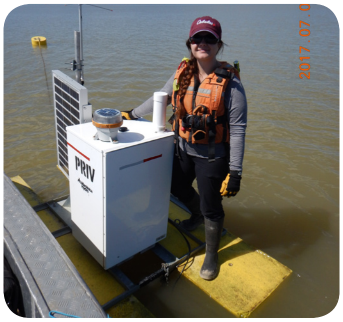
Keeyask Generation Project

Sediment Management Plan for In-stream Construction

Sediment Management Plan Report

SMP-2018-01



KEEYASK

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2017 - 2018

KEEYASK GENERATION PROJECT

SEDIMENT MANAGEMENT PLAN FOR IN-STREAM CONSTRUCTION

REPORT #SMP-2018-01

ANNUAL REPORT

April 2017 – March 2018: Year 4 Construction

Prepared by

Manitoba Hydro

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SUMMARY

This *Sediment Management Plan for In-stream Construction* (SMP) was developed for the construction phase of the Keeyask Generation Project (the Project) to minimize the impacts of in-stream sediment generated from construction activities on the Nelson River. Excessive amounts of sediment generated during construction could change the water quality and be harmful to fish and fish habitat.

Sediment in the river is measured every 15 minutes at locations up and downstream of the construction site using an automated system to track sediment changes during major in-stream work, such as placing rock in the river to build cofferdams. The readings are sent to a computer where personnel watch and compare the amount of sediment between up and downstream in real time. The change in sediment observed is compared to predetermined action levels, which were determined by the Keeyask Hydropower Limited Partnership in consultation with provincial and federal regulators. Should the action levels be exceeded, site personnel would work with the contractor to reduce the amount of sediment entering the river during the particular construction activity, for example, slowing down rock placement in the water to reduce the amount of sediment produced.

Sediment monitoring has been conducted in accordance with the SMP since the Project began in July 2014. There have been no exceedences of action levels due to in-stream construction activities since the start of the Project.

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1.0 INTRODUCTION

The Keeyask Generation Project (the Project) is a 695-megawatt (MW) hydroelectric generating station at Gull Rapids on the lower Nelson River in northern Manitoba. The Project is approximately 725 kilometres (km) northeast of Winnipeg, 35 km upstream of the existing Kettle Generating Station, where Gull Lake flows into Stephens Lake, 60 km east of the community of Split Lake, 180 km east-northeast of Thompson and 30 km west of Gillam. Construction of the Project began in July 2014.

The principal structures for the Keeyask Generating Station are:

- • North and South Dykes;
- • North, Central and South Dams;
- • Powerhouse complex including the intake and tailrace channels; and
- • Spillway including an approach channel and discharge channel.

The *Keeyask Generation Project: Response to EIS Guidelines*, completed in June 2012, provides a summary of predicted effects and planned mitigation for the Project. The *Sediment Management Plan for In-stream Construction* (SMP) (KHLP 2014) was developed for the construction phase of the Project, to minimize the impacts of in-stream sediment from construction activities in the Nelson River. It describes the monitoring and management of Total Suspended Solids (TSS) inputs into the waterway that may occur as a result of shoreline erosion, in-stream construction, river management, and commissioning of the Spillway and the Powerhouse. The SMP comprises a real-time sediment monitoring program, which is being implemented for in-stream construction activities in the Nelson River, throughout construction.

This report summarizes the results for the sediment monitoring that took place during in-stream construction in the Nelson River from April 2017 to March 2018.

1.1 CONSTRUCTION SUMMARY

Construction of the Keeyask GS began in mid-July 2014 with the construction of cofferdams in the north and central channels of Gull Rapids (Figure 1). These cofferdams resulted in the dewatering of the north and central channels and the diversion of all flow to the south channel. Construction of the spillway cofferdam, which extends into the south channel of Gull Rapids, was completed in 2015. During 2016 there was little instream construction until placement of rock for the Tailrace Cofferdam began in late fall and continued into 2017. Large rocks were placed in the Nelson River to form the inner and outer groins of the Tailrace Cofferdam. An opening was left in the rock groins to allow fish to move into and out of the cofferdam. Placement of fine material between the two sections of the cofferdam began and was completed in late 2017. An opening was created to allow fish to move freely over the winter of 2017/18.

The opening will be closed in spring 2018. Construction of the Tailrace Cofferdam did not affect water levels or flows through Gull Rapids.

As in previous years, an ice boom was installed in Gull Lake to assist in the formation of a stable ice cover.

(Note: The North Channel Rock Groin Extension is not shown)

Figure 1: Map of the Keeyask Generating Station site, September 2017

2.0 SEDIMENT MONITORING PROGRAM

As part of the Keeyask Generation Station Project, a detailed real-time sediment monitoring program was developed for the construction phase to monitor sediment inputs from in-stream construction activities in the Nelson River. The *Keeyask Generation Project Sediment Management Plan for In-stream Construction* (KHLP 2014) outlines the monitoring and management of Total Suspended Solids (TSS) that may occur as a result of in-stream construction and commissioning of the Spillway and the Powerhouse.

Turbidity (Tu) is monitored through the use of turbidity loggers at three locations (with a total of five monitoring stations). The turbidity data are converted to TSS values based on the derived relationship between Tu and TSS, as explained in the SMP. Monitoring locations are discussed in more detail in Sections 2.1, 2.2, and 2.3.

The monitoring locations are consistent with the baseline monitoring sites that were used in the environmental assessment studies. While it is intended that monitoring be undertaken at these locations, the actual locations may be adjusted in the field based on factors such as the safety of personnel and equipment, accessibility, and ambient conditions (*e.g.*, high river flow, high water velocity, unsafe ice).

2.1 OPEN WATER MONITORING STATIONS

During the month of June 2017, the open water monitoring stations were installed on the Nelson River. Five monitoring stations (SMP-1, SMP-2L & SMP-2R, SMP-3L & SMP-3R) were deployed as outlined in the SMP to collect turbidity data for the Project. A backup station (SMP-1A) was installed near SMP-1 as a precaution, so background data would be continuously available in the event that SMP-1, which is the sole upstream monitoring station, failed or became damaged. At each station, sensors were installed two meters below the water's surface (designated TSSS) and two meters above the bottom of the channel (designated TSSB). Figure 2 shows the location of each of the SMP open water monitoring stations. The stations are described in more detail below:

- SMP-1 is located upstream of all construction activities in the Nelson River and monitors ongoing background conditions.
- SMP-2 is located approximately 1.5 km downstream of the future Powerhouse. Data loggers are installed on the left and right sides of the channel (SMP-2L and SMP-2R). This location was chosen, as it is a near-field location within the mixing zone prior to fully mixed conditions.
- SMP-3 is located approximately 9 km downstream from the construction site in the fully mixed zone of the primary flow channel, along the deepest part of the river. This location was chosen because the majority of the flow passes through this south channel and it is

where increases in TSS will mostly occur. Data loggers are installed on both the left and right sides of the channel (SMP-3L & SMP-3R).

Figure 2: Open water monitoring stations for the Keeyask Sediment Management Plan

Open water monitoring equipment was removed in September 2017, near the end of the open water season, on the following days:

- SMP-1 on September 21; and
- SMP-2L, SMP-2R, SMP-3L, SMP-3R on September 19.

Since construction began, flow velocities have increased at the site of SMP-2R, likely due to changes in the river's flow pattern driven by the presence of the Project. On June 27, the catamaran at SMP-2R capsized during high winds, which damaged the instrumentation. A similar event occurred at SMP-2R in October 2016. It was determined that flow velocities at SMP-2R have become too great to successfully maintain a station at that location, and a different location nearby would have to be selected. The station was moved to a new site on July 2, but flow conditions at that location were also unsuitable. On July 7, SMP-2R was moved again, 460 meters downstream from its original location, and functioned well for the rest of the open water season.

2.2 SHOULDER SEASON MONITORING STATIONS

Shoulder season monitoring was not implemented in 2017 and will not be implemented in future years because efforts in previous years to monitor TSS during the ice on and off transition periods have not been successful. Each year, moving ice has destroyed the communication cables between the in-stream turbidity sensors and the data loggers installed on shore. There is no feasible layout at these times of the year to prevent this from occurring. Where results were obtained, frazil ice produced in the Nelson River between Clarke Lake and Gull Rapids caused interference and damaged the turbidity monitoring sensors, which produced unreliable data.

2.3 WINTER MONITORING STATIONS

The SMP describes modifications to the open water program required in winter with ice conditions. Monitoring stations were installed upstream at SMP-1 and downstream at SMP-3 during the winters of 2017 and 2018. In both winters, monitoring equipment was not installed at SMP-2 due to unfavorable ice conditions that would cause interference with instrumentation. For the 2017/2018 reporting period, monitoring stations were in place as follows:

- Winter 2017:
  - SMP-1: April 1 – April 15, 2017
  - SMP-3L: April 1 – May 7, 2017
  - SMP-3R: April 1 – May 7, 2017

- Winter 2018:
  - SMP-1: January 18, 2018 – March 31, 2018
  - SMP-3L: January 19, 2018 – March 31, 2018
  - SMP-3R: December 16, 2017 – March 31, 2018

2.4 ACTION AND TARGET LEVELS

As outlined in the SMP, the management of TSS levels during construction incorporates two action levels measured in the mixing zone at SMP-2:

1. Four, consecutive, 15-minute averaged measurements over 25 mg/L above background TSS at monitoring site SMP-1; and
2. One, 15-minute averaged increase of 200 mg/L above background TSS at monitoring site SMP-1.

Both action levels are below acutely lethal thresholds of TSS for freshwater fish, which range from hundreds to hundreds of thousands of mg/L. The action levels at SMP-2 are set such that action is initiated to reduce construction sediment inputs, in order to maintain a 24-hour average increase of 25 mg/L or less at SMP-3, relative to SMP-1 (background TSS).

An exceedence of these action levels initiates an investigation to identify the source of the TSS, implement secondary mitigation strategies for unanticipated events, and/or modify in-stream construction procedures as outlined in the SMP.

2.5 MANUAL SAMPLING

2.5.1 TURBIDITY / TSS RELATIONSHIP VALIDATION

As outlined in the SMP, the *in situ* turbidity logger data measured at each monitoring site and the relationship used to calculate TSS from turbidity were confirmed through manual monitoring of turbidity using handheld loggers and collecting water samples for TSS analysis at the same time. Manual sampling began in late June and ended in mid-September of 2017. Turbidity measurements and TSS samples were collected near the surface, middle, and bottom of the water column in the vicinity of each SMP monitoring station. The results are provided in Table 1.

