



Via Email

Ms. AlecSandra Macdonald
Regulatory Specialist
Gwich'in Land and Water Board
PO BOX 2018
INUVIK, NT X0E 0T0

Dear Ms. Macdonald:

Government of the Northwest Territories, Department of Infrastructure – Ferry Landing O&M Licence(s) G15L8-001 and G15L8-002, Local Area Monitoring Program (LAMP) 2.0 Proposal

The Department of Infrastructure (INF) is submitting the attached Proposal for the LAMP 2.0 as a part of the requirement for the above noted Water Licences.

There are two main components to the proposed monitoring plan:

1. Water monitoring program, measuring total suspended solids in the water.
2. Fish harvest data and Traditional Knowledge collection using methods similar to the GEO North 2001-2002 Aquatic Effects Study.

The Department of Infrastructure submits the attached proposal in earnest and looks forward to furthering the discussion regarding the potential effects of the ferry landings on the Peel and Mackenzie River(s).

Questions and comments can be submitted to the GLWB's Online Review System (ORS) within the specified timeframe. However, should you wish to discuss the proposal in greater detail please contact Jon_Posynick@gov.nt.ca or via telephone 867-767-9083 ext. 31052.

Sincerely,

Jon Posynick
Environmental Analyst
Department of Infrastructure

- c. Dan Carmichael, A/Regional Superintendent, Beaufort Delta, DOL
Merle Carpenter, Regional Superintendent, Inuvik, INF

Impact of ferry landings on water quality and fish catches in the Mackenzie and Peel Rivers

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Background

The use of granular material for ferry landings on the Mackenzie and Peel Rivers has raised environmental concerns among local community members. Nearby communities are worried that the addition of granular material has the potential to increase total suspended solids in these rivers downstream of the ferry landings, resulting in increased turbidity. In addition, there is a concern that granular material is moving downstream, altering river bathymetry, and resulting in diminished fishing habitats. To reduce the potential impact of introducing granular material to the rivers, the Department of Infrastructure (INF) has used clean, local material that does not have a high fraction of fine particles. The INF has also removed granular material from the landing sites at the end of each season to reduce loss of material throughout the winter. Despite these mitigation measures, concerns remain among local community members as to the impact of the granular materials used for ferry landings. We propose to update the Aquatic Effects Study performed by Geo North in 2001-2002 by collecting water quality data, information on fish catches, and additional Traditional Knowledge relevant to the ferry crossings.

Part I, Physical data collection

To examine the potential impacts of the construction of granular ferry landings on water quality in the Mackenzie and Peel Rivers, we will collect data before, during, and after the installation of the landings at each site. Data will be collected on each river during 2018 and 2019 seasons.

The most significant impacts of depositing granular material should occur immediately after installation of the landings, as water movement will quickly suspend small-grained material, while leaving gravel and cobble behind. Therefore, a study conducted in tandem with the installation of the landings would have the highest probability of detecting potential impacts. The study will be conducted as follows:

- Surveys will occur every three days starting nine days prior to the installation of the landings and continue for nine days after the installation is complete.
- Surveys will be conducted at three transects located upstream, and three transects located downstream, of the ferry landings (Figures 1, 2). For the Mackenzie crossing, a transect will also be sampled on the Arctic Red River upstream of its confluence with the Mackenzie (Figure 1).
- Along each transect, we will measure bedload sediment transfer at five points distributed across the width of the stream (Figures 1, 2). This will produce 30 samples during each sampling date times 6 sample dates per stream, for a total of 180 samples per stream. The single transect on the Arctic Red River will contribute an additional 30 samples. Sediment loads will be measured

using a Helley-Smith sampler that is deployed such that the device sits on the bottom of the stream and captures particles moving along the stream bed (Figure 3). These data will allow for a comparison of bedload sediment transfer upstream and downstream of the ferry landings. The resulting data set will also allow for an estimate of the contribution of the construction of ferry landings (if any) to overall bed sediment loads carried by the Mackenzie and Peel Rivers.

- At each sampling point we will also collect a depth-integrated water sample using a D-77 sediment sampler. Water from each sample will be used to measure turbidity (LaMotte portable turbidity meter), and 1L from each sample will be stored in Nalgene bottles in a cooler and returned to the lab for measurements of total suspended solids. Similar to the bedload sediment samples, there will be 30 samples collected on each sampling date for a total of 180 samples per stream.
- Measurements of total suspended solids will follow standard protocols (Environmental Protection Agency Method # 160.2).
- Statistical tests will be conducted to determine if turbidity, total suspended solids, or bed load sediment transfer significantly differs between upstream and downstream locations, as well as through time.

