



Mr. Joe Mackenzie
Chair
Wek'èezhì Land and Water Board
1 - 4905 48 STREET
YELLOWKNIFE, NT X1A 353

APR 03 2019


Dear Mr. Mackenzie:

**Tłchọ All-Season Road Information Request Response for Water Licence
W2016L8-0001 and Land Use Permit W2016E0004**

Please find attached the Government of the Northwest Territories' Department of Infrastructures (GNWT-INF) submission of Information Request Responses pertaining to the Tłchọ All-Season Road Land Use Permit and Water Licence applications. The Information Request Responses were authored in partnership with the P3 consortium, North Star Infrastructure.

Should you have any questions or comments, please contact me at (867) 767-9089 ext. 31186 or by email at Michael_Conway@gov.nt.ca at your earliest convenience.

Sincerely,



Michael Conway
Regional Superintendent
North Slave Region
Department of Infrastructure

Attachment

Thịchō All-Season Road: Water Source Information Request Response

As noted in Information Request dated March 19, WLWB requested the following information:

- a. A finalized list of water sources, including name and location of the water bodies, and the available capacity of each proposed source**

The finalized list of water sources is provided below in Table 1. It should be noted that this list remains unchanged from that submitted as part of the Water Monitoring Plan (WMP) and Fish and Fish Habitat Protection Plan (FFHPP) as part of the Government of Northwest Territories, Department of Infrastructure (GNWT-INF) Water Licence Application (W2016L8-0001) and is currently included in Part C, Table 1 of the Draft Water Licence Conditions on the WLWB Online Review System.

For clarity, the source number, corresponding to location on maps provided in Appendix B of the FFHPP and Appendix E of the WMP, has been added to the table.

Table 1 – Water Sources

Source Number	Name	Type	Latitude	Longitude
1	James River	river	62°58'26.16"N	116°54'43.16"W
2	La Martre River	river	63° 6'33.69"N	116°58'31.90"W
3	Duport River	river	62°43'47.28"N	116°50'21.69"W
4	Crossing 9/Unnamed creek	creek	62°46'12.54"N	116°48'51.2"W
5	Crossing 12	stream/lake	62°51'56.49"N	116°51'29.84"W
6	Unnamed Lake 1	lake	62°50'31.18"N	116°51'20.34"W
7	Unnamed Lake 2	lake	62°49'24.41"N	116°51'29.15"W
8	Unnamed Lake 3	lake	62°29'53.70"N	116°30'33.52"W
9	Unnamed Lake 4	lake	62°29'28.84"N	116°32'35.49"W
10	Unnamed Lake 5	lake	62°39'31.71"N	116°51'33.03"W
11	Unnamed Lake 6	lake	62°39'38.65"N	116°50'50.60"W
12	Unnamed Lake 7	lake	62°46'41.42"N	116°49'17.26"W
13	Unnamed Lake 8	lake	62°29'19.76"N	116°32'10.59"W
14	Unnamed Lake 9	lake	63° 8'41.22"N	116°59'5.78"W
15	Unnamed Lake 10	lake	62°55'29.62"N	116°51'58.34"W

Available Capacity

The Fisheries and Oceans Canada (DFO) guidelines require that:

1. In watercourses, water draws are limited to 10% of instantaneous flow. Instantaneous flow varies over time.
2. In lakes during winter months, water draws are limited to 10% of available volume, where available volume is defined as 10% of the total lake volume once an allowance is made for ice thickness. In the project area, ice thickness estimates are to be 1.5 metres thick.¹
3. In lakes during other months, a water balance is required to demonstrate that no net

¹ DFO Protocol for Winter Water Withdrawal from Ice-Covered Water Bodies in the Northwest Territories and Nunavut, Fisheries and Oceans Canada, 2010.

negative impact to lake volume is expected over a construction season. This requirement will be met if, like watercourses, draws are restricted to 10% of instantaneous flow of the outgoing watercourse.

NSI has prepared tables based on area regressions of watercourses in the area and a desktop analysis of water body topography.

- Table 2 shows the mean and low flows for each of the watercourses proposed as water sources, along with the corresponding restrictions for 10% of instantaneous flow.
- Table 3 shows the estimated lake volumes, available winter water draw volumes and estimated average annual inflow to the waterbody.

b. Anticipated daily withdrawal volumes and duration of use, including a comparison of the total water volume requested for use against the total water volume available.

The sources were identified by the preferred proponent, North Star Infrastructure (NSI), selected by GNWT-INF to construct the Tłı̄ch̄o All-Season Road (TASR). NSI selected locations based on proximity to the design alignment for the Tłı̄ch̄o All Season Road to minimize impacts from having to construct new access roads outside of the proposed corridor. Section 3 and Appendix D of the WMP provided details on the anticipated daily withdrawal volumes and duration of use. This assessment was based on all sources being accessible at the start of the construction year.