Table 1 shows the relationship used to calculate real-time TSS using turbidity as a proxy is appropriate, as laboratory TSS analysis results are generally close to the calculated TSS values.

2.5.2 DETECTING SEDIMENT PLUMES IN THE MIXING ZONE

To confirm the SMP-2 stations (*i.e.*, left and right locations) were positioned such that the deployed loggers would detect an increase in turbidity from a passing sediment plume, if any, turbidity measurements were taken along a cross section of the river at twenty sites near SMP-2 (Figure 3). Transect measurements were obtained once during the open water season, when in-stream work was not occurring (July 15, 2017; Table 2), and during in-stream work on the Tailrace Cofferdam (August 20, 2017; Table 3). Based on the data collected, there were no variations in the turbidity detected across the river when there was no in-stream work and when in-stream work was occurring. When no in-stream work is taking place, it would be expected that the river is well mixed at the transect site and would have relatively uniform turbidity across the channel width. Uniform turbidity levels across the river during periods of in-stream work showed that there was no discernible effect of the work on turbidity at the downstream site.

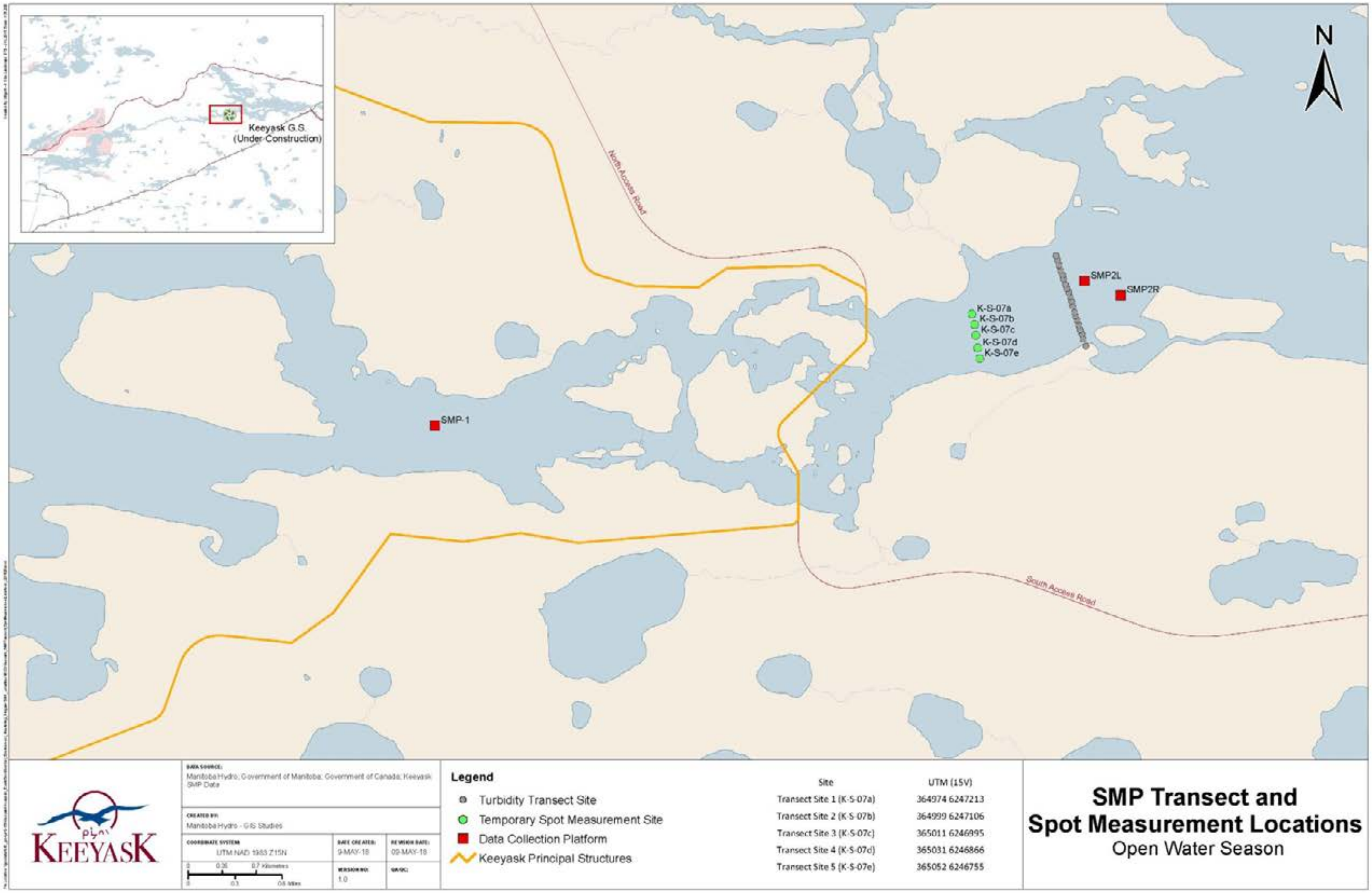

Figure 3: Map of turbidity measurements for cross-section of the Nelson River at SMP-2 sites and spot measurement sites (K-S-07) between Gull Rapids and the SMP-2 sites

3.0 IN- STREAM WORK

3.1 NORTH CHANNEL ROCK GROIN EXPANSION

Extremely high flows forecasted for the spring melt of 2017 posed a threat to the integrity of the North Channel Rock Groin (NCRG), as over-topping could cause the structure to erode or breach. In-stream construction to expand the footprint of the NCRG by approximately 1000 m^2 began on April 8, 2017 and was completed on April 13, 2017. As part of the construction, rock material was placed at a section at the northern end of the NCRG (Figure 4) to increase the elevation of that section, as well as widening it by approximately four meters.

Figure 4: A Cat 390D excavator placing Class C4 rock material at the North Channel Rock Groin on April 12, 2017

As explained in Section 2.3, SMP monitoring equipment was in place (with the exception of SMP-2 sites) during the construction of the North Channel Rock Groin expansion. There were no exceedences of the action levels at SMP-3 observed during the time that this in-stream work was occurring (Figure 5).

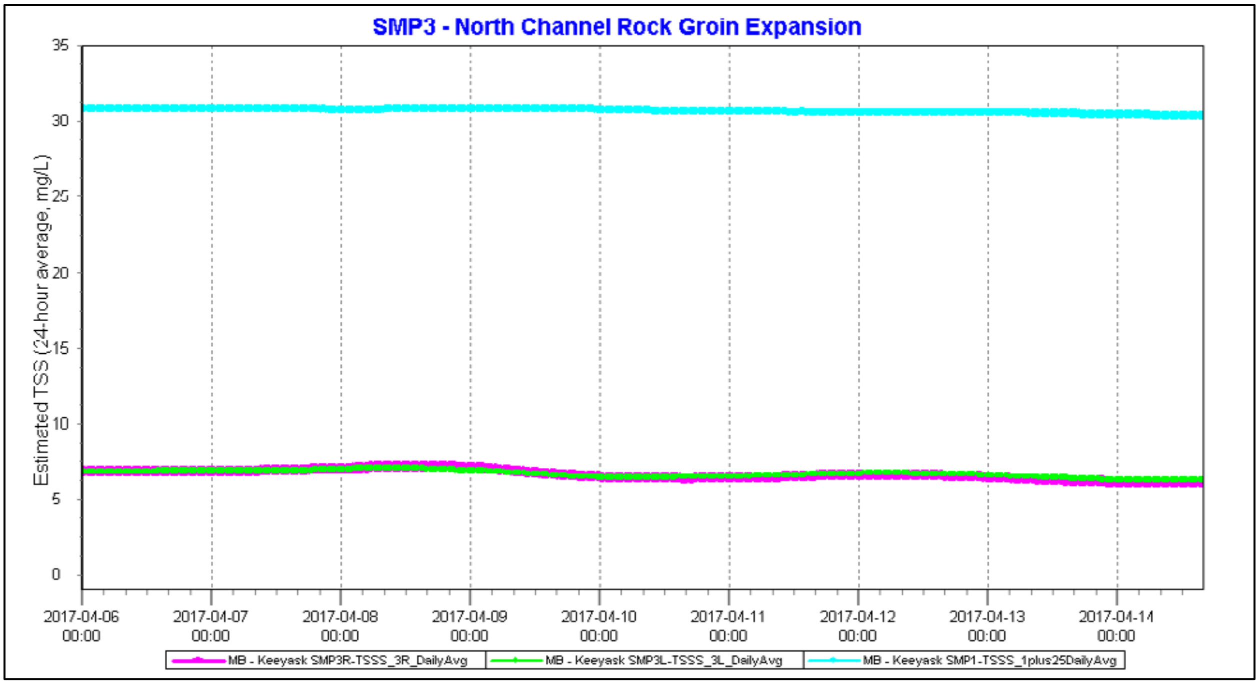

Figure 5: Estimated total suspended solids (TSS) values (24-hour average, mg/L) from April 6, 2017 through April 14, 2017 at monitoring stations SMP-3R and SMP-3L compared with the action level, which is shown in light blue

3.2 DOWNSTREAM BOAT LAUNCH

The temporary downstream boat launch is a rockfill ramp that extends into Stephens Lake below Gull Rapids. The design of the boat launch cannot withstand the movement of ice during freeze-up and break-up and must be repaired every spring. Repairs were made to the downstream boat launch on June 23 and 25, 2017 (Figure 6). In-stream work included the placement of a mixture of coarse and fine rock on the ramp of the launch and a few large boulders along the side of the ramp to serve as a small breakwater.

In-stream monitoring equipment was being deployed during the time that these repairs were being completed, so only a partial monitoring dataset is available (Figure 7). For the period when SMP monitoring equipment was in place, there were no exceedences of the action levels in the SMP observed while the work was occurring.

Note: Several C4-sized boulders were placed along the edge of the ramp (shown at right) to create a small breakwater and help protect the ramp from wave action damage.