Part II, Fish catch data and Traditional Knowledge collection

One of the main concerns expressed by community members regarding the ferry landings is their potential impact on fish and fish habitat. One way to address these concerns is to collect harvest statistics over time to examine if there are any trends in fish catches. We propose to collect catch data and traditional knowledge following the methodology outlined in the previous Aquatic Effects Study performed by Geo North in 2001-02 (Geo North 2003), with some variations. Notably, that study collected data on fish and fish habitat, while this portion of the study only proposes to collect catch data and traditional knowledge. There is a lot of other scientific work being conducted on the local fisheries, and it was deemed that an additional detailed study of those other dimensions was not necessary. On the other hand, it would appear that detailed and comprehensive data of annual catch numbers is not currently being tracked by other investigators.

To gather fish catch data, we will work with local RRCs to form relationships with local harvesters who will be compensated for keeping a log of fish catches. Data from several harvesters will be combined to form a picture of fish harvesting near the communities of Tsiigehtchic and Fort McPherson. The data collected from local harvesters will be compared with previous surveys conducted by Geo North (2003) as well as surveys conducted by the Department of Infrastructure as summarized in their LAMP Summary Report (Department of Infrastructure 2017).

Traditional Knowledge (TK) will also be collected, as it could provide valuable insight into changes in fish catches and fish habitat that happened prior to the studies initiated in the early 2000s. Details on the proposed methods are provided below. To summarize, we will hold meetings in Tsiigehtchic and Fort McPherson to gather community input. Additional TK will be gathered through a series of interviews with elders who will be fairly compensated for their time. We will also hold a workshop at the conclusion of the project to share the data and information collected, and gather community feedback on those conclusions.

In the following tables, details and rationale are provided for each portion of the budget set out above.

Travel: It is indispensable that the researcher visits the communities at the start of the season to build relationships and hold a meeting with the RRCs and community members about the study. This travel is also an opportunity for any training required for the community-based research assistant, who will carry out data collection for significant parts of the study.

Similarly, it is crucial that the researcher visit the communities again to supervise the workshops where the results of the suspended sediment sampling, the catch data and the traditional knowledge is considered together by the members of the RRC, fishers, and other community members.

Catch surveys: Where the 2011-15 Local Area Monitoring Program (LAMP) collected catch data from two voluntary surveys conducted during the fishing season, the proposal here is to recruit fishers to complete catch data logs throughout the season. This approach will provide more accurate figures. In order to secure fishers' collaboration, they will be paid for the equivalent of one-day's work to complete the logs. The number of participants is estimated according to the number of participants reporting in the LAMP study.

Meetings and workshops. A pre-season meeting is crucial to inform fishers and other community members about the study, to recruit fishers to participate in the collection of catch data, and to begin identification and recruitment of elders to participate in the TK interviews. The post-season workshop is also a vital part of the study process, since it is here that the results of the suspended sediment sampling, the catch data and the TK are shared with RRC members, fishers and other community members. The aim of the workshop is to involve the communities in the process of bridging between science and TK to reach conclusions. This kind of activity insures that the communities feel a sense of ownership over the study results, and that they have an opportunity to identify remaining areas of doubt or concern.

The estimated number of participants is based on the number of participants in the 2001-02 study (Geo North 2003). Payment is pro-rated based on the Gwich'in Department of Cultural Heritage rate for participation in a full-day meeting (\$300 for a meeting 10 AM-4 PM).

Interviews. Interviews with elders/experienced fishers is the key way that TK will be gathered in this study. Such individuals can put the current health of the fishery into perspective, noting how different kinds of environmental and social change have altered the character and vitality of the fishery. The interviews will be conducted by the community-based research assistant, and will be recorded.

The proposal to conduct four interviews in each community follows the rationale provided in the 2001-02 study, which also included four such interviews in each community. It is important to note that additional TK is collected from a broader cross-section of community members during the final workshop.

Community-based Research Assistants (RAs). Community-based RAs will be crucial to the success of the study. They will assist with preparation for both the pre- and post-season community meetings, as well as facilitating those meetings. They will also conduct the TK interviews. Finally, they will provide transcription/translation of the recorded interviews and the Science & TK bridging workshop. The rate per hour of work is based on a \$200 daily rate. The rate for transcription/translation is based on Gwich'in Department of Cultural Heritage rates of \$300 for 60 minutes of recording.

Benefits and potential outcomes

This study will provide updated data that describes the immediate impact of the construction of ferry landings on sediment movement, turbidity, and total suspended solids in the Mackenzie and Peel Rivers. If elevations in measured parameters are detected after construction of the landings, our measurements of bedload sediment transfer and total suspended solids will allow us to put the contribution of the landings in context of the total sediment loads transported by these rivers over the course of the year. Although elevation in bedload transfer or turbidity may be detected immediately after construction, the quantity may not be significant given annual sediment loads carried naturally by these large rivers.

