HAMLET OF TUKTOYAKTUK, TOWN OF INUVIK
GOVERNMENT OF NORTHWEST TERRITORIES

ENVIRONMENTAL IMPACT STATEMENT FOR CONSTRUCTION OF THE INUVIK TO TUKTOYAKTUK HIGHWAY, NWT





APPENDICES

MAY 2011
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KIGGIAK - EBA

Hamlet of Tuktoyaktuk, Town of Inuvik,
Government of Northwest Territories

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KIGGIAK - EBA

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APPENDICES

APPENDIX A

APPENDIX A GREEN LIGHT: SIGNALLING THE DEPARTMENT OF TRANSPORTATION'S COMMITMENT TO THE ENVIRONMENT

GREEN LIGHT:

Signalling the Department of Transportation's Commitment to the Environment

Northwest Territories Transportation

Minister's Message

Maintaining a healthy environment is one of the most important issues facing us today. Managing climate change, air and water pollution, and stemming the loss of wildlife habitat are some of our biggest challenges.

The residents of the Northwest Territories are fortunate to live in a vast and relatively unspoiled environment that supports subsistence harvesting, resource development, recreation and tourism. Northerners have a strong and enduring attachment to the land, which demands special attention to addressing environmental challenges.

To formally recognize our commitment to protect our northern environment, I am pleased to present *Green Light*, which confirms the Department of Transportation's commitment to environmental excellence. *Green Light* fosters the development of a corporate culture dedicated to the environment and moving forward on plans and policies that improve the environmental sensitivity of day-to-day transportation operations. *Green Light* lays out the Department's immediate and future plans to become a more environmentally-responsible organization.

Michael McLeod

Minister
Transportation

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Introduction

The 16th Legislative Assembly of the Northwest Territories places a high priority on building an environmentally sustainable and prosperous NWT. The Department of Transportation (DOT) is mandated to provide for the safe, secure, accessible and reliable movement of people and goods to meet the NWT's social and economic needs and aspirations. Conserving the environment for future generations is one of the Department's core values.

The cost efficient transportation of people and goods is of fundamental importance to society. This is especially true in the North, where communities are located far apart and essential goods are delivered from great distances. The delivery of goods is further challenged by the lack of year-round and, in some cases, a complete lack of highway access, low standard highways and the limited and/or costly alternate modes of marine and air. Notwithstanding these challenges, the need for the efficient movement of goods and services must be supported with a balance of attention to environmental considerations. The health of the environment continues to predominate public attention at the territorial, national and international levels. Northerners share a deep concern for the environmental health of our lands and waters, and are firmly engaged in local and global environmental issues. Climate change, habitat loss, the depletion of renewable and non-renewable resources, and water, waste and noise pollution are issues of significant concern to NWT residents, to the GNWT and to DOT.

DOT has undertaken a number of initiatives to date to improve the Department's environmental performance. Actions are ongoing to improve the energy efficiency of our facilities and the fuel efficiency of GNWT vehicles and ferries. These efforts have assisted in reducing operating costs, pollution and Greenhouse Gas (GHG) emissions. DOT considers traditional knowledge (TK) information collected in transportation planning studies and in the implementation of its programs and projects. DOT also conducts internal audits of its facilities to ensure compliance with environmental regulations. The Department is represented on the Environmental Remediation Committee that monitors the assessment and restoration of GNWT contaminated sites. However, recognizing that we can do more, DOT is committed to examining how operations associated with developing, operating, and maintaining the territorial transportation system can be improved and made more environmentally sustainable.

The main goal of *Green Light* is to highlight existing environmental practices and to further foster a corporate culture of environmental excellence at DOT and throughout the northern transportation industry. *Green Light* lays the groundwork for improving operations and demonstrates DOT's commitment to continue efforts to get our own house in order and to lead by example. It is meant to focus DOT employees on progressive approaches to address environmental challenges, while continuing to maintain high service standards. DOT will intensify efforts to engage the transportation industry on environmental issues and priorities by sharing information and encouraging industry to also adopt progressive and necessary environmental practices.

Green Light was conceived and designed to spark action by individuals in each operational region of the NWT and across the organization. The Action Plan presents a blueprint for priority actions in the short term (0 to 2 years) and medium term (2 to 5 years).

Short-term actions focus on: determining appropriate roles and responsibilities to address priority environmental challenges; collecting important baseline information; and developing clear and practical environmental policies for DOT. The medium-term actions focus on implementing the required policies and plans under a new departmental Environmental Management System (EMS). All policies, guidelines and initiatives stemming from *Green Light* will complement and enhance existing GNWT programs and initiatives related to environmental protection. These include the GNWT Sustainable Development Policy, the NWT Greenhouse Gas Strategy, the Climate Change Adaptation Strategy and DOT's Drive Smart Program.

DOT's Challenges:

Impact of Transportation Activities on the Environment

The transportation sector has a significant impact on the environment. However, minimizing negative effects from developing, operating and maintaining transportation systems warrant extra attention to reduce the overall impact of transportation activities on the environment. The Department's operations in the NWT touch many aspects of the environment, from the lands supporting territorial highways, the waterways supporting marine traffic in the summer and ice roads in the winter, and the airspace above us which supports aircraft movements.

DOT's construction and maintenance activities produce GHG emissions, pollution and hazardous wastes, and, in some cases, infringe upon wildlife habitats. The NWT's greatly dispersed population, challenging climate and growing demand for goods, fuel and materials increases DOT's activities and, thus, steadily increases our environmental impact. Environmental issues of particular concern to the Department include management of hazardous waste and pollution, assessment and remediation of environmental liabilities, mitigating wildlife and transportation system interactions, and mitigating and adapting to the effects of climate change.

Hazardous Waste and Pollution Management

DOT's ongoing operations produce hazardous wastes and pollutants. Minimizing pollution and the production of unwanted waste materials is good business, as it reduces the costly need for pollution control, remediation and disposal. The Department is interested in finding innovative ways to prevent and control the production of hazardous wastes and pollutants throughout its NWT operations.

Hazardous waste management relates to the generation, storage, shipping and disposal of waste materials classified by regulators as being hazardous to the environment. Most DOT highway camps, ferry maintenance camps and airports store and use hazardous products, which may also generate hazardous waste products. The Department inherited several federal transportation facilities across the NWT, some of which contained lead paint, asbestos, polychlorinated biphenyls (PCBs) and other contaminants.

A *pollutant* is a substance or condition that contaminates air, water or soil, rendering them unfit for or harmful to living things.

A *hazardous material* is any item or agent (biological, chemical, physical) with the potential to cause harm to humans, animals or the environment, either by itself or through interaction with other factors.

Hydrocarbons, glycol and asbestos are the main hazardous wastes of concern to DOT. The ongoing challenges regarding hazardous waste and pollution for DOT relates to compliance verification, developing appropriate site contamination investigation procedures and optimizing the performance of septic effluent handling systems at all of our facilities.

Wildlife and Transportation System Interaction

The Northwest Territories is home to a wide variety of wildlife populations. DOT takes considerable precautions to protect nature and its inhabitants from the impacts of our work. These protective measures are incorporated into all aspects of our operations. For example, the protection and enhancement of fish habitat is an important part of the planning and work carried out by DOT and our contractors when working near water bodies. DOT also attempts to reduce the spread of invasive species, alerts the public and assists in managing bison interactions with motorists on the territorial highway system, and minimizes soil erosion from transportation-related activities.

Greenhouse Gas Emissions

The world's leading scientists, as represented by the United Nations Intergovernmental Panel on Climate Change, agree that human-caused GHG emissions are mainly responsible for recently observed increases in global air temperatures. Evidence from around the world – including extreme weather events, record temperatures, rapidly retreating glaciers, extensive thawing of permafrost and rising sea levels – indicates that climate change is happening much faster than anticipated. On a per capita basis, Canadians are the second highest contributors of GHG emissions globally, after the Australians and followed by the Americans.

The Canadian transportation sector is the second highest GHG emitter in the country and the NWT, after the manufacturing and resource industry sectors. Alarmingly, the Canadian transportation sector's GHG emissions rose 33 per cent between 1990 and 2005. In 2001, the NWT transportation sector produced approximately 591 kilo-tonnes of carbon dioxide, representing 37 per cent of the NWT's total emissions. While DOT is not directly responsible for all these emissions, it does produce quantities of GHG emissions in its own operations, and efforts are ongoing to reduce the Department's total GHG emissions.

Climate Change Mitigation and Adaptation

Mitigation means decreasing greenhouse gas emissions to lessen future impacts.

Adaptation refers to actions that better insulate us from those impacts.

According to the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report "neither adaptation nor mitigation alone can avoid all climate change impacts; however, they complement each other and together can significantly reduce the risks of climate change."

Climate Change Impacts on the Transportation System

Northern regions face some of the greatest impacts from global climate change. In a recently produced report for DOT, entitled *Climate Change and Transportation in the NWT*, it was noted that climate change has and will continue to pose significant challenges for the transportation system. Warmer temperatures generally result in less extensive ice cover and shortened winter construction seasons. Projected warming temperatures and increases in early winter snow precipitation retards ice growth and increases highway maintenance activities and spending. Permafrost degradation and instability leads to structural problems for our roads, runways and bridge structures due to heaving, thawing and the emergence of sinkholes and potholes. These and other impacts have serious implications for the stability and reliability of the territorial transportation system.

Need for Baseline Information

Accurate baseline information is integral to forecasting future needs for the Department's facilities and operations across the NWT. The current lack of key environmental baseline information is a challenge for the Department. In order to effectively address pressing environmental challenges, DOT must better understand where and how critical impacts are occurring. Better data on our energy and fuel use, emission of GHG and the relative efficiency of all our equipment and facilities is necessary to effect the required improvements.

Need for Consolidated Environmental Policies and Guidelines

The Department of Transportation does not currently have a comprehensive and progressive suite of environmental policies and guidelines to consistently govern operations across the NWT. Although DOT makes best effort to follow all of the applicable federal and territorial environmental laws, policies and guidelines, the Department must go further to set a progressive example of compliance for the rest of the transportation industry operating in the North.

Need to Enhance Corporate Culture

The Department of Transportation must heighten environmental awareness and stewardship in all divisions and across all regions. Enhancing environmental responsibility will demand strong leadership, effective communications and the efficient use of resources.

Environmental Vision

The Department's environmental vision is for a transportation system that best meets the environmental, social and economic needs of the people of the Northwest Territories. We will achieve this vision by making environmental priorities an integral part of the decision-making process and all operations.

Green Light will help focus attention on environmental issues and help foster a corporate culture which strives for environmental excellence. A primary goal is to empower employees to find the most environmentally appropriate approach to delivering transportation programs across the NWT. It is expected that environmental considerations will become a more important part of the day-to-day decision-making process across the Department, and results will be fully assessed.

Action Plan:

Short Term (First Two Years)

In the short term, DOT will lay the groundwork for *Green Light's* implementation. Internal discussions will be initiated across the Department on how to effectively improve our environmental approach in planning and delivering essential transportation programs. Senior management will lead the shift in corporate culture to develop, promote and uphold the highest environmental standards for the transportation sector in the NWT. The Department will begin by looking at innovative and low cost ways of improving operations, which yield the maximum environmental benefits.

Defining the Department's medium-term environmental priorities is also critical. The Department will need to decide what prospective environmental initiatives will likely yield the best results. Research will consider best practices and a detailed examination of all current DOT operations. The development and implementation of an Environmental Management System will guide the Department's selection of implementation costs and priorities.

In two years time, DOT will provide a report card on *Green Light*. The report card will highlight our successes, identify areas that need improvement, incorporate new initiatives and set the stage for the full implementation of the Action Plan.

Fostering Employee Commitment

Fostering employee commitment is an important initial step in developing an enhanced environmental corporate culture. Encouraging the sharing of information and ideas throughout the organization is very important to encourage buy-in for the Department's new environmental plan from all employees. Exemplary employees and work teams will be recognized to acknowledge commitment to the overarching objectives of *Green Light*.

In order to move forward quickly, a dedicated staff member will be appointed to act as the Environmental Management System Coordinator. The EMS Coordinator and Senior Management Committee will play a central role in encouraging the new corporate culture.

Develop the Environmental Management System

The EMS will be the foundation of the Department's approach to enhanced environmental stewardship. It will provide the framework to collect and analyze baseline information and the planning of research and implementation priorities. The Department will undertake a review of all environmental regulations, policies and guidelines relevant to transportation activities.

Under the EMS, the Department will standardize Environmental Site Assessments. The requisite auditing, monitoring and reporting will help DOT ensure that it is carrying out its activities in an environmentally responsible manner, and in full compliance with issued land use permits, water licences, and government regulations and guidelines. Standardization of procedures across the Department will improve efficiencies and simplify environmental accountability.

The design and implementation of the EMS will require a dedicated staff member in the Planning, Policy and Environment Division to serve as the Department's EMS Coordinator. The EMS Coordinator will undertake policy and guideline development and lead the implementation plan. All employees will be encouraged to share ideas on operational practices and innovative policies which would better protect the environment.

The Transportation Association of Canada has developed an EMS guide for the public transportation sector. This guide will be a key component of the Department's efforts to design, adopt and implement its own EMS.

Assessment and Remediation of Contaminated Sites

There are a number of former and current facilities under DOT ownership or responsibility that are known to be contaminated. DOT will increase its efforts in assessing and remediating these sites. These efforts will involve work as required by Financial Administration Manual policies 3201, 3202 and the *Environmental Protection Act*, and in association with the federal government and industry, where applicable.

Environmental Management Systems (EMS)

An *Environmental Management System* is a systematic approach for organizations to bring environmental considerations into decision-making and day-to-day operations.

An EMS establishes a system for tracking, evaluating and communicating environmental performance. An EMS introduces performance measures and helps ensure that major environmental risks and liabilities are identified, minimized and managed.

EMSs are designed and adopted by organizations themselves. They are comprised of policies, procedures and guidelines tailored to an organization's particular needs.

Traditional Knowledge

Traditional knowledge, in the context of the GNWT regulatory regime, refers to the knowledge, innovations and practices of northern Aboriginal peoples. Traditional knowledge (TK) significantly contributes to environmentally and socially responsible decision-making. It is an important tool for mitigating potential environmental impacts, learning about best practices, and for conserving important traditional and cultural activities, sites and intrinsic values.

Baseline Information

Gathering baseline information is necessary for the Department to determine priorities and track subsequent progress. DOT will determine what information is needed and then design and initiate any required baseline studies. Possible studies include:

- current practices for managing hazardous waste;
- current construction practices;
- historical environmental issues at Department facilities;
- energy use/GHG emissions at department facilities;
- vehicles and heavy equipment fuel use/GHG emissions;
- benefits of using energy efficient pilot vehicles;
- office supply consumption patterns; and
- waste produced and proportion recycled (diverted from landfill).

Baseline data collection will utilize traditional and scientific knowledge. With baseline data studies in place, the Department will be better able to measure the performance of its new environmental approaches.

Best Practices and Policy and Procedures

There will be an ongoing commitment to researching best environmental practices and policies from other jurisdictions. The Department will continuously learn about what other jurisdictions and industry stakeholders are doing to determine what is most likely to work in the NWT. Open communications on the EMS will enable important information and ideas to flow throughout the Department.

DOT will incorporate the GNWT's Guide for Procurement of Environmentally Responsible Products and Services into our purchasing of and contracting for goods and services where economically feasible. The intent will be to reduce the consumption of resources and minimize environmental and health risks.

DOT's internal protocol for conducting TK has been in place and in use for eight years. It is governed by regulatory requirements and best practices. The protocol has been circulated within the Department to provide direction and recommendations for comprehensive and meaningful TK interviews. These interviews have influenced aspects of project/program planning such as design, location, timing and methodology.

Develop GHG Emissions Reduction Plan (Mitigation Plan)

The Department will develop a GHG Emissions Reduction Plan to be implemented in the medium and long term. The plan will utilize the information gathered through the baseline and best practices assessments. The GNWT's goal, as stated in the *NWT Greenhouse Gas Strategy 2007-2011*, is to reduce the territorial government's GHG emissions 10 per cent below 2001 levels by the year 2011. The Department's own plan will set this target as its minimum and determine where further reductions are possible.

Develop Climate Change Adaptation Plan

The Department's Climate Change Adaptation Plan will apply traditional and scientific knowledge to define probable northern climate change impacts and propose possible adaptation strategies. The *Climate Change and Transportation in the NWT* report provides a framework to help understand the impacts climate change is having on the NWT. The report recommends adaptation measures, identifies preferred options and best practices, and will be very useful in developing elements of the EMS. To further the understanding of climate change adaptation, DOT has allotted $1.8 million under the R&D component of the Building Canada Fund for research projects.

The Government of the Northwest Territories released the *NWT Climate Change Impacts and Adaptation* report in January 2008, which will also be considered in developing DOT's EMS. The report describes the impacts climate change is having on GNWT activities and defines actions departments are taking to address these challenges. The Department of Transportation will also provide ENR with advice and input in the development of an NWT Climate Change Adaptation Plan.

Develop Worksite Specific Plans

Departmental work teams in all regions will be asked to develop plans and specific initiatives to improve environmental performance. These efforts will have support and oversight from the EMS Coordinator Planning, Policy and Environment Division, and the Senior Management Committee. Work Teams will be encouraged to develop and implement their plans within two years, including the collection of baseline information, desired results, and implementation and monitoring tasks. Employees will be asked to look at all areas of DOT's operations for achievable results.

Engage the Transportation Industry and the Public on the Environment

In recognition of the transportation industry's impact on the environment, DOT will more fully engage with industry and the travelling public on environmental issues. Over the first two years, the Department will look at ways in which we can share information, work with and generally support efforts to become more environmentally responsible.

The Department of Transportation will seek partnerships with other levels of government and NGOs to support and promote such things as active transportation, smart driving practices, green procurement and other best practices.

Medium Term (Three to Five Years)

In the medium term, the Department will move forward with major initiatives and measure progress. The Department will also use this time to determine how initiatives and best practices can be adapted appropriately at DOT and in the transportation industry. In the medium term, DOT will also measure progress and determine appropriate future priorities. At the end of the fifth year it will be important to review the *Green Light* approach to ensure that it continues to meet the environmental goals of the Government of the Northwest Territories.

Employee Training and Education

The Department will develop appropriate environmental training for DOT staff. Training will focus on waste management, sampling, regulatory management, soil erosion control, and site assessment and remediation. The training will be tailored to specific operational needs. Fostering employee commitment through education, training and performance challenges will go a long way to developing the desired responsible environmental corporate culture.

Implement the Environmental Management System

The Environmental Management System's implementation will shape the Department's overall approach to the environment. The EMS will be implemented incrementally to ensure that it is well focused, appropriate and practical. Senior Management support throughout the development and implementation phases is critical to meeting our overarching environmental objectives.

Implement GHG Emissions Reduction Plan

The implementation of the GHG Emissions Reduction Plan will be one of the Department's major environmental initiatives. Since GHG emissions reductions can be gained by improving energy efficiency and conservation, important cost reductions are anticipated. Reducing consumption and using resources more efficiently is the smartest and most cost-effective way to protect the environment and reduce GHG emissions. It is very important to develop solid long-term objectives, as efficiency improvements may require investment in the short and medium term to achieve the stated long-term outcomes.

Implement Climate Change Adaptation Plan

The Department will also focus on developing strategies to adapt to climate change. Adaptation will help the Department preserve its core assets, and to plan and design infrastructure that is less vulnerable to the impacts of climate change and climate variability.

Implement Worksite Specific Plans

In the medium term, DOT work teams will be encouraged to implement priority environmental initiatives. Measurable deliverables will be expected as evidence that the desired corporate shift in environmental attitude is taking place.

Conclusion

Green Light provides a blueprint to improve the environmental performance of the Department of Transportation. It will inspire and guide the Department to achieve new levels of environmental sustainability and stewardship, while fulfilling its main mission of supporting and enabling a safe, secure, accessible and reliable Northwest Territories transportation system. The Department is proud to be entering an era of increased environmental awareness and positive action.

Northwest Territories Transportation

APPENDIX B

APPENDIX B COMMUNITY CONSULTATIONS AND MEETING SUMMARIES

Appendix B-1
Inuvik to Tuktoyaktuk Highway Project
Community Meetings, Presentations, and Consultations
October 2009 – January 2010

Appendix B summarizes consultation proceedings from October 2009 January 2010 Inuvik to Tuktoyaktuk Highway consultations. The October 2009 Consultation notes were circulated to communities, organizations, agencies, and regulators on January 8, 2010.

For clarity, regardless of the terminology used during a meeting, for the purposes of these meeting summaries, the term 'Highway' is used to refer to the proposed Inuvik to Tuktoyaktuk Highway and the term 'Road' is used to refer to the Tuktoyaktuk to Granular Source 177 Access Road.

Appendix B-1. **Inuvik to Tuktoyaktuk Highway Project - Community Meetings, Presentations, and Consultations October 2009 – January 2010**

Topic	Community	Date	Location
October 2009 Consultations: Inuvik to Tuktoyaktuk Highway Project Proponents, Project Status, Schedule, Questions, Community Input and Recommendations	Inuvik Town Council – Town Council Meeting, Mayor Derek Lindsay, Mayor-Elect Denny Rodgers, and Council Members	October 26, 2009	Town of Inuvik Council Chambers, Inuvik, NT
	Tuktoyaktuk Community Meeting (Tuktoyaktuk) – Hamlet of Tuktoyaktuk, Tuktoyaktuk Hunters and Trappers Committee, Tuktoyaktuk Community Corporation, Tuktoyaktuk Elders' Committee, residents (*see Meeting Attendance Log*)	October 27, 2009	Kitti Hall, Tuktoyaktuk, NT
	Inuvik Community Corporation & Inuvik Elders' Committee (*see Meeting Attendance Log*)	October 28, 2009	Midnight Sun Recreation Complex, Inuvik, NT
	Inuvik Community Meeting (Inuvik) (*see Meeting Attendance Log*)	October 28, 2009	Midnight Sun Recreation Complex, Inuvik, NT
	Inuvik Hunters and Trappers Committee – Note: *Committee members did not come to the scheduled meeting.*	October 29, 2009	Inuvik Hunters and Trappers Committee Office, Inuvik, NT
January 2010 Consultations: Inuvik to Tuktoyaktuk Highway Project – Updates since October 2009, Routes, Schedule, Next Steps	Inuvik Community Corporation, Tuktoyaktuk Community Corporation, Inuvik Hunters and Trappers Committee & Tuktoyaktuk Hunters and Trappers Committee meeting with the Inuvik to Tuktoyaktuk Highway Project Steering Committee	January 13, 2010	Ingamo Hall Friendship Centre, Inuvik, NT
	Inuvik Community Meeting	January 14, 2010	Midnight Sun Recreation Complex, Inuvik, NT
	Tuktoyaktuk Community Meeting	January 14, 2010	Kitti Hall, Tuktoyaktuk, NT

Appendix B-2
October 2009 Tuktoyaktuk and Inuvik Community Consultation Summary

Appendix B-2. **October 2009 Tuktoyaktuk and Inuvik Community Consultation Summary**

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
Inuvialuit Final Agreement and Protection of Special Areas	Husky Lakes have special status under the Inuvialuit Final Agreement, Section 8(1). A plan is needed to manage development in the area. There is concern about opening access.	Tuktoyaktuk	The Inuvialuit Land Administration brought this to our attention in September, and indicated some of the special considerations for this area, including a 1 kilometre setback for development. [IFA Section 8 consulted with reference to the proposed project.]
	The completion of the Husky Lakes Management Plan, Environmental Standards, and the Community Conservation Plan updates are anticipated by the end of the year.	Tuktoyaktuk	The submission of the PDR is scheduled for January 2010. We will seek draft copies of the noted plans. [EIRB 2002 and 2005 Drafts obtained and consulted with reference to the proposed project.]
	Show Highway route's distance from 1 kilometre setback along Husky Lakes.	Tuktoyaktuk	The 1 kilometre setback can be shown on maps for January consultation and regulatory submissions. [Husky Lakes 1 km setback obtained from ILA and added to maps.]
	Obtain EIRB guidelines. Consult the IFA Section 8 about Husky Lakes.	Inuvik Community Corporation	Recommendation noted.
Project-Specific Regulatory Review and Decision-making Process	Bring the EISC to the Tuktoyaktuk meeting in January to hear directly from the people.	Tuktoyaktuk	Noted. [Kiggiak-EBA informed the EISC of this request during Oct 29 meeting with F.McFarland and B.Chalmers.]
	Illustrate decision-making process and time line.	Tuktoyaktuk	Once the PDR is submitted to the EISC, the EISC will refer the PDR to regulatory agencies for 30 days. Then the EISC will review the comments and make its decision. The EISC usually applies terms and conditions to their decision, which must be considered as other authorizations are obtained from INAC, DFO, etc. We are working to confirm the

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
			regulatory review requirements. [Note: After the Tuktoyaktuk Community meeting, regulatory consultation identified: (1) the EISC has adopted a 45 day review period and (2) the land use and quarry permits on Crown land and the water licence will require a federal review under the Canadian Environmental Assessment Act (CEAA) in addition to the EISC Screening.]
	What will happen if this project is referred to the EIRB?	Inuvik	Referral to the EIRB could be expected to add at least 6 months to the approval process.
Possible Subsequent Developments	The ILA will administer subsequent developments, such as access, proposed gas station, etc.	Tuktoyaktuk	[John Fraser, Emily Borsy, and Barry Jacobsen attended the community meeting and provided background on the role of the ILA, as required.]
Route and Route Alternatives	Several residents and Elders prefer the Upland route because it is farther from Husky Lakes. There have been many meetings here for decades. Different routes were identified. It is a concern if the options are not considered adequately.	Tuktoyaktuk	We will state in the PDR that some residents would like the Highway to be farther from Husky Lakes. [In response to interest in the Upland Route, the project team undertook more detailed study for comparison. The Partners, Steering Committee, and the communities will be provided with the comparison information.]
	Who will make the decision about the route? Will the Upland route be considered?	Tuktoyaktuk	Along with the community's views, engineering considerations, such as the amount of fill, and the cost will be factored in to the decision about the route that is put forward for development.
	Will the PDR show three routes?	Tuktoyaktuk	To be screened by the EISC, the Partners will need to propose one preferred route for construction. The pros and cons of the route will be given, as will the pros and cons of other options. The PDR's comparison will provide a basis for route selection

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
			provided.
	Show the three to four routes that have been identified since 1977. Show the pros and cons.	Inuvik Community Corporation	The previous studies have been taken into consideration in identifying the PWC 1977 as most suitable for construction, with some modifications.
Traditional Land Use and Cultural Considerations	The Highway will help residents get to their cabins and camps. With the Highway comes the responsibility to properly protect hunting, trapping, and fishing.	Tuktoyaktuk	We agree. GNWT Environment and Natural Resources said the same thing when we discussed the project with them.
	The ICC is accountable to the people on the land and is responsible for helping them maintain their lifestyle. The ICC members will vote on this project.	Inuvik Community Corporation	Noted.
Project Proponent	Who will make the decision to construct the Highway? How long will they take to decide?	Tuktoyaktuk	The Partners (GNWT DOT, Hamlet of Tuktoyaktuk, and Town of Inuvik) will decide when they want to submit their Project Description. It is currently scheduled for January 2010 submission. The EISC and other authorities and review agencies will decide if the Highway plan, as presented, can be approved.
	The Town of Inuvik and Hamlet of Tuktoyaktuk are proposing a project on Inuvialuit private lands. It is up to the people to decide if the project should be allowed.	Inuvik Community Corporation	Noted.
Project Economics	What inside information can be provided about the federal funding and timing?	Tuktoyaktuk	We do not have further information on funding for construction.
	How much will the Highway cost? Costs for this highway not yet been determined. What is the difference in cost between the proposed route and the Upland route?	Tuktoyaktuk	Based on other recent northern highway construction experience road construction costs have been in the range of $600,000 to $1 million per kilometre.
	If this project is approved, will it be built?	Inuvik	Unknown, but federal funding availability will require that it is approved, and the window of opportunity may pass (does not always look as promising as it does now).

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
	Will fees and royalty rights be collected?	Inuvik Community Corporation	The fee and royalty arrangement has not been decided.
	What is the total estimated cost for the project?	Inuvik Town Council	Cost estimation is under development and will be better understood by the end of the year.
Granular Resource / Borrows	Which gravel sources will be used? What is the quality and quantity of gravel from each source?	Tuktoyaktuk	Calculations will be done over the winter. Some fieldwork will be needed to verify the information.
	Have the gravel sources been identified and secured? Will the ILA issue quarry rights at a discounted royalty rate?	Tuktoyaktuk	There are numerous gravel sources identified along the route. Authorizations will be required. Royalties need to be discussed further.
	Will borrows be on Inuvialuit or Crown Lands?	Inuvik	There are several potential borrow sources along the route. The team has not selected quarries yet.
Project Schedule	When will construction start?	Tuktoyaktuk	The Partners have asked Kiggiak-EBA to submit the application to the EISC in January. This is being done to enable equipment to be stored at borrow sources in March or April 2010 so that work in the borrows can commence in the summer or fall of 2010.
	The Highway project is moving too quickly.	Inuvik Community Corporation	Noted.
	What is the timeline for activities between now and submission? When will the necessary information be collected? Has enough time been allowed?	Inuvik Community Corporation	There is a lot of background information available because this project has been studied many times in the past. Focused field studies will be necessary, but the project can be submitted for screening based on the information that is currently available.
Community Social,	Are the effects of drugs and alcohol on the community being considered?	Tuktoyaktuk	There are positive and negative aspects to a project like this, and they all need to be considered. The

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
Economic, and Cultural Considerations			EISC is expected to consider environmental and social effects. The issue will be brought to the attention of the decision-makers in the PDR.
	Include a socio-economic and cultural component in the application. Obtain harvest information from the Inuvialuit Game Council.	Inuvik Community Corporation	The PDR will draw socio-economic information from previous studies and we will hope to update it with the information the meeting participants and organizations provide in the coming months.
Associated Infrastructure Maintenance and Responsibilities	Will the Hamlet be responsible to upgrade and maintain the Tuktoyaktuk to Source 177 component? Will funding be provided? How will the contract for maintenance be awarded?	Tuktoyaktuk	The Tuk to 177 access road is a municipal road. It has not been decided how the funding or contracts for the maintenance of 177 will be handled after the Highway is constructed. Nothing is decided yet, and community input will be included in the decision.
	Will Navy Road be improved? It is rough and narrow. Will the Tuktoyaktuk to Source 177 Road be upgraded?	Inuvik	An upgrade to a portion of Navy Road and the 177 Access Road are planned.
	How will the contracts be let? Will they be federal or territorial?	Inuvik	This has not been determined.
Public Safety	How safe are single-lane bridges? Would a wider crossing be safer?	Tuktoyaktuk	Double lane bridges are not being considered. Risk factors that are reviewed include visibility and traffic volumes. The locations along the Highway where bridges would be installed have excellent or unlimited sight distances. The traffic volumes are low. Signage will be in place.
	Are the Highway and bridge specifications adequate to support large module trucking for Parsons Lake?	Inuvik	The Highway will be constructed to the DOT-GNWT requirements. Overweight loads will operate under permit, will require more axles, lower speeds, seasonal timing, and other special haulage considerations, which are standard for NWT highways and private resource roads. They are

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
			suitable for this Highway design.
Reference to the Tuktoyaktuk to Granular Source 177 Access Road	Have the terms and conditions for the Tuktoyaktuk to Source 177 Road been followed?	Tuktoyaktuk	ILA staff responded that adherence to the terms has been good. The ILA has held the permit holder accountable. Self monitoring, reporting, detailed activity reports, environmental monitors, and inspections have been done. The ILA noted that things do not go perfectly, but any problems have been caught quickly and corrected. The permit holder has been responsive.
	How much gravel has been used at Source 177?	Tuktoyaktuk	Approximately 249,000 cubic metres of the several million available there.
	Did the Tuktoyaktuk to Source 177 Road go through the EISC or just the ILA? Unless referred by the HTC, it should have been reviewed only by the ILA.	Inuvik	It was screened by EISC and reviewed by the ILA. 177 was referred for comment to the standard referral agencies and community groups. The ILA issued permits.
Consultation Approach	Who is being consulted?	Tuktoyaktuk	Residents of Tuktoyaktuk and Inuvik, regulatory agencies and other organizations.
	Please provide residents of Tuktoyaktuk with the questions asked at the Inuvik meeting	Tuktoyaktuk	The meeting proceedings will be circulated. [This summary will be circulated in fulfillment of the commitment made to share information.]
	At the Tuktoyaktuk meeting, how many young adults were there, and how many elders?	Inuvik	Roughly 45 people participated in the meeting, several others came and went. The 45 included elders, adults, young adults (<30 years old), and children.
	A project website would be helpful for people in town to stay up-to-date on the project progress.	Inuvik	Noted.
	Decisions have been made without adequate communication with groups including the Inuvik Community Corporation (ICC) Board and the members.	Inuvik Community Corporation	Noted.

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
	Proper processes should be followed.		
	The aspects of the project to reconsider or improve in the future include: presumptions regarding acceptance of the 'proposed' route; September 2009 field study (personnel, authorizations, process exemptions); October 2009 consultation advertising, timing, meeting location, format, and presentation; accelerated project timeline.	Inuvik Community Corporation	Preferences and suggested improvements noted.
	The ICC is not saying it is for or against the project. The members have not been asked, and the decision is up to them.	Inuvik Community Corporation	Noted.
	Has the route been decided without consultation?	Inuvik Community Corporation	The proposed route is being put forward by the Partners as one that could realistically receive funding to be built. The route has not been decided. The Upland route received considerable attention in the Tuktoyaktuk community meeting.
	Preferred consultation approach: first meeting with note-books only, second meeting with presentation and maps.	Inuvik Community Corporation	Noted.
	Consult with the HTCs, Elders, Community Corps, ILA, Aurora Research Institute (necessary application, review, referral, and approval process).	Inuvik Community Corporation	Noted.
	Need more detail so the ICC can decide to endorse the project, or not.	Inuvik Community Corporation	We can provide additional information. The goal during this consultation is to identify interests and concerns so that we can respond to them. Kiggiak-EBA can add the ICC to the PDR distribution list.
Areas for Further Investigation	Use experienced local land users for field studies. They have been educated by the land and have important information about the areas and activities that must be	Inuvik Community Corporation	Noted.

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
	considered.		
Land Tenure	The community would like clarification on land tenure arrangement – lease, right-of-way, etc.	Tuktoyaktuk	This has not been decided.
	What is the land tenure arrangement? Lease, right-of-way, land swap?	Inuvik	This has not been decided.
Protection of Permafrost, Wildlife, Birds, and Fisheries Resources and Habitat	How will wildlife and waterfowl be protected?	Inuvik	Management plans created by the proponent, community organizations, and regulatory authorities will be required.
	The co-management boards will need to decide how to protect wildlife and fish. The users will need to be responsible stewards.	Inuvik	Agreed.
For Discussion in January 2010	Will there be one big contractor for construction or will smaller companies have a chance?	Tuktoyaktuk	The Partners could respond to that question in January 2010.
	Identify associated training opportunities.	Tuktoyaktuk	It will be a three to four year project and a large workforce will be required. EGT has just graduated 12 heavy equipment operators. Currently, environmental monitor training is underway. There should be a range of opportunities.
	People would feel more comfortable to share information in smaller meetings. There should be a chance to do that.	Tuktoyaktuk	Preference noted.
	Make the next meeting on Monday or Wednesday.	Tuktoyaktuk	Noted.
	Land tenure arrangement.	Tuktoyaktuk / Inuvik	The land tenure arrangement has not been decided.

Appendix B-3
January 2010 Tuktoyaktuk and Inuvik Community Consultation Summary

Appendix B-3. January 2010 Tuktoyaktuk and Inuvik Community Consultation Summary

Of special note, at the start of the meeting in Tuktoyaktuk, elder Persis Gruben, 92 years of age, made a statement to the community. Her statement was in her language, Inuvialuktun, with translation provided by Fred Wolki. A community member recorded the main points of Persis Gruben's statement and they have been transcribed for the project PDR as follows.

> Persis comments that she has not been in a meeting about Husky Lakes road before. She says that we tried to build the road before. It is windy travelling by plane. When you travel, things happen. Travel on the ocean and coast water has caused accidents. It may help when we can travel by land. She always thinks it is a good idea to have the road. People benefit by the road. Cheaper things will be better. Things are high-priced now. Maybe oil will be cheaper. To her understanding, a lot of things happen. A lot of times Inuvialuit ask the GNWT about things, and never get them. When oil companies and government ask for things, they push until they get it. The road will help us out – make it easier for people to get things they need.

This message described the proposed Highway development from the elder's view. It expressed what she has seen in her lifetime and what she feels is important for the community in the future.

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
Inuvialuit Final Agreement and Protection of Special Areas	What stage is the Husky Lakes Management Plan at? What if parts of the plan do not agree with the Highway route?	Inuvik	(ILA response) The Husky Lakes Management Plan is in the final stages of discussions and approvals. (Proponent response) Ultimately, the intent is to construct a highway that is acceptable and beneficial to the Inuvialuit. It would be ideal to know if there are any issues prior to submitting the PDR to screening. This will prevent revisions later on. We have been in communication with the ILA to try to keep up with potential Management Plan terms that may affect the proposed Highway.

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
	(Participant comment) For Husky Lakes, it won't matter if the Highway is five miles away or two miles away, we will go there. We have the resources to protect it.	Tuktoyaktuk	
Project-Specific Regulatory Review and Decision-making Process	What would the Federal government's priority of the routes be? Will it be the Federal government that has the final say?	Inuvik	There is no clear answer to this. The decision about the section of the proposed Highway on Inuvialuit private lands would be the decision of the ILA. The EISC will also screen the project. ILA will take into consideration other agencies comments and recommendations. The Federal government would then have a say on whether the funding is available.
	What if the timeline is delayed, at what point will the Federal government take back the funding?	Inuvik	We do not know how long this funding opportunity will be open. There is a reasonable chance to get funding now. The likely reasons for a longer timeline would be with the environmental screening process. If there are significant concerns of either environmental impacts or public concerns, the project would be escalated to higher levels of assessment. This would mean that more time would need to be spent assessing possible effects and addressing public concerns.
	Can the Highway be divided into sections for the application process, since it seems that the more northern end of the Highway is the most contentious and may take longer to decide upon?	Inuvik	No. The regulators have been clear with us on this point. They have advised us that this would be a 'road to nowhere' concept. They will not screen it in parts or phases.
		Inuvik	(Proponent statement) The decision about the significance of the impacts created by this construction project and the eventual road has to be

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
			made by those who know what is out there on the routes, and by those who know whether those impacts can be lived with. Even if the impacts are considered significant, however, doesn't mean that the funding will not be available, because mitigations can be put in place to control those impacts. A road is a pretty predictable and controllable project, as far as environmental impacts are concerned, but we need to know what the show-stoppers for this project might be from the communities' and traditional users' points of view in order to try and address them or to rule out any specific alternative routes. You must understand that some impacts, though, will occur, such as access from the south right into the Husky Lakes area.
	People might bring up environmental concerns later or even at the last minute. This may cause delays in the timeline for the project. There is a chance now to get the funding, but there is also a need to address all of the public concerns.	Inuvik	Regulatory agencies are not going to sign off on the project if there are major concerns. The question to ask yourself now is, "Are there any show stoppers?" If the environmental concerns could affect whether the project goes ahead or not, we are asking for those points now. Manageable environmental concerns should also be brought up. Manageable effects are things that can be incorporated into management plans and we would see developing those plans as part of the next steps after the screening process.
	What about last minute concerns from the communities	Inuvik	This is highly likely the last round of consultations

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
	after this meeting?		before screening. However, the EISC may request more consultations and presentations after the PDR is submitted. If the community wants more meetings, we will make note of that interest.
	How long before we find out if approved?	Tuktoyaktuk	The review process will begin in 2010. Decisions will start to come from that process in spring or early summer.
	We want the road. The community of Tuktoyaktuk will have their say on the route and it will be settled. We could vote on it.	Tuktoyaktuk	The federal government will go with the route that the communities have chosen. They will want to know what the communities want.
	Oil companies have an interest in the road. Can they be approached for funding?	Tuktoyaktuk	This will be a public highway. The initial construction funding being pursued will be government-sourced.
Possible Subsequent Developments	Husky Lake Access will be opened up. People will want to build cabins and boat launches there. What's to stop that from happening?	Inuvik	(ILA response) The ILA will uphold the HLMP and control access to the extent that it's possible. Any sort of development will have to be approved by the ILA.
Route and Route Alternatives		Inuvik	(Proponent explanation of construction approach) The difference between construction in the northern NWT and southern NWT is that in the south you can shave off hills and push materials to make a flat road. In the north, you cannot cut hills to fill valleys. It is no longer appropriate engineering practice. This means you must bring materials from borrow pits to

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
			level the existing terrain. There are a lot of hills on the Upland Route making it like a roller coaster. The valleys along the Upland Route could have problems with snow build up, which may require the Highway to be closed. The Upland Route would be less safe to drive, harder to maintain and more expensive to construct.
	Has the final route been selected? It sounds like it has been. What priorities go into route selection? Who decides? Do the communities' views bear any weight in the decision?	Inuvik	The routes shown on the map are at about the same stage of analysis, so that's what we're here to get your feedback about. Kiggiak-EBA is at these community consultations to present all three options that the project Steering Committee is considering. We want your comments and feedback on them. The project engineers and scientists have recommended the 2009 route to the Steering Committee above the others for technical and economic reasons. That said, all of the routes are still up for discussion. Ultimately, it is up to the community residents, the Community Corporations, Hunters and Trappers Committees, and the general public to decide what will work for them. The GNWT Department of Transportation's consideration is based on engineering and construction factors, such as construction codes, the constructability of the road along a given route, future maintenance operations, and road stability. The communities' views provide critical input into

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
			this process at every step. The project partners (GNWT Department of Transportation, Hamlet of Tuktoyaktuk, and Town of Inuvik) the purpose of these meetings is to identify any considerations that could tip the balance for or against the 2009 alignment (or one of the others). The Steering Committee will instruct Kiggiak-EBA on which route to use. The Committee is reserving that decision until they hear the outcome of these consultations.
	When the PDR is submitted to the EISC, one route will be selected, what will happen with the alternative routes at this point?	Inuvik	For the PDR submission to the EISC, one route will be selected. The alternative routes will also be mentioned within the PDR. It is important that we describe in that document how the alternatives were evaluated, and how the choice was made.
	A resident favours the Upland Route. How does he ensure that he gets heard? There are lots of people in Tuktoyaktuk that want the Upland Route.	Tuktoyaktuk resident at Inuvik meeting	[ILA and Kiggiak-EBA representatives acknowledged this view and it will be presented in the consultation summary.]
	We are in support of the Highway, but how are we going to get the funding? Who are we going to ask, the Minister, parliament, our MP? Who will write the letter?	Tuktoyaktuk	The Partners (GNWT, Town of Inuvik, and Hamlet of Tuk) are investigating all options for federal funding. To our understanding, the Town of Inuvik and Hamlet of Tuk will put forward formal requests for funding.
	(Participant comment) We have confidence that with the 2009 Route, we can look after the environment, safety concerns, and the cost. Happy with the more cost effective and safe road.	Tuktoyaktuk	Noted.

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
	(Participant comment) A bit of history: Persis is over 90, women have a lot of power, and we admire her thinking of family. Twenty years ago, we discussed the Highway and it got surveyed. Later, the Hamlet Council changed, and our dream was gone. The first time, we went up the river with dogs and it took us days. Then, we went with bombardiers and it took us 10 hours. When we got trucks, it took eight hours. The GNWT said we should build a road – an ice road. Now, we need to get our road to Inuvik. Problems – things happen. Persis said we could learn. Put rules and regulations to protect Husky Lakes. I hope we don't lose this chance.	Tuktoyaktuk	
Traditional Land Use and Knowledge	(Participant suggestion) Engineering should, in certain areas like lower places, have the elders on a plane to see them. They recognize muskegs and can show them before the road is built. There is a lot of planning on Highways and you need some local elders that have knowledge of muskeg. We know some bad areas.	Tuktoyaktuk	
Project Proponent	Would the project be managed by GNWT?	Inuvik	An agreement will be established outlining roles and responsibilities between the project partners (Town of Inuvik, Hamlet of Tuktoyaktuk and GNWT Dept. of Transportation). If is managed the same way as the Tuk to Source 177 Access Road, it would likely be the GNWT Dept. of Transportation.
Project Economics	When will you find out about the funding?	Inuvik	In a couple of weeks, the project partners will be meeting with INAC Minister Chuck Strahl and delivering a proposal for funding.

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
			The partners are making efforts to identify other possible sources of money that could be applied for to help this project happen.
	The environmental process should take as long as it needs and the funding shouldn't then disappear.	Inuvik	We hope that the funding will be there when the regulatory review is complete.
Granular Resource / Borrows	How much stockpiling will be needed?	Inuvik	It is too early in the design to know. Assessments of the pits will determine which pits are suitable. Stockpiling for maintenance would come later. The gravel sources, such as Source 177, will need to ensure that gravel is available for municipal use and community use.

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
Project Schedule	Is there a concern that delays caused by responding to Community and Committee issues will close the window on the funding opportunity?	Inuvik	To some extent, yes. The timing window is perceived to be small because the funding being sought is being made available by the federal government for a very specific purpose. It is stimulus funding, so if it is felt that the Canadian economy no longer requires this assistance, the funding may disappear. It is important to note, though, that due diligence, with respect to concerns about the route, must still be upheld, both with information gathering and identifying environmental impacts. If the review process determines there are significant concerns or risks, then that process may take longer. However, once funding is secured, then federal government would not withdraw the funding.
Community Social, Economic, and Cultural Considerations	Wouldn't the Upland Route generate more local employment because it is a bigger project? It should be the preferred route.	Inuvik	The Upland Route crosses hilly terrain requiring large fills and many curves for any alignment built across it. Flatter, straighter roads are considered safer because of improved sight distances and more gradual corners. There is no question, the Upland Route would require more movement of materials. The Steering Committee has to consider what the tradeoff point might be where the Federal government would say, "Why do we have to spend that much money, when other options are cheaper?" The evaluation of options shows that the Upland Route would be more expensive. The Upland Route

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
			would require more fill. The capital cost estimates mentioned in the presentation do not incorporate the long-term maintenance costs for the routes. There would be more erosion and the sides of the Highway if the Upland Route is constructed. It would go farther out and create a larger footprint on the land.
	What will happen to the ice road construction industry? Also, the ice road is a big draw for tourism.	Inuvik	(Participant comment) I would rather work on an all-weather road any day, than an ice road. (Participant response) Northwind Industries would rather have this Highway than the ice road. There would be more jobs available. It is expected that anyone currently working on ice road construction would be able to make the transition to all-weather road work pretty smoothly. There will always still be some ice road somewhere, since it is a big draw for tourism.
	Has heard the Inuvik population, in general is opposed to the Highway.	Tuktoyaktuk	Noted. The consultations have heard from people in Inuvik and Tuk who want to protect Husky Lakes. Some have said they think the Highway will change or possibly threaten Husky Lakes. In October, a few people said they prefer other routes that have been considered over the past 30 years, including some far west of the ones we see on these maps. Many people in Inuvik and Tuk have told us they are in favour of building a Highway.

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
	There is a concern from Inuvik about whether it will be beneficial to their community versus our community.	Tuktoyaktuk	Noted.
	(Participant comment) Elders would like to have access to visit their families. The ice road is not open long and is rough.	Tuktoyaktuk	Noted.
	(Participant comment) I give my support because of the economics. Not many people are working. That's the main reason.	Tuktoyaktuk	Noted.
	(Participant comment) The pros outweigh the cons. There are so many benefits for the community. Food is one of them.	Tuktoyaktuk	Noted.
	(Participant comment) Some people do small arts and crafts. Tourism will provide a lot of resources to them.	Tuktoyaktuk	Noted.
Public Safety	Along the flatter, straighter 2009 route, there may be more disregard for speed limits. Wildlife would more likely access the Highway. The Upland Route would, however, require more continuous maintenance subsequently providing more jobs within the communities.	Inuvik	Some people speed no matter what kind of road they're on, but there's a better chance they will survive an accident on a flatter, straighter road, at a lower elevation. The flatter, straighter 2009 route would be safer to drive than the Upland Route because it will have a lower profile. The Dempster Highway, for example, has had a lot more fatalities in comparison to the ice road that has hardly had any serious accidents.
Reference to the	You say the costing figures are for the total amount. Does that include costs from Source 177 to Tuk?	Tuktoyaktuk	The funding for upgrading Tuk to 177 Access Road to Highway standards is included in the capital costs

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
Tuktoyaktuk to Granular Source 177 Access Road	The community is in support. The question is the route. You came in October 2009, yourself, Hamlet of Tuk, and Town of Inuvik. About the finalization of the road meeting up with Tuk to Source 177, you did not answer my question. Is the upgrade of the 177 road going to be the Hamlet's responsibility?	Tuktoyaktuk	for the Highway. The funding will come from the federal government / GNWT.
	Is the upgrade of Source 177 to highway standards going to be the Hamlet's funding responsibility?	Tuktoyaktuk	
Consultation Approach	Will there be any more visits, more consultations?	Inuvik	Requests to return to consult again have been received, so depending on the need for more and the funds available, we are certainly willing to consider an additional consultation.
	What plans are there to ensure that all of the community members have expressed their opinions?	Inuvik	The consultation process is intended to provide that opportunity to as many people and agencies as possible by circulating information ahead of time, then discussing it during meetings and question and answer sessions. This will continue through the regulatory review process, during which comments can be submitted individually, or collectively through committees. The EISC's online registry makes the PDR publically available for viewing and comments.

Interest, Concern, or Issue	Question Comment or Interest (as stated by the Community)	By	Response Note: Actions or project modifications made are shown in [ ].
	The Gwich'in are concerned about what is being called "consultation" for this project. The JRP took such a long time to submit the report for the MGP. There should be caution used on the term consultation. We do not want to see this project delayed because it sounds like it will be a good project. More details of our comments/concerns will be provided in a letter.	Inuvik	Please submit comments in the form that you feel is most appropriate.
Protection of Permafrost, Wildlife, Birds, and Fisheries Resources and Habitat	How thick is the geotextile that will be used to insulate the tundra?	Inuvik	Approximately 3/8 of an inch.
	Is geotextile going to be placed under the haul roads to the gravel pits?	Inuvik	Likely temporary winter access ice roads will be used during the winter for haul roads to the gravel pits. There will be very few permanent access roads.

Appendix B-4
Inuvik to Tuktoyaktuk Highway Project
Organization and Agency Meetings, Presentations, and Consultations October 2009 – January 2010

Appendix B-4. **Inuvik to Tuktoyaktuk Highway Project - Organization and Agency Meetings, Presentations, and Consultations October 2009 – January 2010**

Topic	Organization or Agency	Date	Location
October 2009 Consultations: Inuvik to Tuktoyaktuk Highway Project Proponents, Project Status, Schedule, Questions, Organization and Agency Input and Recommendations	Fisheries and Oceans Canada (DFO) – Amanda Joynt (Fish Habitat Biologist), Kevin Bill (Fisheries Management Biologist) & Fisheries Joint Management Committee (FJMC) – Louie Porta (Resource Biologist)	October 26, 2009	Fisheries and Oceans Canada, Western Arctic Area Office, Inuvik, NT
	Government of Northwest Territories, Environment and Natural Resources (ENR) – Paul Voudrach (Environmental Protection Officer), Marsha Branigan (Manager, Wildlife Management)	October 27, 2009	Environment and Natural Resources Shell Lake Office, Inuvik, NT
	Indian and Northern Affairs Canada (INAC) – Conrad Baetz (District Manager), Glenn Sorenson (Resource Management Officer III), Robert Gowan (Manager, Land Programs)	October 27, 2009	Indian and Northern Affairs Canada Office, Inuvik, NT
	Inuvialuit Land Administration (ILA) – John Fraser (Chief Land Administrator), Emily Borsy (Land Use Policy Coordinator), Barry Jacobson (Land Management Officer), Janet Elias	October 28, 2009	Inuvialuit Land Administration Office, Tuktoyaktuk, NT
	Northwest Territories Water Board (NWTWB) – Mike Harlow (Executive Director)	October 29, 2009	Northwest Territories Water Board Office, Inuvik, NT
	Environmental Impact Screening Committee (EISC) – Fred McFarland (Chair) *by teleconference*, Barb Chalmers (Environmental Assessment Coordinator)	October 29, 2009	Joint Secretariat Office, Inuvik, NT
	Inuvialuit Land Administration (ILA) – Christina Carter (Environmental Specialist)	October 29, 2009	Inuvialuit Regional Corporation Office, Inuvik, NT
	Joint Meeting of the Environmental Impact Screening Committee (EISC) and the Environmental Impact Review Board (EIRB) Note: *Presentation by video conference.*	November 5, 2009	Inuvik, NT
	Wildlife Management Advisory Council (NWT) Note: *Teleconference presentation to quarterly WMAC meeting.*	December 7, 2009	Inuvik, NT
Telephone Contact - Project Proponents, Project Status,	Environment Canada – Joel Ingram (CWS)	October 16, 2009 pers. comm.	Inuvik, NT

Schedule, Questions, Community and Agency Input and Recommendations	Environment Canada – Myra Robertson (Environmental Assessment Coordinator)	October 2009	Yellowknife, NT
	Indian and Northern Affairs Water Resources Branch – Robert Jenkins	December 16, 2009	Yellowknife, NT
January 2010 Consultations: Inuvik to Tuktoyaktuk Highway Project – Updates since October 2009, Routes, Schedule, Next Steps	Regulatory- Project Steering Committee Meeting hosted by Indian and Northern Affairs Canada: Conrad Baetz, INAC; Christina Carter, ILA; Jozef Carnogursky, INAC; Norman Snowshoe, GNWT ENR; Jan Davies, INAC; Walter Orr, FSC; Masood Hassan, Kiggiak-EBA; Rick Hoos, Kiggiak-EBA; Rhonda Batchelor, GNWT DOT; Sandra Lukas-Amulung, Kiggiak-EBA; Russell Newmark, Hamlet of Tuk / EGT; Glenn Sorensen, INAC; and Mike Harlow, NWT Water Board. Amanda Joynt, DFO; Sarah Olivier, DFO; Joseph MacLeod, DFO *by teleconference from Yellowknife, NT.*	January 13, 2010	Indian and Northern Affairs Canada Office, Inuvik, NT

Appendix B-5
October 2009 Agency or Organization Consultation Summary

Appendix B-5. **October 2009 Agency or Organization Consultation Summary**

Interest, Concern, or Issue	Question, Comment, or Interest (as stated by the Regulatory Agency)	By	Response Note: Actions or project modifications made are shown in [ ].
Inuvialuit Final Agreement and Protection of Special Areas	How are the consultations going?	EISC	Although the 1 kilometre setback is being observed, the main Husky Lakes concern seems to be more about access and pressure on the natural resources than it is about proximity +/- a few hundred metres.
	Contact Eli Arkin at EIRB to obtain information on Husky Lakes protection under the Inuvialuit Final Agreement.	DFO, FJMC	Draft Husky Lakes Environmental Standards and Draft Community Conservation Plan (Kiggiak-EBA received from E. Arkin on November 3, 2009).
	Review the Inuvialuit Final Agreement Sections 13 and 14.	WMAC (pers. comm. B. Hanbidge Nov 16/09)	Sections 13 and 14 of the IFA can be reviewed. The Partners will seek clarification on the application of the IFA to this project. They will further welcome interpretation from the co-management organizations, communities and organizations.
Project-Specific Regulatory Review and Decision-making Process	Is this a feasibility study?	EISC	This is beyond feasibility. It is the confirmation of conceptual design and logistics to construct the Highway.
	PDR submission is required in mid-January 2010 to have the project screened in March 2010.	EISC	Noted.
	What if the Inuvialuit process and CEAA process have different outcomes?	ILA	The EISC is the starting point. [Inquiry with federal agencies (NWTWB, INAC, DFO) suggests that the federal process would commence only after the EISC issues its decision.]
	Outline regulatory path for Inuvialuit and CEAA processes.	ILA	The regulatory path is becoming clearer through consultation. It will evolve over the coming weeks.
	This is a large scale linear project.	INAC	-
	CEAA screening process will apply as a result of land use	INAC	The project documentation will be designed to meet

Interest, Concern, or Issue	Question, Comment, or Interest (as stated by the Regulatory Agency)	By	Response Note: Actions or project modifications made are shown in [ ].
	permit to be issued for Crown Lands. INAC will likely be the Federal Environmental Assessment Coordinator (FEAC), with NWT Water Board and DFO as Responsible Authorities (RAs) to the CEAA screening. The CEAA screening process will take a minimum of 42 days.		EISC, CEAA Screening, ILA, and any other requirements that apply. [Discussions with INAC are on-going and continue to support the PDR to be used for EISC and federal CEAA processes.]
	The EISC Project Description Report (PDR) could serve the purposes of the CEAA screening. Clarity, contingencies, and completeness in the PDR are very important for efficient screening.	INAC	Noted. If further information about content or process is needed, we will inquire.
	For overland movement of equipment to borrow sources, a Land Use Permit (LUP) will be issued by INAC under the *Territorial Land Use Regulation*. The ILA will likely require a LUP on Inuvialuit Lands. Borrow authorizations will require a land use permit, a pre-disturbance survey and a pit management plan.	INAC	Noted.
	A 'phased' construction approach is not suitable for the CEAA process. The screening will review the whole project.	INAC	Noted.
	Apply for one water licence for the Highway project.	INAC	Recommendation noted.
	DFO anticipates that the Highway will require regulatory screening under the Canadian Environmental Assessment Act (CEAA) due to the requirement for a water licence. DFO will participate as a Responsible Authority (RA) to the CEAA screening, as well as a referral agency to the EISC screening. One document (PDR) could be prepared to serve both purposes.	DFO	The same basic documentation is required for EISC screening as would be required for a CEAA screening. The documentation for this proposed project will be structured to meet the needs of the applicable review processes.
	A water licence under the *Territorial Waters Act* is triggered by a) use of 300 cubic metres of water per day,	NWTWB	A licence is anticipated for water withdrawals, water crossings, and camps, if considered collectively.

Interest, Concern, or Issue	Question, Comment, or Interest (as stated by the Regulatory Agency)	By	Response Note: Actions or project modifications made are shown in [ ].
	b) water crossings for streams >5 metres wide; c) camps of 50 or more persons; and/or d) water diversions.		Water diversion is not currently being considered.
	Based on the description, NWTWB believes this project will undergo CEAA screening.	NWTWB	Noted.
	The project will require a Type A water licence. A Type A licence may require a hearing if interveners request it.	NWTWB	We will prepare for this possibility. The project team will conduct consultation and compile PDR information to attempt to address questions about the project.
	Submit the PDR to the EISC and NWTWB review at the same time. NWTWB staff will review it for completeness.	NWTWB	Noted.
	After the EISC renders its decision report, the proponent may wish to submit amendments to the NWTWB prior to the CEAA screening.	NWTWB	Noted.
	In addition to the water licence, the Federal (INAC) land use permit will require CEAA screening.	NWTWB	Noted. The PDR will be designed to meet the information requirements of these processes.
Lands Administration and Possible Subsequent Developments	ILA has the mandate to regulate any subsequent developments, e.g., access.	ILA	Noted.
	The ILA will issue an access permit, land use permit, and quarry/borrow licences. ILA will work closely with the EISC to formulate the project terms and conditions.	ILA	Noted. The Partners will maintain open communication with the ILA to assist with the process however possible.
	ILA to supply the Partners with mapping files for the former powerline, the Devon winter road (if available), voluntarily registered camps, 1 kilometre setback around Husky Lakes, and more.	ILA	[Complete. This additional information his being added to the project maps.]
	INAC is responsible for the management of granular resources/borrow sources and issuance of land use permits on Crown Lands.	INAC	Noted.
Route and	-	EISC	The project partnership advised on the main

Interest, Concern, or Issue	Question, Comment, or Interest (as stated by the Regulatory Agency)	By	Response Note: Actions or project modifications made are shown in [ ].
Route Alternatives			proposed route and alternate alignments to be considered leading to PDR development. Tuktoyaktuk and Inuvik residents' concerns about the potential effect of increased access to Husky Lakes prompted requests for more detailed comparison of the Upland route and the proposed route and report back to the communities.
	Can the most rugged areas of the Upland route be identified?	ILA	Request noted.
	Conduct quantity and cost estimate for comparison of proposed route and the Upland route.	ILA	Further Upland route investigations are warranted based on October 2009 consultation feedback. [Further investigation took place during November and December 2009, using available data.]
	There is a long history to this highway proposal. Many routes have been considered in the past.	GNWT ENR	This proposal aims to take those ones into consideration and put forward a Highway that can be constructed.
	Previous studies have examined options for a highway between Inuvik and Tuktoyaktuk.	Joint EISC/EIRB Meeting	The Partners have considered the pros and cons of the 'proposed' route, the Upland route, and other previously examined options.
	Regarding the preferred route, who favours it? Why?	Joint EISC/EIRB Meeting	Public Works and GNWT Dept. of Transportation helped determined where this iteration of the project should start. It started with the PWC 1977 route and examined some alternatives. Changes from PWC'77 include maintaining 1 kilometre distance from Husky Lakes; using the Navy Road approach to Inuvik; and assessing the Upland Route.
	If the preferred route is rejected, would an alternate route	Joint	If it is not deemed acceptable by people in decision-

Interest, Concern, or Issue	Question, Comment, or Interest (as stated by the Regulatory Agency)	By	Response Note: Actions or project modifications made are shown in [ ].
	be put forward?	EISC/EIRB Meeting	making roles, then the project would not take place. For example, the Federal government would not fund it. The funders will likely assess the population base that the Highway will serve, the traffic on it, and the cost of alternatives.
	Will the Upland route have a greater environmental impact?	Joint EISC/EIRB Meeting	Yes. The Upland Route footprint will include filling in deep valleys or winding around terrain features. The potential for heritage resources is higher on the Upland Route. Bear denning areas are more likely there too. A lower impact aspect of the Upland Route compared to the proposed route is fewer stream crossings.
Traditional Land Use and Cultural Considerations	Provide a clear comparison between the 2009 route and the Upland route.	Joint EISC/EIRB Meeting	Based on the community consultations, the Upland Route and the proposed route are being treated equally in the analysis process. Some people felt that the proposed route was too close to Husky Lakes. No route will be acceptable to everyone, but the Partners want to put forward a route that addresses most issues as well as possible. The comparison will be developed further in the PDR when more information is available.
	Roads have the potential to generate other activities (more cabins, greater access, increased harvesting).	EISC	John Fraser, ILA, responded, indicating that part of the ILA's mandate is to regulate these subsequent activities.
	Most people respect the ban on caribou hunting. Trapping	GNWT ENR	-

Interest, Concern, or Issue	Question, Comment, or Interest (as stated by the Regulatory Agency)	By	Response Note: Actions or project modifications made are shown in [ ].
	continues between Tuktoyaktuk and Parsons Lake.		
	The Highway is a positive move to help people pursue traditional and recreational activities and cultural activities year-round.	GNWT ENR	-
	There are significant sites and fishing areas along the route.	GNWT ENR	-
Project Proponent	Who will have the Highway responsibility in the long term?	EISC	GNWT
	Whose name will be on the permits? The permittee must consider potential strict liability implications.	INAC	This has not been determined.
Project Economics	When will the cost be known?	EISC	The costs of the project are being calculated in parallel with the preparation of the PDR. A preliminary estimate should be ready by the time the PDR is complete.
	Is the money to build the Highway certain?	INAC	The sooner the project is approved, the more likely it will be to receive funding for construction.
	What will the cost be?	Joint EISC/EIRB Meeting	One task the team will complete before January is the budgetary cost estimate.
Granular Resource / Borrows	Will there be any borrows within 1 kilometre of Husky Lakes?	EISC	No. The borrows that appear to be in or immediately adjacent to Husky Lakes will be revised for the next version of the map.
	On the Inuvik end, will the project use gravel from Source	INAC	Candidate gravel sources have not been selected

Interest, Concern, or Issue	Question, Comment, or Interest (as stated by the Regulatory Agency)	By	Response Note: Actions or project modifications made are shown in [ ].
	251 and Source 235?		yet.
	INAC must balance the granular resource demands of this project with others. Submit the planned volumes per source prior to submission to the EISC.	INAC	Noted.
	Some granular resources are in or near lakes. Will they be used to build the Highway?	DFO, FJMC	Borrow material will not be taken from the shore or the bottom of lakes.
	Remove the gravel sources on the south shore of Husky Lakes from consideration.	GNWT ENR	All gravel sources are shown on this map. Gravel will not be taken from sources at the shores of Husky Lakes. These sources should either be distinguished from potential sources on future maps or removed.
	What is the quality of borrow material? Clarify the borrow source locations and quality.	Joint EISC/EIRB Meeting	It is not the greatest material, but it is good enough, feasible. The material used for the Dempster 25 years ago was better, but this will work.
Project Schedule	Will this application be submitted before the Community Conservation Plan update is finalized? Anticipate that Husky Lakes will become Category E, which restricts development.	DFO, FJMC	This PDR is scheduled for submission to the EISC in January 2010.
Community Social, Economic, and Cultural Considerations	Will the PDR aasess the possible social and economic downside, as well as the benefits?	Joint EISC/EIRB Meeting	In the community meetings, people have expressed concern about alcohol and drugs. This is not the specific role of screening, but we will identify the issues that have been brought forward.

Interest, Concern, or Issue	Question, Comment, or Interest (as stated by the Regulatory Agency)	By	Response Note: Actions or project modifications made are shown in [ ].
Public Safety	Will this eliminate the need for the seasonal ice road?	EISC	Yes.
	Describe responsibility for enforcement of regulations on the Highway.	ILA	The RCMP would be responsible for some types of enforcement. For others, long term operations plans will need to be prepared and responsibilities allocated.
Reference to the Tuktoyaktuk to Granular Source 177 Access Road	-	EISC	The winter road alignment for Tuktoyaktuk to Source 177 Road was changed to be alongside the all-weather access road route.
	Was the gravel for the Tuktoyaktuk to Source 177 Access Road suitable?	NWTWB	It is not the best quality, but with maintenance it is suitable for the purpose.
	Tuktoyaktuk to Source 177 Road: requested addition of culverts; majority of road looked good on inspections.	ILA	-
	Tuktoyaktuk to Source 177 Access Road: ponding noted, additional culverts or revisions required; construction and operations phase environmental management plans are required for this Highway.	DFO	Items noted.
	ENR staff have observed ponding and "slumping" along the Tuktoyaktuk to 177 Access Road. M. Branigan provided photos of a possible "slumped" area adjacent to the Road embankment.	GNWT ENR	[Photographs received and reviewed.]
Consultation Approach	Could Kiggiak-EBA deliver the October 2009 consultation tour presentation via teleconference to EISC/EIRB in early November?	EISC	Yes. [Completed on November 5/09.]

Interest, Concern, or Issue	Question, Comment, or Interest (as stated by the Regulatory Agency)	By	Response Note: Actions or project modifications made are shown in [ ].
	ENR wishes to review and provide input to the PDR prior to submission to EISC. They indicated that it would be preferable for GNWT departments to agree on PDR content before submission.	GNWT ENR	Noted.
	Could Kiggiak-EBA deliver the October 2009 consultation tour presentation via teleconference to WMAC during their quarterly meeting in early December?	WMAC, B. Hanbidge pers. comm. Nov 16/09	Yes. [Completed on December 7/09]
Areas for Further Investigation	The Tuktoyaktuk to Source 177 Road project helps with planning the Highway regulatory process and necessary coordination.	ILA	[The terms and conditions from the Tuk to 177 Access Road are being reviewed for incorporation into the project design and the PDR environmental protection measures, as applicable.]
	INAC recommends the proponent submit information for all 40+ crossings.	INAC	Noted. Additional fieldwork will need to be done in spring/summer 2010.
	Contact INAC Water Resources Division in Yellowknife to clarify their anticipated requirements.	INAC	Noted. [Contacted and discussed project and NWT Water Board review process, December 16, 2009]
	Show proximity to Husky Lakes and distance from 1 kilometre setback.	DFO, FJMC	Request noted. [ILA 1 km buffer added to maps.]
	Will water crossings be assessed at high water conditions (spring)?	NWTWB	Assessment under high water conditions is recommended.
	HTCs can help identify appropriate water sources for the project.	GNWT ENR	Good idea.
	Add proposed MGP lines and the Ikhil pipeline to the map.	GNWT ENR	Future maps can incorporate these additions. [Select PDR maps will present these features.]

Interest, Concern, or Issue	Question, Comment, or Interest (as stated by the Regulatory Agency)	By	Response Note: Actions or project modifications made are shown in [ ].
Land Tenure	What is the land tenure arrangement?	EISC	To be determined.
Protection of Wildlife, Birds, and Fisheries Resources and Habitat	Need to work with the Fisheries Joint Management Committee, Wildlife Management Advisory Committee and perhaps the Inuvialuit Game Council to address the larger, longer-term issues.	EISC	Please provide us with the appropriate contacts. [FJMC – Louie Porta; WMAC – Bruce Hanbidge and Jennifer Lam]
	Management plans will be required and their development should include FJMC, the Wildlife Management Advisory Committee (WMAC, NWT), and others.	ILA	Noted.
	INAC to further consider Lloyd Binder's reindeer wintering reserve near Jimmy Lakes.	INAC	-
	Support use of single span bridge structures for fish-bearing streams.	DFO	-
	DFO and FJMC expect that increased accessibility to Husky Lakes and pressures on the fisheries could increase. Will the scope of the assessment include increased access to Husky Lakes?	DFO, FJMC	Yes.
	DFO supplied report *Fish Species Distribution and Associated Water Chemistry Attributes in the Husky Lake and Sitidgi Lake System, NT* (Limnotek 2007).	DFO	-
	Were any active bear dens identified during the field survey?	GNWT ENR	Yes, 1 active, 2 inactive bear dens identified and shown to ENR. Note: no active bear dens were identified during 2009 ENR Tuktoyaktuk to Source 177 Road surveys.

Interest, Concern, or Issue	Question, Comment, or Interest (as stated by the Regulatory Agency)	By	Response Note: Actions or project modifications made are shown in [ ].
Other	Is global warming being considered in this PDR?	EISC	Yes, the discussion will include the reduced reliability of the existing public ice road and the protection of permafrost.
	Will the impact footprint of the project be extended to include gravel sources? Will a regional or linear spatial scope be used for impact assessment? Mitigation?	Joint EISC/EIRB Meeting	The gravel sources will be included. A linear assessment area will be used for terrain and vegetation. A regional scope will be used for wildlife (caribou, grizzly bears, waterfowl, etc.), issues of access, and harvesting. Mitigation discussions are underway. Management tools such as hunting restrictions can he used. GNWT ENR and local land users will need to work together to develop management plans.
	How will the oil and gas industry be considered in the cumulative effects section?	Joint EISC/EIRB Meeting	The PDR will include cumulative effects related to oil and gas, but this project does not look to affect oil and gas development.
Environmental Mitigation and Management Planning	The EISC noted that the Tuk to 177 operations plan and a fisheries mitigation plan, with community input, are needed. A wildlife plan for construction was received.	EISC	Noted.
	Advise that a Fisheries Mitigation Plan for Husky Lakes may eventually need to be developed. FJMC wants to examine different pressures and sees a multi-year time frame to develop the plan.	DFO, FJMC	Such a plan could be prepared while the Highway is under review and construction.
	In addition to the DFO Operational Statements in the presentation, Hunters and Trappers Committee directions will be important inputs into DOT's plan. ENR cannot dictate a Highway operations management plan.	GNWT ENR	Noted.

Interest, Concern, or Issue	Question, Comment, or Interest (as stated by the Regulatory Agency)	By	Response Note: Actions or project modifications made are shown in [ ].
	The Highway will require a wildlife protection plan.	GNWT ENR	Noted.
	The long-term environmental management plan for the operation of the Highway is important. It will require community and regulatory agency input in order to be effective.	Joint EISC/EIRB Meeting	Noted.
Construction Specifications	Where will culverts be used? Bridges? Culverts in the area can become perched.	INAC	Culverts and bridges will be used. Each crossing will be assessed for suitability.
	How high will the Highway be?	NWTWB	1.4 to 1.8 metres minimum.
	What will the differences be between the proposed Highway and the Tuktoyaktuk to Source 177 Road?	Joint EISC/EIRB Meeting	The biggest differences are width and posted speed. The Tuktoyaktuk to Source 177 Road is 7-7.5 metres wide and is designed for 50 km/h posted speed limit. The Highway will be 8-9 metres wide. It will have flatter curves and will be designed for 80 km/h.

Appendix B-6
January 2010 Agency or Organization Consultation Summary

Appendix B-6. **January 2010 Agency or Organization Consultation Summary**

Interest, Concern, or Issue	Question, Comment, or Interest (as stated by the Regulatory Agency)	By	Response Note: Actions or project modifications made are shown in [ ].
Inuvialuit Final Agreement and Protection of Special Areas	The ILA has advised that there is to be no industrial activity within 1,000 metres of Husky Lakes. Is this setback being observed?	GNWT ENR	(ILA response) The Husky Lakes Management Plan is in development. The 1,000 metre setback has been approved. There is further discussion on the rest of the plan. (Proponent response) The 2009 route has an encroachment of less than 2 kilometres within the setback. The 2009 route with a minor realignment (shown on map) avoids this encroachment. It adds five kilometers to the overall distance of the Highway.
Project-Specific Regulatory Review and Decision-making Process	The EISC and CEAA screenings will run in parallel. But there is a stop point for the CEAA process. At that point, CEAA will wait for the EISC decision and incorporate it into their process.	INAC	Noted.
	Could a season of work be completed prior to screening? That way, if crossings change there would not be a need to re-screen the project.	DFO	The stream crossings were a top priority during the brief September 2009 field study. We gathered enough data from the environmental and engineering perspective that we do not anticipate the crossings moving. However, more information is needed to satisfy construction requirements, and that is scheduled to be collected in summer 2010.
Project Economics	Where does the funding for this project come from?	DFO	INAC and CanNor through a contribution agreement with the Hamlet of Tuktoyaktuk.
	Do the cost estimates include royalties and land access?	ILA	The cost estimates presented are capital costs for construction only. They include the upgrade to the Tuk to Source 177 Access Road.

Interest, Concern, or Issue	Question, Comment, or Interest (as stated by the Regulatory Agency)	By	Response Note: Actions or project modifications made are shown in [ ].
Granular Resource / Borrows	How confident can we be that the gravel quantities and quality is available? This factors in to construction and maintenance.	NWT Water Board	Our compilation and review of all available historical information shows that the material is available and the quality is sufficient for the construction and maintenance of the Highway. A summer geotechnical investigation will provide further data, mostly to help us determine which sources are preferable over others.
Project Schedule	Has the schedule considered EISC, EIRB, CEAA screening?	DFO	The Project Description report has been prepared to meet the screening requirements of the EISC and CEAA. Screening is the first step. Information will be provided to meet the needs of the applicable processes.
	The schedule is optimistic.	NWT Water Board	We believe it is optimistic. However, even with the additional information provided by the various regulatory agencies, we believe the project will be on track for November/December 2010 early construction activities.
	The government must evaluate the Project Description in order to decide what our assessment 'triggers' are. Then the federal agencies will coordinate their activities with each other. If a comprehensive study is required, it could be expected to affect the project schedule.	DFO	The intention is to put this project forward to secure federal funding while it is available. The team is working to provide the information we have to support the project and to satisfy applicable screening and regulatory processes under the constraints of seasonality and funding. The EISC screening and the parallel federal submission are seen as the first steps.
	If any equipment is staged in borrow sources in April 2010, land use permits will be required.	INAC	Noted.

Interest, Concern, or Issue	Question, Comment, or Interest (as stated by the Regulatory Agency)	By	Response Note: Actions or project modifications made are shown in [ ].
Community Social, Economic, and Cultural Considerations	The October 2009 consultation document indicates that the EISC will be provided with information to consider socio-economic aspects of the project. This is not their mandate.	DFO	The socio-economic information will be included because it was specifically requested by community organizations to be part of this submission. EISC and CEAA screening may deal with that information as they deem suitable.
Public Safety	Will the road be 80 km/h for big tucks?	GNWT ENR	The speed we note here is in regard to the design speed limits. For practical purposes, it refers to sight lines, curves, etc. The posted speed is a matter for public policy.
	Would the viability of the project be reduced if only a 40 km/h speed were allowed?	NWT Water Board	There will be markings to reduce speed on corners, and perhaps for other reasons. Bridges will be marked down to 20-30 km/h.
	Who will decide to close the Highway due to reduced visibility?	GNWT ENR	The Highway will be part of the GNWT Department of Transportation system. They will decide when to close it. It will operate seamlessly with the Dempster, so that could be considered as an example.
	It will not be feasible for people to slow down to 50 km/h on the Tuk to 177 stretch of road. Will it be upgraded if the Highway goes ahead?	DFO	Tuk to 177 upgrade is in the budget for the proposed Highway. At present, it is a hybrid between an 80 km/h in terms of its curves, but it requires fill to be modified from a 50 km/h rating now, to an 80 km/h standard when the Highway is completed. The alignment is right for the final Highway plan.
Areas for Further Investigation	Will spring and fall fisheries assessments be completed? DFO is recommending a multi-assessment approach.	DFO	Funding has not been approved. Fisheries assessments are planned, and the project team will have to make best use of available funds.

Interest, Concern, or Issue	Question, Comment, or Interest (as stated by the Regulatory Agency)	By	Response Note: Actions or project modifications made are shown in [ ].
	Authorizations under the Navigable Waters Protection Act have not been discussed. Federal coordination could be delayed if they do not receive project information.	DFO	They will likely be needed. However, the specific design information that Transport Canada will look for is not available.
Protection of Wildlife, Birds, and Fisheries Resources and Habitat	Fisheries authorizations will be required if fish habitat is affected.	DFO	Noted.
	Where will geotextile be used?	INAC	It will be used for the full length of the Highway, just like the Tuk to 177 Road. It keeps the gravel together, and does not allow it to 'punch out' in soft or ice-rich areas. The fabric bears the load across a wide area and continues to hold the weight evenly.
	If your additional wildlife studies identify dens, or habitat features, will the line change again?	GNWT ENR	The line (route) is basically as shown. However, if sensitivities are identified and a revision is required, modifications will be made.
Environmental Mitigation and Management Planning	DFO wants to see sediment and erosion control plans for Highway construction and maintenance.	DFO	Noted.
	INAC will need pit management plans. The proponent is responsible for providing the specifics for borrow sources that will be used.	INAC	Noted.

Appendix B-7
Summary of the Inuvik-Tuktoyaktuk Highway (ILA) Hearings

Appendix B-7: Summary of the Inuvik-Tuktoyaktuk Highway (ILA) Hearings

Introduction

Dates and Advertisement

The ILA held two hearings on the proposed Inuvik-Tuktoyaktuk highway in November, one in Inuvik on the 10th and one in Tuktoyaktuk on the 15th. The Inuvik public hearing was advertised in the Inuvik Drum, on the NewNorth rolling channel and in an announcement that was faxed or emailed to the IHTC, ICC, IRC and other groups. The Tuktoyaktuk public hearing was also advertised in the Inuvik Drum as well as on bingo and through an announcement that was faxed or emailed to the TCC, THTC, IRC and other groups.

Attendance

The meeting in Inuvik was attended by 30 individuals, 25 of whom were beneficiaries.
The meeting in Tuktoyaktuk was attended by 98 individuals, 96 of whom were beneficiaries.

Degree of Support for the Proposed Highway

The vast majority of Tuktoyaktuk beneficiaries who shared their opinion on the highway were strong supporters of the highway, in principle. While they may have expressed concern about routing, environmental and wildlife impacts at the same time, the beneficiaries overwhelmingly supported the concept of a highway between Inuvik and Tuktoyaktuk. There were also some beneficiaries who stated that they opposed the highway for a variety of reasons. Some of the beneficiaries who opposed the road were not comfortable expressing their opinions in front of the assembly and only stated that opinion in one-on-one conversations with ILA staff.

The degree of support for the highway was less evident in Inuvik, although it was clear that most beneficiaries who offered comments or questions were in support of the highway. There were also a minority of Inuvik beneficiaries that felt the road would have too severe an impact and therefore should not be constructed.

Content Related Comments

This section details the comments, questions and statements that were directly related to the fundamentals of the proposed highway; its routing, timing, impacts, mitigations etc.. Questions on the regulatory process, ratification system, and perceived fairness of the process are in the next section below, entitled '*Process Related*'.

Pre Construction

Routing

Support for the *Upland/Elder's Route* was almost unanimous in Tuktoyaktuk. The reason most commonly given for supporting the *Upland/Elder's Route* was that it is the route that is most distant from the shores of Husky Lakes. Keeping the highway at a distance from Husky Lakes was important for numerous reasons, but can all be summarized as either; maintaining the traditional lifestyle and purposes for which Husky Lakes have been used for generations, preventing harvest loss at Husky Lakes (wildlife and fisheries), and protecting the Husky Lakes environment (water quality, vegetation, permafrost, tidiness). According to beneficiaries in Tuktoyaktuk, the *By-Pass Route* and *Proposed Route* are too close to the shores of Husky Lakes, and would permanently and negatively affect the way Husky Lakes is used by beneficiaries. Many beneficiaries contend that part of the reason Husky Lakes was sought as private lands during the land claim process was so that it could be protected from development.

The Inuvik beneficiaries voiced less concern and spent less time discussing the route issue. Inuvik beneficiaries cannot be said to have significantly supported one route over the other routes. A few beneficiaries in Inuvik stated their support for the *Bypass Route* as a good compromise between the *Upland Route* and *Proposed Route*.

Routing Alternatives and Costs

Beneficiaries generally wanted information on how the three routes were devised and why other routes that were historically used or considered were no longer being considered. These other routes included an ILA route that was proposed many years ago and ran to the west of Parsons Lake, and an old oil and gas overland winter road route.

The cost difference between the *Upland Route* and *Proposed Route* was discussed and questioned by several beneficiaries. Some beneficiaries felt that the difference in cost between the two routes was insignificant given the perceived environmental benefits of the *Upland Route*. It was also stated by a Tuktoyaktuk beneficiary that maintenance costs on the *Upland Route* would likely be significantly lower than on the *Bypass Route* or *Proposed Route* due to the relative absence of wet, poorly drained soils in the *Upland Route*.

Importance of Collecting Baseline Data

A common concern of beneficiaries was that if a highway is constructed it should only be done after significant baseline studies are completed. These baseline studies would then be used to determine mitigation plans and to test the effectiveness of those mitigation plans. Specifically, fish stocks and bear dens were mentioned as good target for baseline data collection.

Granular Pit Source Selection and Use

A few beneficiaries expressed concern that the proponent had identified some potential granular material borrow sources that were located close to the shores of Husky Lakes. It was stated that granular material exploitation should not take place near the shores of Husky Lakes as it would impact the area's environment and tranquility. Tuktoyaktuk beneficiaries were particularly concerned that any sources that are used be located far from Husky Lakes.

During Construction

Inuvialuit Employment

Most Inuvialuit who expressed support for the road stated that it would not only reduce the cost of living in Tuktoyaktuk, but would provide many jobs and training opportunities for Inuvialuit. Ensuring that Inuvialuit are the primary benefactors of highway construction jobs was also a common request. The residents of Tuktoyaktuk were particularly adamant that should the project be approved, Tuktoyaktuk beneficiaries should receive 50% of the employment opportunities at minimum.

After Construction

Cost of On-Going Maintenance

Several times during the meetings it was identified that either; highway maintenance had not been significantly discussed by the proponent or that the predicted maintenance data was inaccurate or incomplete. It was stated in Tuktoyaktuk that more complete highway maintenance data would reduce the cost disparity between the *Upland Route* and *Proposed Route*.

Regulation of Highway Impacts, Traffic Laws and Safety

If the highway is constructed, beneficiaries stated that highway inspections and management would be required to mitigate its impacts. Some felt that cooperative management of the highway will be required and should be enacted as early as possible, assuming the highway is approved. Beneficiaries felt that the HTCs, DFO, FJMC and ILA should be working together to the greatest extent possible. There were a few questions as to what extent ILA and beneficiaries would be able to control use of the highway; specifically questions surrounding tolls, speed limits and periods of closure were posed.

Land Tenure

Beneficiaries in both communities were highly sceptical of transferring land in exchange for funds. Some beneficiaries stated that the transfer of lands for funds is specifically disallowed in the IFA. The Tuktoyaktuk beneficiaries also expressed apprehension towards a land exchange because it was feared that the land that would be gained would not be useable by Tuktoyaktuk beneficiaries due to distance from Tuktoyaktuk, or the new land would be for the good of all Inuvialuit as opposed to Tuktoyaktuk beneficiaries primarily. The case of the Pingo Park/Melville Island exchange was cited as an instance

where Tuktoyaktuk beneficiaries lost useable land. Many beneficiaries believe leasing the highway lands ad infinitum is the best option for land tenure.

Process Related

Questions and Concerns about the IFA

Many Tuktoyaktuk beneficiaries questioned how IRC decides what should be permitted on Tuktoyaktuk 7(1)(b) lands. These beneficiaries feel that IRC board members from communities other than Tuktoyaktuk and Inuvik do not use Husky Lakes and thus the beneficiaries are not comfortable with these board members making a decision on how Husky Lakes private lands should be used, protected or developed. Some beneficiaries in Tuktoyaktuk appeared to question how IRC came to have ratification powers over 7(1)(b) lands.

There were a few requests to discuss what protections are currently in place for Husky Lakes, especially in the IFA. A few beneficiaries stated that the Husky Lakes Working Group set a 5km or 3km no-development boundary in Husky Lakes.

Questions and Concerns about the IRC

A Tuktoyaktuk beneficiary stated that Tuktoyaktuk should be given a larger portion of any collected land rents/royalties from the highway since its negative impacts would largely be felt by Tuktoyaktuk beneficiaries.

The beneficiaries of Tuktoyaktuk were especially concerned that IRC board fairly weigh the concerns of the two communities. Tuktoyaktuk beneficiaries believe that their concerns on this proposed project should be considered firstly since they are the primary users of Husky Lakes, since more of the proposed highway would be on Tuktoyaktuk private lands, and because they feel that Tuktoyaktuk has more to gain and lose (economically and socially) if the highway is approved.

APPENDIX C

APPENDIX C SPRING 2010 AQUATIC FIELD PROGRAM RESULTS

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Hamlet of Tuktoyaktuk, Town of Inuvik and the Government of the Northwest Territories

SPRING 2010 AQUATIC FIELD PROGRAM RESULTS FOR THE INUVIK TO TUKTOYAKTUK HIGHWAY NORTHWEST TERRITORIES

Issued for Use
October 2010

File: V23201098.1300

Northwest Territories

Town of Inuvik

KIGGIAK - EBA

Hamlet of Tuktoyaktuk, Town of Inuvik and
Government of Northwest Territories

ISSUED FOR USE

SPRING 2010 AQUATIC FIELD PROGRAM RESULTS FOR THE INUVIK TO TUKTOYAKTUK HIGHWAY NORTHWEST TERRITORIES

V23201098.1300

October 2010

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EXECUTIVE SUMMARY

Completion of the Inuvik to Tuktoyaktuk Highway (the Highway) has been a high priority of the Town of Inuvik, Hamlet of Tuktoyaktuk and the residents of the Inuvialuit Settlement Region since the 1960s and will benefit the region as whole. The proposed Highway will cross approximately 40 ephemeral and permanent streams, and come near many lakes along its route. The Highway Project is proposed to be 138 km long and will be located entirely within the Inuvialuit Settlement Region (ISR) of the Mackenzie Delta-Beaufort Sea Region.

The following fish species have been identified in limited fish surveys along the proposed Highway alignment: lake whitefish (*Coregonus clupeaformis*), round whitefish (*Prosopium cylindraceum*), inconnu (*Stenodus leucichthys*), northern pike (*Esox lucius*), Arctic grayling (*Thymallus arcticus*), lake trout (*Salvelinus namaycush*), burbot (*Lota lota*), least cisco (*Coregonus sardinella*), ninespine stickleback (*Pungitius pungitius*) and sculpin (*Cottus* sp.). A reconnaissance level aerial fish habitat survey was carried out in the fall of 2009, which has been described in a Project Description Report (PDR; Kiggiak-EBA 2010) prepared for the Hamlet of Tuktoyaktuk, Town of Inuvik, and Government of the Northwest Territories.

Kiggiak-EBA consulted with the Fisheries and Oceans Canada (DFO) Central and Arctic Region in Inuvik, NWT in order to design a field program which would satisfy DFO's requirements and support regulatory applications for the proposed Inuvik to Tuktoyaktuk Highway.

Regulatory applications were submitted and permits and approvals were obtained from the DFO and Aurora Research Institute of Aurora College. The DFO provided letters to both the Inuvialuit Lands Administration (ILA) in Tuktoyaktuk, NWT and the Environmental Impact Screening Committee (EISC) in Inuvik, NWT in support of the aquatics field investigation project. The field work was carried out under DFO Licence to Fish for Scientific Purposes S-10/11-4000-IN and Aurora Research Institute 2010 Northwest Territories Scientific Research Licence No. 14734.

The Spring 2010 Aquatic Field Program sampled stream crossings of the proposed Highway in two general areas. The first was the Inuvik segment occurring within 25 km north of Old Navy Road (just outside Inuvik) on June 8 and 9, 2010, and the second being the Tuktoyaktuk segment occurring 25 km south of Granular Source 177 (just south of Tuktoyaktuk) on June 10 and 11, 2010. Following aerial reconnaissance each watercourse crossing was inventoried for fish and fish habitat attributes according to the Resources Inventory Committee (RIC) Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures. In addition, a fisheries assessment was conducted using a backpack electrofisher to determine fish presence. Captured fish were assessed for species and where possible for length, weight, age, and sex. The habitat assessments were carried out by two experienced Kiggiak-EBA biologists with assistance from Mr. John Roland along the southern assessment area, and Mr. Stanley Felix in the northern area.

During the fall 2009 aerial reconnaissance, 44 watercourses were identified as either assumed ephemeral (32) or assumed permanent (12) along the entire Inuvik to Tuktoyaktuk route. During the Spring 2010 sampling program, Kiggiak-EBA confirmed 17 ephemeral drainages and 10 permanent watercourses as a result of the ground assessment along the two section of the road alignment described above.

In general, all 10 permanent watercourses identified provide perennial migratory, rearing and feeding habitat with limited spawning habitat; however, none are expected to provide overwintering habitat as the watercourses freeze solid during the winter. Six permanent watercourses were electrofished (watercourses 3, 4, 13a, 18, 38a and 39) resulting in capture of ninespine stickleback (watercourse 13a) and Arctic grayling (watercourse 39). Several Arctic grayling were observed within watercourses 39 and 39a. Overall, based on fish habitats and fish captured or observed, watercourses 13a, 18 38a, 39, and 39a appear to be the most important watercourses, from the perspective of fish habitat quality, surveyed during the Spring 2010 Aquatic Field Program.

In general most of the 17 ephemeral drainages provided only a source of water, food and nutrients to downstream habitats, and had very limited potential for migration.

Kiggiak-EBA observed 14 additional crossings along alternate routes; however, no ground assessments were conducted. Of the 14 watercourses observed, seven were identified as being assumed permanent while another seven were assumed ephemeral with one having confirmed fish presence.

Based on the Spring 2010 aquatic field program, the majority of stream channels to be crossed by the proposed Highway were assessed to be small, ephemeral streams that generally drain terrestrial upland areas or small, shallow lakes or ponds, most of which do not provide suitable fish habitat features. For these types of stream crossings, it has been recommended that appropriately-sized culverts should be installed using sediment and erosion control best management practices to protect downstream aquatic resources (Kiggiak-EBA, 2010). Streams with moderate or seasonal fish habitat, which are not large enough to support a requirement for a clear-span bridge crossing, typically are best suited for an appropriately sized open bottom culvert. However, it is understood that open bottom culverts are not suitable for use along the proposed Highway corridor for geotechnical reasons. In these circumstances, the sizing and placement of a circular culvert is particularly important to avoid excessive velocities and downstream bed and bank erosion (Kiggiak-EBA, 2010). As above, sediment and erosion control best management practices will be employed to protect downstream aquatic resources.

There were six larger streams observed for which single-span bridges are likely to be installed to minimize or prevent potential impacts on fish and fish habitat (Table 4.1-1). To the extent possible, DFO's Operational Statement for Clear Span Bridges and sediment and erosion control best management practices should be followed. The Project Team is committed to working closely with DFO to design appropriate crossing structures for each stream and to obtain Fisheries Authorizations, if determined to be required.

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1.0 BACKGROUND

Completion of the Inuvik to Tuktoyaktuk Highway (the Highway) has been a high priority of the Town of Inuvik, Hamlet of Tuktoyaktuk and the residents of the Inuvialuit Settlement Region since the 1960's. Currently, Inuvik is accessible by land via the Dempster Highway, which originates in Yukon Territory; however, Tuktoyaktuk is accessible from Inuvik by land only via ice road for approximately three months of the year and otherwise by air year round or water only during the summer months. The construction of the proposed Highway will provide many benefits to the people of the Inuvialuit Settlement Region including, but not limited to:

- Year-round overland access to Tuktoyaktuk;
- Decrease cost of living in Tuktoyaktuk due to year-round shipment of goods;
- Provision to Tuktoyaktuk residents with cheaper, easier and safer access to regional services including:
    1. Health care;
    2. Educational opportunities; and
    3. Recreational opportunities.
- Promotion of tourism and hospitality industries in Inuvik and Tuktoyaktuk; and
- Support for national security and northern sovereignty objectives.

The proposed Highway will cross approximately 40 ephemeral and/or permanent streams, and come near many lakes along its route, located in the vicinity of the spring, summer, fall and winter fish Husky Lakes and the Fish Lakes and Rivers management and harvesting area. The Husky Lakes are important fish habitat and historic and current subsistence harvest areas for the people of Inuvik and Tuktoyaktuk. As such, a 1000 m development setback has been prescribed to protect the important resources of this group of lakes.

The following fish species have been identified in limited fish surveys along the proposed Highway alignment: lake whitefish (*Coregonus clupeaformis*), round whitefish (*Prosopium cylindraceum*), inconnu (*Stenodus leucichthys*), northern pike (*Esox lucius*), Arctic grayling (*Thymallus arcticus*), lake trout (*Salvelinus namaycush*), burbot (*Lota lota*), least cisco (*Coregonus sardinella*), ninespine stickleback (*Pungitius pungitius*) and sculpin (*Cottus* sp.). Kiggiak-EBA carried out a preliminary fish habitat field reconnaissance in the fall of 2009. The survey involved low altitude helicopter flights over the proposed and alternate routes to permit visual observation of watershed conditions upstream and downstream of stream crossing locations. Following the fall reconnaissance, Kiggiak-EBA completed a Project Description Report (PDR) for the Hamlet of Tuktoyaktuk, Town of Inuvik and Government of the Northwest Territories (Kiggiak-EBA 2010). The PDR describes findings of the Fall 2009 aquatics Field Program which was conducted as a reconnaissance level assessment.

Based on the 2009 reconnaissance, a focal list of identified crossings was created for the 2010 Spring Aquatic Field Program. Actual species presence within the identified watercourses is dependent on several habitat and watershed characteristics, often including the availability and accessibility of upstream lakes that provide feeding, rearing, and/or overwintering habitats (if not completely frozen). Kiggiak-EBA consulted with the Fisheries and Oceans Canada (DFO) Central and Arctic Region in Inuvik, NWT to develop the Spring 2010 Aquatic Field Program. The Spring 2010 Aquatic Field Program was designed to satisfy the DFO requirement to collect detailed information on valuable fish habitat characteristics in order to support regulatory applications for the proposed Highway.

In summary, DFO indicated the importance of stream assessments during spring freshet. Observations, measurements, and surveys carried out during freshet would provide an indication of seasonal habitat use at high water, when connectivity to upstream habitats may exist.

1.1 SPRING 2010 AQUATIC FIELD PROGRAM LOCATION

As indicated in Section 4.0 of the Inuvik to Tuktoyaktuk Highway PDR (Kiggiak-EBA 2010), the proposed Highway will be 138 km long and will be located entirely within the Inuvialuit Settlement Region (ISR) of the Mackenzie Delta-Beaufort Sea Region (Figure 1). To the south of the proposed Highway corridor is the Town of Inuvik on the East Channel of the Mackenzie River Delta and the Gwich'in Settlement Area. To the north, the Highway corridor terminates at the Hamlet of Tuktoyaktuk on Kugmallit Bay near the Mackenzie River Delta and the Beaufort Sea. To the east, a portion of the corridor is located near the western shores of Husky Lakes, and the Mackenzie River ranges from 20 to 50 km west of the Highway corridor.

1.2 FISH AND FISH HABITAT

A description of expected fish species to be encountered is described in Section 9.7 of the Inuvik to Tuktoyaktuk Highway PDR (Kiggiak-EBA, 2010). Table 9.7-1 of the PDR provides a generalized summary of habitat preferences and life cycle information for each of the major fish species likely utilizing stream habitats in the vicinity of the proposed Highway. As discussed, Arctic grayling is the valued species most likely to be affected by Highway construction activities and stream crossing structures because grayling utilize and are dependent upon stream habitats for spawning, juvenile rearing, and adult life stages, and require clean, well oxygenated gravel-cobble substrates to complete their life cycle. As such, their productivity within a system is highly sensitive to perturbations that degrade or alter migration access or habitat quality.

Actual species present during the Spring 2010 Aquatic Field Program was dependent on several habitat and watershed characteristics. As indicated earlier, it is unlikely that any of the stream locations along the highway route would provide overwintering habitat due to complete freezing. Similarly, many of the small, shallow headwater lakes within the watersheds crossed by the proposed route would freeze either to the bottom or to a

sufficient depth to preclude the possibility of overwintering, partly due to a diminishment of oxygen to lethal levels (Cott et al. 2008).

2.0 METHODS

Prior to completing the Spring 2010 Aquatic Field Program, regulatory applications were submitted and permits and approvals were obtained from the DFO and Aurora Research Institute of Aurora College. The DFO provided Letters of Advice (LOA) to both the Inuvialuit Lands Administration (ILA) in Tuktoyaktuk, NWT and the Environmental Impact Screening Committee (EISC) in Inuvik, NWT in support of the project (Appendix A). The field work was carried out under DFO Licence to Fish for Scientific Purposes S-10/11-4000-IN and Aurora Research Institute 2010 Northwest Territories Scientific Research Licence No. 14734 (Appendices B and C respectively).