Figure 6: The ramp of the temporary downstream boat launch on June 23, 2017, part-way through the repair

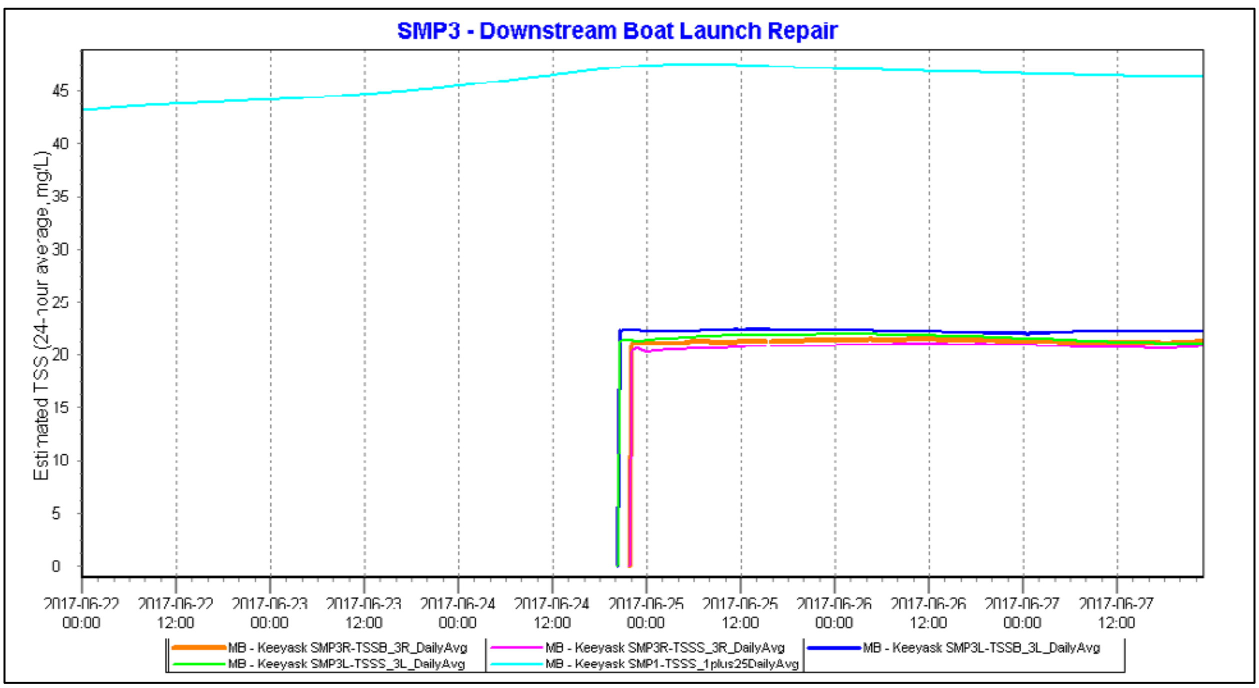

Figure 7: Estimated total suspended solids (TSS) values (24-hour average, mg/L) from June 22, 2017 through June 28, 2017 at monitoring stations SMP-3L and SMP3-R compared with the action level, which is shown in light blue

3.3 TAILRACE COFFERDAM

Construction of the Tailrace Cofferdam began in 2016. This structure is comprised of inner and outer rock groins (Figure 8), between which impervious material will be placed. An opening was left in both of the groins to allow fish to move freely out of the area throughout the 2016/2017 winter months.

In-stream work to construct the Tailrace Cofferdam resumed in July 2017. It was expected that sediment between the rock groins would need to be removed before the sandy-silt (“impervious material”) core of the cofferdam could be placed; however, bedrock scraping tests conducted on July 18 and 22, 2017 (Figure 8) indicated that minimal dredging would be required. Dredging and other in-stream preparation for placing the cofferdam’s impervious core were completed between August 12-13, 2017. On August 20 and 21, 2017, the opening in the outer groin was closed with rockfill to create a continuous road/working surface for haul trucks delivering loads of material for its construction (Figure 9). Placement of impervious material between the inner and outer groins, which was required to seal the cofferdam, occurred from August 21-24 (Figure 10).

Figure 8: A Komatsu PC2000 excavator being used to carry out bedrock scraping tests to determine the extent of dredging required to remove sediment and rocks from between the groins of the Tailrace Cofferdam. Photo taken July 18, 2017

Figure 9: A Komatsu HM400 haul truck delivering rockfill to close the outer groin of the Tailrace Cofferdam on August 20, 2017.

Figure 10: A Komatsu HM400 haul truck delivering sandy-silt material for placement by a Cat D6T dozer to build the impervious core of the Tailrace Cofferdam on August 24, 2017

Placement of the impervious core of the cofferdam could not be completed prior to September 1, which is the start of the Lake Whitefish spawning period. Therefore, on August 30-31, 2017, the outer rockfill groin was re-opened to allow fish to move freely out of the area until construction resumes in the spring.

In-stream SMP monitoring was carried out (Figure 11 and Figure 12) over the summer during construction of the Tailrace Cofferdam. There was one exceedence of the action levels during that time. On July 18, 2017 at 15:32 CDT, the TSS concentration of the surface sensor at SMP2-L was approximately 1300 mg/L for a few minutes (Figure 11). This exceedence was caused by maintenance being performed on the turbidity sensor, which interfered with measurements at that time and was not due to a sediment plume from in-stream construction.

On August 20, 2017, turbidity measurements were taken along a transect near SMP-2 (Table 3), as described in Section 2.5.2. The turbidity results were similar to turbidity values measured upstream of the Keeyask site, at SMP-1, during transect monitoring at that location (Figure 3).

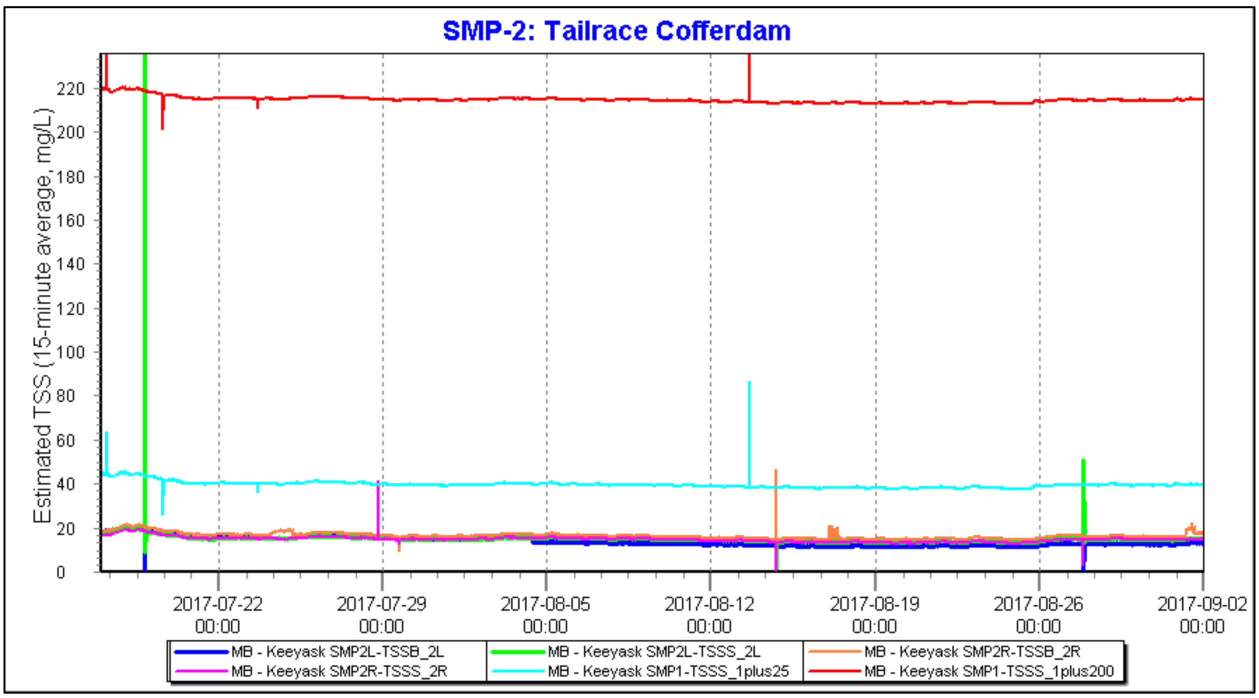

Figure 11: Estimated total suspended solids (TSS) values (15-minute average, mg/L) from July 17, 2017 through September 2, 2017 at monitoring stations SMP2-L and SMP2-R compared with the action levels, which are shown in light blue and red

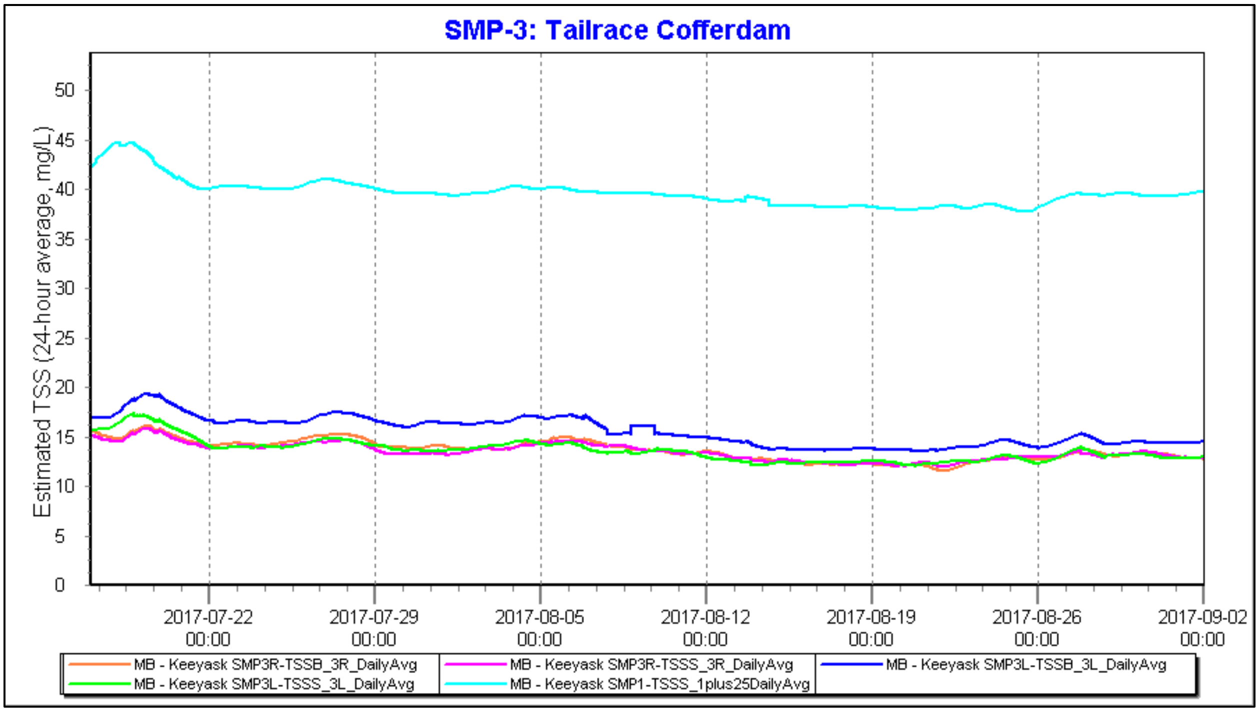

Figure 12: Estimated total suspended solids (TSS) values (24-hour average, mg/L) from July 17, 2017 through September 2, 2017 at monitoring stations SMP3-L and SMP3-R compared with the action level, which is shown in light blue

In-stream work resumed on October 19, 2017 on the Tailrace Cofferdam. In-stream work included placing rock to close the inner groin of the cofferdam on October 19-20, 2017. During the period between October 20 and November 9, 2017, impervious material was placed between the inner and outer groins to create the watertight core of the cofferdam (Figure 13 and Figure 14). On November 9 and 10, 2017, material was removed from the completed impervious core to create a channel between the bay inside the cofferdam and the Nelson River, so that fish could move through freely throughout the winter (Figure 15). The edges of the opening were capped with large rock to prevent erosion of the impervious core material while this channel remains open. Construction ceased after November 10, 2017.

