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Date: June 2nd, 2025
Updated: August 15th, 2025
File: 1509-49

Attention: Ms. Mandy Jones, MCIP, RPP
Manager, Development Services and Approving Officer

Reference: Chief Lake Landing – 4922 Chief Lake Road
RZ100735 – Supplementary Servicing Letter

Dear Mandy,

On behalf of Kidd Real Estate Holdings Ltd., L&M Engineering Ltd. is pleased to submit this Supplementary Servicing Letter to the Scouten Engineering Site Servicing Brief that was completed for 4922 Chief Lake Road. The Site Servicing Brief was originally submitted on May 30th, 2023, in support of the rezoning application RZ100735. Refer to Exhibit 1.



Exhibit 1: Subject Site

Following the Servicing Brief submission, a density restricting covenant was removed from the rezoning application. This letter is being written to supplement the Site Servicing Brief and summarize the impacts the proposed changes will have on the Servicing Brief recommendations.

1.0 SITE INFORMATION

The Subject Site is approximately 4.0 ha in size and is entirely located within the municipal boundaries of the City of Prince George. The developer is proposing to rezone the property to RM1: Multiple Residential to facilitate the development of single-family dwellings, duplexes, and row housing.

2.0 ZONING CHANGES

The original Servicing Brief assumed that a covenant was to be placed on the parcel with the following two components:

- Following the OCPS's density guidelines of 22 dwelling units per hectare and constructing 88 dwelling units on the property.
- Restricting the percentage of row housing and duplex units to 20% each.

Since the original submission, the covenant was removed from the zoning application. The removal of the proposed covenant is to accommodate the provincial government's new housing initiative referred to as "Small-scale, multi-unit housing." The development now intends to use the standard RM1 zone density of 30 dwellings per hectare and construct 120 multi-family housing dwelling units on the property.

3.0 DESIGN POPULATION

The revised design population of the site is calculated as follows:

- The subject property area is 4.0ha;
- The maximum density (RM1) is 30 dwellings/ha;
- Using a factor of 3.0 people/dwelling (Hart/North Nechako – CoPG Design Guidelines – Table 2.10.1) yields a maximum population of **360** people.

The design population used in the original Servicing Brief completed by Scouten was 326 people, therefore this letter will reflect an increase of 34 people.

4.0 STORMWATER INFRASTRUCTURE

The original Servicing Brief prepared by Scouten Engineering modelled the site as a medium-density residential development. Given that the RM1 zoning classification falls within the low to medium density range, the original modelling remains consistent with the proposed land use under the current rezoning application. As a result, the capacity analysis and design recommendations presented in the original report remain applicable and should continue to inform the detailed design of this property.

As noted in the Scouten Servicing Brief, the 8700 Sparwood Road property naturally drains across the subject property, and it should be assumed that post-development storm flows will continue in this direction. It is recommended that a drainage easement be registered on both properties to allow this drainage to occur. At the detailed design stage, a stormwater management plan should be prepared to outline how flows from 8700 Sparwood Road will be collected and conveyed across 4922 Chief Lake Road.

In the City’s Rezoning Summary Letter Package dated August 1, 2025, the City requested that the pre-development flows for both the subject property and the neighbouring 8700 Sparwood Road property be calculated. The combined 10-year, 24-hour pre-development flow for the two sites is 0.095 m³/s. The onsite storm detention system should be designed to limit post-development flows to this same rate. The HydroCAD modelling report used to determine this flow is enclosed with this letter.

5.0 SANITARY INFRASTRUCTURE

The original report by Scouten Engineering estimated the peak sanitary flow for the development at 10.7 L/s, calculated using the methodology outlined in the City of Prince George’s Design Guidelines. However, it should be noted that a typographical error exists in the City’s guideline for the ‘Harmon Peaking Factor’ equation (Section 4.2.2.5), and this error was carried through in the original report’s calculations. By applying the corrected Harmon Peaking Factor and an updated design population, the revised peak sanitary flow is estimated at 6.9 L/s. Refer to Table 1 for details.

Table 1: Estimated Sewage Design Flow			
Variable	Result		Notes
Population	360	people	
Domestic Avg Daily per Capita	380	l/d	Refer to Section 4.2.2.6 CoPG Design Guidelines
Total Avg. Daily Flow	136800	l/d	= Population * Avg. Flow per Capita
Peak Factor	4.04		Harman Equation
Total Peak Design Flow (Qs)	552672	l/d	=Total Avg. Daily Design Flow * Peak Factor

Total Peak Design Flow (Qs)	6.4	l/s	=Total Avg. Daily Design Flow * Peak Factor
Infiltration and Inflow			
Development Area	4	ha	
Infiltration Rate	11200	l/ha/d	Refer to section 4.2.2.4 (11,200 L/ha)
Infiltration (Qi)	44800	l/d	= Development Area x Infiltration Rate
Infiltration (Qi)	0.5	l/s	= Development Area x Infiltration Rate
Total Design Flow (Qs + Qi)	597472	l/d	(Qs + Qi)
Total Design Flow (Qs + Qi)	6.9	l/s	(Qs + Qi)

As the revised design flow is lower than the value presented in the original Scouten report, the analysis and recommendations provided in that report remain valid and applicable.

6.0 WATER INFRASTRUCTURE

The original report by Scouten Engineering included water modelling conducted by the City of Prince George. The water modelling concluded that the available fire flow for the subject development is 223 L/s. The City’s Design Guidelines state the fire flow requirement for Apartments/Townhouses is 125 L/s. The modelling also indicates that the Peak Hour Demand (PHD) pressure at the site is 56 psi, which is above the City’s desirable minimum pressure of 50 psi.

The increase in design population from 326 people to 360 people will have minimal impact on the operation of the proposed water system. The available fire flow and PHD pressure will remain above the City’s recommended minimums. As such the analysis and recommendations outlined in Scouten’s report remain applicable.

Since the lot is planned to be privately owned, the development would require an onsite backflow preventer and water meter. The onsite layout and backflow preventer/water meter should be determined at the detailed design stage.

7.0 EMERGENCY ACCESS

Currently, a gravel access road runs across both 8700 Sparwood Road and 4922 Chief Lake Road, connecting Sparwood Road to Chief Lake Road. It is recommended to maintain emergency access between the two properties once either is developed. A cross-access easement should be registered on both properties during the development stage.

8.0 SUMMARY

In summary, all of the recommendations for sanitary, storm and water infrastructure outlined in Scouten’s report remain valid and applicable. These recommendations should be used to inform future detailed design.

Sincerely,

L&M ENGINEERING LIMITED

Prepared by:

A handwritten signature in black ink, appearing to read 'T. Fjellstrom', with a horizontal line extending to the right.

Tanner Fjellstrom, P.Eng.
Associate

Storm Detention

Prepared by {enter your company name here}
 HydroCAD® 10.00-26 s/n 03054 © 2020 HydroCAD Software Solutions LLC

Pre-Development 10 Year
 CPG24-hr Hyetogr 10yr (2017) Rainfall=44 mm
 Printed 2025-08-15
 Page 1

Summary for Subcatchment 1S: Pre-Development

Runoff = 0.0947 m³/s @ 8.79 hrs, Volume= 0.866 MI, Depth= 13 mm

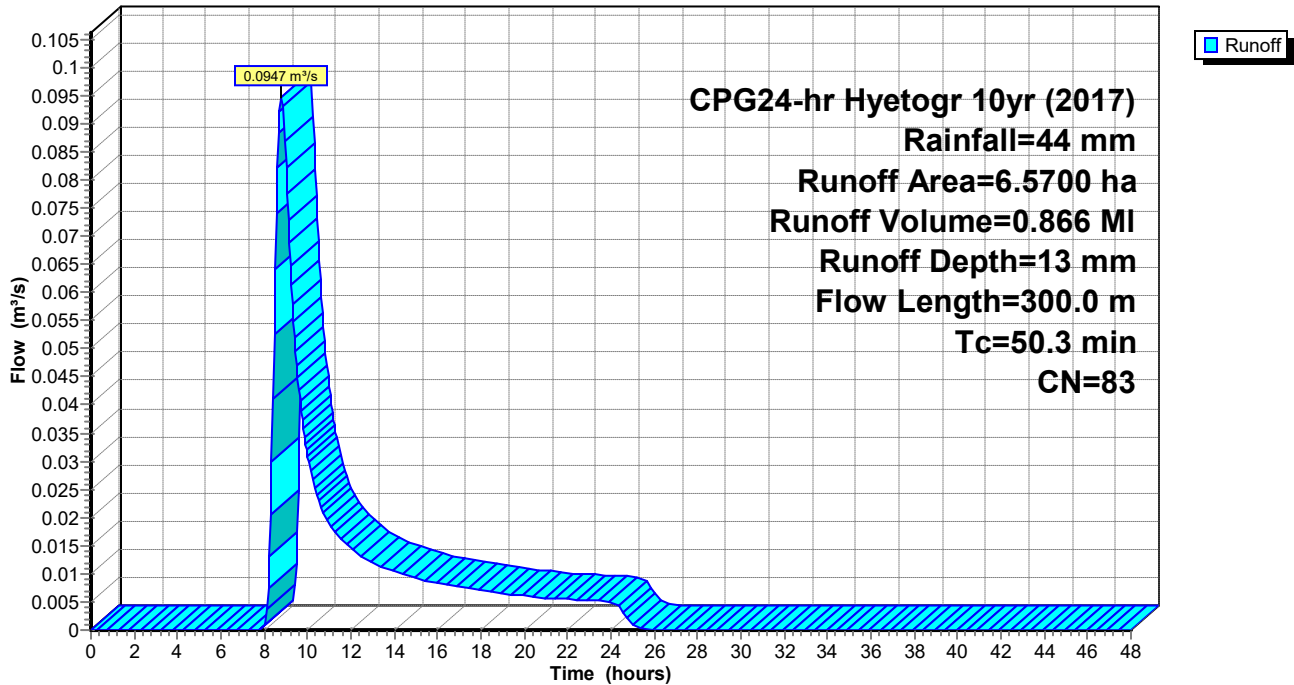
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 CPG24-hr Hyetogr 10yr (2017) Rainfall=44 mm

Area (ha)	CN	Description
6.5700	83	Woods, Poor, HSG D
6.5700		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
43.9	50.0	0.0300	0.02		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 31 mm
6.4	250.0	0.0200	0.65		Shallow Concentrated Flow, Grassed Waterway Kv= 4.57 m/s
50.3	300.0	Total			

Subcatchment 1S: Pre-Development

Hydrograph



CHIEF LAKE LANDING
4922 CHIEF LAKE ROAD

Site Servicing Brief

Kidd Group of Companies

File No. 1529-01

May 30th, 2023

Thinking beyond.



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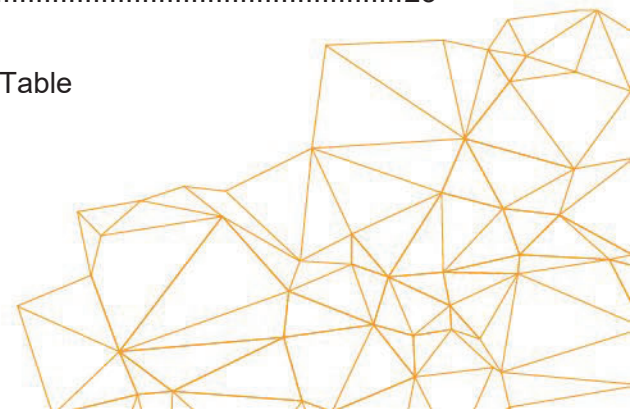
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APPENDIX C: Water Modeling Report

APPENDIX D: Standard Details



1.0 INTRODUCTION

The Kidd Group has applied to Rezone the property located at 4922 Chief Lake Road, Prince George, BC. The current zoning of the lot is RS1m: Suburban Residential. The Property Owner, Kidd Real Estate Holdings Ltd., would like to re-zone the lot to RM1: Multiple Residential as a Bare Land Strata.

- PID: 012-009-008
- Legal Description: LT 2 DL 2424 PL 33278

As part of the Re-zoning process a site servicing brief for the development has been requested prior to the Final Reading before City Council. This document has been prepared to provide information on the anticipated stormwater runoff, sanitary sewer demand, water demand, and snow storage requirements for the new development.

Figure 1: Proposed Rezoning Plan



2.0 REFERENCES

- a) Geotechnical Investigation Report – Proposed Subdivision, CSR Consulting Group, Project ID: G21-004-04 (July 19th, 2022)
- b) City of Prince George Development Services Department, Design Guidelines Draft July 2001
- c) Design Guideline manual, Master Municipal Construction Document
- d) Environmental ReportingBC: Climate change
<https://www.env.gov.bc.ca/soe/indicators/climate-change/precip.html>
- e) Fire Underwriters Survey - Water Supply for Public Fire Protection 1999
- f) NFPA-1, Fire Code
- g) Handbook of Steel Drainage & Highway Construction Products, Corrugated Steel Pipe Institute (Canadian Edition)
- h) City of Prince George Staff Report to Council “Rezoning Amendment Application No. RZ100735 (Bylaw No. 9283) dated October 26th, 2022.

3.0 EXISTING CONDITIONS

4922 Chief Lake Road is a 4.02 ha lot located on the North end of Prince George, in The Hart area of the City at Lat: 54.0096° N, Lon: 122.9096° W.

The Lot is accessible through a panhandle off Chief Lake Road including a minimal frontage length of 20 m. The property is surrounded by Low Density Residential Properties to the North, East and South. The Western property line abuts another undeveloped lot, accessible off Sparwood Road, also owned by the Kidd Group.

The existing subsurface conditions generally consisted of fill, overlying firm to stiff sandy silt, overlying very stiff till-like soils, see CRS’s Geotechnical Report, reference a), for further details.

The site has a natural 2.5% slope, grading down from the Northwest to the Southeast.

The property was cleared and grubbed in late 2019 and has remained free of organic growth.

Storm water runoff in the area is conveyed by a system of overland ditching. No existing underground storm system or service connection in the area currently exists.

The City of Prince George Records show a 450 mm water main on Chief Lake Road as well as 350 mm and 150 mm mains on Sparwood Rd. No water service connection is currently provided to the lot.

The City of Prince George records show a 300 mm sanitary sewer main on Chief Lake Road to the South of the Property. No sanitary service connection is currently provided to the lot.

4.0 PROPOSED DEVELOPMENT DESIGN CONSIDERATIONS

The Chief Lake Landing development is planned to have up to 22 residential units per hectare. In accordance with proposed covenant on the property (see recommendations given in reference h) a maximum of 20% of the units can be four-unit row houses and a maximum of 20% of the units can be duplexes. The remainder of the units are to be single family homes and may contain secondary suites.

Lot Area:	4.02 ha
Total Units:	88 units
Row Houses:	18 units
Duplexes:	18 units
Single Family Homes with secondary suite:	52 units
Estimated People/household:	3 people
Estimated additional People/secondary suite:	1.2 people
Development Total Population:	326 people

5.0 STORMWATER DESIGN SUMMARY AND ASSUMPTIONS

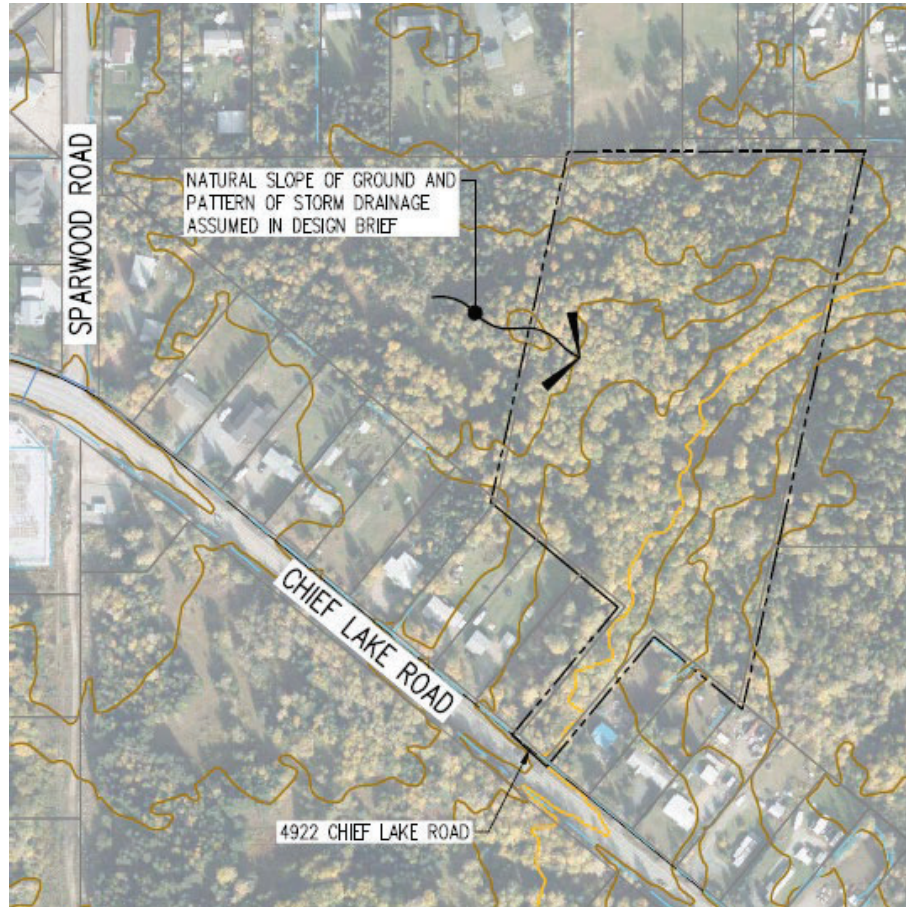
We recommend the stormwater runoff from the development during 1:10 storm events and less be captured in an onsite detention pond and discharged at a reduced rate (50% of the post development 1:2 storm event flow) to the existing overland ditching system on Chief Lake Road in accordance with City of Prince George development guidelines.

Observations of subsurface ground conditions show that there is poor water infiltration and drainage at the Site. Therefore, infiltration into the ground should not be considered when determining the required volume for the detention pond.

Onsite stormwater conveyance systems should be sized to accommodate 1:10 storm events safely. The development of the site will need to consider how to effectively manage infrequent storm events and avoid loss of life and injuries and minimize damage to property from 1:100 storm events.

Due to the natural slope of the property and adjacent property (8700 Sparwood Rd) the storm water design should consider that the Sparwood property will be required to drain through the Chief Lake Rd property. See Figure 2 below.