The Spring 2010 Aquatic Field Program sampled stream crossings of the proposed Highway in two general areas. The first was the Inuvik segment occurring within 25 km north of Old Navy Road (just outside Inuvik) on June 8 and 9, 2010, and the second being the Tuktoyaktuk segment, occurring 25 km south of Granular Source 177 (just south of Tuktoyaktuk) on June 10 and 11, 2010 (Figures 2 & 3 respectively). In total 27 crossing locations were to be assessed from the ground during the Spring 2010 field program; however, only 25 were completed due to time and safety constraints (Table 2.2-1). All 27 crossings were observed by either the aerial reconnaissance or ground assessment. The fish and fish habitat field assessment program was carried out by two experienced Kiggiak-EBA aquatic biologists, with assistance from Mr. John Roland from Inuvik for the southern 25 km portion of the route, and Mr. Stanley Felix from Tuktoyaktuk, for the northern 25 km section.

2.1 AERIAL RECONNAISSANCE

An initial aerial reconnaissance was conducted along the highway alignment via helicopter to assess watercourse conditions upstream and downstream of each crossing to identify lakes and potential obstructions. Height above the ground varied during the reconnaissance level assessment to maximize efficiency of data collection. Highway crossings and routing was identified using pre-existing GPS data and navigated using a hand held Garmin GPSMAP 60Cx. The assessment upstream and downstream of each crossing was approximately 100 metres in either direction.

Kiggiak-EBA also completed an aerial reconnaissance survey of two alternate routes between approximately kilometre 90 and kilometre 110 markings (Figure 3). The purpose of the reconnaissance was to identify potential watercourse crossings and assess watercourse conditions as discussed above. The results of the alternate route reconnaissance will be used to determine feasibility of the alternate routes over the preferred route, where it currently abuts or enters the Husky Lakes management area.

Photographs were taken throughout the field program to verify observations and conditions of the field program and can be found following this report.

2.2 GROUND ASSESSMENT

Following aerial reconnaissance, each watercourse crossing was inventoried for fish and fish habitat attributes according to the Resources Inventory Committee (RIC) Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures (RIC, 2001), with modifications based on field conditions. Kiggiak-EBA navigated to each of the crossing locations by using the above mentioned hand held GPS unit and conducted a habitat inventory at each crossing location. Riparian cover type, amount and location; water quality parameters; morphological attributes and channel and wetted widths and depth were assessed and recorded at each crossing location. Additional measurements of channel width, wetted width and depth occurred at various distances from the crossing location, as the conditions of each channel allowed, to a maximum of 50 m up and downstream. The RIC, 2001 standard stipulates six perpendicular measurements for channel and wetted width should be completed; however, each crossing did not fit this convention and typically three or five perpendicular measurements were taken including the Highway crossing location. This allowed for channel characteristics to be assessed at one or two locations up and downstream of the crossing.

Where watercourse conditions allowed, Kiggiak-EBA also collected stream flow velocities, using a Swoffer flow meter, to determine discharge rates of the watercourses (Table 3.0-1). Watercourse discharge rates normally require no less than ten velocity stations along a transect spanning the width of a channel. The average velocity was multiplied by a representative flow area to determine discharge rate of the watercourse.

The Inuvik segment of the sampling program was conducted between kilometre markings 0 and 25 and included 18 stream crossings, while the Tuktoyaktuk segment was conducted between kilometre markings 93 and 118 and included 8 stream crossings (Table 2.2-1).

TABLE 2.2-1. JUNE 2010 APPROXIMATE SAMPLING LOCATIONS INUVIK TO TUKTOYAKTUK HIGHWAY

Stream Crossing Number	Km Marker[1]	UTM Easting NAD 83, Zone 8	UTM Northing NAD 83, Zone 8
Southern 25 km section			
1	1.3	550652	7591441
2	1.7	550676	7591876
3	2.3	550701	7592439
4	3.2	550738	7593313
5	3.9	550774	7594072
6	4.1	550843	7595987
7	7.0	550461	7596944
8	7.8	550600	759700
9	8.4	550528	7598258
10	9.1	550432	7598916
11	9.4	550486	7599285
12	11.1	550300	7600887

TABLE 2.2-1. JUNE 2010 APPROXIMATE SAMPLING LOCATIONS INUVIK TO TUKTOYAKTUK HIGHWAY			
Stream Crossing Number	Km Marker[1]	UTM Easting NAD 83, Zone 8	UTM Northing NAD 83, Zone 8
13	13.3	550416	7603031
13a	17.0	551299	7606550
14	19.1	552194	7608091
15	22.0	553225	7610775
16	23.0	553244	7611735
17	23.4	553385	7612049
18	26.1	554804	7613971
Northern 25 km section			
36a	94.1	578796	7665217
37	95.0	579579	7665695
37a	96.3	580529	7666601
38a	102.8	582062	7672454
39	108.7	583809	7676965
39a	109.8	583407	7677970
39b	115.1	582873	7683007
39c	115.8	582799	7683622

[1] Km marker is measured from northern end of the Old Navy Road.

2.3 FISHERIES ASSESSMENT

Fish assessments were conducted using a Smith-Root Inc. LR-24 backpack Electrofisher in order to determine potential fish presence. Watercourses were electrofished in a downstream to upstream direction and targeted cover areas such as deep pools and beneath instream LWD or over-hanging vegetation. Captured fish were assessed for species and where possible or appropriate, for length, weight, age, and sex. Backpack electrofishing was conducted within 6 of the 27 crossings and included watercourses 3, 4, 13a, 18, 38a and 39 (see Table 2.2-1 for Km markers at each sample site location). The key reasons for the low number of streams electrofished was due to low water, limited or difficult access, safety precaution and observed fish presence.

3.0 RESULTS

The fall 2009 aerial reconnaissance included assessment of 44 watercourses of which 32 were assumed to be ephemeral and 12 were assumed to be permanent. During the Spring sampling program, Kiggiak-EBA confirmed 17 ephemeral drainages and 10 permanent watercourses as a result of the ground assessment within the two assessment areas identified previously (Table 3.0-1). Three watercourses identified as ephemeral (5, 12, and 39a) and one watercourse identified as permanent (37a) during the Fall 2009 aerial reconnaissance were inconsistent with conditions observed during the 2010 Spring habitat surveys. Their status has therefore been changed for the purpose of designing appropriate crossing structures.

Permanent watercourses were categorized as those which provide perennial (except in winter) channels utilized by fish for migration during open water periods, and spawning, rearing or feeding streams, which are utilized by one or more life cycle stages of fish during open water periods in addition to migration.

The ephemeral watercourses assessed during the field program contain water flow for only a portion of the year and were determined to be non-fish bearing. These channels provide only a source of water, food and nutrients to downstream fish habitat.

3.1 PERMANENT WATERCOURSES

Identified permanent watercourse characteristics are shown in Table 3.0-1. Of the permanent watercourses, fish were observed or captured in three watercourses: 13a, 39 and 39a. Numerous Arctic grayling were observed within 39 and 39a. The majority of the permanent watercourses were closely linked with a lake or existed as a channel between two lakes.

In general all 10 permanent watercourses identified provide perennial migratory, spawning, rearing and feeding habitat; however, none are expected to provide overwintering habitat as they freeze solid during the winter. Rearing habitat was observed in areas of slow moving water with an abundance of over- or in-stream cover including vegetation, deep pools and woody debris. Good or excellent spawning habitat was observed within 5 of the permanent watercourses: 3, 13a, 18, 39 and 39a where appropriate bed material within each watercourse included a component of gravels and cobbles. Watercourses 13a, 39 and 39a were confirmed fish bearing during the fisheries assessment.

Discharge rates within permanent watercourses ranged from 3 L/s (watercourse 14) to 400 L/s (watercourse 18) and averaged approximately 108 L/s.

3.2 EPHERMERAL DRAINAGES

The ephemeral drainages mostly existed as tributaries to one another or to slightly larger drainages, and occasionally discharged directly into lakes. In most cases, flow in the ephemeral drainages was not measureable and occurred intermittently through dense vegetation (willow, grasses). Discharge was only measurable within 5 of the 15 ephemeral drainages due to lack of water or flow rates being too low to register. Where measureable, discharge rates within the ephemeral drainages ranged from 0 L/s (several drainages) to 20 L/s (drainage 37a) and averaged approximately 5 L/s. The discharge rate observed within drainage 37a was taken approximately 100 m downslope of the crossing location.

In general most of the 17 ephemeral drainages were deemed to provide only a source of water, food and nutrients to downstream habitat. While no ephemeral drainage was observed to provide spawning or overwintering habitat; drainage 14 and 16 may provide limited migratory or rearing habitat as both are sourced from small headwater lakes (if not completely frozen).

TABLE 3.0-1. SPRING 2010 AQUATIC FIELD PROGRAM FISH AND FISH HABITAT SAMPLING RESULTS

	Crossing	Km Marker[1]	Feature Descriptor	Cover			Channel Morphology							Water Quality					
				Existing Cover Type (at crossing)[2]	Crown Closure (%)	Dominant Riparian Vegetation	Dominant/ Subdominant Bed Material	Avg. Channel Width (m)[3]	Avg. Wetted Width (m)[4]	Max. Depth (m)	Gradient (%) and Discharge Rate (L/s)	Pattern	Right bank/ Left bank Shape	Temp (°C)[5]	pH[6]	Dissolved Oxygen (mg/L)[7]	Conductivity (µS/cm)[8]	Turbidity[9]	Comments
Southern 25 km section	1	1.3	Ephemeral, assessed from air	D:OV															Assessed from air, no channel characteristics were measured. Ephemeral watercourse is expected to be non-fish bearing. Provision of food and nutrients.
	2	1.7	Ephemeral, low flow drainage	D:OV, S: IV		Shrub	Organics/ fines	5.2. (3)	4.5	-	<3	Straight drainage channel	Sloped	10	7.9	3.4	160	Clear	Low flow observed with dense willow shrub. Provision of food and nutrients. Non-fish bearing.
	3	2.3	Permanent	D:OV; T: IV, DP, U, LWD and SWD	75	Shrub/ deciduous	Silt/ gravel	3.4 (5)	1.9	0.5	- 75 L/s	Sinuous	Vertical	10.5	8.4	5.3	134	Clear	252 seconds fishing effort; no captures. Dense cover and gravels observed within riffle-pool habitat. Provision of good migratory, spawning and rearing habitat.
	4	3.2	Permanent	D: OV, S: DP, T: SWD	75	Deciduous	Fines/ organics	3.6 (3)	2.3	1.6	<3 25 L/s	Sinuous	Vertical/ Sloped	7.0	8.2	3.6	148	Clear	90 seconds fishing effort, no captures. Provision of migratory and rearing habitat and moderate spawning habitat due to silt bed material.
	5	3.9	Permanent	D: OV, S: SWD, T: DP, IV	65	Grasses/ deciduous	Fines/ organics	2.2 (5)	1.1	0.8	<3 15 L/s	Irregular meandering	Vertical	7.0	7.6	15.6	152	Clear	Assumed permanent (low flow) but may become intermittent. Provision of limited migratory and rearing habitat.
	6	4.1	Ephemeral, low flow drainage	D: OV, S: IV	60	Shrub/ deciduous	Organics	0.3 (2)	0.3	0.1	10 u/s 3 d/s	Straight	-	-	6.5	2.9	280	-	Meltwater runoff channel on hill side towards lake. Provision of food and nutrients. Non-fish bearing.
	7	7.0	Ephemeral, low flow	D: OV, S: IV	75	Shrub	Organics/ fines	5.2 (5)	4.0	0.2	<3 3 L/s	Straight	Sloped	8.6	6.6	4.1	160	Clear	Flow occurring over mosses and grasses within willow drainage. Provision of food and nutrients. Non-fish bearing.
	8	7.8	Permanent, still partially frozen	D: OV, S: SWD, T: LWD, U, IV	40	Shrubs/ grasses	Fines/ organics	7.2 (5)	3.7	0.8	<3 40 L/s	Irregular meandering	Vertical/ Sloped	9.0	8.2	6.4	150	Clear	Numerous bank failures, still partly ice covered. Large cobbles within bed material and extensive LWD observed within riffle-pool habitat. Provision of good migratory and rearing habitat with limited spawning habitat due to high level of fines comprising bed material.

[1] Km marker is measured from the northern end of the Old Navy Road (see Figure 2).
[2] Cover type: D = dominant, S = subdominant and T = trace.
[3] Average channel width calculated from the number of perpendicular measurements noted.
[4] Average wetted width calculated from the number of perpendicular measurements noted.
[5] Recorded from YSI 550A Temperature/Conductivity field probe.
[6] Recorded from WTW pH/Cond 340i field probe.
[7] Recorded from YSI 550A Temperature/Conductivity field probe.
[8] Recorded from WTW pH/Cond 340i field probe.
[9] Turbidity based on observer visual estimate ranging from (C)lear – (L)ightly turbid – (M)oderately turbid – (T)urbid

TABLE 3.0-1. SPRING 2010 AQUATIC FIELD PROGRAM FISH AND FISH HABITAT SAMPLING RESULTS

	Crossing	Km Marker[1]	Feature Descriptor	Cover			Channel Morphology							Water Quality					
				Existing Cover Type (at crossing)[2]	Crown Closure (%)	Dominant Riparian Vegetation	Dominant/ Subdominant Bed Material	Avg. Channel Width (m)[3]	Avg. Wetted Width (m)[4]	Max. Depth (m)	Gradient (%) and Discharge Rate (L/s)	Pattern	Right bank/ Left bank Shape	Temp (°C)[5]	pH[6]	Dissolved Oxygen (mg/L)[7]	Conductivity (µS/cm)[8]	Turbidity[9]	Comments
	9	8.4	Ephemeral, assessed from air	D: OV		Shrub													Ephemeral drainage, non-fish bearing. Provision of food and nutrients.
	10	9.1	Ephemeral	D: OV, S: IV, T: SWD	80	Shrubs	Organics/ fines	4.3 (3)	2.1	0.9	3 u/s 5 d/s 4 L/s	Straight	Sloped	4.1	8.3	6.9	160	Clear	Ephemeral drainage and swamp like at crossing with multiple drainage pathways and no headwater lake; however, potentially permanent downstream. No connection to a lake suggests no potential for migratory or rearing habitat downstream.
	11	9.4	Ephemeral drainage	D: OV, S: IV	95	Shrub	Organics	8.3 (3)	6.1	0.9	<3 <1 L/s	Straight	Sloped	6.3	7.6	5.5	187	Clear	Very thick shrub, low flow drainage. Non-fish bearing. Provision of food and nutrients.
	12	11.1	Permanent, with numerous beaver dams	D: OV, S: IV T: U, SWD	10	Shrub	Organics/ fines	14.4 (5)	14	3.0	<3 45 L/s	Sinuous	Sloped	11	8.0	<1.5	120	-	Numerous beaver dams; wide littoral area of upstream lake, low flow downstream. Provision of limited migratory and spawning habitat due to obstructions and high fines, good rearing habitat.
	13	13.3	Ephemeral, swampy area	Crossing at open swamp area.															Intermittent water flowing over land- no channels. Non-fish bearing. Provision of food and nutrients.
	13a	17.0	Permanent connection between two lakes	D: OV, T: SWD, B, U	10	Shrub/ grass	Gravel/ cobbles	9.7 (5)	3.0	1.3	<3 75 L/s	Irregular meandering	Sloped	13	8.0	8.9	118	Clear	Captured stickleback electrofishing 120 seconds fishing effort. Provision of excellent migratory, spawning and rearing habitat.
	14	19.1	Ephemeral, low water	D: OV, S: IV	10	Shrub/ grass	Fines/ organics	8.1 (5)	1.2	0.7	3 u/s 3 d/s 3 L/s	Sinuous	Sloped	10.3	6.5	5.8	86	Clear	Wide low flow channel connects to n-s directed watercourse downstream of crossing. Provision of limited migratory and rearing habitat.
	15	22.0	Ephemeral	D: OV, S: IV	80	Shrub/ grass	Organics/ fines	19.1 (3)	14.3	0.7	<3 6 L/s	Straight	Sloped	12	8.2	2.2	49	Clear	Very wide drainage sourced from small headwater lake. Non-fish bearing. Provision of food and nutrients.
	16	23.0	Ephemeral	D: IV, S: OV	-	Shrub/ grass	Organics	5.3 (5)	4.1	0.7	3 u/s 3 d/s < 1 L/s	Sinuous	Sloped	7.9	7.5	4.1	270	Clear	Lots of in-stream vegetation, drainage between small lakes. Provision of food and nutrients and potentially limited migratory habitat.
	17	23.4	Ephemeral	D: IV, S: OV	<5	Shrub/ grass	Fines	11.4 (5)	9.5	0.6	<3	Sinuous	Sloped	7.0	8.1	7.2	43	-	Iron rich with lots of organics. Non-fish bearing. Provision of food and nutrients.
	18	26.1	Permanent	D: OV, S: IV, T: SWD, U	75	Shrub/ grass	Sand/ gravels	7.0 (5)	4.8	1.6	<3 400 L/s	Meandering	Sloped	9.0	8.9	86.2%	44	Clear	150 seconds of fishing effort. Provision of good migratory, spawning and rearing habitat. Tributary to Jimmy Lake.

TABLE 3.0-1. SPRING 2010 AQUATIC FIELD PROGRAM FISH AND FISH HABITAT SAMPLING RESULTS

	Crossing	Km Marker[1]	Feature Descriptor	Cover			Channel Morphology							Water Quality					
				Existing Cover Type (at crossing)[2]	Crown Closure (%)	Dominant Riparian Vegetation	Dominant/ Subdominant Bed Material	Avg. Channel Width (m)[3]	Avg. Wetted Width (m)[4]	Max. Depth (m)	Gradient (%) and Discharge Rate (L/s)	Pattern	Right bank/ Left bank Shape	Temp (°C)[5]	pH[6]	Dissolved Oxygen (mg/L)[7]	Conductivity (µS/cm)[8]	Turbidity[9]	Comments
Northern 25 km section	36a	94.1	Ephemeral, historical lake	No cover							<1 L/s								Apparent historical lake with no channels observed and intermittent wet areas. Provides no fisheries habitat, non-fish bearing.
	37	95.0	Ephemeral	D: OV, S: IV	35	Shrub/ grass	Organics/ fines	1.6 (3)	1.0	0.2	<3	Straight	Sloped	8.0	8.4	1.9	120	Clear	Small ephemeral drainage into lake. Non-fish bearing. Provision of food and nutrients.
	37a	96.3	Ephemeral	D: OV, S:IV	15	Shrub/ grass	Fines/ organics	3.3 (1)	3.3	0.5	<3 20 L/s	Straight	Sloped	12.8	7.2	2.0	121	-	Only one measurement taken – very wide (60 m) drainage with multiple "channels" making up larger drainage. Non-fish bearing. Provision of food and nutrients.
	38a	102.8	Permanent connection between two lakes	D: IV, T: OV, SWD	15	Shrub/ grass	Organics	24.9 (5)	21.2	1.0	<3 210 L/s	Straight	Sloped	8.0	7.6	2.6	122	Clear	Wide watercourse connecting two lakes with wide marshy edges, low sloped banks and low flow. 78 second fishing effort. Provision of migratory and rearing habitat; however, spawning habitat limited due to fine bed material.
	39	108.7	Permanent	D: OV, S: U T: DP, SWD	-	Shrub/ grass	Gravels/ cobbles	8.7 (5)	3.8	0.7	<3 210 L/s	Irregular meandering	Sloped/ Vertical	6.1	7.9	5.7	93	Clear	Observed 9 Arctic grayling, 1 captured electrofishing. 174 seconds fishing effort. Provision of excellent migratory, spawning and rearing habitat with riffles, runs and large deep pools.
	39a	109.8	Permanent connection between two lakes	D: OV, S: IV, T: U	10	Shrubs/ grass	Sand/ fines	4.3 (5)	3.4	0.9	<3 190 L/s	Straight	Vertical	7.8	7.9	5.3	90	Clear	5 Arctic grayling observed within watercourse connecting two large lakes. Provision of excellent riffle-run migratory, spawning and rearing habitat.
	39b	115.1	Ephemeral	D: OV, T: SWD, IV	65	Shrub	Fines/ organics	6.4 (5)	2.8	0.4	4 u/s 2 d/s 2.5 L/s	Straight	Sloped	5.6	8.2	4.3	48	Clear	Meltwater drainage to lake. Provision of food and nutrients to lake, expected non-fish bearing.
	39c	115.8	Ephemeral drainage	D: OV	-	Scrub birch and ledum	-	-	-	-	-	-	-	-	-	-	-	-	Numerous meltwater drainages mostly dry but intermittent water, no flow and vegetated throughout. No fish habitat observed.

3.3 FISHERIES ASSESSMENT

In total, one ninespine stickleback and one Arctic grayling were captured. Another 14 Arctic grayling were observed. The stickleback was approximately 5 cm in length, while weight, sex and age were not determined. The Arctic grayling was approximately 34 cm in length, while weight, sex and age were not determined. Other grayling observed were visually estimated to be approximately 25 to 35 cm in length. Table 3.3-1 provides results of the fisheries assessment.

TABLE 3.3-1. FISHERIES ASSESSMENT RESULTS

Watercourse	Fishing Effort[10]	Catch and Observations
3	252 seconds; 14% duty cycle; 4 ms pulse width and 35 Hz	No catch; good migratory, spawning and rearing habitat observed.
4	90 seconds; 14% duty cycle; 4 ms pulse width and 35 Hz	No catch; good migratory, and rearing habitat; moderate spawning habitat observed.
13a	120 seconds; 14% duty cycle; 4 ms pulse width and 35 Hz	Captured approximately 5 -7 cm ninespine stickleback. Excellent spawning, migratory and rearing habitat observed.
18	150 seconds; 14% duty cycle; 4 ms pulse width and 35 Hz	No catch. Good migratory, spawning and rearing habitat, tributary to known fish bearing lake.
38a	78 seconds; 14% duty cycle; 4 ms pulse width and 35 Hz	No catch. Good migratory and rearing habitat; moderate spawning habitat observed.
39	174 seconds; 14% duty cycle; 4 ms pulse width and 35 Hz	1 Arctic grayling captured, 9 observed. Excellent migratory, spawning and rearing habitat observed.
39a	Did not electrofish due to observed Arctic grayling.	5 Arctic grayling observed. Excellent migratory, spawning and rearing habitat observed.

3.4 ALTERNATE ROUTE WATERCOURSES

Kiggiak-EBA observed 14 additional crossings along alternate routes; however, no ground assessments were conducted due to time constraints. Of the 14 watercourses observed, seven were assumed to be permanent while an additional seven were assumed to be ephemeral (Table 3.3-1). Locations have been identified for future study.

[10] ms = Amount of time in milliseconds of electric pulse generated.

TABLE 3.4-1. AERIAL RECONNAISSANCE OF ALTERNATE ROUTES (TUKTOYAKTUK SEGMENT)

Crossing Number	Assumed Ephemeral	Assumed Permanent	Northing	Easting	Description
001		✓	58202	7677885	Watercourse flows between two lakes, likely fish bearing
002	✓		579011	7676323	Wetted area between lakes
003		✓	577863	7674377	Watercourse between two lakes with observed flow and inputs from melt water channels
004		✓	579458	7671953	Watercourse connection between two lakes
005		✓	581333	7671439	Watercourse connection between two lakes with dense vegetation
006	✓		577977	7671432	Occurs between lakes but drainage narrows and becomes intermittent
007	✓		577770	7671724	Wetland area
008	✓		577954	7671470	Ephemeral
009	✓		577748	7669874	Occurs between lakes and surrounded by wider wet area
010	✓		576532	7668536	Wetland area
011	✓		576435	7668140	Wetland area
012		✓	576315	7667618	Connection between two lakes
013		✓	757975	7664634	Appears permanent with lots of in stream vegetation
014		✓	575417	7664716	Fish observed within permanent watercourse
TOTAL	**7**	**7**			

4.0 DISCUSSION

As previously noted, DFO indicated the importance of stream assessments during the period of freshet. Observations, measurements, and surveys carried out during freshet would provide an indication of seasonal habitat use at high water, when connectivity to upstream habitats may exist. For this reason, the sampling program was scheduled to occur in conjunction with spring freshet; however, actual flow conditions during the 2010 Spring Field program, conducted June 8 through June 11, 2010 were considerably lower than is normal for this period. Local assistants informed Kiggiak-EBA's team that the snow pack was a great deal lower than in average years and the spring melt occurred in early May, approximately 3-4 weeks before the Spring assessment was conducted. Therefore; spring

freshet conditions were not observed and water levels were lower than expected. Despite this, results of the Fall 2009 reconnaissance survey combined with results of the Spring 2010 field work provided a good baseline of fish and habitat conditions, which are adequate for determining appropriate road crossing structures at each location.

As defined by the Federal *Fisheries Act* fish habitat includes "*spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes*." As such, all watercourses or drainages which provide a water supply, food or nutrients to downstream fish bearing waters should be considered fish habitat. In this respect 24 of the 27 watercourse crossings are considered to provide fish habitat while three watercourses (10, 36 and 39c) have no connection to up or downstream fish habitat. Ten watercourses are expected to be fish bearing based on fish or fish habitat observed and of these, watercourses 13a, 18 38a, 39 and 39a appear to be the most important watercourses surveyed during the Spring 2010 Aquatic Field Program.

Furthermore, it is expected that all watercourses become completely frozen during the winter and are only seasonally fish bearing.

The alternate routes observed via aerial reconnaissance between approximately km 90 and 110 may not provide a better alignment despite providing a good opportunity to avoid the Husky Lakes management area. The current alignment will cross 6 watercourses (including 36a, 37, 37a, 38a, 39 and 39a). Three of these are significant fisheries watercourses with observed fish presence (crossings 38a, 39 and 39a). The alternate alignments have the potential to cross up to 14 watercourses depending on the routes selected (Figure 3). Of these, seven are assumed to be permanent with one confirmed to be fish bearing, and seven are assumed to be ephemeral. It should be noted; however, that these 14 watercourses require additional field survey to confirm fish and fish habitat values. The alternate routes do allow for highway construction to occur entirely outside the Husky Lakes management area.

4.1 FISHERIES RESOURCE CONSIDERATIONS AND MITIGATION MEASURES

The assessment of the potential effects of road construction on fish and fish habitat, and the development of effective avoidance or mitigation measures, are major components of the proposed Inuvik to Tuktoyaktuk Highway Project. From the perspective of fish and fish habitat protection and management, three categories of streams are recognized along the Highway route:

- non fish-bearing: streams that are not used by fish for any part of their life cycles;
- migratory channels: ephemeral and perennial (except in winter) streams that are used by fish only for migration during open water periods or that contribute to downstream habitat quality; and
- spawning/rearing/feeding streams: ephemeral and perennial streams that are used by one or more life cycle stages of fish during open water periods, in addition to migration.

Based on the Spring 2010 aquatic field program, the majority of stream channels to be crossed by the proposed Highway, other than those included in the detailed fish and fish habitat surveys, were assessed to be small, ephemeral streams that generally drain terrestrial upland areas or small, shallow lakes or ponds, most of which do not provide suitable fish habitat features. For those types of stream crossings, appropriately-sized culverts will be installed, and sediment and erosion control best management practices will be employed to protect downstream aquatic resources (Kiggiak-EBA, 2010). Moderate fish habitat or seasonal fish habitat crossings which are not large enough to support a requirement for a clear-span bridge crossing typically are best suited for an appropriately sized open bottom culvert. However, it is understood that open bottom culverts are not suitable for use along the proposed Highway corridor for geotechnical reasons. In these circumstances, the sizing and placement of a circular culvert is particularly important to avoid excessive velocities and downstream bed and bank erosion (Kiggiak-EBA, 2010). As above, sediment and erosion control best management practices will be employed to protect downstream aquatic resources.

There were six larger streams observed for which single-span bridges are likely to be installed to minimize or prevent potential impacts on fish and fish habitat (Table 4.1-1). To the extent possible, DFO's Operational Statement for Clear Span Bridges, and sediment and erosion control best management practices should be followed. The Project Team is committed to working closely with DFO to design appropriate crossing structures for each stream and to obtain Fisheries Authorizations, if determined to be required.

In addition to culvert installation and bridge construction, Kiggiak-EBA (2010) also identified the following activities that have the potential to affect fish and fish habitat, along with suggested general avoidance or mitigation measures:

- Use of heavy equipment;
- Highway design;
- Quarry development;
- Erosion and sediment control;
- Water extraction; and
- Public access.

Section 10.6 of the PDR discusses the appropriate crossing structures and avoidance or mitigation measures to be employed during highway construction in order to achieve no net loss (NNL) of productive capacity of fish habitat (Kiggiak-EBA, 2010). Specific fish habitat issues which must be considered as part of the regulatory approval process and provides general avoidance or mitigation measures to minimize adverse effects are identified in Table 10.6-1; while general guidance in terms of the appropriate crossing structure best suited to avoid the harmful alteration, disruption or destruction (HADD) of fish habitat is provided by Table 10.6-2 and preliminary recommendations for crossing structures based on stream and fish habitat characteristics are provided in Table 10.6-3.

Table 4.4-1 below revisits these referenced tables as a result of the Spring 2010 Aquatic Field Program.

TABLE 4.1-1: STREAM CROSSING STRUCTURE RECOMMENDATIONS BASED ON STREAM AND FISH HABITAT CHARACTERISTICS OR POTENTIAL				
Crossing No.	Culvert (no fish habitat)	Culvert (moderate or seasonal fish habitat)	Bridge(good or known fish habitat)	Comments
01	✓			Ephemeral, no headwater lakes
02	✓			Ephemeral, very small drainage
03		✓		Good habitat, small watercourse.
04		✓		Good habitat. Similar to crossing #03.
05		✓		Permanent, very small headwater lakes
06	✓			Ephemeral, short runoff channel
07	✓			Ephemeral, short runoff channel
08			✓	Provision of good migratory and rearing habitat with limited spawning habitat
09	✓			Ephemeral drainage, assessed from air.
10	✓			Ephemeral, no headwater lakes
11	✓			Ephemeral, no headwater lakes
12		✓		Small, flowing channel. Requires field check.
13	✓			Ephemeral, no channel observed.
13a			✓	Short, wide migration channel between lakes. Likely migration corridor.
14		✓		Ephemeral, very short drainage channel draining small headwater lake.
15	✓			Ephemeral. Drains small upstream headwater lake.
16		✓		Ephemeral. Drains small upstream headwater lake with potential seasonal migratory habitat.
17	✓			Ephemeral. Very small drainage.
18			✓	Good habitat. Tributary to Jimmy Lake.
36a	✓			Historic lake, no channel observed.
37	✓			Ephemeral drainage source to lake.
37a	✓			Ephemeral large, wide drainage.
38a			✓	Perennial stream. Moderate habitat conditions.
39			✓	Good habitat. Perennial stream, large drainage with observed fish presence.

TABLE 4.1-1: STREAM CROSSING STRUCTURE RECOMMENDATIONS BASED ON STREAM AND FISH HABITAT CHARACTERISTICS OR POTENTIAL				
Crossing No.	Culvert (no fish habitat)	Culvert (moderate or seasonal fish habitat)	Bridge(good or known fish habitat)	Comments
39a			✓	Good habitat. Short, wide channel between 2 lakes with observed fish presence.
39b	✓			Ephemeral drainage to lake.
39c	✓			Intermittent water, no channels observed.
A1		✓		Small, flowing channel. Requires field check
A2	✓			Wetland like area, appears ephemeral. Requires field check.
A3		✓		Small, flowing channel. Requires field check
A4		✓		Small, flowing channel. Requires field check
A5		✓		Small, flowing channel. Requires field check
A6	✓			Small assumed ephemeral drainage with intermittent water. Requires field check
A7	✓			Small assumed ephemeral drainage with intermittent water. Requires field check
A8	✓			Small assumed ephemeral drainage with intermittent water. Requires field check
A9	✓			Small assumed ephemeral drainage with intermittent water. Requires field check
A10	✓			Wetland like area, appears ephemeral. Requires field check
A11	✓			Wetland like area, appears ephemeral. Requires field check
A12		✓		Small, flowing channel between small lakes. Requires field check
A13		✓		Small, flowing channel. Requires field check
A14			✓	Large permanent watercourse with observed fish presence.

Future investigation of the 14 crossings along the two alternate routes will be required to determine appropriate crossing types and avoidance and mitigation measures should these routes be considered as feasible alternatives.

5.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of the Hamlet of Tuktoyaktuk, Town of Inuvik and Government of Northwest Territories and their agents. Kiggiak-EBA does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than the Hamlet of Tuktoyaktuk, Town of Inuvik and Government of Northwest Territories, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user.

6.0 CLOSURE

We trust this report meets your present requirements. Should you have any questions or comments, please contact the undersigned at your convenience.

Sincerely,
Kiggiak-EBA

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Rick Hoos, M.Sc., R.P.Bio.
Principal Consultant

REFERENCES

Cott, P.A., P.K. Sibley, W.M. Somers, M.R. Lilly, and A.M. Gordon. 2008. A Review of Water Level Fluctuations on Aquatic Biota with an Emphasis on Fishes in Ice-covered Lakes. Journal of the American Water Resources Association 44(2): 343-359.

Kiggiak-EBA. Consulting Ltd. 2010. Project Description Report for Construction of the Inuvik to Tuktoyaktuk Highway, Northwest Territories. Prepared on behalf of the Hamlet of Tuktoyaktuk, Town of Inuvik and the Government of the Northwest Territories.

Resources Information Committee. 2001. Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures. Version 2. Province of British Columbia.

FIGURES

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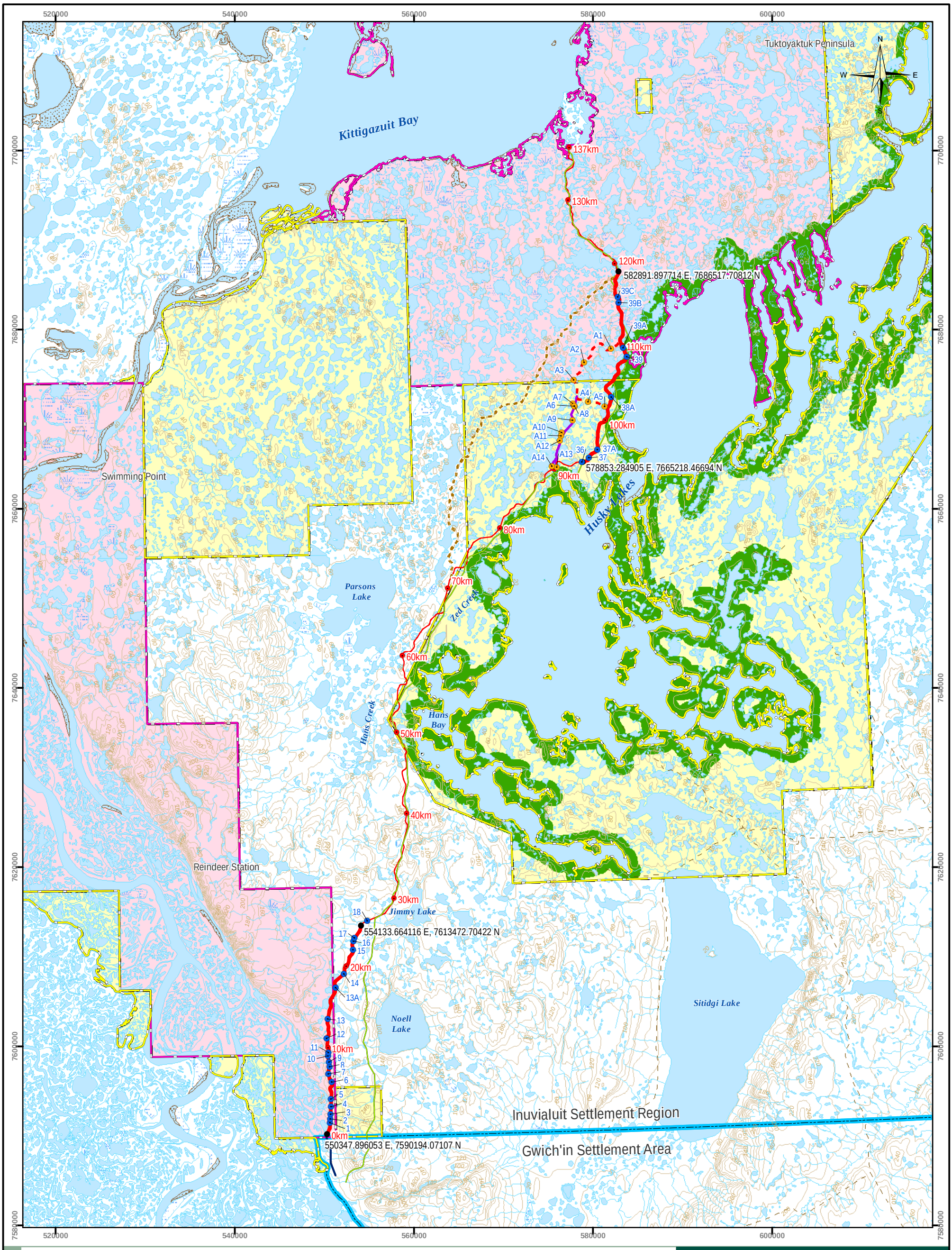

LEGEND

- 2010 Fish Program Sample Location
- A1 to A14 - Alternate Route Fish Sample Location
- Fish and Fish Habitat Sampling Program, 2010
- 2009 Route
- Other Alignments Considered
- Upland Route
- PWC 1977
- Navy Road
- Alternative Highway By-Pass
- Inuvialuit 7(1)(a) Lands
- Inuvialuit 7(1)(b) Lands
- Gwich'in / Inuvialuit Boundary
- Trail
- Contour
- Watercourse
- Waterbody
- Wetland
- Sand
- Husky Lakes 1000m Setback

NOTES

Base data source: NTS 1:250,000
Borrow Sources, powerline, ILA Lands, Husky Lakes 1000m - Inuvialuit Land Administration

ISSUED FOR USE

PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

Spring 2010 Aquatic Field Program

PROJECTION: UTM Zone 8	DATUM: NAD83
Scale: 1:400,000 (5 2.5 0 5 10 Kilometres)	
FILE NO.: V23201098-1300_Figure1.mxd	
PROJECT NO.: V23201098.1300	DWN: KWM / CKD: CK / REV: 1
OFFICE: EBA-VANC	DATE: October 22, 2010

Figure 1

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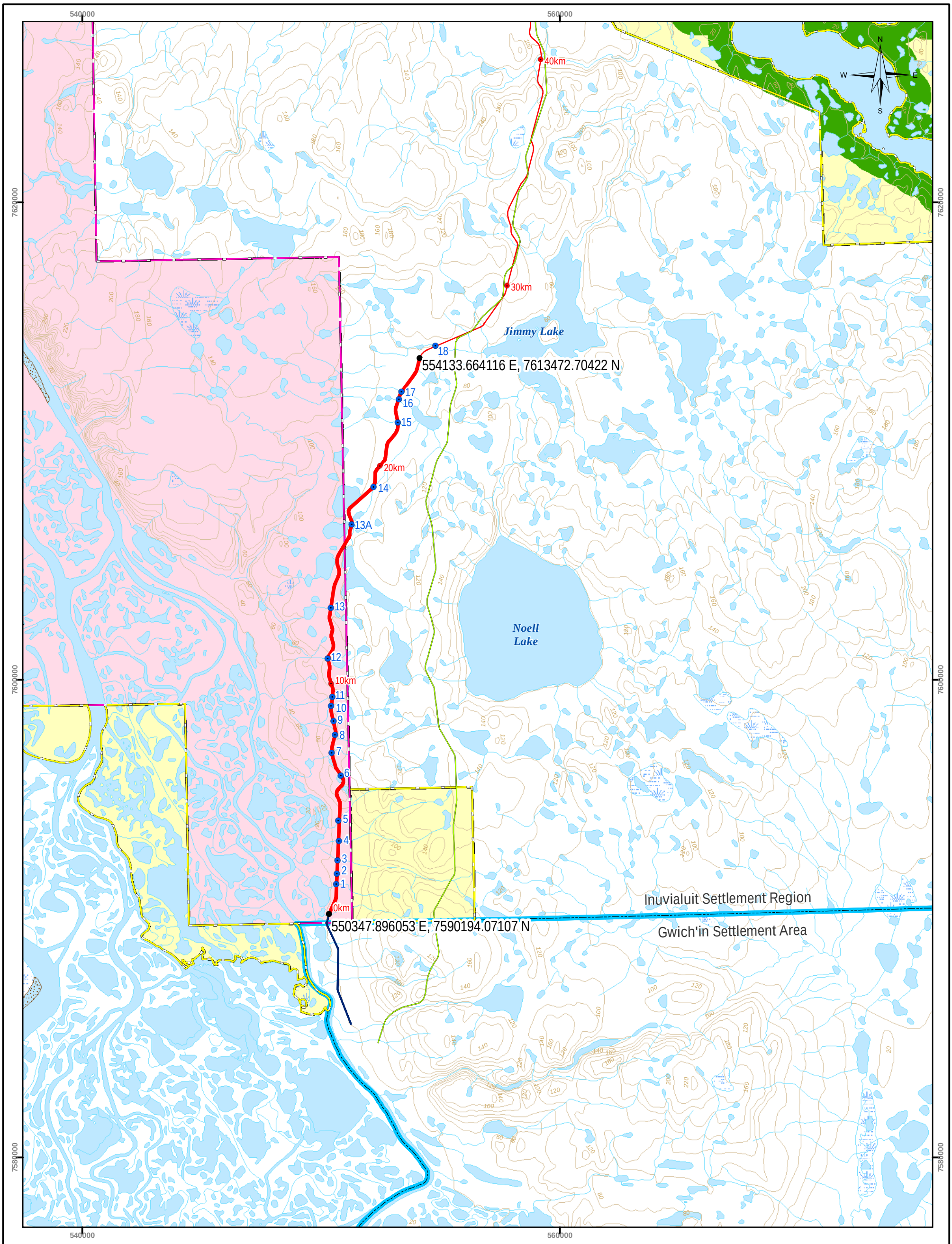

LEGEND

- 2010 Fish Program Sample Location
- Fish and Fish Habitat Sampling Program, 2010
- 2009 Route
- Other Alignments Considered
- Upland Route
- PWC 1977
- Navy Road
- Inuvialuit 7(1)(a) Lands
- Inuvialuit 7(1)(b) Lands
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- Husky Lakes 1000m Setback

NOTES

Base data source: NTS 1:250,000
Borrow Sources, powerline, ILA Lands, Husky Lakes 1000m - Inuvialuit Land Administration

ISSUED FOR USE

PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

Fish and Fish Habitat Sampling Locations Inuvik Segment

PROJECTION	DATUM
UTM Zone 8	NAD83

Scale: 1:150,000
1 0.5 0 1 2 3 4 5
Kilometres

FILE NO. V23201098-1300_Figure2.mxd

PROJECT NO.	DWN	CKD	REV
V23201098.1300	KWM	CK	0

OFFICE	DATE
EBA-VANC	October 22, 2010

Figure 2

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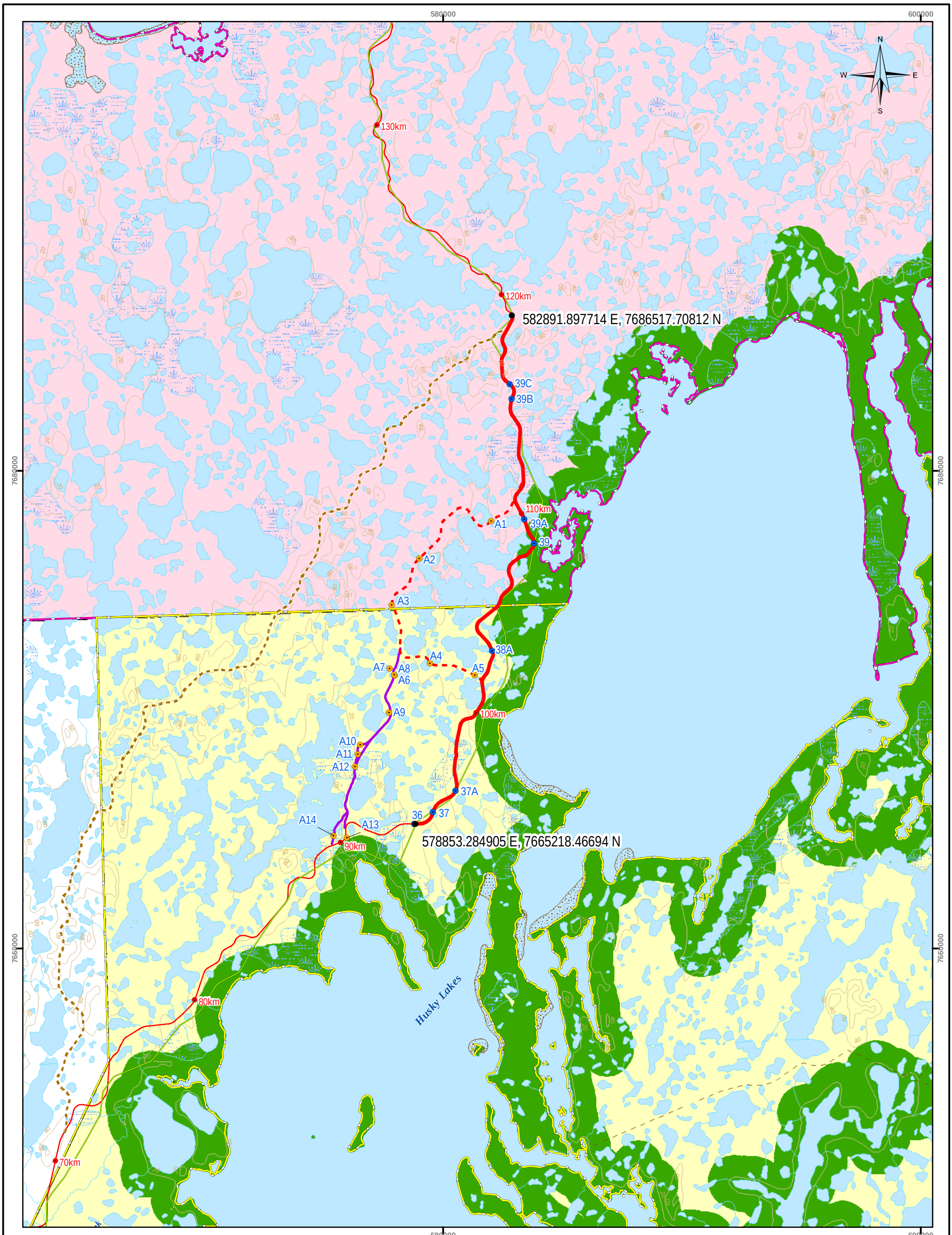

LEGEND

- 2010 Fish Program Sample Location
- A1 to A14 - Alternate Route Fish Sample Location
- Fish and Fish Habitat Sampling Program, 2010
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NOTES

Base data source: NTS 1:250,000
Borrow Sources, powerline, ILA Lands, Husky Lakes 1000m - Inuvialuit Land Administration

ISSUED FOR USE

PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

Fish and Fish Habitat Sampling Locations Tuktoyaktuk Segment

PROJECTION: UTM Zone 8	DATUM: NAD83		
Scale: 1:150,000 (1 0.5 0 1 2 3 4 5 Kilometres)			
FILE NO.: V23201098-1300_Figure3.mxd			
PROJECT NO.: V23201098.1300	DWN: KWM	CKD: CK	REV: 1
OFFICE: EBA-VANC	DATE: October 22, 2010		

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Figure 3

PHOTOGRAPHS

Photo 1
Aerial view of ephemeral drainage crossing 001, June 8, 2010.

Photo 2
Aerial view of ephemeral drainage crossing 002, June 8, 2010.

Photo 3
Ephemeral drainage 002 conditions 50 m upstream of crossing location, June 11, 2010.

Photo 4
Ephemeral drainage 002 conditions 50 m downstream of crossing location, June 11, 2010.

Photo 5
Aerial view of permanent watercourse 003, June 8, 2010.

Photo 6
Permanent watercourse 003 at crossing location, June 11, 2010.

Photo 7
Permanent watercourse 003, 50 m upstream of crossing location, June 11, 2010.

Photo 8
Aerial view of permanent watercourse 004, June 8, 2010.

Photo 9
Permanent watercourse 004 at crossing location, June 9, 2010.

Photo 10
Permanent watercourse 004 view upstream from crossing location, June 9, 2010.

Photo 11
Aerial view of permanent watercourse 005, June 8, 2010.

Photo 12
Permanent watercourse 005 view downstream from crossing location, June 11, 2010.

Photo 13
Permanent watercourse 005, 50 m upstream of crossing location, June 11, 2010.

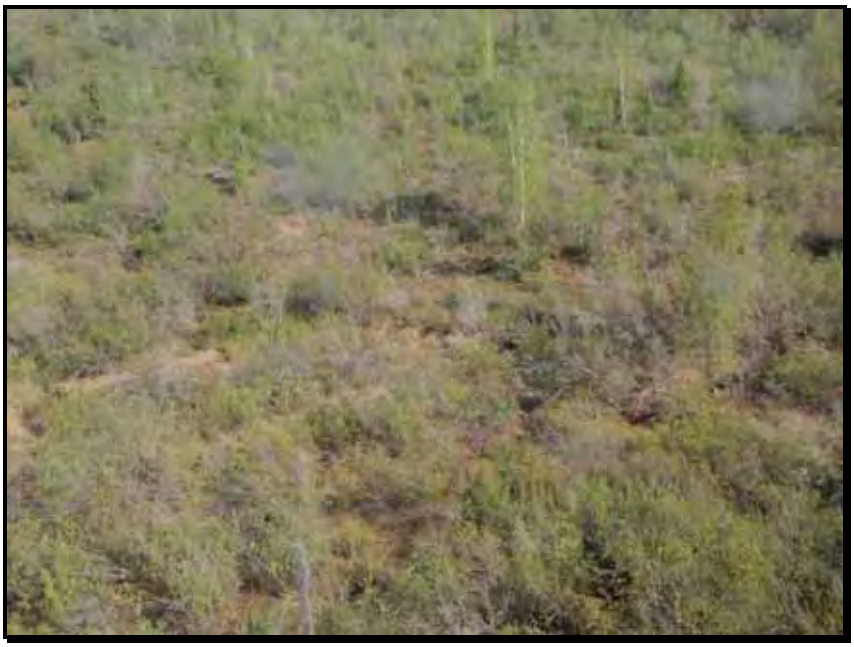


Photo 14
Aerial view of ephemeral drainage 006, June 8, 2010.

Photo 15
Ephemeral drainage 006, 30 m upstream of crossing location, June 11, 2010.

Photo 16
Ephemeral drainage 006, 20 m downstream at confluence with lake, June 11, 2010.

Photo 17
Aerial view of ephemeral drainage 007, June 8, 2010.

Photo 18
Ephemeral drainage 007, looking upstream from crossing location, June 9, 2010.

Photo 19
Aerial view of permanent watercourse 008 still frozen near crossing location, June 8, 2010.

Photo 20
Permanent watercourse 008 conditions 10 m downstream of crossing location, June 11, 2010.

Photo 21
Permanent watercourse 008 conditions 30 m upstream of crossing location, June 11, 2010.

Photo 22
Aerial view of permanent watercourse 010, June 8, 2010.

Photo 23
Watercourse 010 at 20 m upstream of the crossing location, June 9, 2010.

Photo 24
Watercourse 010 at 20 m downstream of crossing location where numerous drainage tributaries begin to confluence into a more permanent watercourse, June 9, 2010.

Photo 25
Aerial view of ephemeral drainage 011, June 8, 2010.

Photo 26
Ephemeral drainage 011 at crossing location, June 9, 2010.

Photo 27
Aerial view of permanent watercourse 012, June 8, 2010.

Photo 28
Permanent watercourse 012 downstream towards lake from locations of numerous beaver dams, June 9, 2010.

Photo 29
Beaver dams situated at crossing location on permanent watercourse 012, June 9, 2010.

Photo 30
Aerial view of ephemeral drainage 013, June 8, 2010.

Photo 31
Ephemeral drainage 013 comprised of intermittent water with no flow, June 9, 2010.

Photo 32
Aerial view of permanent watercourse 13a at confluence to lake, June 8, 2010.

Photo 33
Permanent watercourse 013a, view upstream from crossing location, June 8, 2010.

Photo 34
Unobstructed access from lake into watercourse 013a, June 8, 2010.

Photo 35
Aerial view of ephemeral watercourse 014, June 8, 2010.

Photo 36
Confluence of watercourse 014 and more significant downstream watercourse, June 8, 2010.

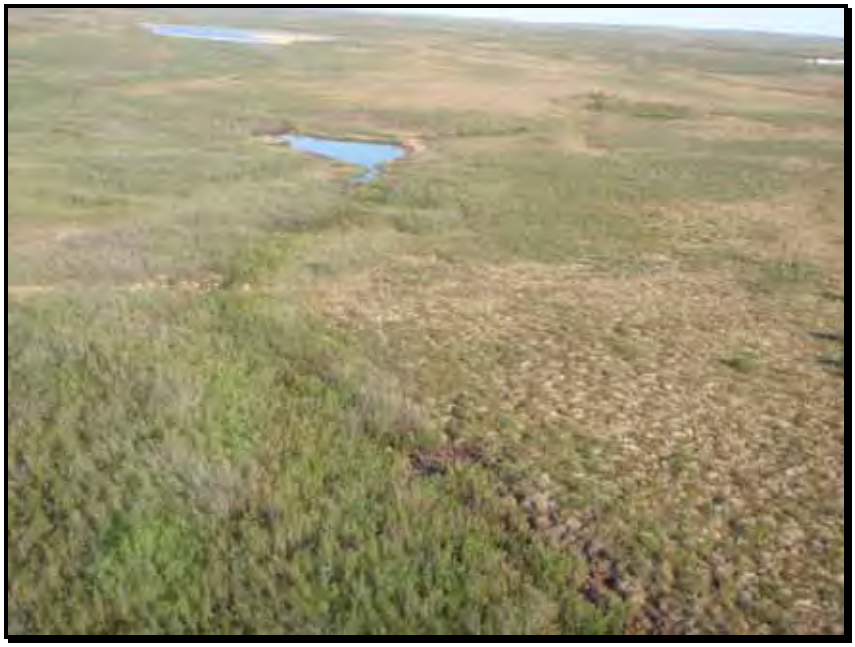


Photo 37
Aerial view of ephemeral drainage 015 sourced from small headwater lake, June 11, 2010.

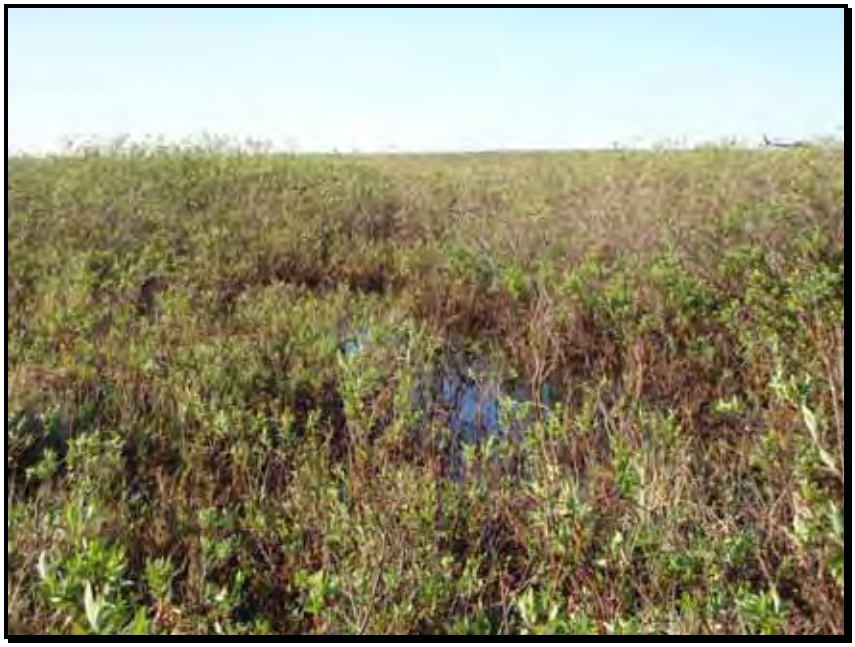


Photo 38
Upstream of ephemeral drainage 015 crossing location June 11, 2010.

Photo 39
Aerial view of ephemeral drainage 016, June 8, 2010.

Photo 40
Downstream of ephemeral drainage 016 crossing location June 8, 2010.

Photo 41
Aerial view of wide ephemeral drainage 017, June 8, 2010.

Photo 42
Watercourse 017 exists as an ephemeral drainage at the base of a slope, June 8, 2010.

Photo 43
Aerial view of permanent watercourse 018, June 8, 2010.

Photo 44
Downstream view of watercourse 018 from crossing location, June 8, 2010.

Photo 45
Upstream view of watercourse 018, June 8, 2010.

Photo 46
Aerial view of historical lake at location of crossing 036a, June 10, 2010.

Photo 47
Aerial view of ephemeral drainage 037 terminates at a lake in top left corner, June 10, 2010.

Photo 48
Crossing location on ephemeral drainage 037, June 10, 2010.

Photo 49
Aerial view of ephemeral drainage 037a depositing into a small shallow lake, June 10, 2010.

Photo 50
Ephemeral drainage 037a at crossing location, June 10, 2010.

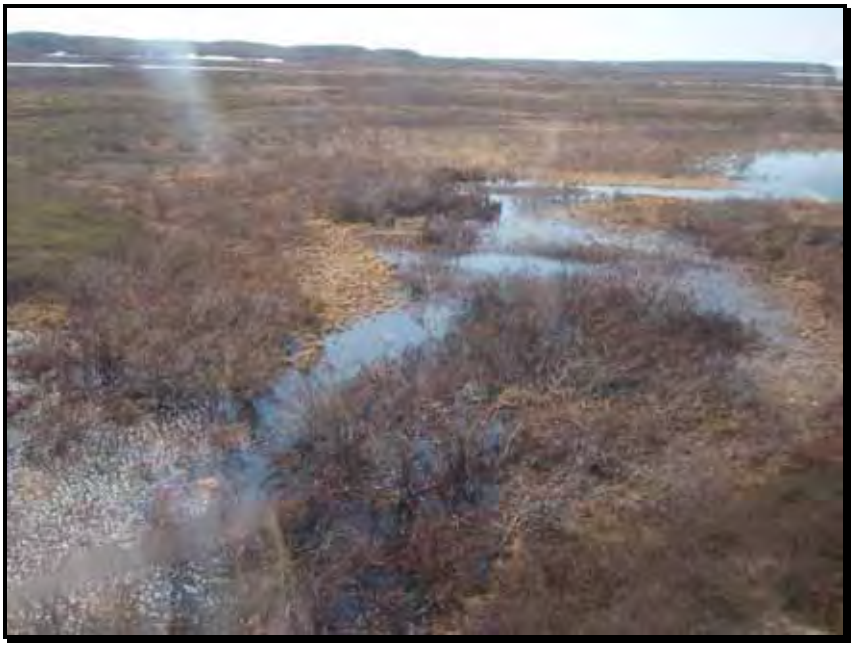


Photo 51
Aerial view of permanent watercourse 038a occurring between two small lakes, June 10, 2010.

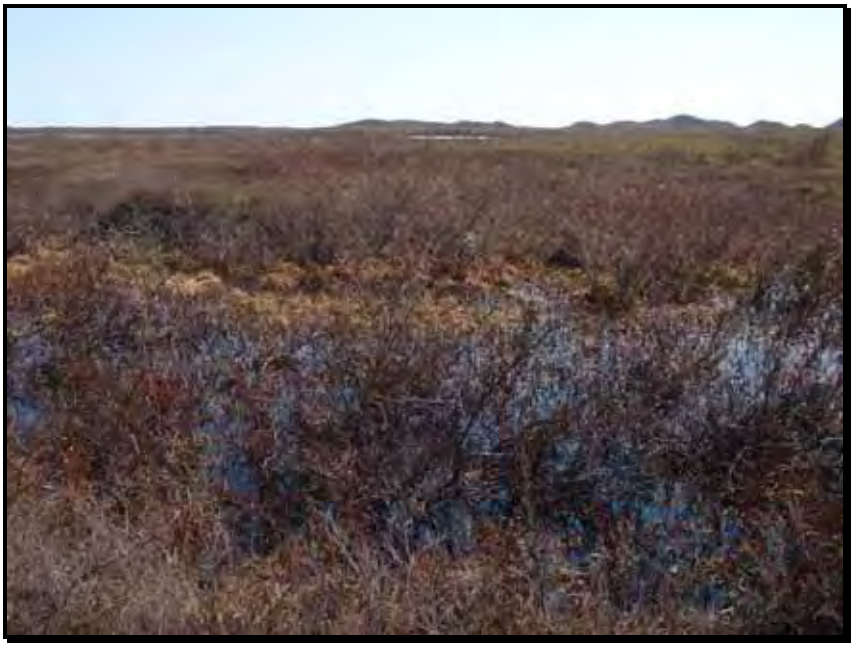


Photo 52
Permanent watercourse 038a at crossing location, June 10, 2010.

Photo 53
Numerous Arctic grayling observed within permanent watercourse 039 near mouth of upstream lake, June 10, 2010.

Photo 54
Arctic grayling captured within permanent watercourse 039 near mouth of upstream lake, June 10, 2010.

Photo 55
Aerial view of permanent watercourse 039a existing as a short connection of two lakes, June 10, 2010.

Photo 56
Downstream view of permanent watercourse 039a, June 10, 2010.

Photo 57
Aerial view of ephemeral drainage 039b at toe of hillslope and draining towards lake, June 10, 2010.

Photo 58
Confluence of ephemeral drainage 039b and lake, June 10, 2010.

Photo 59
Aerial view of ephemeral drainage 039c, Jun e10, 2010.

Photo 60
Intermittent collections of water comprising drainage 039c, June 10, 2010.

Photo 61
Alternate route – assumed permanent watercourse 001 provides connection of two lakes, June 10, 2010.

Photo 62
Alternate route - assumed ephemeral drainage 002 discharges to a lake, June 10, 2010.

Photo 63
Alternate route - assumed permanent crossing 003 provides link between lakes, June 10, 2010.

Photo 64
Alternate route – assumed permanent watercourse 004 provides link between lakes, June 10, 2010.

Photo 65
Alternate route - assumed permanent crossing 005 provides short link between lakes, June 10, 2010.

Photo 66
Alternate route – assumed ephemeral drainage 006, June 10, 2010.

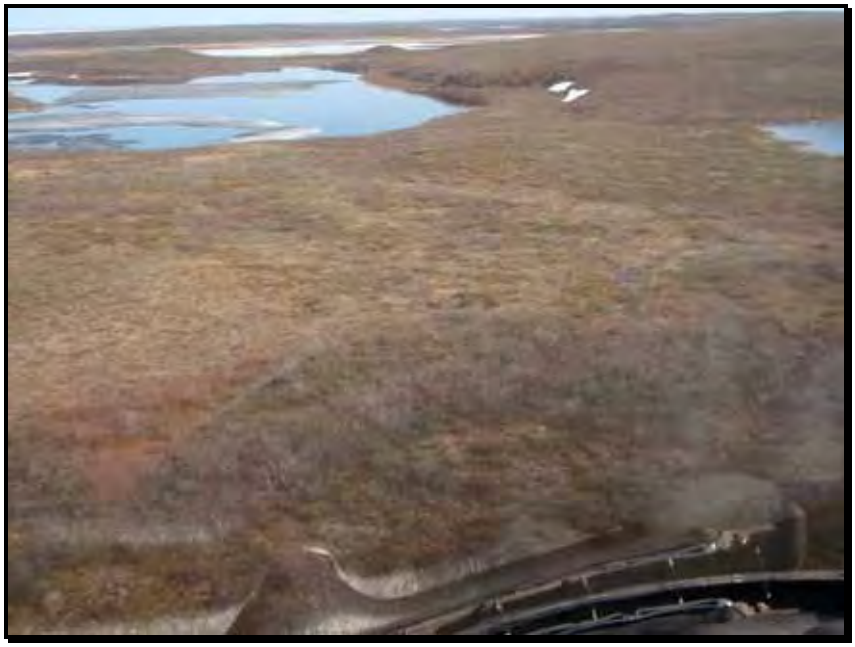


Photo 67
Alternate route - assumed ephemeral crossing 007 exists as seasonal wetland area adjacent to lake, June 10, 2010.

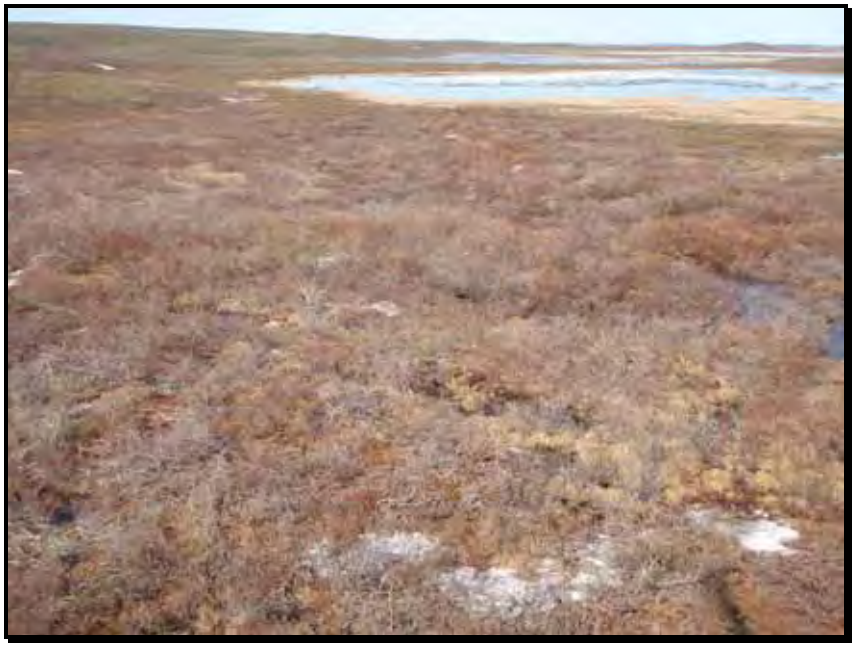


Photo 68
Alternate route – assumed ephemeral drainage 009 surrounded by wide wetted area, June 10, 2010.

Photo 69
Alternate route - assumed ephemeral crossing 010 provides seasonal drainage to lake, June 10, 2010.

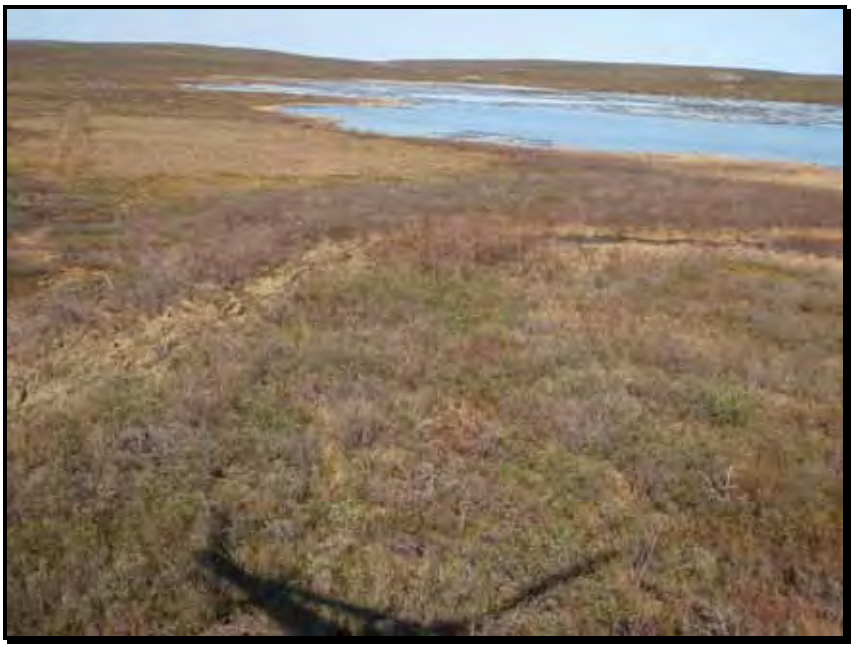


Photo 70
Alternate route – assumed permanent watercourse 012 provides link between lakes, June 10, 2010.

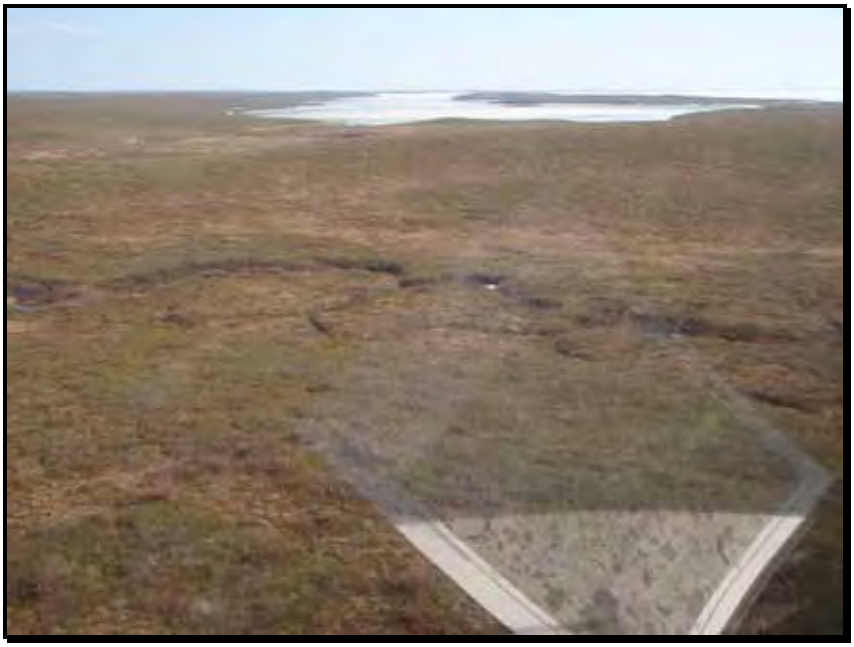


Photo 71
Alternate route - assumed permanent crossing 013, June 10, 2010.

Photo 72
Alternate route – assumed permanent watercourse 014 with observed fish presence from helicopter, June 10, 2010.

APPENDIX A

APPENDIX A DEPARTMENT OF FISHERIES AND OCEANS PROJECT APPROVAL LETTERS

Fisheries and Oceans Canada | Pêches et Océans Canada

P. O. Box 1871
Inuvik, Northwest Territories
X0E 0T0

May 19, 2010

Your file *Votre référence*
05/10-01

Our file *Notre référence*
10-HCAA-CA6-00030

Ms. Barb Chalmers
Environmental Impact Screening Committee
P.O. Box 2120
Inuvik, Northwest Territories
X0E0T0

Dear Ms. Chalmers:

Subject: Proposal not likely to result in impacts to fish and fish habitat.

Fisheries and Oceans Canada - Fish Habitat Management Program (DFO) received the proposal on May 7, 2010. Please refer to the file number and title below:

DFO File No.: **10-HCAA-CA6-00030**
Title: **Field Assessment of Stream Crossings for Inuvik to Tuktoyaktuk Highway**

The proposal has been reviewed to determine whether it is likely to result in impacts to fish and fish habitat which are prohibited by the habitat protection provisions of the *Fisheries Act* or those prohibitions of the *Species at Risk Act* that apply to aquatic species.*

Our review consisted of:

1. Project Description Report – Inuvik-Tuktoyaktuk Highway Project Spring/Summer 2010 Field Stream Crossing Assessment
2. Email correspondence between A. Joynt and S. Lukas-Amulung, May 18, 2010

We understand that the proponent plans to:

- Conduct four days of aquatic studies field work in areas restricted to 0-25 km south of Source 177 near Tuktoyaktuk and 0-25 km north of Inuvik beginning at the north end of Navy Road
- Assess approximately 27 streams within the above areas

*Those sections most relevant to the review of development proposals include 20, 22, 32 and 35 of the *Fisheries Act* and sections 32, 33 and 58 of the *Species at Risk Act*. For more information please visit www.dfo-mpo.gc.ca.

- Subject to anticipated additional funding, repeat the program and sample each of the streams again in late summer.
- Assess surface water and stream and lake characteristics at high water conditions ('freshet') and examine fish species presence or absence at stream crossings along the two defined 25km lengths of the proposed 2009 highway alignment.
- Take measurements, make observations, and conduct limited fish sampling to characterize the freshwater fish communities and the fish habitat of selected lakes and streams along the two defined 25km lengths of the proposed 2009 highway alignment.
- Access field study sites by helicopter and on foot.
- Use non-lethal fish survey methods to study the fish that are present. Electrofishing, minnow trapping, and seine netting will be used.
- Assess potential effects of highway construction on fish and fish habitat.

Provided that the plans are implemented as described DFO has concluded that the proposal is not likely to result in impacts to fish and fish habitat.

The proponent will not need to obtain a formal approval from DFO in order to proceed with the proposal.

If the plans have changed or if the description of the proposal is incomplete the proponent should contact this office to determine if the advice in this letter still applies.

Please be advised that any impacts to fish and fish habitat which result from a failure to implement this proposal as described could lead to corrective action such as enforcement.

If you have any questions please contact the undersigned at (867) 777-7515, by fax at (867) 777-7501, or by email at Amanda.Joynt@dfo-mpo.gc.ca.

Yours sincerely,

(original signed by Amanda Joynt)

Amanda Joynt
Fish Habitat Biologist

Copy: S. Lukas-Amulung – EBA
L. Dow – DFO
T. Stein – DFO
E. Borsy – ILA
J. Malone – FJMC

Fisheries and Oceans Canada | Pêches et Océans Canada

P. O. Box 1871
Inuvik, Northwest Territories
X0E 0T0

May 19, 2010

Your file *Votre référence*
ILA10TN006

Our file *Notre référence*
10-HCAA-CA6-00030

Emily Borsy
Inuvialuit Land Administration
P.O. Box 290
Tuktoyaktuk, Northwest Territories
X0E1C0

Dear Ms. Borsy:

Subject: Proposal not likely to result in impacts to fish and fish habitat.

Fisheries and Oceans Canada - Fish Habitat Management Program (DFO) received the proposal on May 7, 2010. Please refer to the file number and title below:

DFO File No.: **10-HCAA-CA6-00030**
Title: **Field Assessment of Stream Crossings for Inuvik to Tuktoyaktuk Highway**

The proposal has been reviewed to determine whether it is likely to result in impacts to fish and fish habitat which are prohibited by the habitat protection provisions of the *Fisheries Act* or those prohibitions of the *Species at Risk Act* that apply to aquatic species.*

Our review consisted of:

1. Email correspondence between A. Joynt and S. Lukas-Amulung, May 18, 2010
2. ILA Project Assessment Report - Inuvik Tuktoyaktuk Highway Spring Stream Assessment

We understand that the proponent plans to:

- Conduct four days of aquatic studies field work in areas restricted to 0-25 km south of Source 177 near Tuktoyaktuk and 0-25 km north of Inuvik beginning at the north end of Navy Road
- Assess approximately 27 streams within the above areas

*Those sections most relevant to the review of development proposals include 20, 22, 32 and 35 of the *Fisheries Act* and sections 32, 33 and 58 of the *Species at Risk Act*. For more information please visit www.dfo-mpo.gc.ca.

- Subject to anticipated additional funding, repeat the program and sample each of the streams again in late summer.
- Assess surface water and stream and lake characteristics at high water conditions ('freshet') and examine fish species presence or absence at stream crossings along the two defined 25km lengths of the proposed 2009 highway alignment.
- Take measurements, make observations, and conduct limited fish sampling to characterize the freshwater fish communities and the fish habitat of selected lakes and streams along the two defined 25km lengths of the proposed 2009 highway alignment.
- Access field study sites by helicopter and on foot.
- Use non-lethal fish survey methods to study the fish that are present. Electrofishing, minnow trapping, and seine netting will be used.
- Assess potential effects of highway construction on fish and fish habitat.

Provided that the plans are implemented as described DFO has concluded that the proposal is not likely to result in impacts to fish and fish habitat.

The proponent will not need to obtain a formal approval from DFO in order to proceed with the proposal.

If the plans have changed or if the description of the proposal is incomplete the proponent should contact this office to determine if the advice in this letter still applies.

Please be advised that any impacts to fish and fish habitat which result from a failure to implement this proposal as described could lead to corrective action such as enforcement.

If you have any questions please contact the undersigned at (867) 777-7515, by fax at (867) 777-7501, or by email at Amanda.Joynt@dfo-mpo.gc.ca.

Yours sincerely,

(original signed by Amanda Joynt)

Amanda Joynt
Fish Habitat Biologist

Copy: S. Lukas-Amulung – EBA
L. Dow – DFO
T. Stein – DFO
J. Malone – FJMC

APPENDIX B

APPENDIX B DEPARTMENT OF FISHERIES AND OCEANS LICENCE TO FISH FOR SCIENTIFIC PURPOSES

Licence #: S-10/11-4000-IN

David Morantz
1066 W. Hastings Street
Vancouver, BC, CZ V6E 3X2

Dear David Morantz,

Enclosed is your Licence to Fish for Scientific Purposes issued pursuant to Section 52 of the Fishery (General) Regulations.

Failure to comply with any of the conditions specified on the attached licence may result in a contravention of the Fishery (General) Regulations.

Please be advised that this licence only permits those activities stated on your licence. Any other activity may require approval under the Fisheries Act or other legislation. It is the Project Authority's responsibility to obtain any other approvals.

Please ensure that you include the project title and licence number in any future correspondence and that you complete the Summary Harvest Report upon completion of activities under this licence.

Yours truly,

District Manager, Inuvik
Central and Arctic Region
Fisheries and Oceans Canada

Date

Enclosure

LICENCE TO FISH FOR SCIENTIFIC PURPOSES

S-10/11-4000-IN

Pursuant to Section 52 of the Fishery (General) Regulations, the Minister of Fisheries and Oceans hereby authorizes the individual(s) listed below to fish for scientific purposes, subject to the conditions specified.

Project Authority: David Morantz — EBA Engineering Consultants Ltd.
1066 W. Hastings Street
Vancouver, BC, CZ V6E 3X2

Other Personnel:
Cameron Kulak
Jamie Slopgan
Karla Langlois
Celeste Levesque
2 community field assistants (to be determined)

Objectives: EBA proposes to undertake freshwater fish community and fish habitat characterization of selected lakes and streams potentially impacted by the proposed highway from Inuvik (end of Navy road) to Granular Source 177 (kilometer 118). The study will examine the fish species presence or absence at stream crossings along the alignment of the proposed highway. Potential effects of road construction on fish and fish habitat will be assessed and will be used in the development of effective avoidance or mitigation measures.

CONDITIONS

Waters: This licence authorizes the holder to live sample a maximum of 100 fish (cumulative total of all species) from each of the streams within the Mackenzie Delta Area bounded by the straight lines connecting the following coordinates in the order in which they are listed:
68.45587°N, 133.95577°W
69.34805°N, 133.14656°W
69.29961°N, 132.58848°W
68.37076°N, 133.43481°W

Fish captured may be measured for body length and body weight, but no fish may be retained.

Water Body: Mackenzie Delta Area
Point A: 0° 0' N, 0° 0' W

Species: All Species (excludes marine mammals)

Gear: Electroshocker
Gee Trap
Seine

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes

Fishing Period: June 01, 2010 to September 30, 2010

A copy of this licence must be available at the study site and produced at the request of a fishery officer.

Live fish may not be retained unless specified in the conditions of this licence.

The licence holder shall immediately cease fishing when the total fish killed or live sampled reaches any of the maximums set for any of the species listed.

Transportation:

Other approvals/permits may be necessary to collect or transport certain species, such as Marine Mammal Transportation Permits. For marine mammal parts, products and derivatives a Marine Mammal Transportation Licence is required for domestic transport and, for international transport a Canadian CITES Export Permit is also required.

Disposal of Fish Caught:

Fish not required for the purpose of dead sampling and/or retention MUST be returned to the water at the site of capture. Retained fish may be made available to the nearest settlement for domestic consumption or sold commercially within the Territory. Any dead fish for commercial sale beyond the Territory in which it was caught requires authorization under the Fish Inspection Regulations. Disposal of any fish remains must be in accordance with local land use regulations.

Report on Activities:

The Project Authority will submit to the Licensing Administrator, Department of Fisheries and Oceans, within one month of the expiry date, a report stating:
i) whether or not the field work was conducted; and if conducted
ii) waterbody location, fishing coordinates, gear types used at each coordinate, numbers or amount of fish (by species) collected and/or marked and the date or period of collection.

A Summary Harvest Report template is provided by the Licensing Coordinator at time of issuance of this licence.

The Project Authority also will provide a copy of any published or public access documents which result from the project. Information supplied will be used for population management purposes by the Department of Fisheries and Oceans and becomes part of the public record.

All documents should be sent to:

Fisheries and Oceans Canada
Inuvik Fisheries Management
#1 Arctic Road, Inuvik
Box 1871
Inuvik, NT
X0E 0T0

Attention: Inuvik Licensing Administrator

Telephone: (867) 777-7500
Fax: (867) 777-7501
E-mail: XCA-inuvikpermit@dfo-mpo.gc.ca

Notification of Commencement:

Prior to the commencement of fishing the Project Authority will contact:

Fisheries Management Biologist
Fisheries and Oceans Canada
Box 1871
Inuvik, NT X0E 0T0
Phone: (867) 777-7500 Fax: (867) 777-7501

District Manager, Inuvik
Central and Arctic Region
Fisheries and Oceans Canada

Date

For the Minister of Fisheries and Oceans.

Pursuant to Section 52 of the Fishery (General) Regulations.

APPENDIX C

APPENDIX C AURORA RESEARCH INSTITUTE SCIENTIFIC RESEARCH LICENCE

Licence No. 14734
File No. 12 402 635
June 04, 2010

2010
Northwest Territories Scientific Research Licence

Issued by:	**Aurora Research Institute – Aurora College** Inuvik, Northwest Territories
Issued to:	Mr. Steve M Moore EBA Engineering Consultants Ltd. Box 2244 #201, 4916 – 49th Street Yellowknife, NT X1A 2P7 Canada Phone: (867) 920-2287 Fax: (867) 873-3324 Email: smoore@eba.ca
Affiliation:	EBA Engineering Consultants Ltd.
Funding:	Federal Government through CanNor Funding
Team Members:	Steve Moore; Karla Langlois; David Morantz
Title:	**Inuvik to Tuktoyaktuk Highway Project**
Objectives:	The objectives are to determine the presence of fish and the quality of fish habitat at stream crossings along the proposed road alignment.
Dates of data collection:	June 5, 2010 to September 30, 2010
Location:	Between Inuvik and Tuktoyaktuk along the proposed road alignment.

Licence No.14734 expires on December 31, 2010
Issued in the Town of Inuvik on June 04, 2010

*** original signed ***

_____
Pippa Seccombe-Hett,
Director, Aurora Research Institute

Aurora Research Institute - Aurora College
PO Box 1450 Inuvik NT X0E 0T0
Phone: 867-777-3298 **Fax:** 867-777-4264 **E-mail:** licence@nwtresearch.com

Notification of Research

I would like to inform you that Scientific Research Licence No. 14734 has been issued to:

Mr. Steve M Moore
EBA Engineering Consultants Ltd.
Box 2244
#201, 4916 – 49th Street
Yellowknife, NT
X1A 2P7 Canada
Phone: (867) 920-2287
Fax: (867) 873-3324
Email: smoore@eba.ca

to conduct the following study:
Inuvik to Tuktoyaktuk Highway Project (Application No. 1439)

Please contact the researcher if you would like more information.

SUMMARY OF RESEARCH
This licence has been issued for the scientific research application No.1439.

The objectives of this study are to determine the presence of fish and the quality of fish habitat at stream crossings along the proposed road alignment. They will be achieved through observations, measurements, and surveys carried out during freshet. These observations will provide an indication of seasonal habitat use at high water, when connectivity to upstream habitats may exist. Similarly, field work during low summer flows would serve to identify permanent and ephemeral streams, and confirm fish presence under low flow conditions.

The investigator will assess all stream crossing to look for obstructions, size and quality of upstream habitats, size and characteristics of upstream lakes, flow conditions, and identification/confirmation of streams requiring ground sampling; thorough photographic and video documentation.

Methods include:
One field trip will take place in June and one in August. Each field trip will be of 4 to 7 days duration and will include the assessment of all stream crossings. Standard fish habitat surveys following BC Resources Information Standards Committee (RISC) methodology. The trips will also include quantitative habitat surveys (using RISC site cards); electrofishing; 24-hour Gee Trapping at selected stations to sample fish species present.

The results will be written up in a report and will be communicated to various government agencies (as required by the permit) and presented at community meetings in the fall of 2010.

The fieldwork for this study will be conducted from June 5, 2010 to September 5, 2010.