Note: A localized sediment plume can be seen in the immediate vicinity of the area where the material is being placed. Photo taken October 26, 2017.

Figure 13: Rock truck delivering sandy-silt "impervious" material to the Tailrace Cofferdam for placement by a Cat D6T dozer to construct the core of the cofferdam

Figure 14: Aerial photo (looking south) of the Tailrace Cofferdam in-stream construction in progress, taken November 5, 2017

Figure 15: Photo shows an excavator removing rockfill material to create the channel

As discussed in Section 2.2, in-stream turbidity monitoring equipment was not in place during this period, as it had been removed in mid-September in preparation for winter. Visual inspections for turbidity plumes were conducted throughout the period that in-stream work was conducted. In addition, daily spot turbidity measurements were made at sites along a cross-section of the river between Gull Rapids and SMP-2 sites (Figure 3) and collected by boat from October 22-28, 2017 (Table 4 and Table 5) until the weather and ice conditions were no longer safe for on-water work. Afterward, measurements were collected from shore near the opening of the outer groin until November 7, 2017 (Table 6), when ice conditions no longer permitted measurements to be collected safely.

Table 5 and Table 6 show higher and/or more variable values than those in Table 4 for the calculated TSS, including at sites upstream from construction. This is reflected in turbidity values obtained in close proximity to the shore, and is not surprising as sediment is easily disturbed and tends to be more variable where water meets the land. The calculated TSS values measured between October 24 and November 7 ranged from 18.6 to 85.6 mg/L. This large range in values is attributed to the variability of taking measurements close to the shore and within close proximity of the Tailrace Cofferdam construction. When the values associated with those two activities are removed, the range of calculated TSS concentrations measured up and downstream from the work was 19.4 to 26.3 mg/L.

During in-stream work, as expected there was increased turbidity and some instances of localized sediment plumes in the immediate vicinity of impervious material being placed between the inner and outer groins of the Tailrace Cofferdam (Figure 13; Table 5 and Table 6); however, the plumes quickly dissipated downstream from the work. The range of calculated TSS values determined in proximity to the Tailrace Cofferdam construction was 18.6 to 85.6 mg/L (Table 5 and Table 6). These increases in TSS and localized sediment plumes are not expected to have had measurable aquatic impacts.

3.4 SOUTH DAM COFFERDAMS

In-stream work took place from March 7 to 8th, 2018 to construct the south abutments of the Upstream and Downstream South Dam Cofferdams. The sandy slope on the adjacent shore is vulnerable to erosion and is exposed during low water, so the work was conducted in the winter to take advantage of reduced water levels over those that occur in the summer.

In-stream work involved breaking up shoreline ice and placing large rock to create two short rock groins on the south shore of the Nelson River (Figure 16). Winter SMP monitoring equipment was in place during this in-stream work and there were no exceedences of the action levels at SMP-3 observed during the time that this in-stream work was occurring (Figure 17).

Figure 16: Construction of the Upstream and Downstream South Dam Cofferdams. A dozer places rockfill material on the upstream portion (right), while an excavator breaks ice along the shoreline and moves rockfill material into place on the downstream portion (left)

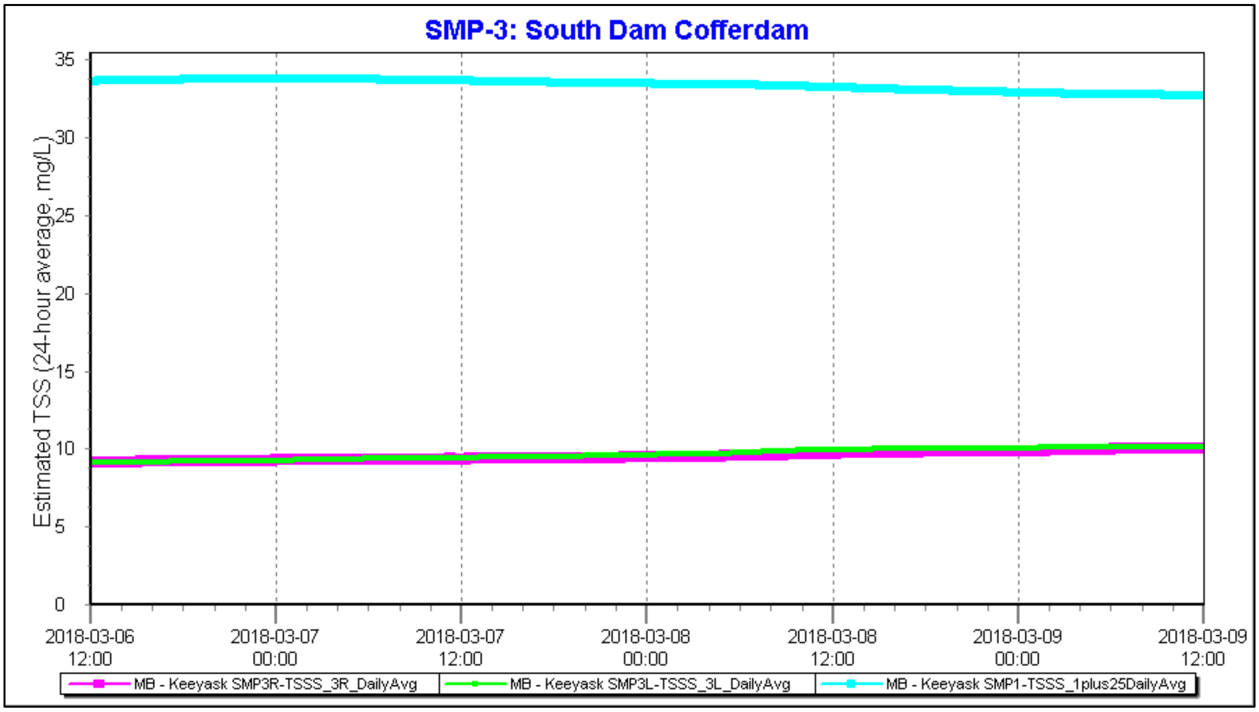

Figure 17: Estimated total suspended solids (TSS) values (24-hour average, mg/L) from March 6, 2018 through March 9, 2018 at monitoring stations SMP3-L and SMP3-R compared with the action levels, which are shown in light blue and red

3.5 PREDICTED TSS LEVELS VS. MONITORING RESULTS

As described in the SMP, construction activities during river management will introduce additional sediment into the Nelson River due to shoreline erosion, construction and removal of cofferdams, and commissioning of the Spillway and the Powerhouse. The predicted effects of in-stream construction presented in the SMP (Figure 18) were based on the proposed construction timeline at the time that the analyses were performed and assumed fully mixed conditions at SMP-2. While the Tailrace Summer Level Cofferdam (now referred to as the Tailrace Cofferdam) was included in the previous analysis for the SMP, the North Channel Rock Groin Extension, Boat Launch repairs and early construction of the south shore abutments were not previously assessed. Construction of the Tailrace Cofferdam has taken place earlier and over a longer time frame than assumed in the originally proposed construction schedule.

Tailrace Cofferdam construction was predicted to increase downstream TSS by up to 1-2 mg/l (Figure 18). The estimated effects assumed construction would involve simultaneous placement of inner and outer rock groins along with the placement of impervious material between these groins, but lagging some distance behind. Individually, placement of rock was estimated to raise levels by 0-1 mg/l while placement of the impervious material would also raise TSS by 0-1 mg/l.

Construction differed from what was expected when the predictions were made; except for a small opening to allow fish passage, the rock groins were almost entirely completed in the previous reporting period. In summer 2017, prior to placement of material for the impervious core, minor in-stream work was done to check the bottom of the river for sediment between the rock groins. The small opening in the rock groins was closed on Aug. 20-21 and placement of the impervious material between the rock groins rather took place from Aug. 21-24. A small gap was between the groins was re-opened between the groins on Aug. 30-31 and the gap was closed again on Oct 19-20, after the SMP-1 and SMP-2 monitoring sites were removed. Impervious material was placed between the groins from Oct. 20 – Nov. 9. The gap was re-opened after that to allow fish passage over winter.

The placement of impervious material between closed rock groins rather than advancing with the groins as previously assumed reduced the potential for the fine material to be exposed to and lost to the river flow. The expected effect on downstream TSS under this construction method would be less than previous estimate, which was small at 0-1mg/l. Monitoring during the open water season showed a generally consistent variation of about 0.25-1 mg/l in 24-hour average calculated TSS between SMP-1 and SMP-2. This difference was observed during periods with and without any in-stream work activity, including placement of fine impervious material. This is consistent with the prediction of a small potential effect. The

As noted, in-stream work for the North Channel Rock Groin Extension, Boat Launch repairs and early construction of the south shore abutments were not previously assessed. These works involve minor in-stream activity that, based on predictions and observations for much more significant in-stream work, would not be expected to produce any measurable effect at SMP2, which is consistent with no apparent effects having been observed between SMP-1 and SMP-2.

