the development via a series of existing and proposed underground storm sewers. The existing SWM facility has been designed for the ultimate development of the Northwoods Forest Subdivision (21.63 ha) inclusive of the proposed phases 3 through 10. The detailed design of the existing facility is further described in the report titled "Northwoods Forest Subdivision - Stormwater Management & Servicing Report" completed by WSP Canada Inc. and dated April 2015.This SWM facility was provided an MOE certificate of approval; the approval number is 5576-9ZRPVN and can be found in Appendix D.

3.1 Storm Sewer Sizing

The proposed storm sewer collection system will be sized based on the peak flow of a storm event with a 5-year return period, a runoff coefficient of 0.45 consistent with the City of Cornwall subdivision manual, an initial time of concentration of 20 minutes and a Manning roughness coefficient of 0.013.

The storm sewer network is shown on drawing Fig.3 found in Appendix "A". Storm sewers constructed as part of phase 1 & 2 of the development have been sized with capacity to accommodate the ultimate development, including phases 3 through 10. The storm sewer design sheet and associated storm catchment area drawing completed by WSP Canada Inc. for the phase 1 and 2 development have been included in Appendix D.

Storm laterals will service each property and be installed from the main line sewer to the property boundary. Storm laterals are to be installed with minimum and maximum slopes of 2% and 8% respectively; consistent with provincial standards.

3.2 Erosion & Sediment Control Measures

Silt fencing as per OPSD 219.110 and straw bale flow check dams as per OPSD 219.180 will be installed at the start of construction and will be maintained during the project. Sediment control measures will be removed only once sodding is completed and adequate grass cover has been achieved.

Silt fence will be installed at the bottom of slopes as required to intercept sediment-laden runoff, while straw bale flow check dams will be installed in roadside ditches. It is anticipated that these measures outlined above will provide adequate protection to minimize erosion and sediment transport during construction.

The contractor will be required to monitor the sediment control measures weekly and following any significant storm consisting of 13 mm of precipitation or greater. The contractor will also be responsible to repair the sediment control measures as required to ensure their proper operation.

4. Schedule

This servicing and stormwater management report is prepared in support of the Draft Plan application for phases 3 through 10 of the Northwoods Forest Development. The Owner intends to proceed with the construction of phase 3 of the Northwoods Forest Subdivision as soon as a subdivision agreement is finalized with the City and once all other approvals are in place.

Respectfully submitted,
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