A revised strategy, for watercourses (rivers and creeks) and lakes, is presented here based on the available capacities. This allows NSI to meet supply requirements for camps and construction uses and respect the requirements of federal and provincial statutes.

Watercourses (Sources 1-4)

NSI has estimated maximum withdrawal requirements during construction to be 299 m³/day, or an average of 3.5 L/s. However, greater withdrawal rates will be required to fill up water trucks periodically through the day rather than at a steady rate over a 24-hour period. If the required instantaneous withdrawal rate is anticipated to be greater than 10% of the instantaneous flow, water will be pumped at a lower rate into tanks or lined ponds where it can later be drawn at a higher rate.

Watercourses will be equipped with a velocity meter at a selected cross section. NSI will develop a velocity-flow table based on the cross section so at any given time the instantaneous flow (Q_i) can be read from the velocity. If Q_i is greater than 10 times the rated pump flow, there will be no need to manage the withdrawal. If Q_i drops below 10 times the rated pump flow, storage measures will be installed.

Lake Draws (Sources 5 - 15) - Winter Months:

NSI has completed a preliminary assessment of the lakes using sections through the waterbodies based on the surrounding topography. To use a single lake as a water source, the volume required is based on the maximum daily water draw, multiply by the number of days required. If the available volume is less than this, sources will be combined to meet the demand.

Lake Draws (Summer: May to October) Summer lake draws require a water balance to ensure NSI is not exceeding the 10% withdrawal limit. A continuous modelling exercise is a highly involved technical process usually used for long term withdrawal requirements such as a municipal raw water supply. Since this is a short-term construction requirement with no one lake likely to be used for longer than one season, NSI is proposing a more efficient program.

Along with winter water draw volumes, NSI has generated yearly average inflow volumes for each lake catchment. Peak seasonal withdrawals at 299 m³/day results in a total seasonal demand from May to October of 53,820 m³ of water. If the average annual volume is greater than ten times this amount, or 538,200 m³, then withdrawals will be taken without monitoring. If the average annual volume is less than ten times the required withdrawal, the site will be managed as watercourses with outlet flow monitoring.

This strategy is based on the rationale that if the maximum withdrawal is less than 10% of the annual average flow into the waterbody, there is a negligible risk of long-term impact to ecological function in the lake with water draws occurring over one or two seasons.

Based on this strategy, the total water volume requested from each source may vary. The total water volume available is provided in Tables 2 and 3.

c. Any available bathymetric information, including maximum depths

As noted in above section, the available capacities were based on surrounding topography, not bathymetry. NSI was awarded contract to construct the Thichq All Season Road in February 2019. Field investigations to confirm site conditions, including bathymetry of proposed water sources, are planned for Summer 2019.

d. Any available information on other water uses from the source(s).

NSI is not aware of other users of water from the proposed sources. The WLWB Current Authorizations webviewer did not indicate other active water licences on the sources as of April 3, 2019.

Table 2 – Flow Rates at Potential Watercourse Water Sources

Source Reference Number	Name	Type	Latitude	Longitude	Catchment Area (ha)	Construction Season (m³/s)	Mean Flow Over Duration of Construction Season - March to November (Inclusive)																	
							March Mean Flow (m³/s)	March 10% Limit (m³/s)	April Mean Flow (m³/s)	April 10% Limit (m³/s)	May Mean Flow (m³/s)	May 10% Limit (m³/s)	June Mean Flow (m³/s)	June 10% Limit (m³/s)	July Mean Flow (m³/s)	July 10% Limit (m³/s)	August Mean Flow (m³/s)	August 10% Limit (m³/s)	September Mean Flow (m³/s)	September 10% Limit (m³/s)	October Mean Flow (m³/s)	October 10% Limit (m³/s)	November Mean Flow (m³/s)	November 10% Limit (m³/s)
1	James River	River	62°58'26.16"N	116°54'43.16"W	72800	2.13	0.22	0.022	0.79	0.079	4.82	0.482	3.83	0.383	3.04	0.304	2.32	0.232	1.82	0.182	1.45	0.145	0.84	0.084
2	La Martre River	River	63° 6'33.69"N	116°58'31.90"W	1390000	40.59	4.29	0.429	15.03	1.503	92.06	9.206	73.04	7.304	58.14	5.814	44.33	4.433	34.69	3.469	27.72	2.772	16.04	1.604
3	Duport River	River	62°43'47.28"N	116°50'21.69"W	28900	0.84	0.09	0.009	0.31	0.031	1.91	0.191	1.52	0.152	1.21	0.121	0.92	0.092	0.72	0.072	0.58	0.058	0.33	0.033
4	Unnamed Creek	Creek	62°46'12.54"N	116°48'51.2"W	13400	0.39	0.04	0.004	0.14	0.014	0.89	0.089	0.70	0.070	0.56	0.056	0.43	0.043	0.33	0.033	0.27	0.027	0.15	0.015