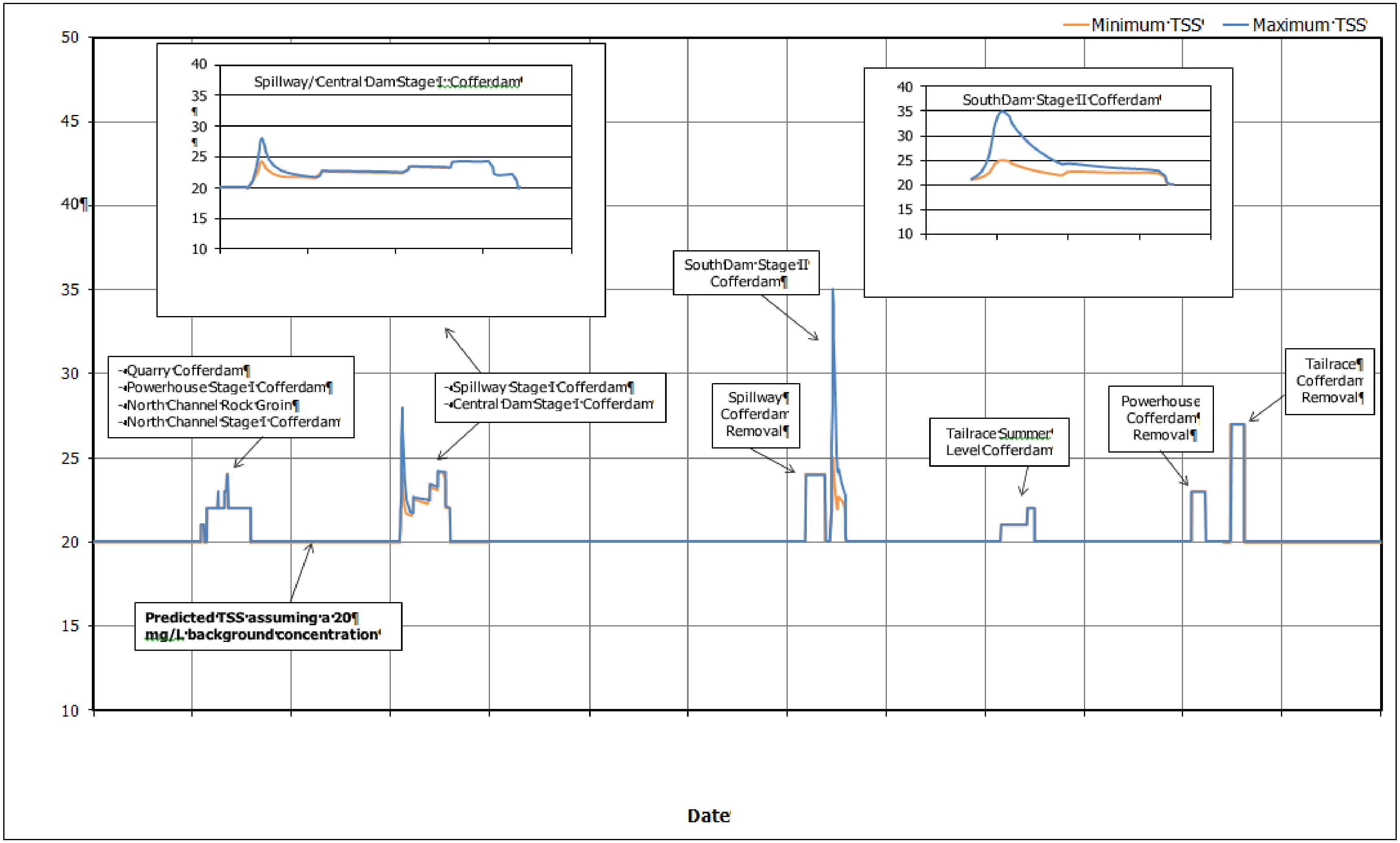

Figure 18: Fully Mixed 24-Hour Average TSS Concentration Predicted in the Proximity of Site SMP2 (mixing zone) During Construction of the Keeyask GS (based on 2012 construction schedule)

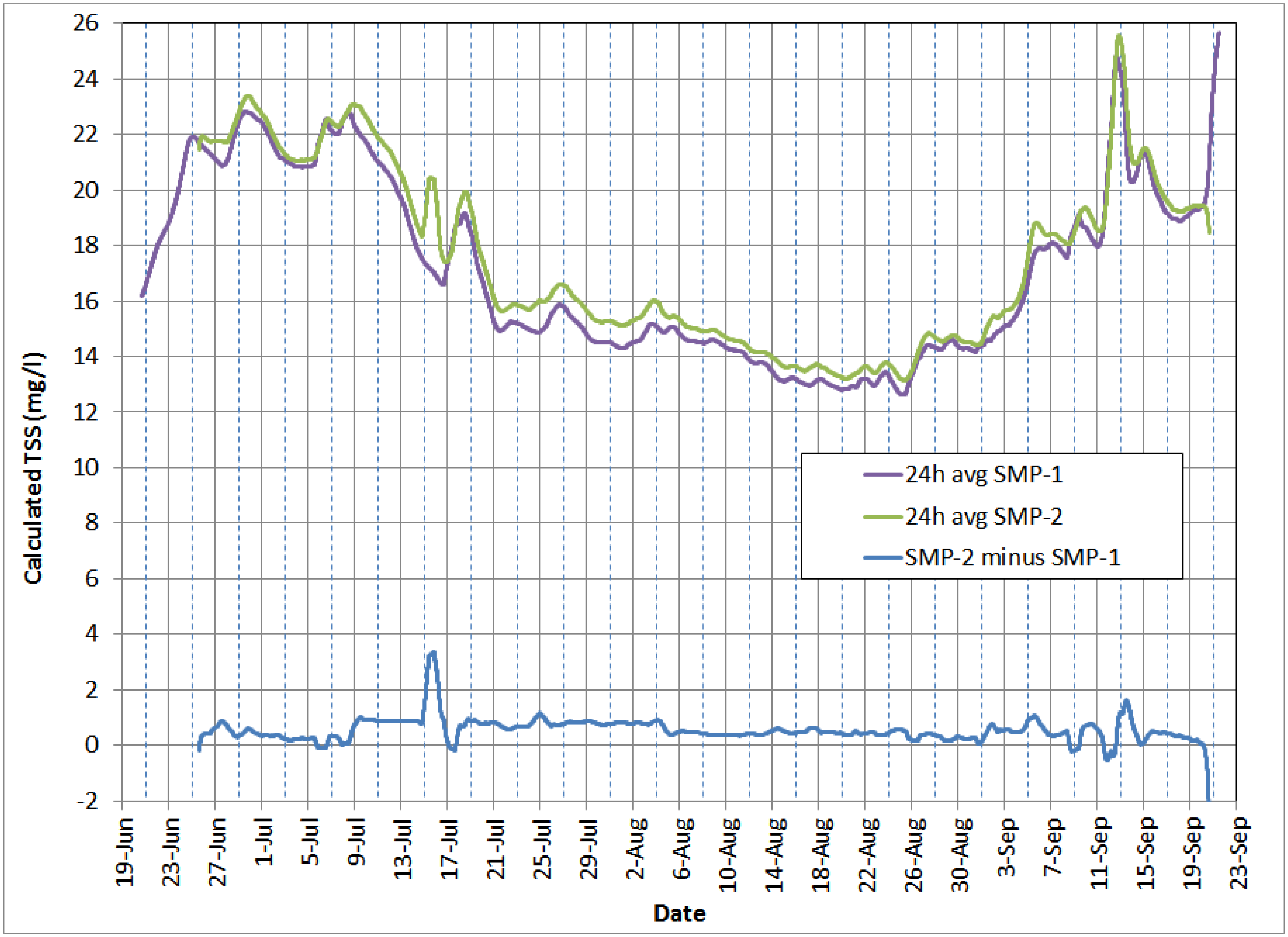

Figure 19: 24-Hour Moving Average TSS Concentration in Summer 2017

4.0 CONCLUSION

During the SMP monitoring period (April 2017 to March 2018) there were no exceedences of the SMP action levels attributed to the in-stream construction activities that took place. The increase in TSS levels that were noted above the action levels resulted from maintenance activities that took place during the time of the observed exceedence. The preliminary construction schedule considered in the assessment of Project effects was presented in the Keeyask EIS (KHLP 2012). The actual schedule and activities has changed from the assessment. Construction of the Tailrace Summer Level Cofferdam was advanced from summer 2018 to summer 2016 and continued in 2017. Construction of the Central Dam Cofferdam Extension and the North Channel Cofferdam Extension were not planned in the pre-construction period and therefore were not assessed in pre-construction studies. However, potential effects can be inferred from other similar works. Construction of the downstream boat launch was a known activity; however, discernible effects at SMP-3 would not have been expected since the boat launch is in a low velocity area off the main flow. Construction of the Tailrace Summer Level Cofferdam did not result in any substantive effects at SMP-2 and other in-stream works similarly had little potential for discernible downstream effects.

5.0 LITERATURE CITED

Keeyask Hydropower Limited Partnership (KHLP), 2012. Keeyask Generation Project: Physical Environment Supporting Volume. June 2012. Winnipeg, Manitoba

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TABLES

Table 1: Manual sampling water quality monitoring data for the 2017 open water season

Station ID	Date (Y/M/D)	Time (CDT)	Site Depth (m)	Sensor/Sample Depth (m)	Turbidity (NTU)	Calculated* TSS (mg/L)	Lab TSS (mg/L)
SMP-1	6/26/2017	15:58	9.6	2.1	28.3	19.5	24
		16:01	9.6	4.8	28.5	19.7	23.8
		16:03	9.6	7.9	28.6	19.7	25.3
	7/10/2017	14:06	9.5	1.9	29.8	20.7	23.8
		14:03	9.5	4.8	29.5	20.4	23.3
		13:59	9.5	7.5	29	20.1	18.5
	7/23/2017	10:51	9.8	2.1	22.4	14.8	15
		10:41	9.8	4.8	22.4	14.8	16.5
		10:31	9.8	7.9	22.7	15.1	19.3
	8/7/2017	15:13	8.9	2	22.4	14.8	12
		15:11	8.9	4.5	22.9	15.2	16.8
		15:09	8.9	7	22.9	15.2	17.3
	8/20/2017	15:35	9.3	2	20.6	13.4	14.3
		15:33	9.3	4.5	20.4	13.3	13.5
		15:30	9.3	7.3	22.3	14.8	13.5
	9/2/2017	12:34	9.2	2	22.1	14.6	14.5
		12:30	9.2	4.7	21.9	14.4	17.8
		12:28	9.2	7.2	22.8	15.2	15.3
	9/17/2017	12:12	8.6	2.1	26.1	17.8	13.5
		12:10	8.6	4.2	26.1	17.8	13.3
		12:08	8.6	6.8	26.4	18	12
SMP-1A	6/26/2017	16:16	10.2	2.1	28.4	19.6	23.8
		16:18	10.2	5	28.8	19.9	25.5
		16:22	10.2	6.3	29.1	20.1	27
	7/10/2017	14:25	10.3	2.1	29.6	20.5	25.5
		14:22	10.3	5.1	29.5	20.4	20.3
		14:16	10.3	8.4	29.8	20.7	20.5
SMP-1A	7/23/2017	11:23	10.2	2.2	22.1	14.6	13.3
		11:20	10.2	5.2	22.2	14.7	15.3
		11:18	10.2	8.2	22.4	14.8	13.3
	8/7/2017	14:50	10.2	2.1	22.1	14.6	16.8
		14:47	10.2	5.1	22.1	14.6	15
		14:44	10.2	5.6	22.1	14.6	15
	8/20/2017	15:45	10	2.1	20.4	13.3	16.5
		15:44	10	4.9	20.5	13.3	16.8
		15:43	10	8.3	20.5	13.3	13.5
	9/2/2017	11:33	10	1.9	21.7	14.3	16
		11:30	10	5	21.5	14.1	15.5

