Pointed Mountain Abandonment Project
Name of Document: Withdrawal Assessment for the Proposed Ice Bridge Locations (Petitot, Liard, and Kotaneelee Rivers)
Revision No.:1

Revision History

Revision #	Section (s) Revised	Description of Revision	Issue Date
0			November 17, 2023
1	All Sections	• Re-ordering methods, existing water licences, and results sub-sections. • Editing text in methods, existing water licences, and results sub-sections. • Minor grammar and formatting edits. • Minor wording edits to table headers and notes	December 22, 2023
1	Introduction	• Minor edits for consistency with other application documents	January 5, 2024
1	Liard River Section	• Adding existing MVLWB licence information; associated edits to Table 3, Table 4, and Figure 1	January 16, 2024

Jacobs

Challenging today.
Reinventing tomorrow.

Jacobs Consultancy Canada Inc.
First Tower, 2700
411 - 1st Street SE
Calgary, AB T2G 4Y5
Canada
T +1.403.407.8700
F +1.503.736.2003
www.jacobs.com

January 16, 2024

Attn: William Kerr, MBA, P.Eng.
Environmental Specialist, Core Projects - West
Enbridge Inc.
200, 425 - 1st Street SW
Calgary, AB. T2P 3L8

Project Name: Pointed Mountain Pipeline Abandonment Project
Project No: CE862600

Subject: Withdrawal Assessment for the Proposed Ice Bridge Locations (Petitot, Liard, and Kotaneelee Rivers)

Introduction

Westcoast Energy Inc. (Westcoast), a subsidiary of Enbridge, applied in 2022 under Section 241 of the Canadian Energy Regulator Act for the Pointed Mountain Pipeline Abandonment Project (the Project). The Nominal Pipe Size (NPS) 20 natural gas gathering pipeline is situated in the southwest corner of the Northwest Territories (NWT), southeast corner of the Yukon Territory, and northeast corner of British Columbia (BC) and is regulated by the Canada Energy Regulator. The pipeline has been deactivated for several years with no prospective future use. As such, Westcoast is planning to take the Pointed Mountain Pipeline permanently out of service by moving on to the abandonment phase.

To access some of the locations where physical abandonment activities will occur in the Northwest Territories, ice bridges will be constructed at the Petitot River, Liard River, and Kotaneelee River. Water will be withdrawn from these rivers to build the ice bridges and to freeze in access along existing roads and the existing Pointed Mountain Pipeline right-of-way.

Based on the proposed amount of water being drawn from the rivers, Westcoast is pursuing a Type A water licence from the Mackenzie Valley Land and Water Board for the Project. As per the Fisheries and Oceans Canada *Code of Practice for ice bridges and snow fills* (Fisheries and Oceans Canada [DFO], 2023), the amount of water to be withdrawn shall not exceed 10% of the actual (instantaneous) flow. Discharge data were publicly available for the Liard River using the Government of Canada Historical Hydrometric Data Search (Government of Canada, 2023). For the Petitot River and Kotaneelee River, monthly discharge statistics were derived using the methods described herein. Discharge data for the Petitot River is publicly available, but the gauging sites are a considerable distance from the proposed diversion.

Date: 16 January 2024

Withdrawal Assessment for the Proposed Ice Bridge Locations (Petitot, Liard, and Kotaneelee Rivers)

Petitot River (IB-01)

Methods

To obtain discharge data for the Petitot River below Highway 77 (Identification [ID] 10DA001), Water Survey of Canada (WSC) information was used for a gauging site approximately 40 km upstream of Ice Bridge IB-01 (Government of Canada, 2023). WSC data were available for 1995 and 1996, and for 2013 through 2019, providing 3,278 days of data. The record of observations is complete over the period of record except for nine days of missing data (late July to early August 2014). Approximately 52% of the discharge data were classified during ice cover conditions.

The contributing watershed areas at the gauged and ungauged sites were as follows:

- Drainage Area at WSC Gauge 10DA001: 22,400 km^2
- Drainage Area at Ice Bridge IB-01: 22,899 km^2

Jacobs transposed the daily discharges recorded at the WSC gauge site for use at the Petitot River Ice Bridge (IB-01) location using the contributing watershed areas at each site and using Equation 1. The exponent 'n' in this equation was set equal to 1, the recommended default value (CEHQ 2019).

Equation 1. Utilized to Transpose WSC Gauge Site Data to IB-01

$$\boldsymbol{Q_u = \left(\frac{A_u}{A_G}\right)^n x Q_G}$$

Q_U: Streamflow at the ungauged station (m^3/s)
Q_G: Streamflow at the gauged station (m^3/s)
A_U: Area of the ungauged station watershed (km^2)
A_G: Area of the gauged station watershed (km^2)
n: Regional exponent

Table 1 summarizes the monthly discharge statistics derived for the Petitot River at IB-01.

Date: 16 January 2024

Withdrawal Assessment for the Proposed Ice Bridge Locations (Petitot, Liard, and Kotaneelee Rivers)

Table 1. Monthly Discharge Statistics for Petitot River at IB-01

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Mean (m^3/s)	10.57	8.97	9.10	33.13	230.81	140.59	90.87	42.22	73.14	48.62	23.50	15.83
Min (m^3/s)	1.80	1.02	0.68	0.72	17.48	18.71	9.26	7.42	6.76	5.63	3.58	1.99
Max (m^3/s)	19.63	18.20	26.17	323.04	1052.95	513.18	395.62	114.50	514.21	140.05	82.60	34.66
Lower (25th Perc.)	5.99	6.02	5.54	7.66	130.85	59.04	39.36	25.28	16.74	18.09	13.75	13.90
Median (m^3/s)	11.76	8.18	8.69	14.62	201.39	111.94	62.77	35.17	35.52	41.50	23.61	17.07
Upper (75th Perc.)	16.97	14.13	13.49	23.77	282.15	191.68	125.74	56.00	56.53	67.57	29.39	20.34
Total Days	279	254	279	270	279	270	277	272	270	279	270	279

Notes:

Perc = percentile

m^3/s = cubic metre(s) per second
Max = maximum
Min = minimum

Date: 16 January 2024

Withdrawal Assessment for the Proposed Ice Bridge Locations (Petitot, Liard, and Kotaneelee Rivers)

Existing Water Licences

Jacobs reviewed the list of existing water licences in the vicinity of the Project that was provided by Westcoast, and it was determined that there are no existing licenses on the Petitot River that need to be included in the present analysis.