Sincerely,

_____
Jonathon Michel,
Manager, Scientific Services

DISTRIBUTION
Department of Fisheries and Oceans Canada
Environmental Impact Screening Committee - c/o Joint Secretariat

Gwich'in Land Use Planning Board
Gwich'in Renewable Resources Board
Gwich'in Social and Cultural Institute
Hamlet of Tuktoyaktuk
Inuvialuit Community Development Division
Inuvialuit Land Administration
Inuvik Hunters and Trappers Committee
Nihtat Gwich'in Renewable Resource Council
Town of Inuvik
Tuktoyaktuk Hunters and Trappers Committee

APPENDIX D

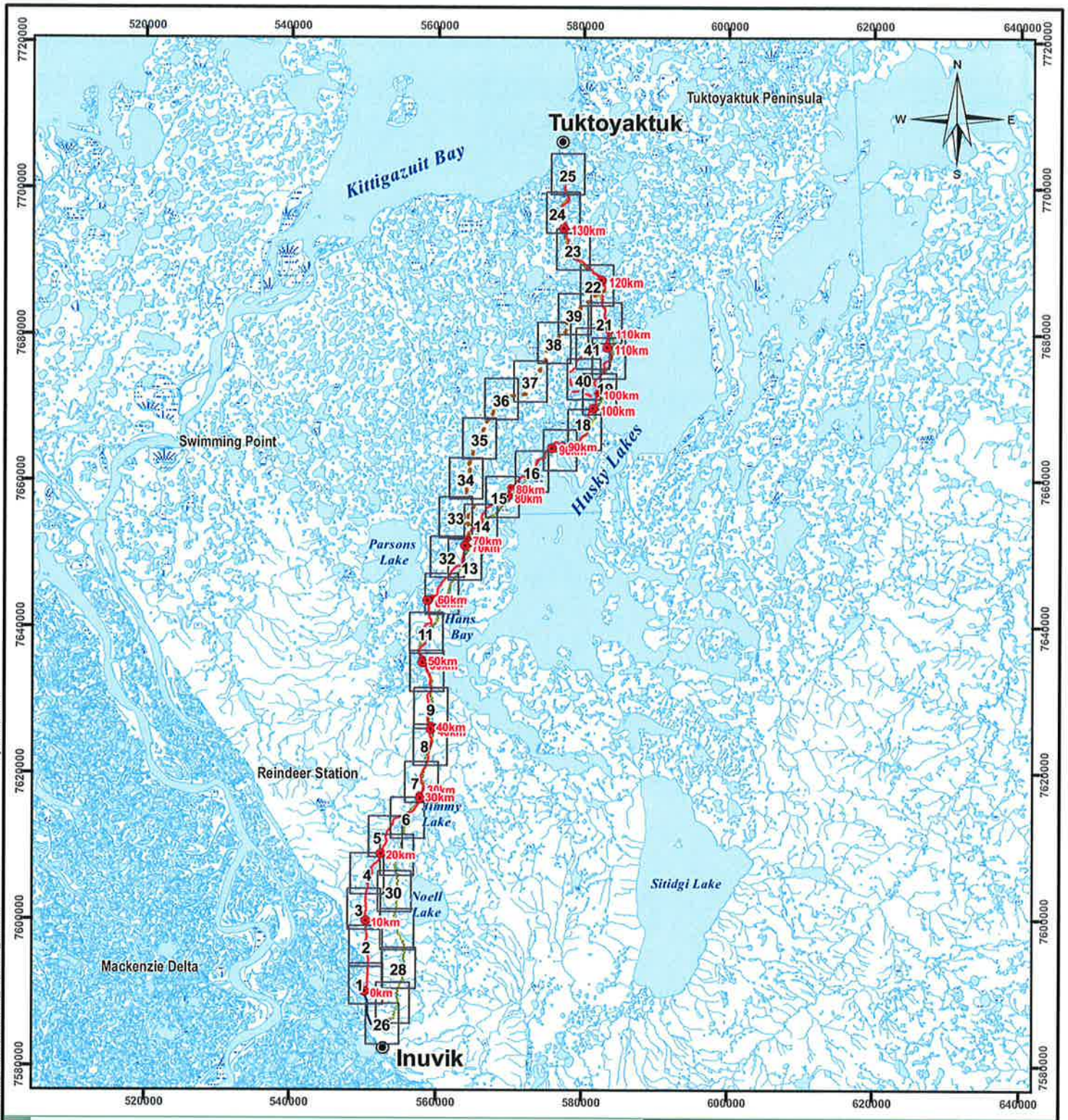
APPENDIX D INUVIK TO TUKTOYAKTUK 1:25,000 MAP BOOK

consulting engineers
& scientists

Proposed Inuvik to Tuktoyaktuk Highway 1:25,000 Map Book

January 2010
Issued For Use
File# V23201098

Northwest Territories
Town of Inuvik
KIGGIAK - EBA



LEGEND

- Communities
- 2009 Route
- Other Alignments Considered
- Upland Route
- PWC 1977
- Navy Road
- Watercourse
- Waterbody
- Wetland
- 1 Map Grid

NOTES

Base data source: 1:250,000 NTS

ISSUED FOR USE

PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book Index Map

PROJECTION: UTM Zone 8	DATUM: NAD83

Scale: 1:750,000

5 2.5 0 5 10 15 20 25

Kilometres

FILE NO.: V23201098_MapBook_INDEX-Jan2010.mxd

PROJECT NO.	DWN	CKD	REV
V23201098	KWM	RM	1

OFFICE: EBA-VANC	DATE: January 6, 2010

Town of Inuvik

Northwest Territories

KIGGIAK - EBA

Index Map

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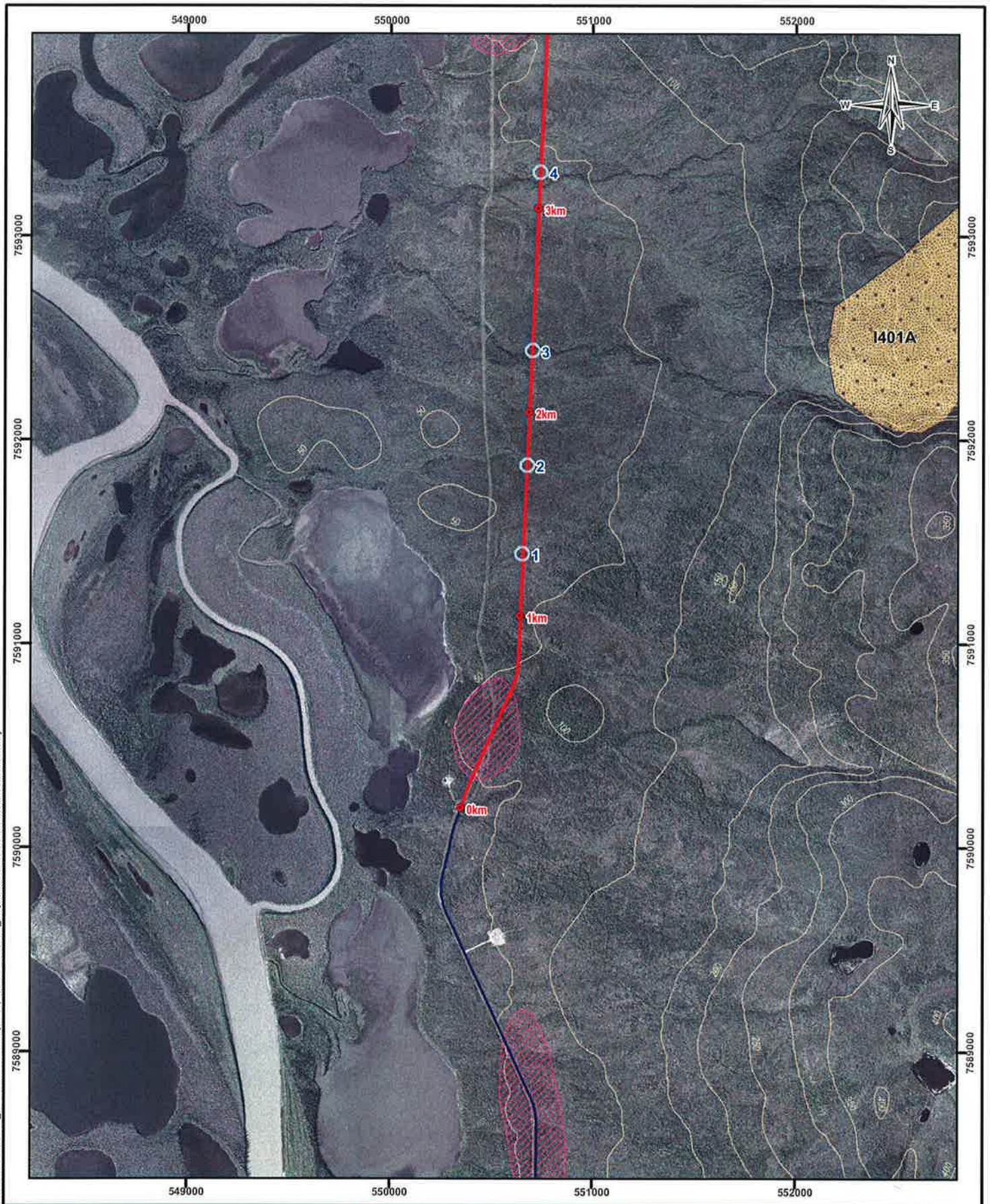

ISSUED FOR USE

Legend

- Grizzly Bear Den
- 10 Stream Crossing — Crossing #
- Stream Crossing - Potential Bridge
- 2009 Route
- Other Alignments Considered
- Upland Route
- PWC 1977
- Navy Road
- Contour
- Borrow Sources
- Archaeology Areas of Interest
- Ice-Rich Polygons
- Grizzly Bear Hibernation Zone
- Twin Otter Strip
- Husky Lakes 1000m Setback

PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Scale: 1:25,000
1000 0 100 200 300 400 500 m

UTM Zone 8
NAD83

Northwest Territories

KIGGIAK - EBA

FILE NO. V23201098_MapBook-Jan2010.mxd
PROJECT NO. V23201098 DATE January 6, 2010

Map 01

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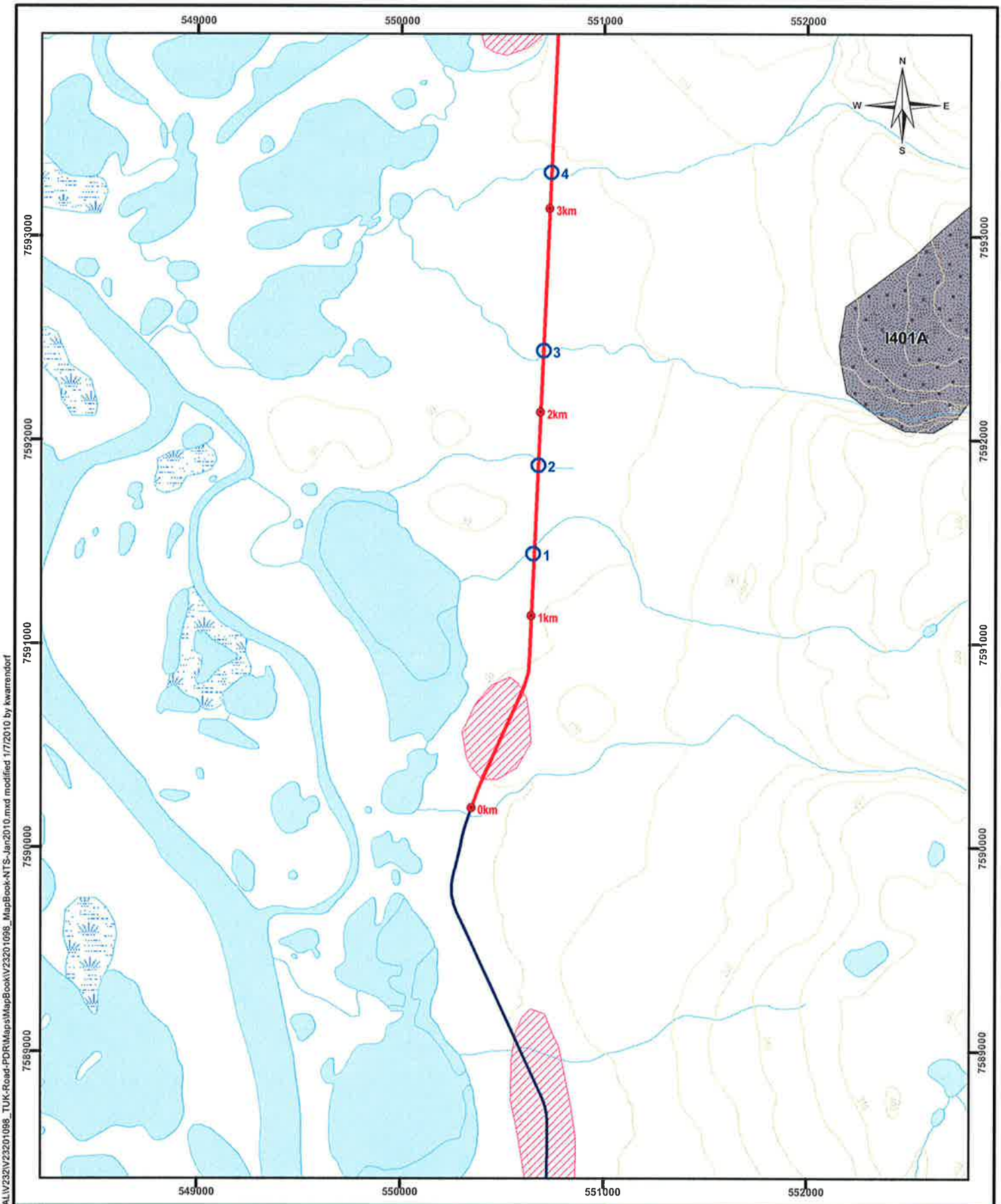

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ISSUED FOR USE

Legend

- Grizzly Bear Den
- 10 Stream Crossing
  - Crossing #
- Stream Crossing - Potential Bridge
- 2009 Route
- Other Alignments Considered
- Upland Route
- PWC 1977
- Navy Road
- Contour
- Watercourse
- Waterbody
- Wetland
- Sand
- Borrow Sources
- Archaeology Areas of Interest
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- Grizzly Bear Hibernation Zone
- Twin Otter Strip
- Husky Lakes 1000m Setback

PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Scale: 1:25,000

1050 0 100 200 300 400 500 m

UTM Zone 8
NAD83

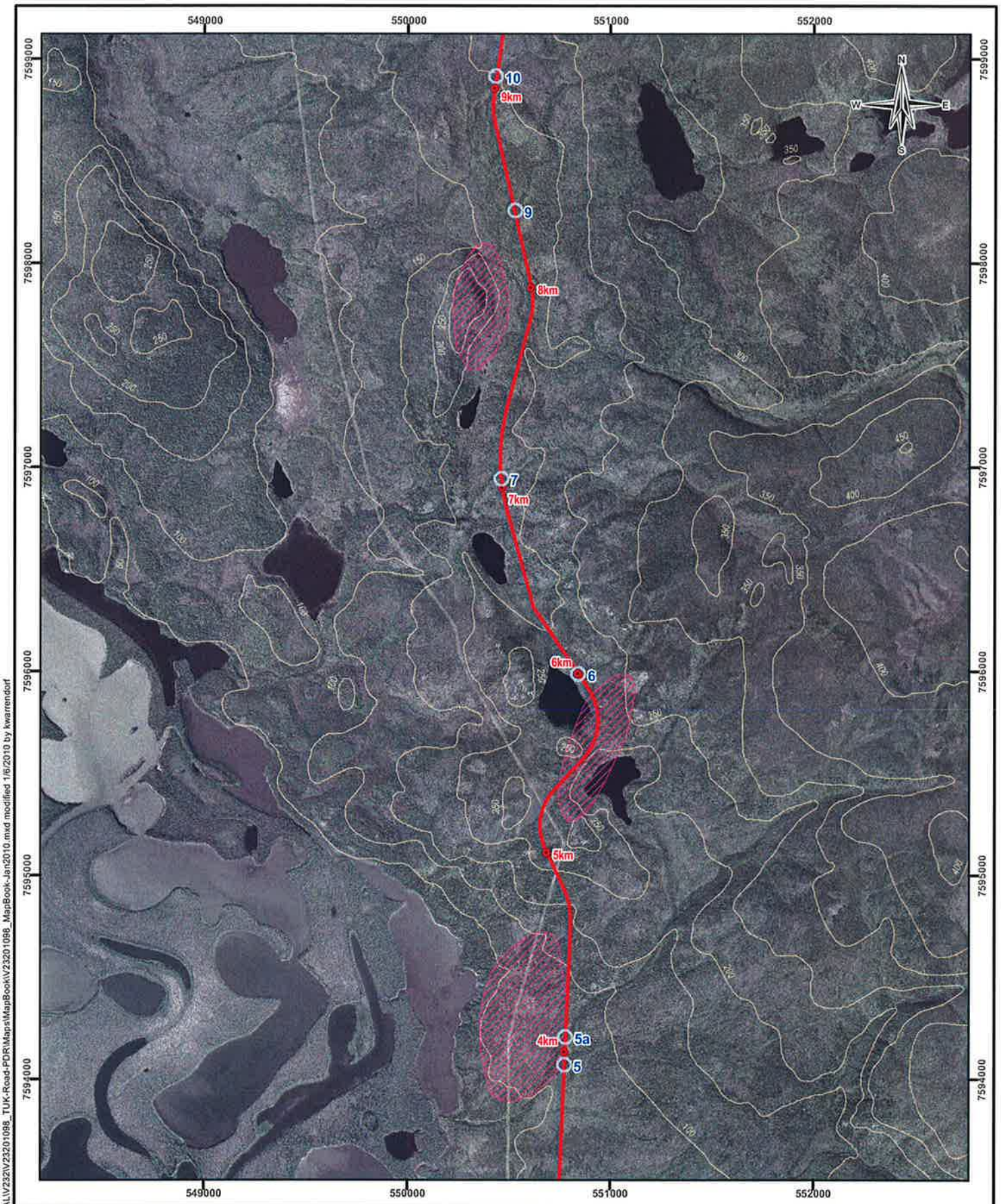
Northwest Territories

KIGGIAK - EBA

FILE NO. V23201098_MapBook-NTS-Jan2010.mxd

PROJECT NO. V23201098 DATE January 6, 2010

Map 01



ISSUED FOR USE

Legend

- Grizzly Bear Den
- 10 Stream Crossing, Crossing #
- Stream Crossing - Potential Bridge
- 2009 Route
- Other Alignments Considered
- Upland Route
- PWC 1977
- Navy Road
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- Grizzly Bear Hibernation Zone
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- Husky Lakes 1000m Setback

PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Scale: 1:25,000
1000 0 100 200 300 400 500 m

UTM Zone 8
NAD83

KIGGIAK - EBA

FILE NO. V23201098_MapBook-Jan2010.mxd
PROJECT NO. V23201098 DATE January 6, 2010

Map 02

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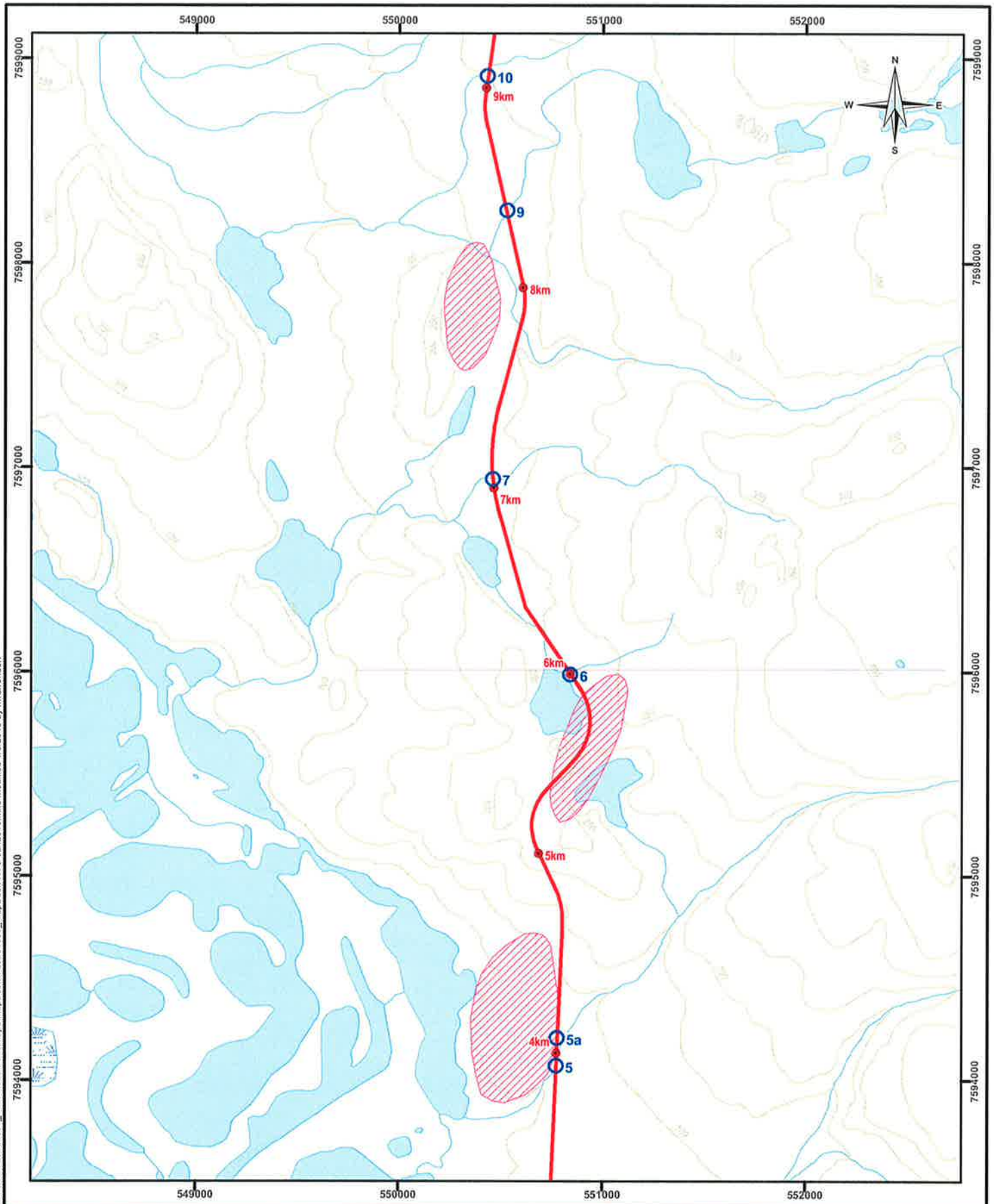

ISSUED FOR USE

Legend

- Grizzly Bear Den
- 10 Stream Crossing
  - Crossing #
- Stream Crossing - Potential Bridge
- 2009 Route
- Other Alignments Considered
- Upland Route
- PWC 1977
- Navy Road
- Contour
- Watercourse
- Waterbody
- Wetland
- Sand
- Borrow Sources
- Archaeology Areas of Interest
- Ice-Rich Polygons
- Grizzly Bear Hibernation Zone
- Twin Otter Strip
- Husky Lakes 1000m Setback

PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Scale: 1:25,000

1000 0 100 200 300 400 500 m

UTM Zone 8
NAD83

Northwest Territories

KIGGIAK - EBA

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Map 02

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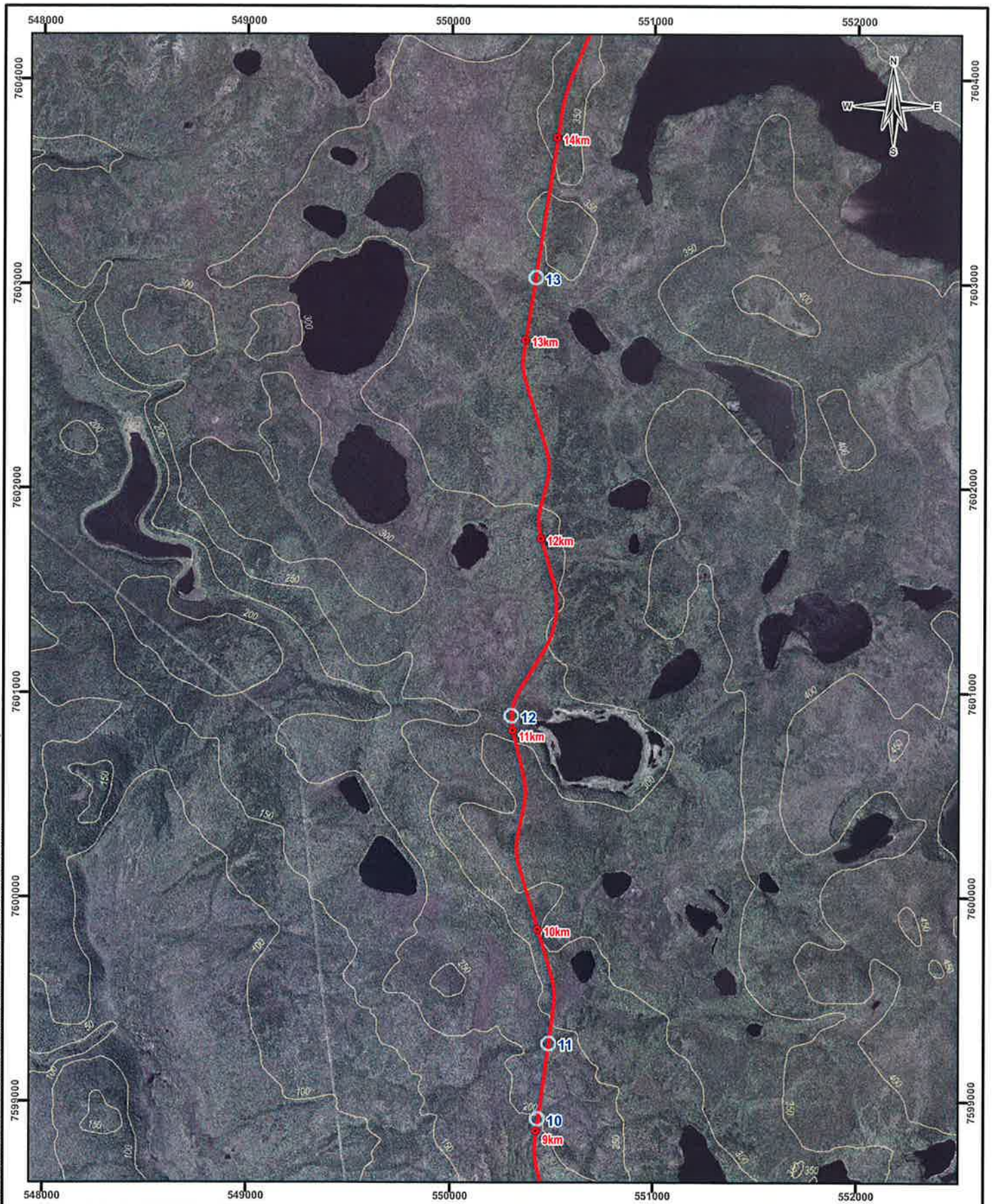

ISSUED FOR USE

Legend

- Grizzly Bear Den
- 10 Stream Crossing — Crossing #
- Stream Crossing - Potential Bridge
- 2009 Route
- Other Alignments Considered
- Upland Route
- PWC 1977
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PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Scale: 1:25,000
1050 0 100 200 300 400 500 m

UTM Zone 8
NAD83

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Map 03

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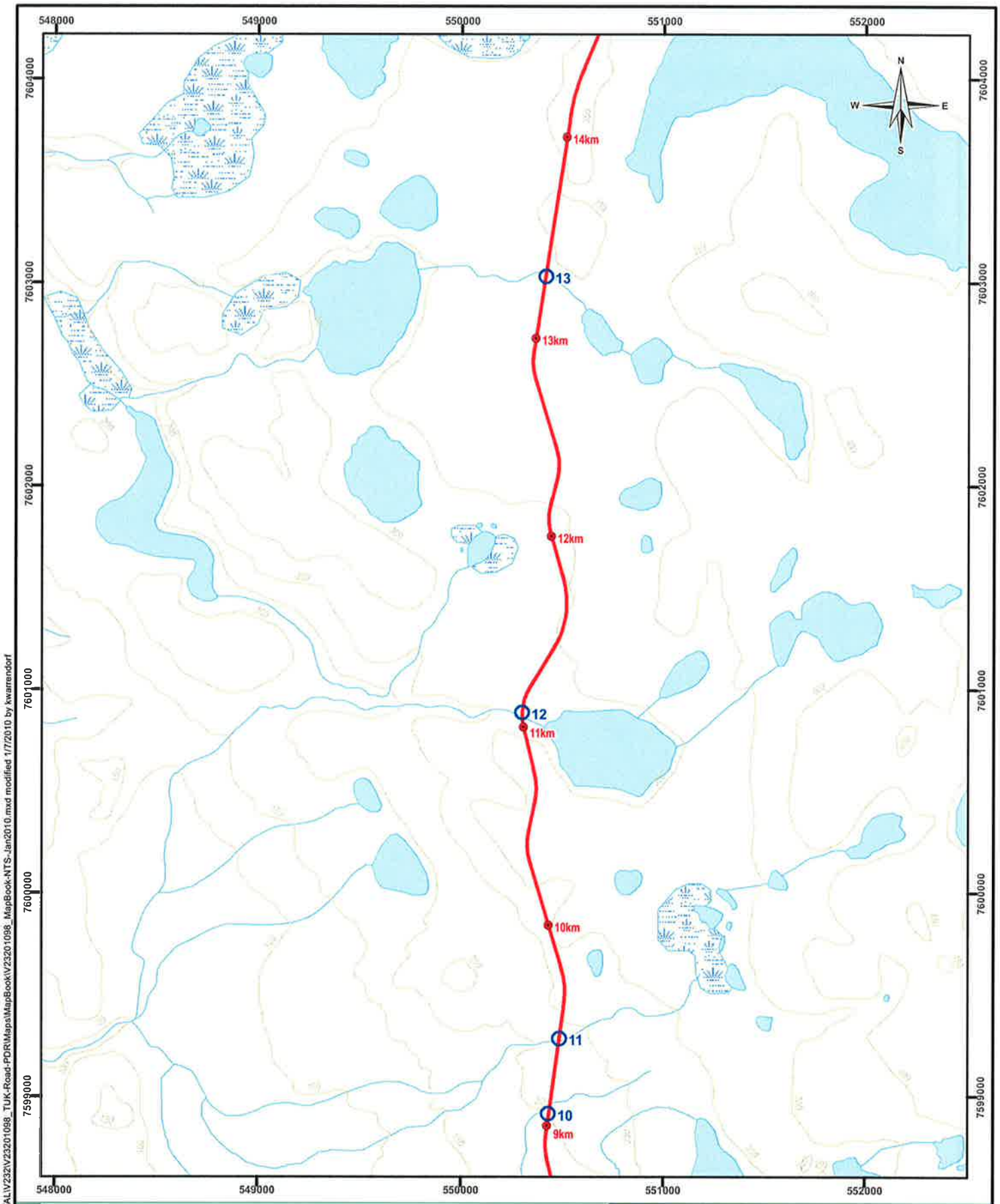

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PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Legend

- Grizzly Bear Den
- 10 Stream Crossing
  - Crossing #
- Stream Crossing - Potential Bridge
- 2009 Route
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- Upland Route
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Scale: 1:25,000

1050 0 100 200 300 400 500 m

UTM Zone 8
NAD83

Northwest Territories

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FILE NO. V23201098_MapBook-NTS-Jan2010.mxd

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Map 03

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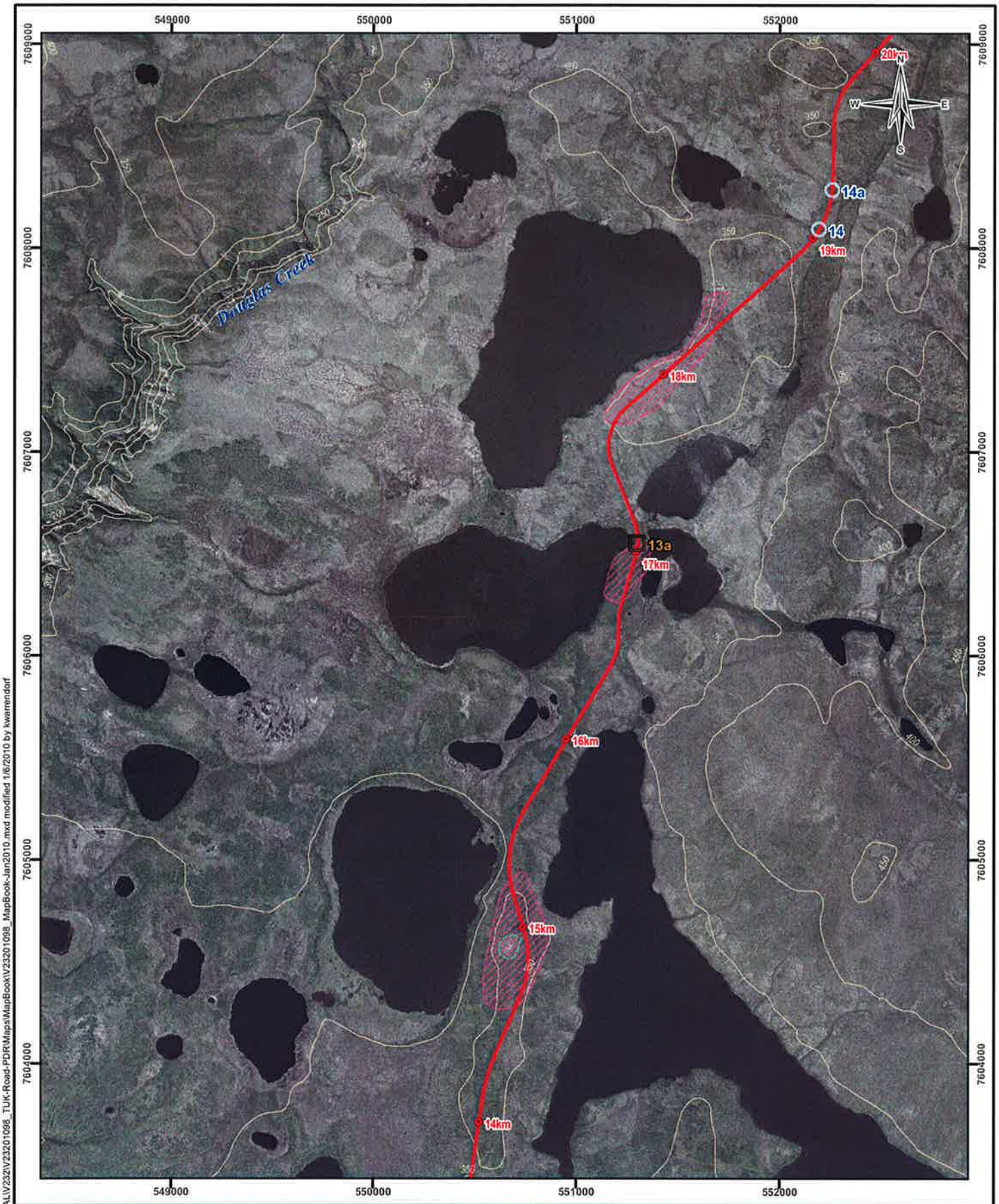

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PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Legend

- Grizzly Bear Den
- Stream Crossing (10 — Crossing #)
- Stream Crossing - Potential Bridge
- 2009 Route
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Scale: 1:25,000
1050 0 100 200 300 400 500 m

UTM Zone 8
NAD83

Northwest Territories

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Map 04

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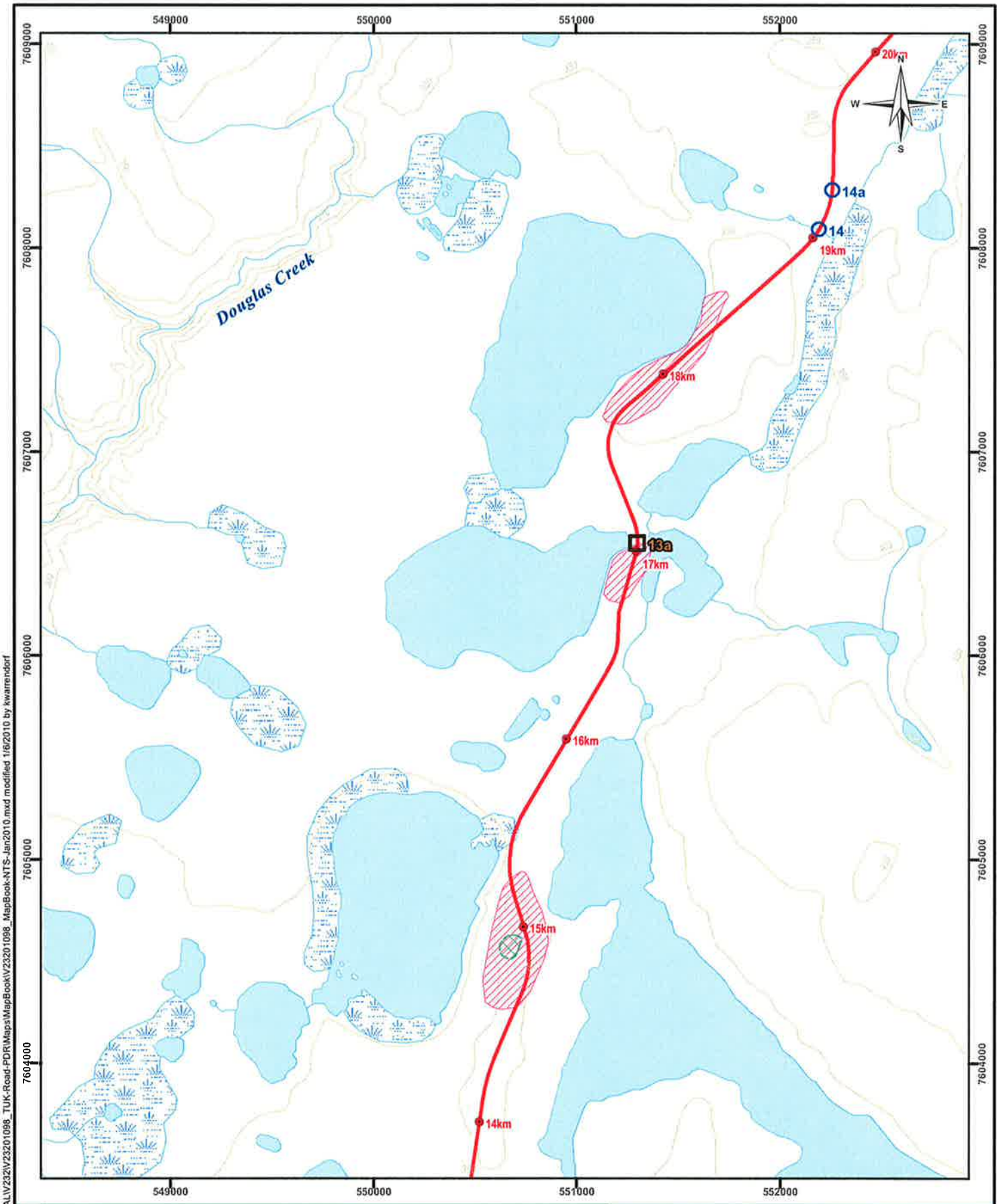

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Legend

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1:25,000 Map Book

Scale: 1:25,000
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UTM Zone 8
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Northwest Territories

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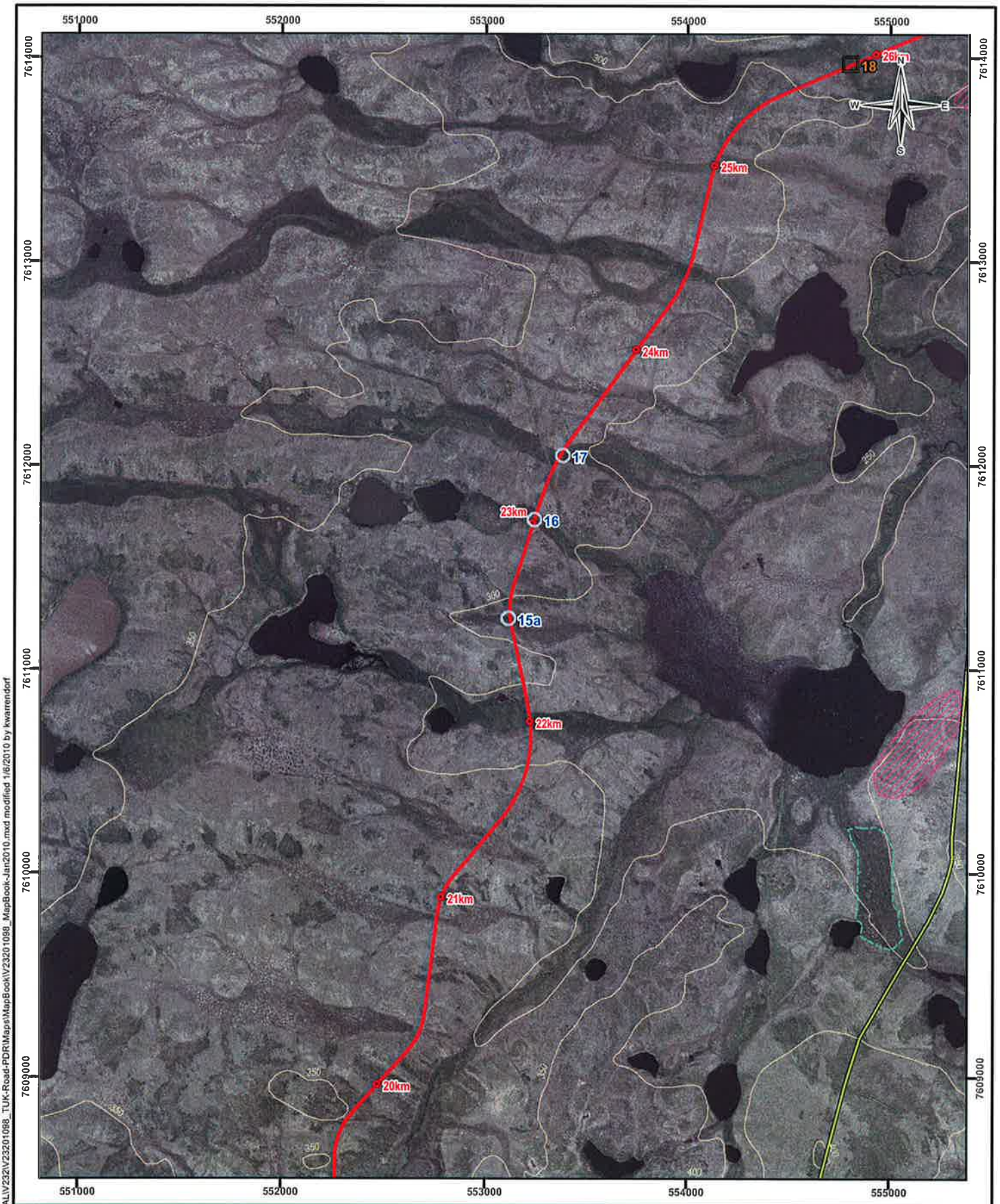
Map 04



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1:25,000 Map Book

Legend

- Grizzly Bear Den
- 10 Stream Crossing — Crossing #
- Stream Crossing - Potential Bridge
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Scale: 1:25,000

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UTM Zone 8
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Northwest Territories

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Map 05

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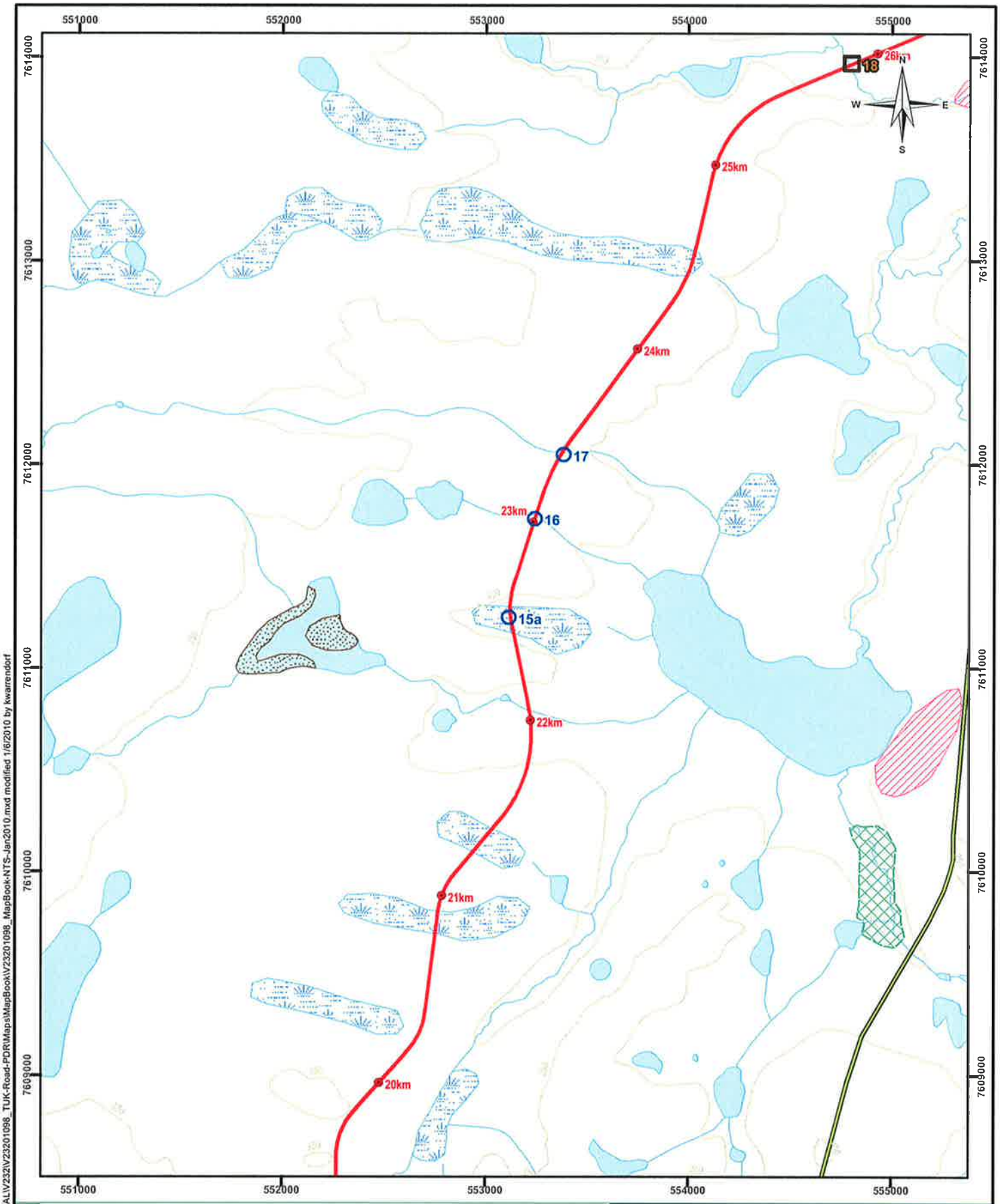

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Legend

- Grizzly Bear Den
- 10 Stream Crossing
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PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Scale: 1:25,000

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UTM Zone 8
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Map 05

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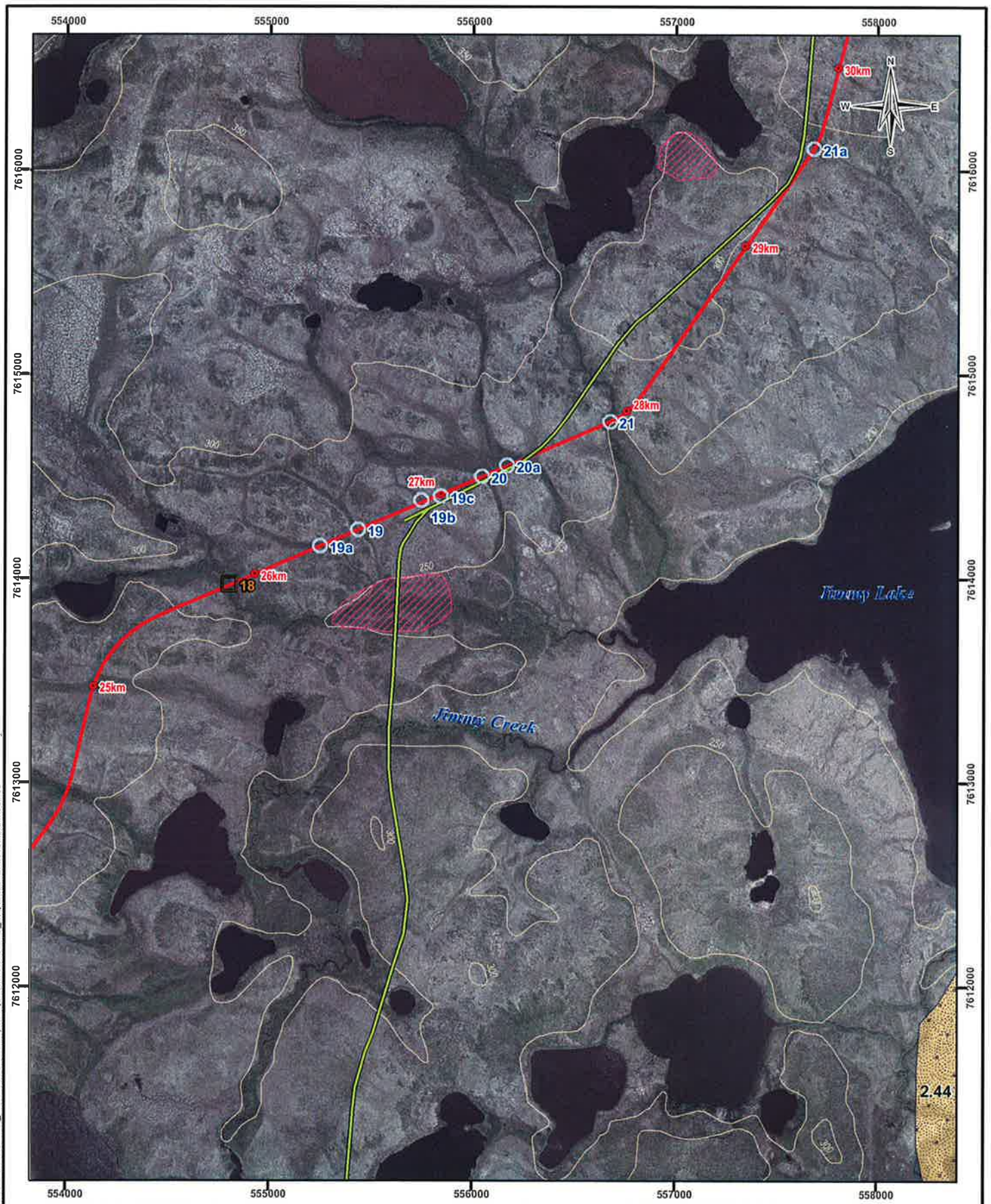

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1:25,000 Map Book

Legend

- Grizzly Bear Den
- 10 Stream Crossing — Crossing #
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Scale: 1:25,000
1050 0 100 200 300 400 500 m

UTM Zone 8
NAD83

Northwest Territories

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Map 06

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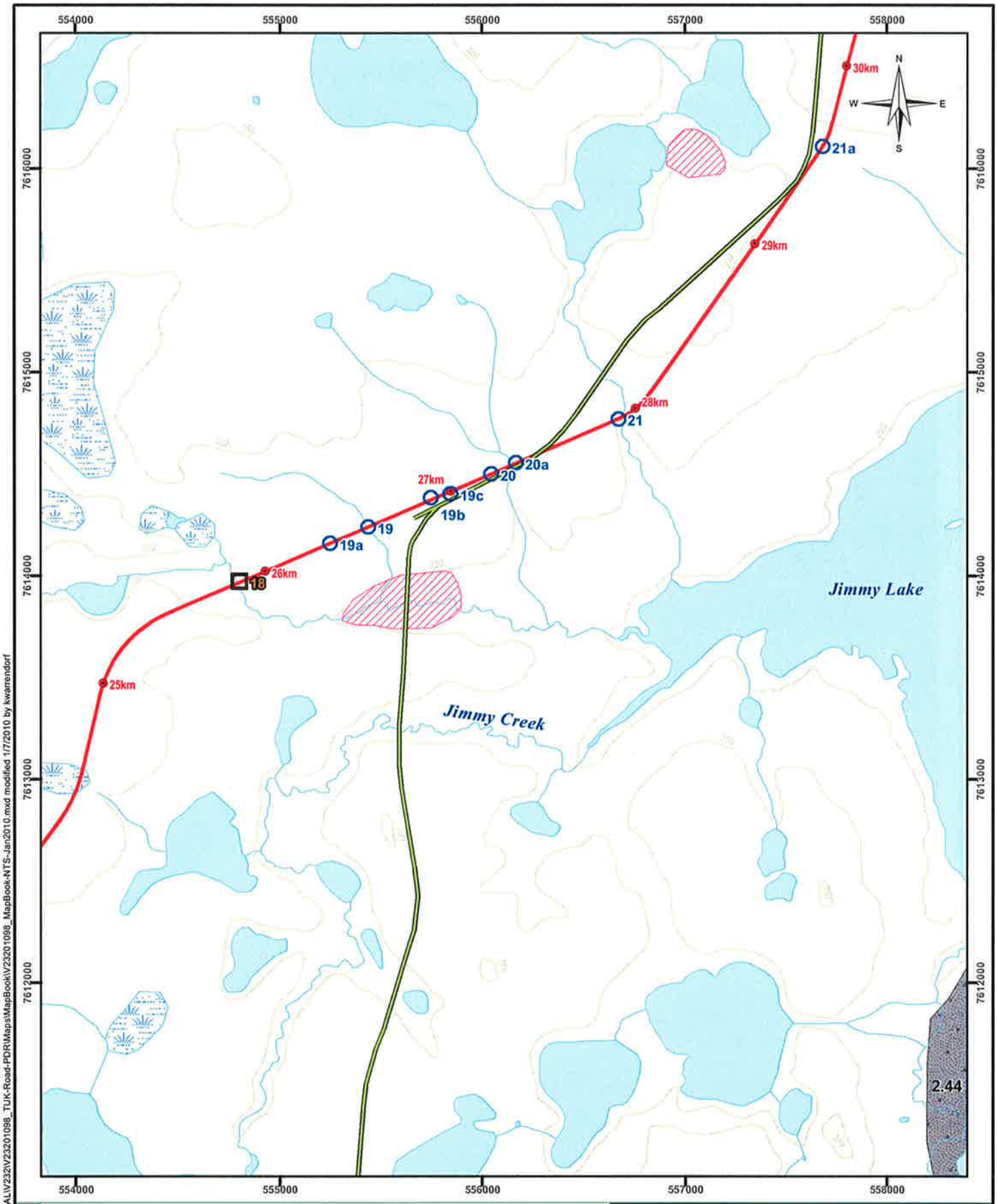

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Legend

- Grizzly Bear Den
- 10 Stream Crossing
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- Upland Route
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- Twin Otter Strip
- Husky Lakes 1000m Setback

PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Scale: 1:25,000

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UTM Zone 8
NAD83

Northwest Territories

KIGGIAK - EBA

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Map 06

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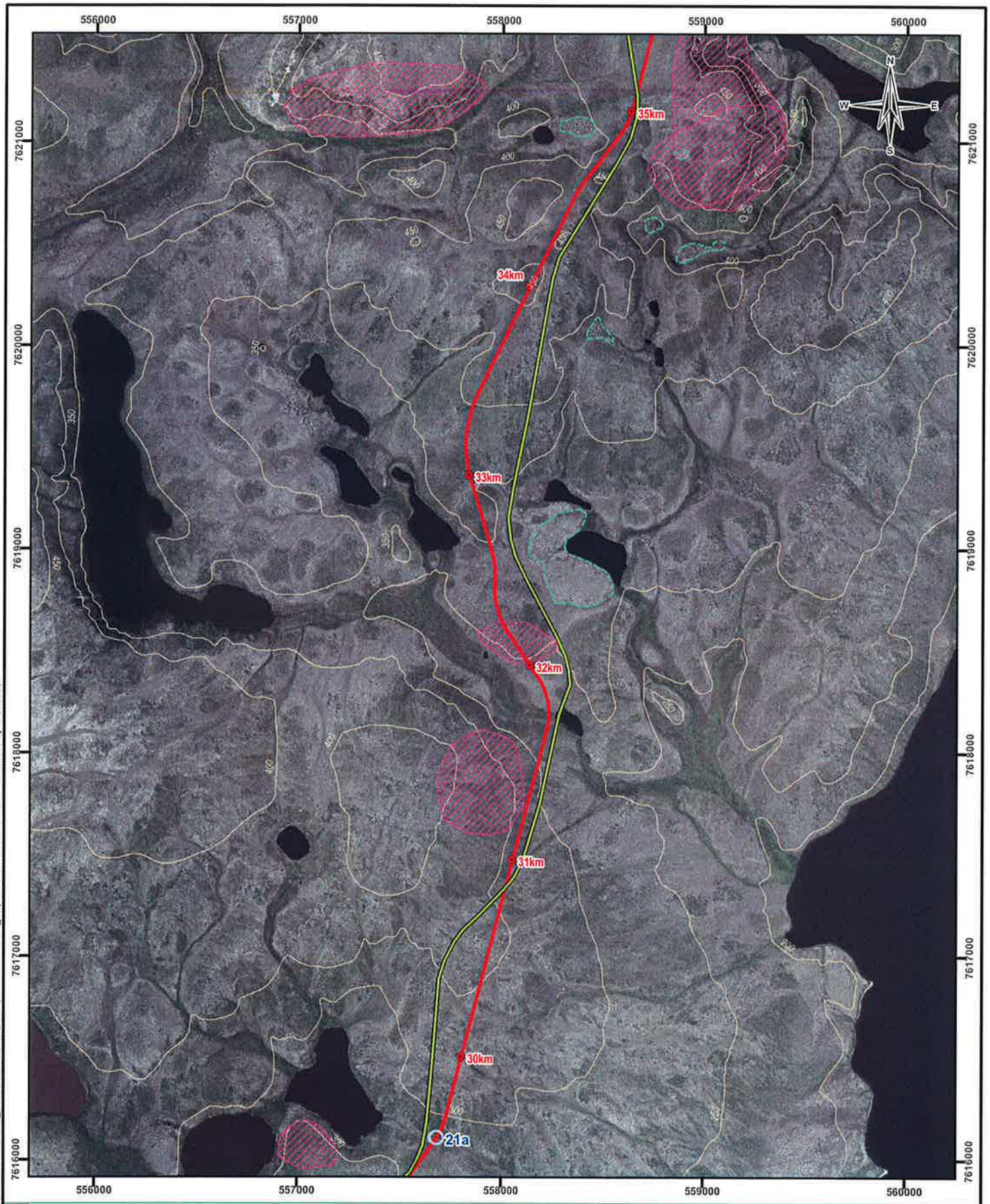

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Legend

- Grizzly Bear Den
- 10 Stream Crossing — Crossing #
- Stream Crossing - Potential Bridge
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- Upland Route
- PWC 1977
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PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Scale: 1:25,000
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UTM Zone 8
NAD83

Northwest Territories — KIGGIAK - EBA

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Map 07

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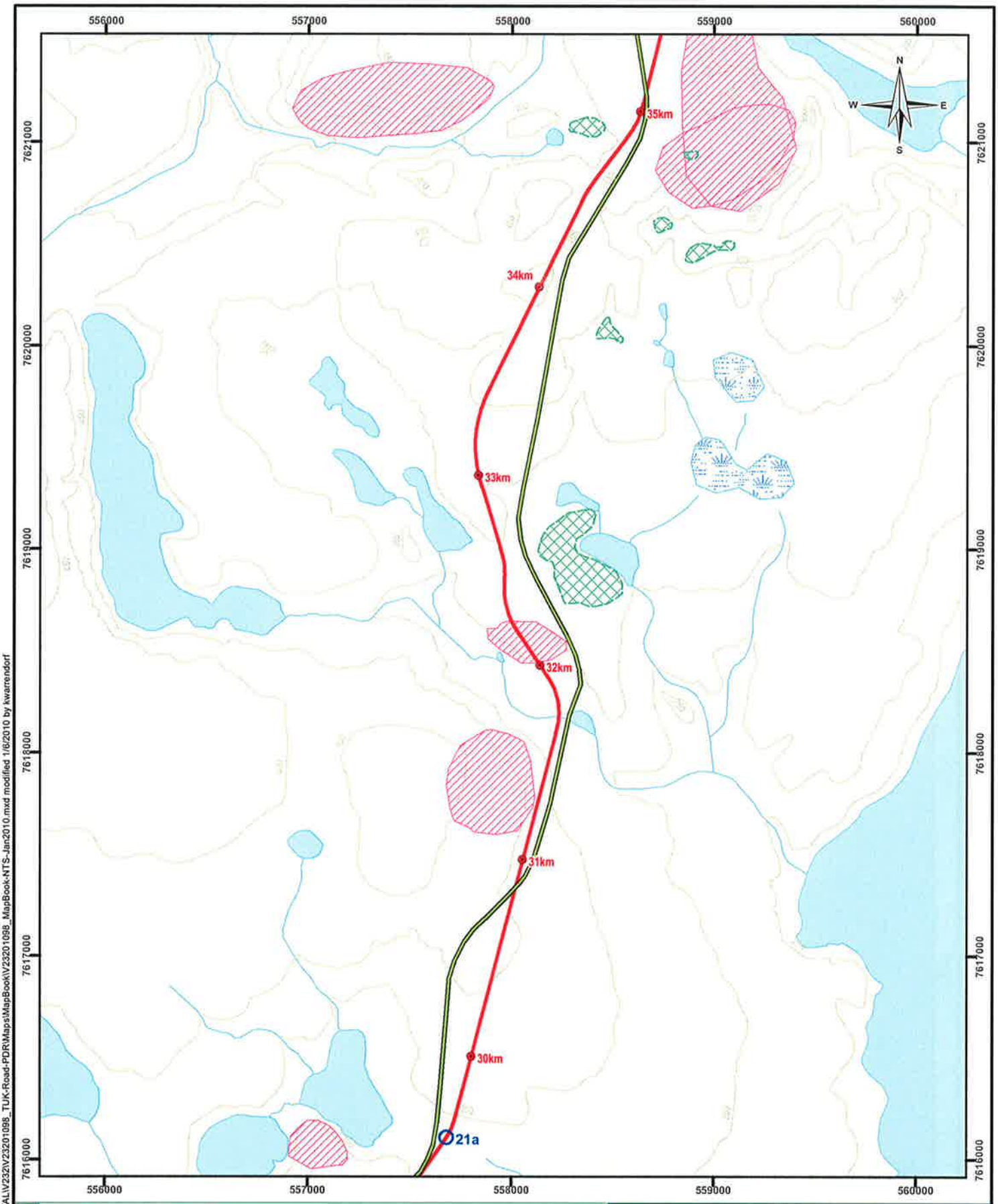

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1:25,000 Map Book

Legend

- Grizzly Bear Den
- 10 Stream Crossing
  - Crossing #
- Stream Crossing - Potential Bridge
- 2009 Route
- Other Alignments Considered
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- Grizzly Bear Hibernation Zone
- Twin Otter Strip
- Husky Lakes 1000m Setback

Scale: 1:25,000

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UTM Zone 8
NAD83

Northwest Territories

KIGGIAK - EBA

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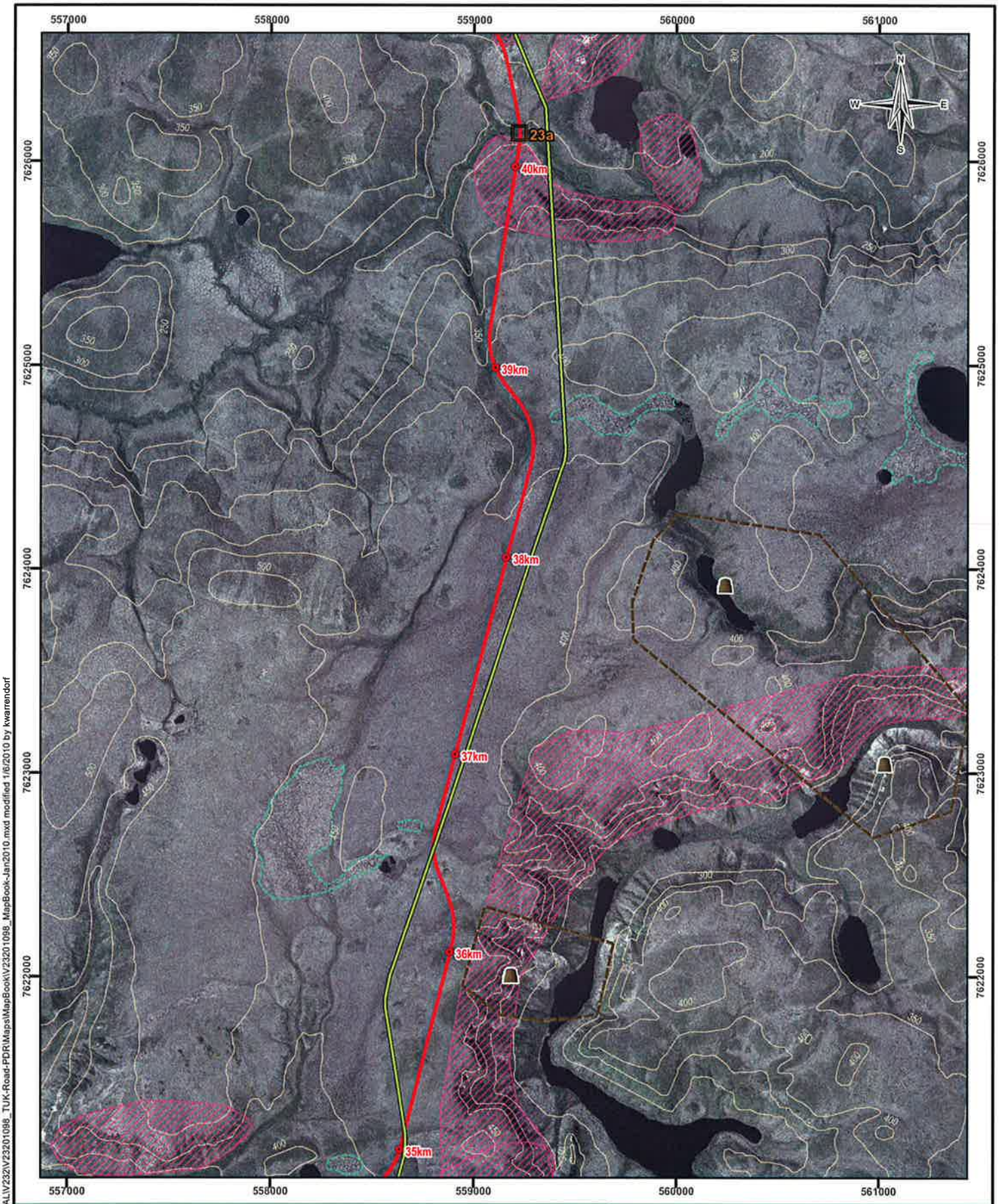
Map 07



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1:25,000 Map Book

Legend

- Grizzly Bear Den
- Stream Crossing (10 — Crossing #)
- Stream Crossing - Potential Bridge
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Scale: 1:25,000
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UTM Zone 8
NAD83

Northwest Territories — KIGGIAK - EBA

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Map 08

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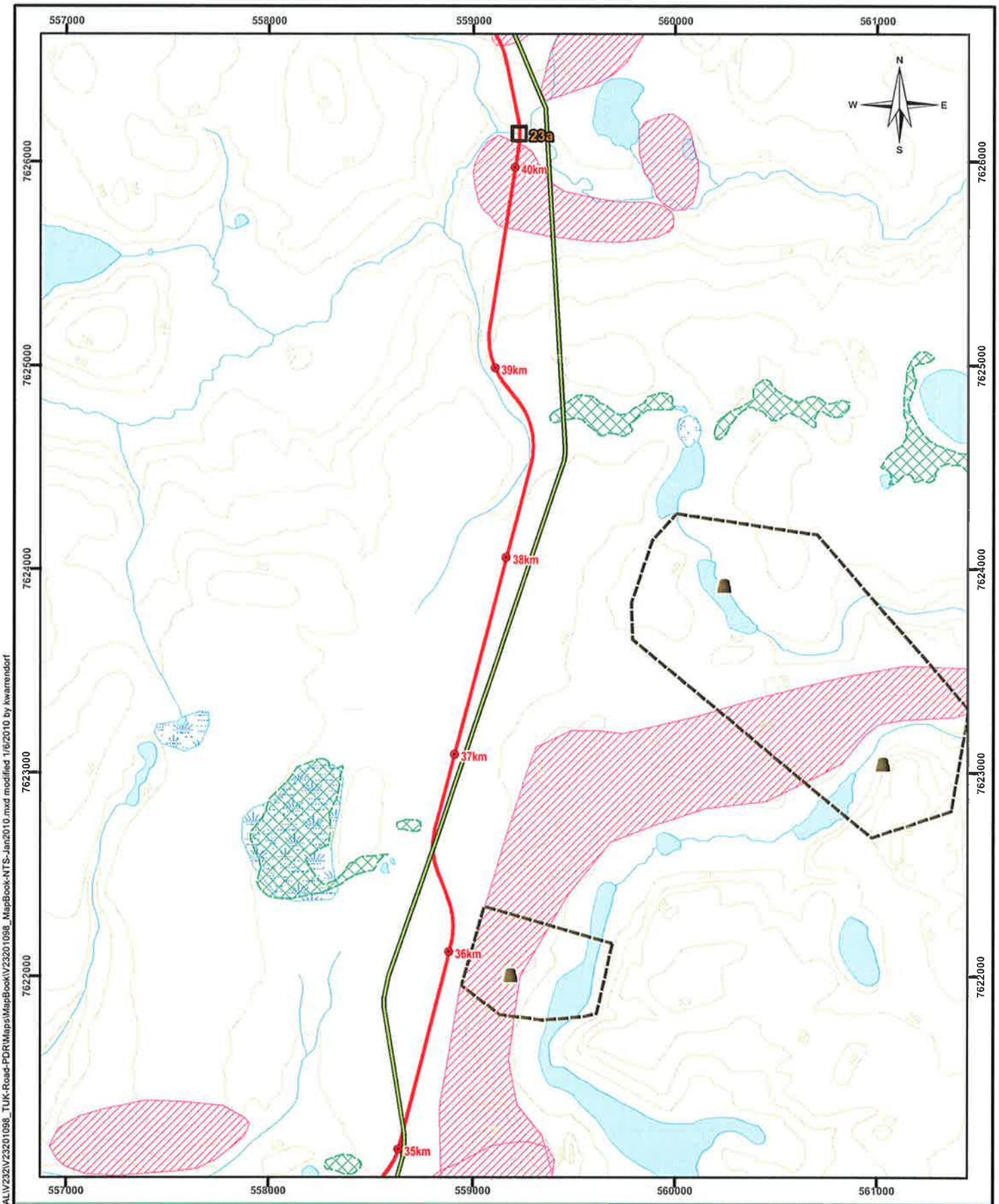

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1:25,000 Map Book

Legend

- Grizzly Bear Den
- 10 Stream Crossing
- Crossing #
- Stream Crossing - Potential Bridge
- 2009 Route
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- Husky Lakes 1000m Setback

Scale: 1:25,000

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UTM Zone 8
NAD83

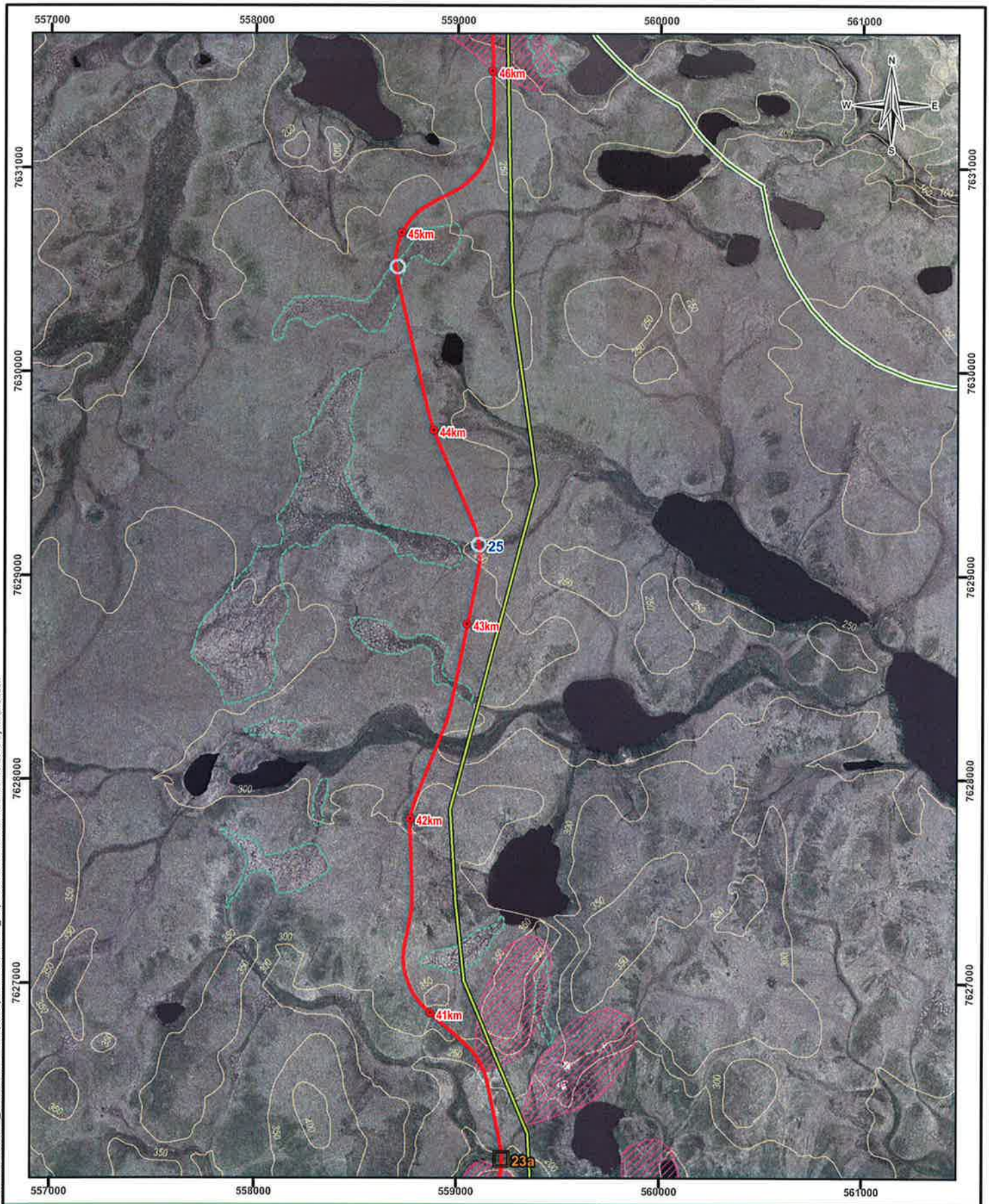
Northwest Territories

KIGGIAK - EBA

FILE NO. V23201098_MapBook-NTS-Jan2010.mxd

PROJECT NO. V23201098 DATE January 6, 2010

Map 08



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Legend

- Grizzly Bear Den
- 10 Stream Crossing, Crossing #
- Stream Crossing - Potential Bridge
- 2009 Route
- Other Alignments Considered
- Upland Route
- PWC 1977
- Navy Road
- Contour
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1:25,000 Map Book

Scale: 1:25,000
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UTM Zone 8
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Map 09

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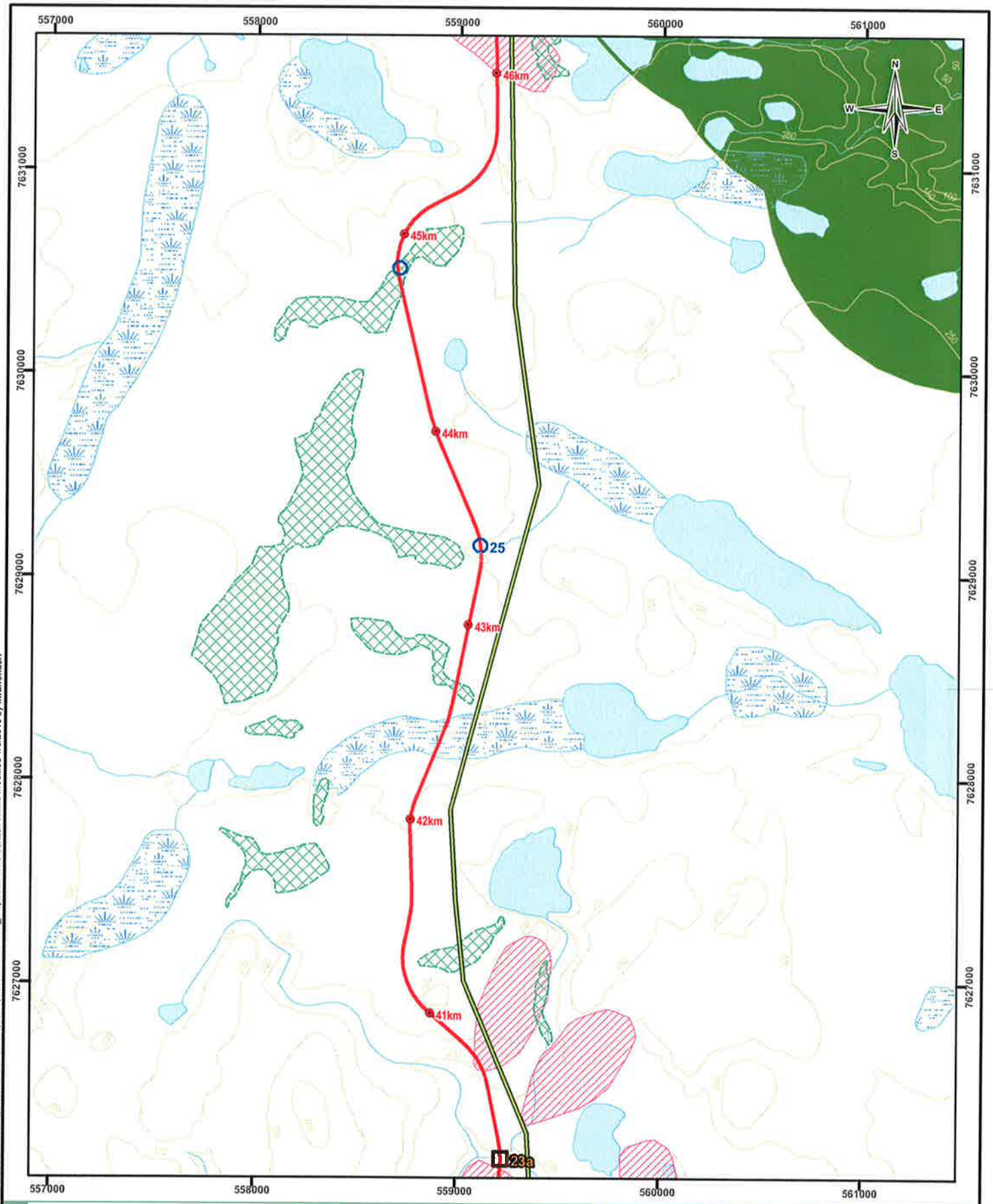

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1:25,000 Map Book

Legend

- Grizzly Bear Den
- 10 Stream Crossing — Crossing #
- Stream Crossing - Potential Bridge
- 2009 Route
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Scale: 1:25,000

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UTM Zone 8
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Map 09

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PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Legend

- Grizzly Bear Den
- 10 Stream Crossing # (Crossing #)
- Stream Crossing - Potential Bridge
- 2009 Route
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UTM Zone 8
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Northwest Territories

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Map 10

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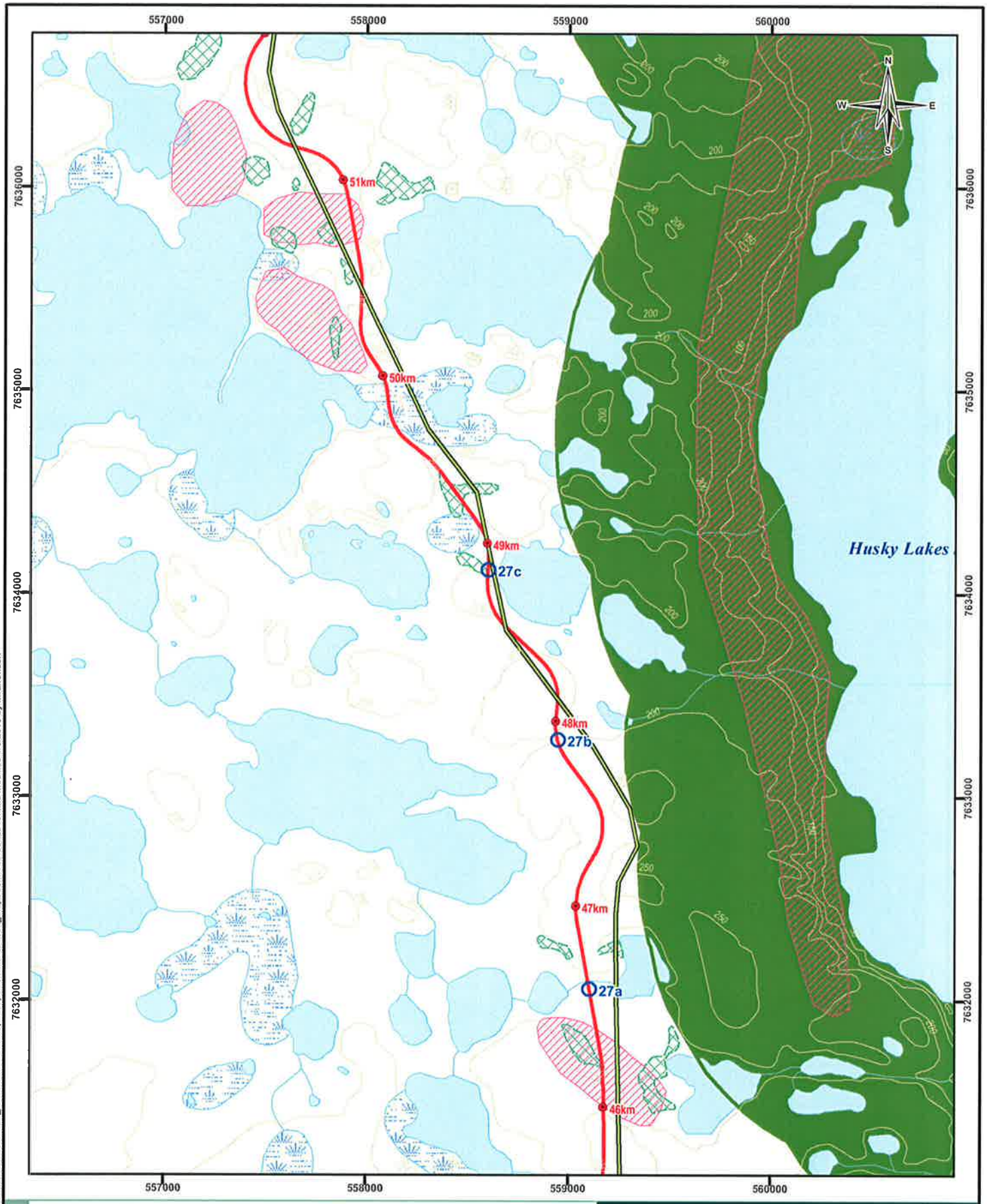

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Legend

- Grizzly Bear Den
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Scale: 1:25,000
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UTM Zone 8
NAD83

Northwest Territories

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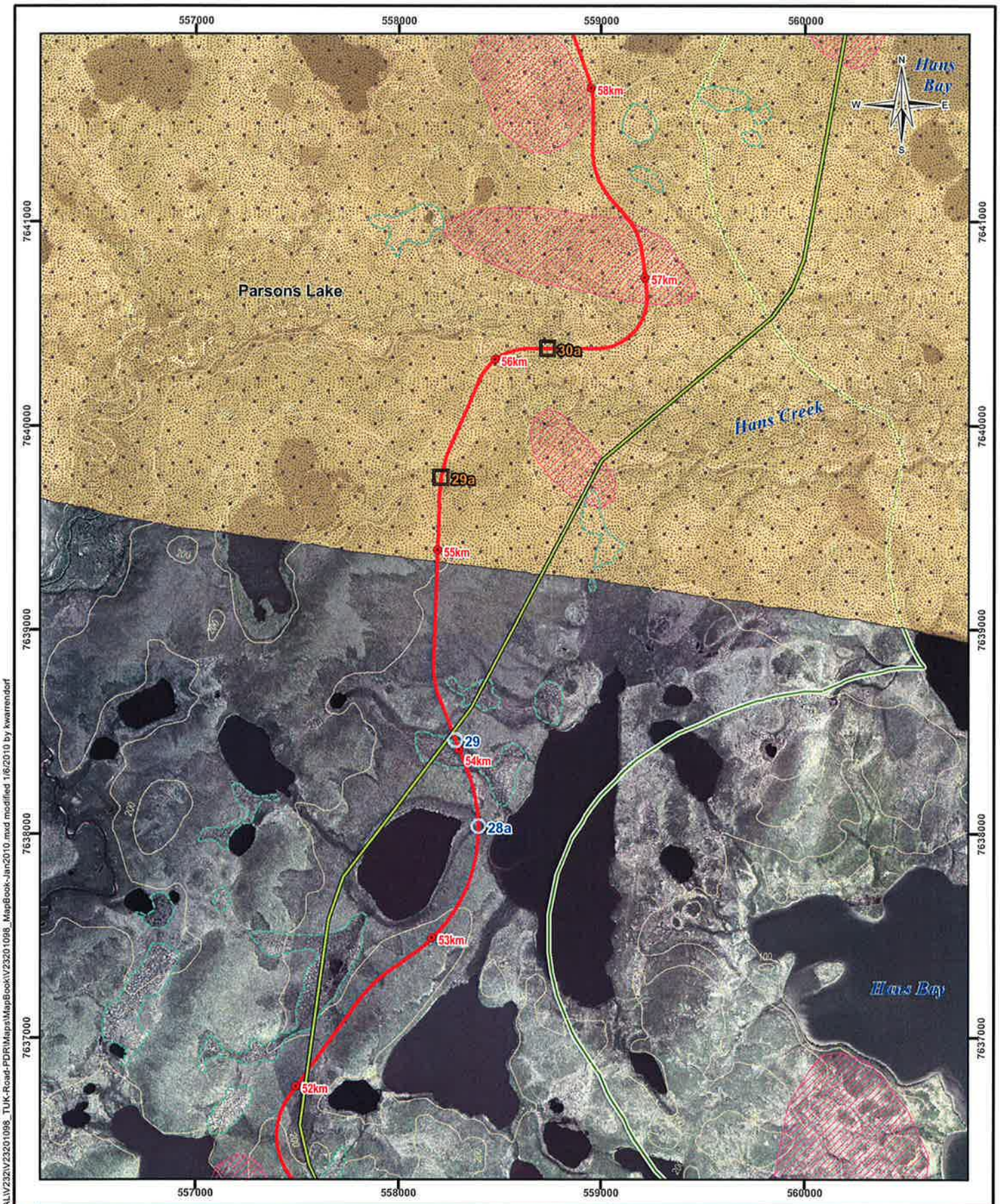
Map 10



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PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Legend

- Grizzly Bear Den
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UTM Zone 8
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Map 11

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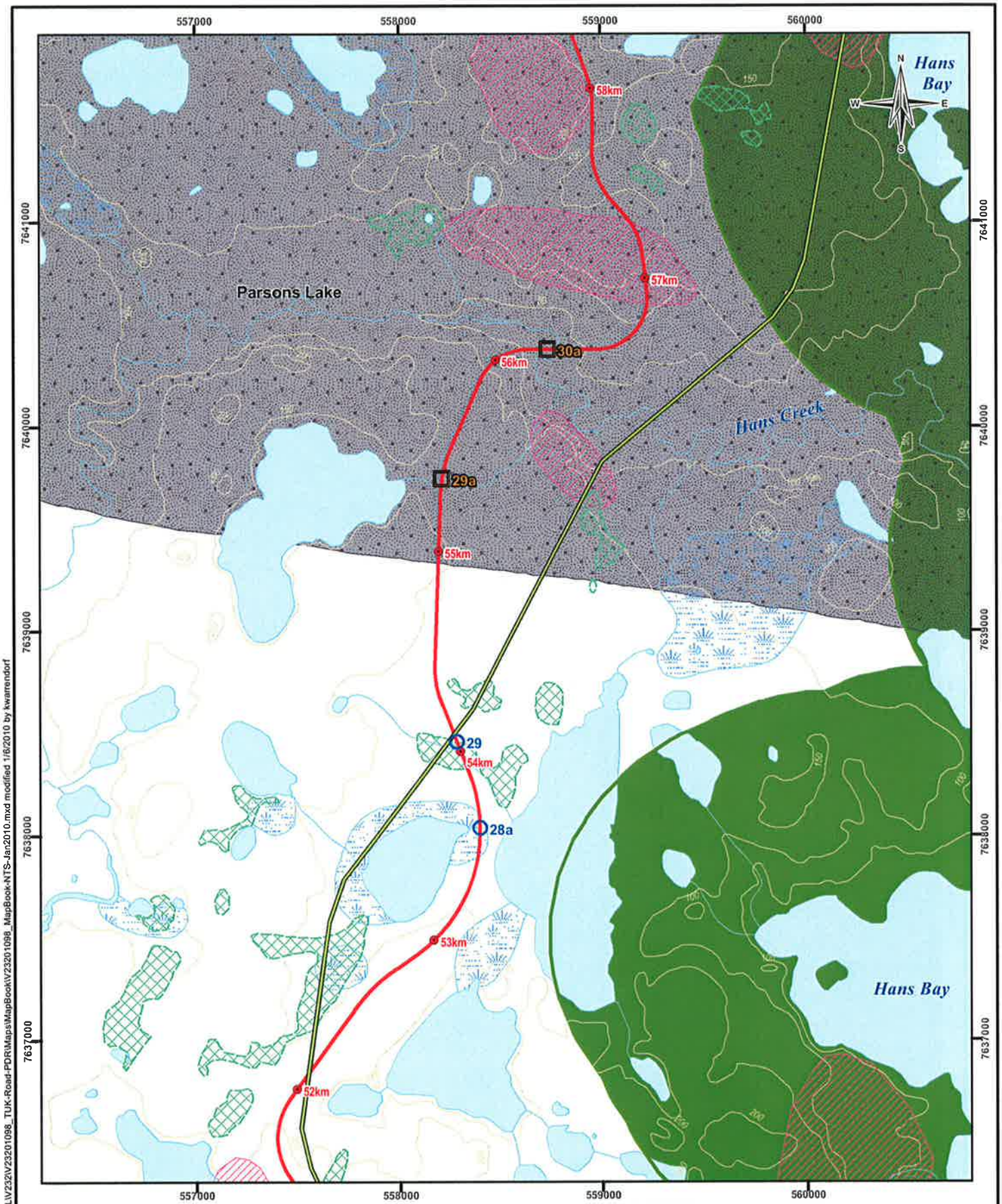

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Legend

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1:25,000 Map Book

Scale: 1:25,000

1050 0 100 200 300 400 500 m

UTM Zone 8
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Northwest Territories

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Map 11

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Legend

- Grizzly Bear Den
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- PWC 1977
- Navy Road
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- Twin Otter Strip
- Husky Lakes 1000m Setback

PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

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UTM Zone 8
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Northwest Territories

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Map 12

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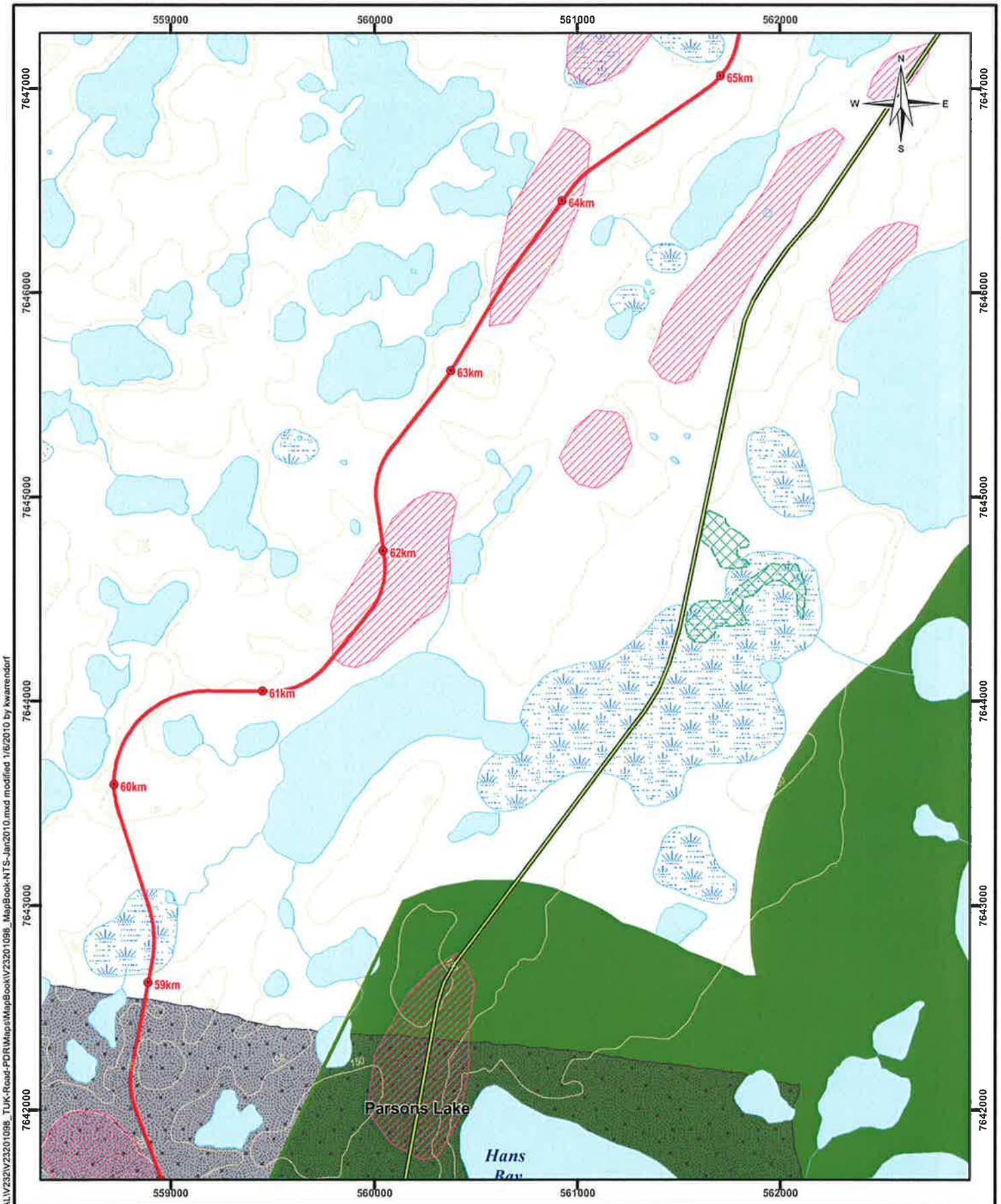

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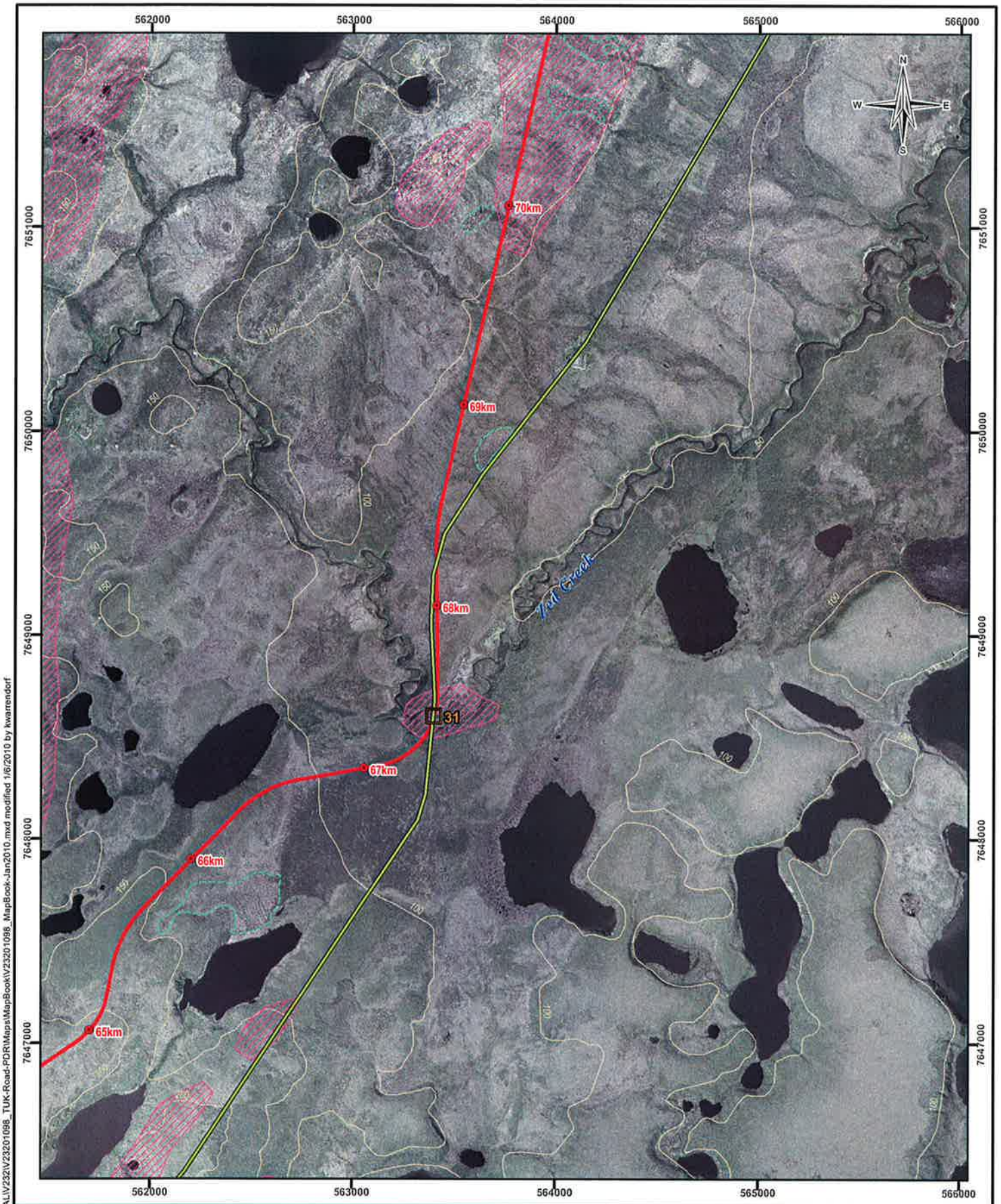

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UTM Zone 8
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Northwest Territories

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Map 13

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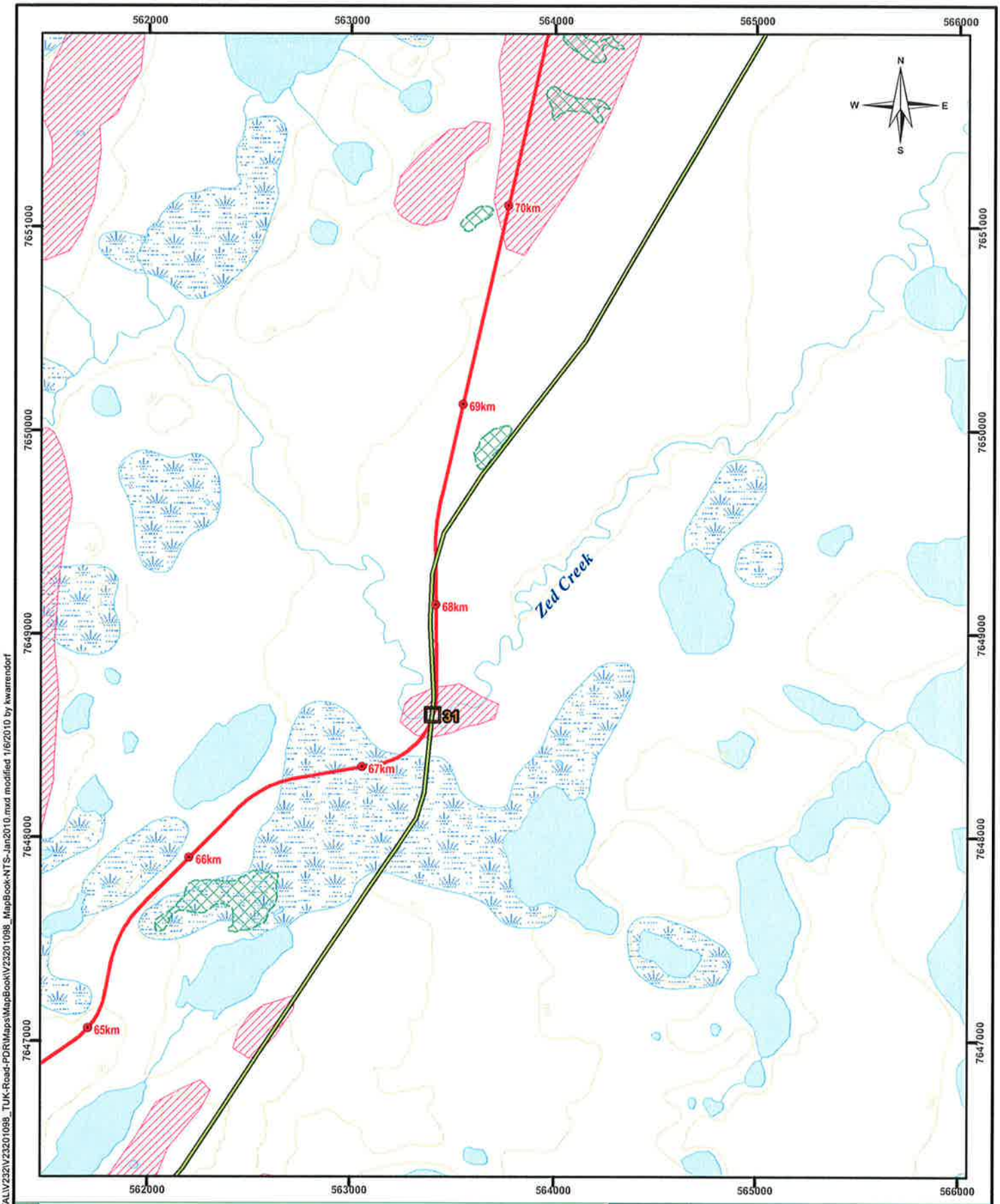

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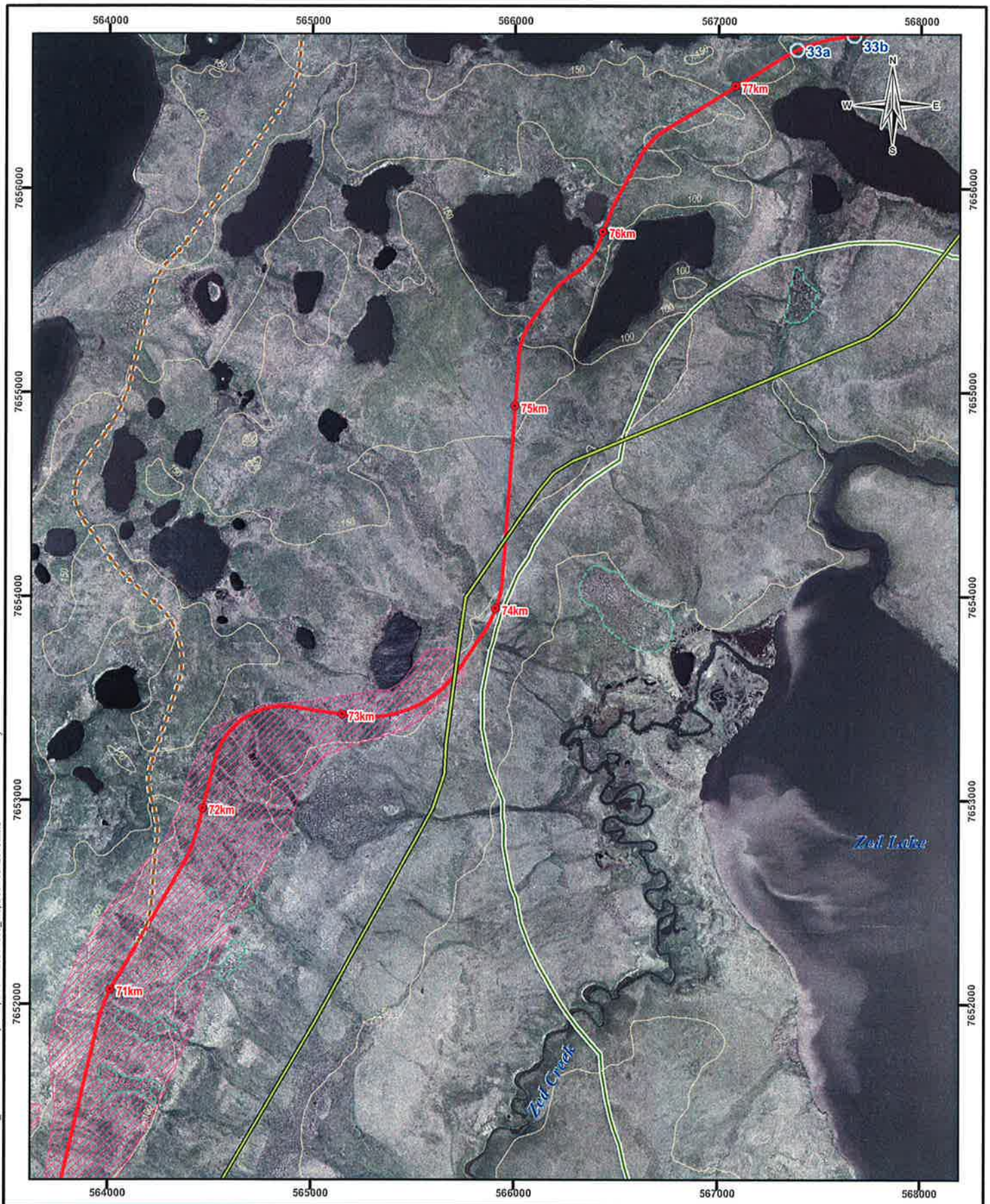

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Map 14

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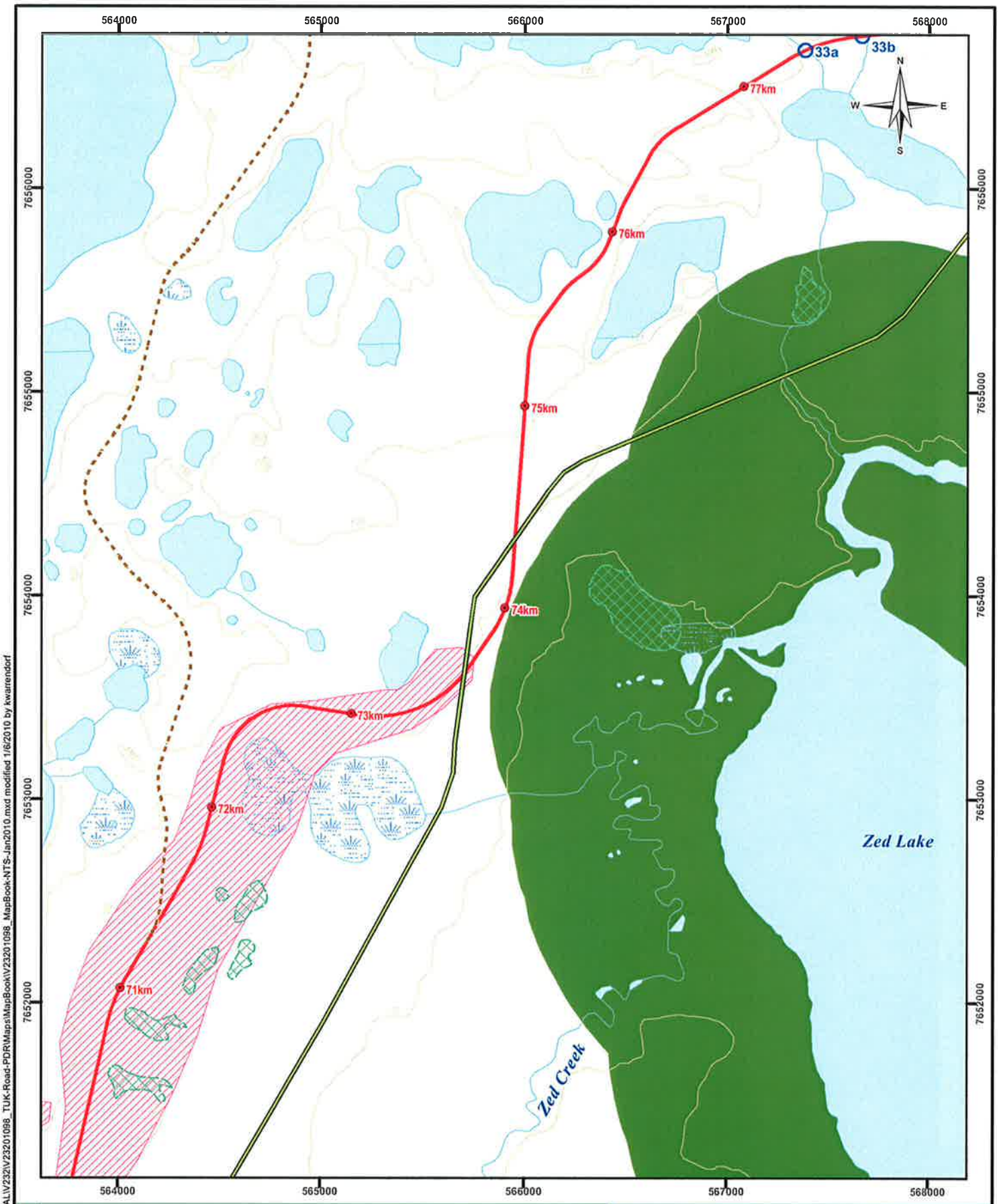

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Map 14

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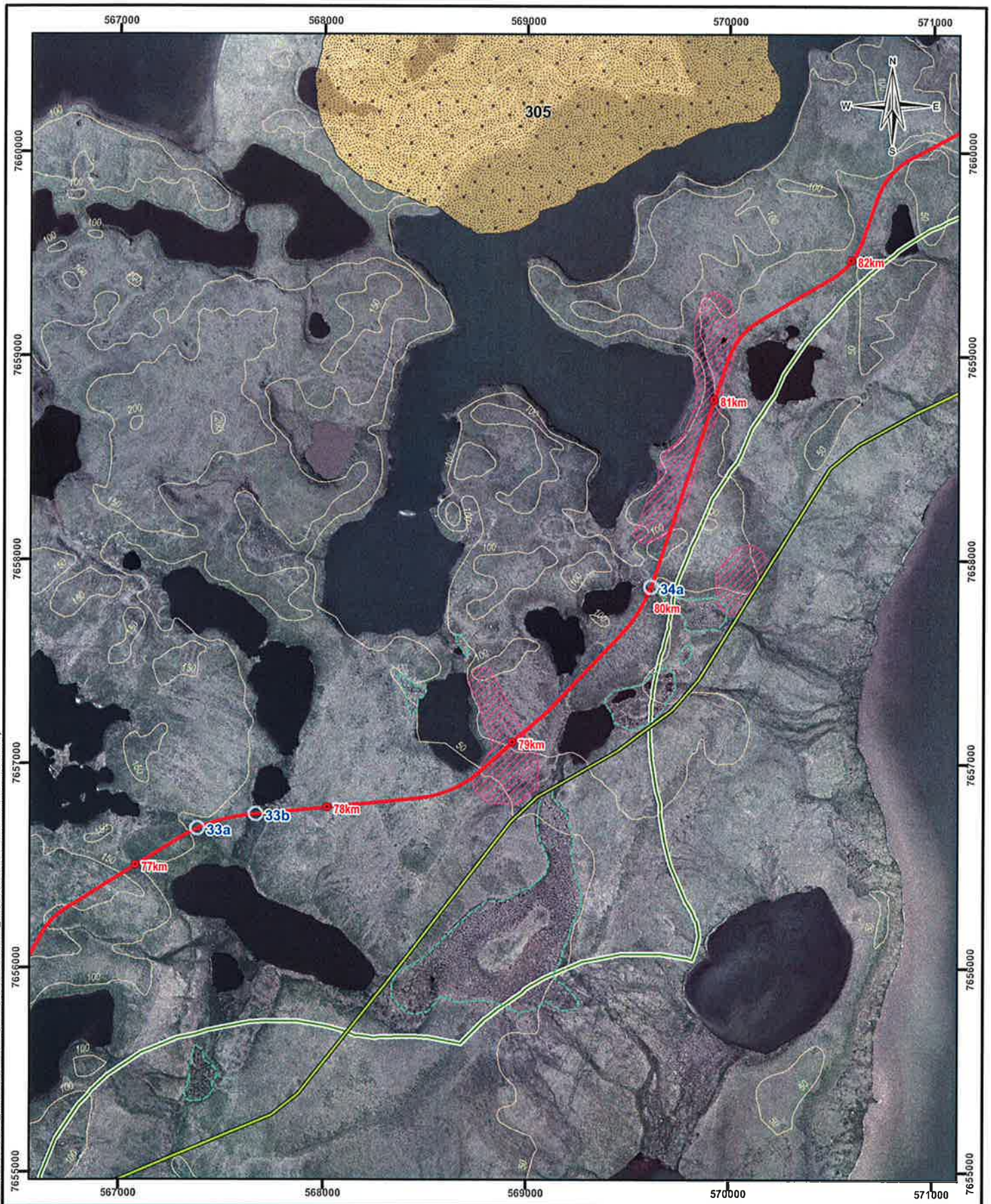