The data collected from this study will allow the Department of Infrastructure to assess if current sediment control measures are adequate, and will provide scientifically defensible information to present to regulators when renewing water licenses for ferry crossings. The Traditional Knowledge and fish catch data collected will provide insight into the current and past state of the fish camps located near Tsiigehtchic and Fort McPherson, and will provide the Department of Infrastructure with insight into how the ferry crossings might be impacting local communities.

Reporting for this project will include an interim update after the first field season, followed by a final report after all the data has been analyzed. The final report provided to the Department of Infrastructure will detail the results of the study and will provide recommendations for future monitoring at ferry landings on the Mackenzie and Peel Rivers. The interim and final reports will be shared with local Renewable Resource Councils and the Gwich'in Renewable Resources Board.

References cited

Department of Infrastructure. 2017. LAMP Summary Report, Peel River and Mackenzie River Ferry Landings. Water licenses G15L8-001 and G15L8-002. 24pp.

Geo North 2003. Final Report – Aquatic effects study for the ferry crossings near Tsiigehtchic and Fort McPherson, NT. 224pp.

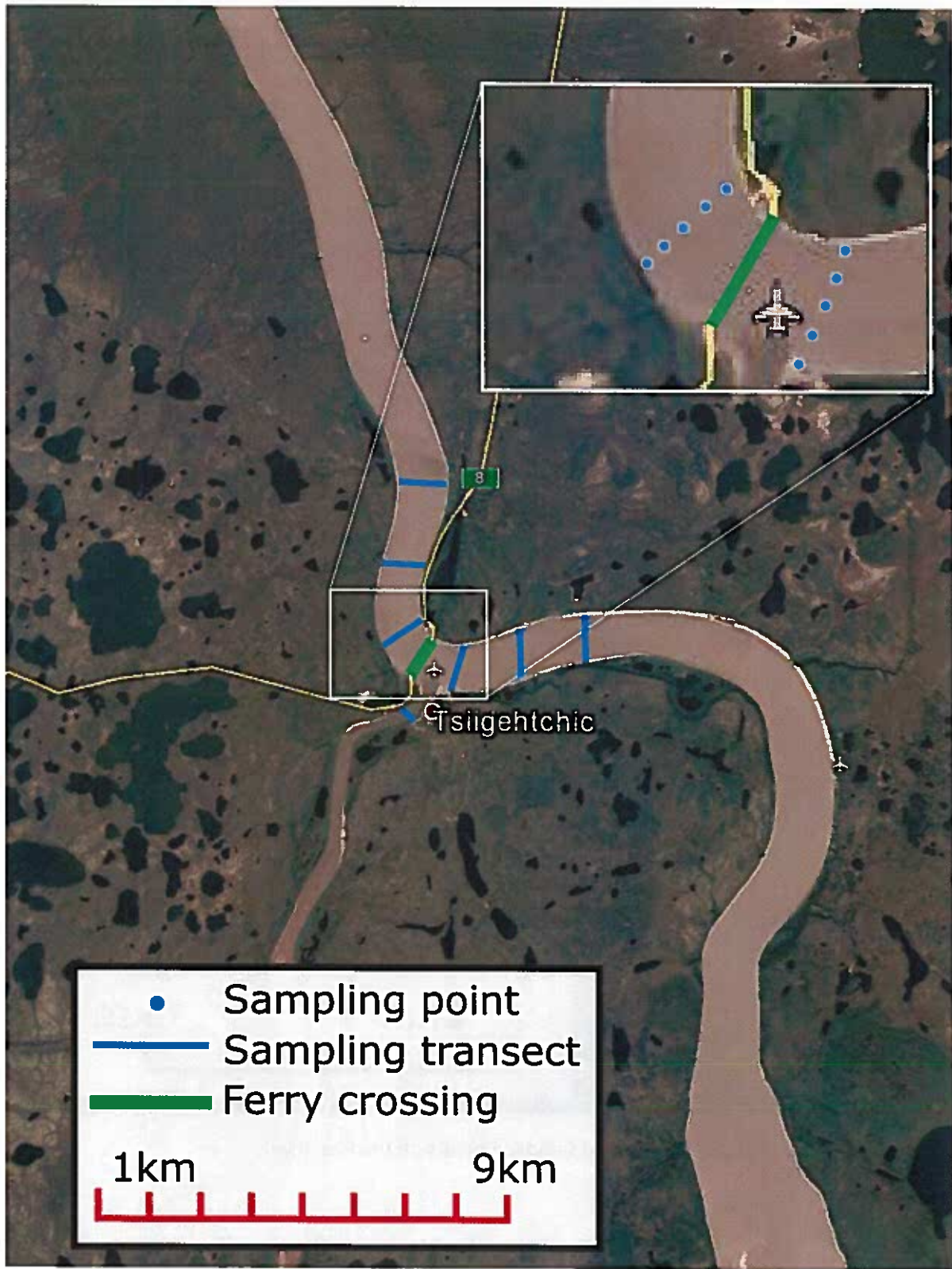


Figure 1. Sampling transects and individual sampling points on the Mackenzie River.