FIGURE 2: Storm Drainage Key Plan



The downstream infrastructure of the development has been reviewed from the development to the existing 900 mm diameter concrete pipe crossing the highway near Estavilla Drive. The culvert discharges to natural drainage patterns beyond that point.

5.1 METEOROLOGICAL DATA

Intensity Duration Frequency (IDF) Data for the site has been obtained from Environment and Climate Change Canada Prince George Airport Auto BC Station 1096453 2022/10/31. See Appendix A for Climatic Data.

IDF	Prince George Airport					
	2	5	10	25	50	100
A	10.4	14.2	16.7	19.8	22.2	24.5
B	-0.705	-0.734	-0.746	-0.757	-0.763	-0.768

Minor System Design Return Period: 10 years
(Recommended by the City of Prince George Engineering Department)

Major System Design Return Period: 100 year
(Reference b) Section 5.5.2.1)

Sub-Boreal Interior Average Precipitation change due to Climate Change (reference c):
14% Increase.

5.1.1 RAINFALL INTENSITY

Rainfall intensity is derived from the following formula.

$$R = (A \bullet T^B) \bullet C_C$$

R: Rainfall Intensity (mm/h)

A: Intensity Duration Frequency Coefficient

T: Rainfall Duration (h)

B: Intensity Duration Frequency Exponent

C_C: Climate Change Precipitation Increase (14% Increase)

5.1.2 ONSITE RUNOFF COEFFICIENT

Land Use	Coefficient	
	≤ 1:10	1:100
RM – Medium Density	0.55	0.66
Adjustment Factor (Sandy-Silty soil with < 5% grade)	0.95	

5.2 POST-DEVELOPMENT ONSITE RELEASE RATES

$$Q = (R \bullet A \bullet I) / 360$$

Q: Flow (m³/s)

R: Runoff Coefficient

A: Area (4922 Chief Lake Rd & 8700 Sparwood Rd) 6.59 ha

I: Rainfall Intensity ((A • T^B) • C_C)

Q₁₀ = Time of Concentration (0.4 h) 0.36 m³/s

Q₁₀₀ = Time of Concentration (0.3 h) 0.81 m³/s

Q₂ = Time of Concentration (0.4 h) 0.22 m³/s

Q_{REL} = 50% of Q₂ 0.11 m³/s

5.3 STORMWATER SERVICE CONNECTION SIZING

The stormwater runoff from the site will discharge via overland ditch to the existing ditch on Chief Lake Road.

Ditch with the following dimensions can support the estimated post development release rates.

Ditch size determined using Manning's formula.

$$Q = (A^{5/3} / WP^{2/3} \bullet S^{0.5}) / n$$

Ditch Bottom Width:	0.6 m
Ditch Side Slope:	2 H : 1 V
Ditch Depth:	0.6 m
S: Slope (m/m)	0.01
n: Manning's Roughness Coefficient	0.03
Q ₁₀ = Flow Depth	0.35 m
Q ₁₀₀ = Flow Depth	0.50 m
Q _{REL} = Flow Depth	0.19 m

5.4 STORMWATER DETENTION POND SIZING

Storm Event	1:10
Time of Concentration (min):	19
Rainfall Intensity:	44.9 mm/hr
Peak Flow:	0.43 m ³ /sec
Release Rate:	0.11 m ³ /sec
Storage Required for 1:10 Stormwater Event:	365 m³

5.5 DOWNSTREAM INFRASTRUCTURE REVIEW

Scouten Engineering has reviewed the implications of the post development flows on the existing down stream infrastructure. Infrastructure assets reviewed include the following items:

- The existing ditch along Chief Lake Road from the proposed development to the intersection at HWY 97N and Chief Lake Road (See Node 1 to Node 2 on the Catchment Area Maps in Appendix A).
- The existing ditch from the intersection at HWY 97N and Chief Lake Road to the existing culvert inlet near Estavilla Drive (See Node 2 to Node 3 on the Catchment Area Maps in Appendix A).

- The existing pipe crossing the Highway which discharges to the natural drainage to the North of Estavilla Drive.

5.5.1 NODE 1 DITCH CAPACITY

Required Flow

$$Q = (R \bullet A \bullet I) / 360$$

Event	Runoff Coefficient	Area (ha)	Time of Concentration (hours)	Rainfall Intensity (mm/hr)	Flow (m ³ /s)
Pre-Development 1:100	0.45	15.61	0.7	36.73	0.72
Post-Development 1:100	0.60		0.6	41.35	1.07

See MAP-1.1 in Appendix A for Catchment Area Maps and Composite Runoff Coefficient.

Ditch capacity determined using Manning's formula.

$$Q = (A^{5/3} / WP^{2/3} \bullet S^{0.5}) / n$$

A = Area 2.16 m²

WP = Wetted Perimeter 5.61 m

S = Slope (m/m) 0.013

n = Manning's *n* for Natural Channels 0.05

Q = Flow 2.61 m/s³

The existing ditch capacity is greater than the post-development 1:100 event flow.

5.5.2 NODE 2 DITCH CAPACITY

Required Flow

$$Q = (R \bullet A \bullet I) / 360$$

Event	Runoff Coefficient	Area (ha)	Time of Concentration (hours)	Rainfall Intensity (mm/hr)	Flow (m ³ /s)
Pre-Development 1:100	0.47	20.29	1	27.93	0.74
Post-Development 1:100	0.58		1	27.93	0.92

See MAP-1.2 in Appendix A for Catchment Area Maps and Composite Runoff Coefficient.

Ditch capacity determined using Manning's formula.

$$Q = (A^{5/3} / WP^{2/3} \bullet S^{0.5}) / n$$

A = Area	1.85 m ²
WP = Wetted Perimeter	6.21 m
S = Slope (m/m)	0.004
n = Manning's n for Natural Channels	0.05
Q = Flow	1.04 m/s ³

The existing ditch capacity is greater than the post-development 1:100 event flow.

5.5.3 NODE 3 DITCH CAPACITY

Required Flow

$$Q = (R \bullet A \bullet I) / 360$$

Event	Runoff Coefficient	Area (ha)	Time of Concentration (hours)	Rainfall Intensity (mm/hr)	Flow (m ³ /s)
Pre-Development 1:100	0.53	30.34	1.2	24.28	1.08
Post-Development 1:100	0.60		1.2	24.28	1.23

See MAP-1.3 in Appendix A for Catchment Area Map and Composite Runoff Coefficient.

Ditch capacity determined using Manning's formula.

$$Q = (A^{5/3} / WP^{2/3} \bullet S^{0.5}) / n$$

A = Area	7.80 m ²
WP = Wetted Perimeter	8.18 m
S = Slope (m/m)	0.010
n = Manning's n for Natural Channels	0.05
Q = Flow	15.11 (m/s ³)

The existing ditch capacity is greater than the post-development 1:100 event flow.

5.5.4 NODE 4 PIPE CAPACITY

Required Flow

$$Q = (R \bullet A \bullet I) / 360$$

Event	Runoff Coefficient	Area (ha)	Time of Concentration (hours)	Rainfall Intensity (mm/hr)	Flow (m ³ /s)
Pre-Development 1:10	0.43	41.34	1.3	15.65	0.78
Pre-Development 1:100	0.52		1.2	24.28	1.45
Post-Development 1:10	0.48		1.3	15.65	0.86
Post-Development 1:100	0.57		1.2	24.28	1.60

See MAP-1.4 in Appendix A for Catchment Area Map and Composite Runoff Coefficient.

The existing pipe that crosses under the highway is a 900 mm diameter concrete pipe.

The pipe's Maximum capacity is achieved at 94% full determined using Manning's formula.

$$Q = A / R^{0.667} \bullet S^{0.5} / n$$

A = Pipe Area @ 94% full	0.62 m ²
R = Hydraulic Radius	0.26 m
S = Slope (m/m) (estimated from LiDAR coverage)	0.01
n = Manning's n for Concrete Pipe	0.013

Q = Flow	1.95 m ³ /s
----------	------------------------

The Existing pipe capacity is greater than the post-development 1:100 event flow.

5.5.4.1 INLET CAPACITY

The inlet capacity of the Existing Pipe is determined using the nomograph Figure 3 provided in reference g) Inlet control Head Water Depth Round CSP & SPCSP. Due to the Difference in roughness between the concrete pipe and a CSP, the nomographs should produce a more conservative result.

Inputs include:

Diameter of Pipe:	900 mm
Discharge Flow 1:10	0.86 m ³ /s
1:100	1.60 m ³ /s
Loss Coefficient (Projecting from Fill)	0.9

1:10 Flow 

HW/D from Nomograph Figure 1 = 0.98

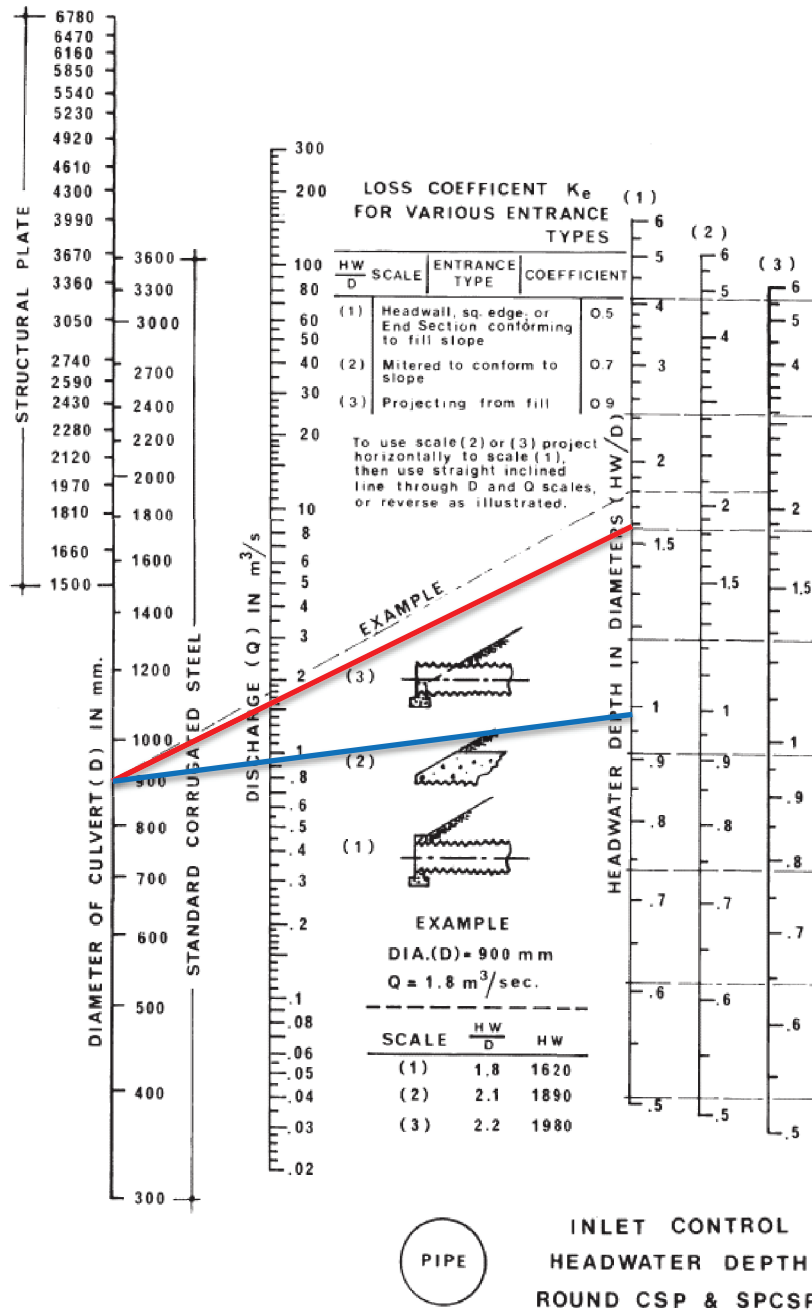
HW: Headwater = 0.88 m

1:100 Flow 

HW/D from Nomograph Figure 1 = 1.60

HW: Headwater = 1.44 m

Figure 3: Headwater depth for round corrugated steel pipe and structural plate corrugated steel pipe under inlet control.



5.5.4.2 OUTLET CONTROL CHECK

The nomograph Figure 4 provided in reference g) will be used to determine if the Headwater levels at the inlet of the pipe are outlet controlled in a 1:100 event. The nomograph allows for the true pipe roughness coefficient to be used to provide representative results.

Inputs include:

Diameter of Pipe:	900 mm
Discharge Flow 1:100	1.60 m ³ /s
Loss Coefficient (Projecting from Fill)	0.9
Manning's n (concrete pipe)	0.013
Pipe Length:	86 m

Pipe Length Adjustment $L' = L \times (n'/n)^2$

L = Actual pipe length	86 m
n' = Actual Manning's n	0.013
n = Manning's n on Nomograph	0.024
L' = Adjusted Pipe Length	25.2 m

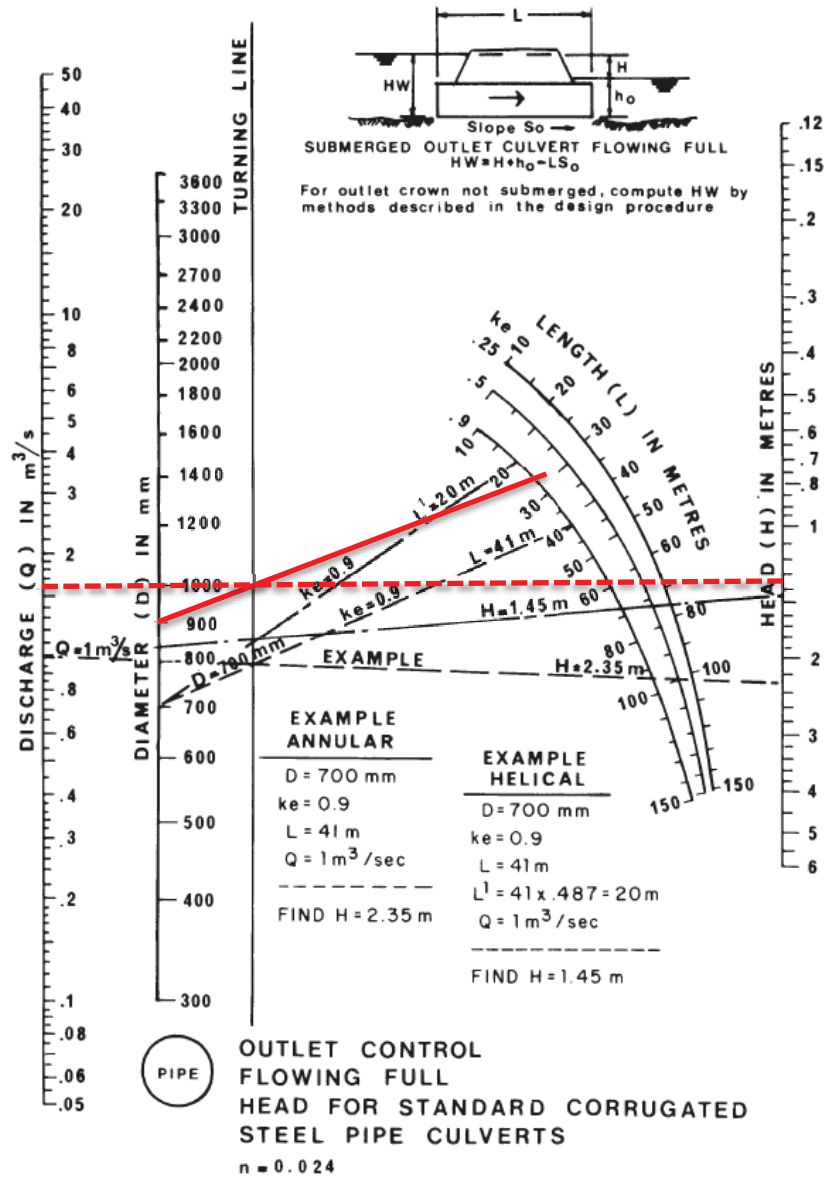
$HW_o = H + h_o - L \bullet S_o$

H = Head from Nomograph (Figure 2)	1.35 m
h_o = Head at outlet $(d_c + D) / 2$	
d_c = Depth of flow in pipe	0.66 m
D = Pipe Diameter	0.90 m
h_o = Head at outlet	0.33 m
L = Pipe length	86 m
S_o = slope (m/m)	0.01
HW_o = Outlet Controlled Headwater Depth =	0.82 m

The Headwater depth controlled by the outlet is less than the headwater depth controlled by the inlet, therefore the Inlet capacity Headwater depth governs.

See MAP-1.4 in Appendix A for head water depths illustrated at the pipe inlet.

Figure 4: Head for round corrugated steel pipe flowing full under outlet control



5.6 STORMWATER OBSERVATIONS

The outlet of the existing concrete pipe that discharges to the North of Estavilla Drive was located in the field. Currently a chain link fence is placed across the pipe opening which has caused a combination of leaves and sediment to back up the pipe to nearly half full, reducing its available capacity. We recommend the City of Prince George have the pipe cleaned out, the fence adjusted and the start of the natural drainage recontoured at no cost to the developer.

5.7 STORMWATER CONCLUSIONS

The stormwater design should consider the flows from the neighbouring property 8700 Sparwood Road due to the natural topography of the land. Stormwater flow from 8700 Sparwood Road has been included in these stormwater calculations.

We recommend a Detention Pond be placed on the development to detain up to 1:10 events and discharge at 50% of the post development 1:2 flow as recommended in the City of Prince George Design Guidelines.

A ditch will be required to connect the proposed development to the existing ditch along Chief Lake Road.

The downstream infrastructure is capable of conveying the additional flow expected from the change from a woodland lot to a Medium Density Residential lot.

We recommend the pipe flowing under the highway to Estavilla Drive be cleaned out by the City of Prince George at no cost to the Developer.

6.0 SANITARY SEWER DESIGN SUMMARY AND ASSUMPTIONS

The Chief Lake Landing development is planned to have a population of up to 326 people. We propose the development be serviced by a new service connection off the existing sanitary sewer main on Chief Lake Road.

The downstream infrastructure has been reviewed from the proposed service connection location at Existing City of Prince George Sanitary Manhole 99 to Sanitary Pump PW 117 at 499 North Nechako Road.