Station ID	Date (Y/M/D)	Time (CDT)	Site Depth (m)	Sensor/Sample Depth (m)	Turbidity (NTU)	Calculated* TSS (mg/L)	Lab TSS (mg/L)
		11:26	10	6.9	21.6	14.2	15.5
	9/17/2017	11:50	8.9	2.2	25.7	17.4	12
		11:48	8.9	4.5	25.9	17.6	11
		11:46	8.9	7	26.8	18.3	12.8
SMP-2L	6/26/2017	13:16	14.1	1.8	28.6	19.7	25.5
		13:18	14.1	7	28.5	19.7	25
		13:34	14.1	12.5	28.1	19.3	27.5
	7/9/2017	17:13	14	2	29.8	20.7	21.5
		17:09	14	7	30.1	20.9	21.3
		17:06	14	11.1	30.4	21.2	22
	7/23/2017	15:35	14.2	2	22.3	14.8	16.8
		15:33	14.2	7.2	22.3	14.8	18.8
		15:31	14.2	12.3	23.6	15.8	13
	8/6/2017	15:39	13.8	2	22.1	14.6	11
		15:37	13.8	7	23.2	15.5	14.5
		15:33	13.8	11.8	23.6	15.8	13.5
	8/19/2017	16:23	13.6	2	20.1	13	12.3
		16:21	13.6	6.9	20	12.9	11.3
SMP-2L	8/19/2017	16:17	13.6	11.6	21.1	13.8	13.8
	9/3/2017	10:27	13.2	1.9	23	15.3	12.3
		10:25	13.2	6.6	23.3	15.5	16
		10:21	13.2	11.1	24.7	16.7	15.3
	9/18/2017	15:27	13.5	2	26.4	18	13.3
		15:26	13.5	6.8	26.1	17.8	11
		15:24	13.5	11.5	26.6	18.2	12.5
SMP-2R	6/26/2017	13:56	14.2	2	28.7	19.8	23.8
		13:58	14.2	7	28.8	19.9	24.8
		13:59	14.2	12.2	28.9	20	25.3
	7/9/2017	16:47	15	1.9	30.5	21.2	23.3
		16:43	15	7.5	30.6	21.3	25.3
		16:38	15	13	30.6	21.3	19.3
	7/23/2017	15:14	15.2	2	22.6	15	15.3
		15:12	15.2	7.6	22.6	15	20.3
		15:10	15.2	13.1	23	15.3	17.3
	8/6/2017	15:18	14.8	2.1	23	15.3	13.8
		15:17	14.8	7.5	23.2	15.5	18.3
		15:14	14.8	12.8	24	16.1	16.5
	8/19/2017	16:09	14.6	2.1	20.4	13.3	15
		16:06	14.6	7.4	21.1	13.8	15.3
		16:04	14.6	12.2	20.5	13.3	14.5

Station ID	Date (Y/M/D)	Time (CDT)	Site Depth (m)	Sensor/Sample Depth (m)	Turbidity (NTU)	Calculated* TSS (mg/L)	Lab TSS (mg/L)
	9/3/2017	10:59	15.2	2	23.2	15.5	12.3
		10:57	15.2	7.6	24.3	16.3	13.8
		10:52	15.2	13.3	23.4	15.6	14.5
	9/18/2017	15:06	14.5	1.9	26.3	17.9	12
		15:04	14.5	7.4	26.6	18.2	12.3
		15:03	14.5	12.4	27.1	18.5	11.8
SMP-3L	6/26/2017	12:43	21.2	2	28.7	19.8	25
SMP-3L	6/26/2017	12:45	21.2	10.6	29	20.1	25.5
		12:48	21.2	19	29	20.1	27.5
	7/9/2017	16:09	21	2	31.5	22	79.3
		16:06	21	10.6	29.1	20.1	23.8
		16:00	21	19	31.1	21.7	24.3
	7/23/2017	14:14	21.3	1.9	21.3	14	16.3
		14:12	21.3	10.9	22.2	14.7	20
		14:09	21.3	19.2	22.9	15.2	15
	8/6/2017	14:46	20.7	2	21.7	14.3	13.5
		14:44	20.7	10.4	21.8	14.4	15.8
		14:42	20.7	18.7	22.7	15.1	12.3
	8/19/2017	14:59	20	2	20.5	13.3	10.5
		14:55	20	10.1	21	13.7	14
		14:48	20	18.1	21.3	14	12.5
	9/2/2017	15:49	20.6	2.1	21.9	14.4	15.3
		15:47	20.6	10.3	22.4	14.8	12
		15:44	20.6	18.6	22.8	15.2	14.5
	9/18/2017	14:35	20.2	2	26	17.7	12.5
		14:33	20.2	10	26.1	17.8	15
		14:30	20.2	18.3	26	17.7	12.8
SMP-3R	6/26/2017	12:11	11.8	2	27.7	19	21.8
		12:19	11.8	5.9	28.3	19.5	24
		12:15	11.8	9.8	28.4	19.6	23.5
	7/9/2017	15:40	11.1	2.1	30.1	20.9	17.8
		15:37	11.1	5.6	29.4	20.4	22.5
		15:33	11.1	9	29.4	20.4	24.5
	7/23/2017	14:40	12.2	2	20.9	13.7	12.8
		14:38	12.2	6.2	21.4	14	16.8
		14:36	12.2	10.4	22	14.5	12.8
SMP-3R	8/6/2017	14:10	11.6	2.1	22.1	14.6	14.5
		14:07	11.6	5.9	21.5	14.1	14.3
		14:03	11.6	9.6	21.3	14	17.8
	8/19/2017	15:30	11.8	2.1	20.5	13.3	9.3

Station ID	Date (Y/M/D)	Time (CDT)	Site Depth (m)	Sensor/Sample Depth (m)	Turbidity (NTU)	Calculated* TSS (mg/L)	Lab TSS (mg/L)
		15:28	11.8	5.9	20.3	13.2	15
		15:25	11.8	9.9	2.4	-1	12.3
	9/2/2017	15:02	11.8	2	20	12.9	12.8
		15:00	11.8	5.8	20	12.9	11.8
		14:58	11.8	9.7	19.8	12.8	10.8
	9/18/2017	14:11	10.9	2.1	25.1	17	10
		14:10	10.9	5.5	25.8	17.5	11.5
		14:08	10.9	8.8	25.7	17.4	10.8

*Turbidity/TSS Relationship where TSS = [0.79 x Turbidity] – 2.86

Table 2: Manual sampling water quality monitoring data for a monitoring transect near SMP-2, collected on July 15, 2017

Site	UTM (15V)	Site Depth (m)	Sensor Depth (m)	Time (CDT)	Water Temp (°C)	Conductivity (µS/cm)	Turbidity (NTU)	Calculated * TSS (mg/L))	Dissolved Oxygen (mg/L)
1	366145 6246883	4.8	2.2	12:34	16.87	277	24.8	16.7	9.91
			2.6	12:34	16.86	276	25	16.9	9.92
			2.6	12:33	16.86	276	25.1	17	9.93
2	366118 6246957	6.5	1.9	12:31	16.86	276	24.8	16.7	9.91
			3.1	12:30	16.85	276	25.1	17	9.91
			4.5	12:29	16.85	276	25	16.9	9.91
3	366104 6247011	5.9	2.1	12:26	16.85	276	24.9	16.8	9.91
			3	12:26	16.85	277	24.9	16.8	9.91
			4	12:25	16.85	277	25.1	17	9.92
4	366086 6247050	7.7	2.1	12:22	16.86	276	24.8	16.7	9.9
			3.9	12:22	16.85	276	24.7	16.7	9.89
			5.6	12:21	16.85	276	24.6	16.6	9.9
5	366073 6247100	9.1	2.1	12:18	16.85	276	25	16.9	9.89
			4.4	12:17	16.85	276	25.1	17	9.85
			7.2	12:17	16.85	276	24.7	16.7	9.82
6	366055 6247150	10.7	2.1	12:13	16.84	276	25	16.9	9.89
			5.4	12:13	16.85	276	25.1	17	9.81
			8.7	12:12	16.84	276	25	16.9	9.83
7	366036 6247192	12.7	2	12:02	16.84	276	24.9	16.8	9.86
			6.3	12:02	16.84	276	25	16.9	9.83
			10.6	12:01	16.83	275	25.1	17	9.78
8	366028 6247230	13.2	1.7	11:56	16.83	275	24.9	16.8	9.88
			6.8	11:55	16.83	275	24.9	16.8	9.82
			11.4	11:54	16.82	275	24.9	16.8	9.79
9	366008 6247295	14.2	1.9	11:48	16.81	274	25	17	9.87
			7.1	11:47	16.82	275	24.9	16.8	9.85
			12.2	11:46	16.81	275	25	16.9	9.79
10	365997 6247342	13.6	1.9	11:42	16.81	274	24.8	16.7	9.88