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Map 15

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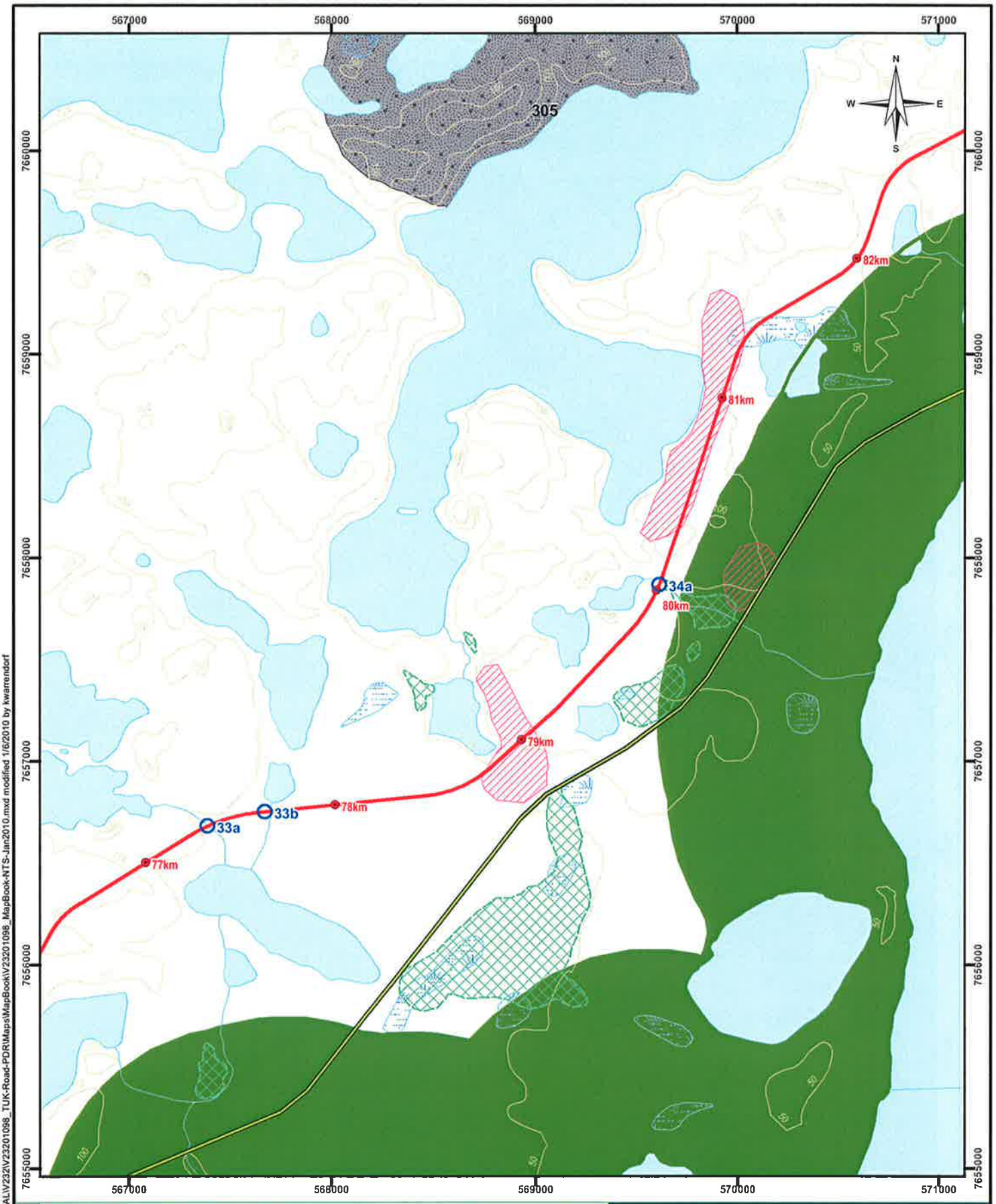

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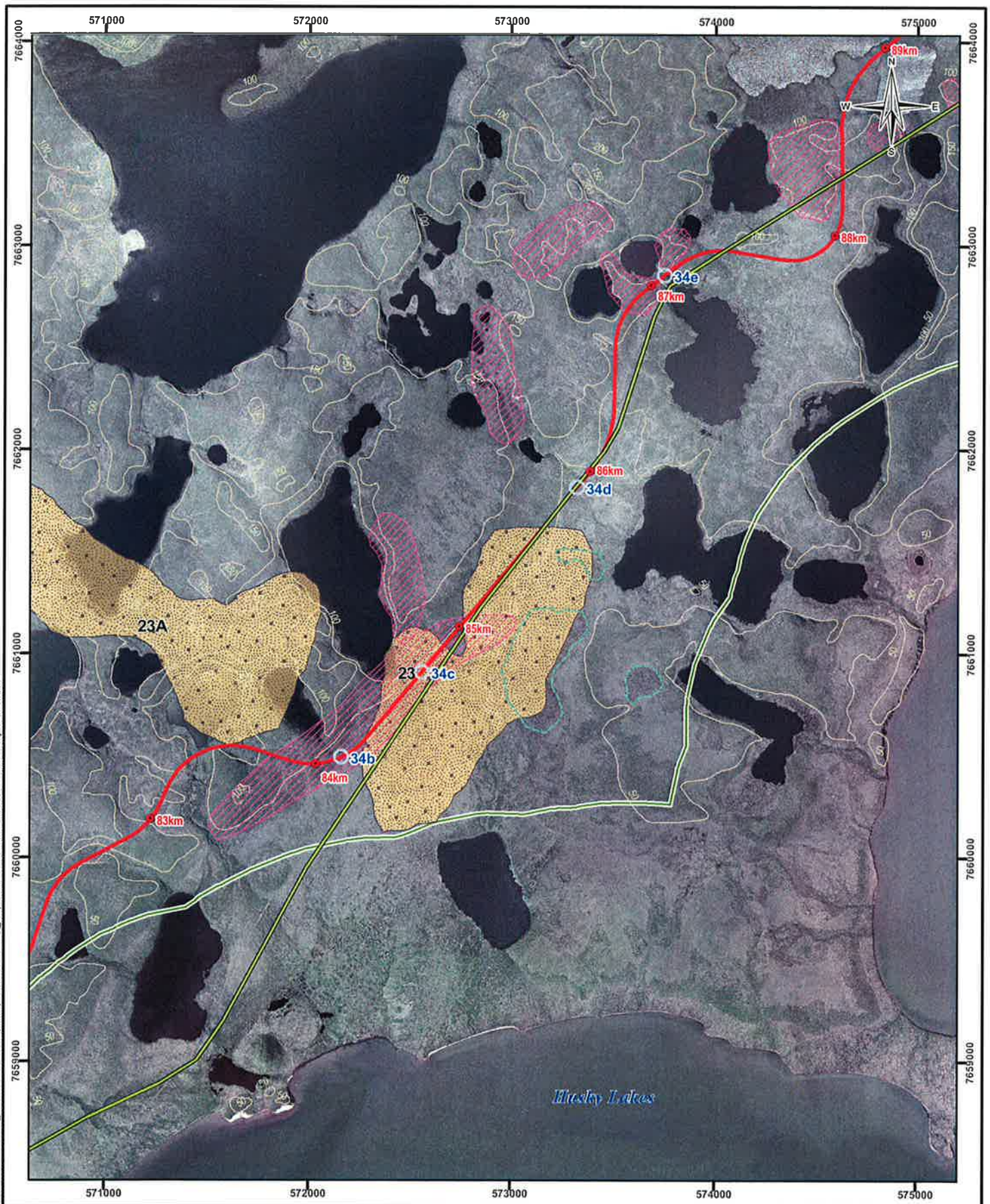
Map 15



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UTM Zone 8
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Northwest Territories

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Map 16

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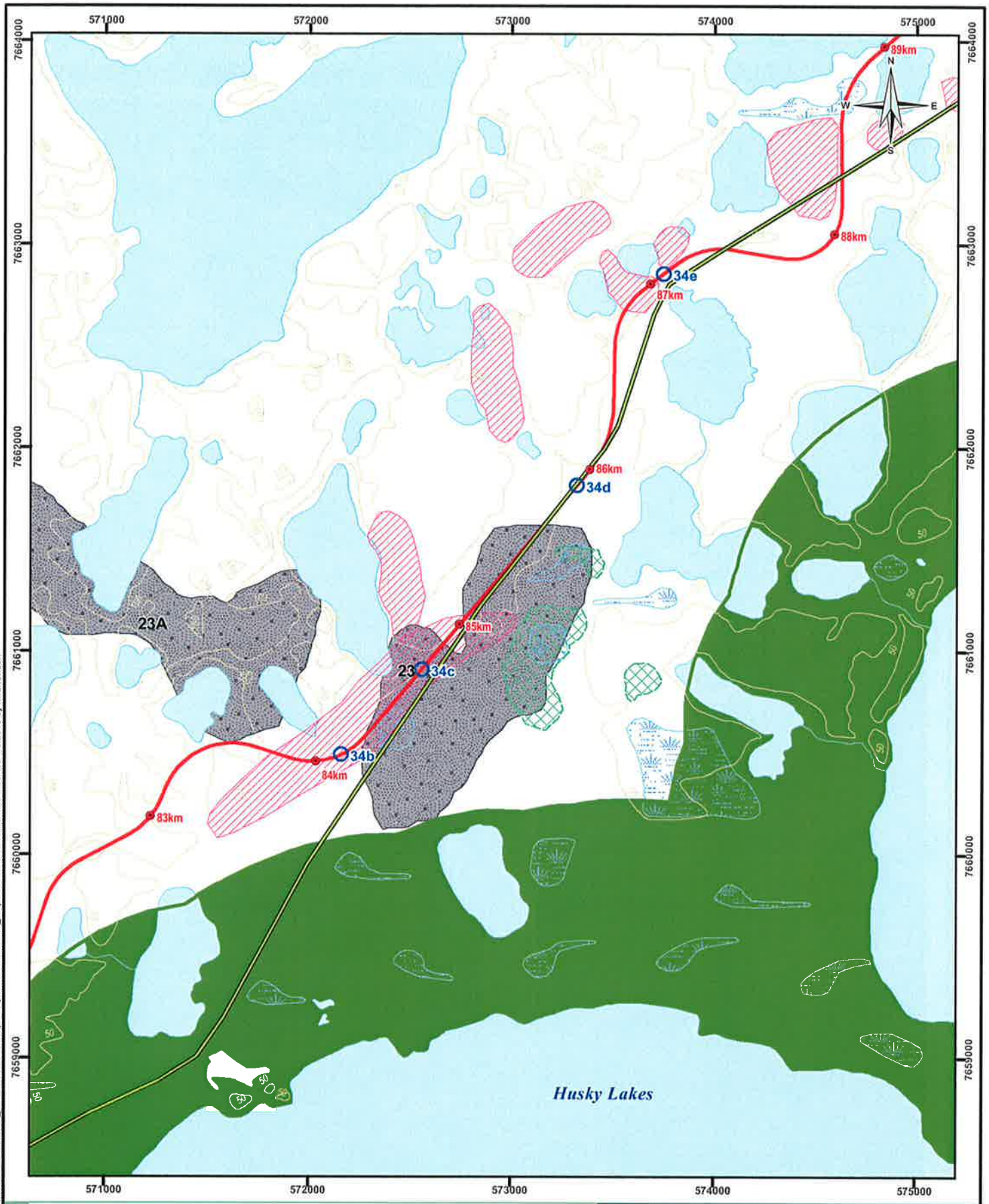

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UTM Zone 8
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Northwest Territories

KIGGIAK - EBA

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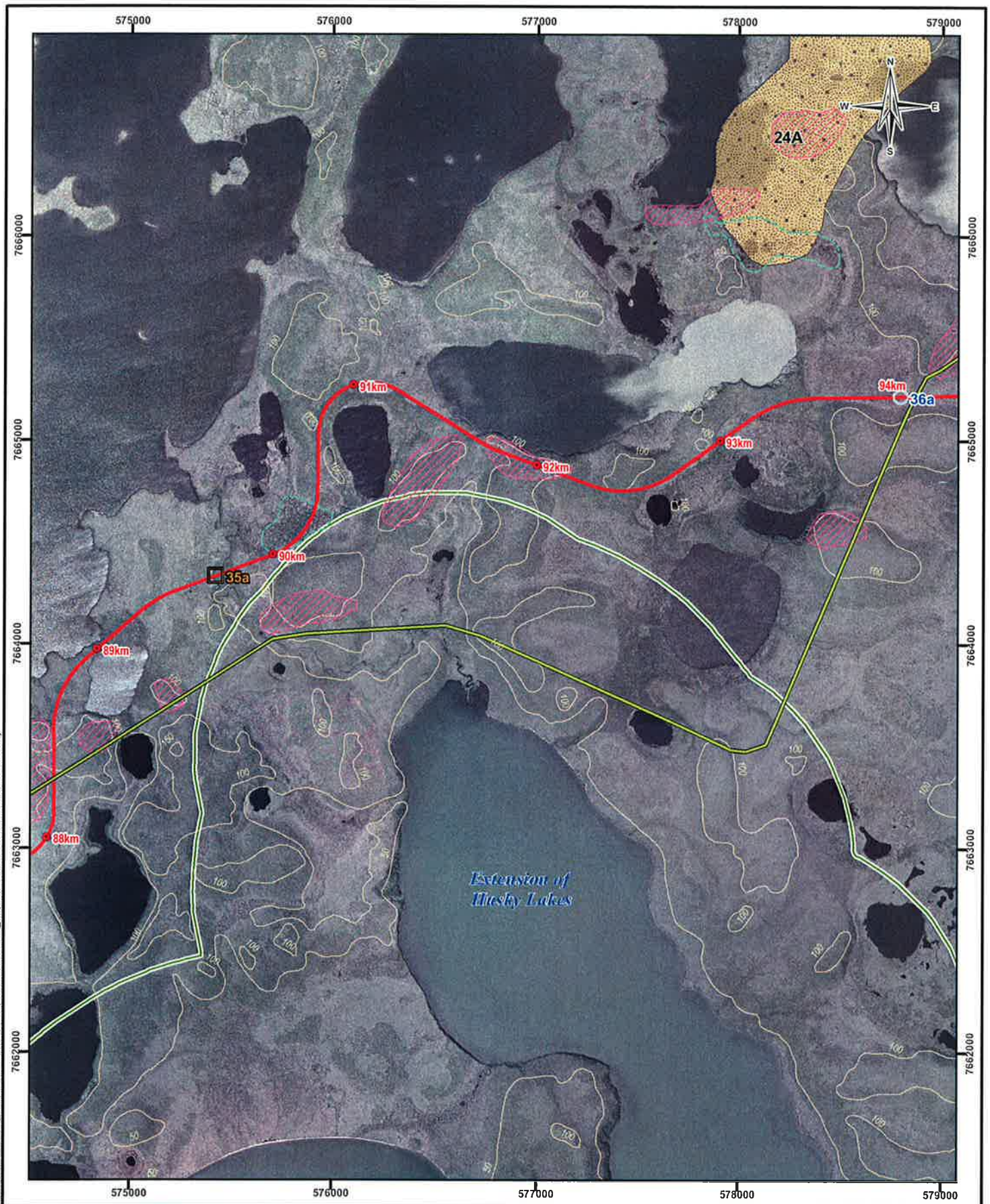

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Northwest Territories

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Map 17

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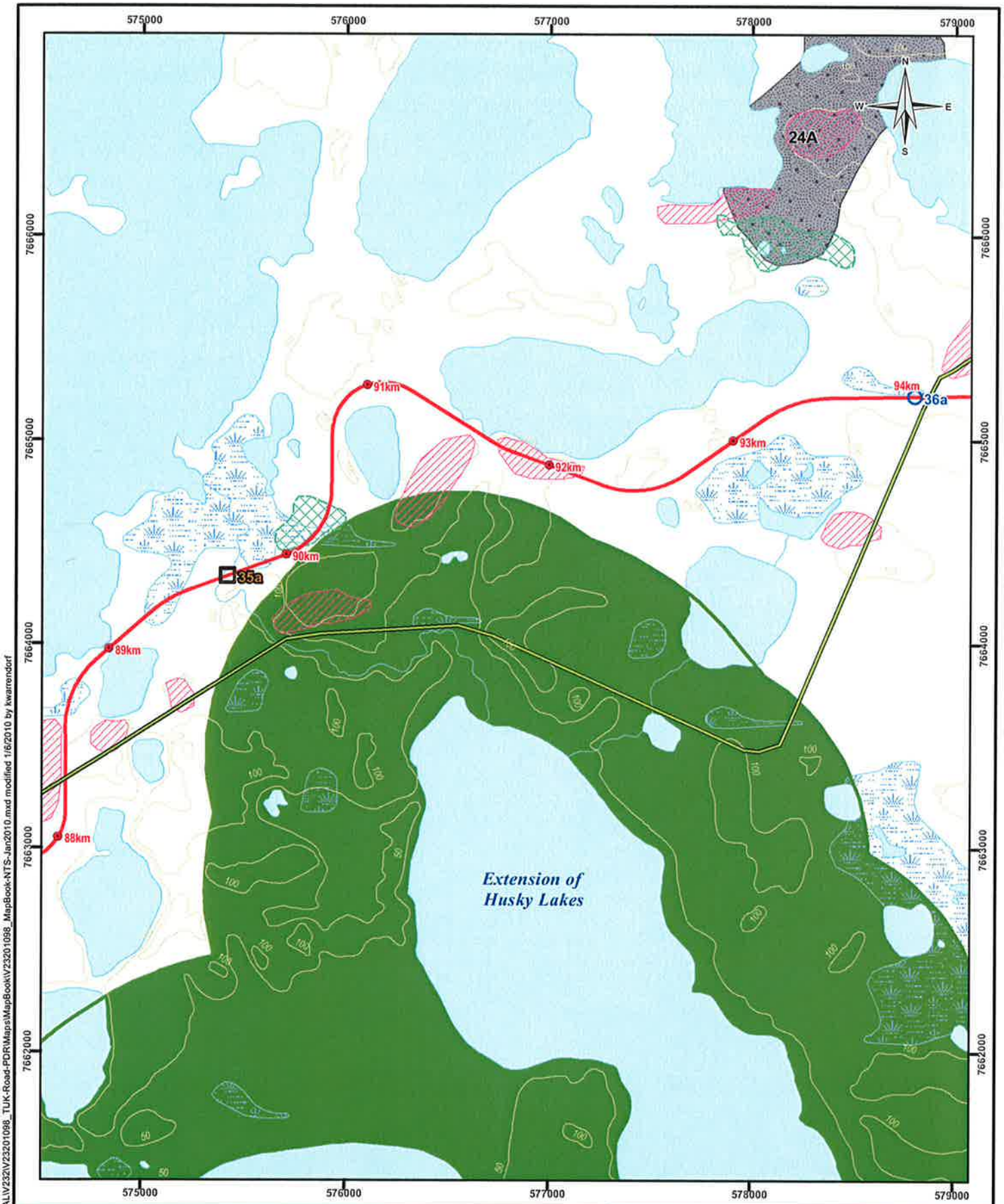

Legend

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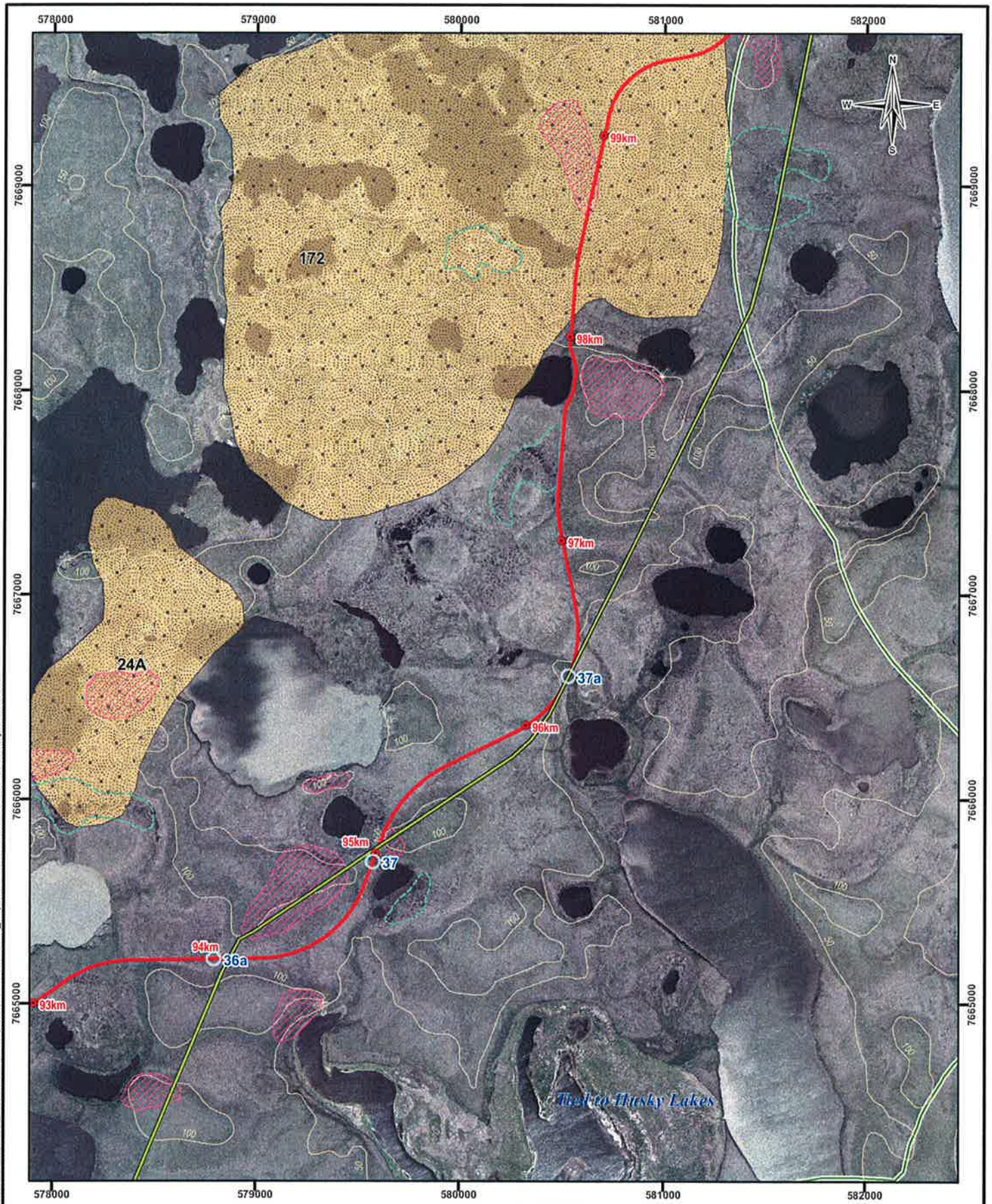

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Northwest Territories — KIGGIAK - EBA

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Map 18

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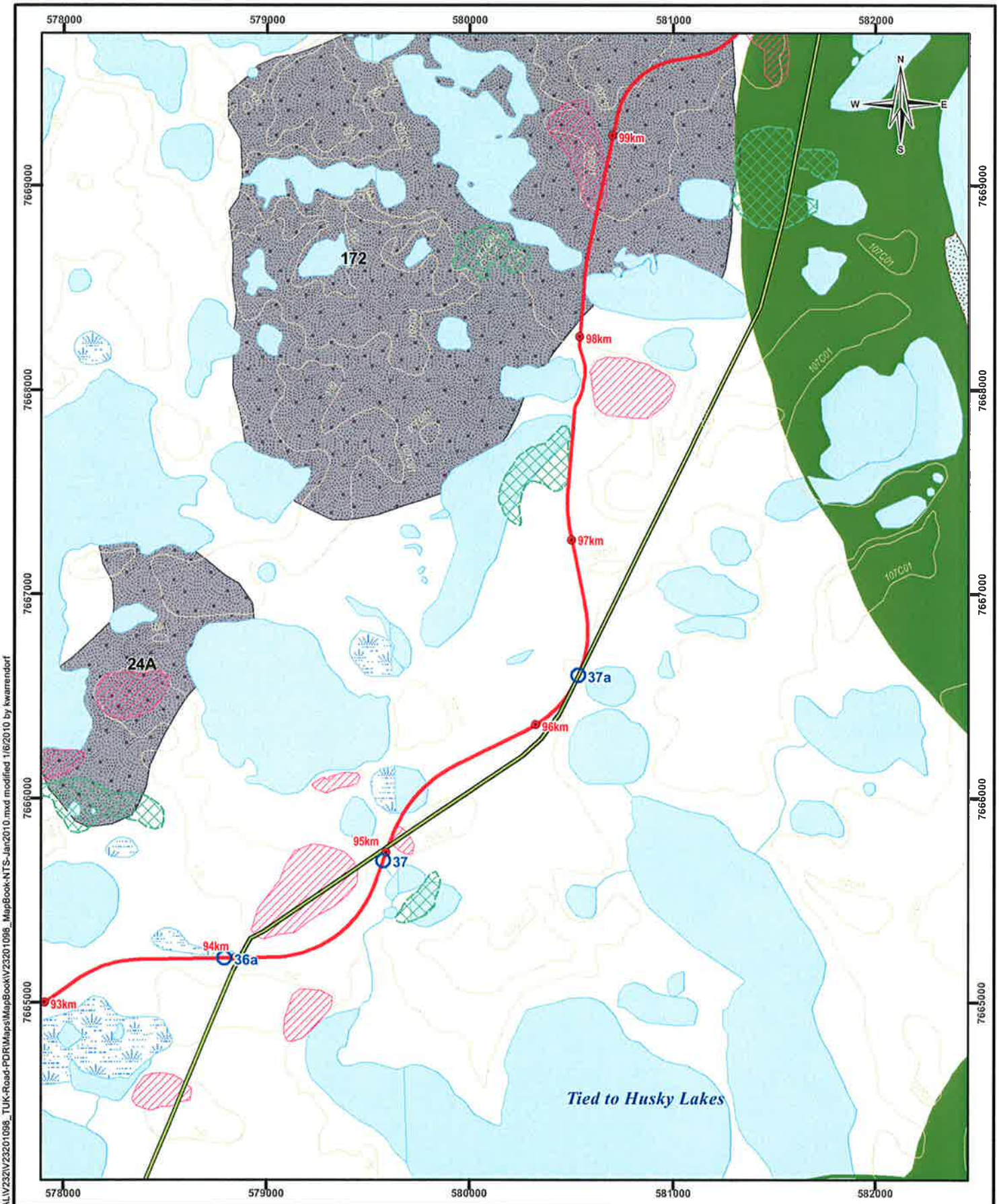

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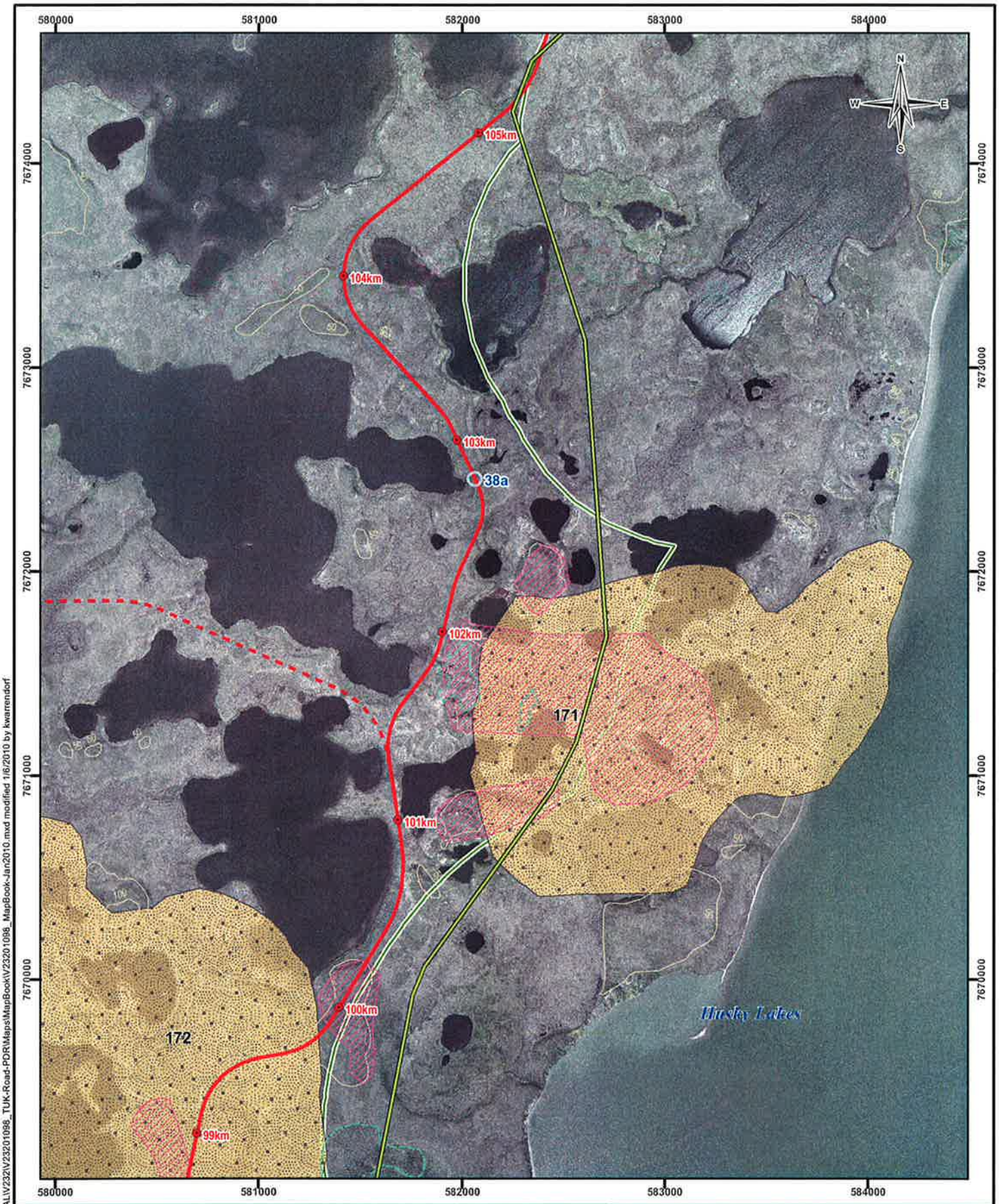

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Map 19

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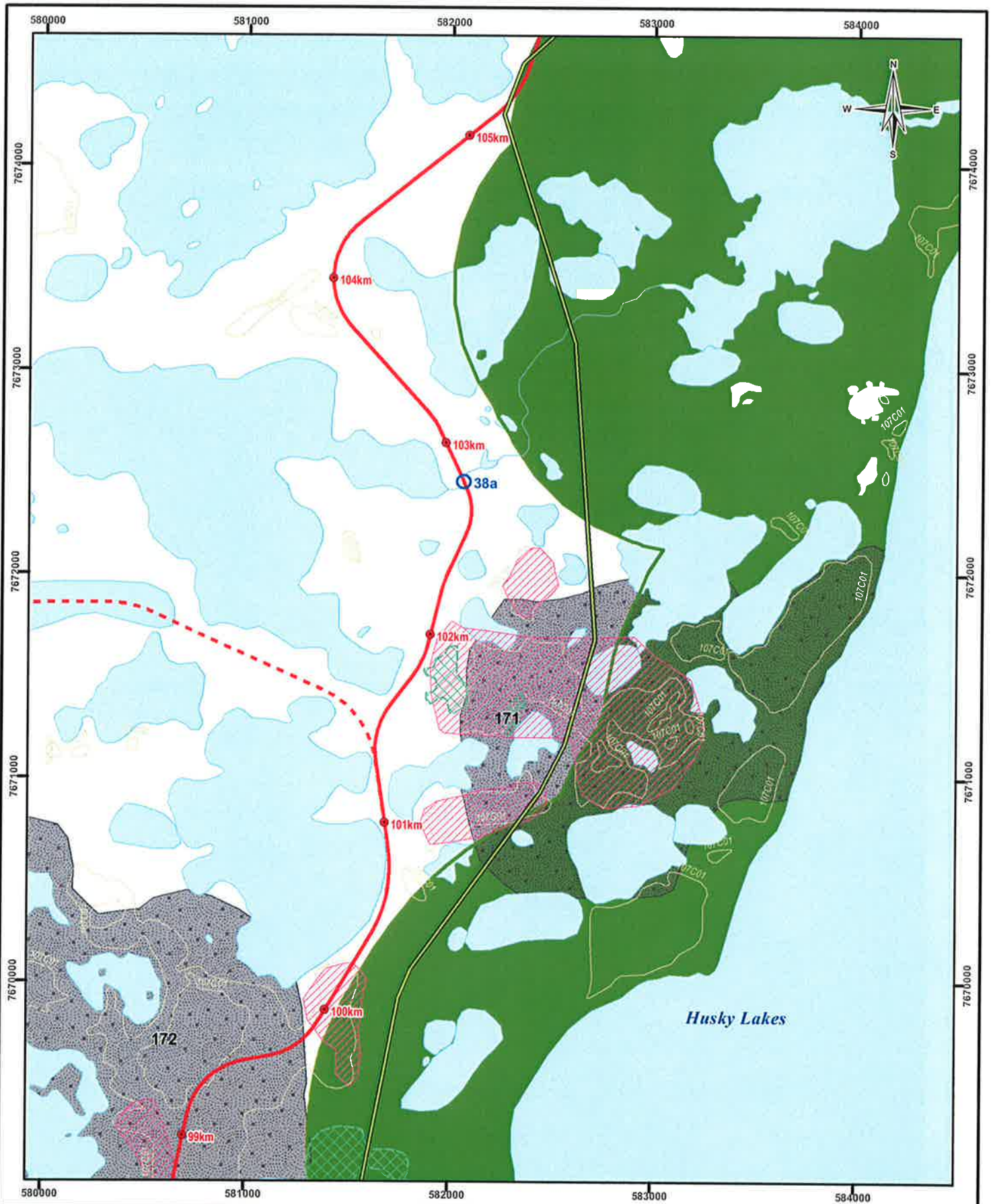

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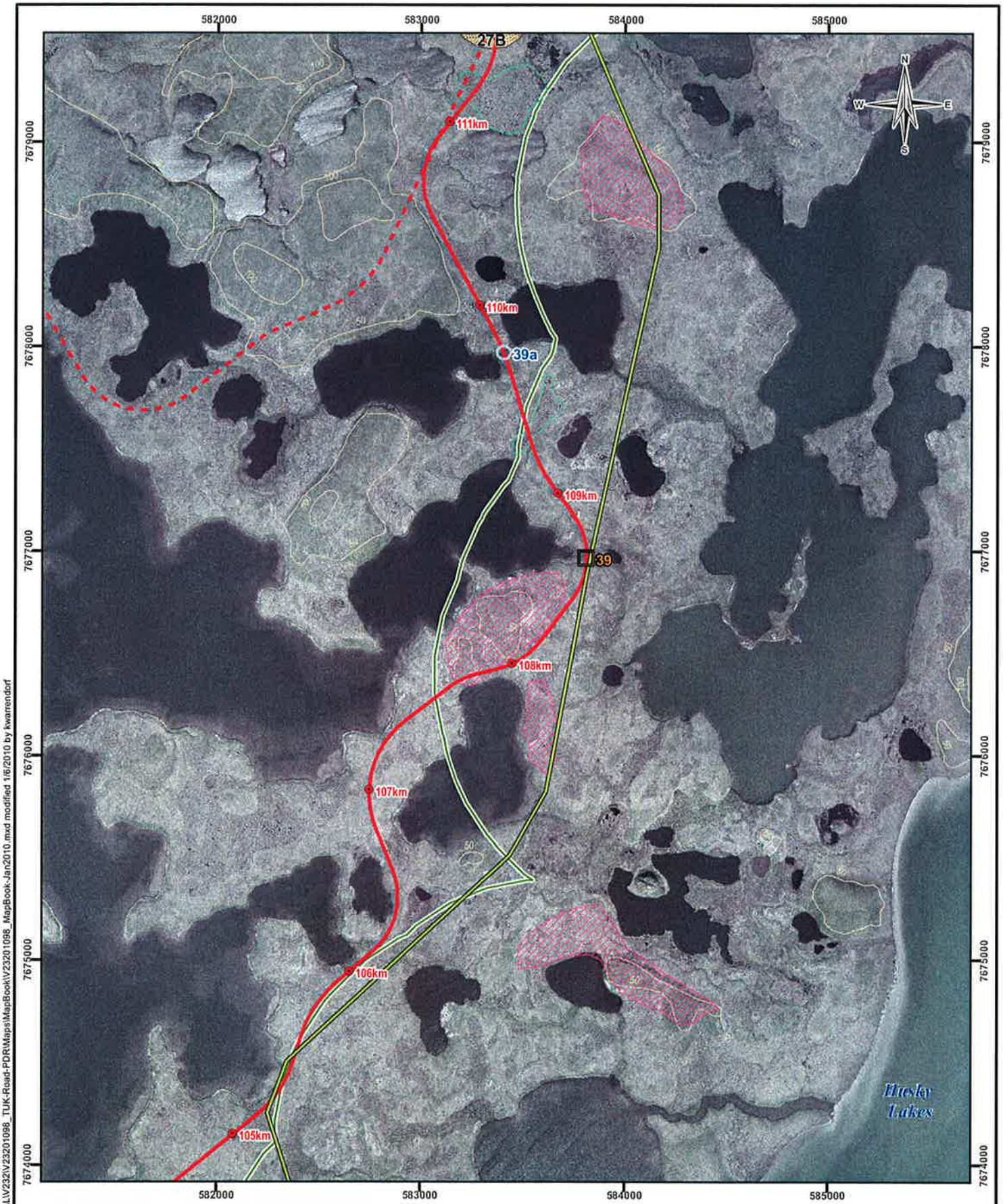

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Map 20

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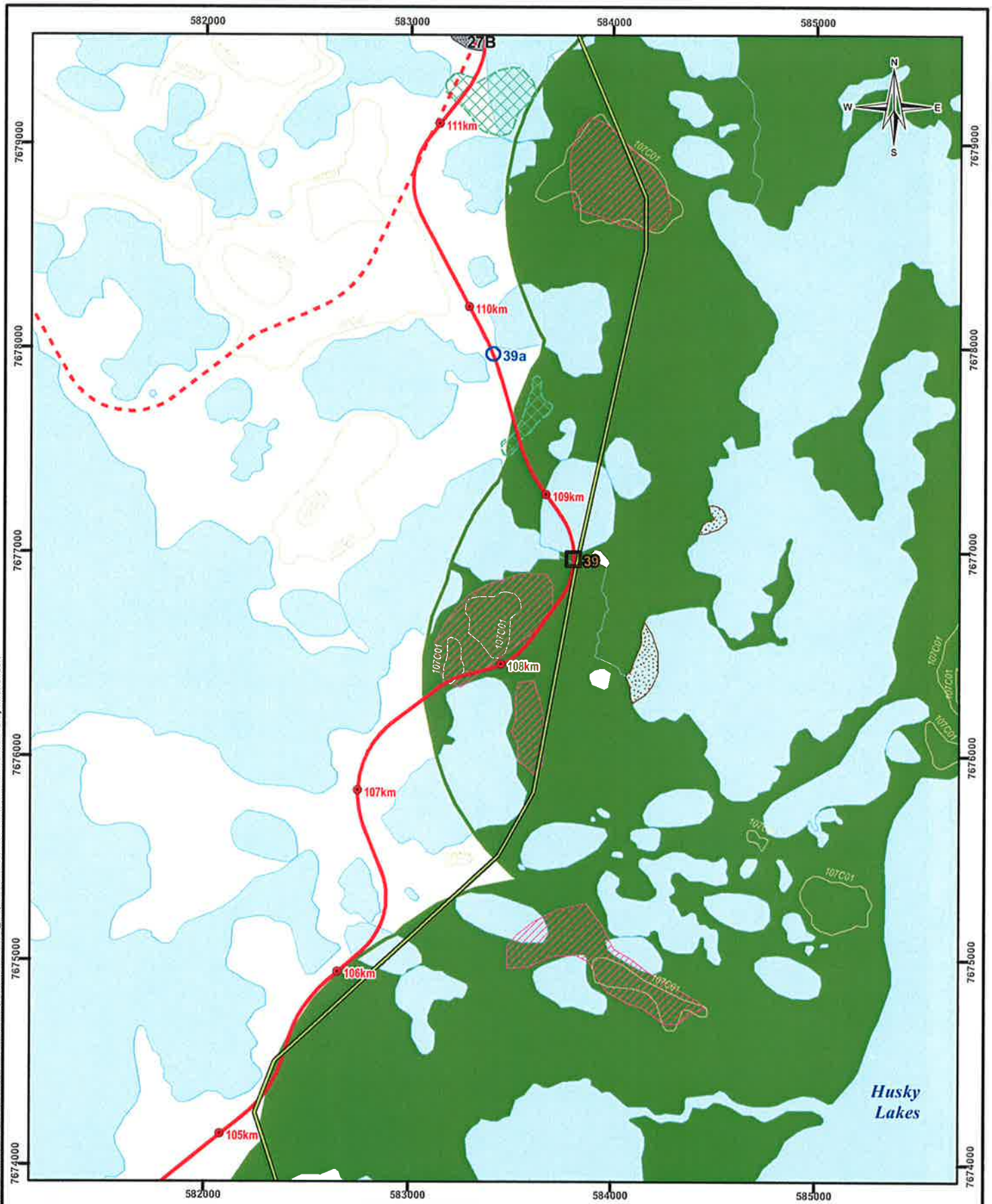

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Map 20

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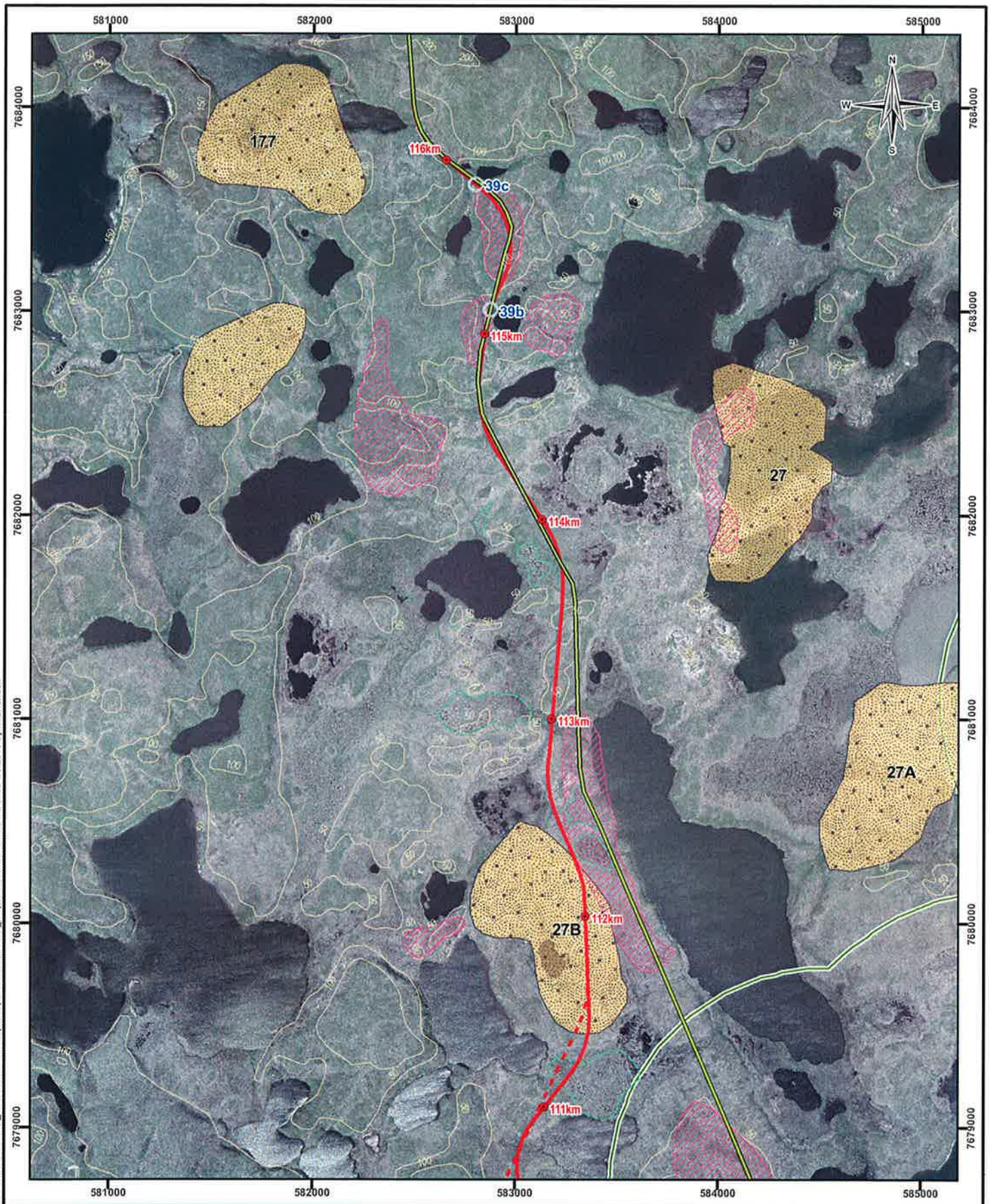

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1:25,000 Map Book

Legend

- Grizzly Bear Den
- Stream Crossing (10 — Crossing #)
- Stream Crossing - Potential Bridge
- 2009 Route
- Other Alignments Considered
- Upland Route
- PWC 1977
- Navy Road
- Contour
- Borrow Sources
- Archaeology Areas of Interest
- Ice-Rich Polygons
- Grizzly Bear Hibernation Zone
- Twin Otter Strip
- Husky Lakes 1000m Setback

Scale: 1:25,000
1050 0 100 200 300 400 500 m

UTM Zone 8
NAD83

Northwest Territories

KIGGIAK - EBA

FILE NO. V23201098_MapBook-Jan2010.mxd
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Map 21

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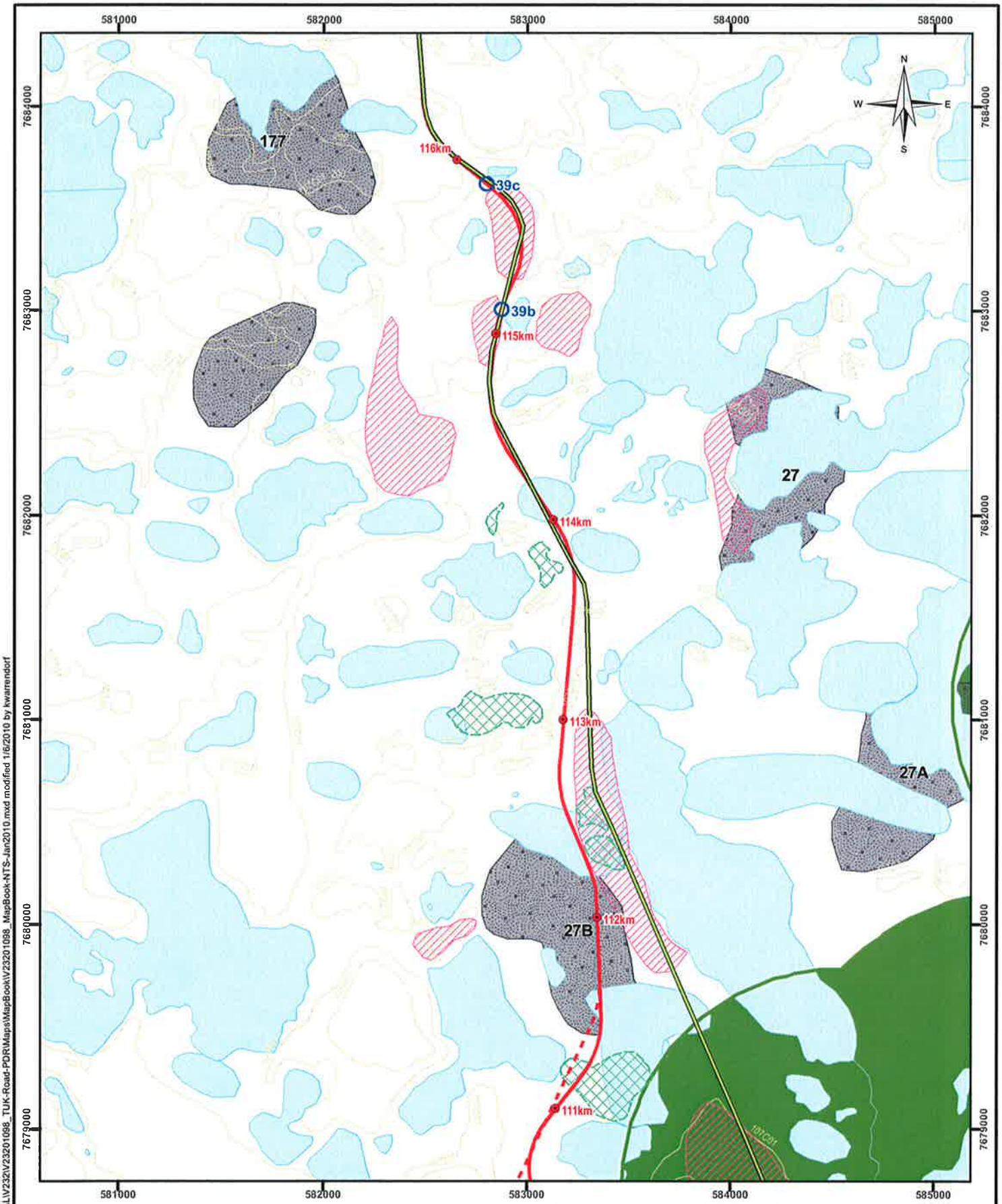

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1:25,000 Map Book

Legend

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1000 0 100 200 300 400 500 m

UTM Zone 8
NAD83

Northwest Territories

KIGGIAK - EBA

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Map 21

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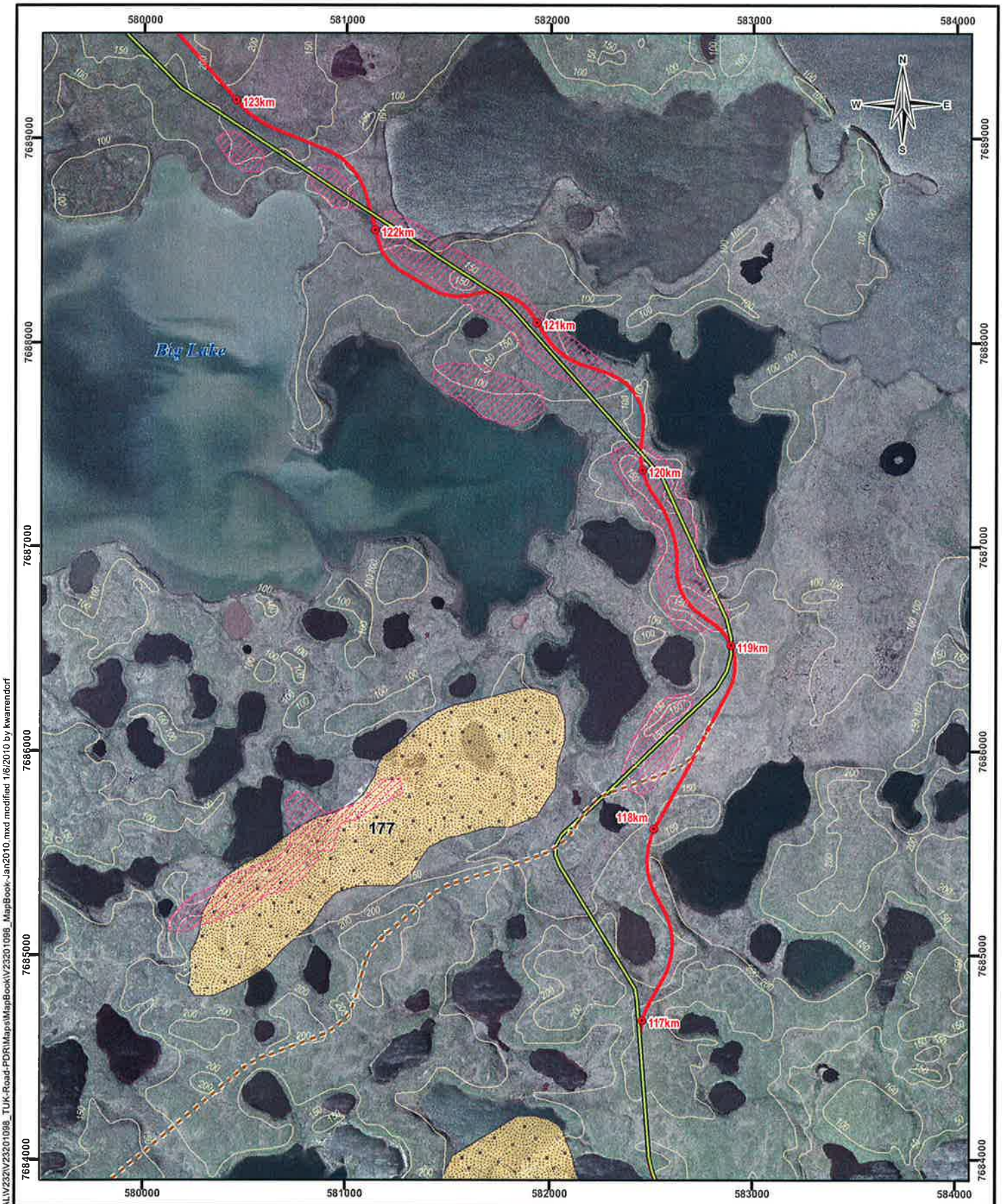

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1:25,000 Map Book

Scale: 1:25,000
1000 0 100 200 300 400 500 m

UTM Zone 8
NAD83

Northwest Territories | KIGGIAK - EBA

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Map 22

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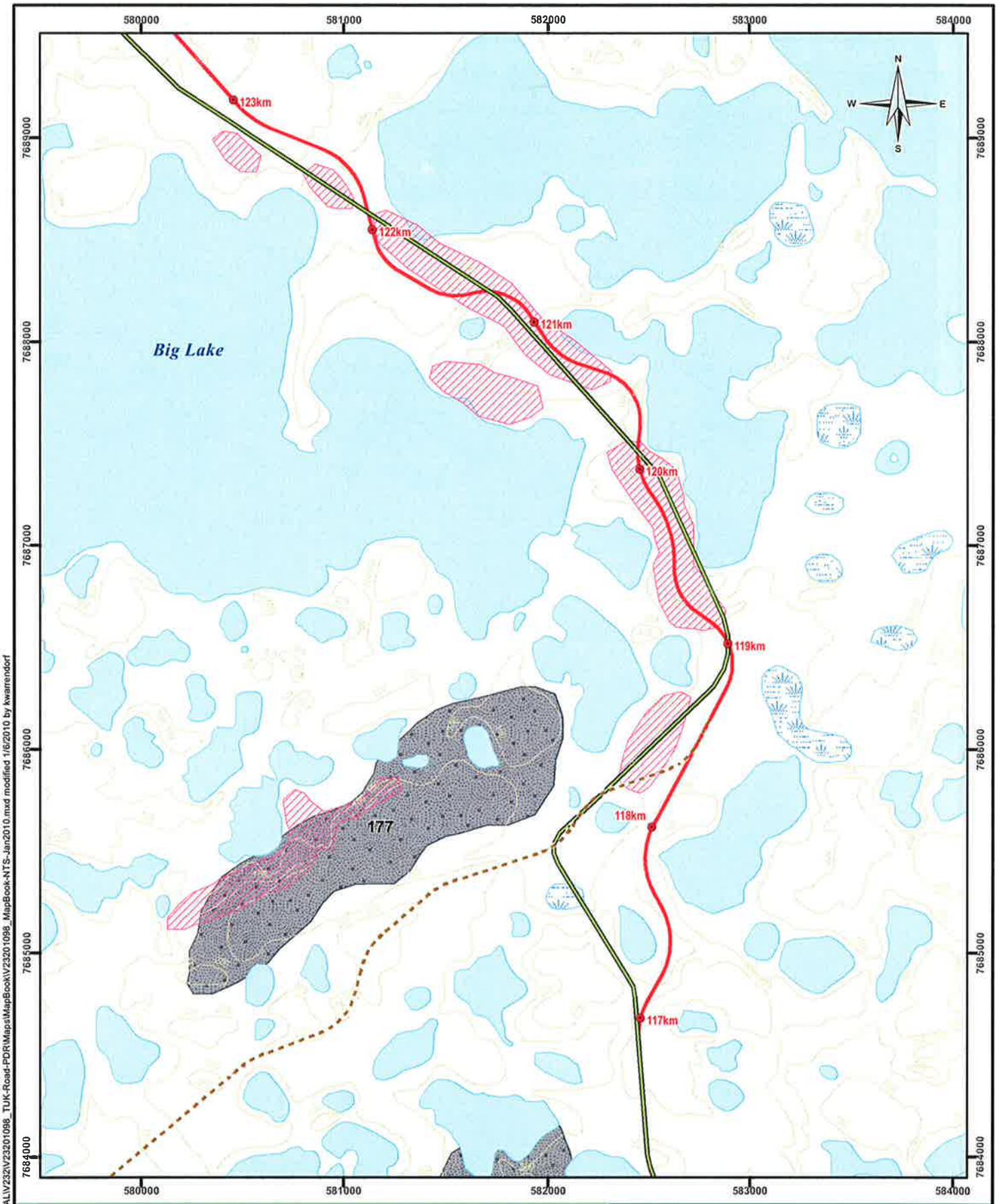

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1:25,000 Map Book

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Scale: 1:25,000

1050 0 100 200 300 400 500 m

UTM Zone 8
NAD83

Northwest Territories

KIGGIAK - EBA

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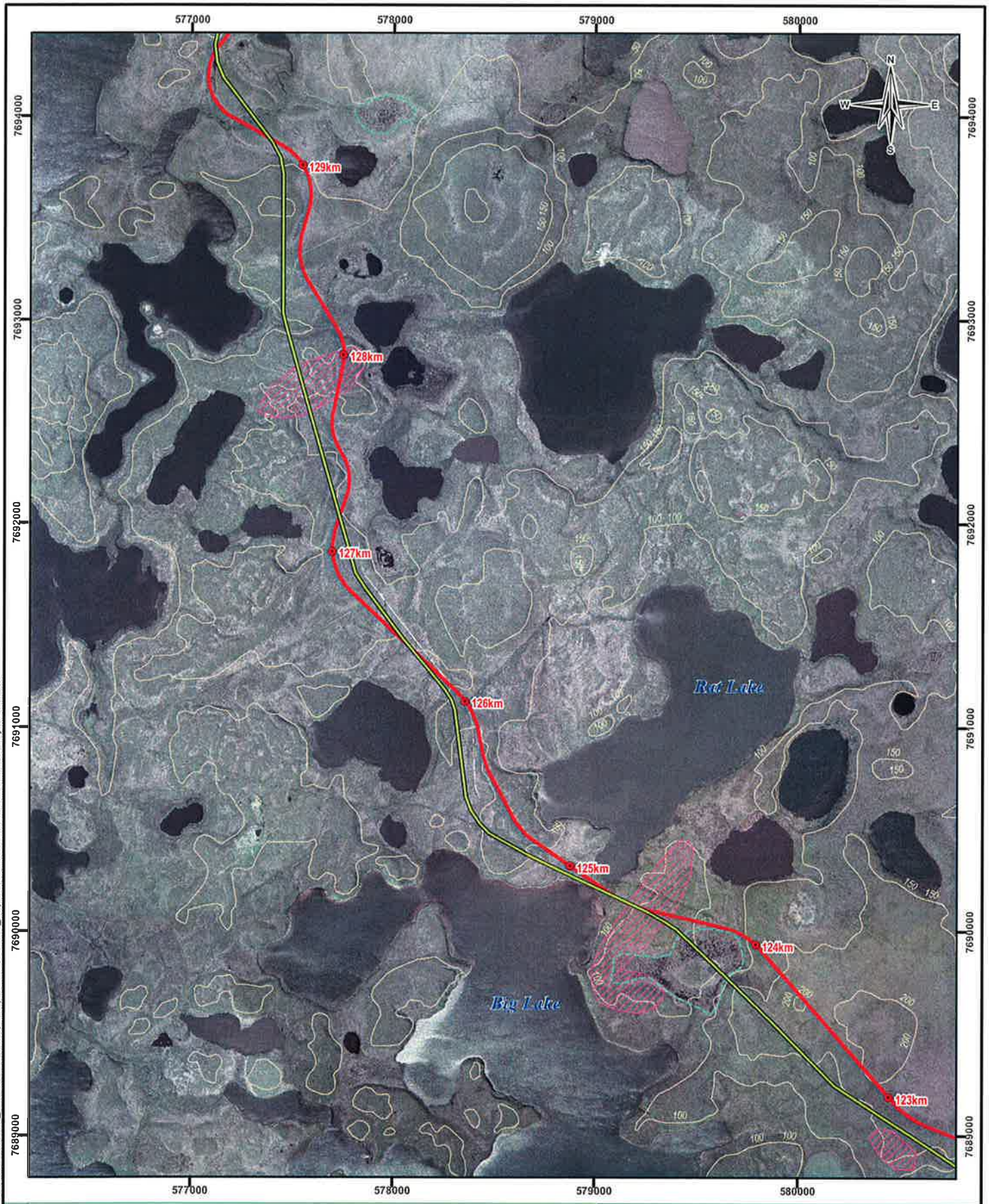
Map 22



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UTM Zone 8
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Northwest Territories — KIGGIAK - EBA

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Map 23

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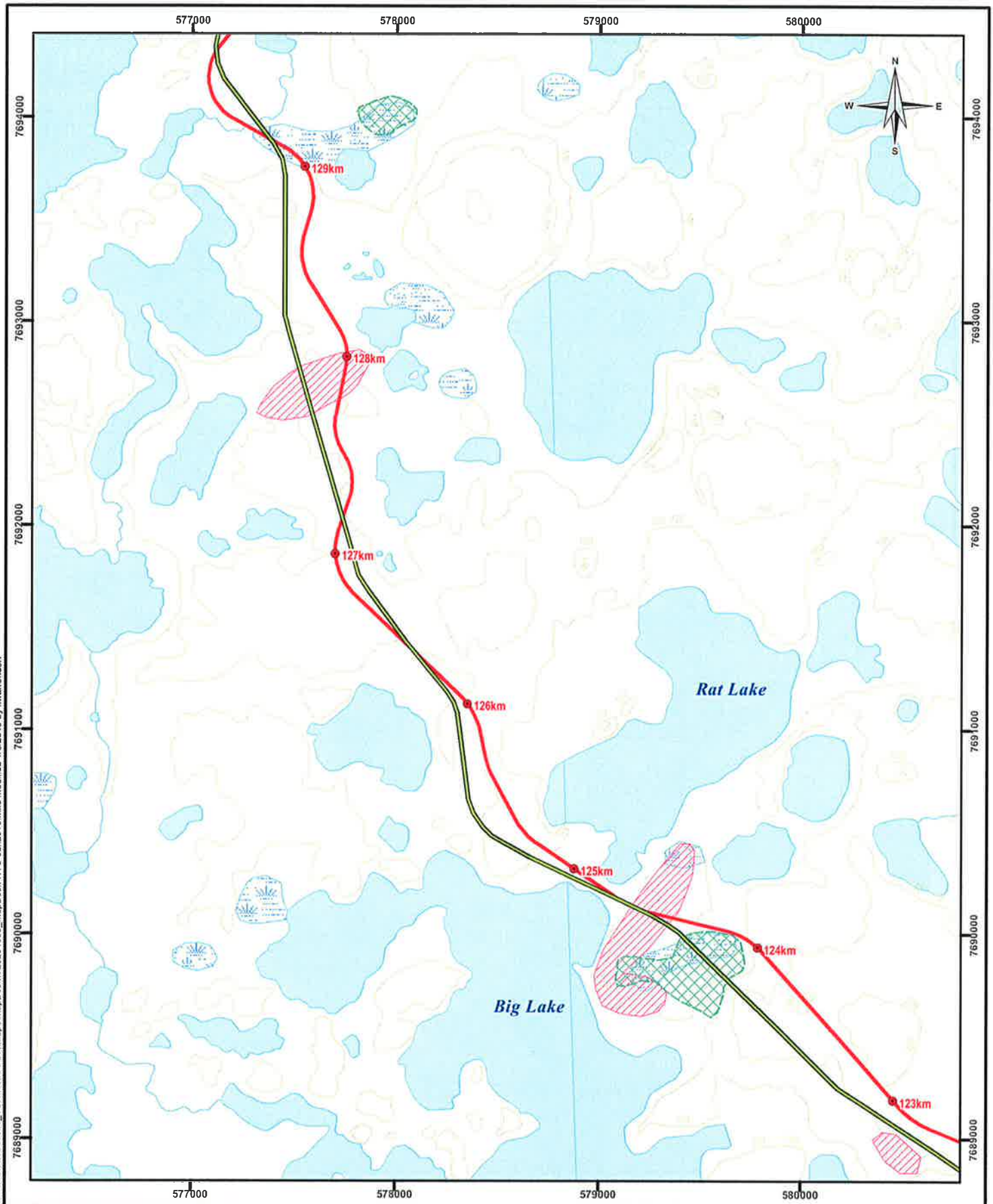

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Northwest Territories

KIGGIAK - EBA

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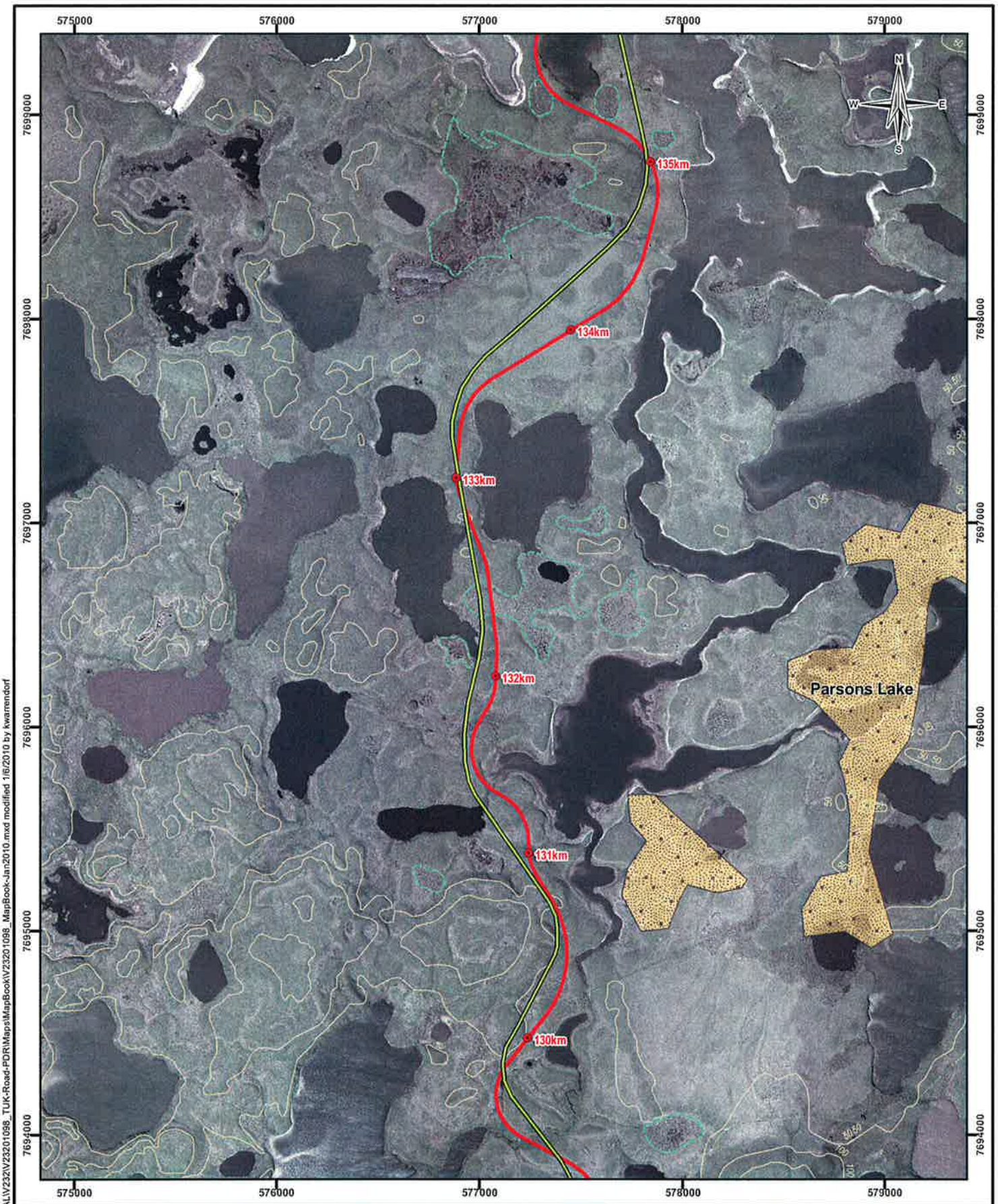

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UTM Zone 8
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Northwest Territories

KIGGIAK - EBA

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Map 24

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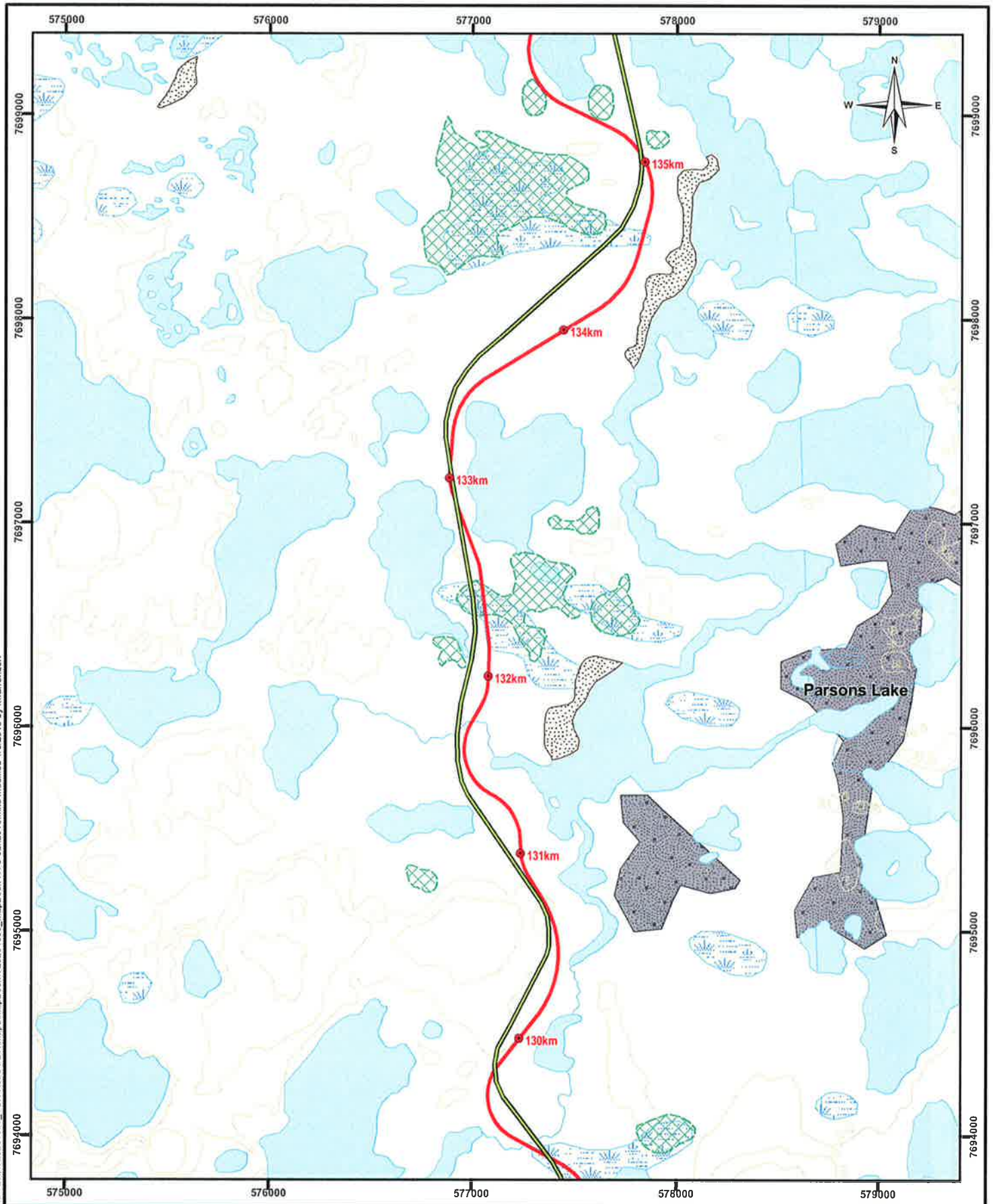

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Legend

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1:25,000 Map Book

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1000 0 100 200 300 400 500 m

UTM Zone 8
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Northwest Territories

KIGGIAK - EBA

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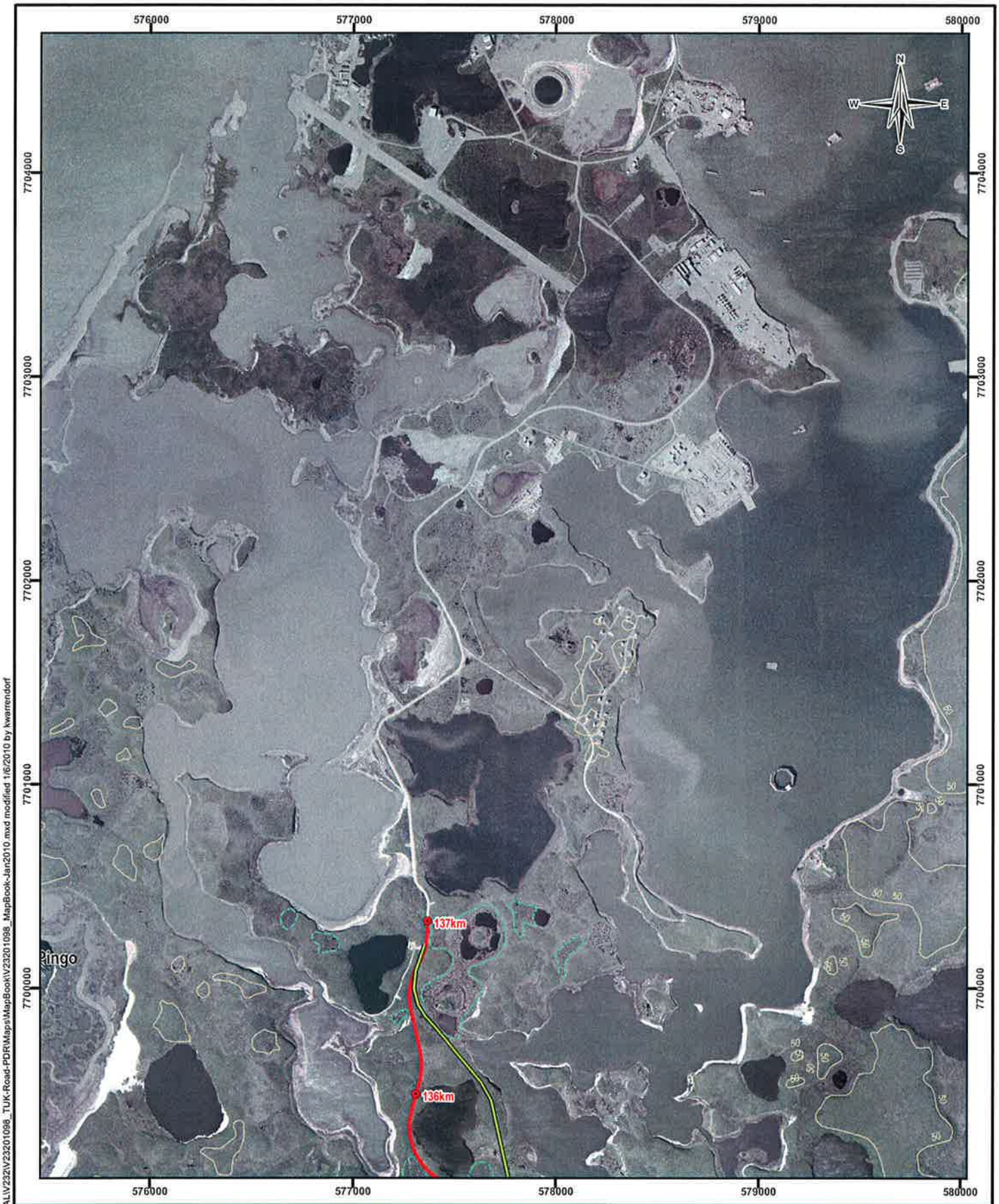
Map 24



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Map 25

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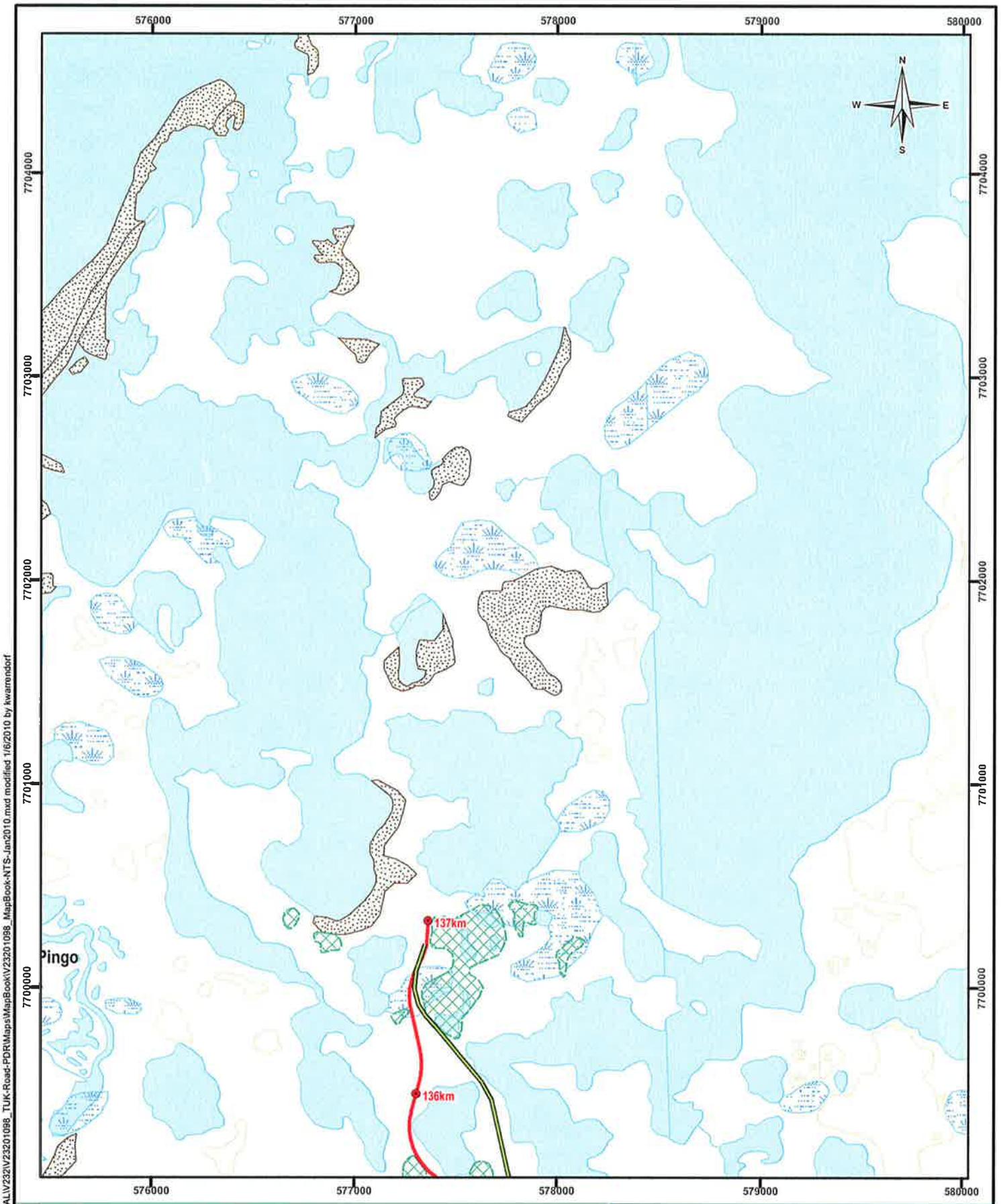

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1050 0 100 200 300 400 500 m

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Map 25

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UTM Zone 8
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Northwest Territories

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Map 26

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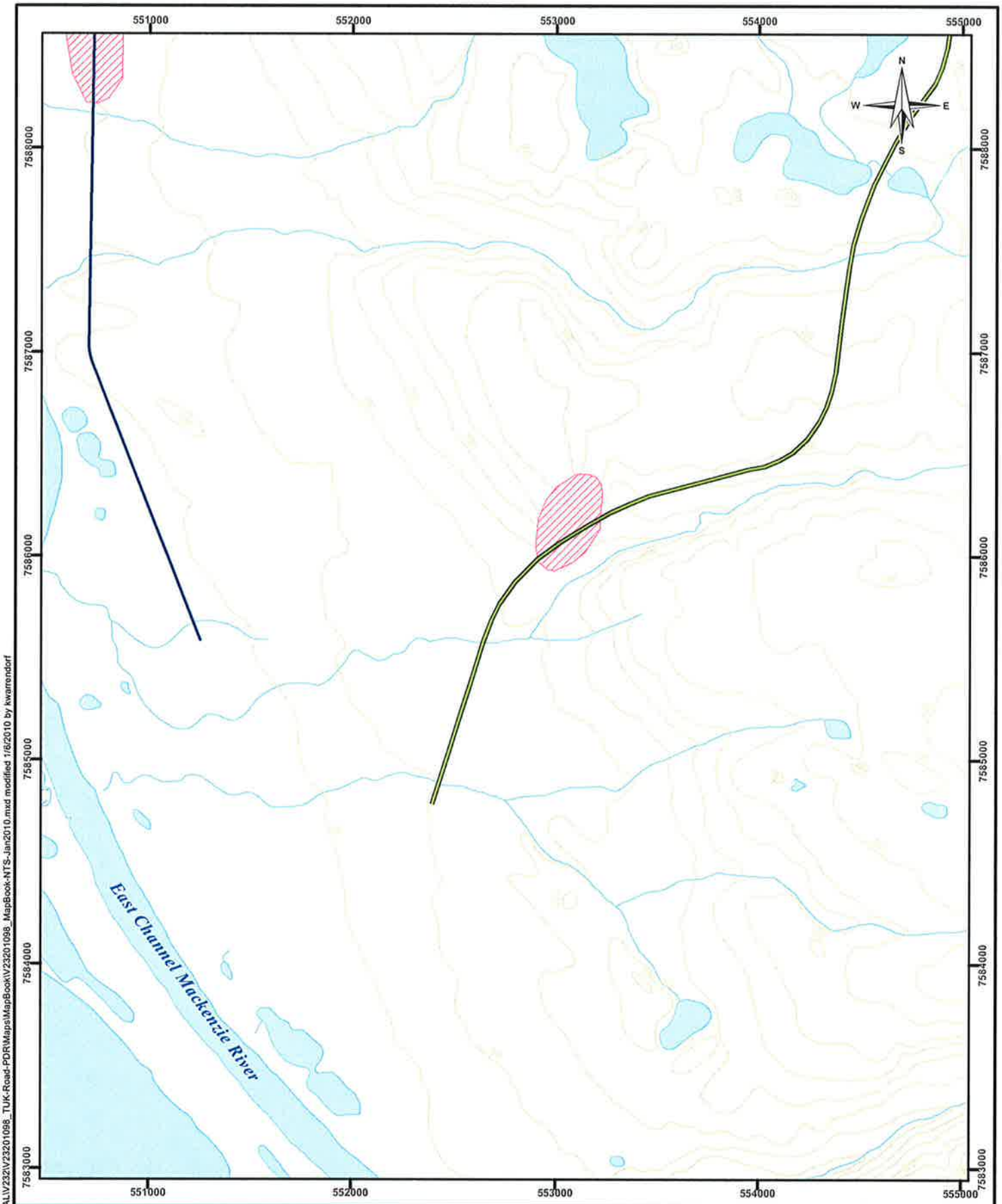

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Northwest Territories

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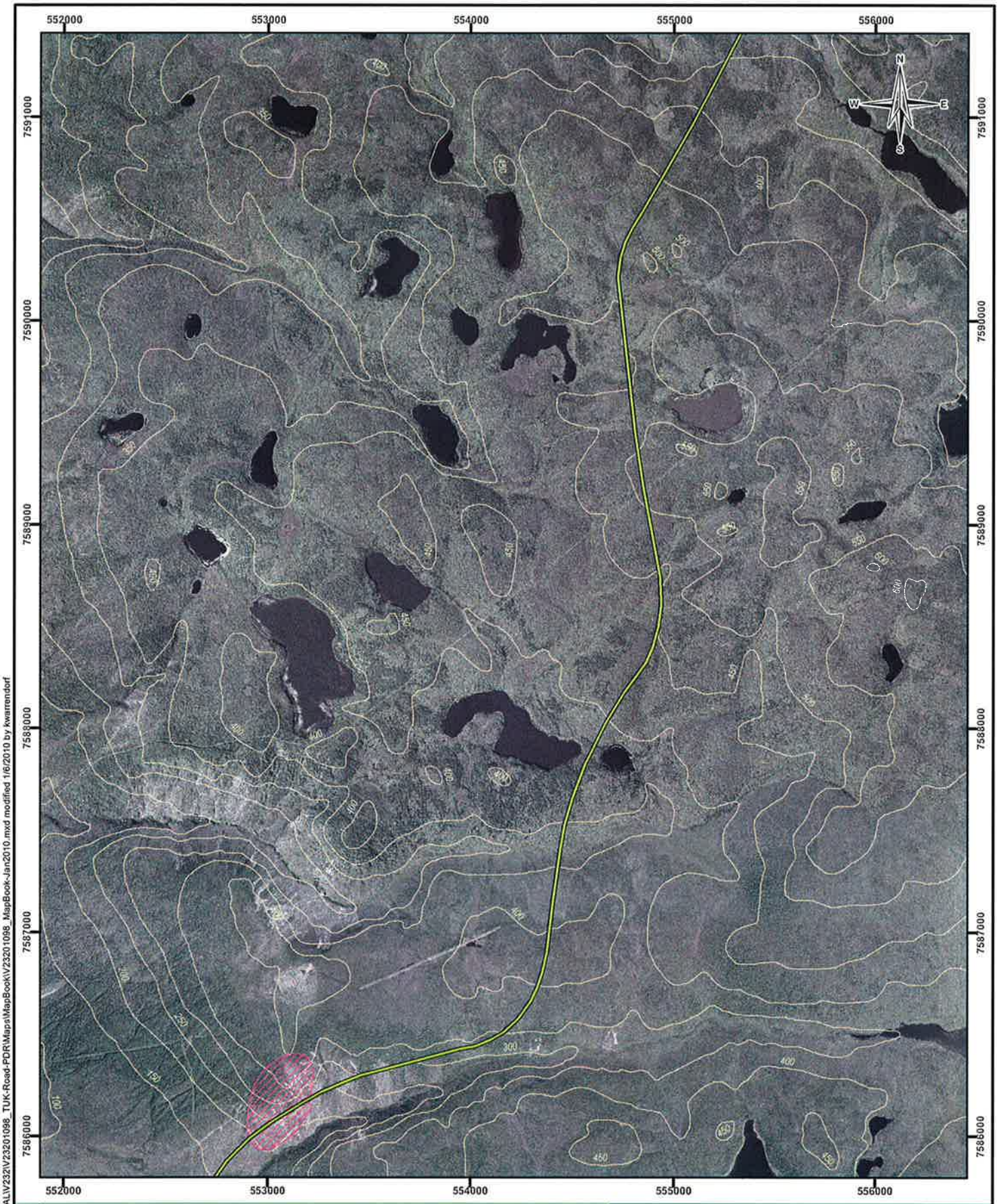
Map 26



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Northwest Territories

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Map 27

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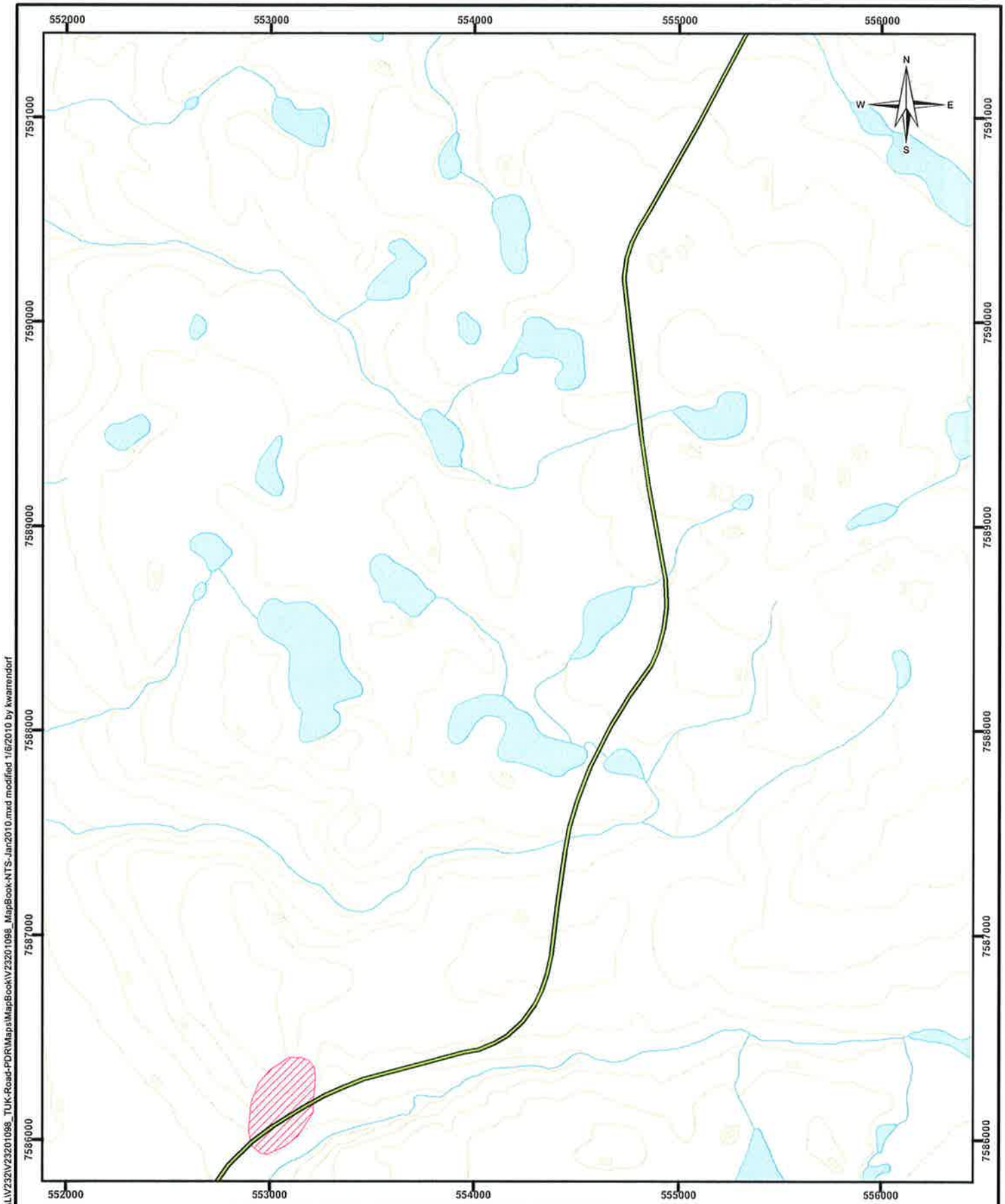

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Northwest Territories

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Northwest Territories

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Map 28

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Map 29

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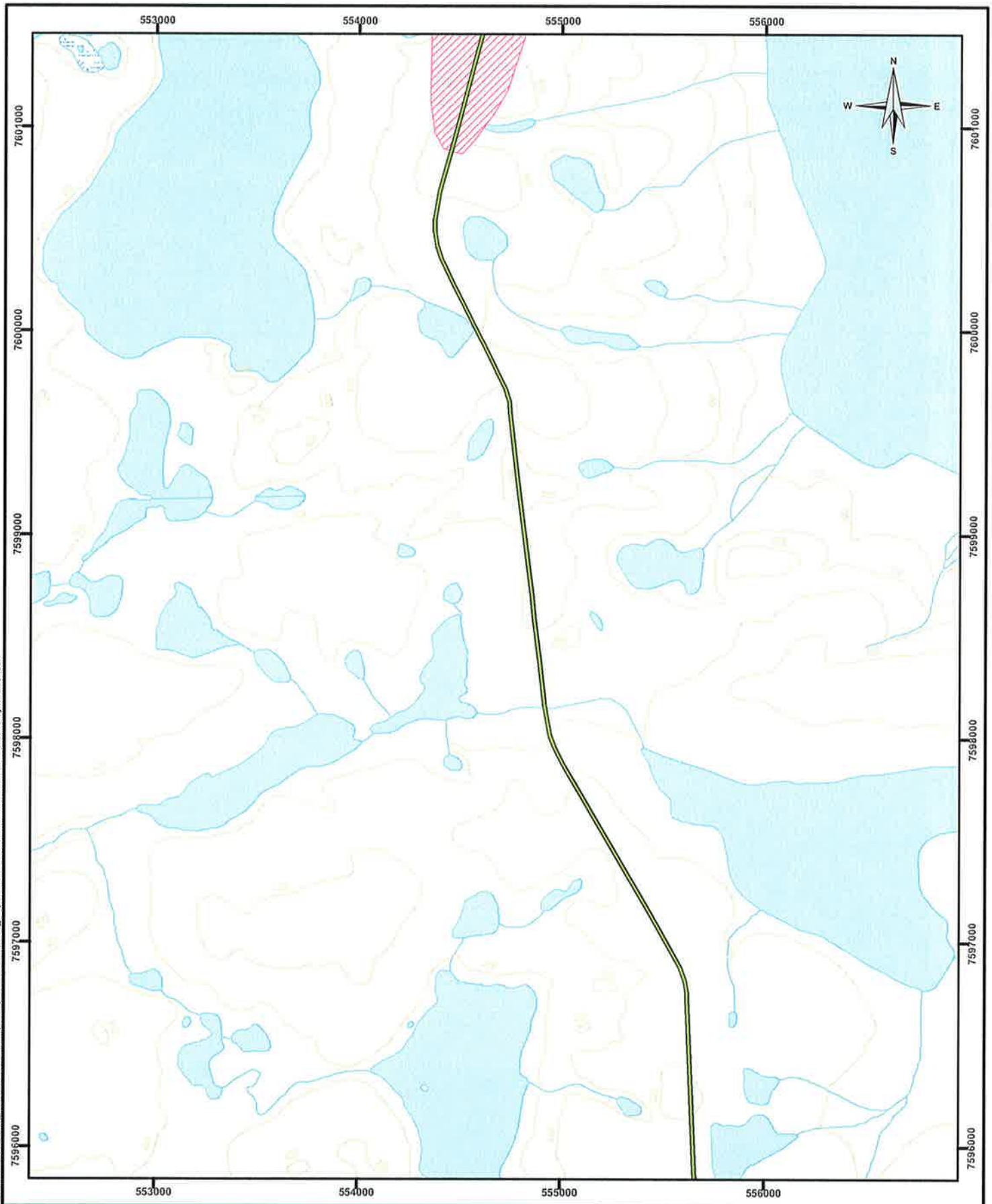

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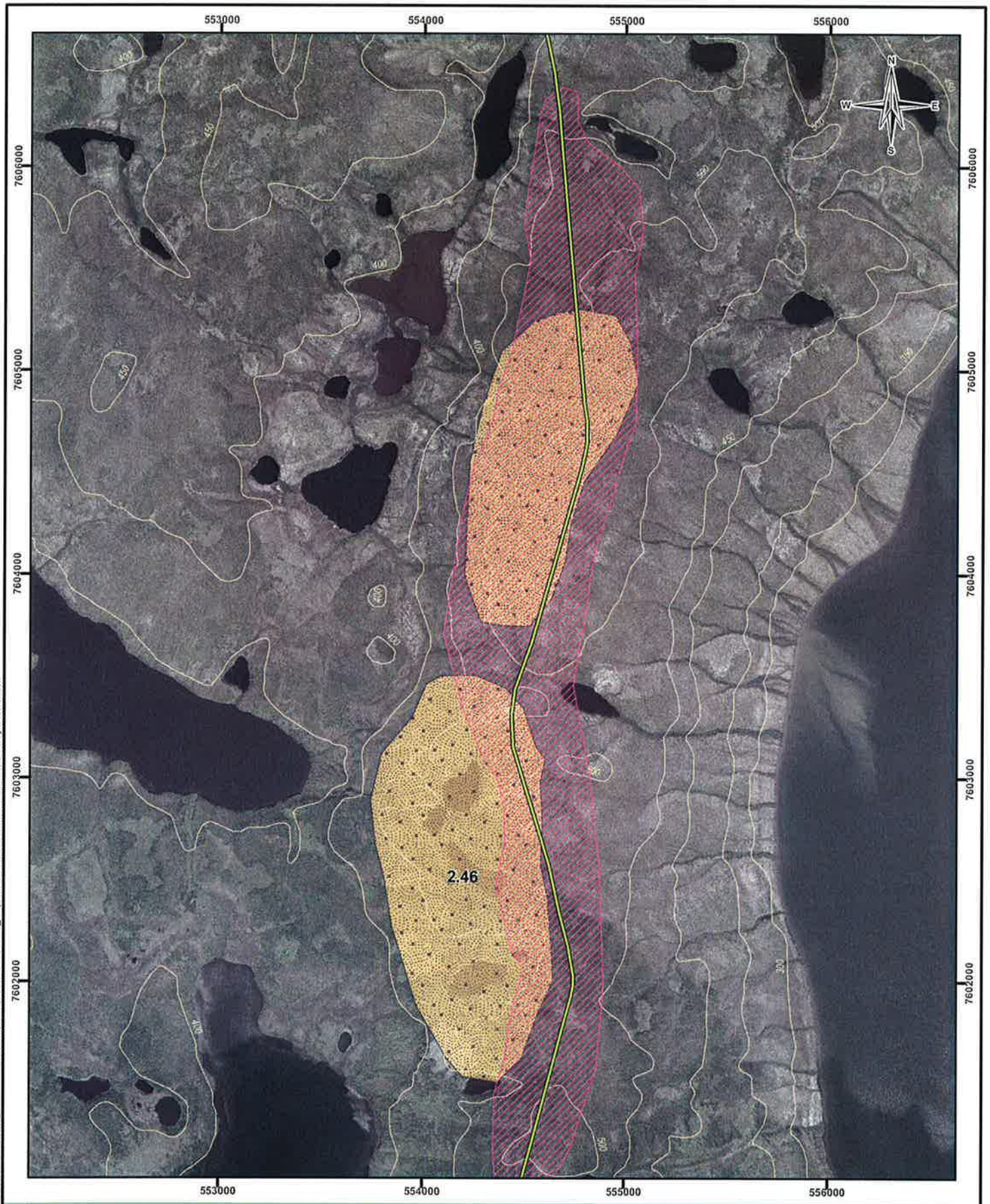