6.1 SANITARY SEWER DESIGN FLOW

Design Population:	326 People	
Domestic Average Daily Flow:	380 l/P/day	[Reference b) Section 4.2.2.6]
Average Daily Flow:	123,880 l/day 1.4 L/sec	
$P_F = 1 + (14 / (4 \bullet P^{0.5}))$		[Reference b) Section 4.2.2.5]
P: Population in thousands		
P_F : Peaking Factor	7.13	
Peak Daily Flow (PDF):	10.2 L/sec	
Ground Infiltration:	11,200 l/ha/day	[Reference b) Section 4.2.2.4]
Infiltration:	44,984 l/day 0.5 L/sec	
Design Flow = PDF + Infiltration	10.7 L/sec	

6.2 SANITARY SEWER SERVICE CONNECTION SIZING

$$Q = (A \bullet R^{0.667} \bullet S^{0.5}) / n$$

Q: Flow (m³/s)

A: Area of Flow within Pipe (m²)

R: Hydraulic Radius (m)

S: Slope (m/m)

n: Manning's roughness coefficient

Proposed Service Connection

Diameter:	200 mm	
Pipe Slope (Estimated):	0.5%	
Manning's n:	0.013	[Reference b) section 5.4.3.1.1]
Pipe Capacity (1/2 Full):	11.6 m ³ /s	(> Design Flow therefore OK)
Velocity @ Design Flow:	0.72 m/s	(Velocity > 0.6 m/s, < 6.0 m/s therefor OK)

6.3 DOWNSTREAM INFRASTRUCTURE REVIEW

Scouten Engineering has reviewed the downstream infrastructure from the proposed service connection location at Existing City of Prince George Sanitary Manhole 99 to Sanitary Pump PW 117 at 499 North Nechako Road.

The proposed 10.7 L/sec design flow has been compared against the Available Flows provided in the City of Prince George Sanitary Sewer study prepared in 2017.

Most of the downstream infrastructure ranges in 20% to 79% additional capacity in the sanitary sewer gravity mains after applying the additional load from the development.

There is one length of pipe located at 6219 Hart Hwy between Sanitary Manholes 448 and 449 that currently has 0.5 L/sec of additional capacity according to the Sanitary Sewer Study. The Additional flow from the development would exceed the capacity of the existing length of sewer main. We suspect this may be an error in the study and is due to mis recorded upstream and downstream invert elevations and recommend the City of Prince George review the sanitary sewer model in this location.

The available flow and total pipe capacity of the 600 mm diameter Sanitary sewer main from Manhole 2220 to Manhole 2287 where the main crosses Highway 97 at 1314 Hart Hwy was not recorded in the 2017 Sanitary Sewer Study. Scouten Engineering has estimated the Total Capacity and Available flow based on an average of upstream and downstream flows.

Refer to Appendix B in this report for Downstream Sanitary Sewer Capacity Tables and Sanitary Sewer Capacity Map MAP-2.

6.4 SANITARY SEWER CONCLUSIONS

A new 200 mm Sanitary Service connection will need to be installed into the sanitary sewer main on Chief Lake Road in accordance with the City of Prince George Subdivision and Servicing Bylaw standard drawings S1 and S4. See Appendix D for Relevant standard drawings. This can be completed by either installing a new Manhole or tying into Manhole 99 at an angle.

We recommend the City of Prince George review the available capacities noted in the 2017 sanitary sewer study for the lengths of sewer main between sanitary manholes 448 and 490, and 2220 and 2287.

7.0 WATER SYSTEM DESIGN SUMMARY AND ASSUMPTIONS

The Chief Lake Landing development is planned to have a population of up to 326 people. We propose the development be serviced by a new service connection off the existing water main on Chief Lake Road. Scouten Engineering has reviewed the Fire Water Demand for the development based on the Fire Underwriters Survey. Below are sizing requirements for the service connection based on the estimated population for the proposed development.

7.1 FIREWATER DEMAND

7.1.1 FIRE FLOW BY FUS

The calculated fire water demand has been developed using Reference e) Fire Underwriter Survey, Water Supply for Public Fire Protection. The calculation has been completed for the worst-case scenario which would be a row house with four 125.4 m² [1,350 sqft] units.

$$F = 220 \bullet C \bullet A^{1/2}$$

F: Required Fire Flow (L/min)

C: Construction Type Coefficient

A: Total Building Floor Area (excluding basements at least 50% Below Grade)

Construction Type:	Woof Frame Construction	
C:	1.5	
A:	502 m ² [5,400 sqft]	
F, to nearest 1,000:	7,000 L/min	
Occupancy Hazard:	Non-Combustible	[Reference e) Part II 2.]
Adjustment Charge:	-25 %	
F _A :	5,250 L/min	
Sprinklered:	No	
Adjustment Charge:	0 %	
F _S : Sprinkler Adjustment:	0 L/min	
Exposure:		
North Side (Street Side):	20 m	+ 15 %
South Side (Back Yard):	4.5 m	+ 20 %
Westside (Fire Wall):	4.5 m	+ 20 %
East Side (End Wall):	4.5 m	+ 20 %
Total Exposure Charge		+ 75 %
F _E : Flow Adjustment:	+ 3,937.5 L/min	
Fire Flow (F _A + F _S + F _E) to the nearest 1,000:	9,000 L/Min [150 L/sec]	

7.1.2 FIRE FLOW BY LAND USE

Land Use:	Single Family Residential	
Required Fire Flow:	60 L/sec	[Reference b) Table 3.2.2]
Land Use:	Apartments / Townhouses	
Required Fire Flow:	125 L/sec	[Reference b) Table 3.2.2]

7.1.3 REQUIRED FIRE FLOW

Fire Flow for the 4-unit row house calculated using the FUS method is the highest recommended fire flow and is therefore the governing flow.

Required Fire Flow: 150 L/sec

The City of Prince George conducted water modelling which showed results of 223 L/sec available fire flow during the MDD; see Appendix C for Water Modelling Report. The available flow exceeds the requirements for the proposed developments.

The current water infrastructure can support the development.

7.2 FIRE HYDRANT REQUIREMENTS

The following statements outline the requirements for Fire Hydrants for this type of Development.

- For the estimated fire flow for the development, the FUS reference e) recommends an average area per hydrant of 12,500 m². For the development of this size a minimum of four hydrants would be required.
- In addition to the coverage area outlined in the FUS reference e) recommends the maximum spacing of hydrants in multi-family residential areas in 90 m and 180 m in single family residential areas.
- The MMCD reference c) section 2.15 recommends hydrants be installed in accordance with the FUS.
- The CoPG Design guidelines reference b) section 3.3.4 refers to the FUS and provides a recommended maximum hydrant spacing of 200 m in single family residential areas and 100 m in multi-family residential areas.
- The NFPA reference f) sections 18.5.2 and 18.5.3 state fire hydrants for one and two-family residential homes shall not be more than 183 m from the closest point on the building and shall not be more than 244 m apart. For any other buildings, fire hydrants shall not be more than 122 m from the closest point on the building and shall not be more than 152 m apart.

There are two fire hydrants within 100 m of the entrance to the development on Chief Lake Road. These fire hydrants are inadequately spaced to service the new development.

During the planning stages of the development, we recommend at least (4) new hydrants be placed within the strata, each servicing an area of approximately 12,500 m². The hydrants should be spaced at 90 m near row houses and 180 m near single and two-family dwellings. The distance from any one- or two-family dwelling to a hydrant should not exceed 183 m and the distance from any row house to a hydrant should not exceed 122 m.

7.3 DOMESTIC WATER DEMAND

The estimated domestic water demand for the development has been derived using the CoPG design guidelines reference b)

Land Use:	Medium Density Residential & Multi Family/Townhouse/Apartment	
Population:	326 People	[Refer to section 4.0]
Domestic Average Daily Flow:	475 l/P/day	[Reference b) Section 3.1.3]
Average Daily Demand (ADD)		
ADD:	1.8 L/sec	
Maximum daily demand (MMD)		
MDD Peaking factor:	2.5	[Reference b) Section 3.1.4]
MDD:	4.5 L/sec	
Peak Hour Demand (PHD)		
PHD Peaking Factor	4.25	[Reference b) Section 3.1.4]
PHD	7.6 L/sec	

7.4 WATER SERVICE CONNECTION SIZING

Currently no service connection is provided to the proposed lot.

A 300 mm diameter service connection will be required to supply the ultimate design flow up to 154.5 L/sec (Fire flow + MDD) at 2.2 m/s.

The CoPG Design Guidelines (reference b) section 3.2.2.8 recommend the velocity of flow shall not exceed 2 metres/second for ultimate design flows. The MMCD (reference c) Section 2.8 recommends the maximum allowable design velocity under fire flow conditions should be 3.5 m/s. Although the velocities within the pipe may exceed the City of Prince George Guidelines, the proposed velocities are still within acceptable engineering standards.

The approximate elevation difference from Modeling Node to furthest point, approximately 410 m away in the system is 4.8 m. Available pressure at the Modeling Node during Peak Hour Demand is 56 psi.

The maximum allowable pressure loss to maintain 20 psi during fire flow events is 36 psi. The estimated Head loss within the water distribution system is 16 psi, therefore acceptable.

7.5 WATER SERVICE CONCLUSIONS

We recommend installing a 300 mm service connection off of Chief Lake Road complete with a thrust blocks and a gate valve accordance with the City of Prince George Subdivision and Servicing Bylaw standard drawings W1 and W3. See Appendix D for relevant standard details.

8.0 SNOW STORAGE

The Zoning Bylaw allows for 45% site coverage for RM1: Multiple Residential lots, 18,000 m². Approximately 10,500 m² of the allowable site coverage will be covered in building footprint. Remaining area expected to require snow clearing is 7,500 m².

Climate Station:	PRINCE GEORGE 15NW
Station Location:	Lat: 54°02'60" N Lon: 122°42'34"
Distance from Site:	8,150 m
1981 to 2010 Climate Normal Annual Snowfall:	2.34 m
Area to be cleared:	7,500 m ²
Annual Snow Volume:	17,550 m ³
Compacted Volume (7:1)	2,507 m ³

Required Storage Area Based on 3 m high pile w/ 1:1 side slope: 1024 m²

During the site development stage 1,024 m² area should be dedicated for snow storage.

9.0 SITE ACCESS AND LIGHTING

L&M Engineering Ltd has completed a traffic Impact Study for the development issued on January 23rd, 2023. The study indicates that the site's main access will be a full movement access directly onto Chief Lake Road.

The site should also have a secondary emergency access. The developer has stated that a secondary access could be installed through the neighbouring property to the west and access Sparwood Road. This would require a cross-access agreement across the neighbouring property, which the developer also owns.

During the Scope development meeting with the City of Prince George, the staff requested a review of the available lighting in the area. An existing Lease light resides

on the pole at the proposed entrance to the development on Chief Lake Road. No additional lighting along chief lake road should be required for this access.

10.0 CONCLUSIONS

10.1 STORMWATER

We recommend a storm water Detention Pond be installed within the development designed to discharge at a rate of 50% of a 1:2 storm event as suggested in the City of Prince George Design Guidelines. A new ditch connection will need to be installed to convey runoff water from the proposed stormwater pond to the existing ditch along Chief Lake Road.

The existing downstream infrastructure can support the new development.

We recommend the City of Prince George complete maintenance on the existing 900 mm diameter pipe that runs under the highway and discharges to the drainage to the North of Estavilla Drive at no cost to the developer. Maintenance to the pipe should include:

- Cleaning out the build up of sediment within the pipe,
- Adjusting the chain link fence at the outlet to allow for unrestricted flow,
- Recontour the outlet to remove the buildup of sediment at the outlet.

10.2 SANITARY SEWER

A new sanitary connection will be required for the development tying into the existing sanitary sewer main on Chief Lake Road.

The existing Sanitary Sewer downstream infrastructure appears to be capable of handling the additional flow from the development except one length of pipe located at 6219 Hart Hwy between Sanitary Manholes 448 and 449 that currently has 0.5 L/sec of additional capacity according to the Sanitary Sewer Study.

In addition the available flow and total pipe capacity of the 600 mm diameter Sanitary sewer main from Manhole 2220 to Manhole 2287 where the main crosses Highway 97 at 1314 Hart Hwy was not recorded in the 2017 Sanitary Sewer Study.

We recommend the City of Prince George review the available capacities noted in the 2017 sanitary sewer study for the lengths of sewer main between sanitary manholes 448 and 490, and 2220 and 2287.

10.3 WATER

A new water connection will be required for the development tying into the existing water main on Chief Lake Road.

Water modelling was completed by the City of Prince George and determined the existing capacity can support the new development.

The existing city infrastructure is capable of providing fire flows in excess of the amounts calculated by the FUS method.

10.4 SITE ACCESS

The site will be accessed off Chief Lake Road. An additional emergency access will be required through the 8700 Sparwood property as recommended in the L&M Traffic Impact Study.

Prepared by:



SCOUTEN ENGINEERING

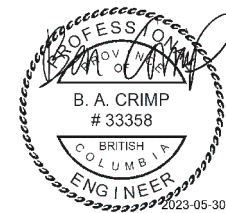
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EGBC Permit to Practice

Number: 1000556

APPENDIX A: CLIMATE DATA & CATCHMENT AREA MAPS



Environment and Climate Change Canada
 Environnement et Changement climatique Canada

Short Duration Rainfall Intensity-Duration-Frequency Data
 Données sur l'intensité, la durée et la fréquence des chutes
 de pluie de courte durée