Site	UTM (15V)	Site Depth (m)	Sensor Depth (m)	Time (CDT)	Water Temp (°C)	Conductivity (µS/cm)	Turbidity (NTU)	Calculated * TSS (mg/L))	Dissolved Oxygen (mg/L)
10	365997 6247342	13.6	6.7	11:41	16.8	274	25	16.9	9.83
			11.6	11:40	16.79	274	24.8	16.7	9.77
11	365984 6247390	13.8	2	11:35	16.78	273	24.8	16.7	9.86
			6.7	11:35	16.79	274	24.9	16.8	9.79
			11.6	11:32	16.79	274	25	16.9	9.76
12	365969 6247439	13.4	1.9	11:28	16.78	274	24.6	16.6	9.84
			6.6	11:25	16.78	274	24.8	16.7	9.79
			11.3	11:25	16.78	274	24.7	16.7	9.78
13	365950 6247475	13.9	1.9	11:20	16.78	274	24.2	16.3	9.82
			6.8	11:19	16.77	274	24.6	16.6	9.78
			12	11:18	16.72	272	24	16.1	9.75
14	365935 6247519	14.2	2.1	11:11	16.74	273	24.4	16.4	9.84
			7.2	11:10	16.73	273	24.9	16.8	9.81
			12.1	11:09	16.71	273	25.1	17	9.76
15	365915 6247574	14.6	2.1	11:02	16.73	273	24.4	16.4	9.84
			7.4	11:01	16.74	273	24.9	16.8	9.79
			12.7	11:00	16.74	273	24.7	16.7	9.85
16	365906 6247617	13.9	2	10:55	16.68	272	24.3	16.3	9.82
			7	10:54	16.66	271	24.3	16.3	9.75
			12	10:54	16.66	271	24.7	16.7	9.76
17	365885 6247661	14.9	2	10:49	16.7	272	24.3	16.3	9.82
			7.6	10:48	16.67	272	25.1	17	9.75
			12.9	10:47	16.65	272	24.1	16.2	9.89
18	365867 6247717	14	2	10:43	16.72	272	24.9	16.8	9.8
			6.9	10:42	16.66	272	25.1	17	9.78
			11.8	10:41	16.65	272	24.6	16.6	9.75
19	365852 6247766	13	1.8	10:37	16.75	272	24.4	16.4	9.82
			6.7	10:36	16.66	272	24.4	16.4	9.74
			11.2	10:35	16.65	272	24.6	16.6	9.75

Site	UTM (15V)	Site Depth (m)	Sensor Depth (m)	Time (CDT)	Water Temp (°C)	Conductivity (µS/cm)	Turbidity (NTU)	Calculated * TSS (mg/L))	Dissolved Oxygen (mg/L)
20	365837 6247813	13.2	1.9	10:32	16.75	272	24.1	16.2	9.8
20	365837 6247813	13.2	6.1	10:31	16.67	272	24.3	16.3	9.73
			11.1	10:30	16.66	272	23.7	15.9	9.69

*Turbidity/TSS Relationship where TSS = [0.79 x Turbidity] – 2.86

Table 3. Manual sampling water quality monitoring data for a monitoring transect near SMP-2, collected on August 20, 2017

Site	UTM (15V)	Site Depth (m)	Sensor Depth (m)	Time (CDT)	Water Temp (°C)	Conductivity (µS/cm)	Turbidity (NTU)	Calculated* TSS (mg/L)	Dissolved Oxygen(mg/L)
1	366145 6246883	5.5	1.9	11:54	19.07	295	20.6	13.4	9.2
			2.7	11:53	19.07	296	20.9	13.7	9.21
			3.6	11:51	19.07	296	20.2	13.1	9.29
2	366118 6246957	6.7	1.9	12:02	19.09	295	20.3	13.2	9.19
			3.3	12:02	19.08	295	20.4	13.3	9.18
			4.7	12:01	19.08	295	20.4	13.3	9.22
3	366104 6247011	5.6	1.9	12:07	19.09	295	20.1	13	9.2
			2.8	12:07	19.09	295	20.2	13.1	9.2
			3.6	12:06	19.09	295	20.5	13.3	9.19
4	366086 6247050	7.8	1.9	12:11	19.09	295	20.1	13	9.18
			3.9	12:10	19.09	295	20.1	13	9.16
			5.9	12:10	19.09	295	20.6	13.4	9.18
5	366073 6247100	9	2.1	12:16	19.09	294	20.1	13	9.15
			4.5	12:14	19.09	294	20.4	13.3	9.17
			7	12:13	19.09	294	22.3	14.8	9.13
6	366055 6247150	10.7	2.1	12:19	19.1	294	20.1	13	9.15
			5.5	12:18	19.09	294	20.2	13.1	9.12
			8.7	12:18	19.09	294	20.4	13.3	9.13
7	366036 6247192	12.5	2.1	12:22	19.1	294	20.1	13	9.15
			6.3	12:22	19.09	294	20.1	13	9.12
			10.5	12:21	19.09	294	21.9	14.4	9.17
8	366028 6247230	13.7	1.9	12:27	19.1	294	20.4	13.3	9.18
			7	12:26	19.09	294	20.4	13.3	9.09
			11.8	12:25	19.09	294	21.2	13.9	9.11
9	366008 6247295	13.7	1.9	12:31	19.1	293	20.4	13.3	9.16
			6.7	12:30	19.1	293	21.4	14.1	9.13
			11.7	12:30	19.1	293	22.3	14.8	9.12

Site	UTM (15V)	Site Depth	Sensor Depth	Time (CDT)	Water Temp	Conductivity (µS/cm)	Turbidity (NTU)	Calculated* TSS (mg/L)	Dissolved Oxygen(mg/L)
10	365997 6247342	13.5	2	12:35	19.1	293	20.4	13.3	9.14
10	365997 6247342	13.5	6.5	12:35	19.1	293	20.5	13.3	9.12
			11.5	12:34	19.1	293	20.7	13.5	9.1
11	365984 6247390	13.5	2.1	12:41	19.11	293	20.3	13.2	9.16
			7.1	12:40	19.11	293	20.4	13.3	9.1
			11.5	12:38	19.1	293	20.5	13.3	9.05
12	365969 6247439	13	1.7	12:46	19.1	292	20.6	13.4	9.12
			6.3	12:45	19.1	292	20.5	13.3	9.07
			11.1	12:44	19.11	293	20.4	13.3	9.15
13	365950 6247475	13.4	2	12:49	19.09	292	21.2	13.9	9.1
			6.7	12:49	19.09	292	21.1	13.8	9.08
			11.4	12:48	19.09	292	21.1	13.8	9.07
14	365935 6247519	13.9	1.8	12:54	19.08	292	22	14.5	9.11
			6.8	12:53	19.08	292	21.2	13.9	9.07
			11.5	12:53	19.08	292	21.4	14.1	9.04
15	365915 6247574	14.2	2	13:02	19.11	292	21.2	13.9	9.13
			7	13:02	19.11	292	22	14.5	9.07
			12.2	13:01	19.11	292	22	14.5	9.08
16	365906 6247617	13.1	2.1	13:16	19.14	293	20.1	13	9.11
			6.4	13:16	19.1	292	20.4	13.3	9.06
			10.8	13:15	19.11	292	20.4	13.3	9.04
17	365885 6247661	14.3	1.9	13:22	19.13	293	20.6	13.4	9.08
			7.1	13:21	19.11	292	21.3	14	9.07
			12.4	13:19	19.11	292	20.5	13.3	9.05
18	365867 6247717	13.8	2.1	13:27	19.16	293	19.9	12.9	9.13
			6.9	13:26	19.11	293	20	12.9	9.02
			11.8	13:24	19.1	292	20.1	13	9.02
19	365852 6247766	12.8	2	13:31	19.15	293	19.9	12.9	9.11
			6.4	13:30	19.12	293	20	12.9	9.03
			10.7	13:29	19.1	292	20.1	13	9.03

Site	UTM (15V)	Site Depth	Sensor Depth	Time (CDT)	Water Temp	Conductivity (µS/cm)	Turbidity (NTU)	Calculated* TSS (mg/L)	Dissolved Oxygen(mg/L)
20	365837 6247813	13.3	2.1	13:35	19.15	293	19.8	12.8	9.14
20	365837 6247813	13.3	6.7	13:34	19.11	292	20.3	13.2	9.06
			11.3	13:33	19.09	292	20.4	13.3	9.01

*Turbidity/TSS Relationship where TSS = [0.79 x Turbidity] – 2.86

Table 4: Manual sampling water quality monitoring data for a monitoring transect near SMP-2, collected on October 24, 2017

Site	UTM (15V)	Site Depth (m)	Sensor Depth (m)	Time (CDT)	Water Temp (°C)	Conductivity (µS/cm)	Turbidity (NTU)	Calculated* TSS (mg/L))
1	366145 6246883	4.9	2.0	14:59	4.70	183	32.3	22.7
			2.5	15:00	4.70	184	32.8	23.1
			2.9	15:01	4.70	183	33.1	23.3
2	366118 6246957	6.9	4.8	15:04	4.71	183	32.1	22.5
			3.3	15:04	4.71	183	32.9	23.1
			1.9	15:05	4.71	183	32.2	22.6
3	366104 6247011	5.5	3.6	15:07	4.71	183	33.3	23.5
			2.7	15:08	4.72	183	33.0	23.2
			2.0	15:08	4.72	183	34.0	24.0
4	366086 6247050	7.6	5.7	15:10	4.72	183	33.3	23.5
			3.8	15:10	4.72	183	32.6	22.9
			2.0	15:11	4.72	183	33.0	23.2
5	366073 6247100	9.1	7.0	15:13	4.73	183	33.0	23.2
			4.5	15:13	4.73	183	33.0	23.2
			2.1	15:14	4.73	183	31.9	22.3
6	366055 6247150	11.4	9.5	15:17	4.73	183	33.3	23.5
			5.6	15:18	4.73	183	32.1	22.5
			2.0	15:18	4.73	183	33.9	23.9
7	366036 6247192	11.9	9.8	15:21	4.73	183	32.2	22.6
			5.8	15:22	4.73	183	32.4	22.7
			2.0	15:22	4.73	183	33.4	23.5
8	366028 6247230	14.0	12.0	15:25	4.73	183	33.2	23.4
			6.9	15:26	4.73	183	31.9	22.3
			1.9	15:27	4.73	183	33.7	23.8
9	366008 6247295	14.1	12.1	15:29	4.73	183	33.0	23.2
			7.0	15:30	4.73	183	31.9	22.3
			2.0	15:31	4.73	183	31.8	22.3
10	365997 6247342	13.6	11.6	15:33	4.72	183	32.7	23.0