Proposed Diversion at IB-01

The proposed diversion will be required from November 2023 through March 2024. Westcoast is proposing to divert 6,000 m^3/day for approximately 150 days. Mean monthly discharge estimates from the WSC station and the proposed diversion are presented in Table 2. As per the Fisheries and Oceans Canada *Code of Practice for ice bridges and snow fills* (DFO, 2023), the proposed water withdrawal will not exceed 10% of the actual (instantaneous) flow. Based on this and assuming 10% of the mean flow, the available capacities from November through March are included in Table 2.

Table 2. Mean Monthly Discharge and Proposed Diversion at IB-01

Month	Monthly Discharge[a] (m^3/day)	10% Allowable Diversion (m^3/day)	Proposed Diversion (%)[b]
November	2,030,400	203,040	2.95
December	1,367,712	136,771	4.38
January	913,248	91,325	6.56
February	775,008	77,500	7.74
March	786,240	78,624	7.60

Notes:
[a]Mean Historical Data -WSC 2023
[b]Percentage of the allowable diversion

Results

The Project is proposing to use between 2.95% and 7.74% of the Petitot River's allowable diversion. The actual water volume used during the Project is likely to be much less, as the maximum withdrawal rate will not be sustained for the entire Project duration. The proposed diversion rates and volume from this diversion are considered sustainable and are not expected to cause any adverse impacts to downstream users.

Date: 16 January 2024

Subject: Withdrawal Assessment for the Proposed Ice Bridge Locations (Petitot, Liard, and Kotaneelee Rivers)

Liard River (IB-02)

Methods

Discharge data were publicly available for the Liard River using the Government of Canada Historical Hydrometric Data Search (Gauge ID 10ED001) [WSC; Government of Canada, 2023], which included years 1942 through 2023. Please refer to Attachment 1 monthly mean flow data for the Liard River.

Jacobs did not transpose the daily discharges due to the relatively close proximity of the proposed ice bridge to the WSC gauge on the Liard River (ID 10ED001) (the gauge is approximately 12 km downstream of IB-02). The difference in the contributing area is not large enough to warrant further analysis.

Existing Water Licences

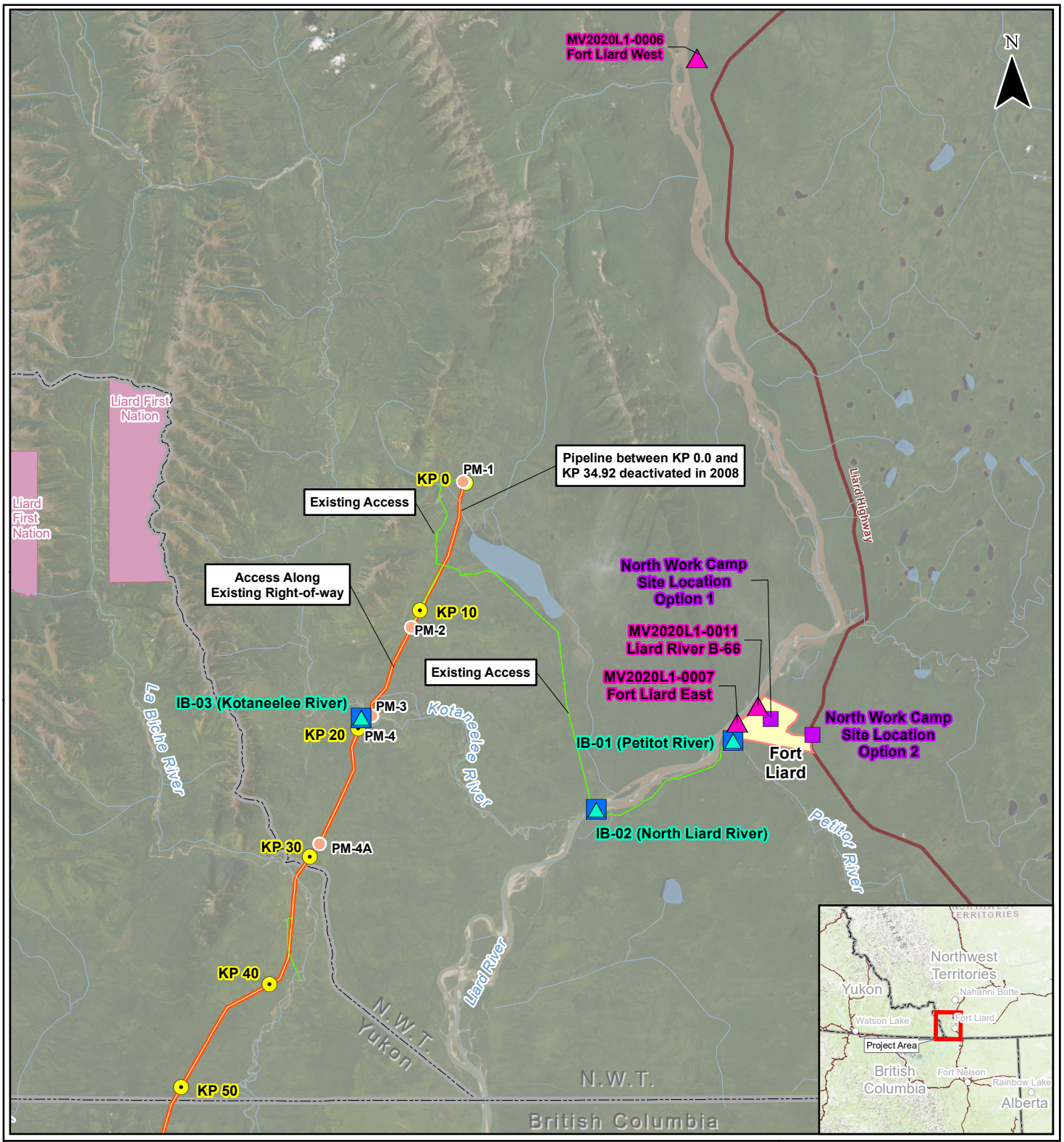
Westcoast obtained all term or permanent water licences on the Liard River in the vicinity of the Project from the Mackenzie Valley Land and Water Board (MVLWB, 2023). Jacobs reviewed the list of licenses provided by Westcoast and selected three water licences for inclusion in the analysis. Table 3 and Figure 1 to the water licence in the vicinity of IB-02. The distance from IB-02 to the water licence diversion location varies from 54 Km upstream to 12 downstream of IB-02.