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Map 30

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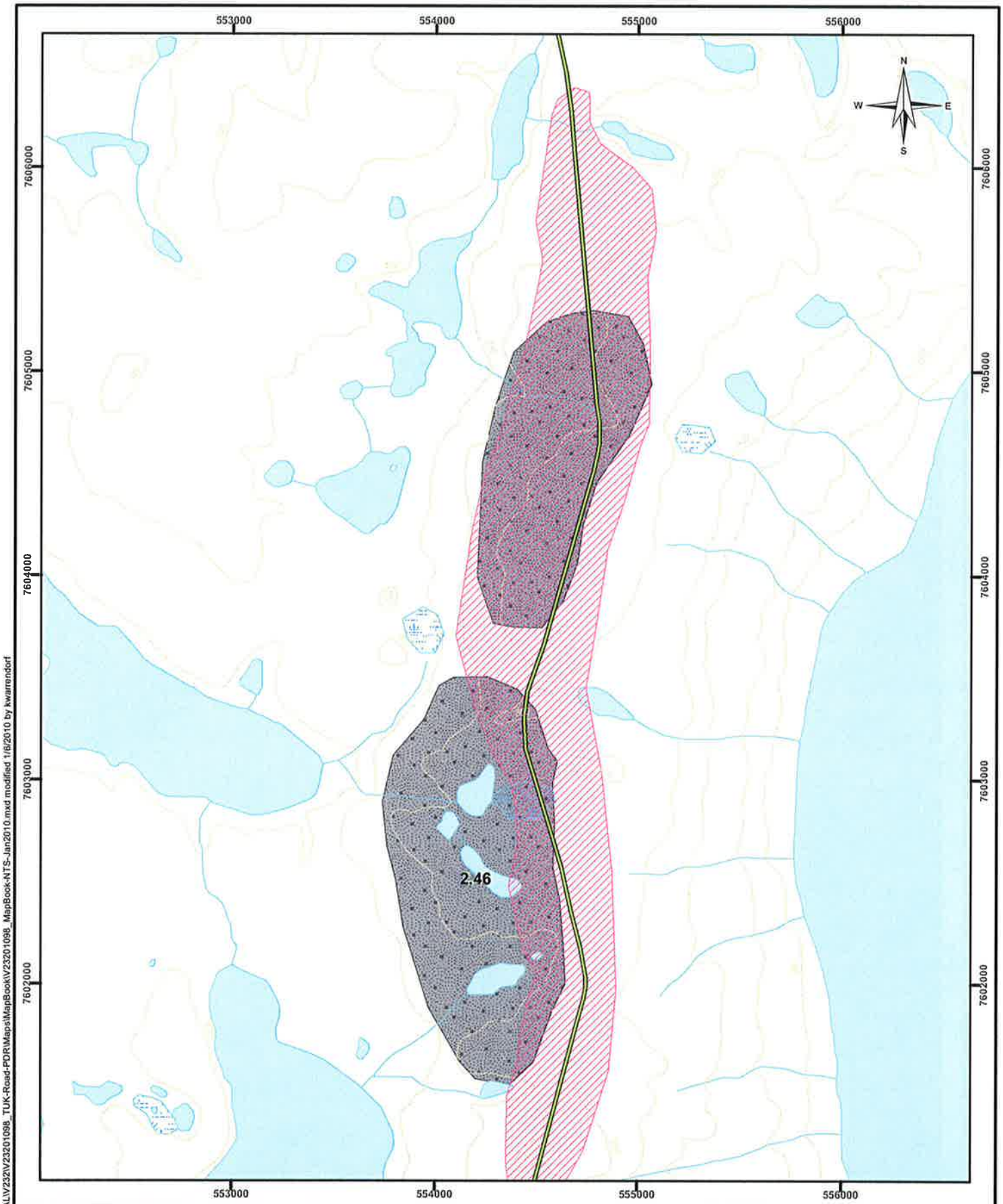

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Map 30

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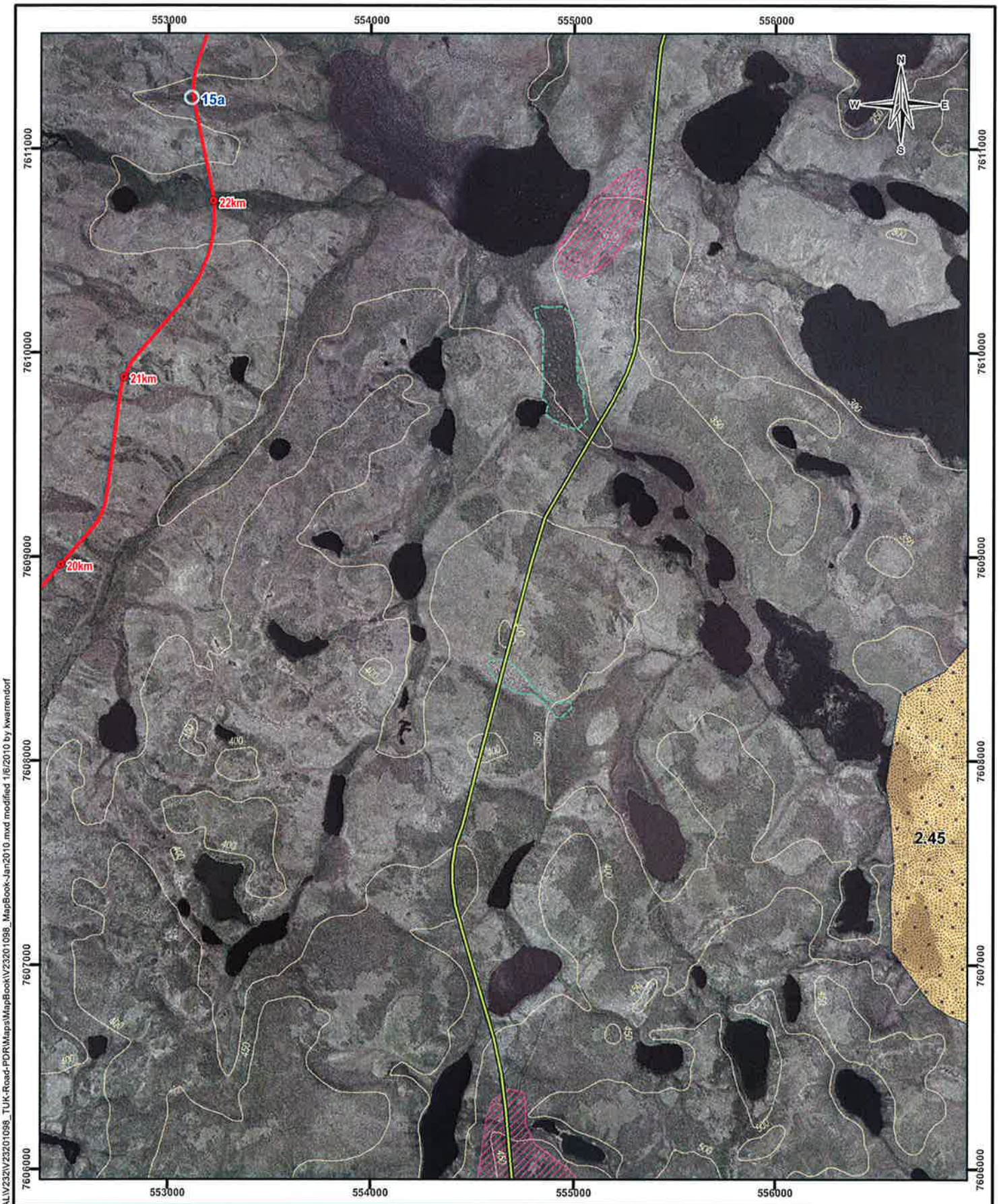

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1:25,000 Map Book

Legend

- Grizzly Bear Den
- 10 Stream Crossing — Crossing #
- Stream Crossing - Potential Bridge
- 2009 Route
- Other Alignments Considered
- Upland Route
- PWC 1977
- Navy Road
- Contour
- Borrow Sources
- Archaeology Areas of Interest
- Ice-Rich Polygons
- Grizzly Bear Hibernation Zone
- Twin Otter Strip
- Husky Lakes 1000m Setback

Scale: 1:25,000

1000 0 100 200 300 400 500 m

UTM Zone 8
NAD83

Northwest Territories

KIGGIAK - EBA

FILE NO. V23201098_MapBook-Jan2010.mxd
PROJECT NO. V23201098 DATE January 6, 2010

Map 31

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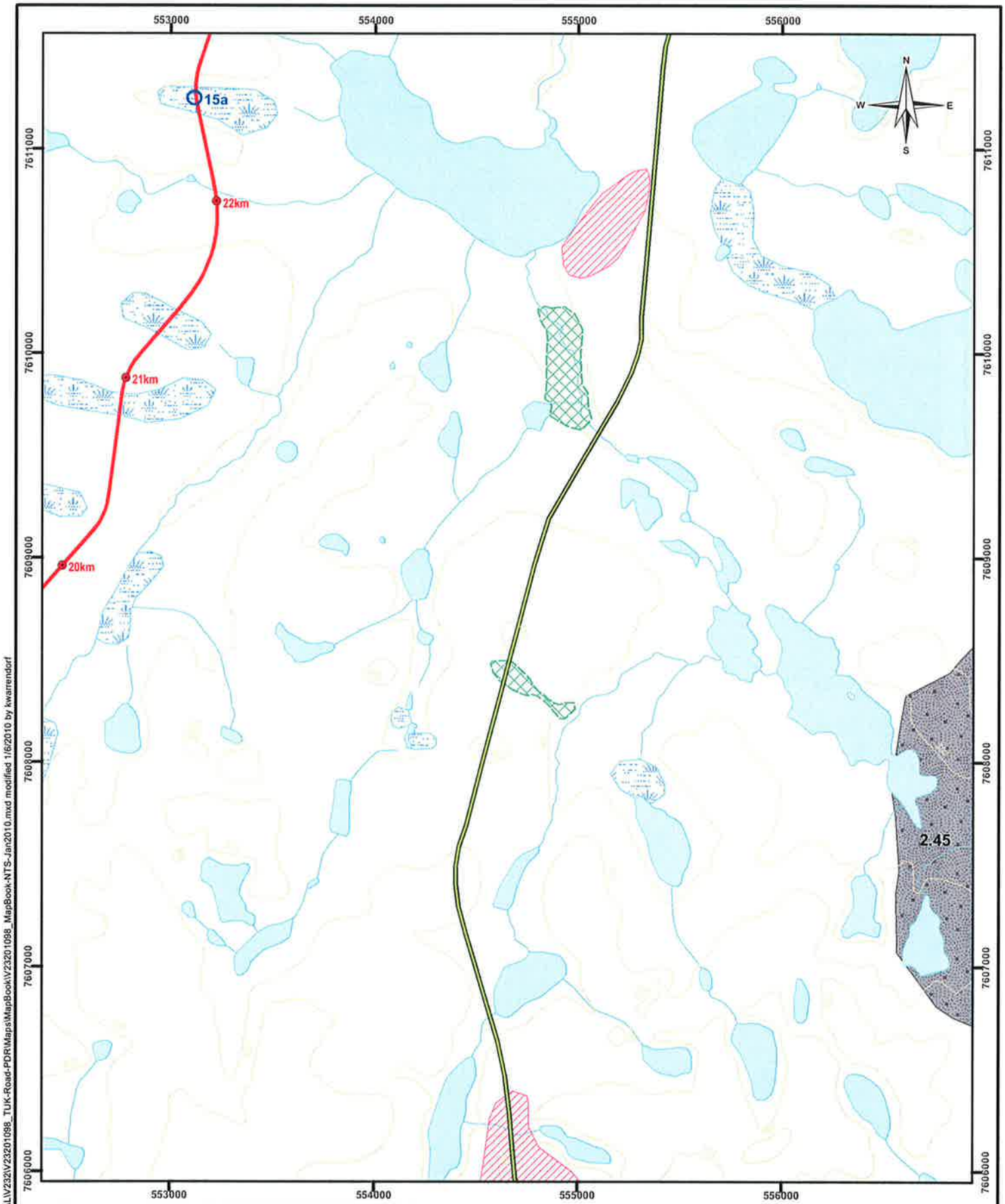

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PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Scale: 1:25,000
1050 0 100 200 300 400 500 m

UTM Zone 8
NAD83

Northwest Territories

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Map 31

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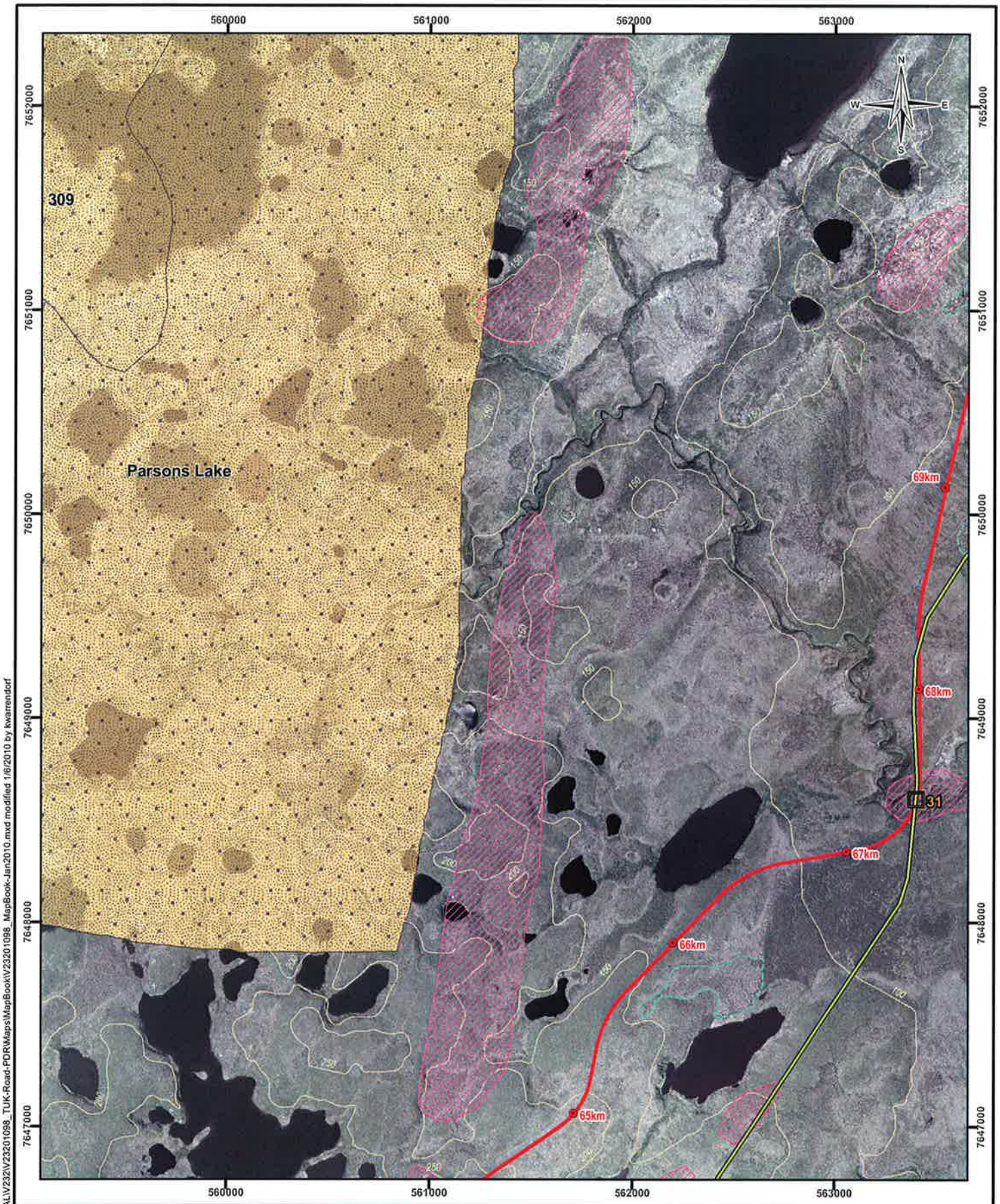

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UTM Zone 8
NAD83

Northwest Territories

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Map 32

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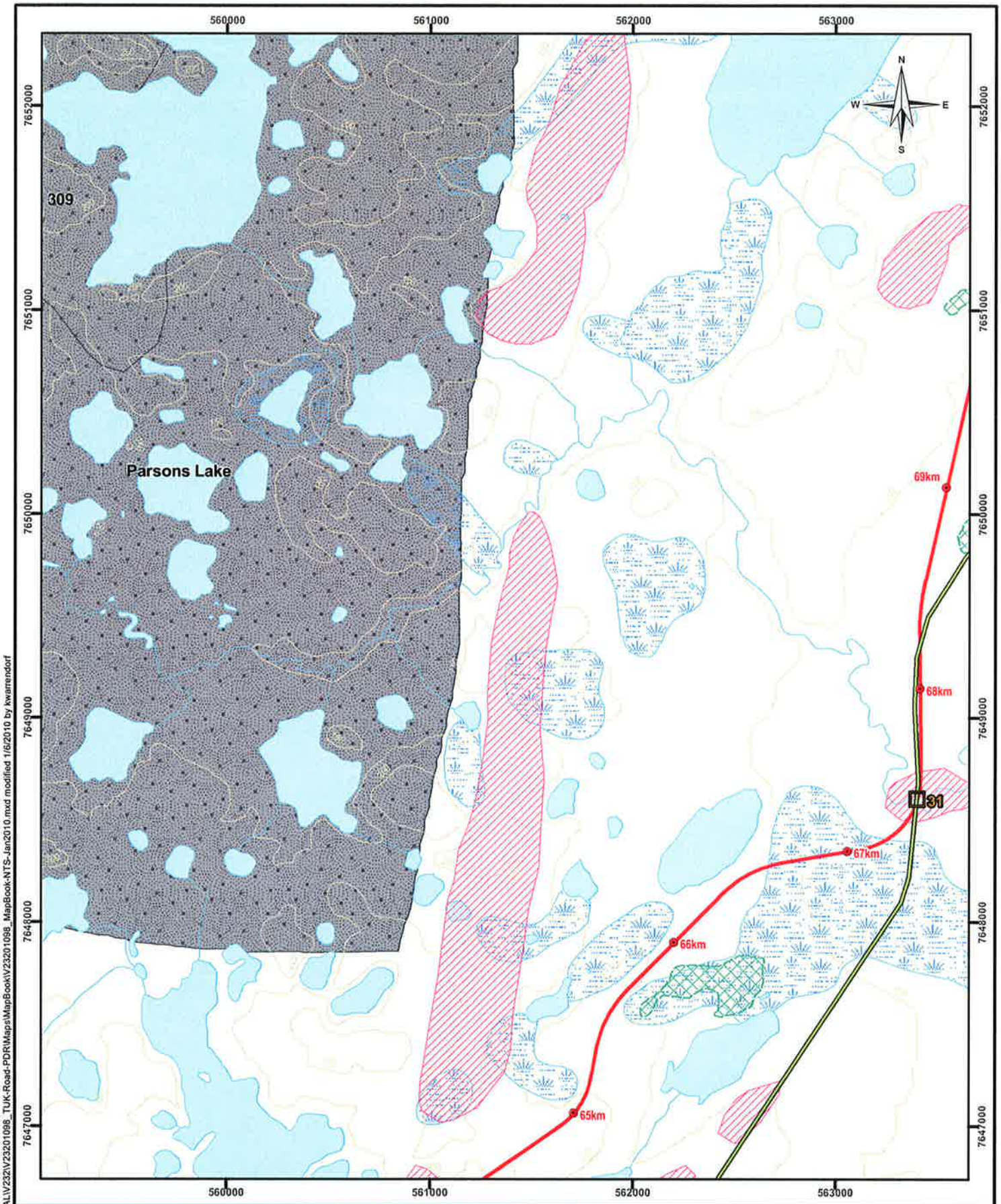

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PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Scale: 1:25,000
1050 0 100 200 300 400 500 m

UTM Zone 8
NAD83

Northwest Territories

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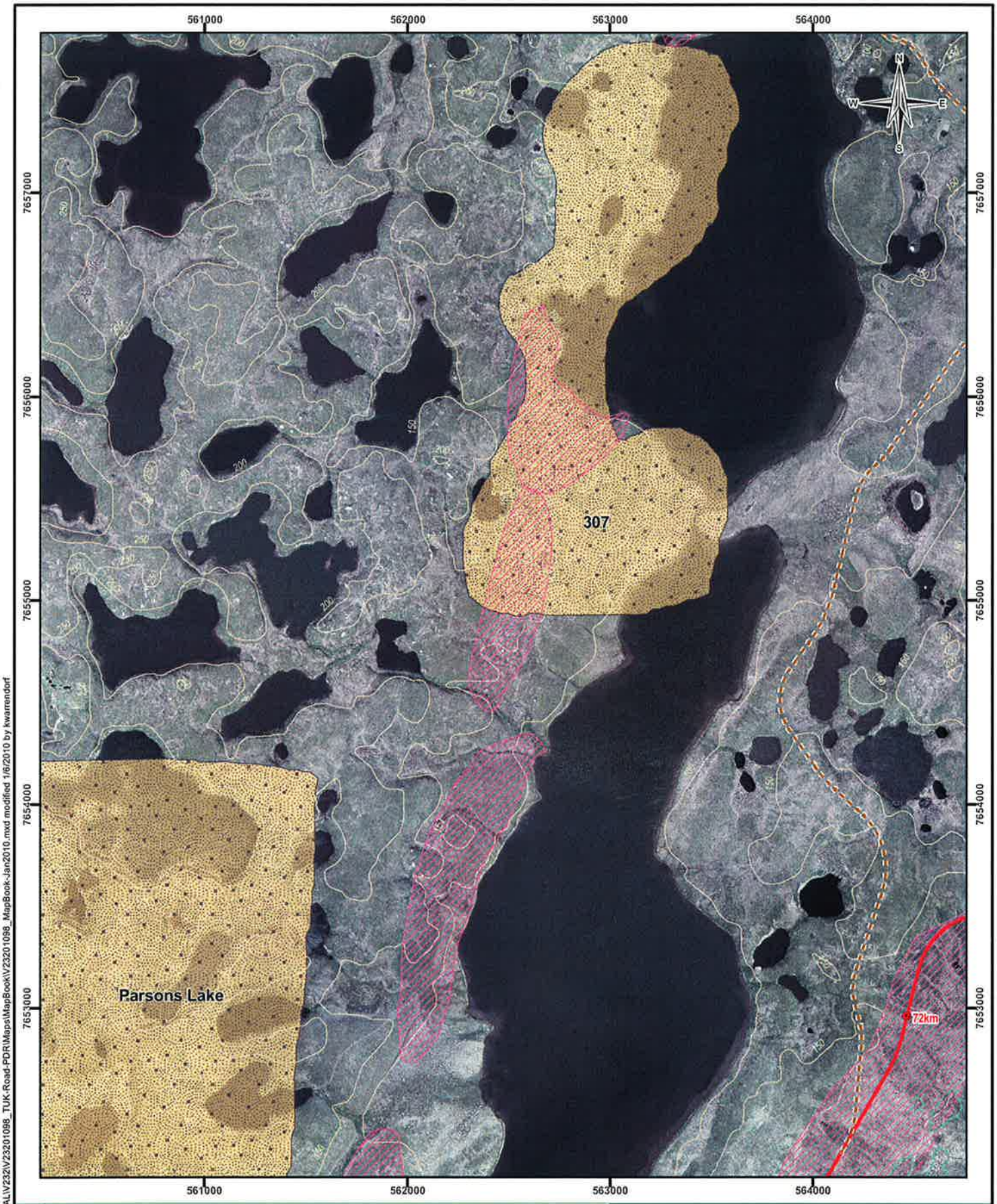
Map 32



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UTM Zone 8
NAD83

Northwest Territories

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Map 33

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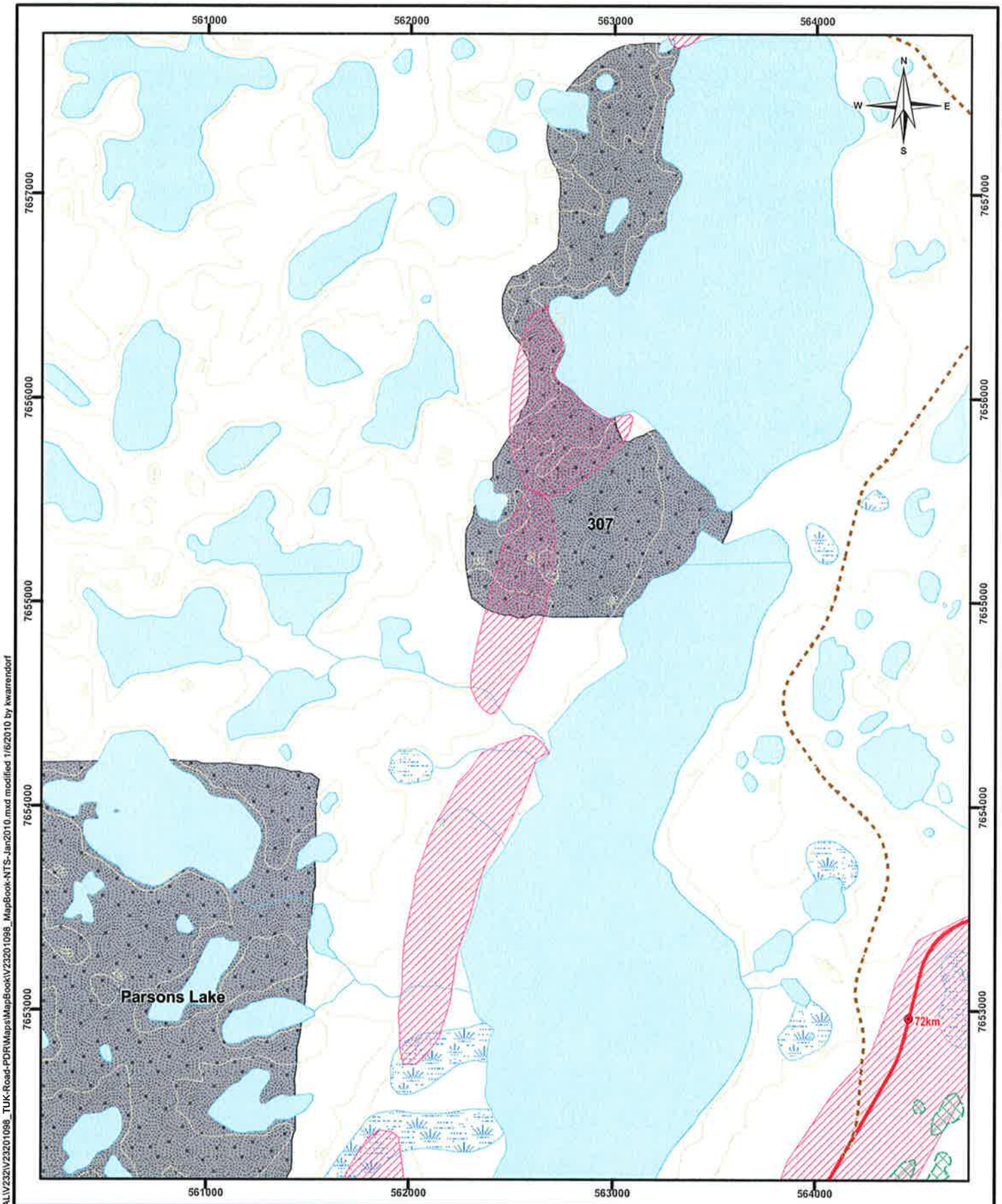

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UTM Zone 8
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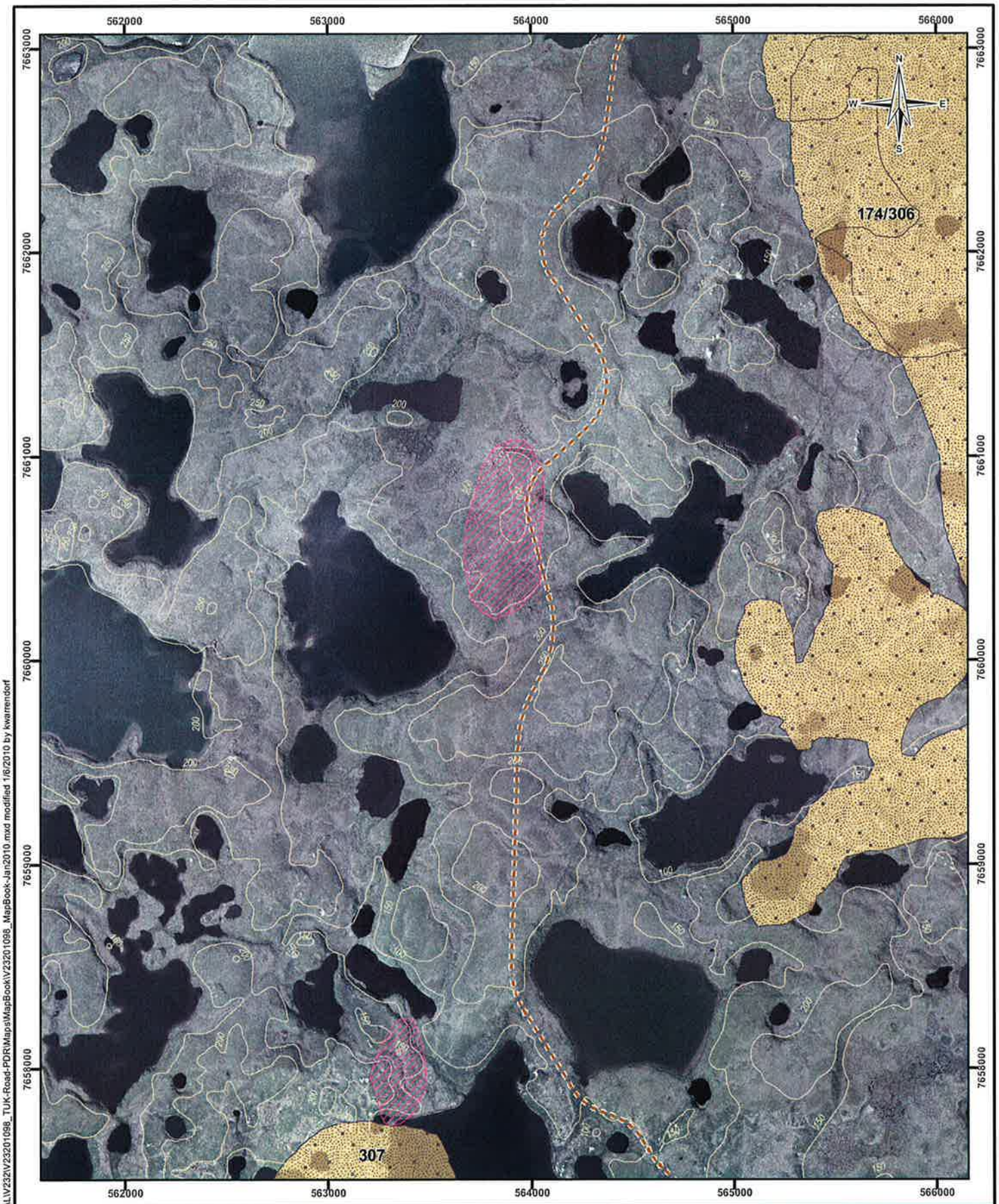

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UTM Zone 8
NAD83

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Map 34

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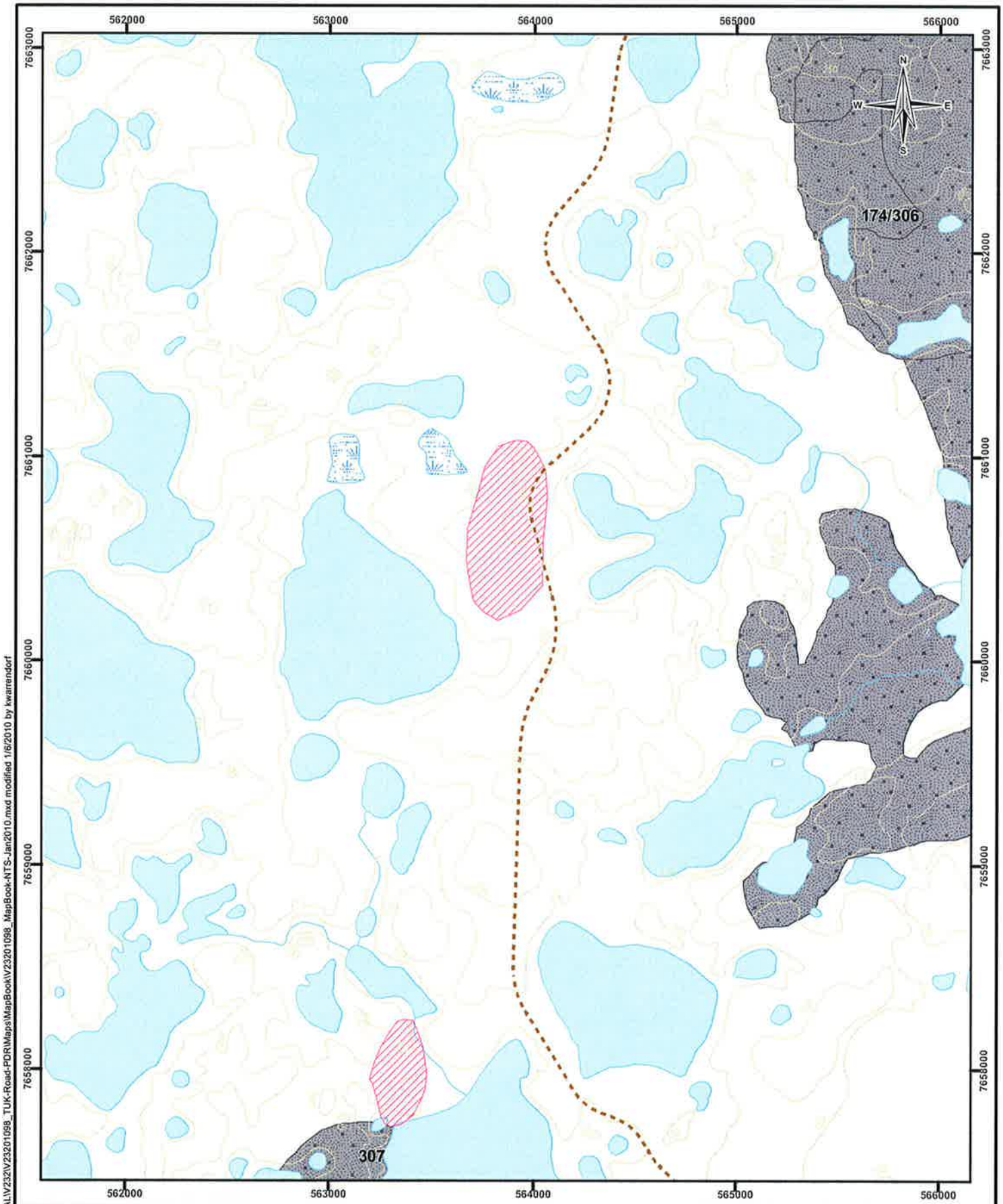

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1050 0 100 200 300 400 500 m

UTM Zone 8
NAD83

Northwest Territories

KIGGIAK - EBA

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Map 34

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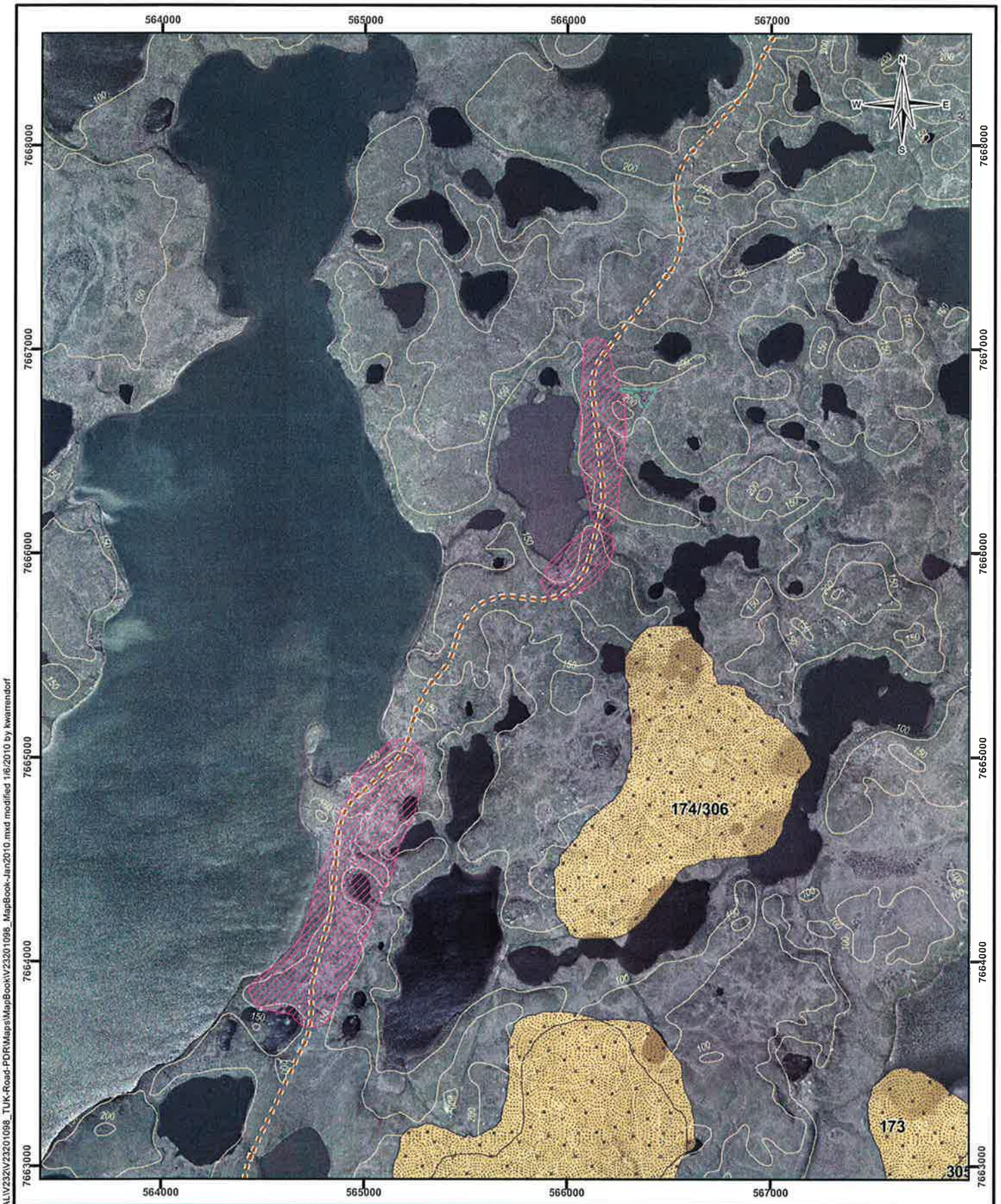

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PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Scale: 1:25,000
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UTM Zone 8
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Northwest Territories

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Map 35

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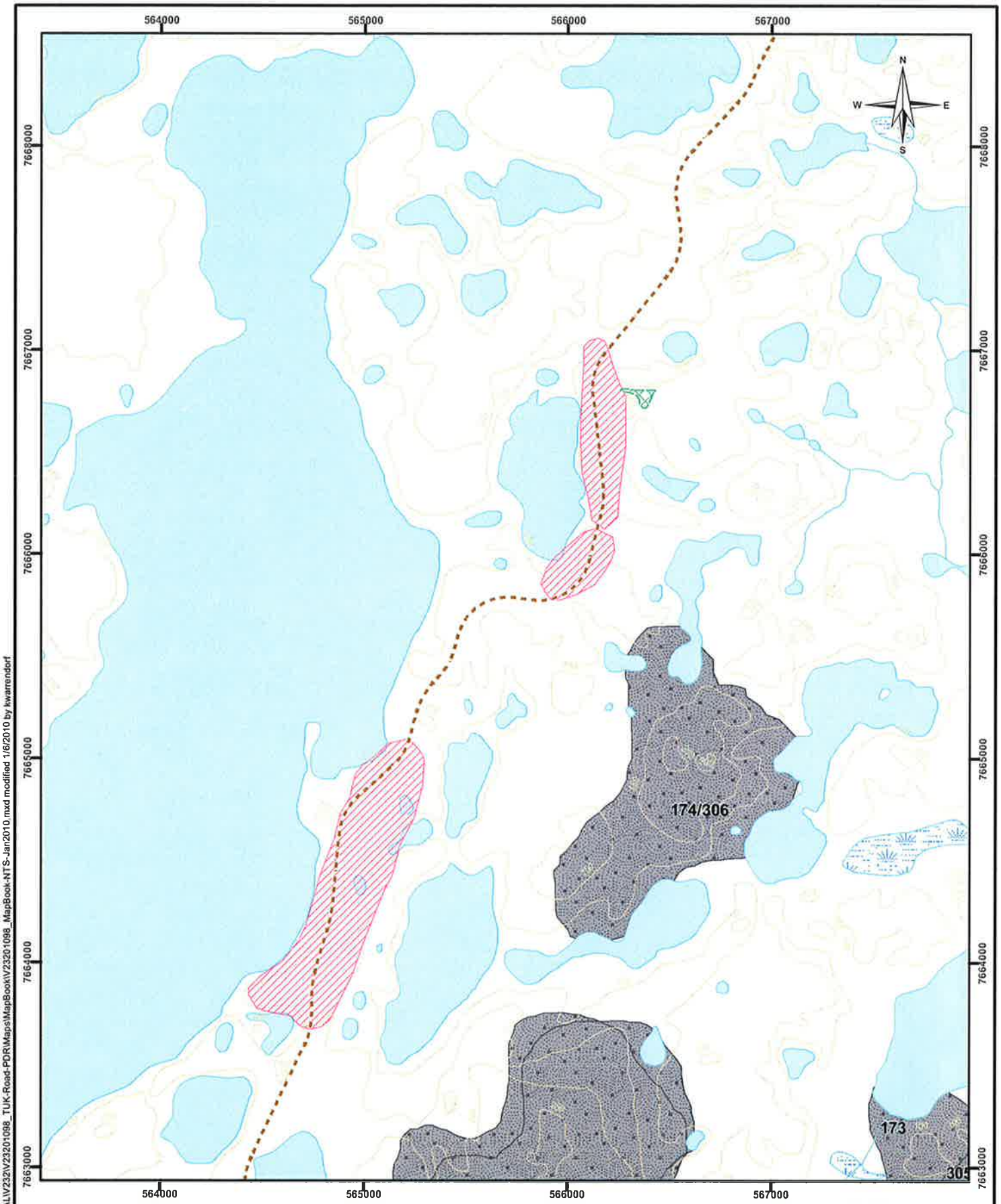

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Scale: 1:25,000

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UTM Zone 8
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Northwest Territories

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Map 35

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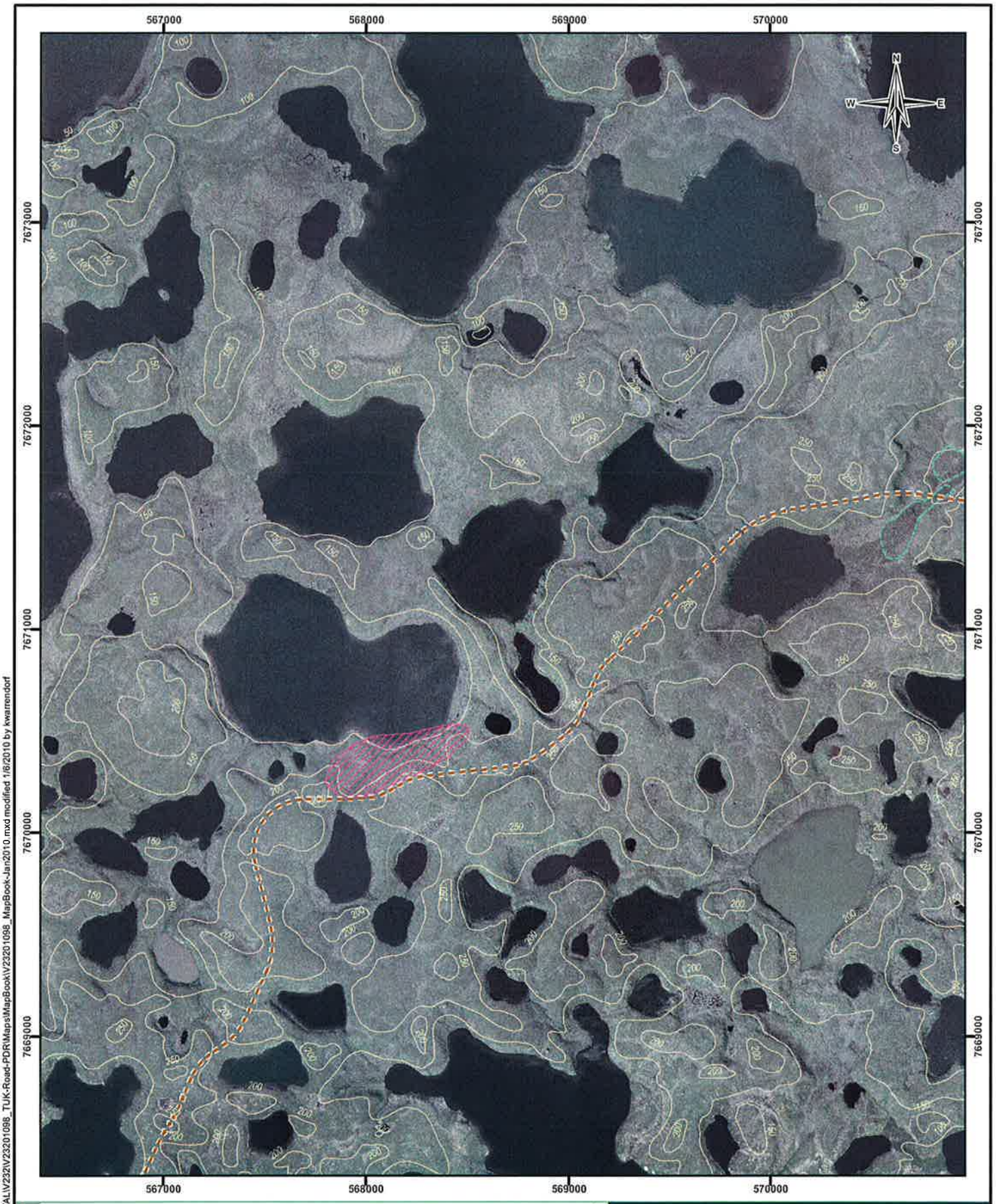

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Legend

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1050 0 100 200 300 400 500 m

UTM Zone 8
NAD83

Northwest Territories

KIGGIAK - EBA

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Map 36

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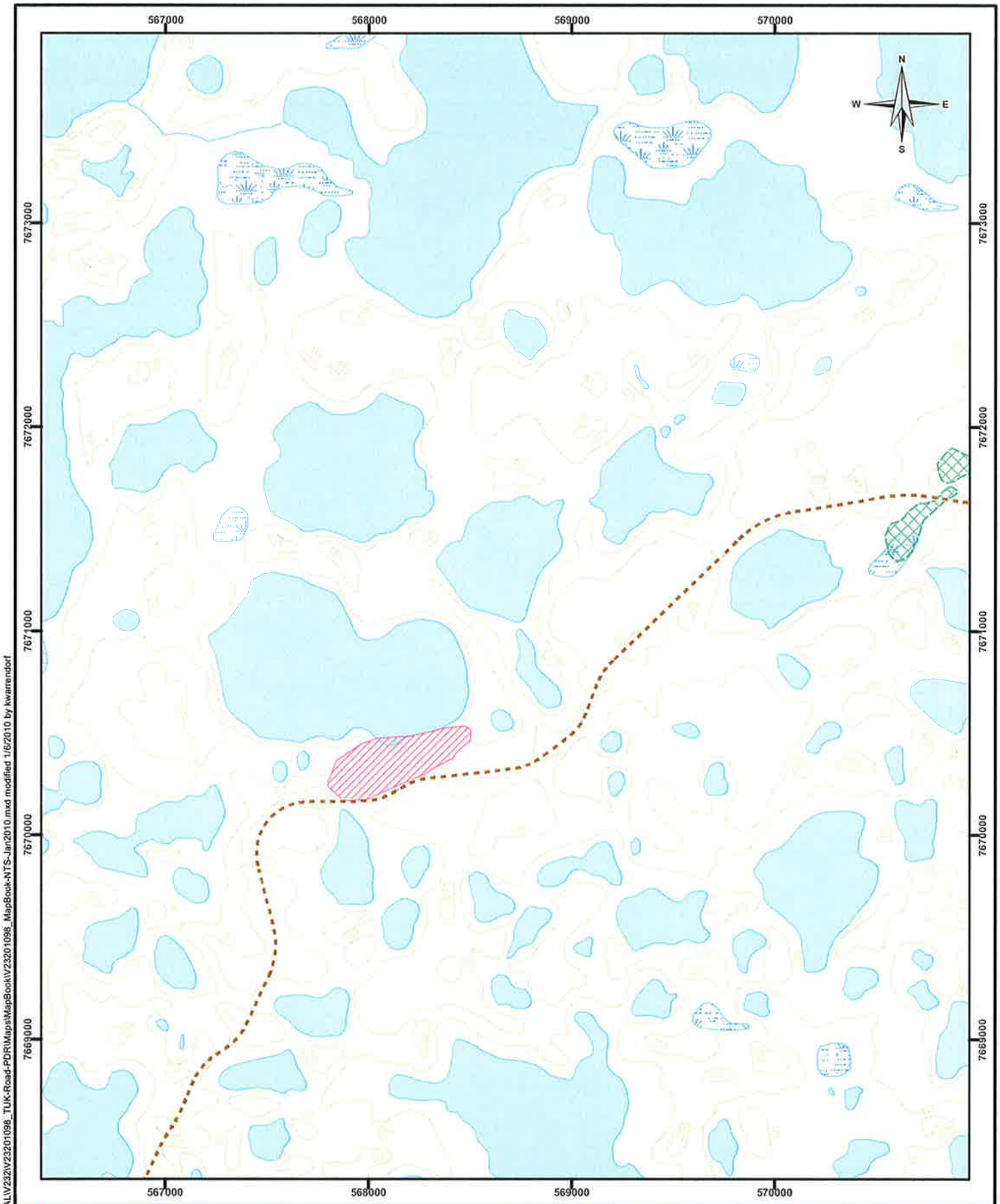

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UTM Zone 8
NAD83

Northwest Territories

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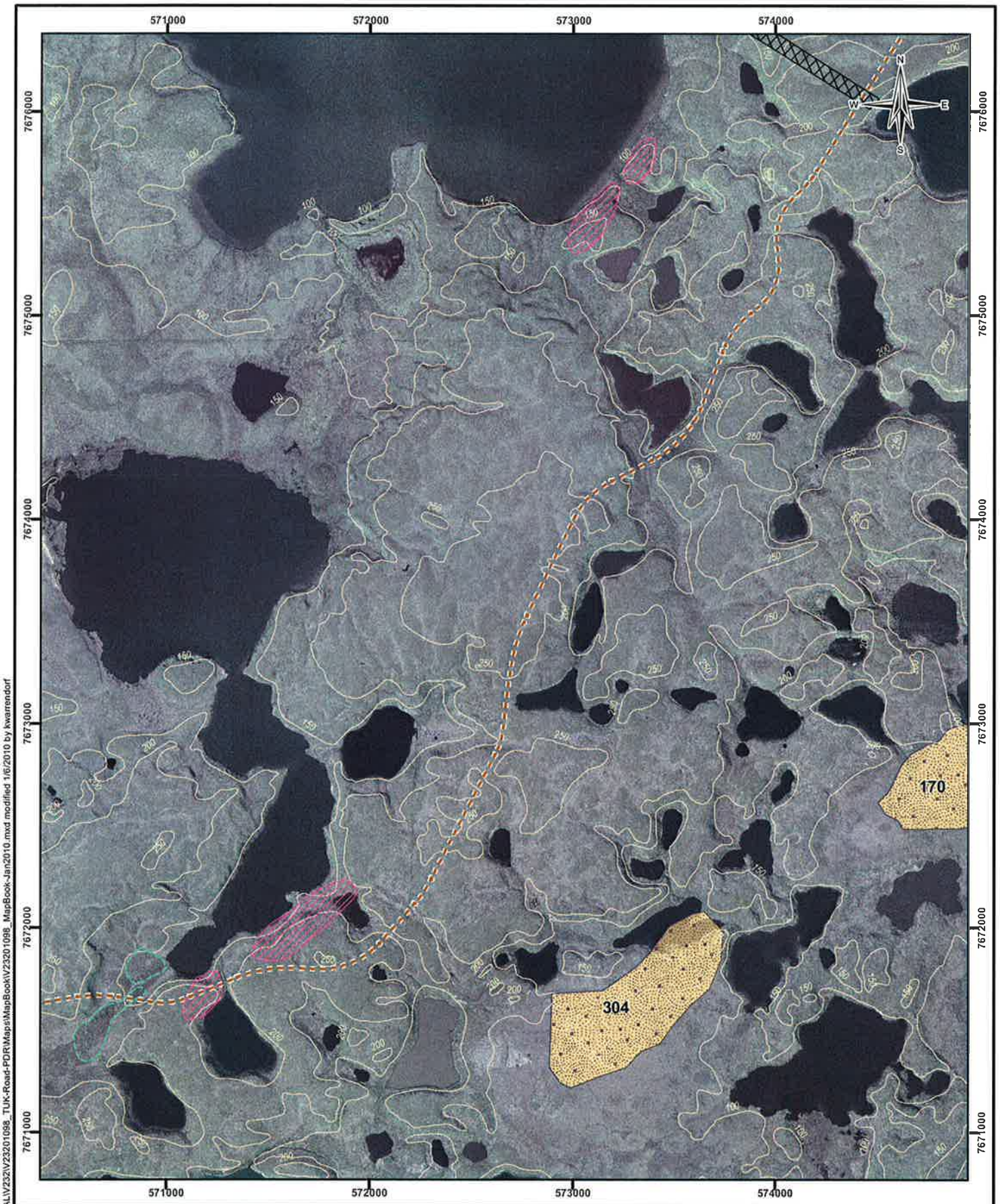

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UTM Zone 8
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Northwest Territories

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Map 37

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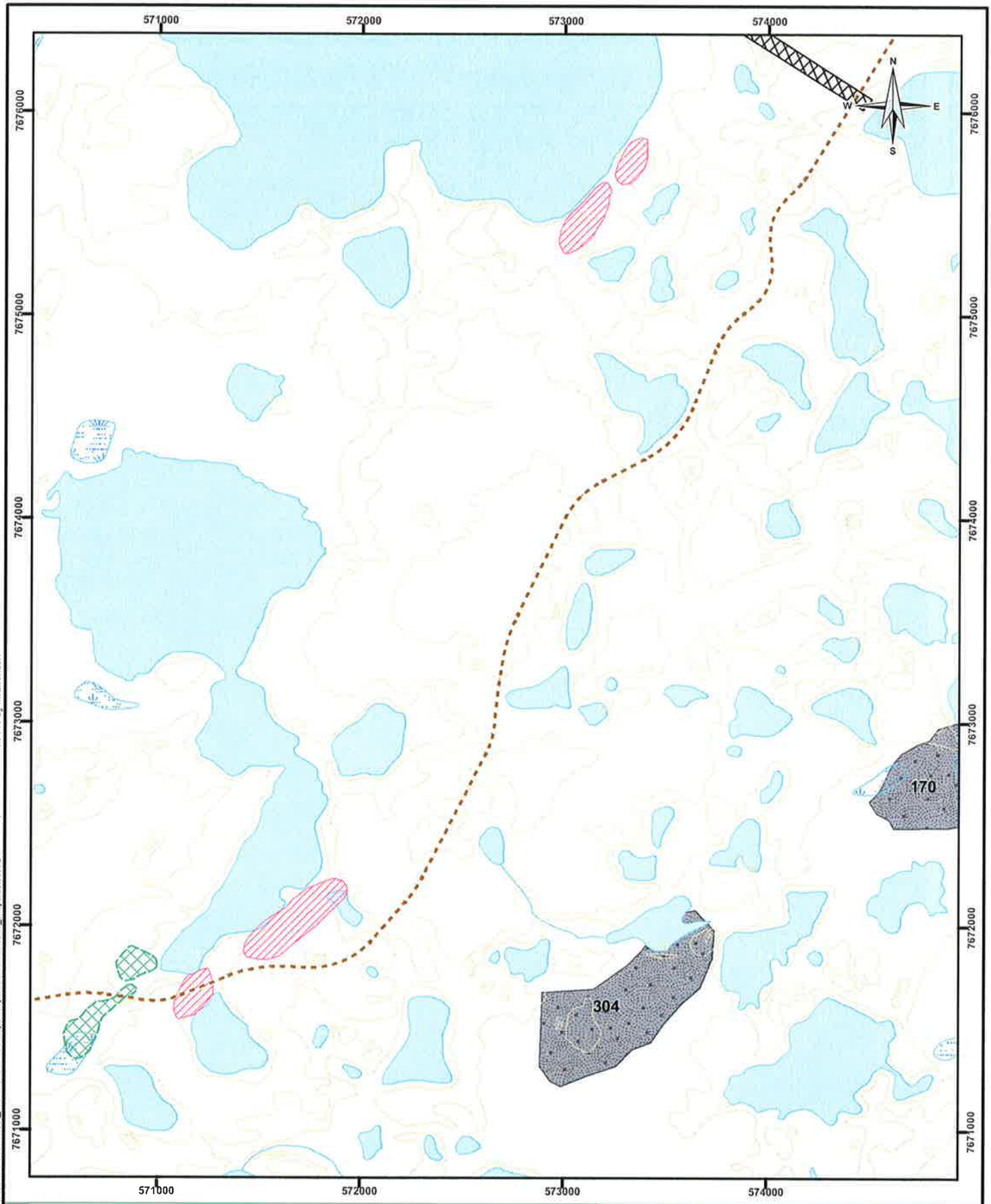

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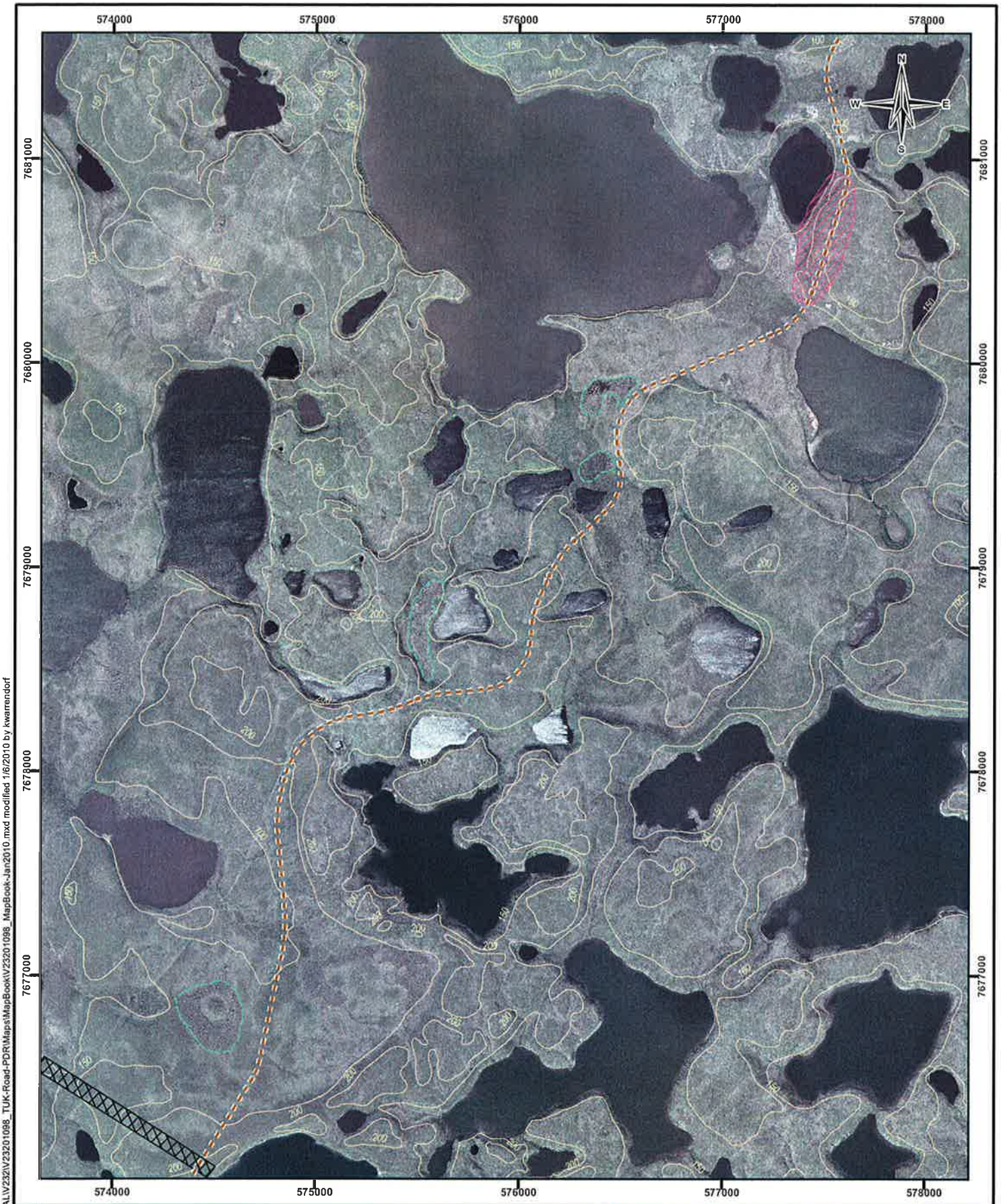

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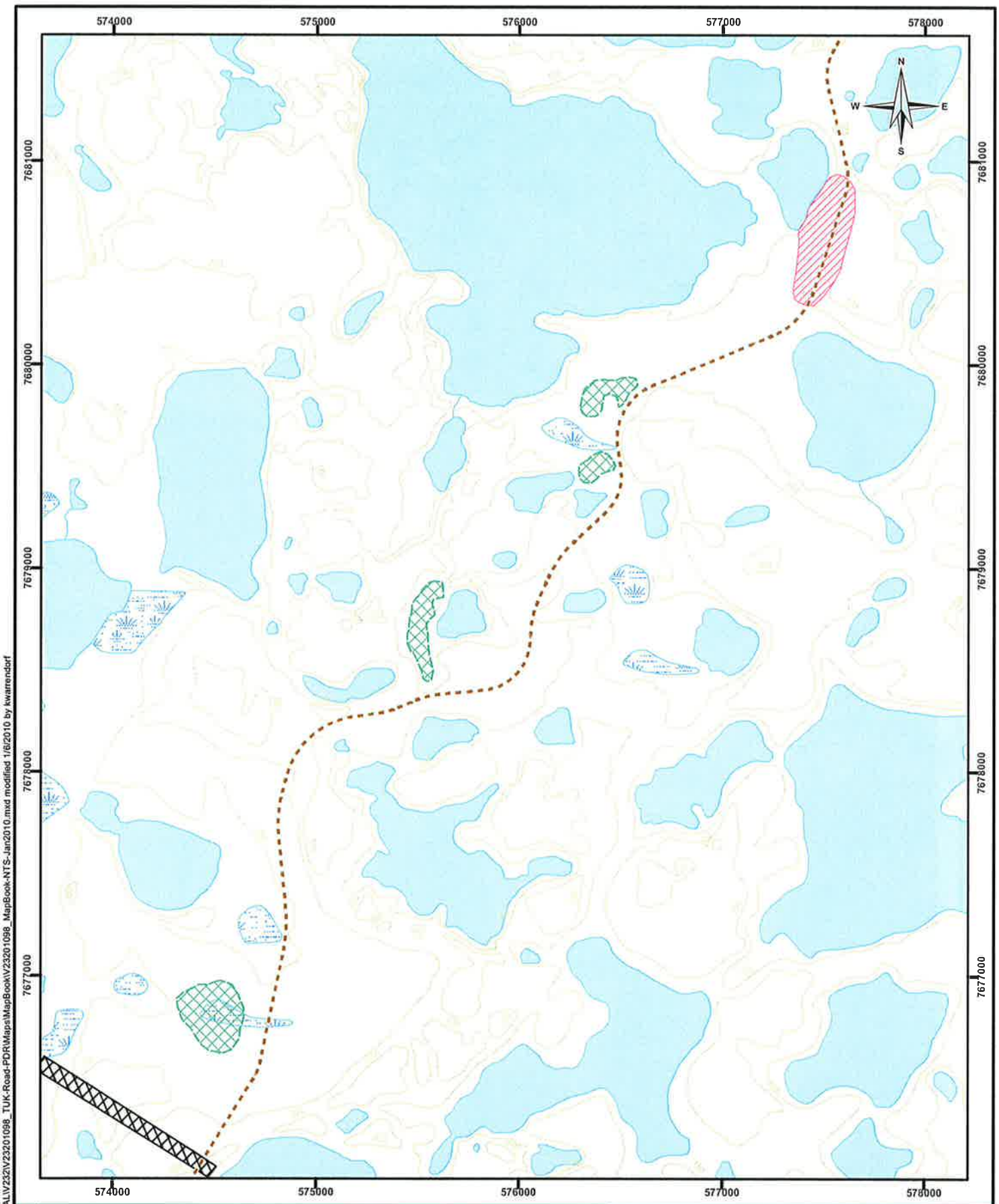

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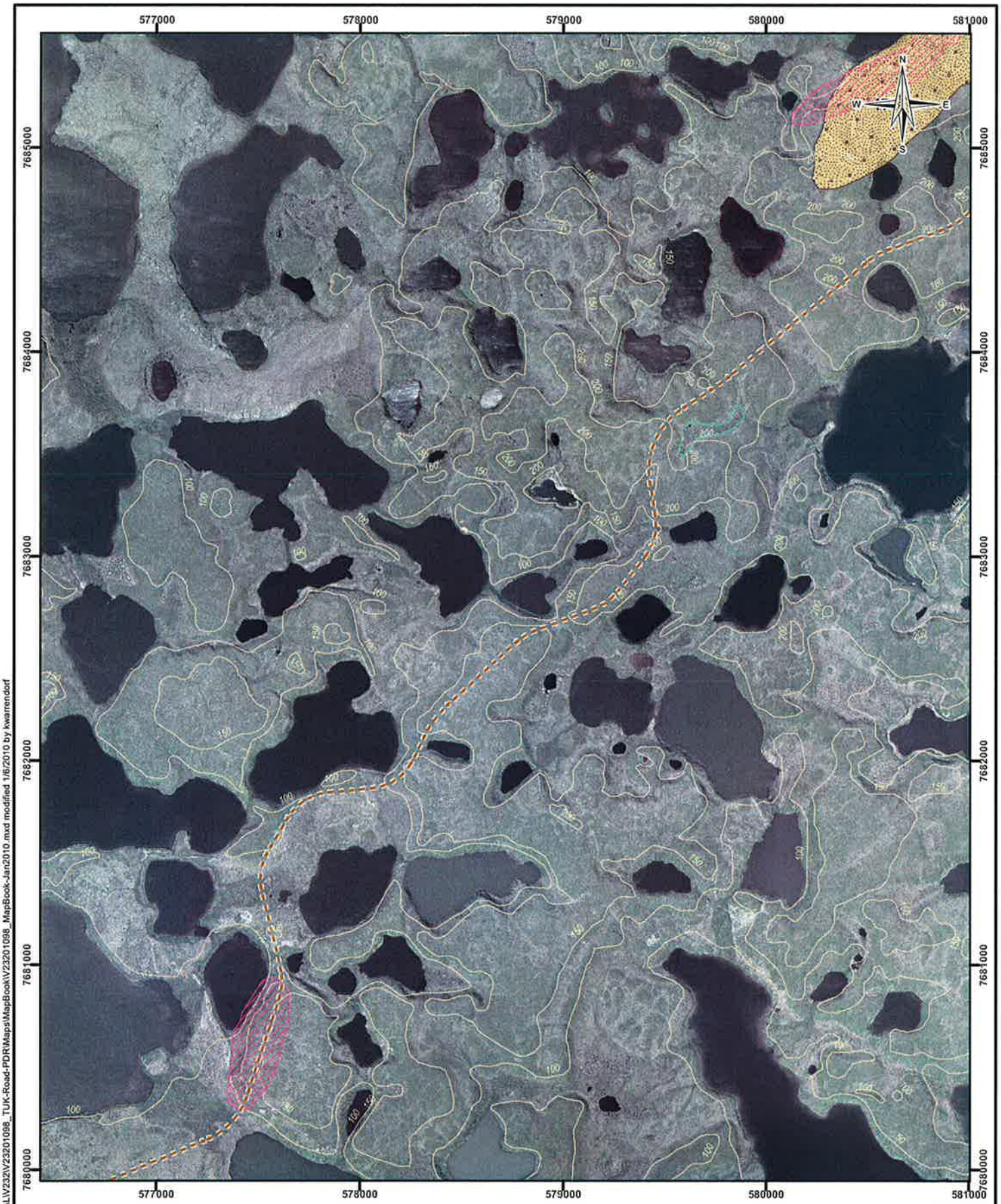

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Map 39

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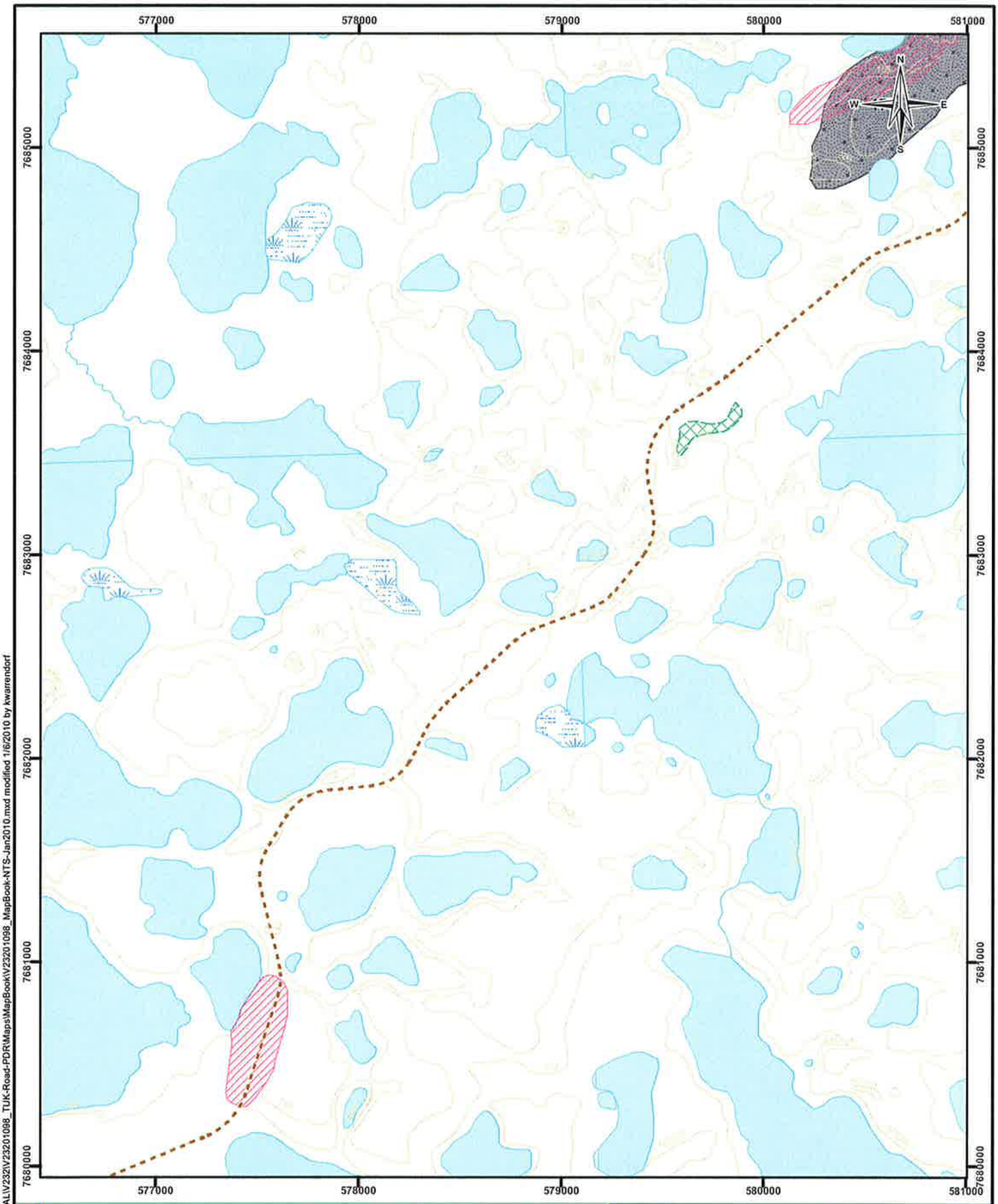

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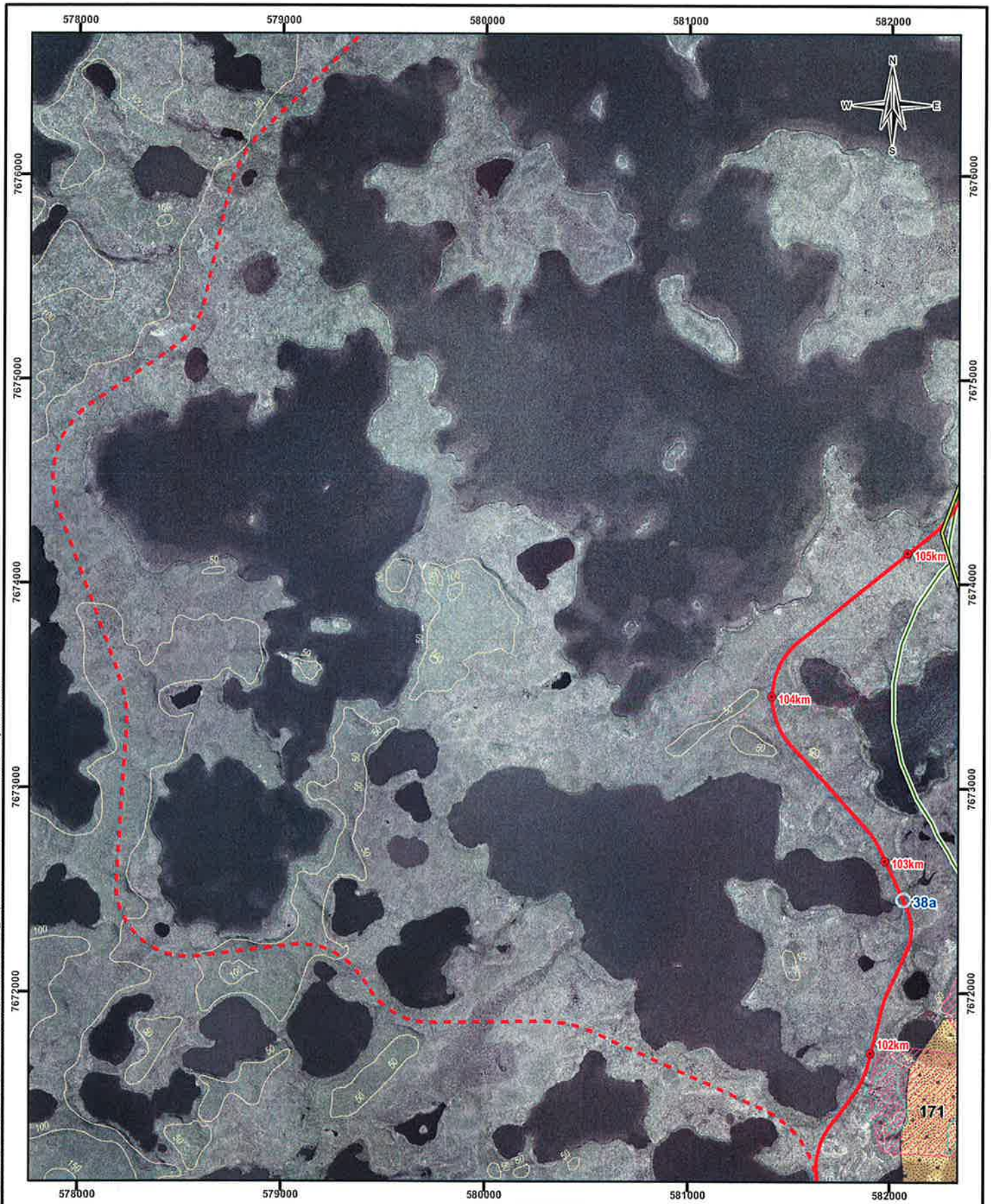
PROJECT NO. V23201098 DATE January 6, 2010

Map 39



ISSUED FOR USE

Legend

- Grizzly Bear Den
- 10 Stream Crossing
- Crossing #
- Stream Crossing - Potential Bridge
- 2009 Route
- Other Alignments Considered
- Upland Route
- PWC 1977
- Navy Road
- Contour
- Borrow Sources
- Archaeology Areas of Interest
- Ice-Rich Polygons
- Grizzly Bear Hibernation Zone
- Twin Otter Strip
- Husky Lakes 1000m Setback

PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Scale: 1:25,000
1000 0 100 200 300 400 500 m

UTM Zone 8
NAD83

Northwest Territories | KIGGIAK - EBA

FILE NO. V23201098_MapBook-Jan2010.mxd
PROJECT NO. V23201098 DATE January 6, 2010

Map 40

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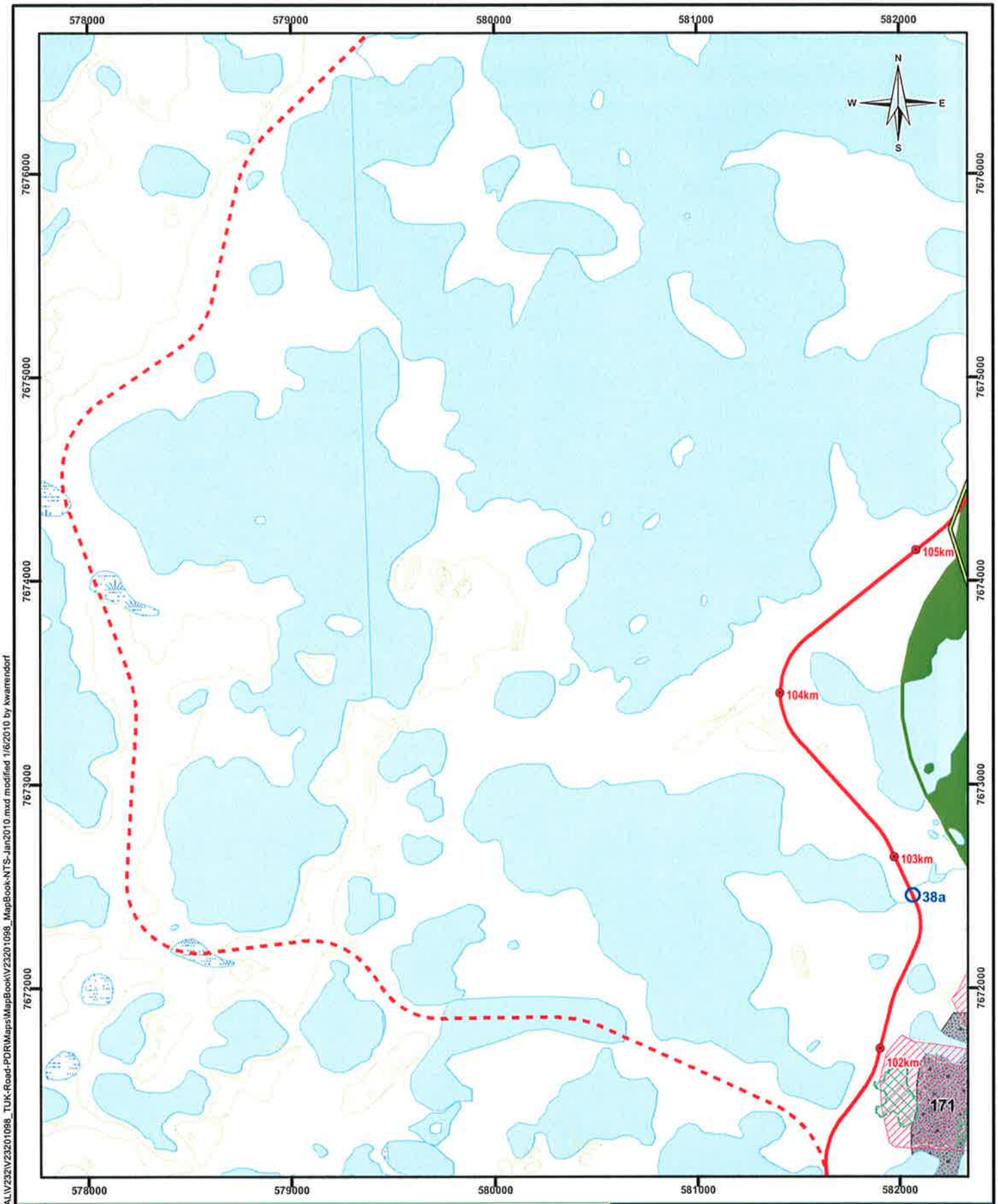

ISSUED FOR USE

Legend

- Grizzly Bear Den
- 10 Stream Crossing
  - Crossing #
- Stream Crossing - Potential Bridge
- 2009 Route
- Other Alignments Considered
- Upland Route
- PWC 1977
- Navy Road
- Contour
- Watercourse
- Waterbody
- Wetland
- Sand
- Borrow Sources
- Archaeology Areas of Interest
- Ice-Rich Polygons
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PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Scale: 1:25,000
1000 0 100 200 300 400 500 m

UTM Zone 8
NAD83

KIGGIAK - EBA

FILE NO. V23201098_MapBook-NTS-Jan2010.mxd
PROJECT NO. V23201098 DATE January 6, 2010

Map 40

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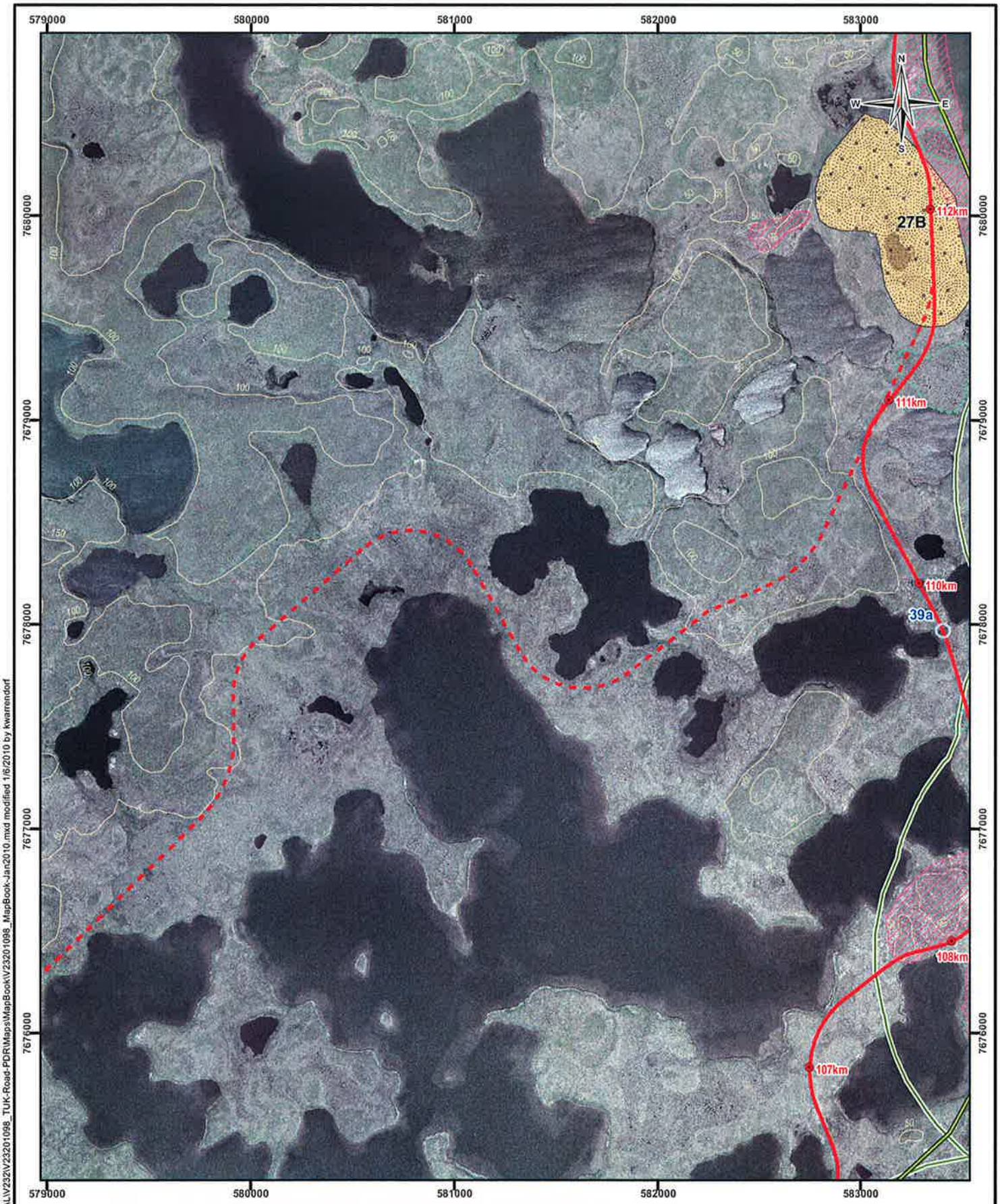

ISSUED FOR USE

PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Legend

- Grizzly Bear Den
- Stream Crossing (10 — Crossing #)
- Stream Crossing - Potential Bridge
- 2009 Route
- Other Alignments Considered
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- PWC 1977
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- Contour
- Borrow Sources
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Scale: 1:25,000
1050 0 100 200 300 400 500 m

UTM Zone 8
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Northwest Territories

KIGGIAK - EBA

FILE NO. V23201098_MapBook-Jan2010.mxd
PROJECT NO. V23201098 DATE January 6, 2010

Map 41

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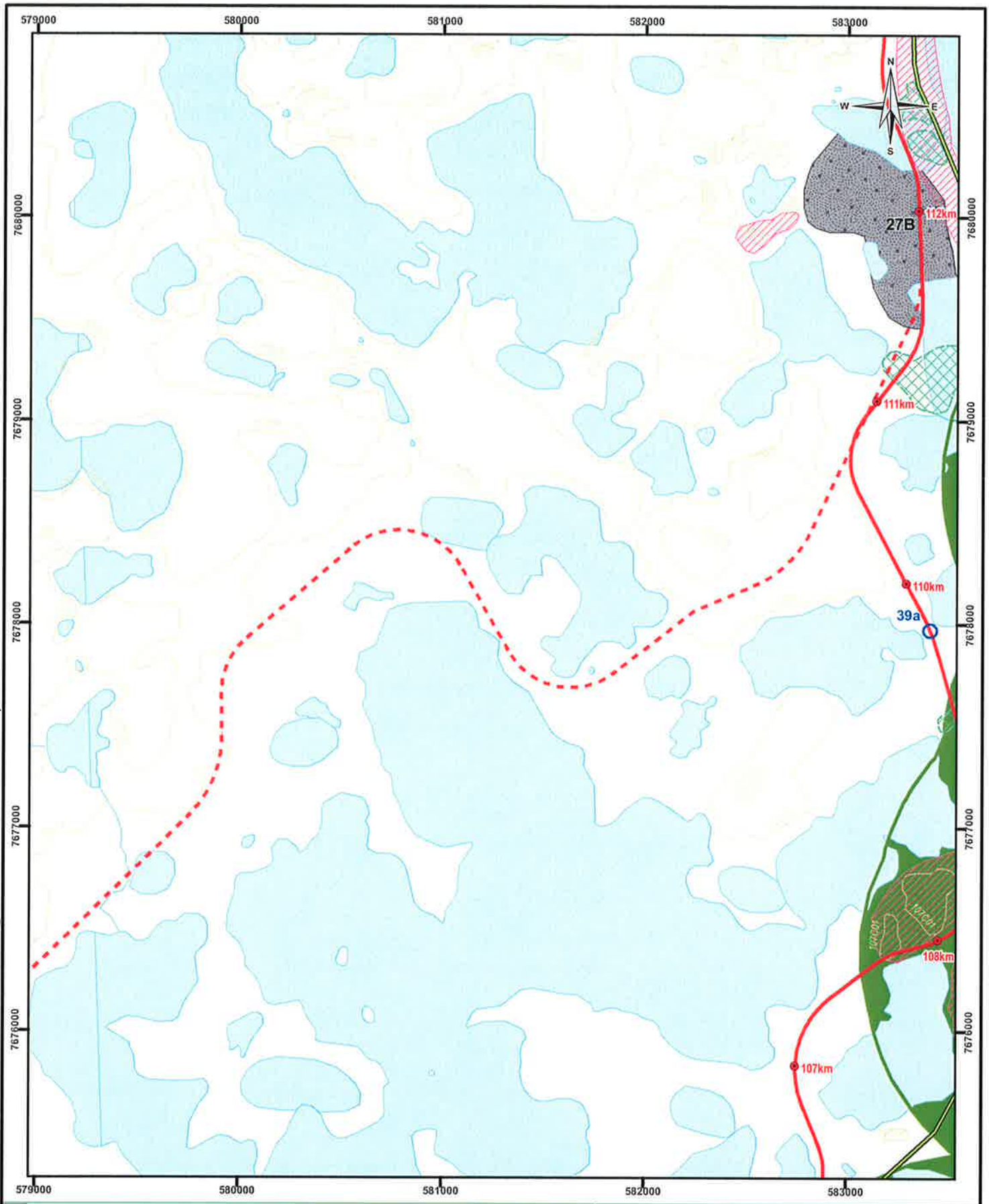

ISSUED FOR USE

PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY

1:25,000 Map Book

Legend

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Scale: 1:25,000

1050 0 100 200 300 400 500 m

UTM Zone 8
NAD83

Northwest Territories

KIGGIAK - EBA

FILE NO. V23201098_MapBook-NTS-Jan2010.mxd
PROJECT NO. V23201098 DATE January 6, 2010

Map 41

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APPENDIX E

Appendix E-1
Guidelines for Spill Contingency Planning

Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada

Guidelines for Spill Contingency Planning

Prepared by Water Resources Division Indian and Northern Affairs Canada Yellowknife, NT April 2007

Canada

Table of Contents

Guidelines for Spill Contingency Planning

Prepared by Water Resources Division
Indian and Northern Affairs Canada

Yellowknife, NT
April 2007

Preface

Under such legislation as the *Northwest Territories Waters Act*, the *Territorial Lands Act*, the *Arctic Waters Pollution Prevention Act*, and the *Mackenzie Valley Resource Management Act*, Indian and Northern Affairs Canada (INAC) has responsibilities with respect to the protection of land and water in the Northwest Territories and Nunavut. Of particular concern to INAC is the occurrence of spills and subsequent response and follow-up. As a result, INAC has been party to the Spills Working Agreement since its inception in 1979.

These Guidelines update and expand on the Northwest Territories Water Board's 1987 Guidelines for Contingency Planning and are intended to complement other existing guidelines and requirements for Spill Contingency Planning in the North. It is recognized that site-specific activities will vary and in certain instances may necessitate deviations from these Guidelines. However, it is the responsibility of the operator to ensure that they meet all applicable regulatory requirements.

The political and legislative environment in the North is in a period of unprecedented change. If these Guidelines are to keep pace with the shifting operational environment, and political and legislative developments, they must be a living document or they will lose their currency and effectiveness. To this end, Indian and Northern Affairs Canada (INAC), NWT Region, will update these Guidelines annually by means of external and internal reviews. A new updated version will be available in April of each New Year.

1.0 Introduction



Spills of petroleum products and other hazardous materials cannot be entirely prevented; however, the impacts of spills can be minimized by establishing a predetermined line of response and action plan. The remote location of developments in the NWT and the environmental sensitivity of the region underline the necessity for good spill contingency planning.

Under the *NWT Waters Act* and Section 6 g (i) and (ii) of the NWT Waters Regulations all operations requesting licences for water use and waste disposal must prepare comprehensive spill contingency plans. These plans are required to establish a state of readiness which will enable prompt and effective response to possible spill events. The plans submitted to Land and Water Boards must demonstrate that the Licence Holder is capable of responding and taking appropriate action in the event of a spill.

The purpose of this document is to provide guidance for the preparation of acceptable Spill Contingency Plans. The recommended structure and content of a spill contingency plan including response organization, action plan, resource inventory, and training is provided in Section 2.0. An example plan illustrating these components is also provided in Appendix A. The Land and Water Board issuing licences for specific projects will review all submitted plans and may require changes prior to final approval.

Spill contingency planning and risk assessment for larger projects involving more complex infrastructure and activities are often required as a part of licencing. Guidance on the approach for developing such plans is provided in Section 3.0. In some cases, general contingency plans are also required to address all types of emergency situations. General contingency plans follow the same basic format as spill contingency plans, and are discussed in Section 4.0. Finally, related regulatory requirements are discussed in Section 5.0.

Wherever possible, these Guidelines were developed to minimize inconsistencies with other regulators' requirements. However, it is the developer's responsibility to comply with relevant regulators' requirements.

2.0 Spill Contingency Plan Contents

A Spill Contingency Plan identifies lines of authority and responsibility, establishes proper reporting and communication procedures and describes an action plan to be implemented in the event of a spill. All the information necessary to effectively control and clean up a spill should be included in the plan. A copy of the plan should be kept on-site at all times and at the company's main office/headquarters.

The plan must reflect current state-of-the-art containment and clean up procedures and methods. The plan should be updated annually, at a minimum, to reflect changes such as fuel storage locations, new hazardous materials on site, new construction and new personnel and contact information. As a result, an easy-to-update format such as a binder where pages may be easily removed is most appropriate. Index tabs further increase the usability of the plan by improving access to specific information. The inclusion of an appendix identifying or summarizing revisions or changes made in annual updates is recommended to facilitate review and to aid in conformity checks.

The plan should include:

- an introduction
- a response organization description
- an action plan
- a resource inventory
- a description of training programs

Specific details on the contents of these sections are described below.

2.1 Introduction and Project Details

The introduction should include the following elements:

- company name, site name, site location
- effective date of plan, recently revised sections and their revision dates
- distribution list
- purpose and scope of the plan
- company environmental policy related to regulatory compliance, environmental protection, safety, spill response and clean-up
- project description
- site description, including the size, location, topography, buildings and infrastructure
- identification of potentially impacted communities, traditional use areas (e.g. hunting and trapping camps), other developments and any environmentally sensitive areas (e.g. parks, game preserves, resource harvesting areas, fish spawning areas, waterfowl habitat, animal migration routes, beaches, archaeological and historic sites, public or private water supplies, etc.)
- list of type and amount of hazardous materials normally stored on-site, the storage capacity and the type and number of storage containers. The storage locations for each of these materials should appear on the map of the site. Material Safety Data Sheets (MSDS's) for each hazardous material should be included in an Appendix
- existing preventive measures should be outlined, such as secondary containment, fuel handling procedures, etc.
- relationship of the spill contingency plan to territorial or local community contingency plans
- details on how to obtain additional copies of the plan

It is recommended that a process for response to media and public enquiries should be discussed in the plan, as guidance for their employees.

The plan should include a map (or maps) showing the following:

- buildings, roads, culverts, airstrips and other infrastructure
- all surface water bodies and direction of water flow including catchment basins
- storage locations of each hazardous material

- probable spill locations and direction of flow on land and in water
- locations of all response equipment
- environmentally sensitive areas
- any approved disposal sites
- topography e.g. slope of land
- any other important on or off-site features

The map should include any off-site areas that may be affected by a spill, such as nearby communities, wetlands, archaeological sites, protected areas, etc. Two or more maps at different scales may be needed to accommodate the on and off-site features.

2.2 Response Organization

This section should identify response personnel (e.g. On-scene Coordinator, Environmental/Safety Advisor, Field Operations Supervisor, etc.), their duties, on or off-site work locations and contact information, including 24-hour telephone numbers for those responsible for activating the plan. A flowchart should be prepared to depict communication lines and the response duties of each member of the response team. For remote areas, a summary of available communication equipment should be provided. An example flowchart is presented in Appendix B as part of the example Spill Contingency Plan.

2.3 Action Plan

This section outlines the procedures that must be taken in response to a spill. It should begin by indicating the size of spill that could occur for each material stored on-site, the potential source of the spill and the potential impacts related to that spill. A description of the worst probable case scenario for the site should also be included, for example a breach of the largest storage vessel and/or numerous vessels at once.