10	365997 6247342	13.6	6.8	15:35	4.71	183	31.6	22.1
			2.0	15:36	4.71	183	31.9	22.3
11	365984 6247390	13.6	11.6	15:38	4.70	182	33.3	23.5
			6.9	15:38	4.70	183	32.4	22.7
			2.2	15:41	4.70	182	32.4	22.7
12	365969 6247439	13.1	11.2	15:43	4.69	182	34.2	24.2
			6.6	15:47	4.68	182	32.5	22.8
			2.0	15:47	4.68	182	32.3	22.7
13	365950 6247475	13.9	11.8	15:50	4.67	182	33.7	23.8
			7.0	15:50	4.67	182	33.4	23.5
			2.1	15:51	4.67	182	33.2	23.4
14	365935 6247519	14.2	12.2	16:03	4.63	183	34.3	24.2
			7.3	16:03	4.64	183	33.3	23.5
			2.1	16:04	4.65	182	34.2	24.2
15	365915 6247574	14.5	12.6	16:06	4.65	183	33.5	23.6
			7.3	16:07	4.65	183	32.7	23.0
			1.9	16:07	4.65	183	32.6	23.0
16	365906 6247617	13.5	11.4	16:10	4.63	183	33.4	23.5
			6.8	16:11	4.65	183	33.5	23.6
			1.9	16:11	4.65	183	32.9	23.1
17	365885 6247661	14.8	12.7	16:14	4.60	183	33.5	23.6
			7.4	16:14	4.60	183	32.5	22.8
			2.2	16:15	4.61	183	32.9	23.1
18	365867 6247717	14.0	11.9	16:17	4.61	183	33.1	23.3
			6.9	16:17	4.63	183	33.1	23.3
			2.0	16:18	4.62	183	32.8	23.1
19	365852 6247766	12.9	10.8	16:20	4.57	183	33.1	23.3
			6.4	16:20	4.62	183	32.9	23.1
			2.0	16:21	4.63	183	32.9	23.1
20	365837 6247813	12.9	11.0	16:22	4.6	183	33.0	23.2
20	365837 6247813	12.9	6.4	16:23	4.64	183	33.1	23.3
			2.0	16:23	4.64	183	32.3	22.7

*Turbidity/TSS Relationship where TSS = [0.79 x Turbidity] – 2.86

Table 5: Manual sampling water quality monitoring data for monitoring transects above SMP-2, spot measurements collected from the Tailrace Cofferdam (TRCD), and background data from the Nelson River above Keeyask, collected October 24-28, 2017

Date (YYYY-MM-DD)	Location	UTM (15V)	Site Depth (m)	Sensor Depth (m)	Time (CST)	Water Temperature (°C)	Conductivity (µS/cm)	Turbidity (NTU)	Calculated* TSS (mg/L))
2017-10-22	Upstream (Background)	358476 6247070	Shore	Surface	15:55	5.30	181	54.8	40.4
	TRCD Outer Groin Opening	364655 6247213	2.4	1.0	14:47	5.62	175	42.4	30.6
	Transect Site 1 (K-S-07a)	364974 6247213	5.4	2.0	15:26	5.59	179	36.9	26.3
	Transect Site 2 (K-S-07b)	364999 6247106	6.3	2.0	15:39	5.61	179	36.6	26.1
	Transect Site 3 (K-S-07c)	365011 6246995	6.3	1.9	15:48	5.60	179	35.7	25.3
	Transect Site 4 (K-S-07d)	365031 6246866	6.5	2.0	15:53	5.60	179	33.9	23.9
	Transect Site 5 (K-S-07e)	365052 6246755	7.2	2.0	15:57	5.60	179	36.1	25.7
2017-10-23	Upstream (Background)	358476 6247070	Shore	Surface	NA	3.61	178	94.1	71.5
	TRCD Outer Groin Opening	364655 6247213	4.9	1.0	13:55	4.98	181	54.8	40.4
	Transect Site 1 (K-S-07a)	364974 6247213	6.0	1.9	14:07	5.05	181	36.3	25.8
	Transect Site 2 (K-S-07b)	364999 6247106	4.9	2.1	14:12	5.01	183	33.8	23.8
	Transect Site 3 (K-S-07c)	365011 6246995	6.9	1.9	14:17	5.04	184	32.9	23.1

Date (YYYY-MM-DD)	Location	UTM (15V)	Site Depth (m)	Sensor Depth (m)	Time (CST)	Water Temperature (°C)	Conductivity (µS/cm)	Turbidity (NTU)	Calculated* TSS (mg/L))
	Transect Site 4 (K-S-07d)	365031 6246866	6.4	1.9	14:38	5.05	185	36.2	25.7
	Transect Site 5 (K-S-07e)	365052 6246755	8.2	2.0	14:41	5.05	185	32.7	23.0
2017-10-24	TRCD Outer Groin Opening	364655 6247213	5.0	1.0	14:10	4.59	182	50.4	37.0
	Transect Site 1 (K-S-07a)	364974 6247213	5.9	2.1	14:22	4.65	183	34.5	24.4
	Transect Site 2 (K-S-07b)	364999 6247106	6.4	2.2	14:27	4.67	183	32.7	23.0
	Transect Site 3 (K-S-07c)	365011 6246995	6.9	2.3	14:31	4.71	183	33.1	23.3
	Transect Site 4 (K-S-07d)	365031 6246866	6.2	2.0	14:38	4.73	183	33.6	23.7
	Transect Site 5 (K-S-07e)	365052 6246755	7.7	2.0	14:42	4.72	183	33.2	23.4
2017-10-25	Upstream (Background)	358476 6247070	Shore	Surface	13:49	3.66	170	29.6	20.5
	TRCD Outer Groin Opening	364655 6247213	NA	1.0	14:46	4.28	177	37.6	26.8
	TRCD Outer Groin Opening	364655 6247213	NA	1.0	15:48	4.28	176	52.1	38.3
	Transect Site 1 (K-S-07a)	364974 6247213	5.9	2.0	14:52	4.31	177	33.4	23.5
	Transect Site 2 (K-S-07b)	364999 6247106	6.3	2.1	14:55	4.3	176	32.7	23.0
	Transect Site 3 (K-S-07c)	365011 6246995	6.7	2.1	15:02	4.31	175	28.2	19.4

Date (YYYY-MM-DD)	Location	UTM (15V)	Site Depth (m)	Sensor Depth (m)	Time (CST)	Water Temperature (°C)	Conductivity (µS/cm)	Turbidity (NTU)	Calculated* TSS (mg/L))
	Transect Site 4 (K-S-07d)	365031 6246866	6.5	2.1	15:05	4.33	175	33.5	23.6
	Transect Site 5 (K-S-07e)	365052 6246755	8.0	2.2	15:10	4.33	175	34.9	24.7
2017-10-26	TRCD Outer Groin Opening	364655 6247213	5.9	1.0	15:07	3.74	168	38.5	27.6
	Transect Site 1 (K-S-07a)	364974 6247213	5.8	2.0	15:17	3.81	169	33.1	23.3
	Transect Site 2 (K-S-07b)	364999 6247106	6.5	1.9	15:20	3.75	167	34.5	24.4
	Transect Site 3 (K-S-07c)	365011 6246995	6.9	1.9	15:25	3.8	167	35.2	25.0
	Transect Site 4 (K-S-07d)	365031 6246866	6.7	2.0	15:29	3.8	167	34.5	24.4
	Transect Site 5 (K-S-07e)	365052 6246755	8.6	2.0	15:33	3.8	167	34.1	24.1
2017-10-27	TRCD Outer Groin Opening	364655 6247213	5.0	1.0	16:37	3.31	171	43.1	31.2
	Transect Site 1 (K-S-07a)	364974 6247213	5.9	2.2	16:10	3.41	170	33	23.2
	Transect Site 2 (K-S-07b)	364999 6247106	6.3	2.0	16:18	3.41	171	31.2	21.8
	Transect Site 3 (K-S-07c)	365011 6246995	6.5	2.1	16:24	3.44	172	31.8	22.3
	Transect Site 4 (K-S-07d)	365031 6246866	6.1	2.0	16:27	3.45	172	31.6	22.1
	Transect Site 5 (K-S-07e)	365052 6246755	8.3	2.2	16:31	3.45	172	32.4	22.7

Date (YYYY-MM-DD)	Location	UTM (15V)	Site Depth (m)	Sensor Depth (m)	Time (CST)	Water Temperature (°C)	Conductivity (µS/cm)	Turbidity (NTU)	Calculated* TSS (mg/L))
2017-10-28	Upstream (Background)	358476 6247070	Shore	Surface	15:00	2.00	164	43.0	31.1
	TRCD Outer Groin Opening	364655 6247213	4.8	1.0	9:38	2.99	170	42.2	30.5
	Transect Site 1 (K-S-07a)	364974 6247213	NA	2.1	11:03	3.11	170	35.2	25.0
	Transect Site 2 (K-S-07b)	364999 6247106	6.1	2.1	11:08	3.13	171	31.2	21.8
	Transect Site 3 (K-S-07c)	365011 6246995	6.4	1.9	11:12	3.16	171	31.4	22.0
	Transect Site 4 (K-S-07d)	365031 6246866	6.8	2.0	11:15	3.18	171	31.8	22.3
	Transect Site 5 (K-S-07e)	365052 6246755	8.6	1.9	11:19	3.18	172	31.8	22.3

*Turbidity/TSS Relationship where TSS = [0.79 x Turbidity] – 2.86

Table 6: Manual sampling water quality monitoring data for spot measurements collected from the Tailrace Cofferdam (TRCD) and background data collected from the Nelson River above Keeyask during November 1 to 7, 2017

Date (YYYY-MM-DD)	Location	UTM (15V)	Site Depth (m)	Sensor Depth (m)	Time (CST)	Water Temperature (°C)	Conductivity (µS/cm)	Turbidity (NTU)	Calculated* TSS (mg/L))
2017-11-01	Upstream (Background)	358476 6247070	Shore	Surface	16:40	0.54	157	31.9	22.3
	TRCD Outer Groin Opening	364654 6247235	Shore	Surface	16:03	1.06	157	30.6	21.3
2017-11-03	TRCD Near Placement	364607 6247073	Shore	Surface	10:18	NA	NA	112	85.6
	TRCD Outer Groin Opening	364654 6247235	2.2	Surface	10:00	1.2	NA	27.2	18.6
2017-11-04	TRCD Outer Groin Opening	364651 6247221	Shore	Surface	13:17	0.2	NA	67.6	50.5
2017-11-05	TRCD Outer Groin Opening	364651 6247221	Shore	Surface	15:10	0.7	NA	40.4	29.1
2017-11-06	TRCD Outer Groin Opening	364651 6247221	Shore	Surface	15:14	0.6	NA	54.9	40.5
2017-11-07	TRCD Outer Groin Opening	364651 6247221	Shore	Surface	15:05	0.3	NA	37.7	26.9

*Turbidity/TSS Relationship where TSS = [0.79 x Turbidity] – 2.86