Source Reference Number	Name	Type	Latitude	Longitude	Catchment Area (ha)	Minimum Flow (Construction Season) (m³/s)	Minimum Flow Over Duration of Construction Season - March to November (Inclusive)																	
							March Minimum Flow (m³/s)	March 10% Limit (m³/s)	April Minimum Flow (m³/s)	April 10% Limit (m³/s)	May Minimum Flow (m³/s)	May 10% Limit (m³/s)	June Minimum Flow (m³/s)	June 10% Limit (m³/s)	July Minimum Flow (m³/s)	July 10% Limit (m³/s)	August Minimum Flow (m³/s)	August 10% Limit (m³/s)	September Minimum Flow (m³/s)	September 10% Limit (m³/s)	October Minimum Flow (m³/s)	October 10% Limit (m³/s)	November Minimum Flow (m³/s)	November 10% Limit (m³/s)
1	James River	River	62°58'26.16"N	116°54'43.16"W	72800	0.25	0.04	0.004	0.05	0.005	0.63	0.063	0.54	0.054	0.36	0.036	0.24	0.024	0.15	0.015	0.17	0.017	0.10	0.010
2	La Martre River	River	63° 6'33.69"N	116°58'31.90"W	1390000	4.84	0.80	0.080	1.04	0.104	12.05	1.205	10.27	1.027	6.91	0.691	4.54	0.454	2.88	0.288	3.17	0.317	1.92	0.192
3	Duport River	River	62°43'47.28"N	116°50'21.69"W	28900	0.10	0.02	0.002	0.02	0.002	0.25	0.025	0.21	0.021	0.14	0.014	0.09	0.009	0.06	0.006	0.07	0.007	0.04	0.004
4	Unnamed Creek	Creek	62°46'12.54"N	116°48'51.2"W	13400	0.05	0.01	0.001	0.01	0.001	0.12	0.012	0.10	0.010	0.07	0.007	0.04	0.004	0.03	0.003	0.03	0.003	0.02	0.002

Table 3 – Flow Rates at Potential Lake Water Sources

Source Reference Number	Name	Type	Latitude	Longitude	Catchment Area (ha)	Surface Area (ha)	Summer			Winter			Inflow (m³/year)
							Average Depth (m)	Estimated Average Volume (m³)	Annual Maximum Draw Volume (m³)	Usable Depth (Winter*) (m)	Total Volume in Winter (m³)	Allowable Draw in Winter (10% of Total Usable Winter Volume) (m³)	
5	Crossing 12	Stream / Lake	62°51'56.49"N	116°51'29.84"W	1047	7	1.1	77000	7700	0	0	0	964263
6	Unnamed Lake 1	Lake	62°50'31.18"N	116°51'20.34"W	573	64	0.5	320000	32000	0	0	0	527720
7	Unnamed Lake 2	Lake	62°49'24.41"N	116°51'29.15"W	682	83	1.4	1162000	116200	0	0	0	628107
8	Unnamed Lake 3	Lake	62°29'53.70"N	116°30'33.52"W	1908	158.6	0.64	1015040	101504	0	0	0	1757225
9	Unnamed Lake 4	Lake	62°29'28.84"N	116°32'35.49"W	2195	34.5	0.58	200100	20010	0	0	0	2021545
10	Unnamed Lake 5	Lake	62°39'31.71"N	116°51'33.03"W	113	13	0.3	39000	3900	0	0	0	104070
11	Unnamed Lake 6	Lake	62°39'38.65"N	116°50'50.60"W	1255	5	1.1	55000	5500	0	0	0	1155827
12	Unnamed Lake 7	Lake	62°46'41.42"N	116°49'17.26"W	12759	94	5	4700000	470000	3.5	3290000	329000	11750750
13	Unnamed Lake 8	Lake	62°29'19.76"N	116°32'10.59"W	159	35	0.6	210000	21000	0	0	0	146435
14	Unnamed Lake 9	Lake	63° 8'41.22"N	116°59'5.78"W	1305	257	7	17990000	1799000	5.5	14135000	1413500	1201875
15	Unnamed Lake 10	Lake	62°55'29.62"N	116°51'58.34"W	172	15	5.1	765000	76500	3.6	540000	54000	158408

* Subtract 1.5 m of ice cover