The following procedures should be described in the action plan:

1. ***Procedures for initial action.*** These procedures are for the first person arriving at the scene of a spill and should cover:

   a) protecting the safety of personnel at the site and notification of all personnel of spill occurrence

   b) shutting of ignition sources, if safe to do so

   c) activating the Spill Response Team

   d) identifying the spilled material

   e) locating the likely source of the spill

   f) stopping the spill at its source, if it is safe to do so

   g) take actions to contain and clean up the spilled material

   h) recording relevant information for reporting purposes (e.g. approximate quantity, product type, location, whether spill in still in progress, odour, colour, weather)

2. ***Spill reporting procedures.*** This part of the plan describes the communication system put in place by the plan holder to ensure an expedient response to a spill. Reporting typically occurs to parties inside and outside an organization. The procedures should include:

   a) telephone numbers of company officials, off-site spill response contractors and government officials who can provide technical assistance (e.g. include in response organization flowchart)

   b) instructions for when and how to report spills to the NWT 24-Hour Spill Report Line (1-867-920-8130). This service is used throughout the NWT to inform all relevant government departments (federal, territorial and/or Aboriginal) that a spill has occurred. The information to be reported to government is outlined on the Spill Report Form in Appendix A. Depending on the site location and industry, there may be specific reporting regulations or protocols that apply. To determine whether these apply to you, contact the permitting agencies

   c) if the public may be impacted by a spill, include notification procedures to alert the public

3. ***Procedures for containing and cleaning up the spill.*** This is one of the most important sections of your spill contingency plan. The procedures should identify the containment and clean up strategies for various spill scenarios, with detailed instructions for how to achieve the strategies. Procedures will vary depending on whether the spill is on land, water, snow, or on or under ice. Procedures need to be proactive to deal with the spill as quickly as possible. Provide criteria and procedures for scenarios which might require ignition and burning of oil or fuel spills.

4. ***Procedures for transferring, storing, and managing spill-related wastes.*** For example, contaminated soil, vegetative matter, snow/ice, spilled product, residual product (e.g. after burning) and waste response materials (e.g. sorbent materials). If materials are to be disposed on or off-site, the plan should describe the disposal method and approved location. Be sure to identify any regulatory steps that must be taken to acquire regulatory approval for the waste management options outlined in the plan.

5. ***Procedures for restoring affected areas, providing Inspectors with status updates and cleanup completion.*** Determining the required level of final cleanup and restoration is to be completed in consultation with, or to the satisfaction of, the Indian and Northern Affairs Canada (INAC) Inspector, Inuvialuit Land Administration and/or National Energy Board depending on location/operation. Site specific studies may need to be performed to determine the appropriate final clean up levels.

   Where appropriate, the procedures outlined above should discuss alternative actions to be taken in the case of impeding environmental conditions (e.g. poor visibility in blizzards, limited daylight hours, extreme cold, difficult terrain, etc.) For example, if spill response relies on contractors accessing the site via a winter road, response actions to be taken when roads are closed should be included in the plan.

   The action plan should address spills of all sizes including the probable worst case scenario. For smaller operations, it may be sufficient to develop one set of procedures to address all sizes of spills. At locations where spills may vary from those with little or no impacts to very large spills that could result in serious injury, fatalities or cause significant damage to the environment, it may be helpful to categorize spills by their potential hazards. Spill response procedures can then be developed for each category of spill. If a spill occurs, the level of success of the response effort should be examined and lessons learned should be incorporated into an updated spill plan.

2.4 Resource Inventory

This section should describe all resources available for responding to spills. This includes personnel and an inventory of and the location of clean up materials, tools and equipment. The resources should be described in two categories:

- ***On-site Resources.*** These may include spill kits, booms, sorbent materials, earth moving equipment, etc. Be sure to include the location and quantity of these resources on the map provided in the Introduction and Project Details section.

- ***Off-site Resources.*** Detailed instructions on how to obtain off-site resources must be provided in the plan. This includes contact numbers for deploying off-site resources and an estimate of how long it takes to deploy them. If spill response is primarily reliant on an off-site contractor, a written contract, mutual aid agreement or memorandum of understanding is strongly advised to ensure timely access to cleanup equipment.

2.5 Training Program

Training employees to familiarize them with the action plan and testing the plan's elements through mock spill exercises is critical to ensuring the success of the plan. Training and training exercises can prepare personnel, evaluate the plan holder's ability to respond to a spill and demonstrate to government and to the public that there is adequate preparation

should a spill occur. Training should be performed annually at a minimum, and under typical operating conditions.

This section should include:

- an outline of the company's training program, including a description of training materials and simulation exercises. The training program should ensure that employees understand the procedures in the action plan, the hazards of the materials stored on-site, where to find response equipment and how to operate it, and how to obtain off-site resources. Copies of training materials are not required in the plan but should be referenced
- a training schedule, indicating when training has occurred and future training dates
- a commitment to notify INAC Inspectors and other relevant regulators of planned upcoming mock spill exercises so that regulators have the option of observing the on-site exercise
- a description of the record keeping procedures that will document which employees have received training and when
- records of recent employee training (e.g. personnel sign-off sheets)

3.0 Spill Contingency Planning and Risk Assessment

Projects with a large and complex scope, usually requiring a Type A licence, in some cases requiring Type B licences, may warrant a risk-based method of spill contingency planning. By initially developing a pollution potential assessment, based on data collected as part of the impact assessment phase, areas of potential risk to spills are identified. To consider the combination of the probability and consequences of a spill incident, a technical analysis of the data will need to be conducted. This will facilitate risk-based decisions about contingency planning. This involves a sensitivity analysis to identify areas of the plan where a change in assumptions renders a change in results. The process of risk assessment will help reduce areas of uncertainties in the spill contingency plan as assumptions are tested.

The use of risk based spill contingency planning should be discussed on a case-by-case basis with the Land and/or Water Board issuing the licence for the project.

4.0 General Contingency Planning

Land and Water Boards in the NWT issuing licences occasionally require general contingency plans that address all types of emergency situations, not just spills. These may include fires, explosions, dam breaches, equipment failures, wildlife encounters, security threats and more. The basic approach to preparing a general contingency plan is very similar to that used for spill contingency plans. Specific instructions for spill contingency planning provided above should be used to develop general contingency plans, bearing in mind the additional situations that must be addressed.

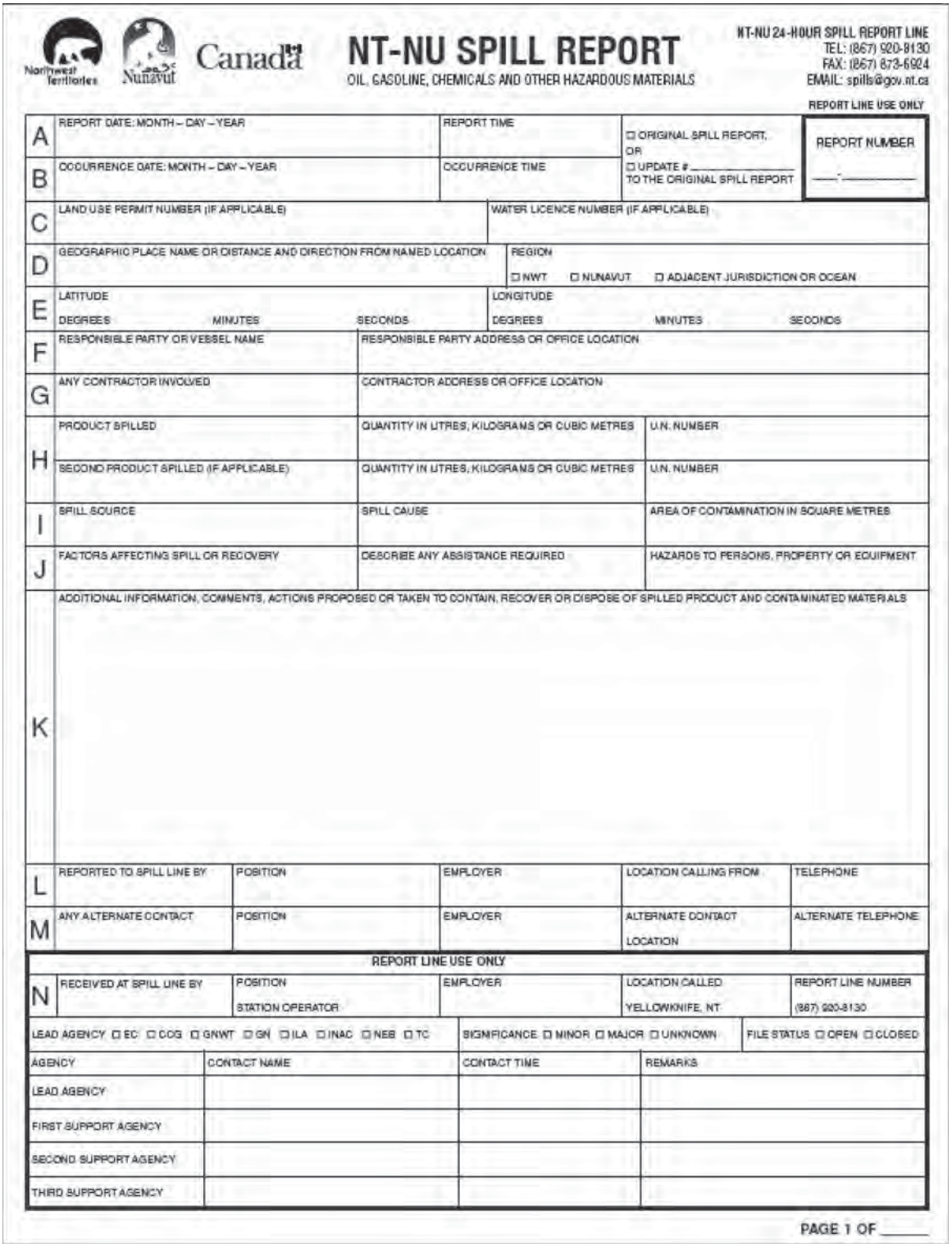
5.0 Related Requirements

There are several regulatory requirements, regulations, guidelines that are directly or indirectly linked to spill contingency planning in the NWT. Following the above guidelines for spill contingency planning does not absolve the licensee from ensuring compliance with all applicable federal, territorial and/or municipal legislation.

Related requirements are:

- Environment Canada's Environmental Emergency (E2) requirements
- Canadian Standards Association (CSA) Emergency Preparedness and Response document
- National Energy Board requirements such as those in the *Canada Oil and Gas Operations Act* and Regulations and the Onshore Pipeline Regulations, 1999
- Government of the Northwest Territories Spill Contingency Planning and Reporting Regulations
- Environment Canada's Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations
- Environment Canada's Guidelines for the Preparation of Hazardous Material Spill Contingency Plans, 1990
- National Energy Board Spill Reporting Protocol for Upstream Oil and Gas Operations in the Northwest Territories and Nunavut, 2003
- Indian and Northern Affairs Canada Spill Reporting Protocol for Upstream Oil and Gas Operations, 2003
- Indian and Northern Affairs Canada Reporting of Minor Spills on Frozen Waterbodies Used as Working Surfaces, 2005
- Indian and Northern Affairs Canada Spill Reporting Protocol for Mining Operations in the Northwest Territories and Nunavut, 2004

Appendix A: NT-NU Spill Report Form



Northwest Territories Nunavut Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR	REPORT TIME	☐ ORIGINAL SPILL REPORT, OR ☐ UPDATE # _____ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER ____-____
B	OCCURRENCE DATE: MONTH – DAY – YEAR	OCCURRENCE TIME		
C	LAND USE PERMIT NUMBER (IF APPLICABLE)	WATER LICENCE NUMBER (IF APPLICABLE)		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION	REGION ☐ NWT ☐ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE DEGREES MINUTES SECONDS	LONGITUDE DEGREES MINUTES SECONDS		
F	RESPONSIBLE PARTY OR VESSEL NAME	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION		
G	ANY CONTRACTOR INVOLVED	CONTRACTOR ADDRESS OR OFFICE LOCATION		
H	PRODUCT SPILLED	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER	
	SECOND PRODUCT SPILLED (IF APPLICABLE)	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER	
I	SPILL SOURCE	SPILL CAUSE	AREA OF CONTAMINATION IN SQUARE METRES	
J	FACTORS AFFECTING SPILL OR RECOVERY	DESCRIBE ANY ASSISTANCE REQUIRED	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT	
K	ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS			

L	REPORTED TO SPILL LINE BY	POSITION	EMPLOYER	LOCATION CALLING FROM	TELEPHONE
M	ANY ALTERNATE CONTACT	POSITION	EMPLOYER	ALTERNATE CONTACT LOCATION	ALTERNATE TELEPHONE

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF _____

Instructions for Completing the NT-NU Spill Report Form

This form can be filled out electronically and faxed to the spill line at 867-873-6924. Commencing on January 2, 2007, the form can also be e-mailed as an attachment to spills@gov.nt.ca. Until further notice, please verify receipt of e-mail transmissions with a follow-up telephone call. Spills can still be phoned in by calling collect at 867-920-8130.

A. Report Date/Time	The actual date and time that the spill was reported to the spill line. If the spill is phoned in, the Spill Line will fill this out. **Please do not fill in the Report Number**: the spill line will assign a number after the spill is reported.
B. Occurrence Date/Time	Indicate, to the best of your knowledge, the exact date and time that the spill occurred. Not to be confused with the report date and time (see above).
C. Land Use Permit Number /Water Licence Number	This only needs to be filled in if the activity has been licenced by the Nunavut Water Board and/or if a Land Use Permit has been issued. Applies primarily to mines and mineral exploration sites.
D. Geographic Place Name	In most cases, this will be the name of the city or town in which the spill occurred. For remote locations – outside of human habitations – identify the most prominent geographic feature, such as a lake or mountain and/or the distance and direction from the nearest population center. **You must include the geographic coordinates** (Refer to Section E).
E. Geographic Coordinates	This only needs to be filled out if the spill occurred outside of an established community such as a mine site. Please note that the location should be stated in degrees, minutes and seconds of Latitude and Longitude.
F. Responsible Party Or Vessel Name	This is the person who was in management/control/ownership of the substance at the time that it was spilled. In the case of a spill from a ship/vessel, include the name of the ship/vessel. Please include full address, telephone number and e-mail. Use box K if there is insufficient space. **Please note that, the owner of the spilled substance is ultimately responsible for any spills of that substance, regardless of who may have actually caused the spill.**
G. Contractor involved?	Were there any other parties/contractors involved? An example would be a construction company who is undertaking work on behalf of the owner of the spilled substance and who may have contributed to, or directly caused the spill and/or is responding to the spill.
H. Product Spilled	Identify the product spilled; most commonly, it is gasoline, diesel fuel or sewage. For other substances, avoid trade names. Wherever possible, use the chemical name of the substance and further, identify the product using the four digit UN number (eg: UN1203 for gasoline; UN1202 for diesel fuel; UN1863 for Jet A & B)
I. Spill Source	Identify the source of the spill: truck, ship, home heating fuel tank and, if known, the cause (eg: fuel tank overfill, leaking tank; ship ran aground; traffic accident, vandalism, storm, etc.). Provide an estimate of the extent of the contaminated/impacted area (eg: 10 m^2)
J. Factors Affecting Spill	Any factors which might make it difficult to clean up the spill: rough terrain, bad weather, remote location, lack of equipment. Do you require advice and/or assistance with the cleanup operation? Identify any hazards to persons, property or equipment: for example, a gasoline spill beside a daycare centre would pose a safety hazard to children. Use box K if there is insufficient space.
K. Additional Information	Provide any additional, pertinent details about the spill, such as any peculiar/unique hazards associated with the spilled material. State what action is being taken towards cleaning up the spill; disposal of spilled material; notification of affected parties. If necessary, append additional sheets to the spill report. Number the pages in the same format found in the lower right hand corner of the spill form: eg. "Page 1 of 2", "Page 2 of 2" etc. **Please number the pages to ensure that recipients can be certain that they received all pertinent documents.** If only the spill report form was filled out, number the form as "Page 1 of 1".
L. Reported to Spill Line by	Include your full name, employer, contact number and the location from which you are reporting the spill. Use box K if there is insufficient space.
M. Alternate Contact	Identify any alternate contacts. This information assists regulatory agencies to obtain additional information if they cannot reach the individual who reported the spill.
N. Report Line Use Only	**Leave Blank.** This box is for the **Spill Line's use only.**

Appendix B

Example
Spill Contingency Plan

Spill Contingency Plan

Company Unknown

Lake Invisible Location,
Northwest Territories

Prepared by:

John Fiction, EHS Specialist

Approved by:

Jane Leader, EHS Manager

Table of Contents

3) **Action Plan**

   i) Potential spill sizes and sources for each hazardous material on site

   ii) Potential environmental impacts of spill (include worst case scenario)

   iii) Procedures (include alternative action in case of impeding environmental conditions):

      A. Procedures for initial actions

      B. Spill reporting procedures

      C. Procedures for containing and controlling the spill e.g. on land, water, snow, ice, etc.

      D. Procedures for transferring, storing, and managing spill-related wastes

      E. Procedures for restoring affected areas

4) **Resource Inventory – describe all resources available for responding to spills**

   i) On-site resources e.g. spill kits, booms, sorbent materials, earth moving equipment

   ii) Off-site resources e.g. contact numbers for deployment and time estimate

5) **Training Program**

   i) Outline of training program

   ii) Training schedule and record keeping

Figures

Figure 1: Site location map (1:50,000 scale)

Figure 2: Sketch of site plan including buildings, roads, water bodies, hazardous material locations, spill kit locations and direction of flow

Figure 3: Flowchart of response organization

Tables

Table 1: List of hazardous materials stored on-site, type and number of storage containers, the normal and maximum storage quantities and storage locations

Table 2: List of hazardous materials, potential discharge events and volumes and direction of flow

Appendices

Appendix B-1: Material Safety Data Sheets (MSDS) for hazardous materials stored on site

Appendix B-2: NWT Spill Report Form (most recent approved version)

Appendix B-3: Immediately Reportable Spill Quantities

1) Introduction and Project Details

Company Unknown has prepared this spill contingency plan for drilling and exploration activities being undertaken at their camp on the west shore of Lake Invisible, Northwest Territories. The plan demonstrates that Company Unknown has appropriate response capabilities and measures in place to effectively address potential spills at its Lake Invisible site.

i) Company name, location and mailing address

Company Unknown

West shore of Lake Invisible, Northwest Territories

Mailing address:

Box 1, Yellowknife, NT X1A 1A1

Phone: (867) 123-1111 Fax: (867) 123-2222

Email: CompanyUnknown@internet.ca

Attention: A. Bonito, Environmental Health and Safety Manager

ii) Effective date of spill contingency plan: January 1, 2004

iii) Last revisions to spill contingency plan: June 1, 2005 (Sections 2 and 3 were updated, and re-dated)

iv) Distribution list:

The plan and the most recent revisions have been distributed to:

A. Bonito	Environmental Health and Safety Manager, Company Unknown
C. Donald	Project Engineer, Company Unknown
D. Edwards	Public Relations, Company Unknown
C. Cat	Camp Manager, Company Unknown
F. Grolsch	President, Company Unknown
H. Inez	Contractor – ABC CleanUP Incorporated
J. Doe	Inspector, Indian and Northern Affairs Canada
S. Davie	Water Resources, Indian and Northern Affairs Canada
A. Smith	Environmental Protection, Environment Canada
I. Spell	Area Manager, Fisheries and Oceans Canada
P. Brown	Environmental Protection Division, Government of the NWT
J. Kraft	Chair, Land and Water Board

v) Purpose and scope:

The purpose of this plan is to outline response actions for potential spills of any size, including a worst case scenario for the Company Unknown site at Lake Invisible. The plan identifies key response personnel and their roles and responsibilities in the event of a spill, as well as the equipment and other resources available to respond to a spill. It details spill response procedures that will minimize potential health and safety hazards, environmental damage, and clean-up efforts. The plan has been prepared to ensure quick access to all the information required in responding to a spill.

vi) Company environmental policy

Company Unknown is committed to the concept of sustainable development and the protection of the environment and human health. Company Unknown's environmental, health and safety policy is to:

- protecting employees, the public and the environment
- fully comply with all applicable legislation, regulations, and authorizations
- work proactively with federal, territorial and Aboriginal governments, other relevant organizations, and the general public, on all aspects of environmental protection
- anticipate future spill control requirements and make provision for them
- keep employees, contractors, Inspectors, Land and Water Boards, appropriate governments

(Aboriginal, federal and territorial), and the public informed of any changes at the site or with project activities.

The plan is presented to all staff during their on-site orientation sessions. All employees and contractors are aware of the locations of the plan on the site at Lake Invisible and in the head office in Yellowknife. During the orientation meeting, training sessions are scheduled to ensure employees have an understanding of the steps to be undertaken in the event of a spill. All employees and contractors are shown where spill kits are stored, are aware of their contents and are trained in using spill equipment and responding to spills. The company is committed to keeping personnel up to date on the latest technologies and spill response methods.

vii) Project description:

The Lake Invisible location of Company Unknown is used as a camp and staging area for local test drilling as well as exploration activities in the surrounding region. Permits and licences are in place for the company's drilling and exploration activities. The camp operates year round, except freeze-up and break-up, at varying levels of capacity.

viii) Site description:

The camp is located xx kilometres north of Yellowknife on the west shore of Lake Invisible, at xox' N, xox' W. It is a remote area, with no adjacent communities or inhabitants. Thus the only people immediately affected by a potential spill are employees or contractors.

The site is located 50 kilometres north of a licenced fishing lodge, 60 kilometres northwest of the XX Protected Area and Yellowknife is the nearest community. Figure 1 illustrates the Company Unknown site on a 1:50,000 scale.

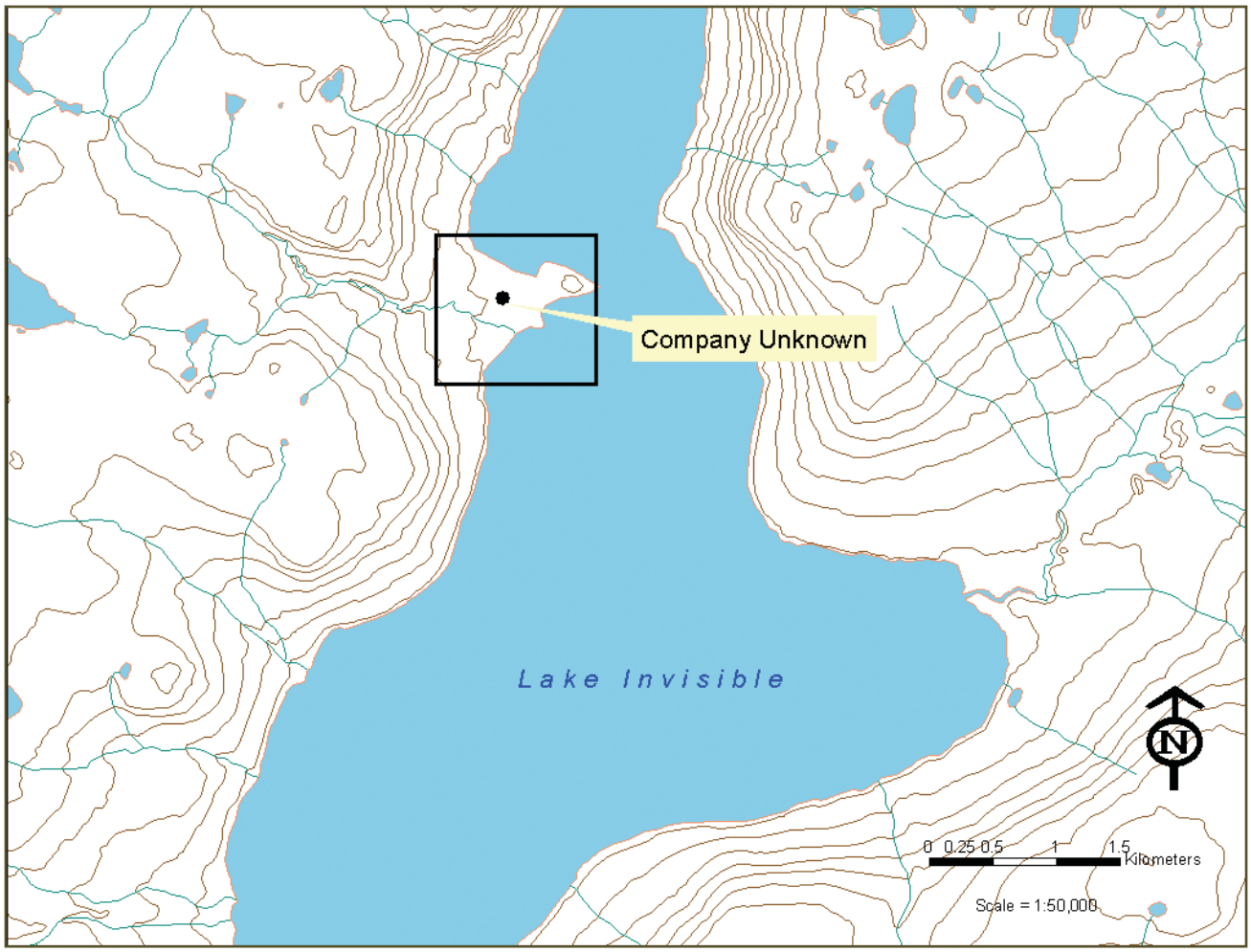


Figure 1: Site location map

A map of the site including the location of fuel storage areas, offices, kitchen, sleeping shelters, generators, helicopter landing pad, drilling site and surrounding water bodies and direction of flow is presented in Figure 2. All buildings and fuel storage areas are at least 100 meters from the nearest water body. All supplies arrive on-site via air (twin otter or helicopter). The lake is used for landing float planes in the summer and planes on skis in the winter on the north shore of the camp.

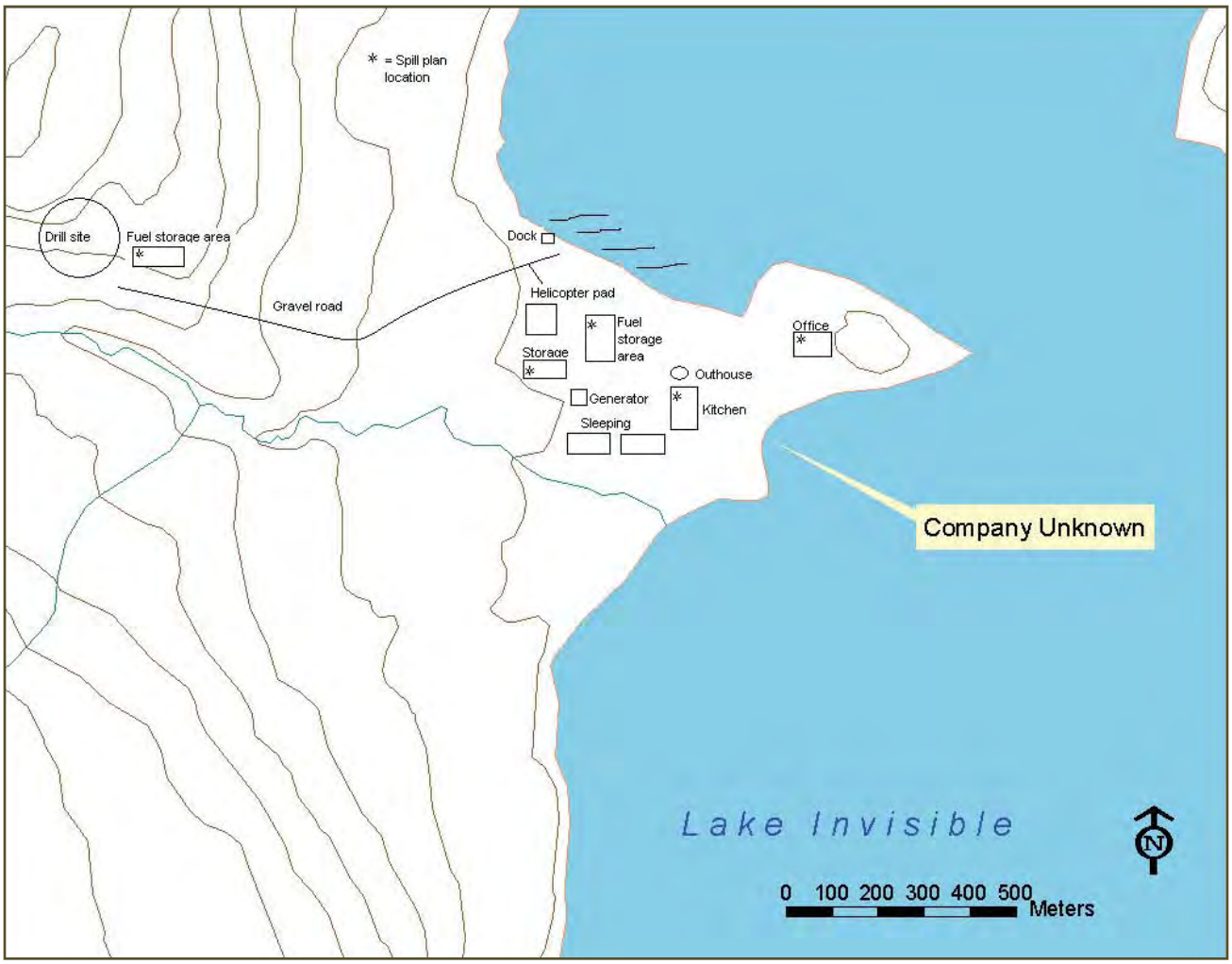


Figure 2: Sketch of site plan including buildings, roads, water bodies, hazardous material locations, spill kit locations and direction of flow

ix) List of hazardous materials on-site

There are two fuel storage areas on site. The fuel storage area near the helicopter pad is for storing diesel, jet B, gasoline and propane. The second fuel storage area near the drill site contains only diesel and gasoline. Smaller amounts of other petroleum products and oils/lubricants are stored on-site at the Lake Invisible camp in a storage building. Table 1 presents a list of hazardous materials on-site, the type of storage container, the average and maximum quantities stored and their storage location.

Table 1: List of hazardous materials stored on-site, type of storage container, the normal and maximum storage quantities, and storage locations

Material	Storage Container	Normally On-site	Maximum On-site	Storage Location (see Figure 1) and Uses
Diesel Fuel	200 L drums	3,000 L (15 drums)	5,000 L (25 drums)	Two fuel storage areas. Used to heat communal buildings by oil stoves and used for drill rig.
Jet B Fuel	200 L drums	2,000 L (10 drums)	4,000 L (20 drums)	Fuel storage area near helicopter pad. Used to power helicopters and twin otter aircraft.
Gasoline	200 L drums	1,000 L (5 drums)	2,000 L (10 drums)	Two fuel storage areas. Used for ATVs and snow machines.
Propane	45kg cylinders	900 kg (10cylinders)	1,800 kg (20cylinders)	Fuel storage area near helicopter pad. Used for kitchen stove and fridge.

Waste oil is stored in empty 200 L drums in either of the fuel storage areas, and shipped out by plane for off-site disposal at an appropriate waste facility.

Other hazardous materials found on-site in very small quantities are in a storage building and/or the kitchen. These include lubricants/oil/grease for maintenance of motorized equipment and general cleaning products for kitchen/bathroom/office use.

Motorized equipment on site includes two all-terrain vehicles, a small loader, a drill rig, three snow machines, a zodiac boat (for emergency response; e.g. airplane accident) and three fuel transfer hoses with pumps.

All buildings containing hazardous materials are over 100 m from any water body. Material Safety Data Sheets for each hazardous material are included in Appendix B-1.

x) Existing preventative measures:

Planning for an emergency situation is imperative, due to the nature of the materials stored on site as well as the remoteness of the site. Along with the preventative measures outlined below, adequate training of staff and contractors is paramount.

All hazardous materials arrive by air as needed throughout the year. They are unloaded by airplane and helicopter pilots and Company Unknown staff and carefully placed in the fuel storage areas. Protective flame retardant clothing, steel toe boots, hard hats and safety glasses are worn while unloading the fuel drums.

The storage areas for diesel fuel, jet B fuel, gasoline and propane are lined with impermeable liners and bermed with 110% containment. Planking is used to protect the liner from the fuel drums and cylinders. In addition the fuel drums used for the oil stoves heating common areas are in secondary containers that are leak proof and are placed on a drip tray.

Spill kits are located wherever fuel is stored or used (see Figure 2). See Section 4.i. for details on spill kit contents. Portable drip trays and appropriately sized fuel transfer hoses with pumps are used when refuelling aircraft, ATVs, or other motorized equipment, to avoid any leaks/drips onto the land.

The camp manager or designated fuel monitor conducts daily visual inspections to check for leaks or damage to the fuel storage containers, as well as for stained or discoloured soils around the fuel storage areas and adjacent motorized equipment. For example, lids/caps are checked for tight seals. A checklist is used to ensure no areas have been missed and results of the inspections are recorded in the company database. Regular maintenance and oil checks of all motorized equipment are also undertaken to avoid preventable leaks.

Gray water is piped to a sump at least 100 m inland of the kitchen, office and sleeping quarters. The sump must maintain a 1 meter freeboard at all times. The sump and pipe are inspected regularly for leaks or overflow.

xi) Additional copies:

Several copies of the plan are kept on-site at all times at the two fuel storage areas, in the office and in the kitchen building. A copy is also held at the company's main office/headquarters in Yellowknife, Northwest Territories and with the Land and Water Board. Additional copies of the plan can be obtained by contacting the company directly at the phone number, fax or email presented in section 1i).

xii) Process for staff response to media and public inquiries:

The company has established procedures for dealing with media and public inquiries. All inquiries are to be directed to the manager of public relations at the headquarters office in Yellowknife. If the manager is not available, there will be another staff member available to act in this position. If a reporter or member of the public arrives at the site unexpectedly, the official in charge of responding to their questions will be the camp manager or acting camp manager. Prior to responding to their questions, they should make every effort possible to contact the head of public relations to discuss the situation.

The camp manager should always keep the head of public relations informed of any news or updates of potential interest to the media or general public, such that the company is prepared to deal with inquiries any time.

If a spill has occurred and a NWT Spill Report needs to be filled out (see Appendix B-2). This information is available for the public to view upon request by contacting the NWT Spill Line or by viewing the GNWT Hazardous Materials Spills Database online at http://www.e-engine.ca/eps_spillreport/.

2) Response Organization

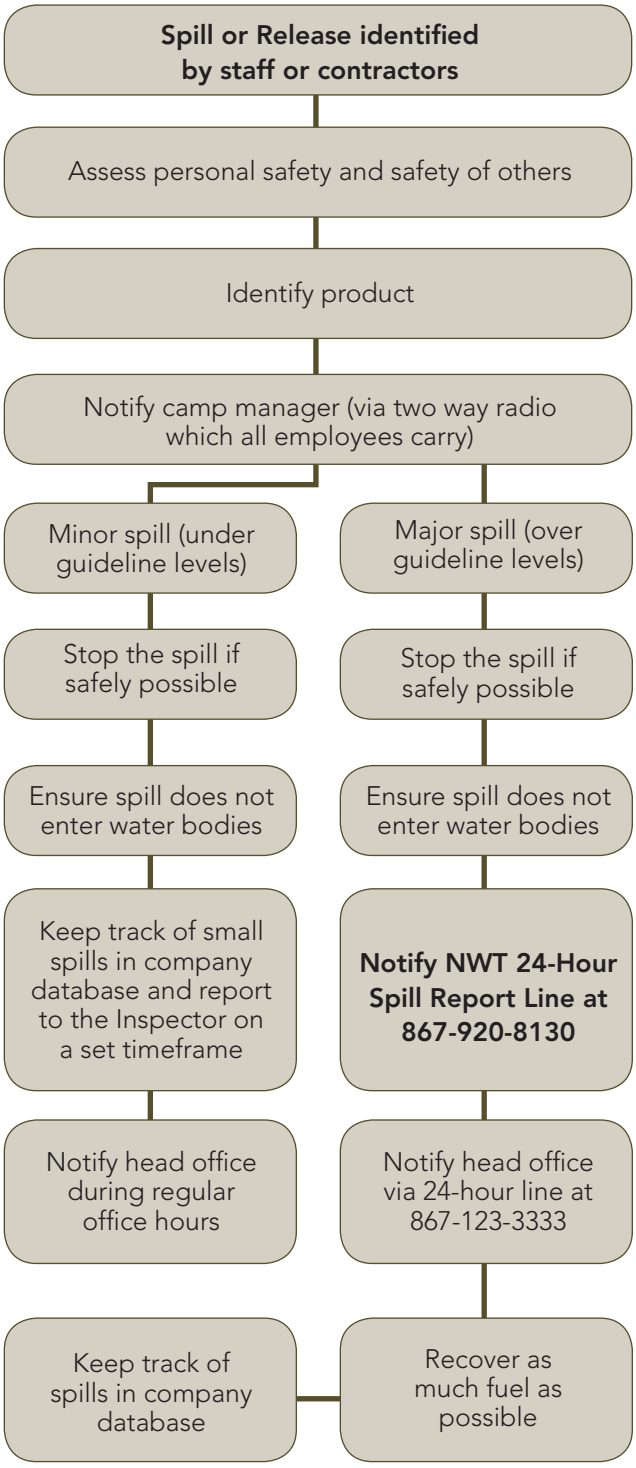
The flow chart depicted in Figure 3 identifies the response organization and when applicable their alternates, as well as the chain of command for responding to a spill or release. The duties of various response personnel are summarized, contact information is provided including 24-hour phone numbers for responsible people and the location of communications equipment on site is discussed.

An immediately reportable spill is defined as a release of a substance that is likely to be an imminent environmental or human health hazard or meets or exceeds the volumes outlined in Appendix B-3. It must be reported to the NWT 24-Hour Spill Report Line at 867-920-8130. Any spills less than these quantities do not need to be reported immediately to the spill reporting line. Rather, these minor spills will be tracked and documented by the company and submitted to the appropriate authority either immediately upon request or at a pre-determined reporting interval. If there is any doubt that the quantity spilled exceeds reportable levels, the spill will be reported to the NWT 24-Hour Spill Report Line.

Emergency satellite phones are located in the office and two fuel storage areas. In the event of a spill involving danger to human life these phones will be used to contact emergency response personnel in Yellowknife. In addition, all employees and contractors carry two-way radios for communication with the camp manager and other staff on site.

Following reporting of the spill to the camp manager, he/she will report spills to the NWT 24-Hour Spill Line as necessary. The camp manager will also inform the head office for tracking spills in company databases and notify the head office in the event of media inquiries. The 24-hour emergency head office number is 867-123-3333.

Figure 3: Flow chart of response organization (details of each step will be provided in the procedures for initial actions under Section 3 Action Plan)



3) Action Plan



i) Potential spill sizes and sources for each hazardous material on site

In Table 2, a list of potential discharge events, with associated discharge volumes and directions is presented for the primary hazardous materials stored on site. The most likely discharge volume is indicated and the spill clean up procedures will focus on spills of this quantity. A worst case scenario is also presented. Specific discharge rates are not indicated for each fuel type as these would vary from a few minutes to several hours, based on the source of leak or puncture.

Table 2: List of hazardous materials, potential discharge events, potential discharge volumes (worst case scenario in brackets) and direction of potential discharge

Material (sources)	Potential Discharge Event	Discharge Volume (worst case)	Direction of Potential Discharge
Diesel Fuel (drill rig, oil stoves)	1) Over pumping of fuel from drum into drill rig. 2) Leaking from drill rig. 3) Minor leaking fuel drum in/outside fuel storage area. 4) Large puncture, fast leaking drum in/outside fuel storage area. 5) From drum connection to stoves in communal buildings. 6) All drums punctured and leaking at once (very unlikely).	Likely under 200 L/1 drum (max 11,000 L/ 55 drums)	Toward stream from drill site or fuel storage area near drill site. In camp on flat ground, from fuel storage area or communal buildings with potential underground seepage to Lake Invisible and/or stream.
Jet B Fuel (twin otter, helicopter)	1) Overfilling of aircraft. 2) Leak from drum or hose while filling aircraft. 3) Minor leaking fuel drum in/out side fuel storage area. 4) Large puncture, fast leaking drum in/outside fuel storage area. 5) All drums punctured and leaking at once (very unlikely).	Likely under 200 L/1 drum (max 4,000 L/ 20 drums)	In camp on flat ground, from fuel storage area or helicopter pad with potential underground seepage to Lake Invisible and/ or stream. In Lake Invisible while refuelling twin otter.
Gasoline (ATVs, snow machines)	1) Overfilling of ATVs or snow machines (small spill). 2) Leak from drum or hose while filing ATVs or snow machines. 3) Minor leaking fuel drum in/outside fuel storage area. 3) Large puncture, fast leaking drum in/outside fuel storage area. 4) All drums punctured and leaking at once (very unlikely)	Likely under 200 L/1 drum (max 2,000 L/ 10 drums)	In camp on flat ground, from fuel storage area with potential underground seepage to Lake Invisible and /or stream. Toward stream from fuel storage area near drill site.

Propane (kitchen stove and fridge)	1) Leak while connected to kitchen stove or fridge. 2) Minor leaking cylinder in or outside fuel storage area. 3) Large puncture, fast leaking drum in/outside fuel storage area. 4) All drums punctured and leaking at once (very unlikely).	Likely under 45 kg/ 1 cylinder (max 900 kg/ 20 cylinders)	In camp on flat ground, from fuel storage area or communal buildings with potential underground seepage to Lake Invisible and/or stream.

Waste oil stored in empty 200 L drums, could potentially leak. The quantity of waste oil drums would be quite limited as they would be shipped out by plane as they are filled up. The risk of a spill from a waste oil drum impacting the environment is very low as waste oil is stored in a bermed site designated for certain wastes.

ii) Potential environmental impacts of spill (include worst case scenario)

Overall for all hazardous materials discussed below, impacts are lower during winter as snow is a natural sorbent and ice forms a barrier limiting or eliminating soil or water contamination, thus spills can be more readily recovered when identified and reported.

Gasoline

Environmental impacts: Gasoline may be harmful to wildlife and aquatic life. It is not readily biodegradable and has the potential for bioaccumulation in the environment. Gasoline is quick to volatize. Runoff into water bodies must be avoided.

Worst case scenario: All fuel drums were punctured or open simultaneously and contents seeped into surrounding soil and water bodies. This could cause illness or death to aquatic life and indirectly affect wildlife feeding from the land and water.

Diesel Fuel

Environmental impacts: Diesel may be harmful to wildlife and aquatic life. It is not readily biodegradable and has the potential for bioaccumulation in the environment. Diesel burns slowly and thus risk to the environment is reduced during recovery as burn can be more readily contained compared with volatile fuels. Runoff into water bodies must be avoided.

Worst case scenario: All fuel drums were punctured or open simultaneously and contents seeped into surrounding soil and water bodies. This could cause illness or death to aquatic life and indirectly affect wildlife feeding from the land and water.

Jet B Fuel

Environmental impacts: Jet B fuel may be harmful to wildlife and aquatic life. It is not readily biodegradable and has the potential for bioaccumulation in the environment. Jet B fuel volatizes relatively quickly. Runoff into water bodies must be avoided.

Worst case scenario: All fuel drums were punctured or open simultaneously and contents seeped into surrounding soil and water bodies. This could cause illness or death to aquatic life and indirectly affect wildlife feeding from the land and water.

Propane

Environmental impacts: Propane may be harmful to wildlife and the surrounding environment. It has the potential to accumulate in the environment. Propane is extremely volatile and is the most flammable material stored on site, thus immediate impacts to the surrounding environment are a concern.

Worst case scenario: All cylinders were punctured or failed simultaneously and contents leaked into the surrounding environment and ignited leading to an explosion. This could cause serious environmental impacts in the immediate surroundings. Safety during emergency response to a propane spill is of the utmost concern.

Waste Oil and Miscellaneous Oils/Grease

Environmental impacts: Waste oils may be harmful to wildlife and aquatic life. It is not readily biodegradable and has the potential for bioaccumulation in the environment. Runoff into water bodies must be avoided.

Worst case scenario: All storage drums were punctured or open simultaneously and contents seeped into surrounding soil and water bodies. This could cause illness or death to aquatic life and indirectly affect wildlife feeding from the land and water.

iii) Procedures:

A. Procedures for initial actions

- Ensure safety of all personnel.
- Assess spill hazards and risks.
- Remove all sources of ignition.
- Stop the spill if safely possible e.g. shut of pump, replace cap, tip drum upward, patch leaking hole. Use the contents of the nearest spill kit to aid in stopping the spill if it is safe to do so. Tyvek suits and chemical master gloves are located in the spill kit and should be worm immediately if there is any risk of being in contact with fuel.
- No matter what the volume is, notify camp manager via two way radio (all employees carry these, as well as on-site contractors if they are not accompanied by an employee).
- Contain the spill – use contents of spill kits to place sorbent materials on the spill, or use shovel to dig dike to contain spill. Methods will vary depending on the nature of the spill. See Section C for more details.

B. Spill reporting procedures

Report spill immediately to camp manager, who will determine if spill is to be reported to the NWT 24-Hour Spill Line at 867-920-8130.

Each spill kit, as well as the office and camp manager, will have copies of the NWT Spill Report form to be filled out (see Appendix B-2). Fill out and fax or email the Spill Report to the staff of the NWT 24-Hour spill line. Also fax or email the report to the head office.

NWT 24-Hour Spill Line
Phone: (867) 920-8130

NWT 24-Hour Spill Line
Fax: (867) 873-6924

NWT 24-Hour Spill Line
Email: spills@gov.nt.ca

Head office, Company Unknown
Phone: (867) 123-1111

Head office, Company Unknown
Fax: (867) 123-2222

Head office, 24 hr phone line
Phone: (867) 123-3333

C. Procedures for containing and controlling the spill (e.g. on land, water, snow. etc.)

- Initiate spill containment by first determining what will be affected by the spill.
- Assess speed and direction of spill and cause of movement (water, wind and slope).
- Determine best location for containing spill, avoiding any water bodies.
- Have a contingency plan ready in case spill worsens beyond control or if the weather or topography impedes containment.

Specific spill containment methods for land, water, ice and snow are outlined below.

1) Containment of Spills on Land

Spills on land include spills on rock, gravel, soil and/or vegetation. It is important to note that soil is a natural sorbent, thus spills on soil are generally less serious then spills on water as contaminated soil can be more easily recovered. Generally spills on land occur during the late spring, summer or fall when snow cover is at a minimum. It is important that all measures be undertaken to avoid spills reaching open water bodies.

Dykes

Dykes can be created using soil surrounding a spill on land. These dykes are constructed around the perimeter or down slope of the spilled fuel. A dyke needs to be built up to a size that will ensure containment of the maximum quantity of fuel that may reach it. A plastic tarp can be placed on and at the base of the dyke such that fuel can pool up and subsequently be removed with sorbent materials or by pump into barrels or bags. If the spill is migrating very slowly a dyke may not be necessary and sorbents can be used to soak up fuels before they migrate away from the source of the spill.

Trenches

Trenches can be dug out to contain spills as long as the top layer of soil is thawed. Shovels, pick axes or a loader can be used depending on the size of trench required. It is recommended that the trench be dug to the bedrock or permafrost, which will then provide containment layer for the spilled fuel. Fuel can then be recovered using a pump or sorbent materials.

2) Containment of Spills on Water

Spills on water such as rivers, streams or lakes are the most serious types of spills as they can negatively impact water quality and aquatic life. All measures need to be undertaken to contain spills on open water.

Booms

Booms are commonly used to recover fuel floating on the surface of lakes or slow moving streams. They are released from the shore of a water body to create a circle around the spill. If the spill is away from the shoreline a boat will need to be used to reach the spill, then the boom can be set out. More then one boom may be used at once. Booms may also be used in streams and should be set out at an angle to the current. Booms are designed to float and have sorbent materials built into them to absorb fuels at the edge of the boom. Fuel contained within the circle of the boom will need to be recovered using sorbent materials or pumps and placed into barrels or bags for disposal.

Weirs

Weirs can be used to contain spills in streams and to prevent further migration downstream. Plywood or other materials found on site can be placed into and across the width of the stream, such that water can still flow under the weir. Spilled fuel will float on the water surface and be contained at the foot of the weir. It can then be removed using sorbents, booms or pumps and placed into barrels or plastic bags.

Barriers

In some situations barriers made of netting or fence material can be installed across a stream, and sorbent materials placed at the base to absorb spilled fuel. Sorbents will need to be replaced as soon as they are saturated. Water will be allowed to flow through. This is very similar to the weir option discussed above.

Note that in some cases, it may be appropriate to burn fuel or to let volatile fuels such as gasoline evaporate after containment on the water surface. This should only be undertaken in consultation with, and after approval from the INAC or lead agency Inspector.

3) Containment of Spills on Ice

Spills on ice are generally the easiest spills to contain due to the predominantly impermeable nature of the ice. For small spills, sorbent materials are used to soak up spilled fuel. Remaining contaminated ice/slush can be scraped and shovelled into a plastic bag or barrel. However, all possible attempts should be made to prevent spills from entering ice covered waters as no easy method exists for containment and recovery of spills if they seep under ice.

Dykes

Dykes can be used to contain fuel spills on ice. By collecting surrounding snow, compacting it and mounding it to form a dyke down slope of the spill, a barrier is created thus helping to contain the spill. If the quantity of spill is fairly large, a plastic tarp can be placed over the dyke such that the spill pools at the base of the dyke. The collected fuel can then be pumped into barrels or collected with sorbent materials.

Trenches

For significant spills on ice, trenches can be cut into the ice surrounding and/or down slope of the spill such that fuel is allowed to pool in the trench. It can then be removed via pump into barrels, collected with sorbent materials, or mixed with snow and shovelled into barrels or bags.

Burning

Burning should only be considered if other approaches are not feasible, and is only to be undertaken with the permission of the INAC or lead agency Inspector.

4) Containment of Spills on Snow

Snow is a natural sorbent, thus as with spills on soil, spilled fuel can be more easily recovered. Generally, small spills on snow can be easily cleaned up by raking and shovelling the contaminated snow into plastic bags or empty barrels, and storing these at an approved location.

Dykes

Dykes can be used to contain fuel spills on snow. By compacting snow down slope from the spill, and mounding it to form a dyke, a barrier or berm is created thus helping to contain the spill. If the quantity of spill is fairly large, a plastic tarp can be placed over the dyke such that the spill pools at the base of the dyke. The collected fuel/snow mixture can then be shovelled into barrels or bags, or collected with sorbent materials.

5) Worst Case Scenarios

Dealing with spilled fuel which exceeds the freeboard of a dyke or barrier would present a possible worst case scenario for the Company Unknown site. To contain the overflow, a trench or collection pit would have to be created downstream of the spill to contain the overflow.

Another worst case scenario would be an excessive spill on water may be difficult to contain with the booms present at the site. In this case, an emergency response mobile unit would have to be called in to deal with the spill using appropriate equipment.

D. Procedures for transferring, storing, and managing spill related wastes

In most cases, spill cleanups are initiated at the far end of the spill and contained moving toward the centre of the spill. Sorbent socks and pads are generally used for small spill clean up. A pump with attached fuel transfer hose can suction spills from leaking containers or large accumulations on land or ice, and direct these larger quantities into empty drums. Hand tools such as cans, shovels, and rakes are also very effective for small spills or hard to reach areas. Heavy equipment can be used if deemed necessary, and given space and time constraints.

Used sorbent materials are to be placed in plastic bags for future disposal. All materials mentioned in this section are available in the spill kits located at Camp Unknown. Following clean up, any tools or equipment used will be properly washed and decontaminated, or replaced if this is not possible.

For most of the containment procedures outlined in Section C, spilled petroleum products and materials used for containment will be placed into empty waste oil containers and sealed for proper disposal at an approved disposal facility.

E. Procedures for restoring affected areas

Once a spill of reportable size has been contained, Company Unknown will consult with the INAC or lead agency Inspector assigned to the file to determine the level of cleanup required. The Inspector may require a site specific study to ensure appropriate clean up levels are met. Criteria that may be considered include natural biodegradation of oil, replacement of soil and revegetation.

4) Resource Inventory

i) On-site resources

Spill kits are located throughout the sites at the locations indicated in Figure 2. The contents are described below. In addition, earth moving and other equipment located at Camp Unknown is also listed below.

Contents of Spill Kits

4 tyvek splash suits

4 pairs of chemical master gloves

10 large bags with ties for temporary use

2 oil only booms (5" x 10')

50 oil only mats (16" x 20")

5 sorbent socks

10 sorbent pads

2 large tarps

1 roll duct tape

1 utility knife

1 field notebook and pencil

1 rake

1 pick axe

3 aluminium scoop shovels

1 instruction binder

Earth moving and other equipment

1 small loader

2 all-terrain vehicles

3 snow machines

1 zodiac boat

1 chain saw

3 fuel transfer hoses with pumps

tool kit including hack saw, hammer, screwdrivers, etc.

ii) Off-site resources

All the contacts listed below could reach the site in 2 hours at a minimum. However, realistically government officials would not be able to reach the site until the next business day, depending on the severity of the spill.

Company Unknown, 24-hour emergency line
(867) 123-3333

NWT 24-Hour spill line
(867) 920-8130

Indian and Northern Affairs Canada Inspector
(867) 669-2761

Environment Canada (Emergency) Yellowknife
(867) 669-4725

GNWT Environmental Protection Division
(867) 873-7654

GNWT Environmental Health Office
(867) 669-8979

RCMP (Yellowknife)
(867) 669-1111

Medivac (Yellowknife)
(867) 669-4115

Great Slave Helicopters (Yellowknife)
(867) 873-2081

Air Tindi (Yellowknife)
(867) 669-8218 or 669-8200

Arctic Sunwest (Yellowknife)
(867) 873-4464

As planning for an emergency situation is imperative due to the materials stored on-site and the remoteness of the site, an employee and contractor training program has been prepared. It is outlined below.

5) Training Program

i) Outline of training program

The employee and contractor training program was developed by the manager of environmental health and safety, and has been disseminated by the camp manager. The following are key steps in the program:

- all individuals entering the site are required to participate in an orientation session
- during this session, all locations of the spill plan and spill kits are provided on a map in hard copy
- an overview of the plan is provided by the camp manager leading the orientation session
- specific training sessions, including mock spill exercises, are scheduled for individuals directly involved in handling hazardous materials to ensure they know all steps to be undertaken in handling these materials, as well as the steps involved in the event of a spill, including the proper use of spill kits
- all employees and contractors are required to have their basic first aid training, as well as WHMIS training, before working on the site
- supervisors are required to have advanced level first aid training, as well as transport of dangerous goods training

ii) Training schedule and recordkeeping

A spreadsheet is kept by the camp manager and head office indicating the training undertaken, and expire dates of specific training e.g. first aid. It is regularly updated.

- diesel
- jet B
- gasoline
- propane

Appendix B-1:

Material Safety Data Sheets (MSDS) for hazardous materials stored on site

The formats of Material Safety Data Sheets vary greatly. Examples can be found on the internet and from Spill Contingency Plans in place for various Water Licences in the NWT (see Land and/or Water Board public registries).

Appendix B-2:

NT-NU Spill Report Form

Northwest Territories | Nunavut | Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR	REPORT TIME	☐ ORIGINAL SPILL REPORT, OR ☐ UPDATE # _____ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER ____-____
B	OCCURRENCE DATE: MONTH – DAY – YEAR	OCCURRENCE TIME		
C	LAND USE PERMIT NUMBER (IF APPLICABLE)	WATER LICENCE NUMBER (IF APPLICABLE)		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION	REGION ☐ NWT ☐ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE DEGREES MINUTES SECONDS	LONGITUDE DEGREES MINUTES SECONDS		
F	RESPONSIBLE PARTY OR VESSEL NAME	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION		
G	ANY CONTRACTOR INVOLVED	CONTRACTOR ADDRESS OR OFFICE LOCATION		
H	PRODUCT SPILLED	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER	
	SECOND PRODUCT SPILLED (IF APPLICABLE)	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER	
I	SPILL SOURCE	SPILL CAUSE	AREA OF CONTAMINATION IN SQUARE METRES	
J	FACTORS AFFECTING SPILL OR RECOVERY	DESCRIBE ANY ASSISTANCE REQUIRED	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT	
K	ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS			

L	REPORTED TO SPILL LINE BY	POSITION	EMPLOYER	LOCATION CALLING FROM	TELEPHONE
M	ANY ALTERNATE CONTACT	POSITION	EMPLOYER	ALTERNATE CONTACT LOCATION	ALTERNATE TELEPHONE

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ COG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF _____

Instructions for Completing the NT-NU Spill Report Form

This form can be filled out electronically and faxed to the spill line at 867-873-6924. Commencing on January 2, 2007, the form can also be e-mailed as an attachment to spills@gov.nt.ca. Until further notice, please verify receipt of e-mail transmissions with a follow-up telephone call. Spills can still be phoned in by calling collect at 867-920-8130.

A. Report Date/Time	The actual date and time that the spill was reported to the spill line. If the spill is phoned in, the Spill Line will fill this out. **Please do not fill in the Report Number**: the spill line will assign a number after the spill is reported.
B. Occurrence Date/Time	Indicate, to the best of your knowledge, the exact date and time that the spill occurred. Not to be confused with the report date and time (see above).
C. Land Use Permit Number /Water Licence Number	This only needs to be filled in if the activity has been licenced by the Nunavut Water Board and/or if a Land Use Permit has been issued. Applies primarily to mines and mineral exploration sites.
D. Geographic Place Name	In most cases, this will be the name of the city or town in which the spill occurred. For remote locations – outside of human habitations – identify the most prominent geographic feature, such as a lake or mountain and/or the distance and direction from the nearest population center. **You must include the geographic coordinates** (Refer to Section E).
E. Geographic Coordinates	This only needs to be filled out if the spill occurred outside of an established community such as a mine site. Please note that the location should be stated in degrees, minutes and seconds of Latitude and Longitude.
F. Responsible Party Or Vessel Name	This is the person who was in management/control/ownership of the substance at the time that it was spilled. In the case of a spill from a ship/vessel, include the name of the ship/vessel. Please include full address, telephone number and e-mail. Use box K if there is insufficient space. **Please note that, the owner of the spilled substance is ultimately responsible for any spills of that substance, regardless of who may have actually caused the spill.**
G. Contractor involved?	Were there any other parties/contractors involved? An example would be a construction company who is undertaking work on behalf of the owner of the spilled substance and who may have contributed to, or directly caused the spill and/or is responding to the spill.
H. Product Spilled	Identify the product spilled; most commonly, it is gasoline, diesel fuel or sewage. For other substances, avoid trade names. Wherever possible, use the chemical name of the substance and further, identify the product using the four digit UN number (eg: UN1203 for gasoline; UN1202 for diesel fuel; UN1863 for Jet A & B)
I. Spill Source	Identify the source of the spill: truck, ship, home heating fuel tank and, if known, the cause (eg: fuel tank overfill, leaking tank; ship ran aground; traffic accident, vandalism, storm, etc.). Provide an estimate of the extent of the contaminated/impacted area (eg: 10 m^2)
J. Factors Affecting Spill	Any factors which might make it difficult to clean up the spill: rough terrain, bad weather, remote location, lack of equipment. Do you require advice and/or assistance with the cleanup operation? Identify any hazards to persons, property or equipment: for example, a gasoline spill beside a daycare centre would pose a safety hazard to children. Use box K if there is insufficient space.
K. Additional Information	Provide any additional, pertinent details about the spill, such as any peculiar/unique hazards associated with the spilled material. State what action is being taken towards cleaning up the spill; disposal of spilled material; notification of affected parties. If necessary, append additional sheets to the spill report. Number the pages in the same format found in the lower right hand corner of the spill form: eg. "Page 1 of 2", "Page 2 of 2" etc. **Please number the pages to ensure that recipients can be certain that they received all pertinent documents.** If only the spill report form was filled out, number the form as "Page 1 of 1".
L. Reported to Spill Line by	Include your full name, employer, contact number and the location from which you are reporting the spill. Use box K if there is insufficient space.
M. Alternate Contact	Identify any alternate contacts. This information assists regulatory agencies to obtain additional information if they cannot reach the individual who reported the spill.
N. Report Line Use Only	**Leave Blank.** This box is for the **Spill Line's use only.**

Appendix B-3:

Immediately Reportable Spill Quantities

TDG Class	Substance for NWT 24 Hour Spill Line	Immediately Reportable Quantities
1 2.3 2.4 6.2 7 None	Explosives Compressed gas (toxic) Compressed gas (corrosive) Infectious substances Radioactive Unknown substance	Any amount
2.1 2.2	Compressed gas (flammable) Compressed gas (non-corrosive, non-flammable)	Any amount of gas from containers with a capacity greater than 100 L
3.1 3.2 3.3	Flammable liquids	> 100 L
4.1 4.2 4.3	Flammable solids Spontaneously combustible solids Water reactant	> 25 kg
5.1 9.1	Oxidizing substances Miscellaneous products or substances excluding PCB mixtures	> 50 L or 50 kg
5.2 9.2	Organic peroxides Environmentally hazardous	> 1 L or 1 kg
6.1 8 9.3	Poisonous substances Corrosive substances Dangerous wastes	> 5 L or 5 kg
9.1	PCB mixtures of 5 or more ppm	> 0.5 L or 0.5 kg
None	Other contaminants (e.g. crude oil, drilling fluid, produced water, waste or spent chemicals, used or waste oil, vehicle fluids, waste water, etc.)	> 100 L or 100 kg
None	Sour natural gas (i.e. contains H2S) Sweet natural gas	Uncontrolled release or sustained flow of 10 minutes or more

In addition, all releases of harmful substances, regardless of quantity, are to be reported to the NWT spill line if the release is near or into a water body, is near or into a designated sensitive environment or sensitive wildlife habitat, poses imminent threat to human health or safety, poses imminent threat to a listed species at risk or its critical habitat, or is uncontrollable.

Contact Information:
Water Resources Division
Indian and Northern Affairs Canada
P.O. Box 1500
3rd Floor, 4914 - 50th Street
Yellowknife, NT
X1A 2R3
(867) 669-2654 (tel)
(867) 669-2716 (fax)

Appendix E-2
Construction Phase, Environmental Management Plan: Tuktoyaktuk to Granular Source 177 Access Road Tuktoyaktuk, Northwest Territories

Environmental Impact Screening Committee

ISSUED FOR USE

CONSTRUCTION PHASE
ENVIRONMENTAL MANAGEMENT PLAN:
TUKTOYAKTUK TO GRANULAR SOURCE 177 ACCESS ROAD
TUKTOYAKTUK, NORTHWEST TERRITORIES

Y22101080

January 2009

Kiggiak - EBA Consulting Ltd.
p. 867.777.2026 • f. 867.777.2027
75 Industrial Road • Box 2418 • Inuvik, Nunavut X0E 0T0 • CANADA

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APPENDICES

1.0 INTRODUCTION

This Construction Phase Environmental Management Plan (EMP) has been developed to provide specific measures to protect the environment and wildlife during construction of the proposed Tuktoyaktuk to Granular Source 177 Access Road. The Project Description Report: Tuktoyaktuk to Granular Source 177 Access Road (Project Description) was submitted to the Environmental Impact Screening Committee (EISC) in December 2008 by the Department of Transportation, Government of the Northwest Territories (DOT) and the Hamlet of Tuktoyaktuk. The EMP provides information on the measures that will be implemented to mitigate potential effects during the construction phase of the Tuktoyaktuk to Granular Source 177 Project (Project).

The Project includes activities associated with the primary objective: construction of an all-weather access road from the Hamlet of Tuktoyaktuk to Granular Source 177, located approximately 19 km south of the Hamlet (Figure 1). It should be noted that this source of aggregate has been used for aggregate borrow activities by the Hamlet in earlier years. Associated activities include the development of a quarry at Source 177 for the purpose of obtaining construction materials, and the establishment of an ice road from Tuktoyaktuk at the outset of the work for the mobilisation of equipment and crews to the camp location (Source 177).

Construction is proposed to begin at Granular Source 177 in February 2009 and is expected to be completed within two (2) years. Road construction is anticipated to begin in the middle section of the road (identified as Section B on Figure 1). A staging area and a small, temporary, 10-12 person camp will be established at the quarry, while the remaining 40-50 construction workers will be based in Tuktoyaktuk. Construction equipment and materials will be delivered to the camp locations prior to the existing winter road closure, before thawing begins on the tundra. Upon completion of the road construction, the mined-out sections of the quarry will be recontoured and reclaimed to be consistent with the surrounding terrain.

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570000 575000 580000 585000

7705000 7700000 7695000 7690000 7685000

N W E S

Tuktoyaktuk

Kugmallit Bay

C

Proposed All-Weather Access Road

B

Temporary Winter Road

A

Granular Source 177

570000 575000 580000 585000

LEGEND

- Phase A - All-Weather Access Road
- Phase B - All-Weather Access Road
- Phase C - All-Weather Access Road
- Temporary Winter Road

A Road Construction Phases

Northwest Territories

Incorporated Hamlet of Tuktoyaktuk — Land of the Pingos

NOTES

Base data source:
Background imagery provided courtesy of Google Earth and is shown for visual presentation purposes only.

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PROPOSED TUKTOYAKTUK TO GRANULAR SOURCE 177 ACCESS ROAD

Proposed All-Weather Access and Winter Access Road Alignments

PROJECTION	DATUM
UTM Zone 8	NAD83

Scale: 1:65,000

1 0.5 0 1

Kilometres

FILE NO.: Y22101080_Access-Road_Figure1.mxd

PROJECT NO.	DWN	CKD	REV
Y22101080	MEZ	TS	0

OFFICE	DATE
EBA-VANC	January 8, 2009

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Figure 1

2.0 PROPOSED SCHEDULE

Construction of the proposed all-weather access road is anticipated to proceed according to the schedule in Table 1.

TABLE 1: PROPOSED CONSTRUCTION SCHEDULE

Schedule	From	To
Permit Issued	Jan-09	Feb-09
Mobilization	Feb-09	-
Construct Winter Ice Road	Feb-09	Mar-09
Heavy Equipment to Begin	Mar-09	-
Borrow	Mar-09	Apr-09
Granular Material: Load, Haul and Spread to Road Section B (note 1)	Mar-09	Apr-09
Grading and Compaction of Section B	Apr-09	May-09
Intermittent Continuation of Grading and Compaction of Section B	Jun-09	Aug-09
Granular Material: Load, Haul and Spread on Section A	Oct-09	Mar-10
Granular Material: Load, Haul and Spread on Section C	Dec-09	Apr-10
Installation of Culverts (Second winter only)	Mar-10	Apr-10
Borrow Site Contouring and Cleanup	Mar-10	Aug-10
Grading and Compaction of Sections A, B, C	Mar-10	Aug-10

Notes:

(1) Road divided into three sections

Section A - From Source 177 to north end Of Big Lake

Section B - North end of Big Lake to bottom of harbour (Gungi area)

Section C - Bottom of Harbour to Tuktoyaktuk

3.0 ENVIRONMENTAL MANAGEMENT PLAN

DOT and the Hamlet of Tuktoyaktuk are committed to constructing and operating the proposed access road and quarry in a safe and environmentally responsible manner. The existing framework for environmental management of the road operation consists of:

- compliance with regulatory instruments that define environmental terms and conditions, including:
  - EISC Screening Decision Report and associated terms and conditions;
  - Inuvialuit Land Administration (ILA) Conditions; and
  - Conformance with Department of Fisheries and Oceans (DFO) Operational Statements;

- use of experienced, local construction contractors;
- avoidance and protection of sensitive terrain and habitats;
- avoidance of identified heritage and archaeological sites; and
- environmental and wildlife protection and monitoring during construction.

The contractor's approach to environmental management for the Tuktoyaktuk to Granular Source 177 construction project will include implementation of the contractor's health, safety and environment (HSE) manual and oil pollution emergency plan.

The EMP provides a guidance document for construction phase activities in relation to the environmental components identified in the Project Description (Kiggiak-EBA 2008).

3.1 GENERAL ACTIVITIES

DOT and the Hamlet of Tuktoyaktuk are committed to minimizing the effects of the project on the environment, wildlife, and human population through careful project design and delivery methodologies. Construction activities are primarily scheduled to occur during the winter season while the ground is frozen and most wildlife are absent or in hibernation. In addition to the scheduling considerations, the road alignment and quarry footprints have been designed to avoid environmentally sensitive or important fish or habitat areas.

3.2 AIR QUALITY AND NOISE

Dust, air emissions and noise associated with the relatively short-term construction of the road and quarry are expected to have limited, localized, and generally temporary effects on air quality and the sound environment in the vicinity of the road and quarry. Temporally, dust emissions and noise will be restricted to the construction periods identified in Table 1. Spatially, effects will be restricted to the proposed road and quarry footprints.

Dust and air emissions will likely occur during operation of heavy equipment, loading and unloading aggregate materials, crushing, screening, erosion from earth and gravel stockpiles, and blasting (if necessary). Air emissions from diesel engine combustion exhaust during the construction phase are considered to be relatively minor.

A summary of the mitigation measures proposed to manage potential emissions from construction activities include:

- ensure proper maintenance of heavy equipment to minimize air emissions;
- conform to the Guideline for Dust Suppression (GNWT 1998);
- restrict speed limits along the road during construction;
- use effective logistical planning to transport employees and materials to/from site; and

- temporarily avoid areas with sensitive wildlife activity or migration (based on recommendations from wildlife monitors).

Noise from construction activities will be intermittent, temporary, and transient in nature. Since most activities are occurring away from the Hamlet of Tuktoyaktuk, effects from noise are considered to be relatively minor. There are no local noise regulations that directly apply to construction noise; however, the following mitigation measures will be implemented to reduce the effect of noise from construction:

- conduct regular maintenance of equipment and ensure that appropriate mufflers are installed for all internal air combustion engines;
- temporarily avoid areas with sensitive wildlife activity or migration (based on recommendations from wildlife monitors); and
- limit construction activity schedules when road construction is near the Hamlet (e.g., limit the number of hours of construction per day to 7:00 am to 7:00 pm), as determined by the Hamlet of Tuktoyaktuk if necessary.

3.3 TERRAIN AND VEGETATION

The proposed road alignment traverses tundra and will be constructed using end dumping methods to initially lay down the base course of aggregate followed by placement of finer aggregate surface for the road. Construction will cause localized soil disturbance due to covering of vegetation with gravel and use of heavy equipment on the road footprint. In areas of wet lowlands, culverts will be installed to allow water passage, to avoid ponding or drying out of isolated sections of wetland. The average road width of the road footprint will be 13-15 m (depending on the surface finish width).

Quarrying will be conducted using progressive reclamation techniques. Only areas where active quarrying is planned will be disturbed. Mined out areas will be recontoured and reclaimed to match the surrounding terrain upon completion of quarrying activities. The effects of the road and quarry on the terrain are generally expected to be limited to the physical footprint.

Equipment traffic between the quarry and active construction areas create the possibility of uncontrolled release of potentially harmful materials, such as hydrocarbons. Designated speed limits, identification of hazards, ad driver diligence will mitigate much of this risk.

The following mitigation measures will be implemented to limit the effects of the construction activities:

- implement construction activities during the winter season while the ground is frozen, to the extent possible;

- limit construction activities, to the extent possible, to within the planned footprint of the road or quarry;
- use fill placement, instead of cut slopes, to protect the permafrost and vegetative cover;
- install geotextile as an underlay to protect the permafrost layer where needed;
- limit heavy equipment and truck travel to within the right of way, on compacted snow/ice, or in designated turn-around locations;
- use a designated, temporary winter access road during construction of Section B to avoid affecting the terrain of Section prior to construction;
- equip snow-clearing dozers with "mushroom pads" to ensure that the vegetative layer on the right of way is not disturbed;
- employ environmental monitors to monitor construction activities, identify potential hazards, provide additional recommendations and measures, educate employees on the environmental management plan, and report their findings to the project manager and superintendent;
- provide instruction to drivers regarding the environmental management plan, rules of the road, potential hazards, and spill response plans;
- implement speed limits along the road;
- conform with mitigation measures in the oil pollution emergency plan (Appendix A);
- have appropriate spill response plans and clean-up kits;
- promptly clean up all spills in accordance with the oil pollution emergency plan (e.g., oil, coolant, etc.);
- install appropriately sized culverts, as appropriate;
- conduct progressive reclamation of the quarry; and
- avoid placing materials over environmentally sensitive terrain.

3.4 WILDLIFE

Wildlife responses to the proposed road construction and quarry development will depend, in part, on whether or not they are resident, seasonally resident, or migratory in their interactions with the road. Potential wildlife habitat management areas are identified on Figure 2. As stated in the Project Description (Kiggiak-EBA 2008), the objectives of the wildlife management activities include:

- minimizing the loss of habitat and reduction of habitat effectiveness;
- minimizing direct mortalities due to collisions with vehicles;

- minimizing disruption of wildlife movements across the road alignment;
- minimizing attractants through responsible waste management (e.g. enclosed waste storage bins, regular removal of wastes from the construction site); and
- work with the Tuktoyaktuk Hunters and Trappers Committee and regulatory agencies to monitor and control harvesting activities.

Road construction and quarry development will cause localized habitat loss and/or may change the use of the habitat from one form to another. To minimize the effects of the construction activities, the following measures will be implemented:

- employ wildlife monitors to monitor wildlife and construction activity, monitor road rule compliance, identify potential hazards, provide recommendations for additional measures, educate employees of wildlife management measures and potential hazards, and report their findings to the project manager and superintendent;
- implement construction activities during the winter season, to the extent possible;
- adopt a sequential development strategy to minimize time and area disturbed;
- limit construction activities, to the extent possible, to within the planned footprint of the road or quarry;
- limit heavy equipment and truck travel to within the right of way, on compacted snow/ice, or in designated turn-around locations;
- use a designated, temporary winter access road to avoid terrestrial habitat, until it is necessary;
- temporarily avoid areas with wildlife activity or migration (based on recommendations from wildlife monitors);
- provide instruction to drivers regarding the environmental management plan, rules of the road (with respect to wildlife management), and potential wildlife hazards;

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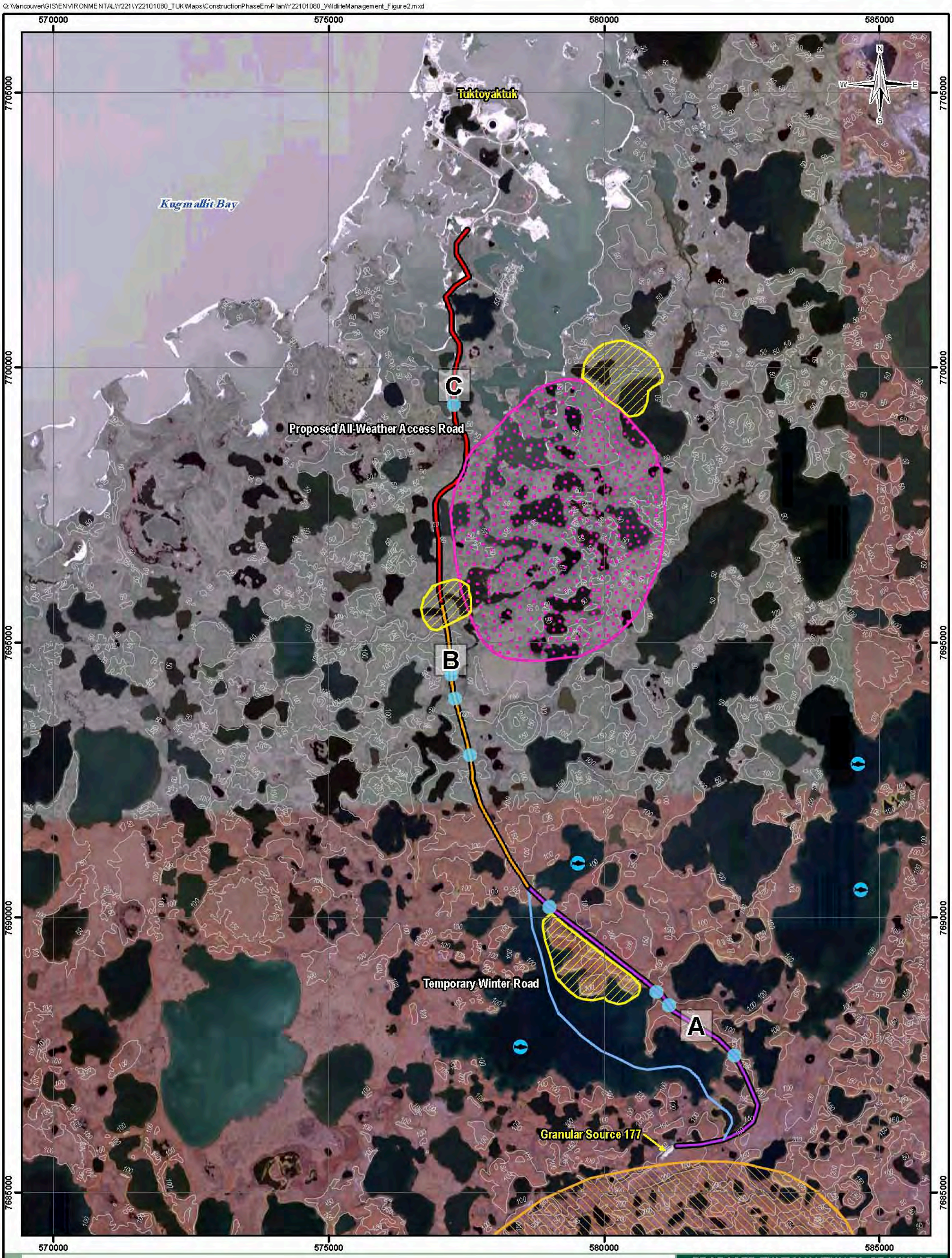

LEGEND

- Potential Stream Crossings
- Fish Bearing / Ilkaasuat
- Contour (50m interval)
- Phase A - All-Weather Access Road
- Phase B - All-Weather Access Road
- Phase C - All-Weather Access Road
- Temporary Winter Road
- Potential Bear Denning Habitat
- Gungi Berry Picking Area
- Moose Area
- A Road Construction Phases

Northwest Territories

Incorporated Hamlet of Tuktoyaktuk — Land of the Pingos

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NOTES

Background imagery provided courtesy of Google Earth and is shown for visual presentation purposes only.
Base data source: NTS 1:50,000

PROPOSED TUKTOYAKTUK TO GRANULAR SOURCE 177 ACCESS ROAD

Potential Wildlife Management Areas

PROJECTION: UTM Zone 8	DATUM: NAD83		
Scale: 1:65,000 (1 0.5 0 1 Kilometres)			
FILE NO.: Y22101080_WildlifeManagement_Figure2.mxd			
PROJECT NO.: Y22101080	DWN: MEZ	CKD: TS	REV: 0
OFFICE: EBA-VANC	DATE: January 8, 2009		

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Figure 2

- implement rules of the road with respect to wildlife management: speed limits, wildlife right of way, and regular communication by radio;
- implement strict waste management measures to avoid attracting wildlife;
- strictly prohibit hunting, feeding, harassing and disturbing wildlife;
- prohibit off-road and recreational use of the road and quarry;
- if wildlife (particularly caribou) tracks are observed, employees will be directed to not follow the tracks;
- have appropriate fuel/oil spill response plans and clean-up kits;
- promptly clean up all spills (e.g., oil, coolant, etc.);
- create breaks in roadside snow banks every 500 m to facilitate wildlife crossing;
- ensure minimal disturbance to any nesting or denning wildlife;
- minimize vegetation removal and conduct progressive reclamation at the quarry; and
- avoid placing materials over important habitat areas, if identified.

3.5 FISHERIES AND AQUATIC RESOURCES

This project intersects with water bodies during two phases: ice road construction and the Access Road's stream crossings. The ice road construction will involve a limited amount of water extraction for the purposes of increasing road covering thicknesses and building ice, as required; and the proposed road alignment crosses eight small (i.e., less than five metres wide), seasonal (ephemeral) streams. All of the streams impacted by construction of the all-weather Access Road are believed to be non fish-bearing. To protect the three small streams to be crossed by the 2009 winter construction program, temporary ice bridges will be constructed across these streams for the first winter. Subsequently, , stream and fish habitat surveys will be conducted during spring and summer of 2009 to determine fish presence/absence and confirm appropriate crossing structure requirements for these streams (Figure 3). Appropriately sized culverts (800-900 mm diameter) will be installed at each of the small stream crossings during the second construction winter to permit seasonal surface water flows to continue unimpeded and fish habitat, if present to be protected.

The following mitigation measures will be implemented to limit the effects of the construction activities:

- all works will be conducted in accordance with the federal *Fisheries Act*, DFO Operational Statement, Protocol for Winter Water Withdrawal in the Northwest Territories (DFO 2005), Freshwater Intake End-of-Pipe Fish Screen Guideline

(DFO 1995) and the Land Development Guidelines for the Protection of Aquatic Habitat (DFO 1993);

- employ environmental monitors to monitor construction activity, identify potential hazards, provide recommendations for additional measures, educate employees about appropriate measures and potential hazards, and report their findings to the project manager and superintendent;

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570000 575000 580000 585000

7705000 7700000 7695000 7690000 7685000

Tuktoyaktuk

Freshwater Creek

Kugmallit Bay

Reindeer Creek

C

Proposed All-Weather Access Road

Reindeer System

B

Mayogiak System

Kanaksak System

Temporary Winter Road

A

Granular Source 177

N W E S

570000 575000 580000 585000

LEGEND

- Fish Bearing / Ilkaasuat
- Potential Stream Crossings
- Phase A - All-Weather Access Road
- Phase B - All-Weather Access Road
- Phase C - All-Weather Access Road
- Temporary Winter Road

A Road Construction Phases

NOTES

Base data source:
Background imagery provided courtesy of Google Earth and is shown for visual presentation purposes only.

Northwest Territories

Incorporated Hamlet of Tuktoyaktuk — Land of the Pingos

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PROPOSED TUKTOYAKTUK TO GRANULAR SOURCE 177 ACCESS ROAD

Potential Fisheries and Aquatic Management Areas

PROJECTION: UTM Zone 8	DATUM: NAD83		
Scale: 1:65,000 (1 0.5 0 1 Kilometres)			
FILE NO.: Y22101080_FisheriesManagement_Figure3.mxd			
PROJECT NO.: Y22101080	DWN: MEZ	CKD: TS	REV: 0
OFFICE: EBA-VANC	DATE: January 8, 2009		

KIGGIAK - EBA

Figure 3

- implement construction activities during the winter season, to the extent possible;
- limit construction activities, to the extent possible, to within the planned footprint of the road or quarry;
- minimize vegetation removal and conduct progressive reclamation at the quarry;
- minimize tracking of soils and fine gravel from the quarry site;
- collect dirty snow from the temporary winter ice road and haul to Tuktoyaktuk for appropriate disposal;
- install silt fencing, where necessary, to minimize siltation in runoff near water bodies;
- extract minimal amounts of water (i.e., less than 100 m^3 per day) from nearby lakes to establish and maintain winter access portage crossings, achieve soil and aggregate compaction for the road, and for dust control purposes;
- prohibit fishing; and
- prohibit off-road and recreational use of the road and quarry by anyone associated with the project activities.

3.6 WASTE MANAGEMENT

The main types of waste produced during the construction phase of the all-weather access road will be typical domestic garbage and sewage. Proper waste management will ensure that wildlife are not attracted to the active construction areas or the camp and that employee health and safety is not compromised.

The following measures will be implemented to protect the environment, wildlife, and employee safety and health:

- employ environmental monitors to monitor construction and camp waste management, identify potential hazards, provide recommendations for additional measures, educate employees of appropriate measures and potential hazards, and report their findings to the project manager and superintendent;
- obtain permission from the Hamlet of Tuktoyaktuk to dispose of waste in the Tuktoyaktuk waste management facility;
- collect all garbage and solid waste and haul to Tuktoyaktuk for disposal in the Tuktoyaktuk waste management facility;
- use Pacto toilets that collect sanitary waste in plastic bags for disposal at an off-site incinerator unit; and
- use hygienic handling procedures for all domestic garbage and sewage handling.

3.7 FUEL AND OIL MANAGEMENT

Environmental consequences related to potential accidents or malfunctions primarily relate to fuel storage, transportation and handling system failures. Fuel needed for road construction and quarry development will be stored in two primary fuel storage units, a 50,000 litre enviro-tank and a 13,000 litre double-walled fuel sloop. All fuel will be stored in accordance with *Canadian Environmental Protection Act*, the Council of Canadian Ministers of the Environment's (CCME's) environmental code of practice for storage of these products (CCME 2003), and Department of Indian Affairs and Northern Development (DIAND) fuel storage guidelines;

A fuel/oil spill response plan for the proposed construction of the all-weather access road and quarry operation will be provided by the selected contractor. A typical example of a suitable oil spill response plan is attached in Appendix A.

To minimize risks, the following preventative and mitigation measures will be implemented:

- implement best management and industry standards, as appropriate, to prevent or minimize the occurrence of accidents or malfunctions;
- employ environmental monitors to monitor construction activity, identify potential hazards, provide recommendations for additional measures, educate employees about appropriate measures and potential hazards, and report their findings to the project manager and superintendent;
- comply with Land use Permit and Quarry Permit requirements and conditions;
- conform to existing applicable GNWT and Workers' Compensation Board standards;
- fuel and other hydrocarbons will be stored in accordance to applicable laws, regulations, and guidelines;
- educate all employees about preventative measures and response measures identified in the spill response plan;
- refuel all vehicles and equipment at least 30 m from water bodies and use a drip tray beneath fuel dispensers;
- if safe to do so, stop any uncontrolled discharge immediately and initiate mitigation according to the fuel/oil spill response plan.
- report spills immediately to the 24-hour Spill Report Line (867-920-8130) and to project managers;
- spill containment and clean-up activities will be implemented in accordance with the contractor's spill response plan and current guidelines.

4.0 CLOSURE

This Construction Phase Environmental Management Plan is intended to provide the information required to successfully construct the Tuktoyaktuk to Granular Source177 all-weather road. If there are any questions or further clarification is required, please do not hesitate to contact us.

Respectfully submitted,
Kiggiak – EBA Consulting Ltd.

Prepared by:

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APPENDIX A

APPENDIX A OIL POLLUTION EMERGENCY PLAN

E. GRUBEN'S TRANSPORT LTD.

OIL POLLUTION EMERGENCY PLAN (OPEP)

Prepared By:
E. GRUBEN'S TRANSPORT LTD.
For the Oil Handling Facility

AT

TUKTOYAKTUK, NORTHWEST TERRITORIES

Located at:
Longitude: 133 01' 55' W
Latitude: 69 27' 15"N

Revised August 1, 2004

E. GRUBEN'S TRANSPORT LTD.

OIL POLLUTION EMERGENCY PLAN – Tuktoyaktuk

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E. GRUBEN'S TRANSPORT LTD.

1.0 PURPOSE

E. Gruben's Transport Ltd. Petroleum Products (EGTPP) was created in February 1999 to provide fuel sales, dispensing and delivery services in the community of Tuktoyaktuk. EGTPP's mandate is to purchase, transport, store, distribute and sell refined petroleum products to residents and private industry in a safe, economic, efficient and reliable manner.

Amendments to the Canada Shipping Act (CSA) now requires owners of the Oil Handling Facility (OHF's) to be prepared to respond to water-borne Oil Pollution Incidents (OPI's) during the loading and/or off-loading of bulk petroleum-based products. EGTPP is a privately owned corporation that is required to comply with CSA standards. EGTPP owns and operates 2 OHF's that is subject to the CSA. EGTPP will comply as part of its overall commitment to environmental responsibility.

The CSA requires that all OHF's have an Oil Pollution Emergency Plan (OPEP) in place that documents how it will respond, contain and recover a water-borne OPI up to a maximum of 1,000 litres. The Canadian Coast Guard (CCG) is the lead Federal Government agency responsible for regulating compliance under the CSA and is mandated to be the first level responder to all OPI's in excess of 1,000 litres, in the Arctic waters. CCG's Arctic Response Strategy outlines its role and methodology for carrying out its mandate.

This OPEP includes plans to respond to both water-borne and land-based OPI's. In all likelihood, any OPI for which EGTPP will have ultimate authority to respond will occur on land. However, given the close proximity of EGTPP's OHF's to water, the probability of a land-based OPI impacting a marine environment is reasonably sufficient to warrant both response regimes.

It is important to note the nature of the contractual agreement the EGTPP has in place for the supply and delivery of petroleum-based products. EGTPP has contracts with the Government of the Northwest Territories (GNWT) and the Beaufort Oilfield Support Services Ltd. (BOSS) for either supply or delivery of such petroleum products. BOSS uses a tug and barge configuration to deliver the fuel supply to the community of Tuktoyaktuk. The barges are generally 120 to 150 feet in length and each barge is capable of carrying 300,000 to 500,000 litres of fuel. Pumps onboard the barge and four-inch floating hose, owned by BOSS, are used to discharge the fuel from the cargo hold to EGTPP's shore connection. The discharge rate at Tuktoyaktuk averages about 50,000 litres per hour.

EGT purchases the fuel in Hay River, NT. This means that EGT is the owner of the petroleum products once the fuel is delivered into the BOSS barges in Hay River. Delivery in the context of the agreement means the physical transfer of bulk petroleum products from IOL or its agent or agents in Hay River into BOSS barges. Therefore, in strict contractual terms, if an OPI were to occur while the fuel was in transit or being discharged at a community, then EGT would be the "polluter of record". As operator of the OHF, EGTPP would be fully involved in responding to the OPI.

E. GRUBEN'S TRANSPORT LTD.

2.0 DECLARATION

Pursuant to the relevant provisions of the CSA, I, Russell Newmark, CEO of E. Gruben's Transport Ltd., located in the Hamlet of Tuktoyaktuk, Northwest Territories, declare:

> **That the E. Gruben's Transport Ltd. Petroleum Products will report and respond to the OPI's, where it has the jurisdiction to do so, in accordance with this OPEP when the OPI occurs as a result of unloading bulk petroleum-based products form a marine vessel.**

The persons listed below are hereby authorized to implement this OPEP:

1. **Mr. Russell Newmark, Vice-President, CEO**
   E.Gruben's Transport Ltd.
   P.O.Box 177
   Tuktoyaktuk, NT X0E 1C0

   Phone: (867) 977-7000 Fax: (867) 977-7040

   Email Address: rnewmark@egrubens.com

2. **Mr. Willie Moore, Operations Manager**
   E. Gruben's Transport Ltd.
   P. O. Box 177
   Tuktoyaktuk, NT X0E 1C0

   Phone: (867) 977-7000 Fax: (867) 977-7040

   Email Address: willie@egrubens.com

3. **Mr. Merven Gruben, General Manager**
   E. Gruben's Transport Ltd. Petroleum Products
   P.O. Box 177
   Tuktoyaktuk, NT X0E 1C0

   Phone: (867) 977-7000 Fax: (867) 977-7040

   Email Address: mgruben@egrubens.com

	9/22/04
Russell Newmark	Date

3.0 OIL POLLUTION EMERGENCY PLAN MAINTENANCE AND CONTROL

The individual responsible for maintaining, updating and controlling the distribution of this OPEP and any amendments made thereto is:

Mr. Russell Newmark, CEO
E. Gruben's Transport Ltd.
P.O. Box 177
Tuktoyaktuk, NT X0E 1C0

Phone: (867) 977-7000 Fax: (867) 977-7040
Email Address: rnewmark@egrubens.com

This OPEP will be reviewed:

1) Annually, on or before June 1st in each bulk fuel re-supply season.
2) As changes to marine shipping and environmental legislation come into effect.
3) During any on-site training and exercise.
4) After each and every OPI.

Changes to phone numbers and names of those individuals identified in this OPEP will be made on an as and when required basis and distributed to all those organizations and/or individuals who have a copy of this OPEP.

4.0 OIL POLLUTION EMERGENCY PLAN AND OTHER EMERGENCY RESPONSE ORGANIZATIONS

EGTPP recognizes that there are other organizations in the community of Tuktoyaktuk that have plans in place for dealing with emergencies and will need to be aware of and to a certain extent, involved in the implementation of this OPEP, in the event of an OPI. These organizations include:

1) Incorporated Hamlet of Tuktoyaktuk
2) Tuktoyaktuk Fire Department
3) Tuktoyaktuk RCMP
4) Resources Wildlife and Economic Development (RWED)
5) Tuktoyaktuk Health Centre

E. GRUBEN'S TRANSPORT LTD.

5.0 SITE SPECIFICATIONS

The Community of Tuktoyaktuk is located at 133 degrees longitude and 69 degrees latitude. The community is on a peninsula that is approximately 1300 m long 90 to 424 meters wide and between 1.5 and 8 meters above sea level.

Tuktoyaktuk receives an average of 7.2 centimetres of rainfall and 65 centimetres of snowfall per year. The mean high temperature for July is 15.2 degrees Celsius and the mean low temperature for July is 6.0 degrees Celsius. Winds are generally from the northwest and average 17.4 kilometres per hour.

6.0 TUKTOYAKTUK OIL HANDLING FACILITY

The OHF is located south of the residential area of the community. The tank farm at the Tuk Canmar site contains a total of 10 tanks for holding three types of petroleum products. The sea-hose connection is currently in the design stage as well as the pipeline system for the tank farm at the Tuk Canmar site.

7.0 ENVIRONMENTALLY SENSITIVE AREAS

The shoreline is continually threatened by erosion due to subsistence from natural melting of ground ice and from regional geological subsistence. Vegetation is salt tolerant on the shoreline. The shoreline is part of an important bird habitant area since the migrant species feed on fish, insects, insect larvae and worms.

Sensitive wildlife in the immediate area of Tuktoyaktuk are whales, seals, fish, polar bears, and waterfowl that could be impacted by a large spill. Whales are hunted during the month of July and into the first two weeks of August. There is also domestic fishery in the Tuktoyaktuk Harbour and the residents usually set up their annual spring and summer hunting and fishing camps along the coastline.

8.0 PROBABLE OIL POLLUTION INCIDENT (OPI) SCENARIOS:

1. An OPI during fuel off-loading within the secondary containment structure of the OHF would be confined within the Tank Farm. The probable cause would be due to human error in allowing a storage tank to be filled to over-capacity. OPI would need to be cleaned-up but it would be contained and pose little immediate threat to human life or to the natural environment.
2. An OPI may also occur as a result of a pipeline failure. The pipeline at Tuktoyaktuk are 4" in diameter. The discharge rate average is 40,000 litres per hour or 666 litres per minute.

It is highly important that a pipeline could rupture during a discharge. However, in the event of a rupture and depending on where it occurred along the length of the pipeline, the damage could be substantial. For example, if the pipeline broke apart at or near the junction where it enters the OHF, back pressure from the storage tank would allow the release of fuel until a Discharge Officer was able to close the valve to the tank. Fuel in the pipeline would continue to be released until the Pumpman on the barge was able to shut off the pump. Fuel would continue to seep from the pipeline until the pressure inside the line was equalized. The fuel would flow down gradient towards the shore. Because the re-supply is to be continually monitored, the discharge agent would immediately radio to the Pumpman to cease pumping fuel. As much as 660 litres could be discharged into the natural environment as a result.

If the pipelined ruptures at or near the shore manifold, fuel would continue to be released until the pump on the barge was shut off. The entire contents of the pipeline would be emptied and backpressure from the storage tanks would continue to release fuel until the Discharge Officer was able to close the valve to the tank. Between 500 and 1,000 litres could be discharged onto the beach and directly into the Tuktoyaktuk Harbour.

3. BOSS deploys about 100 metres of 4" floating hose to affect the discharge from the barge to the shore manifold. BOSS tests and certifies its hose every year up to a maximum pumping pressure of 150 pounds per square inch. The discharge rate at Tuktoyaktuk is approximately 40 pounds per square inch. It is highly unlikely that the hose would rupture. However, if the hose were to break at its midpoint then fuel would continue to be discharged until the pump was turned off and the contents of the hose would be released into the water. This scenario would produce an OPI of about 1,400 litres.

9.0 OIL POLLUTION INCIDENT (OPI) RESPONSE

There are three (3) activities that must be taken when an OPI occurs. First, there must be a Response, followed by Containment, followed by Recovery. An OPI may be as easy to deal with as noticing a valve leaking, putting down some absorbent material and disposing of the used material in a responsible fashion. This is a very simple scenario but there has been a response, an effort to contain and recovery of the OPI. There are intermediary steps within each of the activities and they are identified below. The sequence of the steps is extremely important and should be followed. However, each OPI will have its own unique characteristics and the sequence may need to be altered to suit the circumstances. Common sense should prevail.

E. GRUBEN'S TRANSPORT LTD.

RESPONDING:

STEP 1 – IDENTIFY THE SOURCE OF THE OPI

- Locate the source of the OPI.
- Contact the BOSS barge by radio and notify that you have an OPI and request that the pumps be shut off.
- Assess the immediate hazards of the OPI.
- If it is safe and within your capability to do so, shut off the source of the OPI.

STEP 2 – SECURE THE AREA

- Assess OPI area and eliminate all sources of ignition.
- Keep the public away from the OPI.
- Determine the direction of the OPI, how quickly it is migrating and what is causing it to migrate (wind, gravity).
- Determine if human life is in danger and alert the RCMP, the Health Centre, the Volunteer Fire Department and the local Renewable Resource Officer.

STEP 3 – INITIATE THE CONTAINMENT OF THE OPI

- Deploy the on-site spill containment equipment as required.
- Notify BOSS of the OPI and request assistance if required.
- Erect barriers to minimize the migrating of the OPI.
- Notify E. Gruben's Transport Ltd. Facilities manager if heavy equipment is required.
- If the OPI can not be contained with the resources available in Tuktoyaktuk then contact the General Manager, Petroleum Products Division at (867) 977-7000 and request assistance.

STEP 4 – REPORTING THE OPI

- When the source of the OPI has been shut down and it is reasonably contained, it must be reported to the NWT Spill Line.
- NWT Spill Report forms are included in the Appendices to the OPEP.

- Fill out the NWT Spill Report as completely as possible and fax it immediately to **(867) 873-6924.** If a fax machine is not available then you ***must*** still complete the NWT Spill Report and telephone the NWT Spill Line at **(867) 920-8130** to report the OPI. You can call the NWT Spill Line collect but you ***must*** tell the Operator that you wish to report an OPI.

- You will be required to report to the NWT Spill Line until the OPI has been recovered. Depending on the severity of the OPI this may take days, weeks or even months.

RECOVERING:

STEP 5 – IMPLEMENT OPI RECOVERY

- Ensure that the OPI has been adequately contained before starting recovery procedures.

- Depending on the characteristics of the OPI, containment and recovery may be done simultaneously.

- If required, set up a decontamination site so that individuals involved with the containment/recovery operation don't spread the OPI beyond its contained limits.

- Assess which recovery method is most suitable and/or efficient for the circumstances, taking into account the amount of fuel to be recovered, where the OPI occurred and the anticipated danger to human life and the natural environment.