Gumbel - Method of moments/Méthode des moments

2022/10/31

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=====
PRINCE GEORGE AIRPORT AUTO                BC        1096453
Latitude: 53 53'N   Longitude: 122 40'W   Elevation/Altitude: 680      m
Years/Années : 1960 - 2021                # Years/Années :      53
=====
```

Table 1 : Annual Maximum (mm)/Maximum annuel (mm)

Year Année	5 min	10 min	15 min	30 min	1 h	2 h	6 h	12 h	24 h
1960	4.6	7.4	8.1	9.7	9.9	13.2	32.5	37.3	39.6
1961	5.1	5.3	5.3	5.3	5.8	9.9	20.1	21.8	26.4
1962	4.1	5.1	5.8	5.8	8.9	13.7	28.7	37.8	39.6
1963	4.3	5.8	7.4	11.7	20.1	27.4	29.7	32.3	32.5
1964	8.4	8.4	8.6	10.2	11.4	12.2	21.8	29.0	42.7
1965	15.2	17.0	19.0	22.9	24.9	31.7	41.1	47.0	47.8
1966	4.1	4.3	5.3	7.4	7.4	11.4	14.2	17.5	27.9
1967	3.8	4.8	6.3	6.3	6.9	11.2	16.3	20.6	25.9
1968	2.0	3.0	4.6	4.6	7.4	9.4	15.2	18.5	25.1
1969	10.7	10.9	10.9	10.9	10.9	10.9	15.5	17.0	27.2
1970	7.1	14.2	17.5	19.0	19.0	19.3	24.1	25.9	27.9
1971	2.0	3.8	4.1	4.8	7.4	9.1	17.3	22.4	35.1
1972	6.9	11.9	14.0	17.0	18.8	19.0	20.3	21.8	38.1
1973	8.6	10.9	15.2	17.5	21.6	21.8	22.9	23.1	24.6
1974	4.6	6.3	6.3	7.9	9.9	13.0	19.8	23.6	26.9
1975	3.6	4.3	5.1	6.3	6.3	8.9	13.5	17.3	18.5
1976	4.3	4.8	5.3	5.6	7.1	10.2	15.7	21.3	28.7
1977	4.3	6.1	7.1	8.6	10.4	11.4	13.7	15.0	26.7
1978	4.0	5.8	5.8	5.8	6.1	8.1	10.4	13.5	19.4
1979	3.2	5.6	6.9	9.1	12.7	15.3	19.1	22.3	23.6
1980	6.2	6.7	7.0	9.2	9.5	9.7	13.2	22.8	30.1
1981	5.2	6.2	6.6	8.0	10.8	15.5	18.4	24.7	25.7
1982	6.4	9.0	9.0	9.2	11.7	14.3	23.5	39.6	47.7
1983	11.8	13.6	14.9	16.7	21.5	27.5	31.3	31.3	31.3
1984	2.3	4.1	4.6	5.1	7.3	11.8	21.3	23.2	38.8
1985	3.3	4.0	4.5	5.0	6.2	10.4	15.3	18.4	21.0
1986	4.4	5.5	6.4	6.4	6.4	8.2	13.0	16.5	23.0
1987	3.4	4.2	4.6	4.7	6.8	8.0	12.5	19.2	24.2
1988	3.5	5.2	5.8	6.0	9.5	11.4	13.3	18.4	24.8
1989	4.5	6.2	9.3	12.4	14.8	15.3	15.7	20.0	24.2
1990	3.3	4.1	4.8	7.3	12.6	13.6	15.9	22.9	28.8
1991	9.6	12.4	14.0	15.4	15.4	15.4	15.4	17.4	19.4
1992	3.9	6.0	8.7	10.6	10.7	10.8	17.7	19.6	27.7
1993	4.4	6.2	6.2	7.3	9.6	11.0	15.6	19.2	30.3
1994	2.5	3.3	4.6	6.5	9.0	12.7	13.3	22.2	28.2
1995	6.5	9.9	14.6	16.7	16.9	17.1	17.5	17.7	17.9
1996	5.5	6.5	7.0	7.7	10.1	11.6	13.0	-99.9	24.8
1997	4.4	5.6	6.8	8.5	11.6	12.9	20.3	21.6	23.2
1998	5.7	9.8	12.8	14.1	14.1	14.1	-99.9	-99.9	-99.9
1999	4.2	4.8	5.5	6.8	8.7	12.4	23.6	25.5	27.8
2000	4.0	6.9	7.7	7.7	8.1	8.7	17.5	27.0	44.5
2001	3.5	4.8	6.3	7.2	7.4	8.0	14.6	18.8	28.9
2002	4.4	6.4	8.7	9.7	11.0	11.7	18.2	19.2	28.6
2010	4.8	6.8	7.4	9.2	9.2	11.6	20.2	20.6	29.2

2011	2.8	4.4	4.8	5.0	5.8	9.6	14.6	22.0	30.2
2012	7.4	10.2	10.8	11.8	13.2	17.4	18.2	21.8	30.8
2013	3.6	5.6	6.4	6.8	9.6	10.4	15.2	19.2	23.8
2014	5.0	6.0	7.0	8.2	9.2	9.4	13.2	16.2	16.6
2015	8.4	8.8	9.2	9.8	12.4	13.2	17.8	21.2	29.6
2016	3.8	6.0	7.4	8.6	8.8	9.2	13.4	21.2	37.0
2017	4.8	6.8	8.2	9.4	9.8	9.8	14.6	14.8	19.0
2018	3.8	4.8	6.6	8.6	9.6	10.4	18.4	25.8	30.6
2019	6.2	8.6	8.6	10.0	10.0	10.6	16.8	18.0	22.0
2020	2.4	4.0	4.6	5.8	9.0	13.2	18.4	23.0	30.0
2021	4.4	5.6	6.0	7.2	7.2	9.0	13.8	13.8	17.0

# Yrs.	55	55	55	55	55	55	54	53	54
Années									
Mean	5.1	6.8	7.9	9.2	10.8	13.0	18.3	22.4	28.5
Moyenne									
Std. Dev.	2.5	3.0	3.5	4.0	4.4	4.9	5.8	6.6	7.4
Écart-type									
Skew.	1.90	1.48	1.51	1.46	1.44	2.11	1.85	1.77	0.85
Dissymétrie									
Kurtosis	7.61	5.13	4.83	5.03	4.81	7.98	7.28	6.78	3.73

*-99.9 Indicates Missing Data/Données manquantes

Warning: annual maximum amount greater than 100-yr return period amount
 Avertissement : la quantité maximale annuelle excède la quantité
 pour une période de retour de 100 ans

Year/Année	Duration/Durée	Data/Données	100-yr/ans
1965	5 min	15.2	13.0
1965	10 min	17.0	16.1
1965	15 min	19.0	18.9
1965	30 min	22.9	21.8
1965	1 h	24.9	24.6
1965	2 h	31.7	28.3
1965	6 h	41.1	36.3
1965	12 h	47.0	43.1

Table 2a : Return Period Rainfall Amounts (mm)
 Quantité de pluie (mm) par période de retour

Duration/Durée	2	5	10	25	50	100	#Years
	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	Années
5 min	4.7	6.9	8.4	10.2	11.6	13.0	55
10 min	6.3	8.9	10.7	12.9	14.5	16.1	55
15 min	7.4	10.4	12.5	15.1	17.0	18.9	55
30 min	8.5	12.1	14.4	17.4	19.6	21.8	55
1 h	10.1	14.0	16.6	19.8	22.2	24.6	55
2 h	12.2	16.5	19.4	23.0	25.7	28.3	55
6 h	17.3	22.4	25.8	30.0	33.2	36.3	54
12 h	21.3	27.2	31.0	35.9	39.5	43.1	53
24 h	27.3	33.8	38.1	43.6	47.6	51.6	54

Table 2b :

Return Period Rainfall Rates (mm/h) - 95% Confidence limits
 Intensité de la pluie (mm/h) par période de retour - Limites de confiance de 95%

Duration/Durée	2	5	10	25	50	100	#Years
	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	Années
5 min	56.4	82.9	100.5	122.7	139.2	155.5	55
	+/- 7.3	+/- 12.3	+/- 16.6	+/- 22.3	+/- 26.7	+/- 31.1	55
10 min	38.0	53.7	64.1	77.2	86.9	96.6	55
	+/- 4.3	+/- 7.3	+/- 9.8	+/- 13.2	+/- 15.8	+/- 18.4	55
15 min	29.4	41.8	50.0	60.3	68.0	75.6	55
	+/- 3.4	+/- 5.7	+/- 7.7	+/- 10.4	+/- 12.5	+/- 14.5	55

30 min	17.0	24.2	28.9	34.8	39.3	43.6	55
1 h	+/- 2.0 +/-	3.3 +/-	4.4 +/-	6.0 +/-	7.2 +/-	8.4	55
2 h	+/- 1.1 +/-	1.8 +/-	2.4 +/-	3.3 +/-	3.9 +/-	4.6	55
6 h	+/- 0.6 +/-	1.0 +/-	1.4 +/-	1.8 +/-	2.2 +/-	2.5	55
12 h	+/- 0.2 +/-	0.4 +/-	0.5 +/-	0.7 +/-	0.9 +/-	1.0	54
24 h	+/- 0.1 +/-	0.2 +/-	0.3 +/-	0.4 +/-	0.5 +/-	0.6	53
	+/- 0.1 +/-	0.1 +/-	0.2 +/-	0.2 +/-	0.3 +/-	0.3	54

Table 3 : Interpolation Equation / Équation d'interpolation: $R = A \cdot T^B$

R = Interpolated Rainfall rate (mm/h)/Intensité interpolée de la pluie (mm/h)

RR = Rainfall rate (mm/h) / Intensité de la pluie (mm/h)

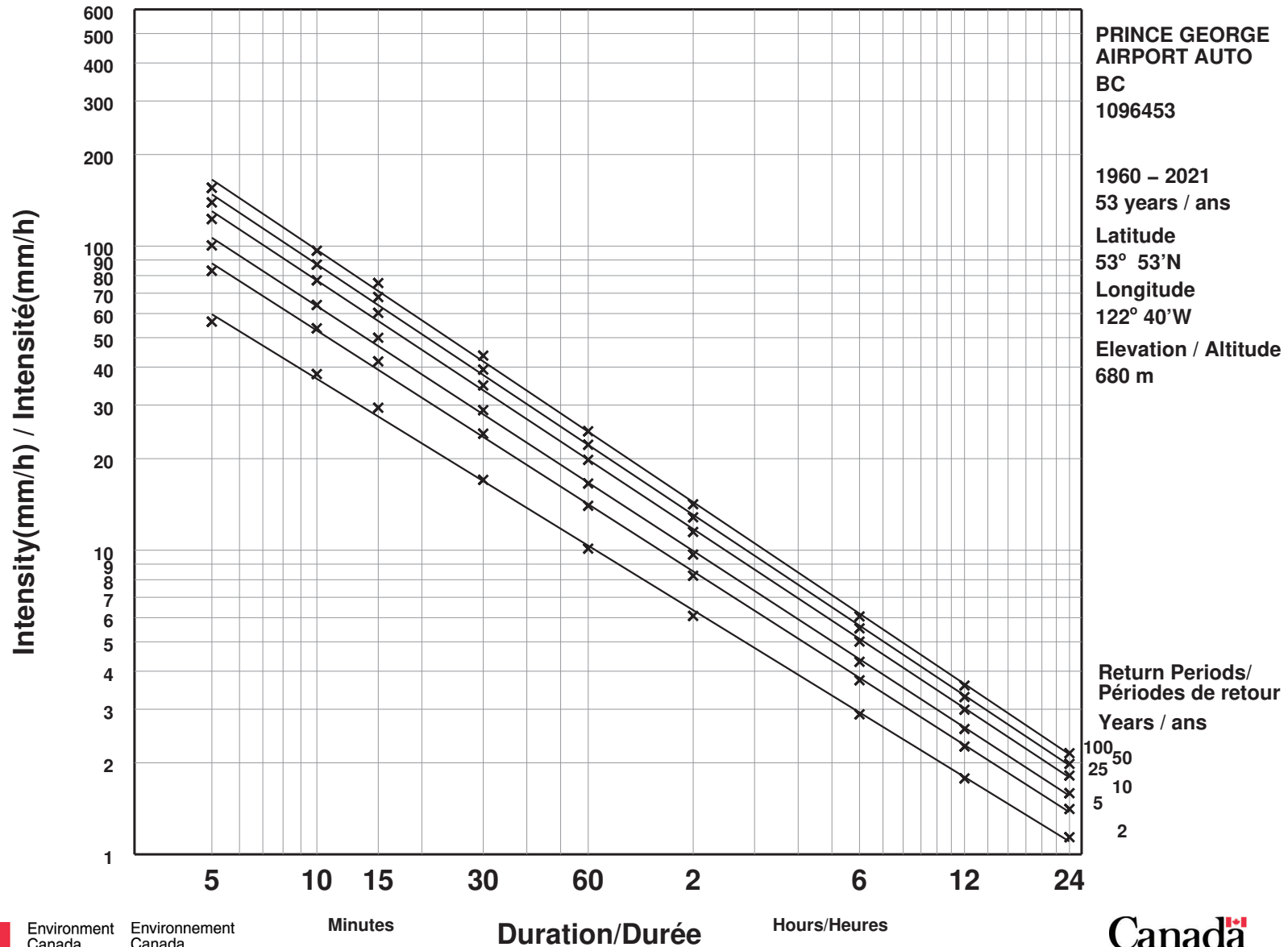
T = Rainfall duration (h) / Durée de la pluie (h)