Table 3. Water Licences within Vicinity of IB-02

Diversion*	Watercourse	Location	Volume of Rate of Withdrawal
MV2020L1-0006[a]	Fort Liard West	6725764 N 472674 E	299 m^3/day
MV2020L1-0007[b]	Fort Liard East	6678389 N 473684 E	300 m^3/day - to a maximum of 60,000 m^3 annually
MV2020L1-0011[c]	Liard River	6679601 N 475177E	45,149 m^3 maximum annually

Notes:

[a] MV2020L1-0006 - Paramount - Issuance - Type B Water Licence - Nov20-20.pdf (mvlwb.ca)
[b] registry.mvlwb.ca/Documents/MV2020L1-0007/Paramount - Liard East – Security Update - Aug30_22.pdf and Canadian Natural Resources Limited – Issuance - Type B Water Licence - Dec30_21.pdf (mvlwb.ca)
[c] Canadian Natural Resources Limited – Issuance - Type B Water Licence - Dec30_21.pdf (mvlwb.ca)



Kilometre Post
Site Location
Water Licence
Water Source
Camp
Ice Bridge
Pointed Mountain Pipeline Route
Access Road
Provincial Boundary
Highway
Watercourse
Water Body
Municipal Boundary
First Nations (Interim Protected Lands)

FIGURE 1

PROJECT OVERVIEW - NORTHWEST TERRITORIES

WESTCOAST ENERGY INC.
POINTED MOUNTAIN PIPELINE ABANDONMENT PROJECT

NAD 1983 UTM Zone 10N

Satellite Imagery: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community; Roads: NRCan 2014-2015; Railway: NRCan 2012.

SCALE: 1:375,000
0 5 10
Kilometres
(All Locations Approximate)

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

January 2024

CE862600

Date: 16 January 2024

Withdrawal Assessment for the Proposed Ice Bridge Locations (Petitot, Liard, and Kotaneelee Rivers)

Proposed Diversion at IB-02

The proposed diversion will be required from November 2023 through March 2024. Westcoast is proposing to divert 6,000 m^3/day for approximately 150 days. Mean monthly discharge estimates from the WSC station and the proposed diversion are presented in Table 4. As per the Fisheries and Oceans Canada *Code of Practice for Ice Bridges and Snow Fills* (DFO, 2023), the proposed water withdrawal will not exceed 10% of the actual (instantaneous) flow. Based on this and assuming 10% of the mean flow, the available capacities from November through March are included in Table 4.

Table 4. Mean Monthly Discharge and Proposed Diversion at IB-02

Month	Monthly Discharge[a] (m^3/day)	Existing Licences[b] (m^3/day)	10% Allowable Diversion (m^3/day)	Proposed Diversion (%)[c]
November	55,071,360	723	5,507,063	0.10
December	38,707,200	723	3,870,647	0.15
January	36,426,240	723	3,642,551	0.16
February	30,838,279	723	3,083,755	0.19
March	27,480,000	723	2,747,927	0.21

Notes:
[a]Mean Historical Data (WSC 2023)
[b]Table 3. Daily maximum value
[c]Percentage of the allowable diversion

Results

The Project is proposing to use between 0.10% and 0.21% of the Liard River's allowable diversion. The actual water volume used during the Project is likely to be much less, as the maximum withdrawal rate will not be sustained for the entire Project duration. The proposed diversion rates and volume from this diversion are considered sustainable and are not expected to cause any adverse impacts to downstream users.

Date: 16 January 2024

Withdrawal Assessment for the Proposed Ice Bridge Locations (Petitot, Liard, and Kotaneelee Rivers)

Kotaneelee River (IB-03)

Methods

To obtain discharge data for the Kotaneelee River at IB-03, Jacobs developed estimates by transferring daily flows from the Beaver River below Whitefish River (ID 10BD001). These data were obtained from WSC, for a gauging site approximately 54 km west-southwest of IB-03 on the Kotaneelee River (Government of Canada, 2023). WSC data were available for 1977 through 1993 and 2014 through 2021 (25 years), providing a total of 8,608 days of data. Approximately 51% of the discharge data were obtained during ice cover conditions and 5% of the data were classified as estimated.

The following years also had incomplete or missing data:

- 1977: 59% missing
- 2014: 69% missing
- 2017: 16% missing

The feasibility of transferring flows from the gauged to the ungauged location was determined by comparing the watershed drainage areas and elevations (Table 5). The mean elevations of the two watersheds are relatively close (there is a 90-metre [m] difference), and Jacobs concluded it was feasible to transfer flows based on the drainage areas. A cursory inspection of publicly available aerial imagery indicated there were no large differences in land cover between the two watersheds, which further supports flow transfer.

Table 5. Table 5. Watershed Area and Elevation Comparison for Kotaneelee River and Beaver River

Location	Watershed Area (km^2)	Min. Elevation (m)	Max. Elevation (m)	Mean Elevation (m)
Beaver River (ID 10BD001)	7,280	379	1,645	983
Kotaneelee River (at IB-03)	2,215	259	1,978	893

Jacobs transposed the daily discharges recorded at the Beaver River below Whitefish River for the IB-03 location using the respective contributing watershed areas at each site and the equation provided in Equation 1, included in section above (CEHQ 2019).