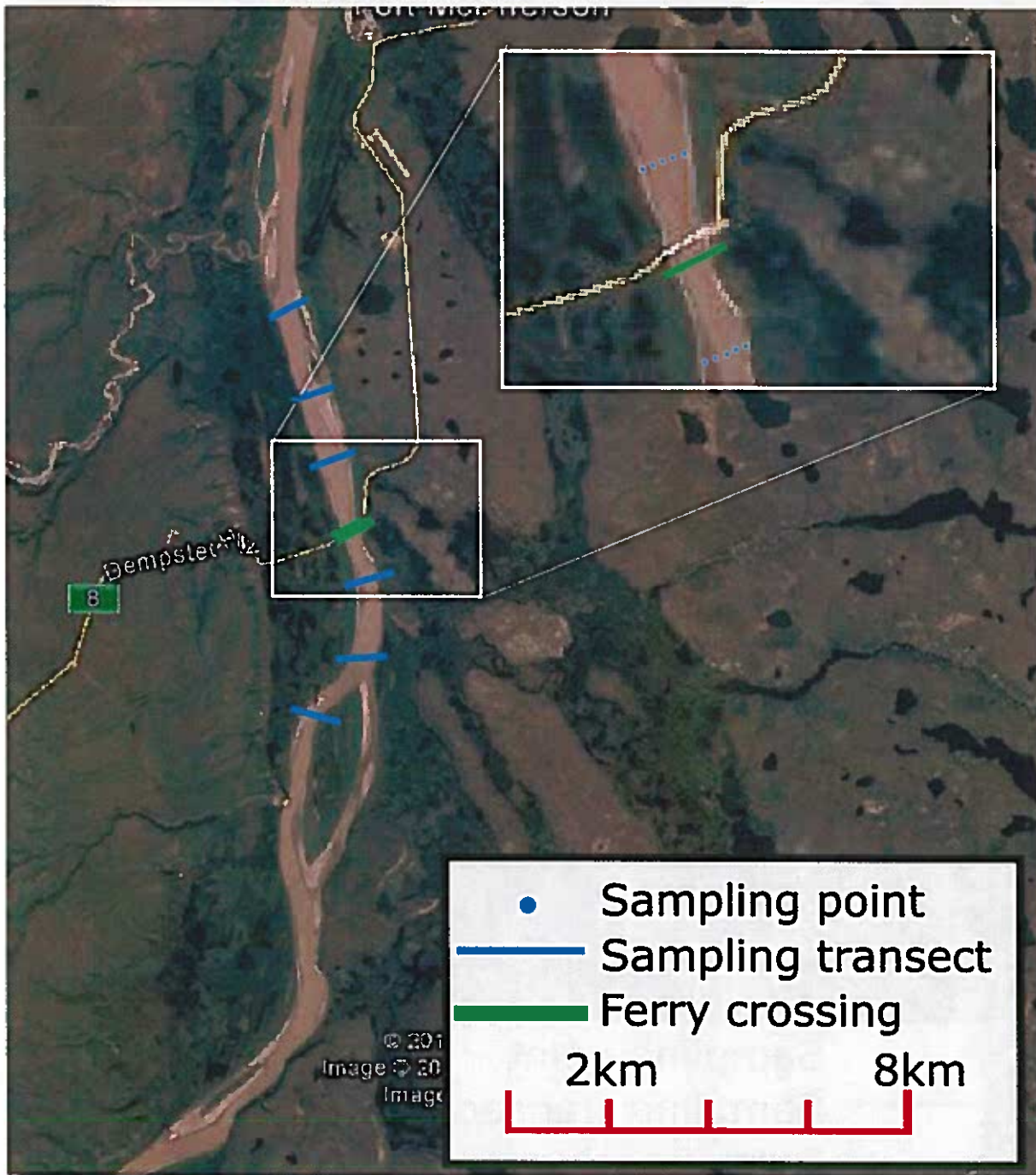


Figure 2. Sampling transects and individual sampling points on the Peel River.



Figure 3. A Helley-Smith suspended sediment sampler. The sampler is deployed near the streambed and moving sediments are captured in the filter screen. The deployment of the sampler is timed so that quantitative estimates of bedload movement can be obtained.