Statistics/Statistiques	2	5	10	25	50	100
	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans
Mean of RR/Moyenne de RR	18.1	25.8	30.9	37.3	42.1	46.9
Std. Dev. /Écart-type (RR)	19.3	28.2	34.2	41.6	47.2	52.7
Std. Error/Erreur-type	1.5	2.1	2.6	3.2	3.7	4.2
Coefficient (A)	10.4	14.2	16.7	19.8	22.2	24.5
Exponent/Exposant (B)	-0.705	-0.734	-0.746	-0.757	-0.763	-0.768
Mean % Error/% erreur moyenne	3.2	2.9	2.7	2.6	2.6	2.6

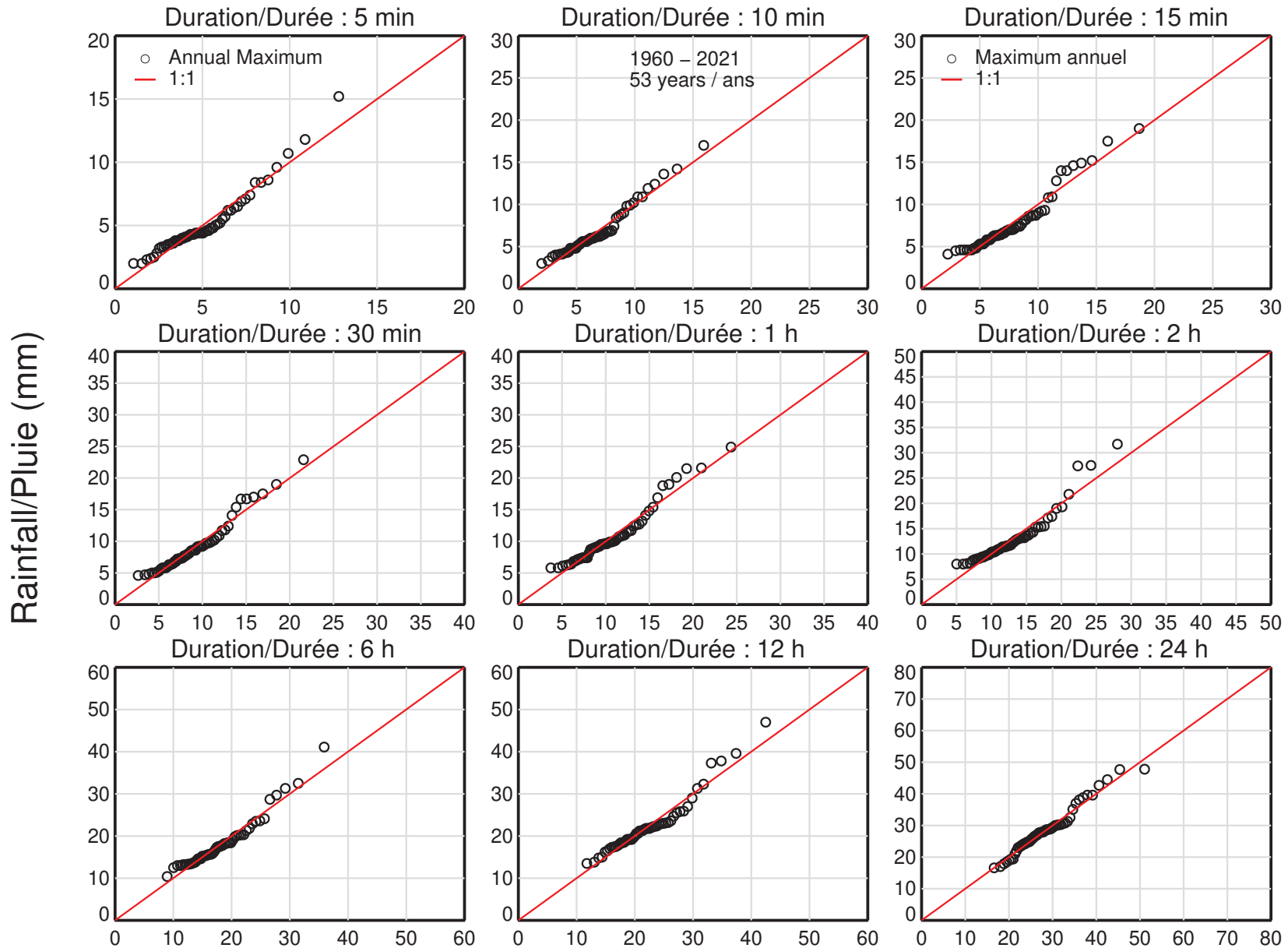
Short Duration Rainfall Intensity–Duration–Frequency Data

2022/10/31

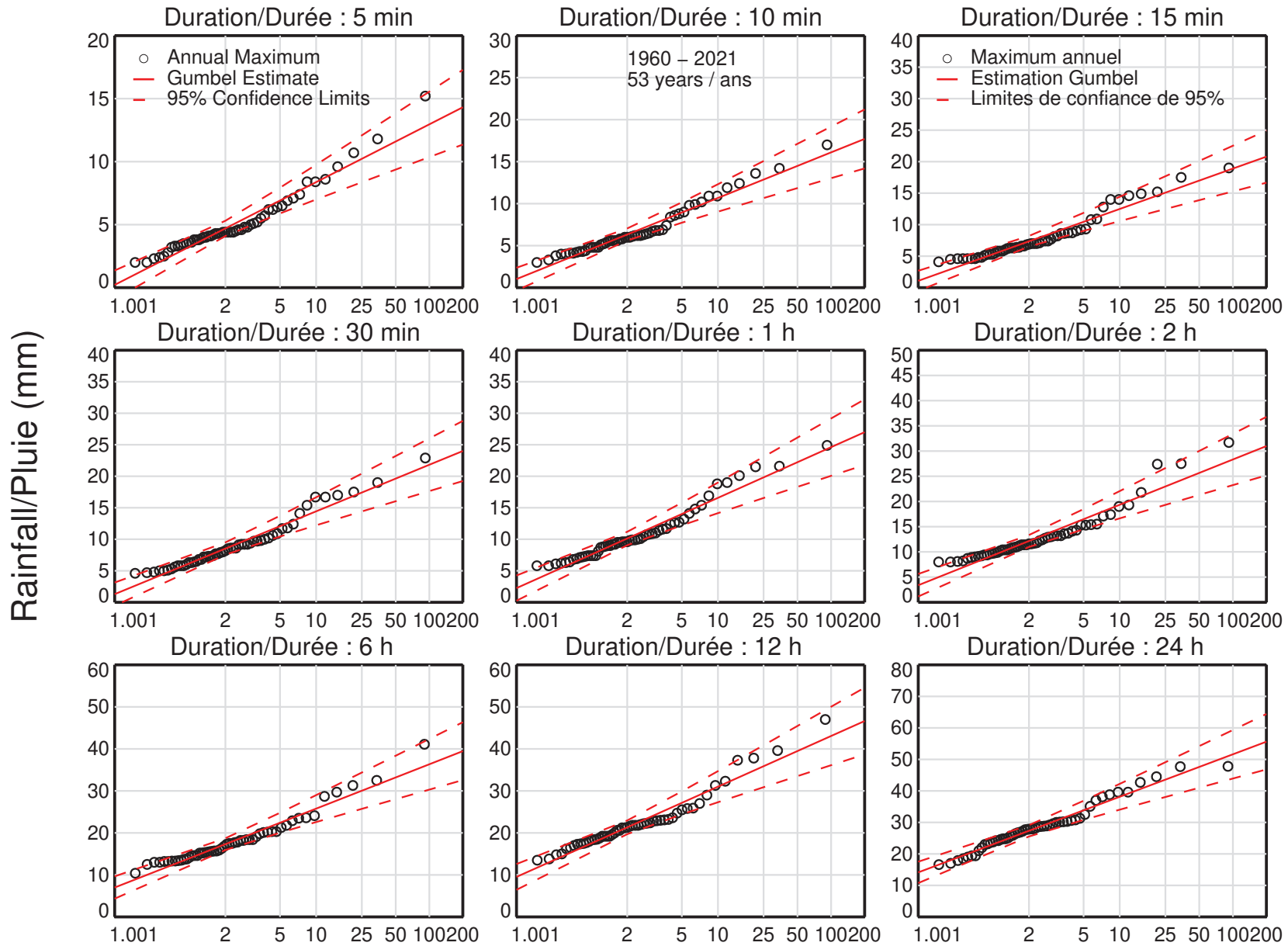
Données sur l'intensité, la durée et la fréquence des chutes de pluie de courte durée



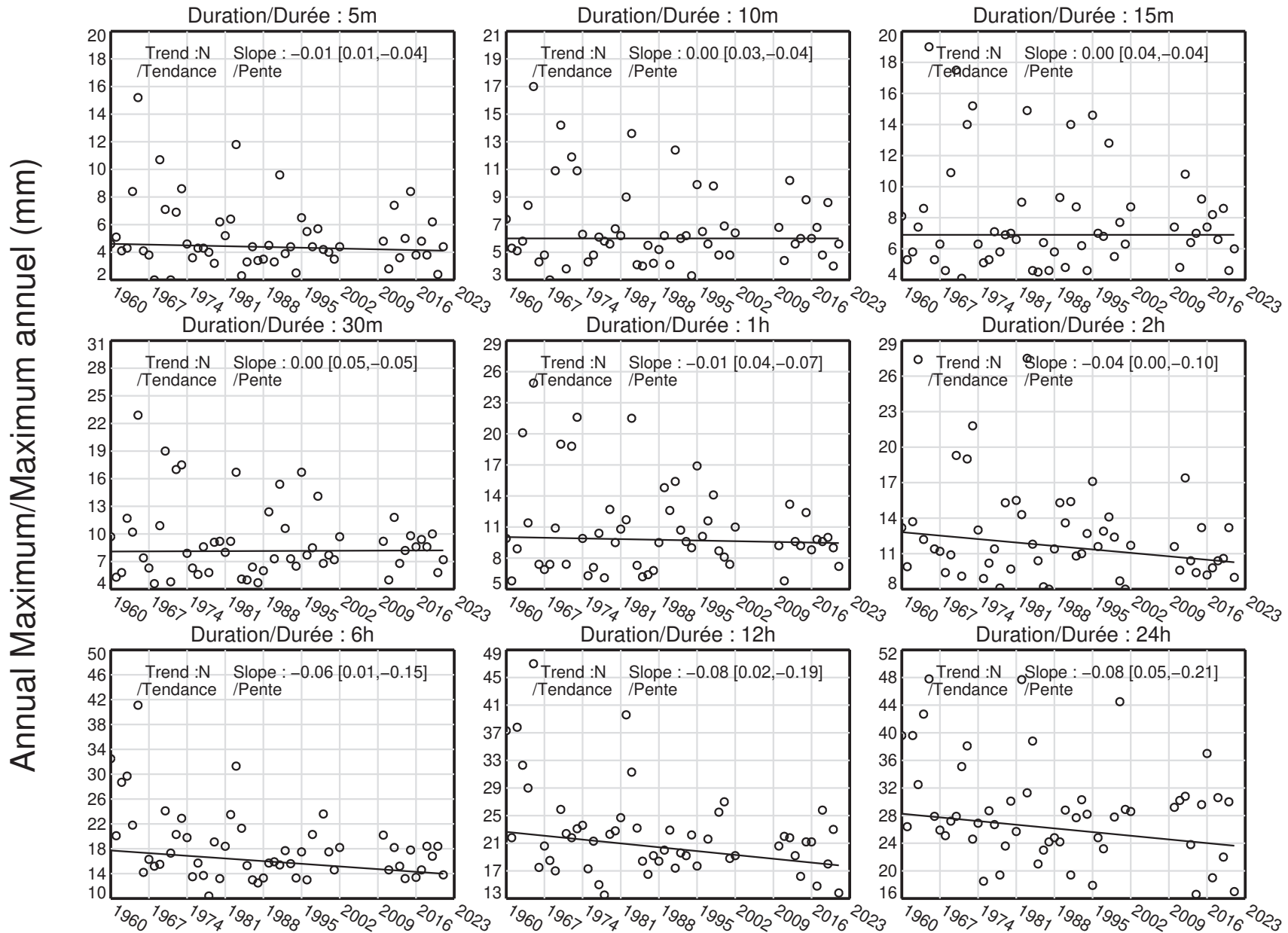
Quantile-Quantile : PRINCE GEORGE AIRPORT AUTO, BC 1096453

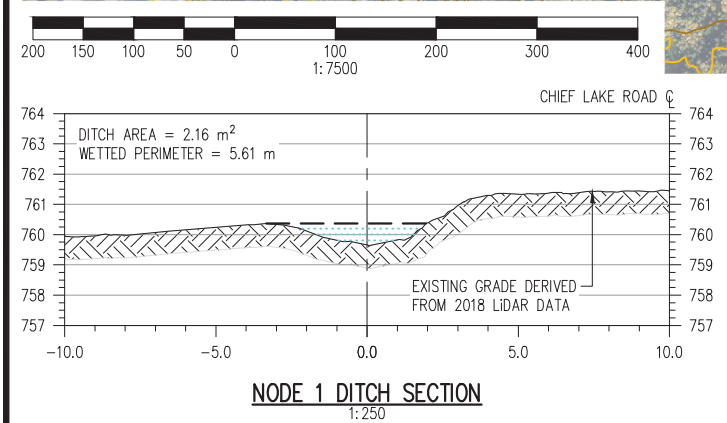
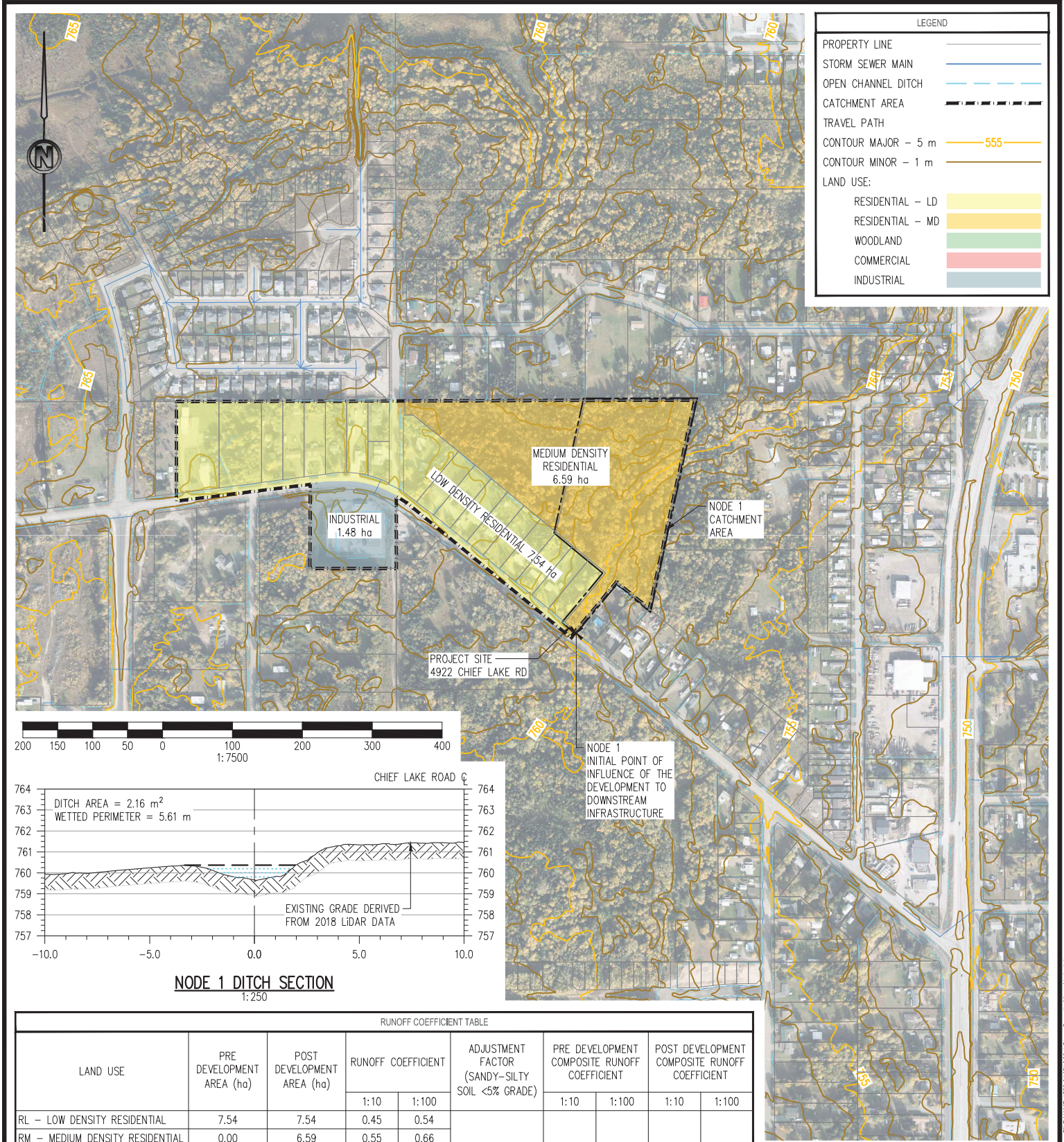


Return Level/Niveau de retour : PRINCE GEORGE AIRPORT AUTO, BC 1096453



Trend/Tendance : PRINCE GEORGE AIRPORT AUTO, BC 1096453



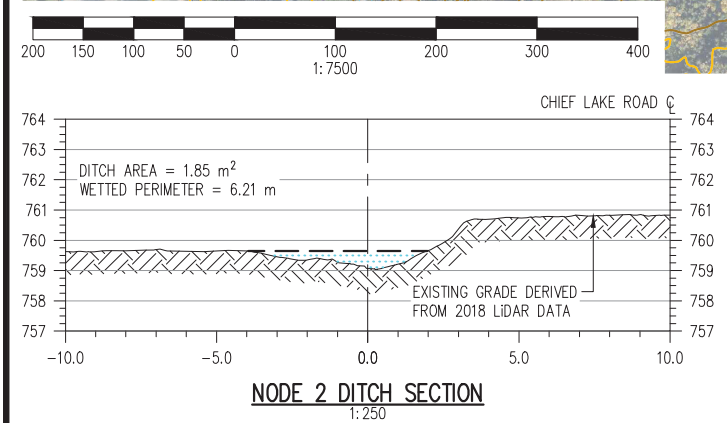
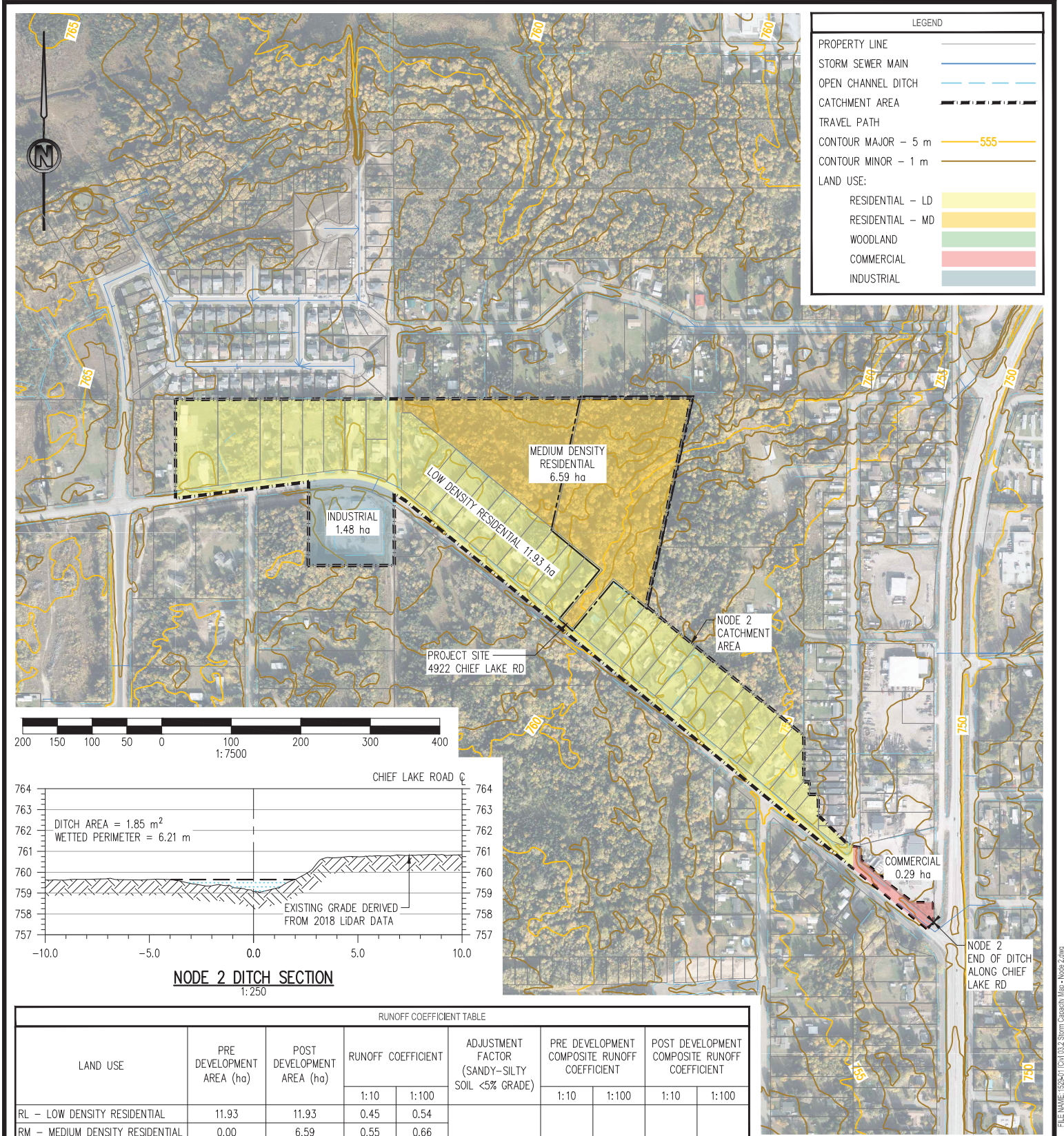


LAND USE	PRE DEVELOPMENT AREA (ha)	POST DEVELOPMENT AREA (ha)	RUNOFF COEFFICIENT		ADJUSTMENT FACTOR (SANDY-SILTY SOIL <5% GRADE)	PRE DEVELOPMENT COMPOSITE RUNOFF COEFFICIENT		POST DEVELOPMENT COMPOSITE RUNOFF COEFFICIENT	
			1:10	1:100		1:10	1:100	1:10	1:100
RL - LOW DENSITY RESIDENTIAL	7.54	7.54	0.45	0.54	0.95	0.38	0.45	0.50	0.60
RM - MEDIUM DENSITY RESIDENTIAL	0.00	6.59	0.55	0.66					
WOODLANDS	6.59	0.00	0.25	0.30					
COMMERCIAL	0.00	0.00	0.80	0.95					
INDUSTRIAL	1.48	1.48	0.80	0.95					

ISSUED WITH REPORT

Scouten ENGINEERING 201 - 1968 QUEENSWAY PRINCE GEORGE • BC • V2L 1M2 info@scoutenengineering.com T 250.562.7050		REFERENCE DRAWINGS		PROJECT INFORMATION KIDD GROUP OF COMPANIES CHIEF LAKE LANDING STORM CATCHMENT AREA MAP NODE 1	PROJECT No.		
		DWG No.	REV		PROJECT No.	PRODUCED BY	1529-01
		DRAWING REVISIONS				DRAWING No.	
		REV	DATE		DRW	DES	APP
					REVISION		
					A		

FILE NAME: 1529-01\103.1\Storm Capacity Map - Node 1.dwg
 LAST UPDATED: 2016.02.23
 DISCARD ALL PREVIOUS REVISIONS

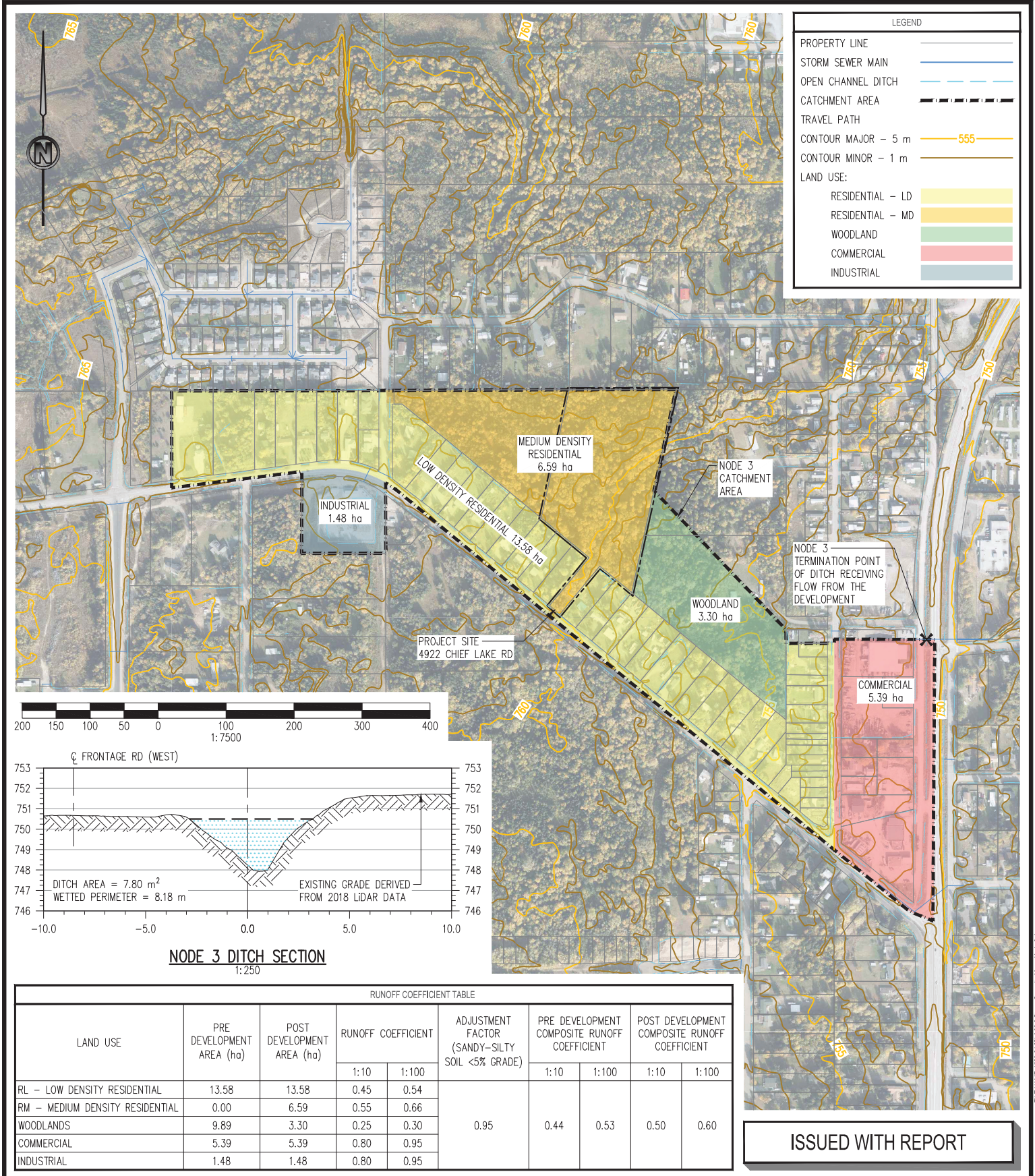


RUNOFF COEFFICIENT TABLE									
LAND USE	PRE DEVELOPMENT AREA (ha)	POST DEVELOPMENT AREA (ha)	RUNOFF COEFFICIENT		ADJUSTMENT FACTOR (SANDY-SILTY SOIL <5% GRADE)	PRE DEVELOPMENT COMPOSITE RUNOFF COEFFICIENT		POST DEVELOPMENT COMPOSITE RUNOFF COEFFICIENT	
			1:10	1:100		1:10	1:100	1:10	1:100
RL - LOW DENSITY RESIDENTIAL	11.93	11.93	0.45	0.54	0.95	0.39	0.47	0.48	0.58
RM - MEDIUM DENSITY RESIDENTIAL	0.00	6.59	0.55	0.66					
WOODLANDS	6.59	0.00	0.25	0.30					
COMMERCIAL	0.29	0.29	0.80	0.95					
INDUSTRIAL	1.48	1.48	0.80	0.95					

ISSUED WITH REPORT

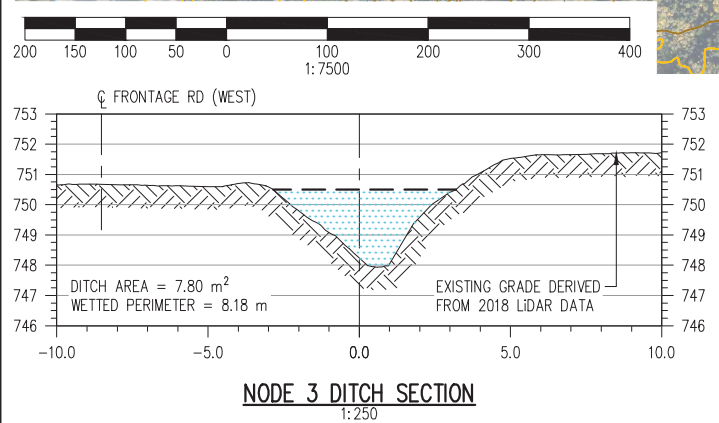
Scouten ENGINEERING 201 - 1968 QUEENSWAY PRINCE GEORGE • BC • V2L 1M2 info@scoutenengineering.com T 250.562.7050		REFERENCE DRAWINGS		PROJECT INFORMATION		PROJECT No.			
		DWG No.	REV	PROJECT No.	PRODUCED BY	KIDD GROUP OF COMPANIES		1529-01	
		DRAWING REVISIONS				CHIEF LAKE LANDING		DRAWING No.	MAP-1.2
		A	23.05.30	KN	KN	BC	STORM CATCHMENT AREA MAP NODE 2		REVISION

FILE NAME: 1529-01 (13.2 Storm Capacity Map - Node 2) LAST UPDATED: 20.05.23 DISCARD ALL PREVIOUS REVISIONS



LEGEND

PROPERTY LINE	---
STORM SEWER MAIN	—
OPEN CHANNEL DITCH	- - -
CATCHMENT AREA	- · - · - ·
TRAVEL PATH	—
CONTOUR MAJOR - 5 m	—555—
CONTOUR MINOR - 1 m	—
LAND USE:	
RESIDENTIAL - LD	Light Green
RESIDENTIAL - MD	Yellow
WOODLAND	Light Green
COMMERCIAL	Red
INDUSTRIAL	Blue



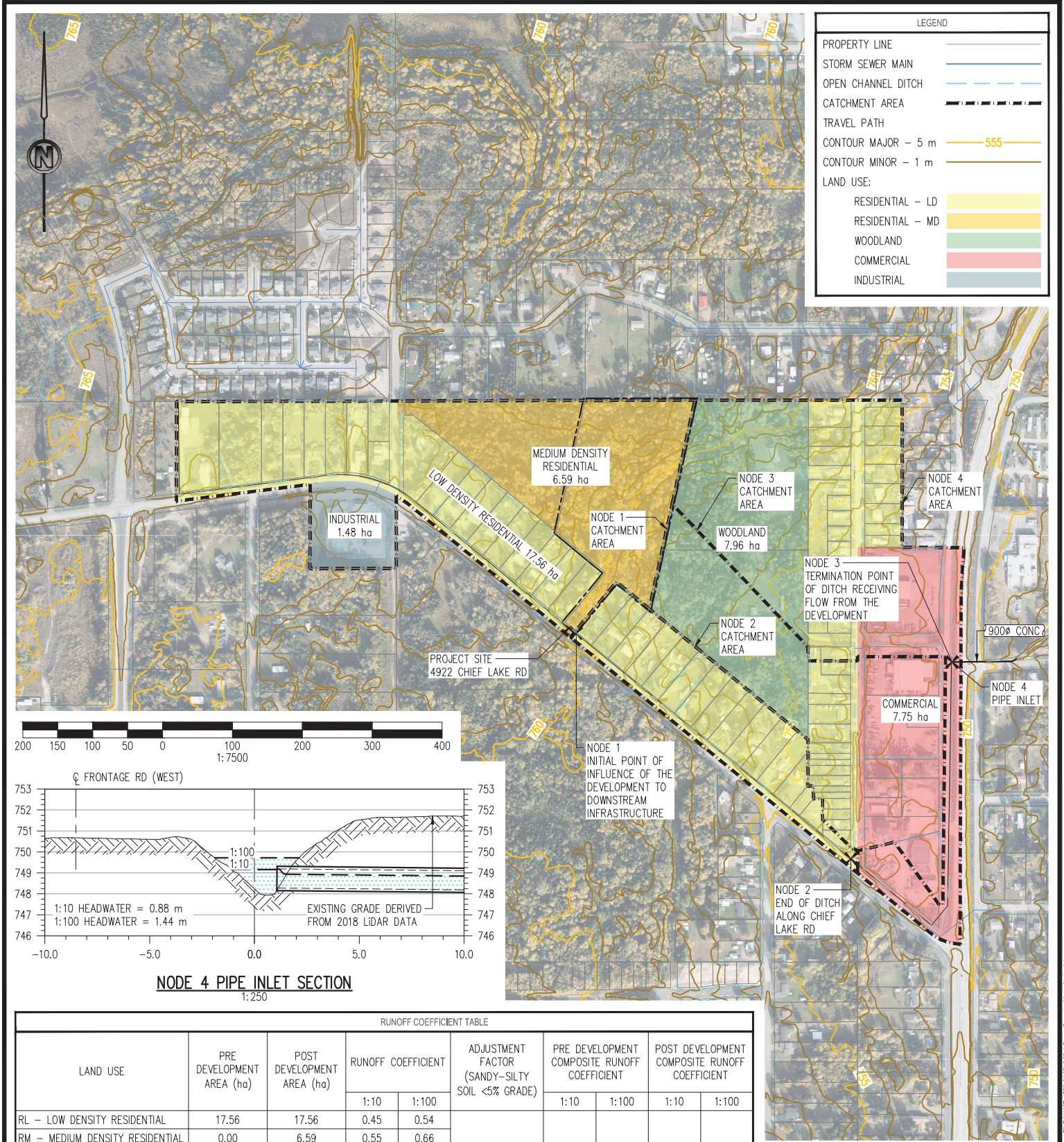
RUNOFF COEFFICIENT TABLE

LAND USE	PRE DEVELOPMENT AREA (ha)	POST DEVELOPMENT AREA (ha)	RUNOFF COEFFICIENT		ADJUSTMENT FACTOR (SANDY-SILTY SOIL <5% GRADE)	PRE DEVELOPMENT COMPOSITE RUNOFF COEFFICIENT		POST DEVELOPMENT COMPOSITE RUNOFF COEFFICIENT	
			1:10	1:100		1:10	1:100	1:10	1:100
RL - LOW DENSITY RESIDENTIAL	13.58	13.58	0.45	0.54	0.95	0.44	0.53	0.50	0.60
RM - MEDIUM DENSITY RESIDENTIAL	0.00	6.59	0.55	0.66					
WOODLANDS	9.89	3.30	0.25	0.30					
COMMERCIAL	5.39	5.39	0.80	0.95					
INDUSTRIAL	1.48	1.48	0.80	0.95					

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Scouten ENGINEERING 201 - 1968 QUEENSWAY PRINCE GEORGE • BC • V2L 1M2 info@scoutenengineering.com T 250.562.7050		REFERENCE DRAWINGS		PROJECT INFORMATION	PROJECT No.
		DWG No.	REV		PROJECT No.
		DRAWING REVISIONS		KIDD GROUP OF COMPANIES CHIEF LAKE LANDING STORM CATCHMENT AREA MAP NODE 3	DRAWING No.
					MAP-13
					REVISION
					A

FILE NAME: 1529-01 CH103.3 Storm Capacity Map - Node 3.dwg
 LAST UPDATED: 11/04/23
 DISCARD ALL PREVIOUS REVISIONS



RUNOFF COEFFICIENT TABLE

LAND USE	PRE DEVELOPMENT AREA (ha)	POST DEVELOPMENT AREA (ha)	RUNOFF COEFFICIENT		ADJUSTMENT FACTOR (SANDY-SILTY SOIL <5% GRADE)	PRE DEVELOPMENT COMPOSITE RUNOFF COEFFICIENT		POST DEVELOPMENT COMPOSITE RUNOFF COEFFICIENT	
			1:10	1:100		1:10	1:100	1:10	1:100
RL - LOW DENSITY RESIDENTIAL	17.56	17.56	0.45	0.54	0.95	0.43	0.52	0.48	0.57
RM - MEDIUM DENSITY RESIDENTIAL	0.00	6.59	0.55	0.66					
WOODLANDS	14.55	7.96	0.25	0.30					
COMMERCIAL	7.75	7.75	0.80	0.95					
INDUSTRIAL	1.48	1.48	0.80	0.95					

ISSUED WITH REPORT

Scouten ENGINEERING 201 - 1968 QUEENSWAY PRINCE GEORGE • BC • V2L 1M2 info@scoutenengineering.com T 250.562.7050		REFERENCE DRAWINGS		PROJECT INFORMATION	PROJECT No.
		DWG No.	REV		PROJECT No.
		DRAWING REVISIONS		KIDD GROUP OF COMPANIES CHIEF LAKE LANDING STORM CATCHMENT AREA MAP NODE 4	DRAWING No.
					MAP-14
					REVISION
					A