Table 6 lists the monthly discharge statistics derived for the Kotaneelee River at IB-03.

Date: 16 January 2024

Subject: Withdrawal Assessment for the Proposed Ice Bridge Locations (Petitot, Liard, and Kotaneelee Rivers)

Table 6. Monthly Discharge Statistics for Kotaneelee River at IB-03

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Mean (m^3/s)	5.30	4.91	5.05	11.60	56.03	40.96	33.96	24.24	19.38	15.06	9.01	6.74
Min (m^3/s)	2.30	2.30	2.72	3.41	4.81	9.92	8.73	6.05	6.66	4.69	4.47	3.62
Max (m^3/s)	8.15	7.33	10.38	127.18	179.21	292.70	241.28	108.92	77.28	41.68	25.16	14.27
Lower (25^{th} Perc.) (m^3/s)	4.69	4.38	4.20	5.17	33.01	21.54	20.04	15.88	14.03	10.80	7.15	5.72
Median (m^3/s)	5.42	4.87	4.75	6.40	49.59	31.95	27.32	20.45	17.24	13.87	8.63	6.60
Upper (75^{th} Perc.) (m^3/s)	5.87	5.51	5.66	11.86	72.87	50.51	40.62	27.98	21.56	18.16	10.32	7.70
Total Days	713	650	682	664	713	690	713	741	742	775	750	775

Notes:

Perc = percentile

m^3/s = cubic metre(s) per second
Max = maximum
Min = minimum

Date: 16 January 2024

Subject: Withdrawal Assessment for the Proposed Ice Bridge Locations (Petitot, Liard, and Kotaneelee Rivers)

Existing Water Licences

Jacobs reviewed the list of existing water licences in the vicinity of the Project that was provided by Westcoast, and it was determined that there no existing licenses on the Kotaneelee River that need to be included in the present analysis.

Proposed Diversion at IB-03

The proposed diversion will be required from November 2023 through March 2024. Westcoast is proposing to divert 6,000 m^3/day for approximately 150 days. Mean monthly discharge estimates from the WSC station and the proposed diversion are presented in Table 7. As per the Fisheries and Oceans Canada *Code of Practice for ice bridges and snow fills* (DFO, 2023), the proposed water withdrawal will not exceed 10% of the actual (instantaneous) flow. Based on this and assuming 10% of the mean flow, the available capacities from November through March are included in Table 7.

Table 7. Mean Monthly Discharge and Proposed Diversion at IB-03

Month	Monthly Discharge[a] (m^3/day)	10% Allowable Diversion (m^3/day)	Proposed Diversion (%)[b]
November	778,464	77,846	7.70
December	582,340	58,234	10.30
January	457,920	45,792	13.10
February	424,224	42,422	14.14
March	436,320	43,632	13.75

Notes:
[a]Mean Historical Data -WSC 2023
[b]Percentage of the allowable diversion

Results

The Project is proposing to use between 7.70% and 14.14% of the Kotaneelee River's allowable diversion. The actual water volume used during the Project is likely to be much less, as the maximum withdrawal rate will not be sustained for the entire Project duration. The proposed diversion rates and volume from this diversion are considered sustainable and are not expected to cause any adverse impacts to downstream users.

Date: 16 January 2024

Subject: Withdrawal Assessment for the Proposed Ice Bridge Locations (Petitot, Liard, and Kotaneelee Rivers)

References

Mackenzie Valley Land and Water Board (MVLWB, 2023). Home | Mackenzie Valley Land and Water Board (mvlwb.com). Accessed on December 2023.

Centre d'expertise hydrique du Québec (CEHQ). 2019. “Lignes directrices pour l’estimation des débits de crue sur le territoire québécois.” *Expertise hydrique et barrages.* https://www.cehq.gouv.qc.ca/debits-crues/methodes-estimation.htm.

Fisheries and Oceans Canada (DFO). (2023). “Code of practice: Ice bridges and snow fills”. https://www.dfo-mpo.gc.ca/pnw-ppe/codes/ice-bridges-ponts-glace-eng.html.

Government of Canada. 2023. “Historical Hydrometric Data.” https://wateroffice.ec.gc.ca/mainmenu/historical_data_index_e.html.

Attachment 1
Liard River Flow Data

Government of Canada Gouvernement du Canada

Daily Discharge Data for LIARD RIVER AT FORT LIARD (10ED001) [NT]

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

This table provides maximum and minimum daily value for each day over the entire record or over the time period defined by user.

Day	Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Day	Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	MEAN m^3/s	474	384	335	318	1,590	5,370	4,940	3,190	2,240	1,810	1,030	554
	MIN m^3/s	256	185	183	200	292	1,470	2,050	1,490	1,060	769	262	260
	MAX m^3/s	716	626	474	450	4,600	10,900	12,600	6,460	5,370	3,460	1,830	980
	LOWER m^3/s	400	331	304	289	750	3,990	3,660	2,320	1,730	1,460	816	453
	MEDIAN m^3/s	470	388	336	319	1,420	5,160	4,910	2,920	2,070	1,760	962	527
	UPPER m^3/s	534	431	364	339	2,210	6,170	6,000	3,850	2,640	2,050	1,220	622
	DAYS	57	57	57	59	72	74	74	73	75	77	64	59
2	MEAN m^3/s	469	382	333	320	1,770	5,520	4,910	3,150	2,240	1,800	968	557
	MIN m^3/s	255	185	182	201	292	1,590	1,990*	1,450	1,050	763	263	265
	MAX m^3/s	709	605	468	464	5,200	12,300	9,850	6,390	5,050	3,330	1,800	985
	LOWER m^3/s	399	334	306	289	880	4,050	3,660	2,240	1,700	1,430	773	470
	MEDIAN m^3/s	474	386	331	319	1,610	5,310	4,950	2,840	2,130	1,770	939	525
	UPPER m^3/s	531	426	365	342	2,470	6,650	5,910	3,710	2,560	2,100	1,140	617
	DAYS	57	57	57	59	72	74	74	73	75	77	64	59
3	MEAN m^3/s	464	379	332	322	2,000	5,630	5,070	3,100	2,250	1,800	922	557
	MIN m^3/s	253	186	182	204	294	1,930	1,960	1,440	1,060	765	282	270
	MAX m^3/s	696	588	474	475	5,690	13,100	10,000	7,440	5,730	3,260	1,730	990
	LOWER m^3/s	403	331	301	289	1,050	4,170	3,720	2,240	1,660	1,420	730	476
	MEDIAN m^3/s	466	385	329	319	1,970	5,440	4,970	2,790	2,070	1,790	878	535
	UPPER m^3/s	528	428	364	343	2,730	6,640	5,920	3,670	2,650	2,070	1,080	610
	DAYS	57	57	57	59	72	74	74	74	75	77	63	59
4	MEAN m^3/s	460	377	330	324	2,160	5,780	5,150	3,060	2,270	1,800	876	556
	MIN m^3/s	250	186	181	205	303	2,070	1,970	1,410	1,040	758	306	275
	MAX m^3/s	685	584	478	497	5,870	14,000	10,800	8,300	6,830	3,210	1,670	980
	LOWER m^3/s	399	331	301	289	1,100	4,230	3,690	2,200	1,660	1,410	708	470
	MEDIAN m^3/s	467	384	328	318	2,120	5,530	4,920	2,720	2,060	1,820	820	544
	UPPER m^3/s	527	426	355	344	2,950	6,870	6,060	3,460	2,660	2,040	1,040	612
	DAYS	57	57	57	59	72	74	74	74	75	77	63	59