10.0 OIL POLLUTION INCIDENT (OPI) CONTAINMENT AND RECOVERY PROCEDURES SCENARIOS

This scenario would only apply to diesel fuel and Jet A-1. Gasoline is a highly volatile liquid and to contain it within a boomed area on the water would endanger the lives of those who are responding to the OPI. The response to a water based gasoline OPI would be to immediately shut off the source of the spill and to clean up with the use of sorbent pads. The goals of responding to water based diesel fuel and Jet A-1 is to minimize the impact on the environment. Accordingly, the approach will be to contain and recover the spill from the area where it is most likely to accumulate. In Tuktoyaktuk, this would be the area bounded by the barge, shore and the booms placed by BOSS.

10.1 BOOMS

Booms are used to deflect or divert fuel to a defined area so it can be contained and then recovered. BOSS will have deployed booms as part of their spill readiness provisions. It would be redundant for EGTPP to deploy booms in the same place.

RECOVERY

The goal of recovering the spilled fuel is to ensure that as much as possible is recovered as soon as possible therefore minimizing the impact on the environment.

1. DIRECT SUCTION TECHNIQUES

The direct suction technique will be utilized as part of the initial response to the OPI. The community sewage truck will be utilized. A skimmer will be connected to the truck and extraction of the fuel floating on the water will take place. With a tank capacity of about 10,000 litres, in all likelihood, all of the spilled fuel can be recovered. The valves on the truck can be employed to serve as a water/fuel separation function.

2. TRANSFER TO PORTABLE TANK

Once the spilled fuel has been recovered, it can be transferred to a portable storage tank for additional fuel/water separation purposes. If the OPI was of such a magnitude that not all of the spilled fuel could be contained in the sewage truck, then the truck can discharge its first load into the portable tank and return to the scene for a second time.

3. TRANSFER TO EMPTY DRUMS

Once the spilled fuel has been transferred to the portable tank, the fuel has been contained and recovered. However, there still needs to be a final disposition. Accordingly, the containment fuel can be transferred to empty drums for temporary storage. The drums can then be loaded on the barge and sent via Tuktoyaktuk and can be incinerated.

4. USE OF ABSORBENT MATERIAL

Absorbents are materials that soak up fuel either by absorption or adsorption. They are commonly used for final clean-up and recovery of small amounts of fuel. They are affective in recovering thin layers of fuel. In Tuktoyaktuk, sorbent pads will be used for soaking up the residue on the water left behind by the skimmer. Sorbents will also be used for final clean-up in the portable storage tank. The saturated sorbent pads will be placed in open drums. When a drum is full, it will be closed up and sent to Tuktoyaktuk for final disposition.

11.0 OIL POLLUTION INCIDENT (OPI) PREVENTION AND PREPARDNESS

It may not be possible to prevent every OPI from occurring but there are several actions that can be taken to prepare for an OPI and to prevent it from having a major impact on human life and the natural environment. Therefore, the following actions will be performed so that the highest level of preparedness is attained:

- At least one member of the Discharge Team have certification under the Supervisor of Oil Transfer Operations (SOTO) course.
- All members of the Discharge Team be trained in OPI containment and recovery operations.
- All members of the Discharge Team be trained in OPI containment and recovery operations.
- The OHF to be inspected by members of the Discharge Team prior to the discharge proceeding, including familiarization with the tankage, valving and re-supply connection.
- All members of the Discharge Team be familiar with the on-site OPI equipment, how to deploy it and use it effectively and efficiently.
- The OPI equipment be located where it is readily accessible and that the boom be deployed in the water around the discharge vessel prior to the discharge commencing.
- Notifying the community based Emergency Response Organizations that the discharge has commenced and request that they "stand-by" if required.

12.0 COMPLIANCE TRAINING AND EXERCISES

The success of any OPI response depends on adequately trained personnel. The level of training has to be tailored to the functions to be performed and the skill levels of the individual.

Basic Marine Oil Spill Response Training is directed towards all members of the Discharge Team and provides training in fundamental OPI containment and response, including basic health and safety size and specifications of the OHF, the proximity of additional OPI resources and equipment and the environmental sensitivities associated with the site. For Tuktoyaktuk, the Discharge Team will be provided a comprehensive BMOSR course, supplemented by refresher training provided every second year.

Training in the areas of Media Relations, Liability Identification will be provided to the individuals who are responsible for implementing this OPEP. At Tuktoyaktuk they are Russell Newmark, Willie Moore and Merven Gruben.

Exercises are equally important to the success of any OPI recovery. The purpose of the Exercise is to reinforce training through hands-on deployment and use of the Discharge Officers to respond to an OPI with the available equipment and identify areas for additional training. They also create an atmosphere to test the effectiveness of this OPEP. Exercises may consist of a tabletop exercise or an operational one. The tabletop version would involve writing up an OPI scenario and going through the OPEP to determine its effectiveness. The operational Exercise would involve the actual deployment and testing of the response equipment under a hypothetical OPI scenario. It is recommended that a tabletop Exercise be conducted annually. Operational Exercises should be conducted every three years in conjunction with CCG.

12.1 TRAINING

E. Gruben's Transport Ltd. recognizes the value of establishing Training Programs in order to provide higher levels of safety in the workplace, higher levels of personnel competence and confidence, opportunities for personal advancement, greater levels of satisfaction amongst personnel in our employ, as well as to satisfy regulatory requirements. We also believe greater and broader training amongst all levels of our personnel will help us produce a higher quality of work for our clients and will result in greater opportunities for the company to gain new work and new clients.

E. Gruben's Transport Ltd. will provide and/or support includes both formal and informal training, on-the-job and classroom training, safety-specific and skill-specific training.

Training and skills-assessment will begin on hiring. New employees will receive basic orientation on safety standards and procedures which are standard procedures for company operations.

Basic Safety Program training, WHMIS, First Aid and TDG programs will be carried out periodically in house as required. As well, programs in Safety Program Supervision, Hazard Identification and Control and Incident Investigation will be provided to supervisory personnel at minimum, in order that such information and developed procedures can be passed down to all personnel through safety meetings.

Programs such as Oil Field Swamper, Oil Field Hauler, Light Duty Vehicle Operator, Heavy Equipment Training, Class 3 and Class 1 Driving Courses, Contaminated Soils and PCB Hauling, and Asbestos Abatement Courses have been and will be offered as operations require.

Many subjects related to new tasks and procedures, or to address newly identified hazards, will be addressed at safety meetings and daily tailgate meetings.

Much of the training which takes place falls under the general heading of On The Job Training.

E. GRUBEN'S TRANSPORT LTD.

12.1.1 Safety Training Certificates

1. DRIVERS LICENSE
2. FIRST AID/CPR
3. TDG
4. H2S ALIVE/AWARENESS
5. WHMIS
6. TRUCK DRIVING
7. AIR BRAKES
8. GENERAL OILFIELD DRIVER IMPROVEMENT
9. OIL FIELD HAULER
10. LIGHT DUTY VEHICLE
11. OIL FIELD SWAMPER
12. HEAVY EQUIPMENT
13. WELDING
14. ENVIRONMENTAL AWARENESS
15. GENERAL SAFETY
16. POWER LINE SAFETY
17. ASBESTOS REMEDIATION
18. HAZWOPER 40 Hour Course
19. ACCIDENT INVESTIGATION
20. HAZARD IDENTIFICATION
21. SUPERVISORS HEALTH AND SAFETY PROGRAM

12.1.2 Employee Files

Employee files should contain records and copies of all training certificates and licences, both those issued by E.Gruben's Tranport Ltd. for in-house training, and also licencing and certification provided by government agencies, training institutions and regulators. Employee files should contain personal information including:

1. Payroll related personal information.
2. Driver License Information (including copy of driver's licence)
3. List of Personal Training Certificates (copies of those certificates)
4. Personal Medical History (this may remain sealed in an envelope and returned at end of employment term)
5. EGT Tuk Base Rules & Policies – Sign off
6. EGT Vehicle Policy – Sign off
7. Drug & Alcohol – Sign off
8. HSE Hand book – Sign off
9. Safety Orientation Acknowledgement Form

Employees receive from E. Gruben's Transport Ltd.:

1. Drug & Alcohol Policy
2. Vehicle Policy
3. EGT Camp Rules
4. Emergency Information
5. HSE Handbook
6. Copies of any certification for any training programs arranged by or conducted in-house by E. Gruben's Transport Ltd.

12.1.3 On the Job Training (OJT)

The purpose of on-the-job training (OJT) is to address the development of on-going job skills. With a disciplined approach to OJT, the worker is provided with the practical knowledge and skills required to perform a job task in a safe, efficient manner that complies with company procedure.

Procedures

OJT must be provided as a means of transferring task knowledge from competent workers to workers who do not have operational experience to conduct the task safely.

Personnel competent in work site and related job tasks must provide on-the-job training as prescribed in documented procedures.

Basic Steps for OJT include:

- Provide written procedures and demonstrate to the trainee how you want it done;
- Observe the trainee as he/she does the task;
- Correct any mistakes made by the trainee in a professional manner – be patient;
- Have the trainee repeat the task until he/she does it right – to your satisfaction; and,
- Have the trainee do it one more time for good measure to reinforce the memory of how to do it correctly.

Topics

Some types of skills are well suited for workers to learn through OJT. Below is a list of appropriate OJT topics:

Approved work procedures:

- Critical tasks;
- Equipment operation;
- Proper use of tools;

- Understanding signage and warning symbols;
- Hand signals; and,
- Personal Protective Equipment.

OJT can also be an effective follow-up to reinforce classroom instruction.

Record Keeping

A record of OJT must be signed by a supervisor and the worker to acknowledge task competency and is maintained on file within the company.

See a sample "Checklist for Developing and OJT Program" on the following page

Mandatory Certification Training

Federal, Provincial and Territorial legislation stipulates mandatory certification training requirements for operations under their specific jurisdiction. The following outlines requirements for Transportation of Dangerous Goods (TDG) and Workplace Hazardous Materials Information System (WHMIS) training.

Other mandatory training specific to your operation may be required. Refer to the pertinent legislation that applies to your operation to ensure compliance to legislated training requirements.

Workplace Hazardous Materials Information System (WHMIS)

The aim of WHMIS is to reduce accidents and injuries in the workplace through a system of hazard communication. Its focus is the handling, storage, use and disposal of hazardous materials. It is the employer's responsibility to convey required information to workers through labels, material safety data sheets (MSDS), and worker education.

Under WHMIS legislation, suppliers of controlled product and employers who handle controlled product are responsible for putting WHMIS into effect. Employer's whose workers use, handle, store and dispose of controlled products, and are thereby exposed to the potential hazards of those products, must provide appropriate training.

WHMIS training provided to workers includes the following topics:

- Hazardous chemicals;
- Labelling and hazard symbols;
- Safe Handling, storage, use and disposal measures;

- Material Safety Data Sheet (MSDS); and,
- Personal Protective Equipment (PPE)

WHMIS worker training also includes:

- Acquisition of knowledge so workers know about WHMIS, what they need to know and why they need to know.
- Learning of procedures so workers know how they are to use, handle, store and dispose of hazardous materials; and
- Learning how those procedures get applied on the job.

The employer must keep a copy of any WHMIS certificates of training issued. Certificates must be kept valid and confirmed by current employer.

Transportation of Dangerous Goods (TDG)

In 1992, the Federal Government of Canada passed the Transportation of Dangerous Goods (TDG) Act to promote public safety in the handling, shipping, transportation and receiving of dangerous goods by air, rail, road and marine modes.

The regulations deal with four main areas.

Classification;
Documentation;
Safety marks; and,
Training.

Anyone shipping, transporting, receiving or otherwise handling dangerous goods for the purpose of transporting them must be trained or working under the direct supervisor of someone trained and certified.

The certificate of training must include the data of the initial training, the date of expiry and the aspects for which the person was trained. The certificate is valid for a 36-month period then must be renewed. Anyone offering, handling or transporting dangerous goods must be able to produce a "Certificate of Training" if asked to do so by an officer.

The TDG training provided includes the following topics:

- Classification, documentation and safety marks;
- Special provisions;
- Dangerous occurrence reporting.
- Emergency response actions;

- Special equipment requirements; and,
- Use of safety equipment.

The employer must keep a copy of any training certificates issued.

Recommended Training

Employees and contractors must be trained in safe work practices. The training required varies depending upon the location and the type of work being performed.

A sample of basic training requirements for a worker includes:

- First Aid/CPR
- H2S Alive (or equivalent);
- Fire fighting;
- Chemical handling (WHMIS/TDG);
- Equipment operation; and,
- Environmental awareness.

Proof of certification must be available onsite prior to commencing work.

Training Summary

Companies are responsible for meeting health standards, worker safety, and ensuring the preservation of the environment while conducting their work. Worker training is an investment in achieving these goals.

Establishing programs to enable workers to learn and apply the knowledge they need into their daily routines has many benefits:

- Companies can demonstrate due diligence in meeting legislation requirements;
- Training helps to facilitate reliable communication; and,
- Workers gain confidence to perform their jobs properly and safely.

The petroleum industry requires companies to develop competence in their work force by:

- Assessing training requirements.

12.2. COMMUNICATION

12.2.1 Role of Communication

The important role that communication plays in health, safety and environmental protection cannot be overemphasized.

Important messages need to be communicated numerous times in different ways to ensure the people hear and understand. To make communication effective, your organization climate must encourage people to listen actively. This means encouraging people to check their interpretations, ask when they do not understand, voice their opinions, and let people know they have been understood.

Being a good corporate citizen is supported by open and honest communication with your workforce, the local communities and your business partners.

This section emphasizes two critical communication areas:

1. Management communication; and,

2. Company Safety Meetings such as:
   - Regular weekly management meetings
   - Regular monthly management meetings
   - Daily health, safety and environment meetings
   - Daily tailgate meetings.

The more employees and contractors know about the HSE program, the better able they will be to support it.

In initiating communications, management makes itself more accessible to others working for the company. This will ultimately result in greater participation of workers, contractors and subcontractors in the development and maintenance of HSE programs. It will also lead to higher morale and improved health, safety and environmental performance, along with improved workplace productivity.

12.2.2 Communication Frequency

Regular communication with employees, contractors and subcontractors should include describing the company's commitment to HSE performance and explaining why HSE is important and whom it affects.

Hold meetings for these communications where senior managers and the majority of employees, contractors and subcontractors are present.

It is important for management and supervisors to tour work-sites, observe work practices and talk to workers about HSE issues. The frequency of tours will vary according to your type of operations and locations of your sites.

Conducting safety orientations, providing instruction and practice with experienced guidance and meeting mandatory training requirements are also part of a good communication process.

In addition, special programs like the new worker program, and specialized training and information sessions demonstrate the commitment companies have for their workers, the environment and the communities in which they work.

12.2.3 Management Communication

Management will communicate clearly and regularly the company's commitment to excellent HSE performance to all workers, contractors, subcontractors, suppliers, clients, and other stakeholders.

12.2.4 Communication of Expectations

Establishing expectations with people requires regular communication of the following topics:

- HSE program goals and performance expectations;
- Why HSE is important and who it affects;
- Hazardous conditions and corrective measures;
- Allocation of HSE responsibilities;
- Best practices;
- Incident and accident reporting procedures; and,
- Regulatory issues.

12.2.5 Types of Communication

To communicate company commitment to health safety and environmental excellence, management can do any or all of the following:

- Go to work sites to observe operations and engage workers in discussions of HSE matters;
- Send motivational letters or memos to employees;
- Participate in committees and meetings;
- Include HSE topics as regular agenda items in meetings;
- Highlight HSE accomplishments at company functions;
- Provide detailed job instruction for new, transferred or temporarily assigned personnel;
- Hold regular safety meetings for all staff;

- Recognize workers who work safely; and,
- Provide regular feedback to all employees on safety performance or concerns.

12.3 MEETINGS

Bringing people together on a regular basis to hear and talk about the different HSE programs, procedures, and topics helps to set clear expectations and fosters commitment to incorporate what they learn into their day-to-day work.

The communication guidelines contained below are not intended to be exhaustive.

12.3.1 Regular or Start-Up Health, Safety & Environmental Meetings

All operator work groups engaged in northern operations shall participate in regularly scheduled safety meetings at least monthly or weekly for construction. Additional specific meetings are called as required (i.e. pre-job and tailgate meetings).

It is essential that site leadership attend and participate in as many safety meetings as possible.

Safety meetings are held to ensure that all personnel understand the operational steps and protective measures pertaining to the potential hazards of the job. The specific purposes of these meetings can include:

- Comprehensive identification of safety issues;
- Pre-job and/or task analysis for hazard prevention;
- Establishing protocols; and,
- Emergency response requirements at the beginning of a project or scope of work.

Meeting Details:

1. To help ensure the meeting makes effective use of time and accomplishes its goals, prepare an outline or agenda. This can be an informal list of items to discuss. Examples of topics on the agenda could include:

- Purpose of meeting;
- Organizational announcements;
- Progress reports;
- Objectives;
- Accomplishments;
- Assistance or resources needed;
- Incidents and Near Miss occurrences;
- Areas of concern and opportunities for improvement;
- Review of hazards and potential risks;

- Identify "next steps";
- Set time and date for next meeting; and,
- Identify possible issues to be covered in the next meeting.

2. Ask participants to share their HSE experiences since the last meeting. Focus on the positives. Encourage proactive thinking about HSE.

3. Effectively manage the time used in the meeting.

4. Start and end at designated times; and,

5. Keep the meeting focused by having a facilitator or chairperson.

A sample general meeting agenda can be found on the next page.

12.3.2 Pre-Shift Meetings

Pre-Shift Meetings shall be held before:
- Starting work each morning;
- Starting a new shift; and,
- Undertaking of non-routine jobs.

Additional meetings are also held when:
- There has been a significant change in the way work is being carried out; and
- The supervisor deems it appropriate.

The objectives of the pre-shift meetings are to:
- Keep all members of the work team informed of the day-to-day opportunities and challenges of working safe;
- Inform workers of the forecasted days activities;
- Identify the unique hazards and required control measures to prevent injuries;
- Review basic safe work practices;
- Inform workers of the activities of the other workers and how their activities will interact; and
- Allow a shift supervisor to assess the emotional and physical capacity of crew and ensure all are prepared for work.

The pre-shift meeting allows the shift supervisor to:
- Ensure all onsite personnel are appropriately trained to carry out their assigned duties;
- Ensure certifications and permits are valid and current;
- Identify possible human hazards such as:

1. Physical and/or emotional fatigue;
2. Use of medication;
3. Stress;
4. Emotional distress; and
5. Effects of drugs or alcohol.;

- Identify interpersonal issues amongst team;
- Manage new or green workers in order to identify to the rest of the crew;
- Ensure that new workers have completed pre-job orientations and required safety training; and
- Identify and control work site visitors.

Meeting Details

The pre-shift meetings allow for the review and reinforcement of basic safe work practices and can include the following topics:

- The importance of a proactive approach to safety;
- The necessity of teamwork to ensure a safe work environment for everyone;
- The right and legal obligation of a worker to stop work it the conditions are unsafe or there is a potential for a safety issue to arise;
- Procedures for working alone;
- Basic radio communication;
- Understanding limits of worker responsibility, training limitations and competency;
- The importance of reporting unsafe conditions or practices to the supervisor such as:
  a) Poor housekeeping;
  b) Blocked walkways;
  c) Improper or damaged PPE;
  d) Slippery floors; and
  e) Exposed electrical wires.
- Unsafe acts relevant to the work being conducted such as:
  a) Improper use of chemicals;
  b) By-passing safety devices;
  c) Not using PPE;
  d) Improper lifting;
  e) Non-clean-up of spills; and
  f) Working alone without controls.

Position Handover Duties

The pre-shift meeting creates the opportunity for necessary cross shift information to be communicated. Each employee coming off a shift will ensure that their cross shift or relief worker is fully informed of any information that relates to their position including:

- Current activities being performed;
- Outstanding work permits;

- Current lockout;
- Wildlife cautions;
- Work status;
- Known hazards.

Emergency Response Procedures

During the pre-shift meeting emergency response procedures are reviewed including:

- Current activities;
- Meeting area in case of an emergency;
- Procedures to account for all employees, visitors and contractors;
- Assigned roles of all personnel;
- Response protocol specific to the area of activity;
- Location of safety stations onsite (fire fighting equipment, first aid, eyewash, and communications)
- Emergency escape procedures and routes;
- Shut down procedures;
- Rescue and medical duties for assigned employees; and,
- Procedures for reporting an emergency.

12.3.3 Tailgate Meetings

Tailgate meetings occur as and when needed and are the responsibility of all workers.

Supervisors or workers can initiate tailgate meetings when the need arises in order to identify a safety issue or review the appropriate work or safety procedure associated with a work assignment. Tailgate meetings should be called whenever the conditions of the job change (for example, for changing weather, different available equipment, change in personnel) or whenever the task itself changes. They should be called when new potential hazards are identified. They should also be called whenever workers or supervisors feel that more complete communication and understanding of the task-at-hand is desirable.

12.3.4 Orientations

Pre-job and pre-employment orientations provide the opportunity to present an overall picture of the company's HSE program and commitment, the rights and responsibilities of both workers and management, the company's expectations and policy's, as well as details of particular contracts and clients' requirements. This also provides the opportunity for new employees to complete employment sign-up procedures and the gathering of required employee information for employee files.

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The orientation, because of its in-depth approach, can set the overall tone for the entire term of a new employee's employment, as well as reinforce attitudes and policies for returning employees, and introduce new procedures and policies.

The orientation may be the first opportunity the company has to thoroughly indoctrinate and thoroughly warn an employee about the work situation he or she is entering.

It is critical that all new employees should receive an orientation and that all long-term employees should receive a new orientation at the beginning of every major work season.

The subjects which will be addressed in the E. Gruben's Transport Ltd. orientation include those on the following Safety Orientation Checklist and Sign-Up Form, as well as any conditions particular to individual client jobs.

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Safety Orientation Checklist and Sign-Up Form

I, _____ have participated in the E. Gruben's Transport Ltd. Orientation, which outlines company policies, safety procedures, alcohol and drug policy, and responsibilities of employees and subcontract personnel.

The Orientation covered the following topics:

- ☐ Management and Staff Emergency Contacts
- ☐ Emergency Contact Numbers – Non-Company
- ☐ Emergency Response Chart
- ☐ Company Reporting Organization
- ☐ HS&E Guiding Principles
- ☐ Workers' Responsibilities
- ☐ Subcontractor Responsibilities
- ☐ Enforcement of Rules and Procedures
- ☐ Alcohol and Drug Policy
- ☐ General Safety Rules
- ☐ Personal Protective Equipment
- ☐ Tuk Base Camp Rules
- ☐ Small Vehicle Policy
- ☐ Journey Management Procedures
- ☐ Completion of Administrative Forms:
  - Medical History
  - Training Certificates
  - Driver's License and Driver's Abstract Form
  - Payroll Information Form
  - TD1 and TD1 NT Income Tax Form
- ☐ Abandoned Vehicle Protocol
- ☐ Establishment of the Roadside as a Workplace Protocol
- ☐ Ice Road Safety
- ☐ Emergency Radio Procedures
- ☐ Spill Response Procedures
- ☐ Emergency Response
- ☐ Hazard Identification
- ☐ Near Miss and Incident Reporting
- ☐ Accident Reporting and WCB Requirements
- ☐ Accident and Incident Investigation Summary
- ☐ Right To Refuse Unsafe Work
- ☐ Meetings
- ☐ Job safety Analysis

I certify that I understand and accept my responsibilities and company rules as outlined in the Employee Orientation Presentation.

I acknowledge that I understand and accept the terms of the company Drug and Alcohol Policy, including the requirements for Pre-Employment, Post-Incident and Reasonable Cause Testing.

I acknowledge that I understand and accept the terms of the company Tuk Base Camp Rules, including the possible requirement for searches of rooms and personal effects.

Signature: _____

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Witness:_____ Position: _____

Date:_____

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12.4. ACCIDENT/INCIDENT INVESTIGATION & REPORTING

12.4.1 Investigation and Reporting

Investigation and reporting are critical steps in preventing a similar incident or accident from recurring. The investigation is intended to determine the root cause or causes of an incident or accident as opposed to finding fault.

Incident and accident reporting is also useful because it helps identify:

- Training Needs;
- Problems with work procedures;
- Problems with work site conditions;
- Needs for Personal Protective Equipment PPE, Safety & Emergency Equipment;
- Failures in communication

It also helps collect information necessary for completing insurance reports, for complying with regulatory requirements and for gathering statistical information used to calculate statistics and identify incident trends so that the effectiveness of the HSE program can be measured.

The steps in developing an investigation analysis procedure should include:

- Implementing an incident reporting system;
- Preparing investigation procedures;
- Establishing a progress to ensure required corrective actions are completed; and
- Sharing the lessons learned from the incident investigations with workers to prevent a recurrence.

Types of events to investigate and report include

- Fatalities;
- Injuries or occupational illnesses that prevent a worker from performing regular tasks;
- Injuries that can be treated at the work site and injuries that require treatment by a medical professional;
- Any emergency or loss, such as a motor vehicle accident, fire, explosion, vandalism;
- Environmental damage or loss; and,
- Near misses;

Supervisors will manage the response to the event and notify the appropriate authorities where necessary.

When to prepare reports

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Reports of an incident should be prepared immediately after the event has occurred and kept on file to ensure requirements for regulatory compliance have been met.

In the case of serious accidents and environmental incidents, the accident/incident scene should be preserved to ensure important evidence is not lost or disturbed and details are not forgotten. The law mandates this for a serious injury accident or fatality.

To ensure incident reporting is consistent, appropriate report forms should be available at all work sites as required by regulatory agencies and company policy.

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Implementation

All E. Gruben's Transport Ltd. personnel must be encouraged to report all incidents and must be informed that this is part of their responsibilities as employees.

E. Gruben's Transport Ltd. has developed incident report forms and has provided training for senior management and job supervisors to complete investigations and complete the required paperwork. Written procedures follow this section and report forms are included in the forms appendix of this manual.

Incident Investigation and Follow-Up

Incident investigation and follow-up assists in determining root causes of incidents and helps prevent incidents from recurring. This can only be done with proper investigation and analysis.

Job Supervisors are initially responsible for the investigation of all incidents, regardless of their severity. Depending on the actual or potential severity of the incident an alternate investigation leader may be appointed. The E. Gruben's Transport Ltd. Safety/Loss Control Officer will provide assistance as required, as will any members of the senior management team. Senior management will also review all Incident Investigations.

Findings from investigations may to the recommendation that changes be made to work procedures, methodologies, management systems and corporate policies.

Training

Superior quality can be delivered to an investigation if the investigation team leader has been trained in investigation techniques. Depending on the severity of the incident, insurance investigators or government authorities may also be required to conduct an investigation and/or may require information provided by in-house investigations.

There is a benefit in training work site supervisors in investigation techniques and providing them with a logical approach in determining the underlying or root causes of incidents. E. Gruben's Transport Ltd. has provided Incident Investigation training to all its senior management and job supervisors, and will continue to provide training as new supervisors come into the system. These skills are transferable and can be used to evaluate hazardous job site situations to prevent incidents.

Investigative Purpose

The purpose of investigations is to identify direct and underlying factors that contributed to an incident and the root causes behind those factors.

For example, worker driving a vehicle has a tire explode. He panics, loses control of the vehicle, and is seriously injured. Both the exploding tire and the panicked reaction of the driver to the explosion are contributing factors to the incident.

The root causes behind these factors may be:

- An excessive workload, causing driver fatigue which impaired his ability to respond effectively;
- Inadequate purchasing controls, which allowed tires to be purchased that were undersized for the truck's weight;
- Inadequate pre-tip inspection procedures, which prevented the driver from noticing the tires were under-inflated; and/or,
- Overloading the vehicle.

Investigative Procedure

After being notified of an incident, the on-site supervisor should survey the area to determine if the work must be stopped to prevent injuries and preserve evidence. The on-site supervisor notifies his management and an investigation leader is appointed. The following decisions must be made:

- Determine if government authorities and insurance investigators should be called; and
- Determine if legal advice is required;

The investigation leader directs the gathering of evidence, which is to include:

- Interviewing witnesses and the people involved;
- Photographing the site to record evidence and damage; and
- Creating scale drawings and diagrams.

If insurance investigators or government or other regulatory authorities are called in, the investigation leader will assist them as required.

Once evidence has been collected, then the investigator can complete the investigation process, which includes:

- Determining the immediate and root causes of the incident;
- Completing the investigation report;
- Developing recommendations to prevent a recurrence;
- Prioritizing a list of corrective actions identifying responsible parties and target dates for completion;
- Submitting completed reports and recommendations to management and, if required, to the insurance company and government;
- Discussing the report and recommendations with everyone who was working on the site at the time of the incident and with all other employees that are affected by the incident; and,

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Consideration should also be given to circulating any learnings and recommendations throughout industry.

Individuals who are assigned action items then carry out the investigator's recommendations and provide feedback to management on a monthly basis until all actions are completed and signed off. Only once there is verification that all recommended corrective actions have been completed can the incident report be closed out.

Investigation Analysis Process

INCIDENT	ACTION	INITIAL REPORTING	ANALYSIS	SYSTEM IMPROVEMENT
Contact with Energy resulting in undesired event	- Protect crew - Care for injuries - Contain incident - Preserve the scene - Notify Superintendent - Mobilize support - Recovery	Immediate causes: - Acts - Substandard conditions - Contributing factors	Investigation leader chosen depending on incident or severity Identify basic or "root" cause(s): - Personal factors - Job/system factors (controls that failed)	Corrective actions to prevent recurrence: - Assign responsible person(s) for implementing corrective action - Set time to completion - Track progress - Communicate lessons learned to others

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Incident Statistics

Incident statistics are compiled for use in the company's HSE performance assessment and for third party use.

Frequency of lost-time injury incidents (including fatalities) and severity of lost-time injury incidents are calculated quarterly.

Calculations are based on the following:

Lost Time Injury Frequency = Number of lost-time injuries x 200,000/Number of hours worked.

Recordable Injury Frequency = Number of lost-time injuries + Number of medical aid injuries Number of restricted work injuries x 200,000/Number of hours worked.

Injury severity = Number of lost days x 200,000/Number of hours worked.

Rates are a better measure than simply counting the number of incidents because they take into account the level of worker activity. Therefore, a comparison of performance between time periods is valid.

Incident Reporting & Investigation Summary

Proper incident reporting and investigation processes will ensure that E. Gruben's Transport Ltd. is:

- Accountable for any actual or potentially serious events;
- Better able to determine the root cause of the incident; and
- Enabled to make the changes necessary to avoid any re-occurrences.

This process also enables the company to demonstrate its responsibility to the workforce, their families, and the communities in which we work.

12.4.2 Accident/Incident Investigation Procedures

Accident/incident investigation is a vital part of E. Gruben's Transport Ltd.'s Health and Safety Program. No other activity produces such quick results as the prompt reporting and investigation of accidents and "near miss" incidents. Therefore, we provide the following written procedures and guidelines for use in the completion of Accident/Incident Investigations

Investigation of an incident or accident involves much more than filling out a report form. It is a process of gathering factual information and drawing conclusions; the repot form is only the documentation and the summary of that process.

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The purpose of an accident investigation is to determine the causes and put corrective measures in place to prevent a recurrence. It is not to find fault of fix blame. Serious accidents or incidents with a high potential for injury or damage will require an in-depth investigation but every incident is a signal of problems that need to be corrected.

Understanding Accidents

Many theories and models exist that explain how accidents happen. How an accident investigation is conducted will, in many cases, depend on the investigator's beliefs about the causes of accidents. A particular accident theory can strongly influence the organizations investigation process and can provide direction to its entire occupational health and safety management system. It is important therefore to explore our understanding of accident causation.

Incident Sequence Model

In the early days of occupational health and safety, most methods used to prevent accidents and injuries tended to focus on the worker and "fixing the worker". Today, we feel that a much broader approach is required. This broader approach looks at supervision and worker involvement.

The Incident Sequence Model is a management system based model of accident theory. It is a modification of accident "domino" theories and says that incidents occur much like dominos falling in sequence. The sequence starts on the left with each "domino" knocking over the one to the right.

To use the model in conducting an investigation, we will start on the right and move left in reverse sequence.

Effect

This is the result of consequences of the incident: injury or illness; damaged tools, equipment or machinery – the loss. In the case of a near miss or close call, there is no loss. The severity of the loss varies and is largely the result of chance (luck).

Incident

In order to better understand the investigation process, it is important to clarify our definition of the terms "accident" and "incident". These can include:

- Injury, illness or disease or fatality;
- Damaged tools, equipment or machinery; and
- Damaged material or property, including environmental damage.

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This differs from dictionary definitions of "accident" which tend to emphasize factors such as "happening without observable cause" "arising from unknown causes" etc. This leaves the perception that accidents just happen and that they cannot be prevented.

In health and safety, the term "incident" is used in a broad sense to include accidents and other unplanned events which, under slightly different circumstances, could have resulted in harm to people or damage to equipment, machinery or property. These are often referred to as "near misses" or "close calls".

This then is the unplanned event that precedes the loss or close call. It is the exposure to the hazard or the contact that could result in harm or damage. Incidents are commonly classified as follows:

- Struck against (running or bumping into);
- Struck by (hit by a moving object);
- Fall to lower level (either the body falls or the object falls and hits the body);
- Fall on same level (slip and fall, top over);
- Caught in (pinch and nip points);
- Caught on (snagged, hung);
- Caught between (crushed or amputated);
- Contact with (electricity, heat, cold, radiation, caustics, toxics, noise); and
- Overstress/overexertion/overload

Immediate Causes

These are the hazards that existed immediately prior to the occurrence of an incident or accident. A hazard is defined as any unsafe practice or unsafe condition that has the potential to cause injury, illness, disease or damage to property, equipment and the environment. Immediate causes are usually easily identified and they are broken down into two types.
These are Unsafe Practices and Unsafe Conditions.

Unsafe Practices

These are the hazardous practices and behaviors that permit the occurrence of an incident, for example, failure to lock out equipment, failure to wear eye protection, overloading, poor driving practices, etc.

Unsafe Conditions

These are hazardous conditions that permit the occurrence of an incident, for example, inadequate guards or barriers, defective tools, poor housekeeping, weather conditions, etc.

Many investigators have a tendency to focus only on the immediate causes of an accident. But in order to prevent a repetition of what happened, you must dig deeper. It may be tempting to pin the accident on something a worker did or did not do and let it go at that. However, there is rarely, if

ever, a single cause behind an incident or accident. Even the simplest incidents occur from a combination of causes.

Immediate causes are also called direct causes. They are the symptoms of deeper problems and the investigation must go beyond the immediate causes to identify the underlying causes.

Underlying Causes

These are real causes behind the symptoms; the reasons why the immediate causes existed. The underlying causes are not as apparent as the immediate causes. They are also referred to as root causes, basic or indirect causes.

Underlying causes can be identified by asking probing questions about the unsafe practices and unsafe conditions identified as the immediate causes. Here are some examples:

- Why was the equipment not locked out? Is there a lockout/tag-out procedure in place? Are workers aware of the procedure? Are workers trained in using the procedure?
- Why did the worker not wear eye protection? Is eye protection available? Is the wearing of eye protection enforced by the supervisor? Was the worker aware of the need for eye protection?
- Why did the worker remove the guard? Was there a lack of maintenance? Is the machine poorly designed? Was the worker aware of the hazard?
- Why was debris on the floor? Was this a rushed job? Is there any individual accountability for clean-up?
- Analysis of the answers to these probing questions will lead to the identification of underlying causal factors in two main categories – personal and work environment:

Personal Factors:

- Inadequate physical capability
- Inadequate mental capability
- Physical stress
- Mental stress
- Lack of knowledge
- Lack of skill
- Improper motivation

Work Environment Factors:

- Inadequate leadership/supervision
- Inadequate engineering
- Inadequate purchasing
- Inadequate maintenance
- Inadequate tools and equipment
- Inadequate work standards

- Wear and tear
- Abuse/misuse

Management System Defects:

Underlying causal factors can be linked to defects in the health and safety management system. There are three key areas to consider:

- System Components: The system may be lacking some important elements.
- System standards: The standards are not clear or specific enough. They may be inappropriate.
- Conformance with System Standards: People in the organization are not following or complying with the established standards.

12.4.3 Applying the Incident Sequence Model:

The Incident Sequence Model has been applied to a simplified form called the Incident Analysis Worksheet. The work sheet can be used during an investigation to record information related to each key element of the model. This information forms the basis for the final Incident Investigation Report.

12.4.4 Why Investigate?

Accidents are caused. They don't just happen. The causes of accidents can be determined through proper investigation, therefore injuries can be prevented if the causes of accidents are corrected. Unless the causes are corrected, the same thing will happen again and again.

The most important reason for investigation accidents is to prevent injury and illness to workers. There are other reasons to consider such as the costs of accidents and the legal requirements to investigate.

12.4.5 Costs

The prevention of accidents through effective investigations can result in considerable savings in both direct and indirect costs.

Direct costs include the insured costs of Worker's Compensation payments to an injured worker while away from work and medical expenses incurred from the worker's injuries.

Indirect costs are other hidden costs of an accident and are most often uninsured. Indirect costs account for a large amount of the true cost of an accident and it is estimated that on average they exceed direct costs by a 4:1 ratio. Indirect costs may include:

- Repair of damage to material/equipment or replacement cost;
- Wages paid for time lost by the injured worker, other than Worker's Compensation payments (ie. medical appointments after returning to work);
- Wages paid for time lost by other workers (ie. those who stopped working to assist following the accident or who took part in the investigation, or who could not work without the damaged equipment or material);
- Overtime work necessitated by the incident;
- Wages paid for the time of the supervisor(s) investigating the incident;
- Time spent by management and administrative staff on accident-related activities;
- Decreased output when the injured worker returns to work;
- Reduced productivity during a replacement workers learning period;
- Uninsured medical costs (on-site medical and first aid services); and
- Miscellaneous costs such as public liability claims, legal fees, equipment rental costs, etc.

12.4.6 Legal Requirements

Occupational Health and Safety Act:

The Occupational Health and Safety Act applies whenever there is a serious injury on a worksite, or an incident that has the potential for causing serious injury to occur. If an injury or incident listed below occurs at a worksite, the employer responsible for the worksite must notify a Labour OH&S Director of Inspection as soon as possible. Examples include:

- An injury or accident that results in death;
- An injury or accident that results in a worker being admitted to an unplanned or uncontrolled explosion, fire or flood that causes a serious injury or that has the potential of causing a serious injury;
- The collapse or upset of a crane, derrick or hoist; or
- The collapse or failure of any component of a building or structure necessary for the structural integrity of the building or structure.

In addition, the employer is required to investigate any other serious injury or any other incident that has the potential for serious injury. Since these "other" serious injuries and incidents are not defined in the Act it is important that nE. Gruben's Transport Ltd.'s investigation policy clearly identify them.

Workers' Compensation Act

While E. Gruben's Transport Ltd. will be dealing primarily with the Occupational Health and Safety Act, there are other obligations and responsibilities under the Workers' Compensation Act whenever a worker suffers personal injury on the worksite, or is entitled to medical aid as a result of an accident. If the accident is likely to disable the worker for more than the day of the incident, E. Gruben's Transport Ltd. is required to:

- Report the accident to the Worker's Compensation Board within 72 hours;
- Notify the Board within 24 hours of learning that the worker has returned to work or is able to do so;

The WC Act contains additional details about what E. Gruben's Transport Ltd. is required to do, and to make available in regard to accident investigations. E. Gruben's Transport Ltd. must be familiar with the WC Act and what is expected in case of an accident.

12.4.7 Other Benefits of Accident/Incident Investigation:

- Providing accurate, unbiased descriptions of what happened. A summary of the incident is useful for communicating with employees, family members or third parties like insurance companies
- Revealing hazards not discovered through hazards assessments and inspections
- Identifying trends
- Tracking accidents/incidents
- Improving morale of employees

12.4.8 What Should Be Investigated?

It is obvious that accidents resulting in death or serious injury must be thoroughly investigated.

However, studies show that for every accident resulting in death or serious injury there were a large number of similar accidents and incidents (unplanned events) resulting in property damage, minor injuries with no injuries at all. Therefore, minor injury accidents, near-miss incidents and property damage accidents with the potential for serious injury should be investigated to identify and

12.4.9 Who Should Investigate?

The supervisor should investigate the accidents and incidents in his or her area of responsibility. As discussed earlier, E. Gruben's Transport Ltd. as an employer, has a legal requirement to investigate those incidents defined in legislation. A definition of employer in the Act is "any person designed by an employer or his representative". This could be the foreman, the lead hand, the superintendent, etc.

A team approach is recommended and whenever possible the supervisor should be assisted in the investigation by a safety committee member or the municipal health and safety coordinator (if one

exists). Safety is a line function, therefore the prime responsibility for accident/incident investigation lies with the supervisor.

12.4.10 Reporting of Accidents/Incidents

Prompt reporting of an accident/incident to the supervisor is essential. This enables the supervisor to carry out an investigation while the events are still fresh in the minds of those involved.

Failure to Report an Accident/Incident

Workers fail to report accidents or incidents for some or all of the following reasons:

- Fear of discipline;
- Concern for their own safety record;
- Concern for reputation;
- Fear of medical treatment and/or medical personnel;
- Desire to avoid work interruption;
- Desire to keep a clear record;
- Desire to avoid "red tape";
- Concern for the reaction of other workers (peer pressure); and
- Lack of understanding of the importance of reporting.

Supervisors can encourage reporting by:

- Reacting positively to the report;
- Training employees in reporting procedures and emphasizing its importance;
- Acting promptly on the report;
- Providing feedback; and
- Following up with corrective measures.

12.4.11 Investigation Preparation

Preparation for an investigation begins with the development of an investigation process described in E. Gruben'sTransport Ltd's investigation policy. The policy outlines the intent of the investigation and the procedures E. Gruben's Transport Ltd. uses in reporting an accident or incident and proceeding with investigation. Areas that are included in the policy are:

- What types of incidents and accidents are to be investigated;
- Notification procedures and contact list (ie. OH&S, Emergency Response, family members, etc.);
- People involved in the investigation team;
- What report form(s) are used for various investigations; and
- The review process after the investigation is complete.

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Most supervisors do not conduct many investigations in their career, which makes the investigation procedures a seldom performed task within many organizations. A regular review of the municipal investigation policy and procedure will assist in prompt and correct response by front line supervisors at the worksite.

Before undertaking an investigation, the supervisor must have the necessary tools to do the job, including:

- Training in accident investigation techniques;
- Safety equipment clothing for the area(s) likely to be entered;
- Required permits and notification forms;
- An Investigation kit which should include the following
    1. Investigation Report Forms
    2. Investigation guide or checklist
    3. Writing material for notes, statements, sketches, etc.
    4. Pencils, pens
    5. Photographic or video equipment, if appropriate (cannot be used in an explosive atmosphere)
    6. Testing equipment
    7. Measuring tape
    8. DO NOT ENTER tape

12.4.12 The Investigation Process

The investigation process involves four phases:

1. Gathering facts -- investigation techniques and methods are designed to produce facts. A fact is something that actually exists or has actually occurred; something known by observation or examination to be true or real.
2. Analyzing and evaluating the facts -- this is a systematic and thorough study of the facts to determine causes and recommend corrective measures.
3. Documenting findings -- a written report is necessary to communicate the findings of the investigation to management and affected employees and to ensure proper follow-up takes place.
4. Following-up -- this is essential to ensure that corrective actions are taken to prevent recurrence and that the recommended controls, measures, practices, etc. are working effectively.

These phases should not be thought of as being separate and distinct but can occur concurrently. Analysis and evaluation begins while the facts are being gathered (ie. while getting an overview of the incident) and can continue well into the documenting of findings. The investigator must be careful not to let early analysis lead to premature conclusions.

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Carrying out an investigation:

When a serious accident occurs, the immediate response is to contact emergency services and take control of the situation. This is necessary to ensure that:

- No further injury or damage occurs by identifying and controlling imminent danger hazards.
- Injured persons are properly cared for.
- The scene of the incident/accident is secured and physical evidence is not disturbed before the investigation team, the police and/or OH&S Officer arrive.

A complete investigation involves the following activities in each of the phases of the investigation process.

Gathering Facts

Get an overview. Basic information about who was involved in the incident or accident and the general conditions at the time of the occurrence will help you decide on the scope of the investigation and who or what may be required to provide further information. An overview of the incident often uncovers the unsafe acts or conditions which directly contributed to the incident. Continuing the investigation will allow you to uncover the underlying or root causes.

Gather information at the scene. Make notes of what you observe and also take photographs and/or draw diagrams, sketches, etc. Look for things such as:

- Positions of injured workers;
- Condition of equipment and material;
- Where objects are in relation to each other;
- The angle something came from or the force behind an object;
- Safety devices that were in use and their positions;
- Housekeeping in the area;
- Noise and lighting levels.

Once the details of the scene have been carefully recorded, broken equipment or samples of materials may be moved for later analysis by experts. Before removing anything, ensure that the authorities having jurisdiction (police, fire, labour, etc.) have authorized this move.

Interview Witnesses

The interviewing of witnesses is your biggest challenge in conducting an investigation. It can be hard to get all of the information you need, or to sort out what really happened from the conflicting descriptions you get. A certain amount of distortion is natural because:

- Different people have different perceptions;
- Information may be overlooked because the witnesses are under emotional stress;
- People may "cover for" themselves or each other in an attempt to avoid further trouble.

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Exactly which questions you should ask will depend on the circumstances of the incident. You should know what they are if you keep an open mind and follow-up on whatever seems relevant as you proceed. However there are seven basic questions you should include in any interview:

1. Where were you when the accident happened?
2. What were you doing at the time?
3. What was (were) the injured worker(s) doing at the time?
4. What did you see and hear?
5. What were the environmental conditions like at the time?
6. What do you think caused the accident?
7. How do you think we could prevent a similar accident in the future?

The following techniques can help your interviews be more effective:

- Conduct the interview at the scene if possible, or in a comfortable place such as a private office;
- Interview one person at a time and privately;
- Keep the interview positive and try to put the person at ease;
- Allow the person to tell their story about the accident;
- Ask open-ended questions, not leading questions;
- Do not talk down to the person or rush them to answer quickly;
- Paraphrase what people tell you to make sure you understand;
- Make notes of key points;
- If needed, obtain a written statement from the witness;
- Thank the person and ask them to come back to you if they think of anything else;

Analyze and Evaluate Facts to Determine Causes

Analysis of the factual information you have gathered is necessary to determine the causes of the accident or incident. There are two types of causes to identify: immediate and underlying.

Recommend Corrections

To prevent a recurrence of the accident or incident, specific corrective action must be applied both to the immediate causes and the defects identified in the management system. Corrective action for the immediate causes will usually be short-term; those for the defects in the management system, long-term.

Short-Term Corrections
Corrective actions for immediate causes often can be implemented quickly and are usually short term. The focus is on the control or elimination of hazards. Some hazards can be eliminated but most will need to be controlled.

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There are three approaches to hazard control:

1. Engineering Controls: These are "hard" controls such as installing guards around moving machinery parts; ventilation systems to remove toxic fumes and vapors; fitting heavy equipment with rollover protection, etc.

2. Administrative Controls: These are "soft" controls such as policies, safe work practices, job procedures, training, job scheduling, rotation of workers, etc.

3. Personal Protective Equipment (PPE): PPE is the "last" line of defense against hazards and should be used only to supplement engineering and administrative controls. PPE includes respiratory, head, eye, hearing, foot, limb, body and fall protection.

Long-Term Corrections
Correction of the organization's management system defects will normally take longer. The failures or weaknesses in the management system must be corrected in order to reduce the probability of similar incidents occurring in the future. Each corrective action, whether short-term or long-term, should be assigned a target date for completion. The corrections may be implemented in stages, depending on hazard priority, training requirements, budget, and so on.

Determine Cost

Whenever you can, determine both the direct costs and the indirect hidden costs. The true costs of an accident will be important in helping management determine which recommendations will be implemented and in what order. While these costs reflect the financial burden of the company that experienced the accident, the cost to the a worker from the effects of an injury or illness and disruption of lifestyle is immeasurable.

Document the Findings of the Investigation

Write the Investigation Report. The report is a comprehensive summary of the findings of the investigation. We have tailored simple report forms to our general needs at E. Grubens's Transport Ltd. However, more complicated reporting may be required if the seriousness of the incident warrants it. For example, a fatal accident investigations should contain more detail than a "standard report form" will allow.

Completed reports are distributed to senior management and are discussed at our regular management meetings. We also discuss relevant information at our safety meetings and post some investigation results.

Follow Up

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Once the report is complete and the corrections determined, it is essential to follow-up and see that the corrective actions take place as scheduled, particularly if the correction will involve action at several different stages. It is important not to rely on memory or to assume that other persons will take care of the action assigned to them. Check to make sure that the specified action is working effectively to correct the problem.

Involve other people in the follow-up when appropriate. Follow-up information should be documented along with the original report.

Summary

An accident or a near-miss is not something that just happens out of the blue. It is a signal that something is out of order with the management of health and safety. An investigation is necessary to find out what that "something" is.

It should be a thorough examination that tells you not only what happened, but why it happened. The goal is not to find someone to blame for what happened, but to prevent it from happening again. With thorough reporting and analysis over time, investigations can reveal important trends and interrelationships, and can lead to valuable corrective actions.

An investigation, therefore, is not just a reaction to a specific incident. It has a much broader role in improving the quality and effectiveness of a health and safety program.

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14.0 EMERGENCY CONTACT LIST

EGT MANAGEMENT & STAFF

Tuk Base Camp and Night Security (24 hours/day)	**TEL: 867-977-7000** **FAX: 867-977-7040**
Tuk Base Camp Manager Doug Saunders	**TEL: 867-977-7017** **CELL:867-777-1391**
Night Security Cellphone	**CELL:867-777-1654**
Safety/Loss Control Jim Stevens	**TEL: 867-977-7011** **CELL:867-777-1173**
Superintendent of Operations Willie Moore	**TEL: 867-777-4975** **CELL:867-777-6119** **CELL:867-777-1108**
Project Manager Bob Stefure	**TEL: 867-977-7014** **CELL:867-777-1524**
Chief Executive Officer Russell Newmark	**TEL: 867-977-7008** **CELL:867-777-1794**
EGT/POL Management Merven Gruben	**TEL: 867-977-7004** **CELL:867-777-1067**
EGT Inuvik Office	**TEL: 867-777-4975** **FAX: 867-777-4374**

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OUTSIDE AGENCIES

Tuk Health Centre	**TEL: 867-977-2321**
Tuk RCMP	**TEL: 867-977-1111**
Tuk Fire Department	**TEL: 867-977-2222**
Inuvik Hospital	**TEL: 867-777-8000**
Inuvik RCMP	**TEL: 867-777-1111**
Inuvik Fire Department	**TEL: 867-777-2222**
Inuvik Renewable Resources	**TEL: 867-777-7230**
Workers' Compensation Board – Accident Reporting	**TEL: 1-800-661-0792**
Northwest Territories Spill Line	**TEL: 867-920-8130**

Appendix E-3
Wildlife Management Plan
Tuktoyaktuk to Granular Source 177 Access Road
Tuktoyaktuk, Inuvialuit Settlement Area, Northwest Territories

WILDLIFE MANAGEMENT PLAN

Tuktoyaktuk to Granular Source 177 Access Road

TUKTOYAKTUK, INUVIALUIT SETTLEMENT AREA, NORTHWEST TERRITORIES

Submitted To:

ENVIRONMENTAL IMPACT SCREENING COMMITTEE
Inuvialuit Settlement Area, Northwest Territories

By

DEPARTMENT OF TRANSPORTATION
Government of the Northwest Territories
March, 2009

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APPENDIX A

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1.0 Introduction

The Wildlife Management Plan (WMP) is part of the Department of Transportation's (DOT), Government of the Northwest Territories (GNWT) submission in support of a Type A Land Use Permit and a combined Land Use/Quarry permit for the Tuktoyaktuk to Granular Source 177 Access road and quarry operation (the Project). The Project is located on Inuvialuit Private Lands approximately 19 km south of the hamlet of Tuktoyaktuk, in the Inuvialuit Settlement Region (ISR) of the Northwest Territories (NWT).

The protocols set out in the WMP were guided by external regulations and guidelines, and internal policies and procedures including:

- The applicable legislation and regulations of the federal and territorial governments
- The *Inuvialuit Final Agreement* (IFA)

1.1 Purpose

Project activities may potentially adversely affect wildlife through direct disturbance and/or deterioration or destruction of wildlife habitat, alteration of wildlife movements, and wildlife mortality. It is intended that the WMP be used during Project planning and implementation to reduce or avoid potential effects on wildlife. The WMP provides:

- General and specific mitigation measures
- Contingency Planning
- Monitoring and Inspection requirements
- Reporting and documentation frameworks
- Basic training and awareness for successful implementation

The purpose of the WMP is to provide information and requirements that, when applied to Project design and execution planning, will help to mitigate potential environmental effects of Project activities and manage environmental risks and uncertainties. It is also intended to be used in conjunction with terms and conditions of Project permits and approvals to ensure regulatory compliance. Site and activity-specific application of this plan will ensure that Project commitments are met.

1.2 Objectives

The overall objective of the WMP is to provide guidance and information sufficient to:

- Provide suitable protection of wildlife through planning

- Ensure compliance with regulatory requirements, Project commitments and best management practices
- Support engineering design and construction planning efforts
- Support regulatory approvals processes

1.3 Scope of the Plan

The WMP addresses management strategies and protective measures for:

- Terrestrial mammals, in particular grizzly bear and wolverine. These species were chosen because of their importance to resource managers and local communities, and potential interaction with Project activities. A large number of other terrestrial mammals, such as wolves, Arctic fox and reindeer (an introduced species of local concern), also occur in the Project area and will be protected by the general mitigation measures outlined in the WMP (Section 3.3). These measures would also protect species that occur at the periphery of their ranges or that are uncommon or rare to the Project area, such as moose and muskox.

- Birds, including the Rusty Blackbird, Short Eared owl and the Peregrine Falcon.

- Marine mammals, with emphasis on the Polar bear.

The WMP is a comprehensive document that:

- Addresses the regulatory responsibilities and the Project commitments that influence management practices and mitigation measures for wildlife.
- Identifies Project activities that have the potential to negatively impact wildlife and outlines measures to mitigate and manage these effects
- Provides contingency planning practices in the event of mitigation failure
- Outlines monitoring requirements to ensure the effectiveness of the mitigation measures and to assess Project effects on wildlife
- Addresses inspections, reporting, notification and documentation requirements of Shell and regulatory authorities
- Identifies basic wildlife training and awareness requirements for all Project personnel

1.4 Definition of Terms

The following definitions are important to understanding the WMP:

Critical habitat — Under the Species at Risk Act (SARA), defined as “the habitat that is necessary for the survival or recovery of a listed wildlife species

	and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species."
Key habitat feature	A structure, feature or area that is used by key wildlife species on a seasonal or continuous basis (e.g., den, nest, trail, wetland). Key habitat features include residences and critical habitat as defined under SARA.
Key wildlife species	Wildlife species that are: • Schedule 1; species protected under the NWT Wildlife Act; species protected under the Migratory Birds Convention Act) • Important management species (e.g., grizzly bears) • Important species for communities (e.g., moose, barren-ground caribou) • Afforded legal protection provincially, territorially or federally (i.e., threatened and endangered species listed under SARA
Migratory birds	Under the Migratory Birds Convention Act, migratory birds include waterfowl, cranes, shorebirds, marine birds, insectivorous birds and other migratory non-game birds.
Migratory bird Area	Set out in the Schedule (s.3) of the Migratory Bird Sanctuary Sanctuary. Regulations under the Migratory Birds Convention Act and protected under the Act.
Monitoring survey	Quantitative wildlife survey conducted within pre-determined distances from planned disturbances before, during and potentially after any ground disturbance activities.
Pre-disturbance survey	Wildlife reconnaissance-level survey to determine the presence of key habitat features. Conducted during the appropriate season Before ground disturbance and construction activities begin.
Residence	Under SARA, defined as "a dwelling-place, such as a den, nest or other similar area or place, that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating." This definition applies only to SARA-listed species.
Wildlife Encounter	Observation of key wildlife species.
Wildlife Incident	Human interaction with key wildlife species that result in a safety concern for workers or wildlife (e.g., bluff charge by bear, caribou struck by vehicle, disturbance of nest, etc.).

Wildlife Mortality	Any mortality of wildlife caused directly or indirectly by human activities or structures

2.0 Regulatory Responsibilities

This section describes the legislation, regulations, guidelines and quarry operation commitments that pertain to wildlife in the project area. The applicability of each is discussed, as they are currently understood. The sections of the WMP in which regulation, commitment or guideline is addressed are also identified.

2.1 Federal

Table 2-1 outlines key federal regulations and guidelines and their applicability to wildlife. The federal agencies with authority in the Project area include the Canadian Wildlife Service (CWS), Environment Canada (EC), Indian and Northern Affairs Canada (INAC), and Fisheries and Oceans Canada (DFO).

Table 2-1 Federal Regulations and Guidelines

Regulator	Regulations/Guideline	Applicability to Wildlife
DFO	Marine Mammal Regulations pursuant to the Fisheries Act	These regulations outline responsibility conservation, management and research, as well as for other marine species in Canadian waters. The existing Marine Mammal Regulations prohibit the disturbance of marine mammals. Proposed amendments provide more specific measures with respect to activities and marine mammal protection.
EC/CWS	Species at Risk Act	SARA was created to prevent wildlife species from becoming extinct. It requires Canada to provide for the recovery of species risk due to human activity and to manage species of special concern. SARA governs all species listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and legally designated under SARA. Section 32 and 33 identify prohibitions under this Act. It is an offence to: • Kill, harm, harass, capture or take an individual of a listed species that is extirpated, endangered or threatened • Damage or destroy the residence of one or more individuals of a listed endangered or threatened species or an extirpated species if a recovery strategy has recommender its reintroduction • Possess, collect, buy sell or trade an individual of a listed species that is extirpated, endangered or threatened or its part or derivative
EC/CWS	Migratory Birds Convention Act	This Act (Article V) prohibits the taking of nests or eggs of migratory birds. This act also prohibits (S.5) the deposition of substances that maybe harmful to migratory birds in waters or other areas frequented by migratory birds.
EC/CWS	Migratory Bird Sanctuary Regulations pursuant to the Migratory Birds Convention Act	These regulations provide the legal basis for CWS to establish and manage migratory bird sanctuaries. Regulations prohibit (S.3) hunting, disturbing or destroying nests and keeping birds in migratory bird sanctuaries, except by subsistence hunters. Carrying out any activity that is harmful to migratory birds, their eggs, or their nests is also prohibited (S.10) except with a permit.

Table 2-1 Federal Regulations and Guidelines (cont.)

Regulator	Regulations/Guideline	Applicability to Wildlife
EC/CWS	Canada Wildlife Act	This Act outlines the powers of the federal government to protect wildlife, in cooperation with territories and provinces. This Act (S.8) enables the CWS, in cooperation with provincial and territorial governments, to take measures to protect endangered wildlife species and to acquire lands for wildlife research, conservation and interpretation. This Act (S.5) also enables the CWS to enter into agreements with other governments to acquire lands for wildlife research, conservation and interpretation programs and measures to protect wildlife species. This Act sets down the powers bestowed to wildlife officers and wildlife offences and associated punishments.
EC / CWS	Canadian Environmental Protection Act	This Act defines pollution prevention and the control and management of pollutants and wastes if their release into the environment cannot be prevented. The CWS is the responsible agency for research aimed at developing regulations to protect migratory birds and their habitat from the toxic effects of environmental contaminants.
INAC	Territorial Land Use Regulations pursuant to the Territorial Lands Act	These regulations outline the requirement for a Class A Land Use Permit for all phases of the development. The Permit may have conditions attached to it that concern wildlife habitat, related to: • The methods and techniques employed for the land use activity. • The methods of controlling or preventing ponding of water, flooding, erosion, slides and subsidence of land. INAC district officers are responsible for ensuring compliance with legislation and Regulations on Crown land only.

2.2 Territorial

Table 2-2 outlines territorial regulations and their applicability to wildlife. Environment and Natural Resources (ENR), Government of the Northwest Territories (GNWT) is responsible for territorial governance of wildlife.

Table 2-2 Territorial Regulations

Regulator	Regulations/Guideline	Applicability to Wildlife
ENR	NWT Wildlife Act	The Act pertains to all wildlife harvesting and management. It identifies the authority of the Wildlife Management Advisory Council (WMAC NWT) in the western Arctic. Section 38(1) indicates that no person shall, without a permit, chase, disturb or harass wildlife. This is relevant to the project for responding to the presence of wildlife in work areas; e.g., herding caribou or deterring bears from an activity area. It prohibits the destruction, disturbance or taking of the eggs or nests or birds identified in the list of prescribed wildlife, including birds of prey (eagles, falcons, hawks, harriers, osprey and owls), upland game birds and non-game birds. It also provides a list of wildlife species considered at risk by the GNWT. Permits are issued under the Act to haze/herd wildlife, engage in activity that may result in disturbance to an animal or destroy or damage a den, dam or lodge, or eggs or nests of birds. Hazing/herding permits can be obtained on an incident specific basis from ENR.

2.3 Inuvialuit

Table 2-3 outlines Inuvialuit regulations and their applicability to wildlife. Under the IFA, the Joint Secretariat oversees Inuvialuit co-management institutions such as the Environmental Impact Screening Committee (EISC), Wildlife Management Advisory Council (WMAC NWT) and the Inuvialuit Game Council (IGC). The community of Tuktoyaktuk has a Community Conservation Plan relevant to wildlife management, which, while not legally binding, provide insight into key wildlife conservation issues for these communities.

Table 2-3 Inuvialuit Regulations and Guidelines

Regulator	Regulations/Guideline	Applicability to Wildlife
Community of Tuktoyaktuk	Community Conservation Plans (ACCP, ICCP, TCCP 2000)	These documents provide guidance to planning, but are not legally binding. Special areas (e.g., KIBS) are listed with recommended wildlife and land use practices for these areas. Also, important habitat and traditional harvest areas are identified for resource species such as barren-ground caribou and grizzly bears.
Environmental Impact Screening Committee (EISC)	Operating Guidelines and Procedures (EISC 2004)	The purpose of this document is to provide guidance to developers, government authorities, the Inuvialuit community and other organizations regarding the structure, procedures and information requirements of the EISC. The Operating Guidelines and Procedures should be used together with the IFA. This document includes a summary of flight recommendations from various organizations that should be considered for protecting wildlife during project activities.
EISC/ IGC	Flight Altitudes/Routes and Interference with Inuvialuit Harvesting (EISC 2004)	The IGC represents the collective Inuvialuit interest in wildlife and wildlife habitat in the ISR. In response to complaints from harvesters concerning helicopters and fixed-wing aircraft activity, the IGC has provided suggestions and general advice to help reduce the effects of air traffic on harvesters and wildlife. Flight altitudes, corridors and timing are important wildlife mitigation measures.

Table 2-3 Inuvialuit Regulations and Guidelines (cont.)

Regulator	Regulations/Guideline	Applicability to Wildlife
ILA	Inuvialuit Land Administration pursuant to the Inuvialuit Final Agreement (1984)	These regulations stipulate that a Land Use Permit is required to develop the borrow site and construct an access road. The Permit may have conditions attached to it concerning wildlife habitat, such as provisions for waste management and fuel storage. The Environmental Monitor commissioned through the ILA is responsible for ensuring Project compliance with legislation and Regulations on private land in the ISR region. This includes the Terms and Conditions of permits and licences issued by the ILA. Inuvialuit hunters and trappers are represented by a Hunters and Trappers Committee (HTC) in each of the six communities in the Inuvialuit Settlement Region. Wildlife Monitors are commissioned through the HTC and are responsible for monitoring Project activities related to wildlife and providing recommendations to the Environmental Monitor, Project Supervisor and the ILA.
WMAC (NWT) and Fisheries Joint Management Committee (FJMC)	Inuvialuit Renewable Resource Conservation and Management Plan (1988)	Objectives outlined include the participation of Inuvialuit in resource management and conservation, development of harvest quotas, selection and wildlife management guidelines for protected areas.

3.0 Project Activities and Schedule

Linear developments and associated activities, such as the Access Road and the Source 177 quarry, may affect wildlife to varying degrees, depending on the species and the structure of their development. There are generally six types of possible effects: individual disruption, social disruption, habitat avoidance, habitat disruption or enhancement, direct and indirect mortality, and population effects. Quarry operations of drilling, moving and hauling construction materials will generate noise above ambient levels when the quarry is in operation. The breeding season is from approximately June to August. Project activities that could occur during the breeding season; include intermittent continuation of grading and compaction of Section B. however work will be restricted to 500 metres from locations of known or suspected caribou activity and 300 metres from known or suspected bear denning sites

Little habitat will be directly altered from the construction of the Tuktoyaktuk to Granular Source 177 Access Road; however, the Project will have both direct and indirect effects on wildlife. Direct effects include the following:

- Direct habitat loss and conversion of suitable habitat to unsuitable habitat
- Wildlife-human interactions and possible removal of problem animals because of predator attraction to Project sites
- Wildlife-vehicle collisions
- Nest disturbance and loss because of predator attraction to Project sites
- Bird mortality through collisions with lighted structures, wires and tall structures

Indirect effects include:

- Improved access for humans to hunt, trap, and other subsistence activities such as fishing or plant harvesting,
- Sensory disturbance

The following table presents the current timing of Project phases used to develop the mitigation and management measures presented in the following sections.

Table 3-1 Current Development Schedule and Activities

Estimated Time Frame	Activity
February, 2009 – April, 2009	• Mobilization of quarry and road construction equipment to Source 177 • Granular material: load, haul and spread to Section B
March, 2009 – May, 2009	• Grading and compacting of Section B.

Table 3-1 Current Development Schedule and Activities (cont.)

Estimated Time Frame	Activity
June, 2009 – August, 2009	• Intermittent continuation of grading and compaction of Section B.
October, 2009 – March, 2010	• Granular material: load, haul and spread on Section A
December, 2009 – April, 2010	• Granular material: load, haul and spread on Section C
March, 2010 – April, 2010	• Installation of culverts
March, 2010 – August, 2010	• Borrow site Contouring and Cleanup
March, 2010 – August, 2010	• Grading and compaction of Sections, A, B and C

4.0 Wildlife Protection Planning

The Tuktoyaktuk Peninsula supports a wide variety of wildlife. At least 33 species of terrestrial mammals are known to occur within the Mackenzie Delta as listed in Table 4-2. The local and regional abundance and distribution of these species varies considerably depending on habitat availability and access to terrain suitable for various life history phases, such as calving and denning.

This section provides information on wildlife present in the Inuvialuit Settlement region and provides a toolbox of mitigation measures specific to wildlife management. Site-specific and activity-specific plans will be based on the information provided in this section taking into account site-specific information and requirements. Not all measures will necessarily apply to all sites. A significant number of these mitigation measures are expected to be used to reduce environmental impacts from project activities.

An Environmental Monitor commissioned through the ILA and a Wildlife Monitor from the Hunters and Trappers Committee will on site during all Project activities. Monitoring will occur for the entirety of the activities. Responsibilities and duties of the Environmental and Wildlife monitors is included in Section 9.0

4.1 Wildlife Description

More than 100 species of birds are known to occur regularly in the Mackenzie Delta and Tuktoyaktuk Peninsula, with many others having been recorded irregularly or accidentally. Wildlife valued components (VCs) in the region include caribou, moose, grizzly, wolf, fox, waterfowl and breeding birds. Information on wildlife VCs are provided below in Section 4.2 and a summary table of other terrestrial mammals found in the region is in Table 4-2. A description of birds is provided in Section 4.3 and Table 4.3.

In order to reduce indirect impacts from hunting and trapping, the contractor and environmental monitors' responsibilities will be made aware of the following wildlife species, as they relate to the proposed project. Their responsibility will include monitoring the use of the road by hunters and trappers and reporting issues or concerns about wildlife to the project manager and the Hunters and Trappers Committee.

4.2 Mammals

Barren-Ground Caribou (*Rangifer tarandus groenlandicus*) / Cape Bathurst Herd

The proposed road is within Barren-Ground Caribou range (Imperial Oil, 2004). There are eight major Barren-Ground Caribou herds (SENES, 2005), each of which are identified by the location of their calving grounds (Thomas, 1969; Gunn and Miller, 1986). They are highly migratory and occupy different habitats during different seasons (Imperial Oil, 2004). Caribou are an important food source for the Inuvialuit. The Cape Bathurst Herd was identified as a distinct herd from the Bluenose herd using genetic and radio-telemetry studies (Nagy et al., 1999). This herd calves and summers in Brock, Hornaday and Horton River area (CoT et al., 2000), while rutting occurs east of Husky Lakes (Imperial Oil, 2004). The herd's winter range stretches from the Tuktoyaktuk Peninsula to the Mackenzie River in the west and the Husky Lakes in the south (Imperial Oil, 2004; GNWT, 2008). The GNWT Department of Environment & Natural Resources (ENR) reports that the caribou migration from Parsons Lake (40 km south of Source 177) to Cape Bathurst occurs in April. Caribou have been active in the Parsons Lake area, but a notable decline has been detected in the past three to four years (ENR, pers. comm. to EBA, Nov. 20, 2008). In 1992, the combined population of the Cape Bathurst herd and Bluenose-West herds were estimated to be 88,000 to 106,000 (Cot et al., 2000). The most recent photocensus was completed in summer 2006, and indicated that the herd has declined significantly since it was distinguished as a distinct herd in 2000 (Table 4-1).

Table 4-1 Barren-Ground Caribou Year Population Estimate (non-calf)

Year	Population
1992	17,521
2000	10,013
2005	2,400
2006	1,821

Source: GNWT, 2008.

The general abundance of caribou in the region shows a different trend than that of the Cape Bathurst Herd. Caribou are slowly returning from a population decline in the 1920s, related to over-hunting (IEG, 2002). Caribou were absent from the Tuktoyaktuk area during the 1950s, but reappeared in the 1970s (IEG, 2002). Residents of Tuktoyaktuk notice that caribou migrate west, around the south side of Husky Lakes. Near the Husky Lakes, local residents identified that reindeer often compete for caribou food sources, and often destroy caribou habitat (IEG, 2002). The Government of the Northwest Territories lists barren-ground caribou as *sensitive* (a species not at risk of extinction or extirpation) but which might require special attention or protection to prevent them from becoming at risk (GNWT, 2007). This species is not considered to be at risk under the *Species at Risk Act* (GNWT and EC, 2008) or by the Committee on the Status of endangered Wildlife in Canada (COSEWIC, 2008).

Moose (*Alces alces*)/ Tuttuvak

Moose occur in the Mackenzie Delta, but their distribution is restricted to patches of suitable habitat, which, according to previous studies, is not in the vicinity of the proposed road corridor (Rescan, 1999). However, the corridor is adjacent to the spring moose hunting area (Community of Tuktoyaktuk, 1993). In addition, Paul Voudrach of ENR advised that some moose had been observed in the vicinity of the southern end of the proposed all-weather road in recent years (pers. comm., Nov.21, 2008). Since the Tuktoyaktuk to Source 177 corridor does not represent suitable habitat, it is unlikely that habitat effectiveness will be altered.

Grizzly Bear (*Ursus arctos horribilis*)/ Aklaq

In the Inuvialuit Settlement Region grizzly bears are co-managed under the Inuvialuit Final Agreement by GNWT, Yukon Territorial Government, Hunters and Trappers Committee, Inuvialuit Game Council, Wildlife Management Advisory Council and the

Wildlife Management Advisory Council for the North Slope. The Tuktoyaktuk Grizzly Bear Management Area possesses a population of 214 bears over the age of two, occurring at a density of six bears per 1,000 km^2, compared to a density of 7 to 8 bears/1000 km^2 in the Inuvialuit Settlement Region (Imperial Oil, 2004). There is a total allowable harvest of six bears per year.

The proposed road corridor is within occupied grizzly bear habitat (Pearson and Nagy, 1976; Nagy et al., 1983; Community of Tuktoyaktuk, 1993),while areas immediately adjacent to the corridor, in particular the Husky Lakes, are important to the species (CoT et al., 2000). According to Nolan et al. (1973) the habitat has a quality rating of Class 2 (common use, but less than optimum habitat). No dens were identified near the alignment by Rescan (1999). However, during discussions with Marsha Branigan of ENR in Inuvik (pers. comm.., Nov. 20, 2008), several potential grizzly bear denning areas were identified in the vicinity as illustrated in Figure 8.

In the Northwest Territories, grizzly bears are listed as *sensitive* (GNWT, 2007). Nationally, they are classified as a species of *special concern:* a species that might become threatened or endangered because of a combination of biological characteristics and identified threats (COSEWIC, 2008). Grizzly bears do not have a special status on the federal *Species at Risk Act* (Government of Canada, 2008).

Wolf (*Canis lupus*)/ Amaruq

Wolves are found in the vicinity of the Project. They are ecologically important predators and economically important furbearers. Wolf habitat and density is closely related to that of their prey, such as caribou and reindeer. The wolf population appeared to decline in the 1950s, but recovered in the mid 1970s (CoT et al., 2000). The Husky Lakes area is important habitat area (CoT et al., 2000). Habitat requirements include den sites, typically on embankments with stable soils, and as such, are susceptible to habitat displacement. In contrast to grizzly bears, roads may not cause wolves to avoid the area.

Red Fox (*Vulpes vulpes*)/ Aukpilaqtaq & Arctic Fox (*Alopex lagopus*)/ Tigiganniaq

Foxes are important furbearers in the region. In the Mackenzie Delta area, red foxes are considered widespread below the treeline, whereas Arctic foxes are widespread above the treeline, often near coastal areas (CoT et al, 2000). Jim Raddi, in a November 17, 2008 News/North NWT article reported that “I’ve never seen so many foxes going back and forth on evenings.” He added that family members were trapping one or two an evening by the ocean. Habitat requirements are linked to food sources, such as carrion, birds and small mammals (Rescan, 1999). Denning habitat consist of well-drained, stable soils (Martell et al., 1984), with Arctic fox dens occurring in open areas with little

relief (Rescan, 1999). The proposed road occurs in good Arctic fox habitat (Rescan, 1999).

Table 4-2 Terrestrial Mammals in the Mackenzie Delta

Common Name	Scientific Name
Masked shrew	*Sorex cinereus*
Dusky shrew	*Sorex monticolus*
Arctic shrew	*Sorex arcticus*
Collared Pika	*Ochotona collaris*
Snowshoe hare	*Lepus americanus*
Arctic hare	*Lepus articus*
Arctic ground squirrel	*Spermophilus parryii*
American red squirrel	*Tamiasciurus hudsonicus*
American beaver	*Castor Canadensis*
Northern red-backed vole	*Clethrionomys rutilus*
Brown lemming	*Lemmus sibiricus*
Collared lemming	*Dicrostonyx torquatus*
Muskrat	*Ondatra zibethicus*
Singing vole	*Microtus miurus*
Meadow vole	*Microtus pennsylvanicus*
Tundra vole	*Microtus oeconomus*
Wolf	*Canis lupus*
Arctic fox	*Alopex lagopus*
Red fox	*Vulpes vulpes*
Grizzly bear	*Ursus arctos*
Ermine	*Mustela erminea*
Least weasel	*Mustela nivalis*
American mink	*Mustela vison*
Wolverine	*Gulo gulo*

4.3 Birds (Geese, Swans, Loons and Ducks)

More than 100 species of birds are known to occur regularly in the Mackenzie Delta and Tuktoyaktuk Peninsula, with many others having been recorded irregularly or accidentally.

Birds in the region include waterfowl such as geese, swans, loons, ducks and ptarmigan. The proposed road occurs in good waterfowl habitat (Rescan, 1999), which is an important area for nesting and staging of geese and swans. Geese are an

important source of food for the Inuvialuit while the down is also used for pillows and blankets (CoT et al, 2000).

Nesting habitat for Tundra Swans/ Qugruk (*Cygnus columbianus*) can include wet sedge meadows and ponds, lakes and slow rivers, with brood rearing occurring in deeper water (Palmer, 1976). Canada Geese/ Uluagullik (*Branta canadensis*) and Brant/ Niglignaq (*Brantabernicla*) prefer to nest on small islands in ponds, lakes and rivers; brant also nest on the edge of freshwater or tidal pools (Bellrose, 1976). White-fronted Geese/ Nirliq (*Anser albifrons frontalis*) are secretive nesters, preferring dispersed, higher and drier nesting sites. Snow Geese/ Kanguq (*Chen caerulescens)* are primarily colonial nesters, preferring low grassy tundra and islands in shallow lakes (Bellrose, 1976).

Geese and swan populations are stable or increasing (CoT et al, 2000). Common Loon/ Tutlik (*Gavia immer*), Yellow-Billed or King Loon/ Qaqauq (*Gavia adamsii*), Pacific Loon/ Maliri (*Gavia pacifica*) and Red-throated Loon/ Suglia (*Gavia stellata*) occur in the Mackenzie Delta area. All probably nest in the area, but the Pacific and red-throated loons also breed near the proposed route. Nesting habitat consists primarily of shorelines of lakes and ponds. Ducks (Qaugait) are economically important to the Inuvialuit as a spring and fall food source. Several species occur and nest in the area of the proposed road, including King Eider/ Quingalivik (*Somateria spectabilis*), Common Eider/ Quingalik (*Somateria mollissima)*, Scaup, Mallard/ Kurugakpak (*Anas platyrhynchos*), Scoters (Black duck)/ Taakruaq (*Melanitta spp.*), Wigeon (Baldpate duck)/ Ugiuhiuq (*Anas americana)*, Oldsquaw/ Ahaliq (*Clangula hyemalis*), and Pintail/ Kurugak (*Anas acuta*) (CoT et al, 2000). Nests are dispersed and occur in low-lying to upland habitat and may be hundreds of metres from water. Diving ducks, such as scaup, may nest on shorelines or in emergent vegetation. Eider nests are often found on small islands close to the coast or on inland tundra ponds (Bellrose, 1976). The distribution and behaviour of ducks has been shown to be affected by human disturbance (Thompson, 1973). In general, the duck populations are decreasing (CoT et al. 2000).

The Wildlife Monitors will be responsible for scouting shorelines in advance of construction crews in an effort to reduce effects on waterfowl populations at sensitive times of the year in critical habitat such as nesting and moulting areas, if applicable. If nests are identified, the monitor will notify the project manager / superintendent so that equipment and crews can avoid nesting locations.

Ptarmigan (*Lagopus lagopus*)/ Qaiq

Ptarmigan occur year-round within the area of the proposed road, particularly within the upland tundra. Nest sites are commonly located in shrub habitats, including dwarf shrubheath and alder (Rescan, 1999). Shrub communities are also important for winter

habitat (Platt, 1976). Ptarmigan are a well-liked food source (CoT et al., 2000). Their population varies from year to year.

The project's Wildlife Monitor will be instructed to look for signs of dens and nests along the access road alignment. Monitors and construction crews will be responsible for preventing harm to wildlife (including feeding) or destruction of active dens

Table 4-3 Birds in the Mackenzie Delta

Common Name	Inuit Name	Scientific Name
Canada Geese	Uluagullik	Branta canadensis
Tundra Swans	Qugruk	Cygnus colubianus
Brant	Niglignaq	Branta bernicla
White-fronted Geese	Nirliq	Anser albifrons frontalis
Snow Geese	Kanguq	Chen caerulescens
Common Loon	Tutlik	Gavia immer
Yellow-Billed or King Loon	Qaqauq	Gavia adamsii
Pacific Loon	Maliri	Gavia pacifica
Red-throated Loon	Suglia	Gavia stellata
King Elder	Quingalivik	Somateria spectabilis
Common Eider	Quingalik	Somateria mollissima
Scaup, Mallard	Kurugakpak	Anas platyrhynchos
Scoters (Black duck)	Taakruaq	Melamitta
Wigeon (Baldplate duck)	Ugiuhiuq	Anas americana
Oldsquaw	Ahaliq	Clangula hyemalis
Pintail	Kurugak	Anas acuta
Ptarmingan	Qaiq	Lagopus lagopus

5.0 Wildlife Protection Measures

Key mitigation measures for wildlife include:

- Minimizing the Project footprint
- Minimizing the volume, duration, and frequency of noise producing activities, where possible
- Selective timing of Project activities to avoid critical periods for wildlife, wherever possible
- Employing properly trained environmental, wildlife and marine mammal monitors
- Respecting pre-determined setback distances from key wildlife habitat features
- Ensuring proper storage, transportation and disposal of wastes
- Ensuring Project personnel have appropriate levels of wildlife training and awareness

5.1 Critical Wildlife Periods

Avoiding construction activities during critical migration, breeding and rearing periods is the primary mitigation measure to prevent impacts to wildlife. Critical periods for wildlife and the Project activities occurring during those periods are summarized below:

Period	Wildlife Activity	Project Activities
Late May	spring migration	Grading and compacting of Section B.
June through July	nesting	Intermittent continuation of grading and compaction of Section B.
July through early September	moulting	Intermittent continuation of grading and compaction of Section B.
August through mid-October	fall migration	Intermittent continuation of grading and compaction of Section B.
October through April	denning for grizzly bears	• Installation of culverts • Borrow site Contouring and Cleanup • Grading and compaction of Sections, A, B and C

Period	Wildlife Activity	Project Activities
February through April	denning for wolverines	• Mobilization of quarry and road construction equipment to Source 177 • Granular material: load, haul and spread to Section B • Granular material: load, haul and spread on Section A • Granular material: load, haul and spread on Section C • Installation of culverts • Borrow site Contouring and Cleanup • Grading and compaction of Sections, A, B and C

In addition to the periods listed above, spring, summer and fall are also critical, particularly for grizzly bear because they have limited time to acquire food resources prior to denning. Because some resident wildlife species, such as the grizzly bear, are sensitive year-round to disturbance, avoiding critical time periods may not be possible. Mitigation measures for these species will involve minimizing disturbance activities and avoiding critical features, such as dens.

5.2 Project Design Mitigation Measures

Table 5-1 presents the mitigations which have been integrated into the project methodologies and practices to reduce or minimize potential impacts on wildlife.

Table 5-1 Project Design Mitigation Measures

Potential Effect	Design Mitigation
Habitat Disturbance / Deterioration	• Project footprint has been minimized and previously disturbed areas will be used, wherever possible. • Access to the Project site will be shared, wherever possible • Waste will be trucked out, rather than using a sump.
Sensory and other Disturbances	• Wherever possible, technologies to minimize sound disturbance have been incorporated into Project design.
Wildlife Incidents	• Access to the surface facilities will be limited. • Field workers education and awareness of the Wildlife Management Plan guidelines and programs. • The Field Supervisor will educate all field workers on the applicable practices contained within this Wildlife Management Plan. • The Field Supervisor will provide all field workers with Bear Aware Training and Training in wildlife awareness. • Implementation of wildlife-human interaction procedures, which will include Bear Aware training, safe working distances from wildlife. • Workers must avoid all interactions with wildlife unless crew safety is at risk. • Birds, nests and eggs must be left intact. If an active nest is directly near or in the path of the quarry site a no –work zone will be established and crews will work in another area within the approved quarry site until birds have vacated the nests. • Field workers will not feed, harass or approach wildlife. • All human/wildlife conflicts and incidents will be reported to the Field Supervisor and documented. • All significant wildlife features, such as nests and dens will be documented and reported. • Implementation of No Firearms and No Hunting/Fishing for field workers. • Firearms will be used on-site by authorized personnel only. • Personal firearms and fishing gear are not permitted on site. • No hunting or fishing by Project-related field workers will be permitted. Private vehicles, including snowmobiles will not be permitted on-site.

Table 5-1 Project Design Mitigation Measures (cont.)

Potential Effect	Design Mitigation
	• All food and stored garbage should be kept in bear-proof areas or bear proof containers. • Any grease, oils, fuels stored on-site must be stored in bear-proof areas or containers • Operators will implement an Observe, Record and report policy, encouraging workers to report any suspicious activity related to wildlife. The Field Supervisor will be responsible for obtaining this information and passing the information on to the appropriate responsible agency • Wildlife sightings will be recorded (including GPS location data if possible) to be submitted to the DOT Planning, Policy and Environmental Division and ENR Inuvik office upon completion of the project.
Wildlife attraction to site and Waste Management	• Waste Management that minimizes and disposes of attractants to wildlife such as garbage, food wastes and other edible and aromatic substances will include the following measures: ➢ Minimize and dispose of attractants to wildlife such as garbage, food wastes and other edible and aromatic substances. ➢ To prevent wildlife from being attracted to odours all food and stored garbage to be kept in either: airtight sealed container/bear proof containers or in an enclosed bear proof area. ➢ Any grease, oils, fuels stored on-site to be stored in bear-proof areas or containers. ➢ No waste will be incinerated on or off site. Waste will be transported and disposed of at E. Grubens Transport Ltd. (the Project contractor) facility that is within Inuvik municipal boundaries, operates year round and is serviced by municipal services. The following will be identified: • Listing of hazardous, non-hazardous waste and any wastes of special concern, if any. • Waste types and volumes expected to be produced • Listing of storage and transport methods and disposal locations for these wastes. • Listing of odorous wastes that may attract wildlife, and the identification of its storage and method of transport to prevent wildlife attraction. • Indication of whether odorous waste is stored for the purpose of on-site of off-site disposal (i.e. road or air transport).

Table 5-1 Project Design Mitigation Measures (cont.)

Potential Effect	Design Mitigation
Wildlife mortality	• Immediate consultation with appropriate territorial (ENR) and federal (CWS) wildlife authorities will occur. Any key species mortality will be reported to ENR and CWS. • Situation and site will be assessed, including potential for further mortalities; consider increased wildlife deterrent mechanisms and security, including fencing and lights to ensure wildlife and personnel safety. • Ongoing or multiple mortalities of other species should be reported to CWS (i.e. birds regularly striking infrastructure over course of time, or single incident of a large flock of migratory birds striking infrastructure).
Spills of hydrocarbons or toxic substances resulting in injury to wildlife and wildlife habitat	• Federal (CWS) and territorial (ENR) authorities will be contacted immediately to determine appropriate course of action, which may include capturing and relocating or appropriately treating contaminated wildlife. • The spill area will be monitored closely by the Environmental Monitor and appropriate deterrents (e.g., warning noises, flagging) employed to discourage wildlife from entering the affected area and ingesting toxic substances or being covered in spill material.

Table 5-2 Mitigation Measures for Terrestrial Mammals

Project Activity	Potential Effect	Mitigation Measure	Schedule
All activities	Disturbance to wildlife: Disturbance or injury to wildlife and their habitat.	• Project personnel will be provided with wildlife awareness training.	Ongoing throughout the life of the Project
All activities	Disturbance of denning mammals: Denning bears or wolverines could be disturbed and could abandon den sites near Project activities during the winter. Presence of key wildlife feature (e.g., nest, den)	• If active bear or wolverine dens are discovered within 500 m of Project sites, territorial (ENR) and federal (CWS) authorities will be contacted immediately to determine the appropriate course of action. Activities may be temporarily suspended pending consultation with ENR. • A trained Wildlife Monitor will be onsite during construction during operations and decommissioning, to monitor wildlife and manage the risk. • Ongoing monitoring and inspection of site will occur, as determined in consultation with ENR and using the wildlife monitor. Monitoring may include assessment of disturbance to den by wildlife monitor, monitoring den during spring to identify bear or wolverine emergence, etc. • Personnel is to maintain a minimum distance of 300 meters between sighted and/or known bear den sites for the duration of the Project. • If a den is identified the animal may be hazed away (permit required) to discourage it from continuing to construct a den there. This action will be taken in consultation with ENR and will involve the wildlife monitor. • If a key wildlife feature of a Species at Risk is discovered, both CWS and ENR will be contacted. Activities may be temporarily suspended pending consultation with these agencies. Ongoing monitoring and inspection of key wildlife feature will be conducted, as determined in consultation with CWS and ENR.	Continuous throughout the life of the Project.
All activities	Disturbance of denning and other mammals by Facility workers walking off site may disturb denning bears during the winter months or other mammals (e.g., fox, wolverine) year-round.	• Facility workers will not walk off-site onto tundra at any time of year, unless there is a specific requirement (i.e., waste recovery), and these activities will be scheduled to avoid sensitive wildlife periods. All facility workers will receive, at minimum, a basic wildlife orientation, and will be instructed not to disturb any wildlife. • Personnel is to maintain a minimum distance of 300 meters between sighted and/or known bear den sites for the duration of the Project.	Ongoing throughout the life of the Project while personnel are onsite.

Table 5-2 Mitigation Measures for Terrestrial Mammals (cont.)

Project Activity	Potential Effect	Mitigation Measure	Schedule
All activities	Wildlife incident or mortality: Wildlife (e.g., grizzly bear, polar bear) may approach facility sites while workers are present potentially resulting in a wildlife incident or mortality.	• ENR will be contacted if an active grizzly bear or wolverine den is identified within 500 m of Project activities to determine appropriate course of action. Observations of any polar bear within 1 km of Project sites will be reported to territorial (ENR) and federal (CWS) agencies. • The Wildlife Monitor and designated trained staff will have access to bear deterrent materials including bear spray, cracker shells, and a 12 gauge shotgun with plastic slugs. All work crews will have at least one can of bear spray during periods when bears may be present. The use of any deterrent method will be reported to ENR. • Staff will be familiarized with ENR's Bear Encounter Response Guidelines (Appendix A)	Ongoing throughout the life of the Project while personnel are onsite.
All activities	Wildlife incident or mortality: Wildlife (e.g., grizzly bear, polar bear) may approach facility sites while workers are present potentially resulting in a wildlife incident or mortality.	• Suitable hazing/herding techniques will be used to move wildlife from Project facilities, as per consultation with ENR/CWS. The Wildlife Monitors will advise personnel regarding the appropriate course of action. Permits are required to haze/herd wildlife. • Snow will be removed around buildings and work areas to increase visibility. • Adequate lighting will be installed in areas where it is essential to detect bears that may be in the vicinity.. • Camps and facility sites will be designed to incorporate proper bear safety; including consideration of avoiding blind corners, installation of proper lighting, incorporating proper waste management, kitchen and dining area cleanliness and maintenance, fencing, and wildlife detection.	Ongoing throughout the life of the Project while personnel are onsite.

Table 5-2 Mitigation Measures for Terrestrial Mammals (cont.)

Project Activity	Potential Effect	Mitigation Measure	Schedule
Waste storage	Wildlife incident or mortality: Poorly secured waste can be blown off of the site and pose risk of mortality to nearby nesting or foraging songbirds, shorebirds and waterfowl through the ingestion of wastes or entanglement in waste materials. Poorly secured waste can attract predators, which may increase predation pressure on nearby nesting songbirds, shorebirds and waterfowl.	• Waste removal crews will be sent out to areas surrounding each construction site before the arrival of breeding birds in the spring to collect and properly dispose of any waste material that has been blown off construction sites and on to the tundra. • All waste products will be properly secured, stored and transported. This includes the use of bear-proof storage containers that reduce odours at all times and clean camps and facility sites. • Fencing will be considered around areas that might attract wildlife (i.e., waste storage facilities, sites with food storage). • The main wastes produced during the construction of the all-weather access road will be typical domestic garbage and sewage. Strategies for Waste Management are outlined in Table 5-1.	Ongoing throughout the life of the Project.
Vehicle/ equipment use	Wildlife incident or mortality: Spills or leaks may harm wildlife.	• Best management practices, contingency plans, mitigation and emergency response plans will be implemented where necessary to prevent and address leaks and spills (details will be outlined in the Emergency Preparedness and Spill Contingency Response Plan). • All fuelling locations will be appropriate distances from waterbodies with strategically placed berms • Equipment used in or near water will be clean and free of oil, grease or other deleterious substances (details will be outlined in the Emergency Preparedness and Spill Contingency Response Plan).	Ongoing throughout the life of the Project while personnel are onsite.

Table 5-2 Mitigation Measures for Terrestrial Mammals (cont.)

Project Activity	Potential Effect	Mitigation Measure	Schedule
		• In the event of a spill, all efforts will be made to properly contain and manage the spill, including wildlife removal and treatment if necessary, • As per the Emergency Response and Spill Contingency Plan the spill area will be monitored closely and appropriate deterrents (e.g., warning noises, flagging) employed to discourage wildlife from entering the affected area and ingesting toxic substances or being covered with spill material. •	
All activities	Disturbance to barren-ground Caribou	• No person shall hunt barren-ground Caribou in the Aklavik/Inuvik/Tuktoyaktuk Barren-Ground Management Area I/BC/07 • Maintain a minimum distance of 500 meters between field operations and Barren-ground Caribou for the duration of the project.	

Table 5-3 Mitigation Measures for Birds

Project Activity	Potential Effect	Mitigation Measure	Schedule
Offsite activities	Wildlife incident or mortality: Facility workers walking off site may disturb nesting songbirds, shorebirds and waterfowl during the breeding season and cause nest abandonment and chick/egg mortality.	• Facility workers will not walk off-site onto tundra at any time of year, unless there is a specific need (i.e., waste clean-up, emergency), and planned activities will be scheduled to occur outside of peak breeding times. All facility workers will be instructed not to disturb any birds or nests observed. • Where practical, workers will avoid conducting project activities within 500 m of an active raptor nest during nesting season. • If active nesting sites are discovered within 500 m of Project sites, territorial (ENR) and federal (CWS) authorities will be contacted immediately to determine the appropriate course of action. Activities may be temporarily suspended pending consultation with ENR. • Trained wildlife monitors will be onsite during construction, operations and decommissioning, to monitor wildlife and manage the risk. • Ongoing monitoring and inspection of site will occur, as determined in consultation with ENR and using the wildlife monitor. Monitoring may include assessment of disturbance to nesting sites by wildlife monitor, monitoring nesting sites during spring to species, etc. • If a key wildlife and nesting feature of a Species at Risk is discovered, both CWS and ENR will be contacted. Activities may be temporarily suspended pending consultation with these agencies. Ongoing monitoring and inspection of nesting sites will be conducted, as determined in consultation with CWS and ENR.	Ongoing throughout the life of the Project while personnel are onsite.

Table 5-3 Mitigation Measures for Birds (cont.)

Project Activity	Potential Effect	Mitigation Measure	Schedule
Waste storage	Wildlife incident or mortality: Poorly secured waste can be blown off of the site and pose risk of mortality to nearby nesting or foraging songbirds, shorebirds and waterfowl through the ingestion of wastes or entanglement in waste materials. Poorly secured waste can attract predators, which may increase predation pressure on nearby nesting songbirds, shorebirds and waterfowl.	• Waste removal crews will be sent out to areas surrounding each construction site before the arrival of breeding birds in the spring to collect and properly dispose of any waste material that has been blown off construction sites and on to the tundra. • All waste products will be properly secured, stored and transported. This includes the use of bear-proof storage containers that reduce odours at all times, and clean camps and facility sites. • The main wastes produced during the construction of the all-weather access road will be typical domestic garbage and sewage. • Waste Management strategies are outlined in Table 5-1. •	Ongoing throughout the life of the Project.
Vehicle/ equipment use	Wildlife incident or mortality: Spills or leaks may harm wildlife.	• Best management practices, contingency plans, mitigation and emergency response plans will be implemented where necessary to prevent and address leaks and spills (details will be outlined in the Emergency Preparedness and Spill Contingency Response Plan). • All fuelling locations will be appropriate distances from waterbodies with strategically placed berms	Ongoing throughout the life of the Project.

Table 5-3 Mitigation Measures for Birds (cont.)

Project Activity	Potential Effect	Mitigation Measure	Schedule
Vehicle/ equipment use	Wildlife incident or mortality: Spills or leaks may harm wildlife.	• Equipment used in or near water will be clean and free of oil, grease or other deleterious substances (details will be outlined in the Emergency Preparedness and Response Plan). • In the event of a spill, all efforts will be made to properly contain and manage the spill, including wildlife removal and treatment if necessary as per the Emergency Response Plan. The spill area will be monitored closely and appropriate deterrents (e.g., warning noises, flagging) employed to discourage wildlife from entering the affected area and ingesting toxic substances or being covered with spill material.	Ongoing throughout the life of the Project.
Offsite activities	Wildlife incident or mortality: Facility workers walking off site may disturb nesting songbirds, shorebirds and waterfowl during the breeding season and cause nest abandonment and chick/egg mortality.	• Facility workers will not walk off-site onto tundra at any time of year, unless there is a specific need (i.e., waste clean-up, emergency), and planned activities will be scheduled to occur outside of peak breeding times. All facility workers will be instructed not to disturb any birds or nests observed. • Where practical, workers will avoid conducting project activities within 500 of an active raptor nest during nesting season.	Ongoing throughout the life of the Project while personnel are onsite.

5.3 Mitigation Measures for Species at Risk

Table 4-4 outlines mitigation measures for Species at Risk. Species that may occur in the quarry site are that are protected by SARA includes the Peregrine Falcon and the Woodland caribou (listed as threatened species). The Grizzly Bear, Wolverine, Rusty Blackbird and Short Eared Owl have been assessed as species of Special Concern under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC),

Species that may occur in the Project area that are protected by SARA under Schedule 1 include the Eskimo curlew (listed as Endangered). The short-eared owl is listed on Schedule 3 of SARA as species of Special Concern and is thus not afforded protection under SARA. Grizzly bear and wolverine are not currently listed under any Schedule of SARA. However, under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC, wolverine has been assessed as species of Special Concern and grizzly bear is listed as Sensitive. Project activities have the potential to adversely affect these species through direct habitat loss, sensory disturbance and accidental mortality. Both species of peregrine falcon are unlikely to nest in the Project area; however they have been considered in this EMP. It is also possible that peregrines may move through the Project area during migration.

The Contractor will employ an adaptive management approach to ensuring sensitive species/ species at risk are adequately protected during all phases of construction and quarry work. The species registries of ENR, COSEWIC and SARA will be monitored continuously throughout Project implementation, and management plans will be updated accordingly. The measures outlined in Section 3 will be followed wherever possible and will mitigate potential impacts on all wildlife, including Species at Risk.

Table 5-4 Mitigation Measures for Species at Risk

Activity/Potential Effect	Mitigation Measure
Wolverine -SARA Schedule 3 - Special Concern*; ENR - Special Concern*	
Wolverines and/or wolverine denning sites may be disturbed by Project activities.	• All staff will receive, at minimum, an orientation to this Wildlife Management Plan and the Bear Response Guidelines. Wildlife monitors will be onsite at all times during construction activities to report and advise as needed. • If, for any reason, spring disturbance is unavoidable, pre-disturbance surveys will be conducted in cooperation with ENR, as required. If a den is found, it will be reported immediately to ENR and a 500 m set-back will be in place around an active den during activities. If a wolverine, not denning, is identified within 500 m, ENR will be contacted to determine an appropriate course of action.
Grizzly Bear - COSEWIC - Special Concern; ENR – Sensitive; Not SARA-listed – currently pending public consultation for addition to SARA Schedule 1	
Grizzly bear and/or grizzly bear denning sites may be disturbed by Project activities.	• ENR will be contacted prior to construction start-up to determine locations of any known denning sites near the Project area. Ongoing consultation with HTCs and IGC will occur to ensure awareness of Project activities and obtain any local knowledge. • Denning surveys will be conducted in cooperation with ENR. If possible, no activities will take place within 500 m of an active den during the denning period, between October and April. If active dens or if a grizzly bear are observed within 500 m of the site during activities, territorial (ENR) and federal (CWS) agencies will be contacted immediately and an appropriate course of action will be determined. • All staff will receive at minimum a wildlife orientation and basic wildlife training (Section 8). Wildlife monitors will be onsite, when required.
Peregrine falcon (anatum sp./tundrias sp.) - COSEWIC - Special Concern; ENR - Sensitive	
Birds can collide with communication towers and other facilities, especially during the migration period.	• Guy wires will not be used.
Lighting of communication towers and other facilities can attract birds at night, especially during the migration period, resulting in injury or mortality.	• Lights will be positioned to shine down or fixed with shielding to direct light downward on buildings and other infrastructure sites, wherever possible. Lighting will be switched off, whenever possible (i.e., when camps and facilities are unmanned); this may include the use of remote control of lighting, motion detectors, etc.