FILE NAME: 1529-01 (03.4 Storm Capacity Map - Node 4.dwg) | LAST UPDATED: 11/03/23 | DISCARD ALL PREVIOUS REVISIONS

APPENDIX B: DOWNSTREAM SANITARY SEWER CAPACITY TABLE



DOWNSTREAM SANITARY SEWER CAPACITY TABLE

Sanitary Main PG Map AssetID	Location (Street Name)	Nominal Pipe Size	Upstream Manhole ID	Downstream Manhole ID	2017 Total Pipe Capacity (Litres/sec)	2017 Available Flow (Litres/sec)	Post Development Available Flow (Litres/sec)	Percent Available (%)
8492	4901 Chief Lake Rd	300	99	100	116.6	74.8	64.1	45%
8485	4817 Chief Lake Rd	300	100	101	113.5	72.3	61.6	54%
8482	4705 Chief Lake Rd	300	101	111	136.7	88.2	77.4	57%
8477	4663 Chief Lake Rd	500	111	116	255.7	168.0	157.3	62%
8475	4633 Chief Lake Frontage Rd	500	116	117	255.0	167.4	156.6	61%
8469	4549 Chief Lake Rd	500	117	129	190.9	122.3	111.6	58%
8465	4543 Chief Lake Frontage Rd	500	129	130	210.1	135.7	125.0	59%
8464	4517 Chief Lake Frontage Rd	525	130	131	235.0	152.3	141.6	60%
8462	7985 Kelly Rd	525	131	132	294.4	177.9	167.1	57%
8458	7909 Kelly Rd	525	132	145	214.3	113.9	103.1	48%
8450	7791 Kelly Rd	525	145	149	228.9	126.5	115.8	51%
8396	7709 S Kelly Rd S	525	149	165	216.7	120.7	109.9	51%
8386	7653 S Kelly Rd S	525	165	168	246.9	144.5	133.7	54%
8378	7565 S Kelly Rd S	525	168	193	213.4	117.0	106.2	50%
8366	7583 Hart Hwy	525	193	195	228.7	131.8	121.1	53%
8360	7347 Hart Hwy	525	195	217	234.2	139.5	128.8	55%
8357	7283 Hart Hwy	525	217	228	206.0	70.5	59.8	29%
8422	7191 Hart Hwy	525	228	266	228.5	94.4	83.7	37%
8413	7091 Hart Hwy	525	266	269	211.6	84.8	74.0	35%
8399	6991 Hart Hwy	525	269	309	242.3	112.9	102.1	42%
8330	6921 Hart Hwy	525	309	312	1121.4	847.3	836.6	75%
8325	6891 Hart Hwy	525	312	313	1160.7	879.1	868.4	75%
8323	6943 Hart Highway Frontage Rd	525	313	319	526.0	349.0	338.3	64%
8308	6835 Hart Highway Frontage Rd	525	319	355	613.0	422.5	411.7	67%
8302	7241 Hart Hwy	525	355	357	568.4	381.1	370.4	65%
8287	6985 Hart Hwy	525	357	359	458.9	289.7	279.0	61%
6822	6733 Hart Hwy	525	359	392	453.0	285.7	274.9	61%
6818	6877 Hart Hwy	525	392	393	480.2	308.4	297.7	62%

DOWNSTREAM SANITARY SEWER CAPACITY TABLE

Sanitary Main PG Map AssetID	Location (Street Name)	Nominal Pipe Size	Upstream Manhole ID	Downstream Manhole ID	2017 Total Pipe Capacity (Litres/sec)	2017 Available Flow (Litres/sec)	Post Development Available Flow (Litres/sec)	Percent Available (%)
6809	6671 Hart Highway Frontage Rd	525	393	402	348.7	180.0	169.2	49%
8275	6569 Hart Highway Frontage Rd	525	402	403	315.0	152.3	141.6	45%
8251	6479 Hart Hwy	525	403	439	694.2	469.0	458.3	66%
8240	6389 Hart Hwy	525	439	441	800.6	557.7	546.9	68%
8237	6353 Hart Hwy	525	441	444	2165.6	1697.5	1686.7	78%
8219	6329 Hart Hwy	525	444	445	211.6	54.5	43.8	21%
8217	6281 Hart Hwy	525	445	448	238.0	77.0	66.3	28%
8206	6219 Hart Hwy	525	448	490	145.6	0.5	-10.2	-7%
8193	6151 Hart Hwy	525	490	511	235.3	76.1	65.4	28%
8178	6099 Hart Hwy	525	511	502	210.7	55.9	45.2	21%
7090	6061 Hart Hwy	525	502	555	204.5	50.8	40.1	20%
8167	6015 Hart Hwy	525	555	558	870.7	606.2	595.5	68%
8152	5959 Hart Hwy	525	558	560	1303.1	967.4	956.6	73%
8145	5921 Hart Hwy	525	560	579	513.4	280.6	269.9	53%
8140	5863 Hart Hwy	525	579	580	453.8	231.0	220.3	49%
8134	5813 Hart Hwy	525	580	585	993.2	681.5	670.8	68%
8123	5755 Hart Hwy	525	585	608	433.4	205.7	194.9	45%
8111	5639 Hart Hwy	525	608	613	426.9	200.4	189.7	44%
8100	5507 Hart Hwy	525	613	930	462.7	230.5	219.8	47%
8095	5001 Hart Hwy	525	930	932	515.0	271.6	260.9	51%
8087	5451 Hart Hwy	525	932	935	433.4	203.6	192.8	44%
8077	5385 Hart Hwy	525	935	948	613.8	354.3	343.5	56%
8074	5351 Hart Hwy	525	948	949	649.0	430.0	419.3	65%
8072	5321 Hart Hwy	525	949	950	585.9	330.3	319.6	55%
8069	5269 Hart Hwy	525	950	1218	495.1	254.6	243.8	49%
8068	5211 Hart Hwy	525	1218	1219	714.0	437.3	426.6	60%
9862	5145 Hart Hwy	525	1219	1234	801.6	510.6	499.8	62%
9863	5069 Hart Hwy	525	1234	1237	802.0	511.0	500.3	62%

DOWNSTREAM SANITARY SEWER CAPACITY TABLE

Sanitary Main PG Map AssetID	Location (Street Name)	Nominal Pipe Size	Upstream Manhole ID	Downstream Manhole ID	2017 Total Pipe Capacity (Litres/sec)	2017 Available Flow (Litres/sec)	Post Development Available Flow (Litres/sec)	Percent Available (%)
9868	5001 Hart Hwy	525	1237	1263	785.1	497.1	486.3	62%
9871	4981 Hart Hwy	525	1263	1270	662.3	393.1	382.4	58%
10015	4859 Hart Hwy	525	1270	1290	647.9	380.4	369.7	57%
9876	4745 Hart Hwy	525	1290	1316	994.9	670.1	659.3	66%
9877	4641 Hart Hwy	525	1316	1322	750.4	466.0	455.3	61%
7814	2281 E Knell Rd E	525	1322	1321	530.0	281.8	271.0	51%
7815	2243 E Knell Rd E	525	1321	1323	529.0	280.7	269.9	51%
8035	2182 E Noranda Rd E	525	1323	1338	574.6	318.7	308.0	54%
9883	Noranda	525	1338	1339	423.0	192.4	181.7	43%
9884	4385 Hart Hwy	600	1339	1342	722.0	442.0	431.3	60%
9885	2308 Mytting Rd	600	1342	1361	673.0	401.2	390.5	58%
9886	4209 Hart Hwy	600	1361	1366	688.4	407.6	396.9	58%
7781	4136 Wagon Trail Rd	600	1366	1375	690.2	409.0	398.2	58%
8021	4057 Wagon Trail Rd	600	1375	1373	706.4	422.6	411.9	58%
8017	4045 Hart Hwy	600	1373	1377	698.3	415.7	405.0	58%
8012	3947 Hart Hwy	600	1377	1393	675.8	397.1	386.3	57%
8007	2381 W Kenworth Rd W	600	1393	1395	656.0	402.0	391.3	60%
8006	3845 Hart Hwy	600	1395	1398	421.8	183.2	172.5	41%
8004	3723 Hart Hwy	600	1398	1425	427.2	188.0	177.2	41%
8032	3549 Perrin Hts	600	1425	1448	397.1	162.7	151.9	38%
8023	3483 Hart Hwy	600	1448	1454	412.7	175.4	164.6	40%
7977	3353 Hart Highway Frontage Rd	600	1454	1469	381.5	149.2	138.5	36%
7969	3275 Hart Hwy	600	1469	1473	445.8	203.2	192.5	43%
7965	3147 Hart Hwy	600	1473	1479	410.3	173.7	163.0	40%