Day	Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5	MEAN m^3/s	456	375	329	326	2,390	5,820	5,100	3,000	2,260	1,790	838	554
	MIN m^3/s	245	186	181	208	340	2,110	2,010	1,340	1,030	714	323	285*
	MAX m^3/s	678	578	478	525	6,280	14,200	11,500	8,350	6,930	3,140	1,580	960
	LOWER m^3/s	399	328	300	292	1,190	4,300	3,700	2,160	1,660	1,400	651	464
	MEDIAN m^3/s	465	378	334	320	2,210	5,620	4,780	2,700	2,120	1,780	785	545
	UPPER m^3/s	514	422	355	345	3,090	6,850	6,040	3,410	2,620	2,050	1,000	630
	DAYS	57	57	57	59	72	74	74	74	75	77	63	59
6	MEAN m^3/s	451	372	327	329	2,540	5,780	4,980	2,950	2,230	1,770	802	552
	MIN m^3/s	238	187	180	210*	396	2,080	2,090	1,300	1,000	748	310	283
	MAX m^3/s	671	555	471	551	6,330	12,800	11,100	8,300	6,200	3,060	1,520	940
	LOWER m^3/s	399	329	298	292	1,420	4,360	3,810	2,140	1,650	1,410	613	455
	MEDIAN m^3/s	450	375	328	326	2,230	5,600	4,510	2,710	2,080	1,740	751	530
	UPPER m^3/s	508	420	355	348	3,230	7,120	5,700	3,320	2,580	2,010	948	632
	DAYS	57	57	57	59	72	74	74	74	75	77	60	59
7	MEAN m^3/s	447	370	325	333	2,680	5,820	4,840	2,910	2,210	1,770	760	549
	MIN m^3/s	232	187*	178	210	464	2,170	2,060	1,250	1,000	752	280	283
	MAX m^3/s	662	549	471	576	7,450	11,100	10,300	7,110	5,070	3,110	1,430	925
	LOWER m^3/s	401	329	296	293	1,610	4,510	3,860	2,130	1,630	1,400	590	456
	MEDIAN m^3/s	446	374	332	328	2,330	5,520	4,640	2,690	2,100	1,740	691	543
	UPPER m^3/s	504	419	354	356	3,500	7,410	5,370	3,250	2,660	1,980	907	632
	DAYS	57	57	57	59	72	74	73	74	75	77	60	59
8	MEAN m^3/s	443	368	324	336	2,760	5,940	4,700	2,880	2,200	1,760	715	545
	MIN m^3/s	225	185	178	213	538	2,430	2,000	1,190	992	743	270	283
	MAX m^3/s	662	546	474	596	8,230	13,100	9,220	7,370	4,320	3,410	1,400	916
	LOWER m^3/s	396	331	293	292	1,760	4,720	3,700	2,100	1,620	1,410	540	464
	MEDIAN m^3/s	435	370	326	326	2,500	5,580	4,580	2,650	2,020	1,710	687	540
	UPPER m^3/s	508	411	351	363	3,580	7,460	5,580	3,190	2,800	1,980	872	610
	DAYS	57	57	57	59	72	73	73	74	75	77	60	59

Day	Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
9	MEAN m^3/s	439	367	322	340	2,860	6,020	4,590	2,860	2,200	1,750	679	540
	MIN m^3/s	220	184	178	216	623	2,470	1,930	1,410	972	738	260	283
	MAX m^3/s	677	542	470	619	8,060	15,000	8,740	6,680	4,930	3,880	1,360	878
	LOWER m^3/s	396	331	289	295	1,920	4,610	3,550	2,050	1,650	1,410	520	470
	MEDIAN m^3/s	425	370	326	330	2,530	5,660	4,380	2,520	1,970	1,710	654	538
	UPPER m^3/s	503	406	349	370	3,400	7,370	5,620	3,370	2,770	2,010	850	592
	DAYS	57	57	57	59	72	73	72	75	75	77	60	59
10	MEAN m^3/s	436	365	322	344	3,010	6,050	4,490	2,820	2,180	1,730	646	536
	MIN m^3/s	214	183	177	223	708	2,510	1,900	1,380	974	746	240	283
	MAX m^3/s	691	539	463	638	8,160	15,200	8,550	6,620	5,480	4,220	1,380	850
	LOWER m^3/s	390	328	289	300	2,110	4,560	3,450	2,020	1,670	1,390	450	470
	MEDIAN m^3/s	422	368	324	333	2,800	5,460	4,290	2,530	1,960	1,680	634	535
	UPPER m^3/s	500	401	351	378	3,710	7,200	5,520	3,380	2,630	1,980	805	592
	DAYS	57	57	57	59	72	73	72	75	75	77	60	58
11	MEAN m^3/s	432	364	321	349	3,100	6,120	4,410	2,780	2,140	1,710	623	535
	MIN m^3/s	208	182	177	227	850	2,700	1,920	1,380	974	753	185	283
	MAX m^3/s	685	537	461	651	7,960	15,300	9,370	6,390	5,430	4,110	1,420	871
	LOWER m^3/s	385	328	289	301	2,150	4,640	3,350	1,950	1,640	1,360	439	464
	MEDIAN m^3/s	425	365	323	336	2,960	5,630	4,070	2,440	1,940	1,660	603	535
	UPPER m^3/s	489	404	349	382	4,050	6,970	5,440	3,400	2,530	1,950	722	584
	DAYS	57	57	57	59	72	73	73	75	75	77	60	58
12	MEAN m^3/s	428	363	320	355	3,260	6,140	4,320	2,720	2,110	1,680	602	532
	MIN m^3/s	202	181	178	229	963	2,610	1,950	1,380	986	770	210*	280
	MAX m^3/s	675	533	463	663	7,890	15,000	9,030	5,540	5,060	3,910	1,370	883
	LOWER m^3/s	389	326	289	309	2,080	4,690	3,260	2,010	1,620	1,310	420	455
	MEDIAN m^3/s	429	362	323	335	2,980	6,110	3,990	2,450	1,980	1,640	565	528
	UPPER m^3/s	480	409	349	384	4,150	6,770	5,170	3,240	2,500	1,890	774	596
	DAYS	57	57	57	59	73	73	73	75	75	77	60	58

Day	Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
13	MEAN m^3/s	426	360	320	362	3,350	6,090	4,310	2,670	2,070	1,650	585	528
	MIN m^3/s	195	179	178	232	1,100	2,490	2,030	1,410	1,030	757	228	280
	MAX m^3/s	667	530	460	690	7,970	14,600	9,290	5,160	4,670	3,690	1,210	857
	LOWER m^3/s	385	326	289	311	2,240	4,560	3,220	1,970	1,610	1,290	411	449
	MEDIAN m^3/s	428	360	322	339	3,070	5,800	3,960	2,460	1,900	1,610	545	525
	UPPER m^3/s	474	406	346	398	4,300	6,900	5,350	3,200	2,440	1,870	743	586
	DAYS	57	57	57	59	73	73	73	75	75	77	60	58
14	MEAN m^3/s	423	358	319	370	3,450	5,990	4,320	2,630	2,050	1,620	566	524
	MIN m^3/s	192	178	178	235	1,150	2,540	2,080	1,490	1,020	756	225	280
	MAX m^3/s	655	527	459	726	9,090	14,000	12,000	4,930*	4,330	3,410	1,180	818
	LOWER m^3/s	379	323	289	314	2,220	4,520	3,280	2,080	1,550	1,260	400	445
	MEDIAN m^3/s	422	359	322	342	3,240	5,520	3,820	2,450	1,850	1,600	520	516
	UPPER m^3/s	473	399	345	422	4,260	7,040	5,130	3,090	2,390	1,850	712	582
	DAYS	57	57	57	59	74	73	73	74	75	77	59	58
15	MEAN m^3/s	420	357	318	380	3,630	5,860	4,320	2,580	2,030	1,590	560	522
	MIN m^3/s	188	177	178	238	1,020	2,940	2,090	1,450	1,000	755	226	280
	MAX m^3/s	646	524	458	770	8,320	12,500	14,100	4,850	4,170	3,160	1,160	785
	LOWER m^3/s	375	323	291	318	2,400	4,490	3,220	2,040	1,520	1,260	390	440
	MEDIAN m^3/s	424	358	322	360	3,460	5,520	3,880	2,390	1,900	1,630	530	512
	UPPER m^3/s	470	398	346	431	4,490	6,750	5,040	3,020	2,370	1,800	685	583
	DAYS	57	57	57	59	75	73	73	74	75	77	59	58
16	MEAN m^3/s	419	356	317	394	3,700	5,770	4,310	2,530	2,030	1,560	554	521
	MIN m^3/s	186	175	179	244	804	3,040	2,060	1,420	970	769	229	280
	MAX m^3/s	650	520	459	797	9,580	11,100	14,300	4,980	4,350	2,980	1,130	767
	LOWER m^3/s	377	323	291	323	2,550	4,340	3,060	1,990	1,550	1,270	392	439
	MEDIAN m^3/s	419	359	318	372	3,550	5,290	4,000	2,310	1,910	1,600	513	511
	UPPER m^3/s	462	396	345	449	4,480	6,680	5,070	2,900	2,360	1,770	668	580
	DAYS	57	57	57	59	75	74	73	74	75	77	59	58