7963	3027 Hart Highway Frontage Rd	600	1479	1489	516.1	262.2	251.4	49%
7956	2917 Hart Highway Frontage Rd	600	1489	1492	406.5	171.1	160.3	39%
7951	2873 Hart Hwy	600	1492	1491	386.4	154.3	143.5	37%
7952	2852 Hart Hwy	600	1491	1493	561.3	299.0	288.2	51%

DOWNSTREAM SANITARY SEWER CAPACITY TABLE

Sanitary Main PG Map AssetID	Location (Street Name)	Nominal Pipe Size	Upstream Manhole ID	Downstream Manhole ID	2017 Total Pipe Capacity (Litres/sec)	2017 Available Flow (Litres/sec)	Post Development Available Flow (Litres/sec)	Percent Available (%)
7950	2100 Hart Hwy	600	1493	1501	476.3	227.6	216.8	46%
7949	2780 Hart Hwy	600	1501	1502	475.2	226.7	215.9	45%
9938	2688 Hart Hwy	600	1502	1503	475.3	226.7	216.0	45%
9939	2590 Hart Hwy	600	1503	1521	476.9	228.2	217.5	46%
7996	2490 Hart Hwy	600	1521	1520	412.1	174.3	163.6	40%
7994	2396 Hart Hwy	600	1520	1535	419.4	180.2	169.5	40%
7989	2292 Hart Hwy	600	1535	1542	597.6	328.7	317.9	53%
7985	2162 Hart Hwy	750	1542	1566	528.1	270.8	260.1	49%
7932	2092 Northwood Pulpmill Rd	750	1566	1568	437.1	194.5	183.8	42%
7931	2050 Hart Hwy	750	1568	1571	520.2	261.0	250.3	48%
9965	1980 Hart Hwy	750	1571	1595	534.8	273.4	262.6	49%
9966	1880 Hart Hwy	750	1595	1598	511.6	254.1	243.3	48%
9967	1746 Hart Hwy	750	1598	1613	517.8	259.0	248.3	48%
7646	1884 Hart Hwy	750	1613	1866	573.1	305.4	294.7	51%
7637	1634 Hart Hwy	750	1866	1867	521.1	262.3	251.5	48%
9969	1528 Hart Hwy	900	1867	2098	858.3	543.9	533.2	62%
9975	1502 Hart Hwy	900	2098	2099	846.2	533.9	523.2	62%
9976	1451 Hart Hwy	900	2099	2131	864.8	549.6	538.9	62%
9977	1386 Hart Hwy	900	2131	2132	749.9	453.8	443.0	59%
9978	1336 Hart Hwy	900	2132	2164	861.5	547.0	536.3	62%
9979	1291 Hart Hwy	900	2164	2165	841.3	530.3	519.5	62%
9980	1225 Hart Hwy	900	2165	2167	574.9	307.9	297.1	52%
9981	1176 Hart Hwy	600	2167	2168	2357.6	1796.5	1785.7	76%
9982	1165 Hart Hwy	900	2168	2166	4053.6	3212.6	3201.9	79%
9983	1049 Hart Hwy	900	2166	2220	4531.2	3611.5	3600.7	79%
11141	1314 Hart Hwy	600	2220	2287		Estimated	Values	
9687	196 North Nechako Rd	600	2287	2288	1439.9	520.2	509.5	35%
9688	331 North Nechako Rd	600	2288	2218	1284.3	900.6	889.8	69%

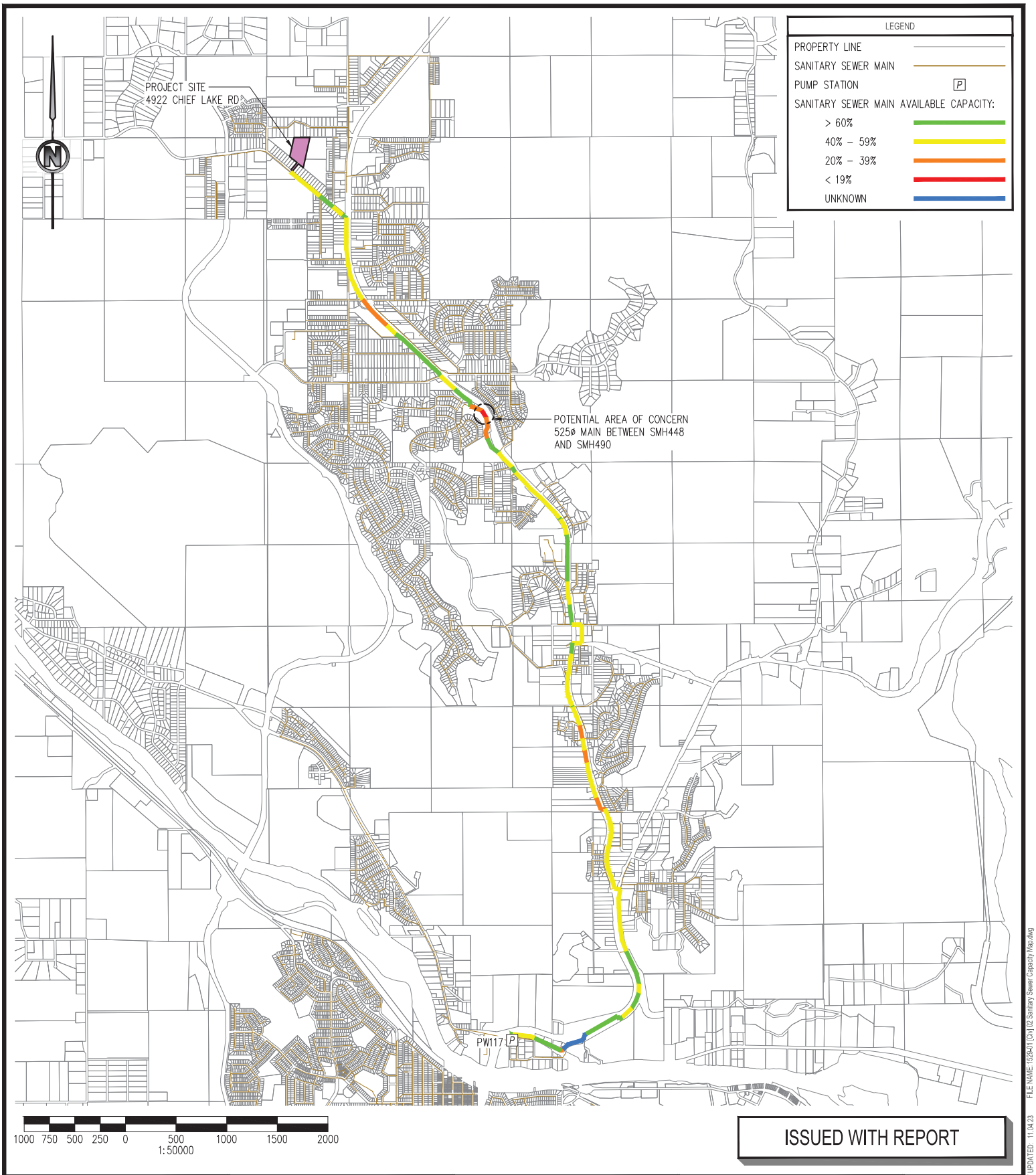
DOWNSTREAM SANITARY SEWER CAPACITY TABLE

Sanitary Main PG Map AssetID	Location (Street Name)	Nominal Pipe Size	Upstream Manhole ID	Downstream Manhole ID	2017 Total Pipe Capacity (Litres/sec)	2017 Available Flow (Litres/sec)	Post Development Available Flow (Litres/sec)	Percent Available (%)
9693	454 North Nechako Rd	600	2218	2213	442.2	197.0	186.2	42%
9694	499 North Nechako Rd	600	2213	PW117	1948.4	1454.6	1443.9	74%

Data provided in this table has been retrieved from the City of Prince George Open Data Catalogue "Sanitary Main Capacity" Data and the "Sanitary Main Capacity" layer on PG MAP.

The Calculation Date for the Total Capacity and Available Flows were preformed on May 26, 2017.

Percentage Available Colour Coding Legend 0%  100%



LEGEND	
PROPERTY LINE	
SANITARY SEWER MAIN	
PUMP STATION	
SANITARY SEWER MAIN AVAILABLE CAPACITY:	
> 60%	
40% - 59%	
20% - 39%	
< 19%	
UNKNOWN	



ISSUED WITH REPORT

<p>CONSULTANT</p> <p>Scouten ENGINEERING</p> <p>201 - 1968 QUEENSWAY PRINCE GEORGE • BC • V2L 1M2 info@scoutenengineering.com T 250.562.7050</p>	<p>CLIENT</p>	<p>REFERENCE DRAWINGS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>DWG No.</th> <th>REV</th> <th>PROJECT No.</th> <th>PRODUCED BY</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p>DRAWING REVISIONS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REV</th> <th>DATE</th> <th>DRW</th> <th>DES</th> <th>APP</th> <th>REVISION</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>23.05.30</td> <td>KN</td> <td>KN</td> <td>BC</td> <td>ISSUED WITH REPORT</td> </tr> </tbody> </table>	DWG No.	REV	PROJECT No.	PRODUCED BY					REV	DATE	DRW	DES	APP	REVISION	A	23.05.30	KN	KN	BC	ISSUED WITH REPORT	<p>PROJECT INFORMATION</p> <p>KIDD GROUP OF COMPANIES</p> <p>CHIEF LAKE LANDING</p> <p>SANITARY SEWER CAPACITY MAP</p>	<p>PROJECT No.</p> <p>1529-01</p> <p>DRAWING No.</p> <p>MAP-2</p> <p>REVISION</p> <p>A</p>
DWG No.	REV	PROJECT No.	PRODUCED BY																					
REV	DATE	DRW	DES	APP	REVISION																			
A	23.05.30	KN	KN	BC	ISSUED WITH REPORT																			

DISCARD ALL PREVIOUS REVISIONS LAST UPDATED: 11JUL23 FILE NAME: 1529-01 (01) Sanitary Sewer Capacity Map.dwg

APPENDIX C: WATER MODELLING REPORT





MEMO

To: Kyle Nelson
Scouten Engineering
knelson@scoutenengineering.com

From: Alex Childs, EIT
250-614-7807
Alex.Childs@princegeorge.ca

Date: January 4, 2023

Subject: WM000157 Water Modelling for 4922 Chief Lake Road PID: 012-009-008
Total number of pages (including this sheet): 4 Original WILL NOT follow by mail.

Kyle Nelson,

Water modelling has been carried out for 4922 Chief Lake Road PID: 012-009-008 under the conditions provided by yourself via the attached email sent December 12, 2022. As requested, the scenario has been evaluated at the location shown on the attached map.

The results of the modelling are outlined in Table 1, and the hydrant curve for Node 1 is attached. The design flows meet the City guideline of at least 150l/s with a minimum residual pressure of 20psi for commercial development.

Table 1: Modelling Scenarios for 4922 Chief Lake Road PID: 012-009-008

Node	Modelling Node #	Pressure During ADD	Pressure During PHD	Design Fire Flow During MDD
Node 1	111337	405.41 kPa (58.80PSI)	388.45 kPa (56.34PSI)	223.04 l/s