Day	Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
17	**MEAN m^3/s**	418	354	316	409	3,790	5,760	4,300	2,470	2,020	1,540	548	520
	MIN m^3/s	185	174	180	249	787	3,010	2,060	1,400	953	779	229	280
	MAX m^3/s	661	517	460	840	10,600	13,000	14,000	5,040	4,900	2,850	1,110	773
	LOWER m^3/s	374	320	292	331	2,810	4,330	2,990	1,910	1,520	1,250	410	439
	MEDIAN m^3/s	430	357	316	388	3,570	5,200	3,890	2,370	1,900	1,550	521	505
	UPPER m^3/s	473	395	343	476	4,460	6,660	5,150	2,810	2,360	1,750	698	581
	DAYS	57	57	57	59	75	74	73	74	76	77	59	58
18	**MEAN m^3/s**	416	352	315	427	3,920	5,760	4,270	2,440	2,030	1,510	546	519
	MIN m^3/s	183	173	181	255	1,170	2,930	2,020	1,370	932	702	220	280
	MAX m^3/s	673	513	460	893	10,500	13,400	12,500	4,810	5,030	2,790	1,100	778
	LOWER m^3/s	374	320	293	331	2,960	4,300	2,940	1,980	1,510	1,220	427	446
	MEDIAN m^3/s	425	352	315	393	3,620	5,290	3,800	2,340	1,950	1,530	505	500
	UPPER m^3/s	469	398	343	498	4,670	6,670	5,050	2,760	2,470	1,710	674	578
	DAYS	57	57	57	59	75	74	73	74	76	77	59	58
19	**MEAN m^3/s**	414	350	315	466	4,080	5,710	4,180	2,440	2,010	1,480	544	517
	MIN m^3/s	182	172	181	261	1,530	2,850	1,980	1,320	920	657	209	279
	MAX m^3/s	679	510	458	1,780	9,850	13,300	12,500	6,060	4,940	2,840	1,080	775
	LOWER m^3/s	372	320	293	331	3,090	4,190	2,850	1,950	1,510	1,170	411	441
	MEDIAN m^3/s	418	349	316	439	3,590	5,250	3,830	2,290	1,940	1,480	495	502
	UPPER m^3/s	470	398	341	535	4,590	6,640	5,110	2,830	2,430	1,680	680	572
	DAYS	57	57	57	59	75	74	72	74	76	77	59	58
20	**MEAN m^3/s**	410	348	315	487	4,180	5,600	4,090	2,450	1,980	1,450	543	512
	MIN m^3/s	182	173	182	266*	1,550	2,730	1,950	1,360	901	585	220	276
	MAX m^3/s	679	508	459	1,530	11,000	12,600	11,900	6,770	4,690	2,830	1,060	767
	LOWER m^3/s	370	317	291	337	3,220	4,240	2,730	1,930	1,500	1,170	416	438
	MEDIAN m^3/s	413	348	320	472	3,670	5,290	3,680	2,370	1,940	1,450	520	500
	UPPER m^3/s	465	394	338	549	4,670	6,590	5,020	2,850	2,340	1,650	650	566
	DAYS	57	57	57	59	74	74	72	73	76	76	59	58

Day	Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
21	**MEAN m^3/s**	408	346	314	519	4,260	5,500	4,050	2,440	1,950	1,420	541	508
	MIN m^3/s	183	173	183	268	1,610	2,650	1,900	1,300	882	510	243	272
	MAX m^3/s	670	506	461	1,340	10,400	11,200	9,460	6,970	4,300	2,750	1,050	756
	LOWER m^3/s	368	314	292	347	3,170	4,390	2,620	1,920	1,480	1,170	410	430
	MEDIAN m^3/s	408	346	320	497	3,850	5,250	3,620	2,340	1,920	1,420	525	497
	UPPER m^3/s	466	384	337	590	4,810	6,540	4,840	2,860	2,290	1,660	651	581
	DAYS	57	57	57	59	74	74	72	73	76	76	59	58
22	**MEAN m^3/s**	405	345	313	566	4,330	5,440	3,990	2,450	1,920	1,390	539	503
	MIN m^3/s	183	174	184	273	1,700	2,620	1,900	1,270	901	499	255	271
	MAX m^3/s	652	505	462	1,400	9,520	10,300	9,150	8,010	3,990	2,660	1,030*	739
	LOWER m^3/s	363	311	289	358	3,320	4,290	2,640	1,910	1,460	1,130	409	425
	MEDIAN m^3/s	403	346	319	516	4,030	5,160	3,650	2,310	1,910	1,360	502	496
	UPPER m^3/s	463	384	337	665	4,890	6,430	4,640	2,870	2,180	1,620	638	577
	DAYS	57	57	57	59	74	74	72	73	76	76	59	58
23	**MEAN m^3/s**	403	344	313	637	4,420	5,420	3,930	2,460	1,900	1,360	535	501
	MIN m^3/s	183	176	185	286	1,780	2,510	1,870	1,260	886	446	255	269
	MAX m^3/s	642	503	463	2,250	9,930	9,740	8,760	9,000	3,750	2,580	1,010	737
	LOWER m^3/s	357	311	289	378	3,160	4,480	2,820	1,900	1,450	1,130	396	425
	MEDIAN m^3/s	397	342	318	552	4,080	5,190	3,520	2,280	1,910	1,310	507	490
	UPPER m^3/s	460	387	336	770	4,930	6,340	4,570	2,890	2,240	1,560	628	578
	DAYS	57	57	57	59	74	74	72	73	76	76	59	58
24	**MEAN m^3/s**	401	343	312	729	4,470	5,430	3,840	2,420	1,890	1,330	533	499
	MIN m^3/s	183	177	187	292	1,880	2,400	1,800	1,220	877	398	255	268
	MAX m^3/s	640	501	464	3,300	10,100	10,500	7,650	8,860	3,580	2,520	991	748
	LOWER m^3/s	343	311	289	396	3,360	4,340	2,740	1,870	1,460	1,090	387	420
	MEDIAN m^3/s	396	343	317	580	4,240	5,170	3,440	2,210	1,910	1,290	500	486
	UPPER m^3/s	458	386	334	855	5,000	6,470	4,700	2,710	2,200	1,560	628	568
	DAYS	57	57	58	59	74	74	72	73	76	76	59	58

Day	Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
25	**MEAN m^3/s**	399	341	311	897	4,510	5,380	3,750	2,420	1,880	1,300	533	496
	MIN m^3/s	183	178	188	292	1,920	2,360	1,780	1,190	852	338	255	266
	MAX m^3/s	647	493	463	4,000	9,320	10,800	6,930	8,210	3,470	2,480	971	745
	LOWER m^3/s	340	307	289	405	3,450	4,300	2,790	1,830	1,520	1,070	393	420
	MEDIAN m^3/s	394	342	315	657	4,410	5,080	3,340	2,190	1,900	1,290	520	486
	UPPER m^3/s	456	382	333	1,130	5,150	6,460	4,450	2,590	2,180	1,530	610	566
	DAYS	57	57	58	59	74	74	73	73	76	76	59	58
26	**MEAN m^3/s**	397	340	312	1,090	4,600	5,330	3,630	2,390	1,870	1,270	536	496
	MIN m^3/s	183	180	190	292	2,040	2,320	1,760	1,160	842	317	250	265
	MAX m^3/s	658	485	462	5,730	9,490	10,900	6,510	7,190	3,350	2,460	951	752
	LOWER m^3/s	337	306	287	435	3,650	4,230	2,790	1,820	1,490	1,040	402	420
	MEDIAN m^3/s	395	342	314	722	4,480	4,980	3,180	2,180	1,900	1,250	520	482
	UPPER m^3/s	454	382	335	1,330	5,380	6,630	4,280	2,610	2,160	1,500	600	575
	DAYS	57	57	58	59	74	74	73	73	76	76	59	58
27	**MEAN m^3/s**	395	338	312	1,230	4,700	5,280	3,530	2,340	1,860	1,230	537	492
	MIN m^3/s	183	181	193	292	1,930	2,360	1,690	1,140	830	300	250	263
	MAX m^3/s	670	479	460	6,410	10,500	10,300	6,400	6,450	3,300	2,430	942	764
	LOWER m^3/s	334	309	285	467	3,840	4,080	2,690	1,800	1,500	1,010	406	420
	MEDIAN m^3/s	396	341	317	805	4,630	4,870	3,230	2,140	1,850	1,190	510	490
	UPPER m^3/s	450	379	335	1,460	5,440	6,560	4,130	2,600	2,160	1,470	635	568
	DAYS	57	57	58	60	74	74	73	74	76	76	59	58
28	**MEAN m^3/s**	393	337	312	1,340	4,860	5,200	3,440	2,320	1,860	1,180	542	489
	MIN m^3/s	184	181	194	292	1,810	2,360	1,660	1,110	804	286	250	262
	MAX m^3/s	666	477	461	6,500	12,000	10,200	6,370	5,920	3,380	2,370	957	749
	LOWER m^3/s	336	308	288	512	3,850	4,050	2,570	1,840	1,460	980	427	420
	MEDIAN m^3/s	396	337	317	905	4,770	4,780	3,150	2,140	1,820	1,150	515	483
	UPPER m^3/s	449	365	335	1,720	5,590	6,460	4,050	2,550	2,160	1,390	629	571
	DAYS	57	57	58	60	74	74	73	74	76	76	59	58

Day	Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
29	**MEAN m^3/s**	391	-	313	1,410	4,970	5,080	3,360	2,290	1,840	1,140	549	486
	MIN m^3/s	184	-	195	292	1,700	2,280	1,600	1,090	794	275	250	261
	MAX m^3/s	653	-	458	6,000	11,600	11,300	7,270	5,760	3,540	2,260	960	741
	LOWER m^3/s	332	-	289	566	3,900	3,970	2,540	1,800	1,470	929	460	415
	MEDIAN m^3/s	394	-	317	961	4,750	4,570	3,090	2,140	1,810	1,100	517	481
	UPPER m^3/s	443	-	336	1,980	5,840	6,190	4,050	2,620	2,130	1,390	623	554
	DAYS	57	-	58	60	74	74	73	74	76	76	59	58
30	**MEAN m^3/s**	389	-	314	1,540	5,120	4,980	3,270	2,280	1,830	1,100	551	482
	MIN m^3/s	184	-	197	292	1,590	2,140	1,570	1,070	784	266	255	259
	MAX m^3/s	642	-	452	5,000	11,100	12,500	6,350	5,730	3,560	2,030	970	726
	LOWER m^3/s	327	-	289	617	3,870	3,790	2,430	1,770	1,440	889	445	415
	MEDIAN m^3/s	392	-	321	1,160	4,890	4,750	3,050	2,140	1,780	1,060	525	480
	UPPER m^3/s	437	-	340	2,180	5,960	5,900	3,940	2,550	2,110	1,330	626	547
	DAYS	57	-	58	60	74	74	73	74	76	76	59	58
31	**MEAN m^3/s**	386	-	316	-	5,240	-	3,210	2,250	-	1,060	-	478
	MIN m^3/s	185	-	198	-	1,500	-	1,540	1,070	-	261	-	258
	MAX m^3/s	638	-	453	-	10,200	-	6,180	5,580	-	1,920	-	723
	LOWER m^3/s	326	-	289	-	4,020	-	2,370	1,730	-	840	-	415
	MEDIAN m^3/s	391	-	320	-	5,050	-	3,100	2,070	-	999	-	481
	UPPER m^3/s	436	-	341	-	6,040	-	3,970	2,580	-	1,270	-	538
	DAYS	57	-	58	-	74	-	73	74	-	76	-	58

- - = Data is not available.
- * = Data occurs more than once.

*Note: If n<10, percentiles are not calculated.

Station Information

Active or discontinued:	Active
Province / Territory:	Northwest Territories
Latitude:	60° 14' 29" N
Longitude:	123° 28' 31" W

Gross drainage area:	222,000 km^2
Effective drainage area:	N/A
Record length:	82 Years
Period of record:	1942-2023
Regulation type:	Natural
Regulation length:	N/A
Real-time data available:	Yes
Sediment data available:	No
Type of water body:	River
RHBN:	No
EC Regional Office:	YELLOWKNIFE
Current Operation Schedule:	Continuous
Data contributed by:	N/A
Operation Period:	N/A
Vertical datum of published data:	ASSUMED DATUM
Datum Conversions:	More information

Data Collection History

This table contains information pertaining to the historical changes of defined elements in the operation of a station.

	Type	Operation schedule	Gauge type
1942 - 1959	Flow	Seasonal	Manual
1960 - 1961	Flow	Continuous	Manual
1962 - 1964	Flow	Miscellaneous	Manual
1965 - 1965	Flow	Seasonal	Manual
1966 - 1980	Flow	Continuous	Recorder
1981 - 1982	Flow	Seasonal	Recorder
1983 - 2001	Flow	Continuous	Recorder
2002 - 2023	Flow & Level	Continuous	Recorder

Historical Hydrometric Remarks

RECORDS ARE BEING REVIEWED

Click here for further information on remarks.