Keep in mind that the values provided are at the proposed main and any losses within the service connections must be taken into account by the designer.

If you have any questions, please contact me.

Modelling has been carried out using the most recent version of the City's water model, analyzed under Average Day Demands (ADD), Maximum Day Demands (MDD), and Peak Hour Demands (PHD). Average Day represents the expected average demand over the entire year. Maximum Day represents the average demand during the expected highest demand day of the year. Peak Hour represents the expected highest single-hour average demand with a 3-year return period. Fire Flows given are Design Fire Flows, representing the highest flow that can be drawn from a hydrant under Maximum Day Demand, without reducing pressure at any point in the network below 20 PSI.

Regards,

Prepared by
Alex Childs, EIT
Engineering Technologist

Alan Clark

Reviewed by
Al Clark, P.Eng
City Engineer

CC: Jon LaFontaine, Utilities Manager
Mandy Stanker, Supervisor Subdivision & Building Inspection

From: [Kyle Nelson](#)
To: [devserv](#)
Subject: Water Modelling Request - 4922 Chief Lake Rad
Date: Monday, December 12, 2022 6:08:27 PM
Attachments: [image001.png](#)
[image002.png](#)

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Hello Development Services,

I am the civil consultant for a re-zoning application associated with the property at 4922 Chief Lake Rd and would like to request water modelling be performed by the City of Prince George for the following potential development:

Job 1529-01

Civic Address: 4922 Chief Lake Road, Prince George, BC

ADD: 1.8 L/s

MDD: 4.5 L/s

PHD: 7.6 L/s

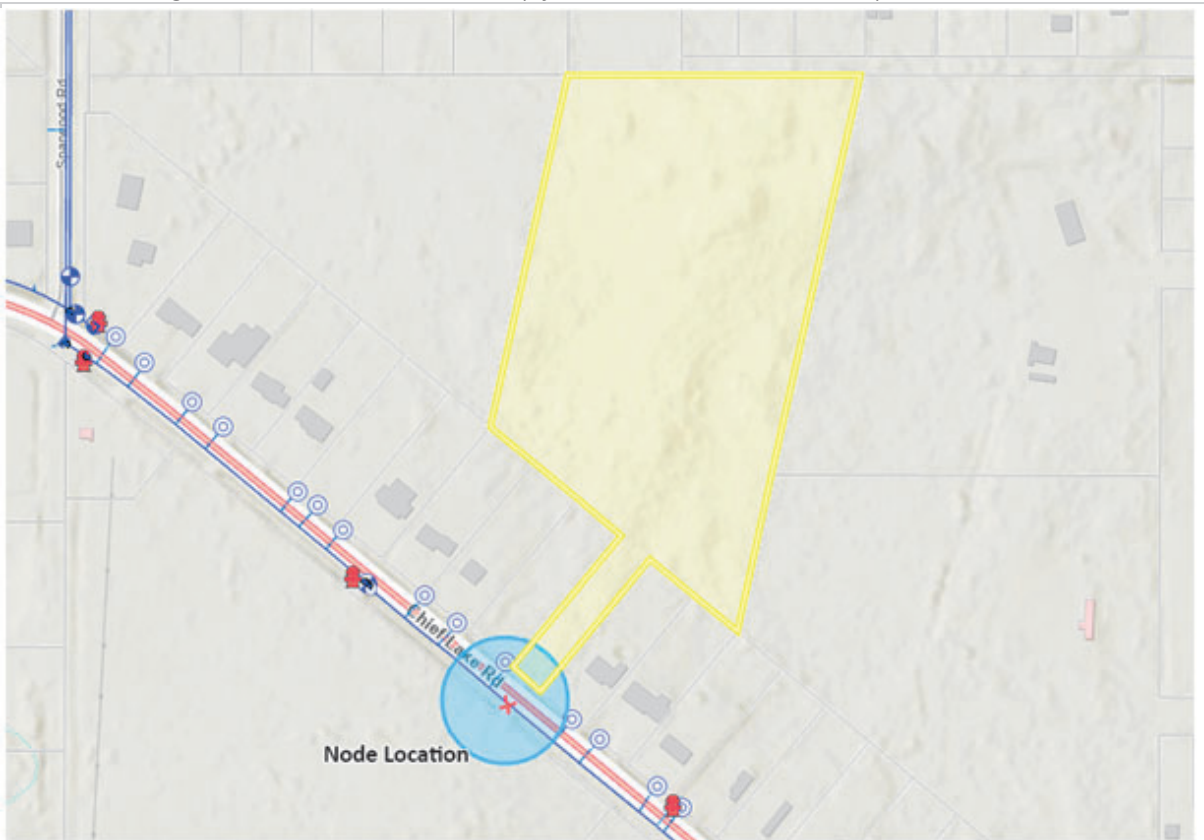
The scenarios I would like modelled are:

Pressure during PHD

Pressure during ADD

Available Fire flow during MDD

Pressure during MDD with Fire flow demand (hydrant curve at node location).



If you need any further information to assist in the development of the model, please let me know.

Thanks,

Kyle Nelson

Principal, CBDO

Senior Design Technologist

T 250.562.7050

knelson@scoutenengineering.com

www.scoutenengineering.com

Node Map



Node 1

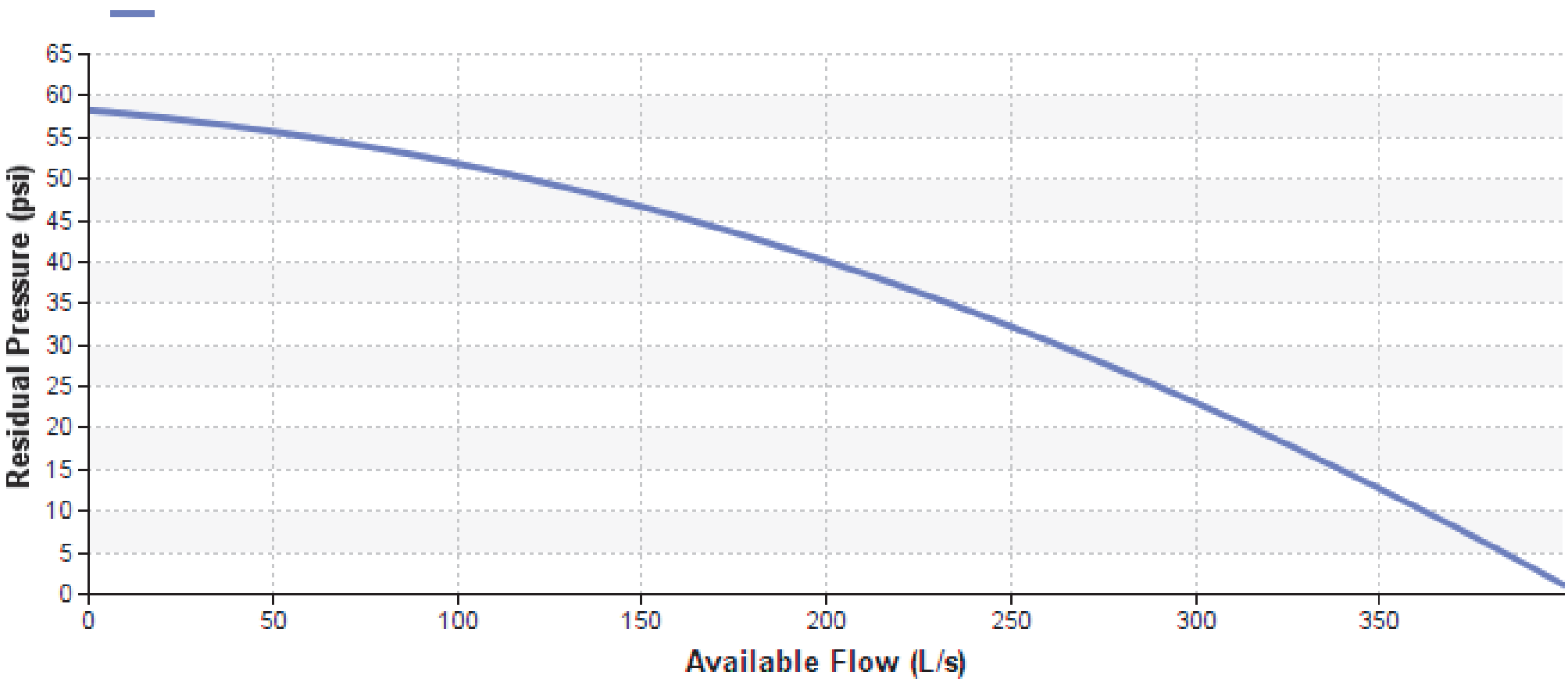
Notes:



This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. This map should not be used for: navigation, a plan of survey, routes, nor locations.

Printed: January 3, 2023 14:43

Hydrant Curve for Node 1



APPENDIX D: STANDARD DETAILS

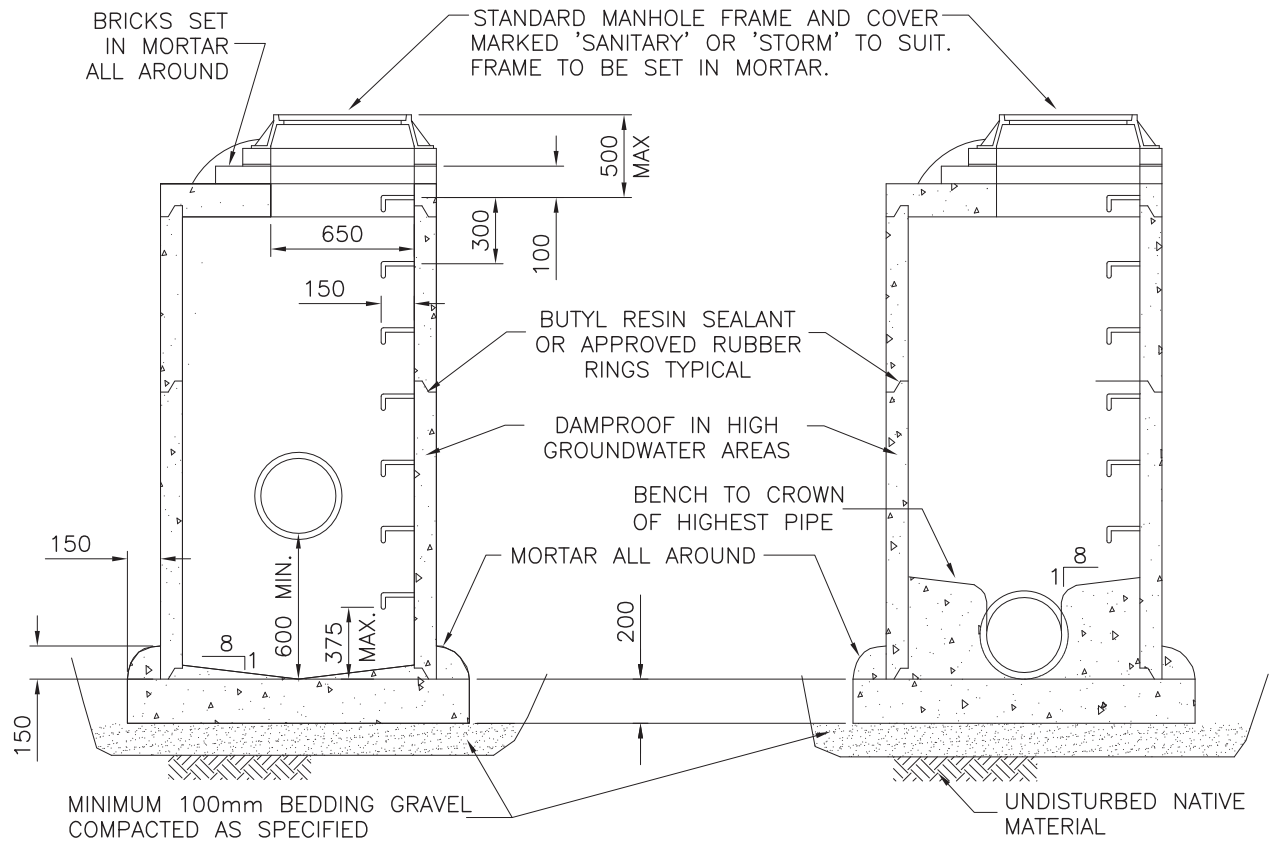




CITY OF PRINCE GEORGE

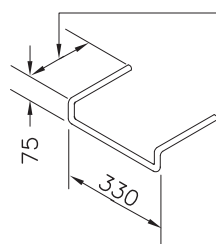
MANHOLE FOR 200mm – 450mm PIPES

S1



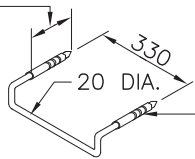
MANHOLE WITH SUMP

STANDARD 1050mm DIAMETER MANHOLE



GALVANIZED LADDER RUNG TO BE CAST WITH PIPE

TO SUIT LOAD AND MANUFACTURING REQUIREMENTS



GALVANIZED OR ALUMINUM LADDER RUNG

INSERT TO BE CAST WITH PIPE

NOTES:

1. DETAILS ARE DRAWN FOR PRECAST RISERS ON CAST-IN-PLACE BASE. PRECAST BASES APPROVED BY DIRECTOR ARE ACCEPTABLE.
2. MAXIMUM DEPTH TO FIRST RUNG IS 500mm. WHEN HANDHOLD IS INSTALLED BETWEEN TOP AND FIRST RUNG, MAXIMUM DEPTH MAY BE INCREASED TO 660mm.
3. REFER TO DWG. S4 FOR CONNECTION DETAILS.
4. REFER TO SECTION 02631 OF STANDARD SPECIFICATIONS.
5. FIELD INSTALLATION OF LADDER RUNGS NOT ALLOWED UNLESS APPROVED BY DIRECTOR.

2004

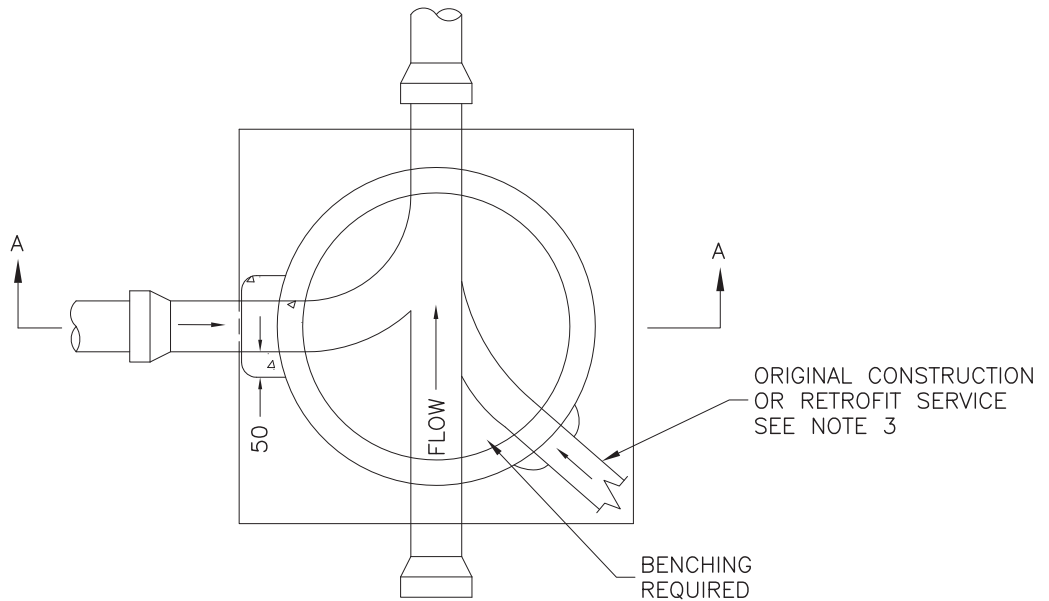
DATE OF REVISION	REVISION NUMBER	SCALE	DRAWING NUMBER
JUN 2004	0	N.T.S.	S1



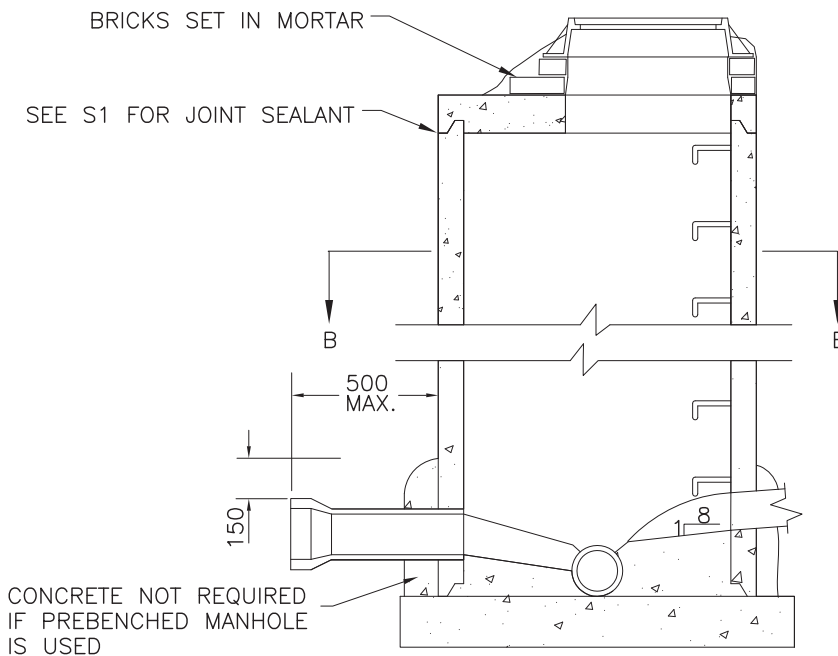
CITY OF
PRINCE GEORGE

MANHOLE CONSTRUCTION

S4



SECTION B-B



SECTION A-A

- NOTE:**
1. THIS DRAWING SHOWS CONNECTION DETAILS ONLY. REFER TO DRAWINGS S1 TO S3 FOR ADDITIONAL DETAILS PERTAINING TO MANHOLE REQUIREMENTS AND INSTALLATION.
 2. REFER TO CONTRACT DRAWINGS AND SECTION 02631 FOR DETAILED SPECIFICATIONS.
 3. MULTIPLE SERVICES ARE PERMITTED TO BE PUT IN UNDER THE FOLLOWING CONDITIONS:
 - BENCHING IS PUT IN, FLOW IS DIRECTED TO THE STREAM FLOW.

2004

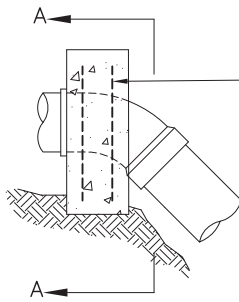
DATE OF REVISION	REVISION NUMBER	SCALE	DRAWING NUMBER
JUN 2004	0	N.T.S.	S4



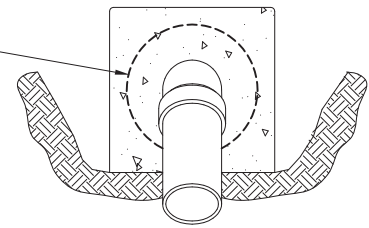
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THRUST BLOCK ARRANGEMENT

W1



10mm TIE BARS

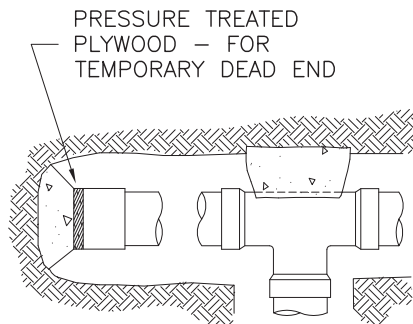


SECTION A-A

VERTICAL BENDS GENERAL ARRANGEMENTS — ELEVATIONS

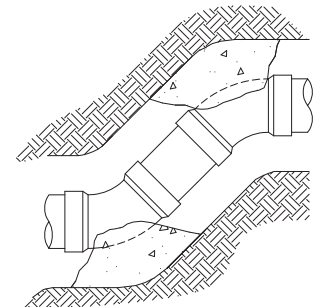


TEES

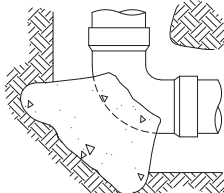


PRESSURE TREATED PLYWOOD — FOR TEMPORARY DEAD END

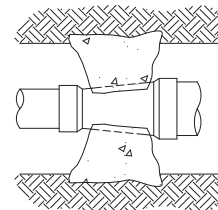
TEES



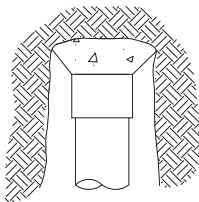
11½°, 22½°, 45° BENDS



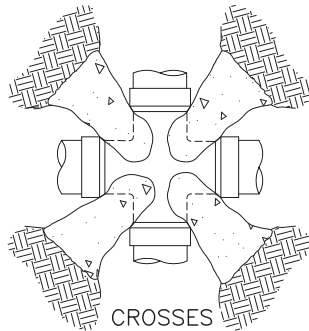
90° BEND



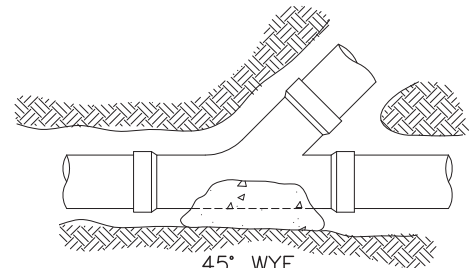
REDUCER



CAPS



CROSSES



45° WYE

GENERAL ARRANGEMENTS — PLAN VIEW

NOTES:

1. REFER TO CONTRACT DRAWINGS FOR SPECIFIED BEARING AREA OF THRUST BLOCKS AND/OR SPECIFIC REQUIREMENTS NOT SHOWN ON THE DRAWING.
2. PLACE 6mm POLYETHYLENE ON INTERFACE BETWEEN CONCRETE AND FITTING.
3. PLACE 20 MPa CONCRETE AGAINST UNDISTURBED GROUND. KEEP CONCRETE CLEAR OF FITTING JOINTS.
4. REFER TO SECTION 02511 OF STANDARD SPECIFICATIONS.

2004

DATE OF REVISION

JUN 2004

REVISION NUMBER

0

SCALE

N.T.S.

DRAWING NUMBER

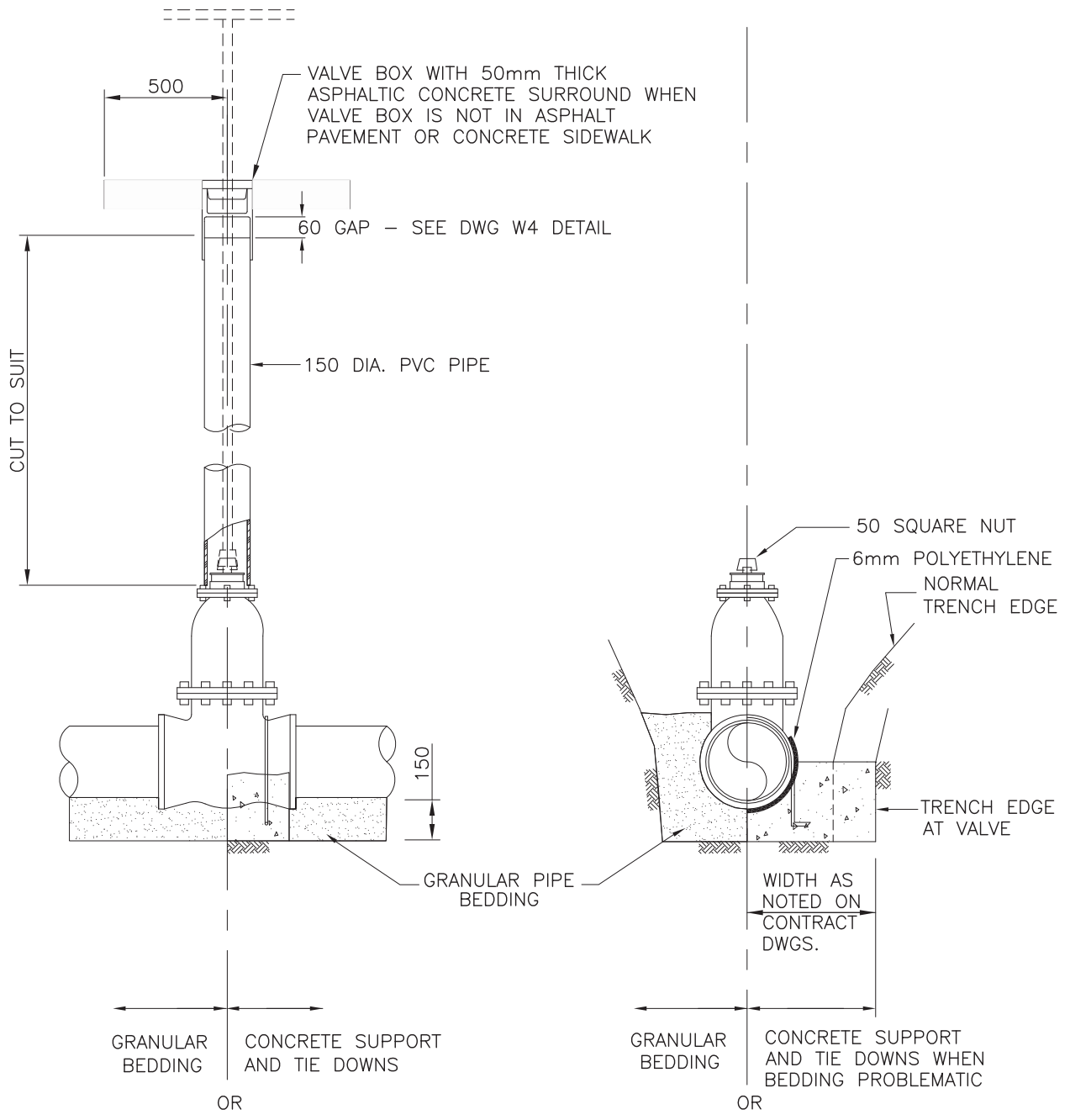
W1



CITY OF PRINCE GEORGE

GATE VALVE INSTALLATION (FOR WATERMAINS 300mm OR LESS)

W3



NOTE:

1. REFER TO CONTRACT DRAWINGS FOR VALVE INSTALLATION DETAILS IN AREAS OF UNSTABLE GROUND (WHERE APPLICABLE).
2. REFER TO SECTION 02511 OF STANDARD SPECIFICATIONS.

2004

DATE OF REVISION	REVISION NUMBER	SCALE	DRAWING NUMBER
JUN 2004	0	N.T.S.	W3