Table 5-4 Mitigation Measures for Species at Risk (cont.)

Activity/Potential Effect	Mitigation Measure
Short-eared Owl - SARA Schedule 3 - Special Concern; ENR - Special Concern	
Nest sites may be abandoned due to disturbance from Project activities.	• Activities that cannot be conducted between October and April will be scheduled to occur outside the sensitive nesting period in June. Project activities scheduled for June are; intermittent continuation of grading and compaction of Section B.This precludes emergency activities. • Appropriate federal (CWS) and territorial (ENR) authorities will be contacted immediately before continuing work if a nest of a key wildlife species is identified within predetermined set-back distances (as determined through consultation with CWS/ENR).
Birds may be at risk of mortality from leaks and spills.	• The prevention and response measures to manage spills and leaks will be outlined in the Emergency Preparedness and Spill Contingency Response Plan • In the event of a spill, all efforts will be made to properly contain and manage the spill, including wildlife removal and treatment if necessary, as per the Emergency Preparedness and Response Plan. The spill area will be monitored closely and appropriate deterrents (e.g., warning noises, flagging) employed to discourage wildlife from entering the affected area and ingesting toxic substances or being covered with spill material.
Individuals may become entangled with waste materials blown off facility sites onto the tundra.	• Waste removal crews will be sent out to areas surrounding each construction site before the arrival of breeding birds in the spring to collect and properly dispose of any waste material that has been blown off construction sites and on to the tundra. • All waste products will be properly secured, stored and transported so as to be inaccessible to wildlife.
Eskimo Curlew - SARA Schedule 1 - Endangered - ENR - At Risk	
Birds may be at risk of mortality from leaks and spills. Nests may be abandoned due to disturbance from Project activities.	• The prevention and response measures to manage spills and leaks will be outlined in the Emergency Preparedness and Spill Contingency Response Plan.

Table 5-4 Mitigation Measures for Species at Risk (cont.)

Eskimo Curlew - SARA Schedule 1 - Endangered - ENR - At Risk	
	• In the event of a spill, all efforts will be made to properly contain and manage the spill, including wildlife removal and treatment if necessary, as per the Emergency Preparedness and Spill Contingency Response Plan. The spill area will be monitored closely and appropriate deterrents (e.g., warning noises, flagging) employed to discourage wildlife from entering the affected area and ingesting toxic substances or being covered with spill material. • Appropriate federal (CWS) and territorial (ENR) authorities will be contacted immediately before continuing work if a nest is identified within predetermined set-back distances (as determined through consultation with CWS/ENR).

5.3 Environmental Contingency Planning

Table 4-3 provides contingency planning measures for wildlife to be applied during all phases of the Project. Contingency planning is a tool to deal with unforeseen events that do not constitute emergencies, but could have environmental impacts during Project construction and operations. This section provides examples of possible events that could occur and describes actions that should be taken to respond to, minimize and/or correct any adverse consequences. Although the list is not exhaustive, the general procedures outlined can be applied to various unforeseen events. Emergency situations will be addressed in the Emergency Response and Spill Contingency Plans for the Project.

There are a number of unforeseen events that might affect wildlife, such as the presence of key habitat features at construction sites (e.g., den, nest, trail), wildlife/human interactions, wildlife mortality (e.g., road collisions), and spills of hydrocarbons or toxic substances. Contingency plans for these incidents include notifying appropriate authorities about wildlife incidents and proper containment and management of spills.

Table 5-5 Environmental Contingency Planning

Potential Issue	Contingency Strategy
Presence of key wildlife feature (e.g., nest, den)	• ENR and CWS will be contacted immediately upon discovery of grizzly bear or wolverine den site within 500 m of Project site to determine appropriate course of action. Construction activities may be temporarily suspended pending consultation with ENR. Ongoing monitoring and inspection of site will occur, as determined in consultation with ENR and using the wildlife monitor. Monitoring may include assessment of disturbance to den by wildlife monitor, monitoring den during spring to identify bear or wolverine emergence, etc. • If a den is identified the animal may be hazed away (permit required) to discourage it from continuing to construct a den there. This action will be taken in consultation with ENR and will involve the wildlife monitor. • If a key wildlife feature of a bird species or Species at Risk is discovered, both CWS and ENR will be contacted. Activities may be temporarily suspended pending consultation with these agencies. Ongoing monitoring and inspection of key wildlife feature will be conducted, as determined in consultation with CWS and ENR, e.g., nearby nest sites will be periodically monitored to assess disturbance to nest site. •

Wildlife encounter or incident	• **Event Type 1:** Bear observed > 500 m from Facility
	  • Alert all staff of bear presence including field crews in area.
	  • Monitor activity of bear while in area.
	  • Mobilize bear deterrent equipment (cracker shells, shotgun with rubber bullets and rifled slugs and high powered rifle).
	  • Inspect facility to determine if waste management may be attracting bear and take remedial action to reduce stimulus.
	• **Event Type 2:** Bear > 60 m and < 500 m
	  • Alert all staff of bear presence including field crews in area.
	  • Require all staff to return to secure shelter (buildings or vehicles).
	  • Monitor activity of bear while in area.
	  • Mobilize bear deterrent equipment (cracker shells, shotgun with rubber bullets and rifled slugs and high powered rifle).
	  • Fire cracker shells.
	• **Event Type 3:** Bear >30 m and < 60 m
	  • Alert all staff of bear presence including field crews in area.
	  • Require all staff to return to secure shelter (buildings or vehicles).
	  • Monitor activity of bear while in area.
	  • Mobilize bear deterrent equipment (cracker shells, shotgun with rubber bullets and rifled slugs and high powered rifle).
	  • Fire rubber bullets and be prepared to fire rifled slugs or high power rifle.
	• **Event Type 4: Bear < 30 m**
	  • Alert all staff of bear presence including field crews in area.
	  • Require all staff to return to secure shelter (buildings or vehicles).
	  • Monitor activity of bear while in area.
	  • Mobilize bear deterrent equipment (cracker shells, shotgun with rubber bullets and rifled slugs, high powered rifle, bear spray).
	  • Fire rubber bullets or lethal shot depending on conditions. If rubber bullets are fired, first be prepared to immediately follow with lethal shot.

Potential Issue	Contingency Strategy

	• **Event Type 5:** Bear Attack on Personnel
	  • Alert all staff of bear presence including field crews in area.
	  • Require all staff to return to secure shelter (buildings or vehicles).
	  • Attempt to safely distract bear.
	  • Mobilize shotgun with rifled slugs, high powered rifle and bear spray).
	  • Destroy bear.
	  • Immediately employ appropriate emergency medical care. Following the event, the local wildlife officer (CWS and ENR) will be notified, a post incident assessment will be conducted, and any appropriate corrective actions taken.

Wildlife mortality	• Immediate consultation with appropriate territorial (ENR) and federal (CWS) wildlife authorities will occur. Any key species mortality will be reported to ENR and CWS. • Situation and site will be assessed, including potential for further mortalities; consider increased wildlife deterrent mechanisms and security, including fencing and lights to ensure wildlife and personnel safety. • Ongoing or multiple mortalities of other species should be reported to CWS (i.e. birds regularly striking infrastructure over course of time, or single incident of a large flock of migratory birds striking infrastructure). •
Spills of hydrocarbons or toxic substances resulting in injury to wildlife and wildlife habitat	• Promptly implement Emergency Preparedness and Response Plan. Federal (CWS) and territorial (ENR) authorities will be contacted immediately to determine appropriate course of action, which may include capturing and relocating or appropriately treating contaminated wildlife. • The spill area will be monitored closely and appropriate deterrents (e.g., warning • noises, flagging) employed to discourage wildlife from entering the affected area and ingesting toxic substances or being covered in spill material.

6.0 Monitoring

A formal monitoring program has been implemented for this project. One Environmental Monitor trained and supplied by the ILA and one Wildlife Monitor supplied by E. Grubens Transport Ltd. (the Contractor) will be on site during all Project activities. Details on the Environmental and Wildlife Monitor duties and their responsibilities are included below:

Environmental Monitor

The Environmental Monitor is trained by the ILA and is certified in the following: WHIMIS, TDG, H2S alive, First Aid, and CPR. The Environmental Monitor will be tasked with the following:

- Inspecting Project activities and ensuring all Terms and Conditions of the ILA Permit are fulfilled.
- Communicating environmental concerns to the Regulators, Project personnel and the Environmental Division of DOT.
- Identifying activities that have the most potential to result in adverse impacts on the environment.
- Ensuring mitigation measures are implemented adequately.
- Documenting relevant information for regulatory authorities and co-management institutions, as required.
- Liaising with Regulators and Project Supervisors.

Wildlife Monitor

The Wildlife Monitor is trained by Hunters and Trappers Committee (HTC) and will be onsite during construction, operations and decommissioning, to monitor wildlife and manage risks. Ongoing monitoring and inspection of site will occur, as determined in consultation with ENR and using the wildlife monitor. The Wildlife Monitor will be tasked with the following:

- Wildlife Management including assessment of disturbance to dens and monitoring dens during spring to identify bear or wolverine emergence, etc.
- scouting shorelines in advance of construction crews to reduce effects on waterfowl populations at sensitive times of the year in critical habitat such as nesting and moulting areas. If nests are identified, the monitor will notify the Project Supervisor so that equipment and crews can avoid nesting locations.
- The Wildlife Monitors will advise personnel regarding the appropriate course of action during a wildlife encounter. Permits are required to haze/herd wildlife. Suitable hazing/herding techniques will be used to move wildlife from Project facilities, as per consultation with ENR/CWS.
- Inspection of camps and facility sites to incorporate proper bear safety; including consideration of avoidance of blind corners, installation of proper lighting, incorporating proper waste management, kitchen and dining area cleanliness and maintenance, fencing, and wildlife detection.
- Bear management
- Wildlife incident and sightings reporting
- Addressing youth and Elders' wildlife concerns

- Bluenose caribou and Dempster Highway caribou hunting
- Liaising with Regulators and Project Supervisors and providing recommendations on wildlife and applicable regulations pertaining to wildlife.
- Fur and trapping issues
- The Wildlife Monitor and designated trained staff will have access to bear deterrent materials including bear spray, cracker shells, and a 12 gauge shotgun with plastic slugs. All work crews will have at least one can of bear spray during periods when bears may be present. The use of any deterrent method during a bear encounter will be reported to ENR.

Project Supervisor

The Project Supervisor bears onsite responsibility for ensuring that all environmental compliance requirements as outlined in terms and conditions of permits and authorizations are being met as they pertain to this project. The Project Supervisor is also responsible for liaising with the Environmental and Wildlife Monitors for the entire duration of the project.

7.0 Reporting and Notification

Reporting is a key regulatory and management tool used to demonstrate compliance and document performance. This section identifies both qualitative and quantitative information that will be reported to satisfy both Shell internal and external regulatory reporting requirements.

7.1 Internal Reporting Requirements

High risk incidents or near misses (high potential) with significant learning value shall be analysed to identify the underlying root causes and latent failures. The reporting of near misses and hazardous events will be actively promoted as part of creating a “no blame” culture and “one site team”. Any incident that results in a noncompliance with a regulated limit or condition will be reported.

7.2 External Reporting Requirements

Regulatory authorities will be kept informed as required, as per the Monitor’s duties, applicable laws and regulations, Project commitments, and the terms and conditions of Project permits and authorizations. All bear and wolverine encounter-incident reports will be filed in accordance with established protocol and reported to ENR, to be included in annual mortality statistics for the NWT.

8.0 Documentation

Maintenance of records and other information is required to satisfy regulatory requirements and facilitate effective Project execution. Record keeping activities will be established as per the terms and conditions of the permits and authorizations, and other documentation and retention requirements for any necessary internal and external reports (e.g. Bear Complaint Checklist [ENR]) as required.

9.0 Environmental Training and Awareness

The Wildlife Monitor will be familiar with all wildlife management principles and will ensure that Project personnel is aware of and prepared to practice the following:

1) An overview of wildlife potentially occurring in the area (and considered in the WMP) and training on species and habitat identification, avoidance techniques, incident reporting procedures as required.

2) A review of ENR wildlife management legislation and regulations.

3) General restrictions related to wildlife protection and wildlife-human conflicts, including wildlife attractants, garbage management, wildlife and vehicles, preventing problem wildlife and procedures to deal with problem wildlife

4) Basic bear biology, bear behaviour, bear-human conflicts (including encounters), as well as the effective use of bear deterrents.

5) Review of safety in bear country videos (polar bear and grizzly bear), relevant literature and statistics, damage prevention and control methods and equipment as required.

6) A review of Section 38(1) of the Wildlife Act: Harassment of wildlife.

7) A review of the purpose of the Migratory Bird Conventions Act and its regulations, prohibitions and penalties, and species covered by this legislation as required.

8) A review of the purpose of SARA legislation and species status, prohibitions and penalties, and SARA-listed species found in the Project area as required .

Glossary

Buffer zone	An area of no activity (i.e., no disturbance) around a specific habitat or wildlife feature to protect the wildlife or wildlife feature.
Compliance monitoring	Monitoring to ensure regulatory requirements compliance with Project commitments and
Environmental effects monitoring	Monitoring indicators to measure the success of mitigation measures and the HSE MS to assess whether targets are being met
Habitat	The part of the physical environment in which an animal lives and which provides the animal with its basic needs
Riparian	Pertaining to anything connected with or immediately adjacent to the banks of a watercourse or waterbody
Set-back	A distance from a wildlife from a wildlife feature (e.g., nest, den), within which no activity or disturbance is permitted

Appendix A

Bear Response Guidelines (Environment and Natural Resources, GNWT)

Department of Environment and Natural Resources
Bag Service #1 Inuvik, NT X0E 0T0

Bear Encounter Response Guidelines

I. PRINCIPLES:

1. Protection of Life and Property
2. Conservation

II. OPERATIONAL GUIDELINES:

A. Deterrence
B. Re-locate, if feasible
C. Destroy

III. OPERATIONAL PROCEDURES:

Contacts:

Initial contact during regular hours:
Environment and Natural Resources Inuvik office at (867) 678-6650

Initial contact after regular hours and weekends:
Renewable Resource Officer on call
Cell: (867) 777 -1185
Fax: (867) 678 -6659

Response Personnel:

The following personnel can be available for responding to problem bear situations:

Tobias Halle	Inuvik	(867) 678-6681
Ian Ellsworth	Inuvik	(867) 678-6680
Kevin Allen	Inuvik	(867) 678-6683
Paul Voudrach	Inuvik	(867) 678-6652
Ian McLeod	Aklavik	(867) 978-2248
Lila Voudrach	Tuktoyaktuk	(867) 977-2350

Initial Contact:

1. The complainant should complete the attached checklist prior to calling Department of Environment and Natural Resources. It is critical that as much information as possible be provided at this point in order to determine the appropriate response.

IV. RESPONSE

Wildlife Monitors will be the initial responders to problem bears. It is imperative that they have a sufficient supply of approved deterrents at their disposal. All bear sightings and encounters shall be reported to the ENR office closest to the area of operation.

The potential responses will be considered in the following order:

a) Camps

1. Wildlife Monitors will employ conventional means of deterring problem bears that threaten public safety or property. This may involve chasing a bear out of the camp with a vehicle or snowmobile, or using noise makers and rubber bullets. If these methods prove ineffective, and where a helicopter is available or can be obtained in the area, the bear may be chased from camp. Pilots must be careful not to over stress the bear during this flight and must back off when the bear is a sufficient distance from the camp and keeps running in the desired location. If circumstances allow, a Renewable Resource Officer (RRO) should be contacted prior to using aircraft to deter bears. Undue harassment is illegal and must be avoided. **All incidents involving any means of deterrence should be reported to a Renewable Resource Officer as soon as possible.**

2. Should for some reason, the Wildlife Monitor be unable to deter a bear, and where the bear does not pose an immediate threat to public safety or property, the Department of Environment and Natural Resources (DENR) may send a deterrent or capture team to the site.

b) Denning bears

If a bear is located in, at or near a den site, work in the area must halt. All employees should safely retreat from the area and report the occurrence to the Site Supervisor, Wildlife Monitor, and the Renewable Resource Officer in your area as soon as possible. Staff from DENR will be required to assess the site and may implement measures to ensure bears are not unduly disturbed. This may include the establishment of an exclusion zone of 300 meters around the den in which no work will be permitted. Work inside the exclusion zone will remain stalled until after den emergence.

c) Free ranging bears

Prior to active deterrence of free ranging bears, and where public safety or property is not in immediate danger, the Wildlife monitor will assess the situation. The monitor should determine if the bear has been disturbed from a den or if it is denning in close proximity. Bears in the vicinity of a den should not be deterred and work should cease until DENR has assessed the site. If the Wildlife Monitor has determined that the bear is in fact free ranging, and not lingering around a den site, then active deterrence may commence.

d) Destruction of the bear

Instructions to destroy the bear will be given when deterrent actions have failed, when additional deterrent actions are not possible, and when it is determined that capture and relocation cannot be conducted or is unlikely to be successful.

The bear can be destroyed if human life or property is in immanent danger.

If a bear is killed, you will be required to:
1) Report the kill to Department of Environment and Natural Resources, as soon as possible.
2) Skin the bear, leaving the claws and penis (if applicable) attached, and preserve the hide by freezing or salting it and storing it in a cool place. Be generous with the salt.
3) Turn in the hide, the skull, and any other biological samples requested to a Department of Environment and Natural Resources Renewable Resource Officer.

As per the NWT Wildlife Act, no person may retain any part of a bear killed in defence of life or property.

V. FOLLOW-UP

After response measures are completed, the situation will be reviewed with the camp operator and corrective actions identified. These may include a wide array of actions aimed at avoiding future bear problems and ensuring that the operator is made aware of legal obligations. The need for conservation and the vulnerability of bear populations to over harvest is to be stressed.

Northwest Territories Inuvik Region

Department of Environment and Natural Resources
Bag Service #1 Inuvik, NT X0E 0T0
FAX (867) 678-6659

Bear Complaint Checklist

1. **Complainant Details:**
   - Date/Time of Report: _____
   - Complainants Name: _____
   - Affiliation/Location of Complainant: _____
   - Contact Number for Complainant: _____
   - Other on Site Contacts: _____
   - Wildlife Monitors Name: _____

2. **Camp Details:**

Location of Complaint: _____

   - Latitude/Longitude: _____
   - Type of Camp- Permanent/ Mobile: _____
   - Number of People in Camp: _____
   - How Long has Camp Been Here (if Mobile): _____
   - Are there any Aircraft on site? If yes, Type: _____

3. **History of the Problem:**

Date/Time Bear First Sighted: _____

   - Type of Bear: Grizzly_____ Polar _____ Black _____
   - Sex of Bear: Male _____ Female _____ Unknown _____
   - Age of Bear: Cub _____ Juvenile _____ Adult _____
   - Has Bear Been Observed Before: _____

Den site found (description)? _____

   - What was the Bear Attracted To: _____
   - Did the Bear Obtain Food: _____
   - Behaviour of Bear: Fearful _____ Not Fearful _____ Aggressive_____
   - Damage By Bear: _____

4. **Deterrent Action:**
   - Was the Bear Deterred? Yes_____ No _____
   - If Yes, Type of Deterrent Used: _____
     _____
   - Present Status of Bear: _____
     _____

5. **Other Information:**

Reporters Name/Title: _____

   - Weather on Site at Time of Report: _____
   - Checklist Forwarded to: _____

APPENDIX F

APPENDIX F INUVIK TO TUKTOYAKTUK ALL-WEATHER ROAD ECONOMIC ANALYSIS

Inuvik to Tuktoyaktuk All-Weather Road Economic Analysis

Department of Transportation
Government of the Northwest Territories
Second Floor, Lahm Ridge Tower
4501 Franklin Avenue
Yellowknife, NT X1A 2L9
SC 791942

June 8, 2010

Tuktoyaktuk - Inuvik All-Weather Road Economic Analysis
Government of the Northwest Territories, Department of Transportation, Planning Division

EXECUTIVE SUMMARY

The Government of the Northwest Territories, Department of Transportation (DOT) retained Terra-Firma Consultants and Pacific Analytics Inc. to undertake an analysis of the economic effects of building an All-Weather Road (AWR) from Inuvik to Tuktoyaktuk.

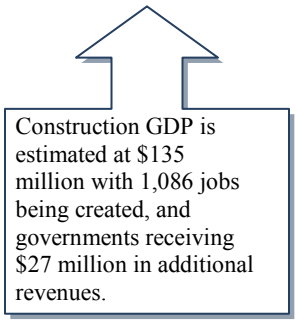
Four overall economic effects of building an AWR from Inuvik to Tuktoyaktuk were assessed: 1) building and maintaining the AWR, 2) reduction in the cost of living, 3) increase in tourism activity, and 4) impacts on the Mackenzie Gas Pipeline (MGP) including natural-gas field exploration and development in the Delta Region.

The study uses two models: the NWT Input-Output Tables developed by Statistics Canada, and a financial/economic model of the MGP developed by Pacific Analytics and used in earlier studies of the MGP that were submitted to the Joint Review Panel (JRP) and the National Energy Board (NEB). The Input-Output Tables analyze how the broader NWT and Canadian economies are affected by the AWR by calculating the spin-off (indirect and induced) impacts on the NWT and the rest of Canada (ROC). The financial/economic model is based on the detailed financial structure of the proposed MGP provided by Imperial Oil, and analyzes how the AWR changes the MGP's internal finances (Cash Flows, Royalties, Income Taxes, Internal Rates of Return, etc.) and investment requirements based on various operating assumptions.

Assumptions for the MGP model were refined through interviews with oil and gas executives, business managers and those businesses most directly affected by the AWR, such as air and ground transport companies and tourism operators servicing Tuktoyaktuk.

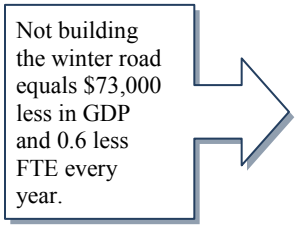
The results of the study indicate that the AWR will have a significant positive influence on local standards of living, tourism and general employment and importantly, will facilitated more efficient gas exploration and development in the Delta. Specifically, the study concludes the following:

AWR CONSTRUCTION AND MAINTENANCE CONTRIBUTION TO NWT GDP



The total contribution to NWT GDP from the Inuvik to Tuktoyaktuk construction is estimated at $135 million with 1,086 jobs being created, and governments receiving $27 million in additional revenues (of which the GNWT will receive $11 million). The direct and indirect impacts on ROC are $73 million in GDP, 860 jobs, and $9.5 million in government revenues. The increase in GDP due to AWR maintenance activities is estimated at $27 million with government revenues of $4 million.

GDP IMPACT OF DISCONTINUING THE ANNUAL TUKTOYAKTUK TO INUVIK WINTER ROAD

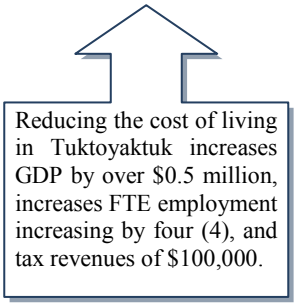


Discontinuing annual winter road construction will cause a reduction in economic activity of $73,000 in GDP, the loss of 0.6 full-time equivalent (FTE) jobs, and a reduction in government revenues of approximately $15,000.

Reduction in the Cost of Living

Assuming prices in Tuktoyaktuk approximately match those of Inuvik after the AWR is built (or Tuktoyaktuk residents purchase more of their goods and services in Inuvik); savings (excluding any extra vehicle costs and excluding the Food Mail savings examined previously) would reach roughly $1.0 million. Adding in the savings on Food Mail of $456,000 would mean that the AWR would result in approximately $1.5 million in savings, all of which would be available to be re-spent.

The elimination of the Food Mail program would have a negative impact on flights and a slight impact on the local trucking industry, the net impact being close to $0.5 million in reduced transport industry revenues.

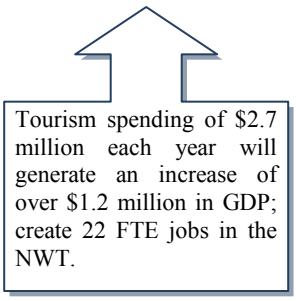


Overall, reducing the cost of living in Tuktoyaktuk will result in a GDP increase of over $330,000, FTE employment increasing by 1.6 jobs and tax revenues of just over $60,000, of which almost half would go to the Government of the NWT.

Tourism Spending Projected to Increase by $2.7 Million Annually

The expect increase in tourism spending each year due to the building of the Inuvik-to-Tuktoyaktuk AWR is projected at $2,705,000. The direct tourism spending of $2.7 million each year will generate an increase of over $1.2 million in GDP, create 22 FTE jobs in the NWT, and result in government

revenues increasing by over $200,000, of which over $100,000 will accrue to the Government of NWT. The rest of Canada will also benefit, with GDP in other parts of the country increasing by almost $400,000, jobs increasing by six FTEs, and further government revenues rising by just over $50,000. The NPV increase in NWT GDP over this period is estimated at $21 million, and government revenues up by $3.5 million. In the rest of Canada, GDP increases by another $7 million and government revenues rise by almost $1 million.



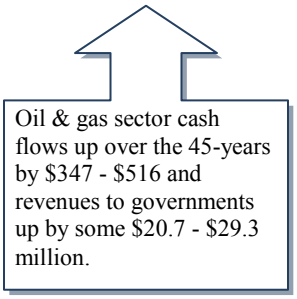
Total Economic Impact of Building the AWR (Not Including the MGP)

After taking into account all tax revenues stemming from the construction of the AWR, building the Inuvik-to-Tuktoyaktuk AWR will cost the Federal and Territorial government about $184 million. When all economic spin-offs (direct, indirect, and induced impacts) are accounted for over the 45 year existence of the AWR, this investment will create about $248 million in net purchases of goods and services (material inputs) in the NWT and an additional $97 million in ROC. This results in a net increase in GDP in the NWT of $186 million and an increase in GDP in the rest of Canada of $84 million. Building the Inuvik-to-Tuktoyaktuk AWR will create 1,086 one-time jobs in the NWT and another 860 one-time jobs in ROC. In addition, the building of the AWR will create 42 long-term jobs in the NWT and another 9 in ROC. Building the AWR will earn the Federal and Territorial governments almost $55 million from economic activities in the NWT and an additional $11 million accruing to governments in ROC.

Impacts of the AWR on the Proposed Mackenzie Gas Pipeline

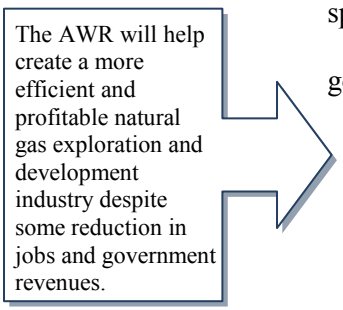
The AWR reduces oil and gas company investment costs which lead directly to greater company cash flows over the 45-year period of the MGP of $347 - $516 million depending on whether the eventual capacity of the pipeline is 1.2 bcf/day or 1.8 bcf/day.

Total revenues to governments will increase by some $20.7 - $29.3 million ($2009 dollars, discounted at 5 percent), although, due to the vagaries of royalty legislation, the Federal Government will increase its revenues by $29.6 - $41.5 million, and the NWT will see its revenues drop by $8.9 - $12.1 million. It is expected that the Federal and NWT Governments will sign a royalty-sharing agreement, and therefore it is likely that the AWR will result in an increase in revenues flowing to the GNWT.



Economic Impacts of the AWR Increasing Oil and Gas Sector Profitability

The AWR will enable the oil and gas sector to become more efficient and profitable through reduced exploration and well development expenditures. The increase in efficiency is a critical advantage for the industry, but the reduced spending by the oil and gas sector does result in reduced GDP, and diminished government revenue and jobs. That is, there will be:



1. Less buying and selling: Less buying and selling in the amount of $385 - $572 million over the 45-year period will result in the NWT accumulating $94.5 - $140.2 million less in GDP.

2. Fewer person-years of employment: With less buying and selling, it is estimated that over 45 years, there will be 1,127 -1,600 fewer person-years of employment in the NWT.
3. Lower government revenues: With less buying and selling and fewer person-years of employment, government revenues will decline by $65.4 - $97.1 million ($21.4 - ($31.8 million in NWT revenues).

Assertion of Canadian Sovereignty

The Beaufort-Delta region is a territorial and national asset of strategic importance. It provides the only NWT and Canadian deep-sea port in the Western Arctic, and the development of oil and gas resources in Alaska may create additional and as yet unrealized opportunities, particularly if all-weather road access is available. The region is strategically located to assist shipping to/from Alaska, Asia, and the continental U.S. It could receive goods from Asia for trans-shipment south to the rest of Canada. Arctic sovereignty concerns over the Northwest Passage could lead to the establishment and investment of an amplified Canadian presence. Potential partnerships exist with the U.S. and Canada in the transport of oil and gas, and between the private and public sectors in the NWT in the development of infrastructure.

The AWR is a comparatively low-cost assertion of Canadian sovereignty in Canada's Arctic without significant on-going expenses and risks.

For comparison purposes, the cost of "[f]lying the flag in the Arctic could cost the Canadian military as much as $843 million annually, says a series of internal Defence Department cost estimates. The bill for operation and maintenance would be on top of the estimated $4.5-billion capital outlay for

new light icebreakers, a deepwater port and a support base" (Brewster, 2009: and that is for the Eastern Arctic only). "From a cost perspective, it cannot be over-emphasized that the vastness, isolation and lack of existing infrastructure will lead to increased costs in all aspects of implementation and operations in the Arctic" (Brewster, 2009). With experts predicting that Arctic channels could be open to unimpeded summer navigation by 2015 (Brewster, 2009), Canada's ability to exercise its sovereignty in the Western Arctic becomes more urgent.

Jim Johnson MA, CFA
Pacific Analytics Inc.

Louie Azzolini MA, MBA, MCIP
Terra-Firma Consultants

Third Party Disclaimer

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INTRODUCTION

1.1. APPROACH

The purpose of this study, commissioned by the Department of Transportation (DOT), Government of the Northwest Territories (GNWT), is to estimate the economic effects of building an All-Weather Road (AWR) from Inuvik to Tuktoyaktuk.

The outcome of the study flows from an analysis of the following:

1. the effects of building and maintaining the AWR, including the reduction in economic activity resulting from not having to build a winter-road each year;
2. the reduction in freight costs due to the year-round AWR resulting in lower consumer prices and increased standards of living in Tuktoyaktuk;
3. the effects on tourism stemming from the improved access provided by the AWR to Tuktoyaktuk;
4. the impacts of the AWR on exploration and new gas-well development linked to the Mackenzie Gas Project (MGP); and finally
5. a qualitative assessment of the intangible impacts that the AWR may bring to Beaufort-Delta region of the NWT.

The first three components are assessed in Section 2.2. Section 0 addresses the impacts of the AWR on the MGP. The latter including interviews with owners or senior executives of Aurora Expediting, E. Gruben Transport Ltd., Horizon North Logistics Inc., employees of the GNWT, Mid-Arctic Transportation Company (MATCO), Inuvialuit Regional Development Corporation, the North West Company, Northwest Transport, Stanton Distributing and Up North Tours. The information from that analysis was included in a full financial model of the MGP that was developed and submitted to the MGP Joint Review Panel in 2007. The output of the financial model included:

1. financial information (e.g., cash flows, internal rates of return, royalties, and income taxes payable); and
2. economic outcomes (i.e., direct, indirect, and induced impacts) of the AWR on the MGP.

For the purposes of all the analyses, a 45-year life of the AWR was assumed, corresponding to the 45-year life of the MGP used by the Joint Review Panel assessment. The annual impacts of the AWR are discounted (at 5 percent) and summed over that 45-year period in order to calculate total impacts. It should be noted that because of the large effect that discounting has after 30 or so years, selecting an AWR life of 40 or 50 years would have no material effect on the outcome of the analysis.

1.2. CONTEXT

Connecting Inuvik to Tuktoyaktuk is a transportation system comprised of a seasonal ice which is in operation about three months a year; year road air access; and, the twice yearly barge runs. All weather road access to Inuvik via the Dempster Highway #8 with ferry/ice bridge crossings on the Mackenzie River at Fort McPherson and on the Arctic Red River at Tsiigehtchic.

The Beaufort-Delta region is a territorial and national asset of strategic importance. It provides the only NWT and Canadian port in the Western Arctic, and the development of oil and gas resources in the Beaufort Sea may create additional and as yet unrealized opportunities, particularly if all-weather road

FIGURE 1 LOCATION MAP

access is available. The region is also strategically located to assist shipping to/from Alaska, Asia, and the continental U.S. It could receive goods from Asia for transhipment south to the ROC. Arctic sovereignty concerns related to the Northwest Passage could lead to increased investment in Canadian presence.

With the development of oil and gas discoveries in the Beaufort Delta and Arctic shipping becoming a reality, connecting Canada to the Arctic Coast facilitates Canada's development of these resources.

Connecting Canada to the Arctic Coast is also crucial to the socioeconomic future of Canada. The benefits would extend coast to coast to coast. The Inuvik to Tuktoyaktuk highway is a crucial step to connecting Canada's three coasts and is critical for the future protection and prosperity of Canadians.

A 140-kilometre all-weather highway could someday connect Inuvik and Tuktoyaktuk, N.W.T., which are currently linked by air or ice road. (CBC)

The cost of "[f]lying the flag in the Arctic could cost the Canadian military as much as $843 million annually, says a series of internal Defence Department cost estimates. The bill for operation and maintenance will be on top of the estimated $4.5-billion capital outlay for new light icebreakers, a deepwater port and a support base" (Brewster, 2009): and that is for the Eastern Arctic only. "From a cost perspective it cannot be over-emphasized that the vastness, isolation and lack of existing infrastructure will lead to increased costs in all aspects of implementation and operations in the Arctic," (Brewster, 2009). Moreover, with experts predicting that Arctic channels could be open to unimpeded summer navigation by 2015 (Brewster, 2009), Canada's ability to exercise its sovereignty in the Western Arctic becomes more urgent.

> *There is a critical need for a port connected to an AWR road link because if BP goes into development and production it will need a vastly improved harbour than currently exists at Tuktoyaktuk to support the level of activity that will occur and the type of vessels that will be frequenting the Beaufort Sea. Bob Ball, BP Operations Manager, North American Arctic Exploration, (personal communication, June 16, 2009).*

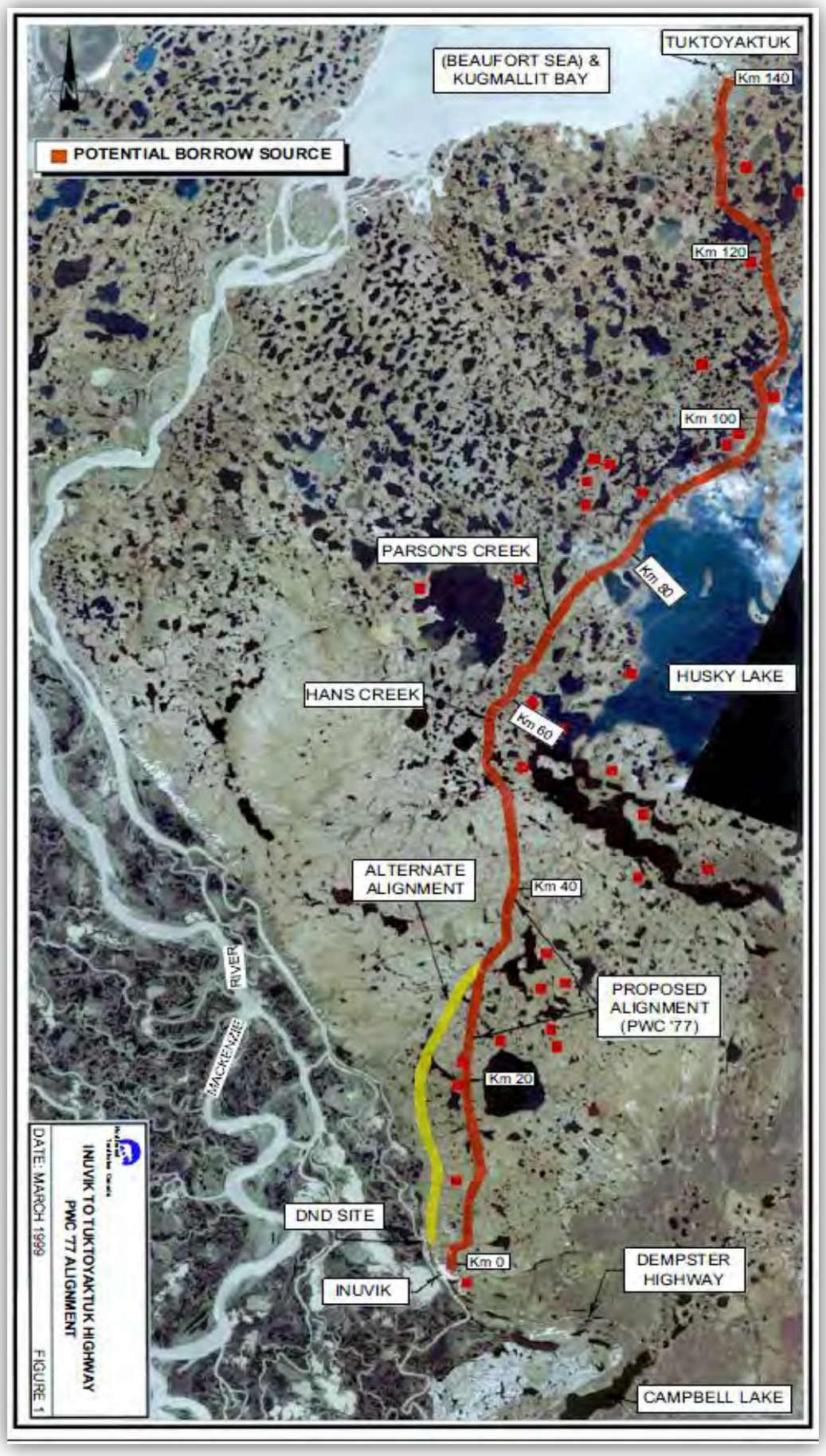

FIGURE 2 INUVIK – TUKTOYAKTUK ALL-WEATHER-ROAD PROPOSAL

2. THE ECONOMIC IMPACTS OF THE ALL-WEATHER ROAD

2.1. INTRODUCTION

Four overall economic effects of building the AWR from Inuvik to Tuktoyaktuk were assessed.[1] They are:

1. The construction and maintenance of the AWR: The actual building of the AWR will have three major impacts on the economy of the NWT.

   1.1. *Construction of the AWR:* Construction of the AWR will have a temporary (limited to the building period) impact on demand for supplies (e.g., gravel and fuel) and employment (and therefore wages), both of which will create additional spin-off activity in the economy. Once the AWR is built, there will be no additional economic stimulus from construction.

   1.2. *Annual maintenance of the AWR:* This component will generate much less activity in the economy than the construction activity; however, maintenance will need to be done every year, and therefore demand for supplies and maintenance jobs will be permanent fixtures in the economy.

   1.3. *Loss of annual winter-road construction:* This represents an annual cost savings to the government, but it also represents a reduction in economic activity since the supplies and employment associated with the winter-road building will no longer be required.

2. Reduction in the cost of living: With the AWR, it will cost less to transport goods to Tuktoyaktuk. With lower freight rates, people and businesses will pay less for what they buy and will therefore have money left over (equal to the savings in freight rates) with which to buy more goods and services. At the same time, easier access to Inuvik will enable people in Tuktoyaktuk to travel to Inuvik where goods and services are generally less expensive. This also will provide cost savings which can be spent on other goods and services. Since people will be able to buy more with the same amount of money after the AWR is built, all things the same, this will lead to a higher standard of living and likely create

[1] The economic impacts that will result from the building of the AWR have been calculated using the NWT Input-Output Tables developed by Statistics Canada. Three measures of economic impacts are calculated. The first are the direct impacts. Direct impacts refer to the contribution to the economy made from specific economic activities related to the AWR ─ for example, actual AWR construction activities or the specific increase in tourism spending resulting from the existence of the AWR. Over and above these impacts are the indirect impacts, which refer to the additional economic activity generated as the result of the purchases of material inputs. That is, when (say) the construction company building the AWR purchases goods and services (such as gravel, asphalt, or trucking services), those industries themselves generate activity in the economy through their own production process and through their own purchase of additional goods and services (e.g., the trucking industry would have to purchase greater quantities of diesel fuel, which would increase economic activity in the petroleum refining industry). On top of that, there are the induced impacts on the economy generated when the wages and salaries paid by the (say) construction company and (say) the trucking company are re-spent in the economy, generating economic activity in the retail sector, the recreation sector, the restaurant sector, and the like. Companies affected by this increase in local disposable income will themselves demand greater inputs and will hire additional staff, all of which serves to increase economic activity even further.

Direct, indirect, and induced impacts are determined separately for GDP (Gross Domestic Product – a standard measure of economic activity in the economy), for Labour Incomes, for Employment, and for Government Revenues. In order to calculate the direct, indirect, and induced impacts of an investment or an increase in spending, the investment or spending estimates (broken down by commodity type) are first entered into the NWT Input-Output Model. Then, since taxes do not add to economic activity, the appropriate taxes are removed. Third, the value of margins are reallocated (in a nutshell, the value of (say) gravel is made up of three price components: the value of the gravel at the mine site, the value of any wholesale and retail mark-ups, and the value of the transport or delivery costs to the construction site – see Appendix B for an in-depth explanation of IO modeling). Finally, the import content of each commodity is removed, since imported goods and services do not generate additional economic activity in the local economy. These impacts are calculated separately for impacts on the NWT economy and for impacts on the economies in the rest of Canada. Note that for ROC estimates, Statistics Canada does NOT calculate induced impacts and therefore the impacts highlighted in the Tables are "Direct + Indirect" only; consequently, the stated impacts are under-estimates.

additional local employment, too. This increase in consumer purchases and standard of living will have spin-off impacts on other parts of the economy throughout the NWT.

It should be noted that the reduction in freight rates will likely have a negative impact on - airline industry revenues. This decline will be partially counterbalanced by an increase in purchases by residents of Tuktoyaktuk and hence slightly more trucking business.

3 Increase in Tourism Activity: The creation of more economical access to northern areas will result in additional tourism activity. This increase in tourist activity will stem from both an increase in the number of tourists and an increase in the number of days, on average, each tourist spends in the region. While it is possible that some industries could be adversely affected (e.g., the air charter industry), the overall increase will have a direct impact on local employment and incomes, and it will also have spin-off effects on the demand for supplies and other goods and services.

4. Impacts on the Mackenzie Gas Pipeline The AWR could have two potential impacts on the Mackenzie Pipeline Project. It could affect the initial cost of construction of the MGP; and it could affect future exploration and well-development costs.
   4.1. *Construction of the MGP:* The cost structure of the MGP as proposed by the proponents (Imperial Oil et. al) was estimated based on the absence of an AWR. With a full-length AWR, it is possible that the cost of building the MGP will decline and reduced MGP construction costs would result in lower tolls for moving gas through the pipeline and would therefore increase gas field profitability. However, the existence of just the Inuvik-to-Tuktoyaktuk AWR is unlikely to have any impact on overall construction costs, and therefore no changes to the impacts should be expected.
   4.2. *Impacts on natural gas field exploration and development*: Apart from any effects on the construction phase of the MGP, the AWR could reduce the cost of natural gas field drilling and well development in the Delta area. If this does happen, field profitability would increase, as would royalties and income taxes going to the GNWT. However, as with the MGP construction, a reduction in trucking costs for exploration and field development would result in less money spent in the NWT and therefore fewer spin-off dollars in the NWT economy. Whether the net effects are positive or negative for the economy of the NWT would depend on the exact nature of the exploration and well development costs, and this, in essence, will be the focus of this assessment.

2.2. Economic Impacts of the AWR (Excluding Impacts on the MGP)

2.2.1. AWR Construction and Maintenance

The economic effects flowing from this construction investment have been calculated using the NWT Input-Output Tables developed by Statistics Canada. Three measures of economic effects are calculated. The first is the ***direct impacts***, which refer to the contribution to the economy made from the actual AWR construction activities. Over-and-above these effects are the ***indirect impacts***, which refer to the additional economic activity generated as the result of the purchase of material inputs. That is, when the construction industry purchases goods and services (such as gravel, diesel, or trucking services), those industries themselves generate activity in the economy through their own purchase of goods and services (e.g., the trucking industry will have to purchase greater quantities of diesel fuel). On top of that, there are the ***induced impacts*** that are created when the wages and salaries paid by the construction industry and (say) the trucking industry are re-spent in the economy, generating economic activity in the retail sector, perhaps the restaurant sector, and the like.

The economic effects stemming from the Inuvik to Tuktoyaktuk AWR construction are based on an estimated investment of $230 million

TABLE 1 AWR CONSTRUCTION COSTS

	Kms	Road Cost	Bridge Cost	Engineering Cost	Total Cost
Inuvik to Tuktoyaktuk	145	$200,000,000	$0	$30,000,000	**$230,000,000**

Source: NWT Department of Transportation

As displayed in Table 2, the direct impact on GDP is estimated at $91 million, the number of jobs at 668, and government revenues at $19 million. Indirect impacts reach $26 million in GDP, generating 282 jobs and $4 million in government revenues. Induced GDP impacts are estimated at $17 million, 135 jobs, and $4 million in additional government revenues. Overall, therefore, the total contribution to NWT GDP from the Inuvik to Tuktoyaktuk construction is estimated at $135 million with 1,086 jobs being created, and governments receiving $27 million in additional revenues (of which the GNWT will receive $11 million). The direct and indirect impacts on ROC are $73 million in GDP, 860 jobs, and $9.5 million in government revenues.

TABLE 2 ECONOMIC IMPACTS OF INUVIK TO TUKTOYAKTUK AWR CONSTRUCTION

AWR Maint. Inuvik to Tuktoyaktuk	NWT				REST OF CANADA
	Direct	**Indirect**	**Induced**	**TOTAL**	**Dir. + Indir.**
Output	$230,000,000	$55,928,500	$49,630,720	**$335,559,220**	$157,787,352
Material Inputs	$138,553,140	$29,545,230	$32,905,170	**$201,003,540**	$84,740,348
GDP	$91,446,860	$26,383,280	$16,725,550	**$134,555,690**	$73,047,004
Employment (FTE)	668.3	282.0	135.5	**1,085.8**	859.6
Wages & Salaries	$61,277,480	$15,012,190	$9,162,100	**$85,451,770**	$37,857,452
Benefits	$4,238,680	$1,089,250	$664,780	**$5,992,710**	$4,667,674
Total Gov't Revenues	$18,701,490	$3,997,460	$4,206,360	**$26,905,310**	$9,522,410
Federal	$11,801,440	$2,226,930	$1,761,250	**$15,789,620**	$5,269,710
Net Indirect Taxes	*$1,622,000*	*$317,340*	*$414,950*	***$2,354,290***	*$893,430*
Personal Income Taxes	*$10,179,440*	*$1,909,590*	*$1,346,300*	***$13,435,330***	*$4,376,280*
NWT/Provincial	$6,900,050	$1,770,530	$2,445,110	**$11,115,690**	$4,252,700
Net Indirect Taxes	*$1,882,650*	*$976,370*	*$1,825,760*	***$4,684,780***	*$2,531,360*
Personal Income Taxes	*$5,017,400*	*$794,160*	*$619,350*	***$6,430,910***	*$1,721,340*

Source: NWT Input-Output Model

2.2.2. Annual Maintenance Costs of the AWR

Once the AWR is completed, it will be necessary to provide an annual budget for its maintenance. Again, the NWT DOT provided estimates of these maintenance costs.

Table 3 highlight the estimated annual economic effects associated with the maintenance budget for the Inuvik-to-Tuktoyaktuk portion of the AWR. Total economic impacts are estimated at $1.5 million in GDP with employment effects estimated at 19 jobs, $230,000 in government revenues. ROC impacts are respectively $366,000 in GDP, five direct and indirect jobs, and $47,000 in government revenues.

Table 3 Annual Economic Impacts Of Inuvik To Tuktoyaktuk AWR Maintenance

AWR Maint. Inuvik to Tuktoyaktuk	NWT				REST OF CANADA
	Direct	**Indirect**	**Induced**	**TOTAL**	**Dir. + Indir.**
Output	$1,957,500	$569,210	$570,537	**$3,097,247**	$712,682
Material Inputs	$950,195	$276,302	$378,270	**$1,604,767**	$345,788
GDP	$1,007,305	$292,908	$192,272	**$1,492,485**	$366,895
Employment (FTE)	13.6	4.0	1.6	**19.2**	4.9
Wages & Salaries	$620,983	$180,572	$104,037	**$905,592**	$201,242
Benefits	$53,295	$15,497	$8,930	**$77,722**	$24,435
Total Gov't Revenues	$158,006	$45,946	$45,903	**$249,855**	$46,550
Federal	$82,477	$23,983	$19,591	**$126,051**	$25,680
Net Indirect Taxes	*$10,008*	*$2,910*	*$4,397*	***$17,315***	*$2,980*
Personal Income Taxes	*$72,469*	*$21,073*	*$15,194*	***$108,736***	*$22,700*
NWT/Provincial	$75,529	$21,963	$26,312	**$123,804**	$20,870
Net Indirect Taxes	*$47,025*	*$13,674*	*$19,349*	***$80,048***	*$11,940*
Personal Income Taxes	*$28,504*	*$8,289*	*$6,963*	***$43,756***	*$8,930*

Source: NWT Input-Output Model

Unlike the economic effects of the AWR construction phase, which are one-time impacts, these maintenance effects are annual impacts and will therefore continue to impact the economy year after year. In order to convert these annual impacts into a single impact value, the standard treatment is to convert the profile of annual impacts (in this case, over the 45-year life of the AWR) into a discounted value (discounted at a 5 percent discount rate).

Table 4 displays the same information as Table 3, except the data are in the form of a Net Present Value (NPV) over a 45-year period (discounted at 5 percent). Over this period, the (discounted) increase in GDP due to maintenance activities is estimated at $27 million. The NPVs of government revenues are estimated at $4 million. Note: the concept of NPV employment is not valid and therefore no estimate is provided.

Table 4 NPV Maintenance Impacts For Inuvik To Tuktoyaktuk Portion

NVP Inuvik to Tuktoyaktuk Maint.	NWT				REST OF CANADA
	Direct	**Indirect**	**Induced**	**TOTAL**	**Dir. + Indir.**
Output	$34,793,000	$10,117,000	$10,141,000	**$55,051,000**	$12,667,335
Material Inputs	$16,889,000	$4,911,000	$6,723,000	**$28,523,000**	$6,146,001

NVP Inuvik to Tuktoyaktuk Maint.	NWT				REST OF CANADA
GDP	$17,904,000	$5,206,000	$3,418,000	**$26,528,000**	$6,521,324
Employment (FTE)	0	0	0		0
Wages & Salaries	$11,037,000	$3,209,000	$1,849,000	**$16,096,000**	$3,576,874
Benefits	$947,000	$275,000	$159,000	**$1,381,000**	$434,181
Total Gov't Revenues	$2,808,000	$817,000	$816,000	**$4,441,000**	$827,394
Federal	$1,466,000	$426,000	$348,000	**$2,240,000**	$456,349
Net Indirect Taxes	*$178,000*	*$52,000*	*$78,000*	***$308,000***	$53,008
Personal Income Taxes	*$1,288,000*	*$375,000*	*$270,000*	***$1,933,000***	*$403,538*
NWT	$1,343,000	$390,000	$468,000	**$2,201,000**	$371,029
Net Indirect Taxes	*$836,000*	*$243,000*	*$344,000*	***$1,423,000***	*$212,255*
Personal Income Taxes	*$507,000*	*$147,000*	*$124,000*	***$778,000***	*$158,779*

Source: NWT Input-Output Model

2.2.3. Elimination of Temporary Winter-Road Requirements

Once the AWR is in place, there will be no need for the temporary winter-road to be built. This will result in annual savings to the GNWT, but it also means that the associated annual purchases of goods and services and hiring of labour will be eliminated, thereby reducing economic activity in the NWT.

Economic effects stemming from the Inuvik to Tuktoyaktuk winter-road are displayed in Table 5. With savings to government of $129,000 each year (equal to Output – what the cost of the winter-road will be without the AWR), this results in a reduction in economic activity of $73,000 in GDP, the loss of 0.6 full-time equivalent jobs, and a reduction in government revenues of approximately $15,000. The equivalent NPV values for this portion of the winter-road are displayed in Table 6.

Table 5 Reduction In Economic Impacts From Inuvik To Tuktoyaktuk Winter-Road

Winter: Inuvik to Tuktoyaktuk	NWT				REST OF CANADA
	Direct	**Indirect**	**Induced**	**TOTAL**	**Dir. + Indir.**
Output	$128,650	$29,988	$26,758	**$185,396**	$91,619
Material Inputs	$78,790	$15,916	$17,740	**$112,446**	$49,326
GDP	$49,860	$14,073	$9,018	**$72,951**	$42,293
Employment (FTE)	0.4	0.1	0.1	**0.6**	0.5
Wages & Salaries	$33,326	$7,886	$4,947	**$46,159**	$21,818
Benefits	$1,951	$560	$351	**$2,862**	$2,693
Total Gov't Revenues	$10,329	$2,119	$2,273	**$14,721**	$5,260
Federal	$6,514	$1,175	$952	**$8,641**	$2,920
Net Indirect Taxes	*$954*	*$170*	*$224*	***$1,348***	*$390*
Personal Income Taxes	*$5,560*	*$1,005*	*$728*	***$7,293***	*$2,530*
NWT/Provincial	$3,815	$944	$1,321	**$6,080**	$2,340
Net Indirect Taxes	*$1,068*	*$525*	*$986*	***$2,579***	*$1,350*

Winter: Inuvik to Tuktoyaktuk	NWT				REST OF CANADA
Personal Income Taxes	*$2,747*	*$419*	*$335*	***$3,501***	*$990*

Source: NWT Input-Output Model

TABLE 6 NPV IMPACTS FOR THE INUVIK TO TUKTOYAKTUK PORTION OF THE WINTER-ROAD

NPV Winter: Inuvik to Tuktoyaktuk	Direct	Indirect	Induced	TOTAL	Dir. + Indir.
Output	$2,207,000	$515,000	$459,000	**$3,181,000**	$1,571,982
Material Inputs	$1,352,000	$273,000	$304,000	**$1,929,000**	$846,187
GDP	$856,000	$242,000	$155,000	**$1,252,000**	$725,833
Employment (FTE)					
Wages & Salaries	$572,000	$135,000	$85,000	**$792,000**	$374,360
Benefits	$33,000	$10,000	$6,000	**$49,000**	$46,113
Total Gov't Revenues	$178,000	$36,000	$39,000	**$253,000**	$90,400
Federal	$112,000	$20,000	$16,000	**$148,000**	$50,013
Net Indirect Taxes	*$16,000*	*$3,000*	*$4,000*	***$23,000***	$6,654
Personal Income Taxes	*$95,000*	*$17,000*	*$12,000*	***$125,000***	*$43,363*
NWT	$65,000	$16,000	$23,000	**$104,000**	$40,026
Net Indirect Taxes	*$18,000*	*$9,000*	*$17,000*	***$44,000***	*$23,032*
Personal Income Taxes	*$47,000*	*$7,000*	*$6,000*	***$60,000***	*$16,967*

Source: NWT Input-Output Model

2.2.4. REDUCTION IN THE COST OF LIVING

The AWR will reduce cost of shipping goods to Tuktoyaktuk. With lower prices on goods, people will have money left over after buying the same basket of goods they bought before the AWR. They will be able to buy more goods and services without having to make more money and thus standards of living will increase. This additional disposable income, by definition, will be equal to the savings in freight rates.[2]

Another effect of the AWR is that the delivery of food via the Federal Government-sponsored Food Mail programme would likely cease as food costs in Tuktoyaktuk would more closely reflect those in Inuvik. Consequently, there would be less need for food delivery via air cargo, and barge and more trucking activity.

The building of the Inuvik to Tuktoyaktuk AWR will eliminate the need for transporting food packages by mail (Food Mail) to Tuktoyaktuk. It is estimated that there are at least 400 pieces of food mail sent each month for a minimum 4,800 per annum; translating to roughly 160,000 lbs of food deliveries over the course of a year. Transport costs by plane between Inuvik and Tuktoyaktuk are $3/lb, equating to an estimated $480,000 in Food Mail costs. With the AWR in place, these flights would be discontinued and the food would be hauled by road at an estimated cost of $0.15/lb. Thus, in terms of transportation impacts, the trucking industry would receive an additional $24,000 in revenues while the air transportation industry

[2] The reduction in prices for consumer goods will flow partly to local individuals, resulting in additional disposable income. For local businesses that purchase (lower-priced) goods, the assumption is that lower input costs to businesses will lower business prices rather than raise profits. These lower business prices then flow to consumers, resulting in additional disposable income.

would receive $480,000 less in revenues. The change in the economy as Tuktoyaktuk transports more freight by truck and less by air highlighted in table 7 on the next page.

TABLE 7 ECONOMIC IMPACT OF MOVING FROM AIR TRANSPORT TO TRUCK TRANSPORT

Food Mail	NWT				REST OF CANADA
	Direct	Indirect	Induced	TOTAL	Dir. + Indir.
Output	-$456,000	-$144,018	-$80,929	**-$680,947**	-$360,244
Material Inputs	-$333,200	-$104,969	-$53,660	**-$491,829**	-$187,709
GDP	-$122,800	-$39,049	-$27,273	**-$189,122**	-$172,534
Employment (FTE)	-1.6	-0.5	-0.2	**-2.4**	-2.3
Wages & Salaries	-$88,358	-$28,006	-$14,497	**-$130,861**	-$95,252
Benefits	-$9,350	-$2,952	-$1,527	**-$13,829**	-$11,984
Total Gov't Revenues	-$29,795	-$9,449	-$6,486	**-$45,730**	-$24,400
Federal	-$13,279	-$4,222	-$2,734	**-$20,235**	-$13,030
Net Indirect Taxes	*-$1,949*	*-$633*	*-$635*	***-$3,217***	*-$2,280*
Personal Income Taxes	*-$11,330*	*-$3,589*	*-$2,099*	***-$17,018***	*-$10,750*
NWT	-$16,516	-$5,227	-$3,752	**-$25,495**	-$11,370
Net Indirect Taxes	*-$11,775*	*-$3,726*	*-$2,796*	***-$18,297***	*-$7,140*
Personal Income Taxes	*-$4,741*	*-$1,501*	*-$956*	***-$7,198***	*-$4,230*

The negative impact on the economy as highlighted in Table 7 is offset by the fact that the cost of food in Tuktoyaktuk should fall due to less costly transportation. This savings in food costs (equal to the difference in transportation costs or $456,000) will be available to be re-spent on other goods and services, effectively increasing the standard of living of those living in Tuktoyaktuk.

There should also be a savings in general, non-perishable goods in Tuktoyaktuk by having the AWR in place. However, the consensus among most people interviewed is that most people in Tuktoyaktuk will choose to drive to Inuvik in order to do their shopping, treating the trip as both a necessary shopping trip and as a trip for social purposes. In this case, there would be little impact from additional trucking, but there would be a savings (after paying for additional car expenses for travelling to Inuvik) to residents of Tuktoyaktuk from less costly goods (and possibly less costly services such as dental care, restaurant food, etc.).

According the GNWT Bureau of Statistics, prices in Tuktoyaktuk are on average just over 10% higher than in Inuvik.[3] With total personal incomes in Tuktoyaktuk of around $15 million, personal disposable incomes after taxes and after savings would be approximately $12 million. Assuming prices in Tuktoyaktuk approximately match those of Inuvik after the AWR is built (or Tuktoyaktuk residents purchase more of their goods and services in Inuvik); savings (excluding any extra vehicle costs and excluding the Food Mail savings examined previously) would reach roughly $1.0 million. Adding in the savings on Food Mail of $456,000 would mean that the AWR would result in approximately $1.5 million in savings, all of which would be available to be re-spent.

[3] GNWT, Bureau of Statistics, 2005. Living Cost Differentials, Northwest Territories Federal Isolated Post Living Cost Differentials, by Community retrieved from www.stats.gov.nt.ca/Statinfo/PricesIncome/prices/Hist_LCD.html

Table 8 below highlights the impacts of this additional $1.5 million in savings that would be re-spent in the economy. Note, because of the very high import content of most consumer goods, the impacts in NWT of the $1.5 million are relatively low.

TABLE 8 IMPACTS OF $1.5 MILLION IN TRANSPORTATION COST SAVINGS

Gross Consumer Savings	NWT				REST OF CANADA
	Direct	Indirect	Induced	TOTAL	Direct + Indirect
Output	1,500,000	$106,087	$167,161	**$867,848**	$152,753
Material Inputs	$184,559	$50,342	$110,830	**$345,731**	$79,300
GDP	$410,042	$55,744	$56,333	**$522,119**	$73,453
Employment (FTE)	2.9	0.6	0.5	**3.9**	1.1
Wages & Salaries	$224,984	$28,583	$30,923	**$284,490**	$41,534
Benefits	$7,866	$2,009	$2,175	**$12,050**	$4,721
Total Govt Revenues	$83,661	$8,140	$14,101	**$105,902**	$10,040
Federal	$40,946	$4,193	$5,929	**$51,068**	$5,500
Net Indirect Taxes	*$5,635*	*$824*	*$1,381*	***$7,840***	*$900*
Personal Income Taxes	*$35,311*	*$3,369*	*$4,548*	***$43,228***	*$4,600*
NWT/Provincial	$42,715	$3,947	$8,172	**$54,834**	$4,540
Net Indirect Taxes	*$25,830*	*$2,622*	*$6,078*	***$34,530***	*$2,730*
Personal Income Taxes	*$16,885*	*$1,325*	*$2,094*	***$20,304***	*$1,810*

Overall, the reduction in cost of living will result in the GDP increasing by over $0.5 million, FTE employment increasing by four, and tax revenues of $100,000 of which just over half would go to the Government of the NWT. The rest of Canada would also benefit, although clearly at a much reduced level.

TABLE 9 NET TUKTOYAKTUK CONSUMER SAVINGS WITH AN AWR

Net Consumer Savings	NWT				REST OF CANADA
	Direct	Indirect	Induced	TOTAL	Dir. + Indir.
Output	$1,044,000	-$37,928	$86,231	**$186,903**	-$207,491
Material Inputs	-$148,640	-$54,629	$57,170	**-$146,099**	-$108,409
GDP	$287,240	$16,691	$29,057	**$332,988**	-$99,082
Employment (FTE)	1.2	0.1	0.2	**1.6**	-1.3
Wages & Salaries	$136,622	$574	$16,423	**$153,619**	-$53,719
Benefits	-$1,480	-$942	$643	**-$1,779**	-$7,263
Total Gov't Revenues	$53,865	-$1,309	$7,614	**$60,170**	-$14,360
Federal	$27,661	-$32	$3,196	**$30,825**	-$7,530
Net Indirect Taxes	*$3,681*	*$187*	*$745*	***$4,613***	*-$1,380*
Personal Income Taxes	*$23,980*	*-$219*	*$2,451*	***$26,212***	*-$6,150*
NWT	$26,204	-$1,277	$4,418	**$29,345**	-$6,830
Net Indirect Taxes	*$14,055*	*-$1,106*	*$3,284*	***$16,233***	*-$4,410*
Personal Income Taxes	*$12,149*	*-$171*	*$1,134*	***$13,112***	*-$2,420*

The combined (positive) impacts of reduced cost of goods with the (negative) impacts of the elimination of the Food Mail program on flight transport are highlighted in Table 9 above. The combined impacts are lower, generating some $330,000 in GDP in the NWT, an extra 2 jobs and government revenues of roughly $60,000.

The importance of the Net Consumer Savings is not the economic impacts in terms of jobs and the like. Rather, the importance of the Consumer Savings is the impact of the standard of living for the residents of Tuktoyaktuk. In this case, overall prices would be reduced (by some 10%), the cost of food would decline markedly, the selection of available goods and services would expand, and the availability on a year-round basis would be greater. The latter consequence: the fact that many goods and services would be available all year round at more-or-less Inuvik prices rather than being limited to times of the year when the ice road is in place will have a major impact on the standard of living of residents.

2.2.5. TOURISM IMPACTS

Total tourist visits in the Inuvik-Beaufort Delta region has hovered around 5,000-recorded visitations over the last few years. With the AWR between Inuvik and Tuktoyaktuk in place, we project that the total number of tourists would increase by 10%[4], or by some 500 tourists, to reach roughly 5,500 per annum. Average spending by tourists in the Inuvik-Beaufort Delta region was $2,935 in 2008 (Northwest Territories Tourism, 2010) excluding flights to/from the NWT. Using this figure, the 500 new tourists that the Inuvik to Tuktoyaktuk AWR is expected to attract will spend a total of $1,467,500.

In addition to attracting more tourists to Inuvik and Tuktoyaktuk, the AWR should result in some of these tourists staying longer in order to take advantage of fixed overland access to Tuktoyaktuk. That is, at least an extra nights stay in Inuvik proceeded by a day trip to Tuktoyaktuk. At present, the average stay is estimated at approximately 4.5 days. How many extra days the average tourist will spend in the region will largely depend on the entrepreneurial initiatives of the local population in terms of providing interesting and cost-effective northern tourist experiences. While it is difficult to provide a definitive estimate, the assumption is that perhaps half of all tourists would spend on average an extra day and a half in the Invuik-Tuktoyaktuk region. Assuming one-half of all 5,500 annual tourist visitations to Inuvik spend an extra day and a half in the region, this translates into an additional 4,125-tourist visitations days/year. With daily spending for accommodation, food and entertainment/cultural endeavours[5] estimated at approximately $300 (excluding expenditures for travelling to and from the region); this represents an increase of another $1,237,500. In total then, the expect increase in tourism spending each year due to the building of the Inuvik-to-Tuktoyaktuk AWR is projected at $2,705,000.

The direct tourism spending of $2.7 million each year will generate an increase of over $1.2 million in GDP, create 22 FTE jobs in the NWT, and result in government revenues increasing by over $200,000, of which over $100,000 will accrue to the Government of NWT. The rest of Canada will also benefit, with GDP in other parts of the country increasing by almost $400,000, jobs increasing by six FTEs, and further government revenues rising by just over $50,000.

[4] In the earlier analysis of the full AWR, NWT tourism officials suggested that the AWR would increase visitations by 20 percent or by 2,500 – 2,700 new tourists each year, resulting in an increase in annual tourism revenues of some $2 million based on average expenditures of $800. An important impetus for this increase, however, was the existence of an all-weather road extending all the way form Yellowknife to Inuvik. Without this paved highway between Yellowknife and Inuvik, a 20% increase in tourists is unlikely.

[5] We exclude spending to travelling to and from the Delta region. As well, we are assuming that the additional days spent in the region will NOT result in additional spending on souvenirs, jewelry, handicrafts and the like since according to general research, most tourists are believed to have a set spending limit on such items irrespective of the time spent in an area.

TABLE 10 ECONOMIC IMPACTS OF INCREASED AND LENGTHENED TOURIST VISITATIONS

Tourism	NWT				REST OF CANADA
	Direct	Indirect	Induced	TOTAL	Dir + Indir
Output	2,705,000	$424,402	$467,084	**$891,486**	$856,477
Material Inputs	$831,158	$226,864	$309,670	**$1,367,692**	$459,685
GDP	$873,373	$197,538	$157,406	**$1,228,317**	$396,792
Employment (FTE)	18.0	2.7	1.3	**21.9**	5.8
Wages & Salaries	$533,599	$105,942	$85,344	**$724,885**	$221,230
Benefits	$43,997	$8,864	$7,138	**$59,999**	$25,573
Total Gov't Revenues	$138,770	$30,340	$37,204	**$206,314**	$54,410
Federal	$73,782	$15,460	$15,995	**$105,237**	$29,420
Net Indirect Taxes	*$21,015*	*$3,613*	*$3,520*	***$28,148***	*$5,040*
Personal Income Taxes	*$52,767*	*$11,847*	*$12,475*	***$77,089***	*$24,380*
NWT/Provincial	$64,988	$14,880	$21,209	**$101,077**	$24,990
Net Indirect Taxes	*$44,233*	*$10,220*	*$15,488*	***$69,941***	*$15,400*
Personal Income Taxes	*$20,755*	*$4,660*	*$5,721*	***$31,136***	*$9,590*

The increase in tourism will be sustained over the 45-year life of the AWR. Table 11 on the next page displays the total impacts on the NWT economy from this increase (using a Net Present Value discounted by 5% over a 45-year period). The NPV increase in NWT GDP over this period is estimated at $21 million, and government revenues up by $3.5 million. In the rest of Canada, GDP increases by another $7 million and government revenues rise by almost $1 million.

TABLE 11 NPV OF ECONOMIC IMPACTS OF INCREASED AND LENGTHENED TOURIST VISITATIONS

NVP Tourism	NWT				REST OF CANADA
	Direct	Indirect	Induced	TOTAL	Dir. + Indir.
Output	$46,415,070	$7,282,310	$8,014,690	$15,297,000	$14,696,288
Material Inputs	$14,261,702	$3,892,722	$5,313,576	$23,468,000	$7,887,662
GDP	$14,986,427	$3,389,604	$2,700,969	$21,077,000	$6,808,658
Employment (FTE)					0
Wages & Salaries	$9,155,803	$1,817,815	$1,464,382	$12,438,000	$3,796,002
Benefits	$755,294	$152,168	$122,538	$1,030,000	$439,015
Total Gov't Revenues	$2,381,059	$520,583	$638,358	$3,540,000	$933,584
Federal	$1,266,192	$265,313	$274,494	$1,806,000	$504,884
Net Indirect Taxes	$360,603	$61,997	$60,401	$483,000	$86,483
Personal Income Taxes	*$905,586*	*$203,318*	*$214,096*	*$1,323,000*	*$418,409*
NWT	$1,114,885	$255,270	$363,845	$1,734,000	$428,709
Net Indirect Taxes	*$758,920*	*$175,348*	*$265,733*	*$1,200,000*	*$264,223*
Personal Income Taxes	*$355,960*	*$79,922*	*$98,118*	*$534,000*	*$164,474*

2.2.6. TOTAL ECONOMIC IMPACTS (EXCLUDING MGP EFFECTS)

Building the Tuktoyaktuk to Inuvik AWR will provide on-going benefits to the economy for many years in the future. Economists convert the flow of benefits (and costs) over time into a single value. This is done by adding up all the economic plusses and minuses over the years (in this case, over the 45-year life of the

AWR) and coming up with a total. However, a dollar today buys more than a dollar in the future because of inflation. This study uses a 5 percent discount rate. This "Net Present Value" (NPV) is a way of comparing the value of money now with the value of money in the future.

Table 12 presents the total economic impacts (over 45 years) in 2009 dollars due to building the AWR. It highlights the positives (e.g., from construction and maintenance, reductions in cost of living, and increases in tourism) and the negatives (e.g., from not building the winter-road each year).

TABLE 12 TOTAL ECONOMIC IMPACTS OF THE AWR EXCLUDING THE MGP

TOTAL NPV IMPACTS excluding the MGP	NWT				REST OF CANADA
	Direct	Indirect	Induced	TOTAL	Dir. + Indir.
Output	$341,073,070	$75,080,810	$70,901,410	**$421,282,220**	$176,496,770
Material Inputs	$166,941,842	$37,690,952	$43,790,746	**$248,423,540**	$96,970,502
GDP	$127,490,287	$35,281,884	$23,240,519	**$186,013,690**	$84,166,547
Employ (Initial Const.)	668.3	282.0	135.5	**1,085.8**	859.6
Employ (On-Going)	$33	$7	$3	**$42**	$9
Wages & Salaries	$82,818,283	$20,148,005	$12,654,482	**$115,621,770**	$44,008,660
Benefits	$5,890,974	$1,502,418	$935,318	**$8,328,710**	$5,431,783
Total Gov't Revenues	$24,468,549	$5,373,043	$5,748,718	**$35,590,310**	$10,966,205
Federal	*$14,815,632*	*$2,938,243*	*$2,424,744*	***$20,179,620***	*$6,062,648*
Net Indirect Taxes	*$2,191,603*	*$435,337*	*$560,351*	***$3,187,290***	*$1,007,001*
Personal Income Taxes	$12,626,026	$2,503,908	$1,863,396	**$16,992,330**	$5,056,250
NWT	*$9,655,935*	*$2,433,800*	*$3,322,955*	***$15,412,690***	*$4,903,634*
Net Indirect Taxes	*$3,646,570*	*$1,404,718*	*$2,462,493*	***$7,513,780***	*$2,914,649*
Personal Income Taxes	*$6,013,360*	*$1,028,082*	*$857,468*	*$7,898,910*	*$1,988,431*

Although the initial building the Inuvik-to-Tuktoyaktuk AWR will cost the Federal and Territorial government about $230 million, after subtracting the increase in government revenues resulting from the existence of the AWR, the net cost to the Federal and Territorial Governments will only be $184 million ($230 million minus total tax revenues of $46 million). When all economic spin-offs (direct, indirect, and induced impacts) are accounted for over the 45 year existence of the AWR, this investment will create about $248 million in net purchases of goods and services (material inputs) in the NWT and an additional $97 million in ROC. This results in a net increase in GDP in the NWT of $186 million and an increase in GDP in the rest of Canada of $84 million. Building the Inuvik-to-Tuktoyaktuk AWR will create 1,086 one-time jobs in the NWT and another 860 one-time jobs in ROC. In addition, the building of the AWR will create 42 long-term jobs in the NWT and another 9 in ROC. Building the AWR will earn the Federal and Territorial governments almost $36 million from activities in the NWT and an additional $11 million accruing to governments in ROC.

LIMITATIONS

In addition to increased tourism and trucking demand to accommodate additional spending by residents and businesses in Tuktoyaktuk, the AWR will engender a number of catalytic effects for which no

economic analysis has been undertaken. These effects are partially the result of increased economies of scale that the AWR will generate, particularly with regards to the MGP. In Newfoundland, for example, the development of Hibernia provided sufficient demand for a number of different types of supplies that prior to Hibernia had been sourced from outside the province.[6] At the same time, the reduced transport costs and improved transport links will act as a catalyst for import substitution and export potential beyond the MGP similar to what has occurred whenever transportation links improve (e.g., the Trans-Canada Highway). These catalytic effects can be summarised as follows:

1. Increased regional and territorial economic development stimulated by the greater efficiency and reliability of the highway network and reduced transportation costs.
2. Reduced sense of isolation due to improved connections between Inuvik and Tuktoyaktuk.
3. improved access to government services and employment opportunities.
4. increased opportunities for Aboriginal training, employment, business development, and equity investment.
5. Attracting new inward investment from outside the area (i.e., companies relocating to a given area).
6. Retaining existing companies in the area.
7. Promoting the import substitution and export success of companies located in the area by the provision of overland transport links to key markets.
8. Enhancing the competitiveness of the regional economy and thereby reducing storage, warehousing, and medical travel costs.
9. Increasing opportunities for social and cultural interaction and development through reduced isolation, increased mobility, and expanded learning and training opportunities.

[6] One of the best examples coming out of Newfoundland is the supply of some specific office supplies, which has enabled several companies not only to provide these goods locally, but also, through the Internet, to develop a viable export product.

2.3. IMPACTS OF THE AWR ON THE PROPOSED MACKENZIE GAS PIPELINE

2.3.1. ANALYSIS OF THE IMPACTS OF THE AWR ON THE MGP

In our previous analysis of the proposed Mackenzie Gas Project (MGP), it was concluded that the full AWR would not impact initial construction costs of the Pipeline and its Gathering System; however, some cost savings were likely for future exploration and well development. For the oil and gas sector, these savings stem principally from a reduction in logistic costs associated with the more efficient use of rented drilling rigs, camps and their support equipment; and, a reduction in risk costs by not having to carrying excess inventory and compete for scarce resources and the accompanying price inflation. Concurrently, the existence of a full-length AWR facilitates the movement of rig equipment to/from Alberta during the non-drilling season rather than companies having to store rig equipment and thus incur storage costs and extended rig rental costs.

This portion of the study analyzes the impacts of the AWR on exploration and development savings for the MGP proponents' three anchor fields (Niglingtak, Taglu and Parsons Lake) and for contingent fields in the Basin Margin and Listric Fault regions. In this analysis, our assumption is that the Inuvik to Tuktoyaktuk AWR is a stand-alone road connected to the Dempster Highway. Under that assumption, there are no savings from enabling rigs to be moved to/from Alberta during the non-drilling season. Similarly, there are no savings on exploration and well development in those areas outside the Delta region (e.g., Colville Hills). Accordingly, further discussions with knowledgeable participants in the natural gas exploration and development industry have confirmed that there would be some logistic savings, but because of the location of the AWR vis-à-vis where most of the contingent wells will likely be developed; the savings would not be major.

Using oil and gas industry estimates, we have assumed that there would be savings of 5% in development costs for all fields, with the exception of Parsons Lake where, due to its location closer to the AWR, development costs would be reduced by 10%. These percentage reductions would also apply to on-going operating costs, which extend for the life of the field.

The savings realized by the existence of the Inuvik to Tuktoyaktuk AWR were integrated into the MGP Financial Model[7], and two gas flow scenarios were examined to contrast against the Base Case gas flow of 1.2 bcf/day.

1. The first scenario assumes that the MGP gas flow remains at 1.2 bcf/day over the 45-year production period, but because of the AWR, exploration and development for the appropriate wells and associated on-going operating costs are reduced by the aforementioned percentages.

2. The second scenario assumes that additional compression is added to the MGP enabling a daily capacity to increase from 1.2 bcf/day to1.8 bcf/day (and, consequently, the number of development

[7] In 2005, a comprehensive financial model of the MGP was developed by Pacific Analytics Inc. with the objective to assess the financial implications (Cash Flows, Royalties, Income Taxes, Internal Rates of Return, etc.) of the project based on various assumptions regarding gas production over time; construction and development costs; gas prices; tax and royalty rates; and the like. A Base Case scenario was developed using information provided by Imperial Oil (updated in September 2007) and was presented to the Joint Review Panel. The present Financial Model maintains all the assumptions in that Base Case scenario, with the exception that an updated gas price forecast (from the same source used by Imperial Oil in the 2007 Base Case) is used; all other assumptions remain the same.

wells increases from a 1.2 bcf/day Base Case with 435 wells to a 1.8 bcf/day scenario with 648 wells).[8]

2.3.1.1. FINANCIAL IMPACTS

1.2 BCF/DAY CAPACITY PIPELINE

Based on a 1.2 bcf/day capacity pipeline and the estimated reduction in overall logistics costs with the AWR, future exploration and well-development costs are reduced by an estimated $385 million ($2009 dollars, discount rate of 5 percent) over the 45-year operating period of the pipeline. This reduction in investment by the oil and gas sector will result in the following financial impacts:

1. Reduced investment costs will lead directly to greater company cash flows. It is estimated that after-tax cash flows going to corporations will increase by $347 million over the 45-year period (impacts are highlighted in Table 14). This will have the effect of increasing company Internal Rate of Return (IRR) by roughly 0.7 percent.

2. Because of the AWR total revenues to governments will increase by some $20.7 million ($2009 dollars, discounted at 5 percent), although, due to the vagaries of royalty legislation, the Federal Government will increase its revenues by $29.6 million, and the NWT will see its revenues drop by $8.9 million. It is expected that the Federal and NWT Governments will sign a royalty-sharing agreement, and therefore it is likely that the AWR will result in an increase in revenues flowing to the GNWT. [9]

Table 13 below describes the impacts of the two Base scenarios (a 1.2 bcf/day pipeline and a 1.8 bcf/day pipeline) along with two impact scenarios that include the AWR. The differences in the two gas export scenarios, each with an AWR, are highlighted in Table 14.

TABLE 13 IMPLICATIONS OF AWR ($2009 CONSTANT)

	GLJ Base Case Without AWR (1.2 Bcf)	With AWR (1.2 Bcf)	Base Case Without AWR (1.8 Bcf)	With AWR (1.8 Bcf)
PRE-TAX CASH FLOWS	$38,886.1	$39,279.6	$56,754.8	$57,338.9
Pre-Tax Tax IRR*	28.3%	29.0%	25.1%	25.8%
AFTER-TAX CASH FLOWS	$24,124.3	$24,495.6	$31,649.8	$32,202.5

[8] Gilbert Lausten Jung Associates Ltd. (GLJ) developed the original 1.2 bcf/day production forecast submitted by the proponents of the NEB and Joint Review Panel. GLJ did not, however, provide a 1.8 bcf/day production scenario. For the analysis submitted to the Joint Review Panel in 2007, we augmented GLJ's 1.2 bcf/day scenario with a 1.8 bcf/day production forecast produced by Sproule Associates. The present analysis includes two 1.8 bcf/day scenarios: a Base 1.8 bcf/day scenario, which excludes any AWR impacts, and a 1.8 bcf/day with the Inuvik-to-Tuktoyaktuk AWR. The difference between these two scenarios is the impact of the AWR, given that the AWR is not necessary for an expanded pipeline.

[9] The reduced exploration and well development costs factor into the financial results through a number of avenues. First, reduced costs directly lead to an increase in pre-tax cash flows and consequently the Internal Rate of Return (IRR) since expenses are now lower. Second, royalties increase because the "payout" date (the date at which the development company recovers the cost of field development and the date after which royalties kick in) is achieved earlier, and thus the royalties are larger and the discounted value of the stream of royalties over the 45-year period of production is higher. At the same time, royalties are a corporate tax write-off, and accordingly, despite the increase in cash flows, income taxes actually decline. Nevertheless, the aggregate level of taxes going to governments does increase.

	GLJ Base Case Without AWR (1.2 Bcf)	With AWR (1.2 Bcf)	Base Case Without AWR (1.8 Bcf)	With AWR (1.8 Bcf)
After-Tax IRR*	**20.6%**	**21.4%**	**17.8%**	**18.5%**
TAXES	**$25,521.9**	**$25,544.1**	**$35,917.5**	**$35,948.9**
Federal Royalties	$12,101.8	$12,133.5	$18,656.1	$18,700.5
Field Income Taxes	$8,780.1	$8,770.6	$12,625.8	$12,612.8
- to Canada	*$5,325.6*	*$5,319.9*	*$7,658.3*	*$7,650.4*
- to NWT & Alb	*$3,454.5*	*$3,450.7*	*$4,967.5*	*$4,962.4*
Pipeline Income Taxes	$4,640.0	$4,640.0	$4,635.6	$4,635.6
- to Canada	*$2,622.3*	*$2,622.3*	*$2,619.6*	*$2,619.6*
- to NWT & Alb	*$2,017.7*	*$2,017.7*	*$2,015.9*	*$2,015.9*

Table 13 above describes the impact of building the Inuvik to Tuktoyaktuk portion of the AWR on the financial characteristics of the two MGP scenarios – one based on a pipeline with a 1.2 Bcf/day capacity and the second based on a pipeline with a 1.8 Bcf/day capacity.[10] In order to clearly identify the impacts of building the AWR, Table 14 below details the same impacts as displayed in Table 13, but in this case in terms of differences with the same pipeline scenario without the AWR.

TABLE 14 DIFFERENCES BETWEEN 1.2BCF AN1.8BCF WITH AN AWR

	GLJ Base Case With AWR (1.2 Bcf)	GLJ Base Case With AWR (1.8 Bcf)
PRE-TAX CASH FLOWS	**$367.2**	**$545.0**
Pre-Tax Tax IRR*	**0.7%**	**0.7%**
AFTER-TAX CASH FLOWS	**$346.5**	**$515.7**
After-Tax IRR*	**0.7%**	**0.6%**
TAXES	**$20.7**	**$29.3**
Federal Royalties	$29.6	$41.5
Field Income Taxes	-$8.9	-$12.1
- to Canada	*-$5.4*	*-$7.4*
- to NWT & Alb	*-$3.5*	*-$4.8*
Pipeline Income Taxes	$0.0	$0.0
- to Canada	*$0.0*	*$0.0*
- to NWT & Alb	*$0.0*	*$0.0*

[10] The difference in pipelines lies mainly with added compression (with attendant additional costs) which results in a higher gas pressure. The actual size and configuration of the pipeline is not different.

1.8 BCF/DAY CAPACITY PIPELINE

Based on a 1.8 bcf/day capacity pipeline and the estimated percent reduction in overall logistics costs with the AWR, future exploration and well development costs are reduced by an estimated $572 million ($2009 dollars, discount rate of 5 percent) over the 45-year operating period of the pipeline, resulting in the following financial impacts:

1. Estimated after-tax cash flows going to corporations will increase by $516 million over the 45-year period. This will have the effect of increasing the Internal Rate of Return (IRR) to corporations by roughly 0.6 percent.

2. Total revenues to governments with the AWR will be $29.3 million greater compared to the 1.8 bcf/day pipeline without the AWR. Of total government revenues, $41.5 million will go to the Federal Government via an increase in royalties, while corporate income taxes to both the Federal Government and to the Government of the NWT will actually fall by $12.1 million. It is expected that the Federal and NWT Governments will sign a royalty agreement which would result in part of the royalty revenues flowing to the Government of the NWT, and therefore the tax impacts on both Governments will be positive.

2.3.1.2. ECONOMIC IMPACTS

The above analysis described the implications of building the Inuvik to Tuktoyaktuk section of the AWR on the financial characteristics (i.e. the implications on corporate returns) of the MGP. At the same time as their impacts on corporate financial returns, there are broader economic implications of the AWR on the economy of the NWT, which is what this section addresses.

1.2 BCF/DAY CAPACITY PIPELINE

Based on a 1.2 bcf/day capacity pipeline, the construction of the Inuvik to Tuktoyaktuk AWR affects the MGP by reducing exploration and well development costs by $385 million (discount rate of 5 percent) over the 45-year operating period of the pipeline. In economic terms (as opposed to the financial effects on corporations discussed earlier), the reduced exploration and well development costs result in less money being spent in the NWT and in the ROC. As displayed in **Error! Reference source not found.** 4, this reduction in spending by the oil and gas sector will result in the following:

1. Less buying and selling: Less buying and selling in the amount of $385 million over the 45-year period will result in the NWT accumulating $94.5 million less in GDP.

2. Fewer person-years of employment: With less buying and selling, it is estimated that over 45 years, there will be 4,811 (1,127 in the NWT) fewer person-years of employment.

3. Lower government revenues: With less buying and selling and fewer person-years of employment, government revenues will decline by $65.4 million ($21.4 million in NWT revenues).

TABLE 15 ECONOMIC IMPACTS

	GLJ Base Case Without AWR (1.2 Bcf)	With AWR (1.2 Bcf)	Base Case Without AWR (1.8 bcf)	With AWR (1.8 Bcf)
TOTAL INVESTMENT	$27,093.3	$26,680.1	$34,109.7	$33,496.4
GROSS DOMETIC	$19,467.3	$19,189.8	$24,239.0	$23,827.1

	GLJ Base Case Without AWR (1.2 Bcf)	With AWR (1.2 Bcf)	Base Case Without AWR (1.8 bcf)	With AWR (1.8 Bcf)
PRODUCT (GDP)				
Rest of Canada	**$9,911.4**	**$9,735.2**	**$12,818.5**	**$12,556.8**
NWT	**$9,555.9**	**$9,454.7**	**$11,420.5**	**$11,270.3**
LABOUR INCOME	**$9,597.5**	**$9,435.6**	**$12,318.8**	**$12,078.6**
Rest of Canada	**$6,428.0**	**$6,312.4**	**$8,331.4**	**$8,159.9**
NWT	**$3,169.5**	**$3,123.2**	**$3,987.4**	**$3,918.6**
EMPLOYMENT (jobs)	**312,446**	**307,291**	**391,284**	**383,967**
Rest of Canada	**234,030**	**230,082**	**293,969**	**288,367**
NWT	**78,416**	**77,208**	**97,314**	**95,600**
GOVERNMENT REVENUES	**$3,917.0**	**$3,846.9**	**$5,072.7**	**$4,968.7**
Rest of Canada	**$2,694.6**	**$2,647.5**	**$3,476.4**	**$3,406.4**
- Federal	*$1,743.7*	*$1,712.9*	*$2,254.1*	*$2,208.3*
- Provincial	*$950.9*	*$934.6*	*$1,222.3*	*$1,198.2*
NWT	**$1,222.3**	**$1,199.4**	**$1,596.3**	**$1,562.3**
- Federal	*$908.8*	*$891.4*	*$1,191.1*	*$1,165.2*
- Prov/Territorial	*$313.5*	*$308.0*	*$405.2*	*$397.1*

1.8 BCF/DAY CAPACITY PIPELINE

Based on a 1.8 bcf/day pipeline, the reduced exploration and well development costs result in less money being spent in the NWT and in ROC. This reduction in spending by the oil and gas sector will result in the following:

1. Less buying and selling: Less buying and selling in the amount of $572 million over the 45-year period will result in the NWT accumulating $140.2 million less in GDP.

2. Fewer person-years of employment: With less buying and selling, it is estimated that over 45 years, there will be 6,827 (1,600 in the NWT) fewer person-years of employment.

3. Lower government revenues: With less buying and selling and fewer person-years of employment, government revenues will decline by $97.1 million ($31.8 million in NWT revenues).

In order to clearly identify the economic impacts of building the AWR, Table 16 below details the same economic impacts as displayed in Figure 3, without the AWR. Figure 3 above describes the impact of building the Inuvik-to-Tuktoyaktuk portion of the AWR on the economics of the two MGP scenarios – one based on a pipeline with a 1.2 Bcf/day capacity and the second based on a pipeline with a 1.8 Bcf/day capacity.

TABLE 16 WHAT AN AWR DOES FOR THE 1.2BCF AND THE 1.8BCF BASE CASE MGP SCENARIOS

	GLJ Base Case With AWR (1.2 Bcf)	GLJ Base Case With AWR (1.8 Bcf)
TOTAL INVESTMENT	**-$385.5**	**-$572.3**
GROSS DOMETIC PRODUCT (GDP)	**-$259.0**	**-$384.4**
Rest of Canada	**-$164.5**	**-$244.2**
NWT	**-$94.5**	**-$140.2**
LABOUR INCOME	**-$151.1**	**-$224.2**
Rest of Canada	**-$107.8**	**-$160.0**
NWT	**-$43.2**	**-$64.2**
EMPLOYMENT (jobs)	**-4,811**	**-6,827**
Rest of Canada	**-3,684**	**-5,228**
NWT	**-1,127**	**-1,600**
GOVERNMENT REVENUES	**-$65.4**	**-$97.1**
Rest of Canada	**-$44.0**	**-$65.3**
- Federal	*-$28.8*	*-$42.8*
- Provincial	*-$15.2*	*-$22.5*
NWT	**-$21.4**	**-$31.8**
- Federal	*-$16.3*	*-$24.1*
- Prov/Territorial	*-$5.1*	*-$7.6*

TABLE 17 ECONOMIC IMPACTS OF THE AWR ($2009 MILLIONS; DISCOUNT RATE = 5%)

	GLJ Base Case (1.2 Bcf/day)	With AWR (1.2 Bcf/day)	Base Case (1.8 Bcf/day)	With AWR (1.8 Bcf/day)	With AWR (1.8 Bcf/day) and Rig Savings
TOTAL INVESTMENT	**$27,093.3**	**$25,878.4**	**$34,109.7**	**$32,121.2**	**$31,779.0**
GROSS DOMESTIC PRODUCT (GDP)	**$19,467.3**	**$18,651.3**	**$24,239.0**	**$22,903.5**	**$22,673.6**
Rest of Canada	**$9,911.4**	**$9,393.1**	**$12,818.5**	**$11,970.1**	**$11,824.1**
NWT	**$9,555.9**	**$9,258.2**	**$11,420.5**	**$10,933.4**	**$10,849.5**
LABOUR INCOME	**$9,597.5**	**$9,121.5**	**$12,318.8**	**$11,539.8**	**$11,405.7**
Rest of Canada	**$6,428.0**	**$6,088.2**	**$8,331.4**	**$7,775.4**	**$7,679.7**
NWT	**$3,169.5**	**$3,033.3**	**$3,987.4**	**$3,764.4**	**$3,726.0**
EMPLOYMENT (jobs)	**312,446**	**295,857**	**391,284**	**366,568**	**361,684**
Rest of Canada	**234,030**	**221,328**	**293,969**	**275,045**	**271,305**
NWT	**78,416**	**74,529**	**97,314**	**91,524**	**90,380**
GOVERNMENT REVENUES	**$3,917.0**	**$3,710.9**	**$5,072.7**	**$4,735.4**	**$4,677.3**
Rest of Canada	**$2,694.6**	**$2,556.0**	**$3,476.4**	**$3,249.5**	**$3,210.4**
- Federal	*$1,743.7*	*$1,652.9*	*$2,254.1*	*$2,105.4*	*$2,079.9*
- Provincial	*$950.9*	*$903.1*	*$1,222.3*	*$1,144.0*	*$1,130.5*
NWT	**$1,222.3**	**$1,154.9**	**$1,596.3**	**$1,485.9**	**$1,466.9**
- Federal	*$908.8*	*$857.5*	*$1,191.1*	*$1,107.2*	*$1,092.7*
- Provincial/Territorial	*$313.5*	*$297.3*	*$405.2*	*$378.7*	*$374.2*

3. TOTAL ECONOMIC IMPACTS

The MGP Economic impacts affect GDP, Incomes and Taxes while the MGP Financial impacts relate to profits and taxes. Combining all non-MGP impacts and MGP impacts (in GDP, in Labour income, in Taxes) provides a comprehensive picture of the potential impacts of building the Inuvik-to-Tuktoyuktak AWR. These comprehensive impacts are displayed in Table 18 below.

TABLE 18 TOTAL ECONOMIC AND FINANCIAL IMPACTS

TOTAL NPV IMPACTS	NWT	REST OF CANADA	TOTAL CANADA
	All Impacts	Dir. + Indir.	
MGP Profits (increase)	$346,452,555		**$346,452,555**
GDP	$91,553,744	-$80,325,032	**$11,228,712**
Employ (Initial Const.)	1,028.6	807.5	**1,836.1**
Employ (On-Going)	-1,085.1	-3,674.9	**-4,760.0**
Labour Income	$80,715,792	-$58,375,168	**$22,340,623**
Total Gov't Revenues	$34,922,135	$5,431,783	**$40,353,918**
Federal	*$28,134,698*	*-$22,760,477*	***$5,374,221***
NWT/Other Provinces	*$6,787,436*	*-$10,278,448*	***-$3,491,012***

Again, the reader is cautioned that the above impacts are highly influenced by the impacts on the MGP which, increasing corporate profits considerably, generally reduce GDP, Incomes and taxes because of the

effect on more efficient logistics. The building of the AWR with the concomitant positive impacts on profits may however be an important inducement to the (as yet unconfirmed) decision to construct the MGP. Furthermore, while the immediate impacts of the AWR on the MGP have been accounted for in this analysis, the presence of the AWR and the basin-opening MGP could have a profound influence on a myriad of economic opportunities available to local individuals and companies.

4. CORE GLOSSARY

Direct Impacts: equivalent to the level of direct value-added (or GDP) generated by an industry.

Gross Domestic Product (GDP or Value-Added): a measure of the total flow of goods and services produced by the economy and used for final domestic consumption, investment, and export (e.g., excluding immediate consumption). GDP can be calculated in three different ways, all of which yield the same results. The first method, applied in this report, estimates the value of net output of all industries minus the value of net material inputs used for immediate production (excluding indirect taxes). The second method sums the values of Wages and Salaries, Supplementary Labour Income (Benefits), Operating Surplus (Profits plus Depreciation plus Interest on Long-Term Debt), and Indirect Taxes for all industries. The third method sums the values for personal consumption, government expenditures, investment (including changes to inventories), and net exports. In addition to total GDP for the economy, GDP is also estimated for individual industrial sectors.

Indirect Impacts: the impacts resulting from the expenses (goods and services) of a firm or industry used in the production process. The purchase of goods or services increases the economic activity of the supplying firms and, in turn, the supplying firms themselves must purchase their own goods and services, which generates further economic activity in those supplying firms.

Induced Impacts: the impacts resulting from the wages and salaries paid by a firm or industry. When the wages and salaries are spent (minus taxes and savings) on goods and services, the economic activity of the firms supplying those goods and services increases. As well, the supplying firms themselves will pay additional wages and salaries to their own employees, which, when spent, generate more economic activity.

Input-Output Model: comprised of three tables or matrices: a **Make** matrix, a **Use** matrix, and a **Final Demand** matrix. The Make matrix lists all the different outputs produced by each industry. The Use matrix lists all the different purchases (material inputs) by each industry used in the production process as well as itemizing all taxes (explicit and implicit) paid by the industry (GST is not a company-level tax; rather, it is a tax paid by final consumers but channelled through the company). The Final Demand matrix lists all the various purchases by persons (including GST), by government, by industries for investment purposes, plus all net exports (exports minus imports) of each commodity (good or service). Mathematically re-arranging the tables enables one to determine how much additional production will be generated in the economy from an increase in demand for a commodity or series of commodities.

Intermediate Demand (or Material Inputs): a measure of all material inputs (goods and services) used in the production process excluding wages and benefits.

Internal Rate of Return (IRR): discount rate at which the present value of the future cash flows of an investment equals the cost of the investment. When the IRR is greater than the required return – called hurdle rate in capital budgeting – the investment is acceptable. The internal rate of return is the average rate earned by each and every dollar invested during the period. This rate is influenced by the timing and size of the cash inflows and outflows and the beginning and ending depreciated book or market value of the investment.

Payout Date: the date at which gas project revenues exceed project costs (capital investment and operating costs) and after which standard royalties apply.

Person-Year (PY) Employment: the total level of employment in a firm or industry when part-time positions are counted as a fraction of full-time positions. For example, four half-time positions equal two person-years of work.

Producer Prices: the value of a commodity (good or service) at the factory gate. It excludes all indirect taxes as well as wholesale, retail, and transportation costs (called "margins") associated with the final selling (purchaser) price.

Purchaser Prices: the price of a commodity (good or service) actually invoiced to the purchaser. It includes the factory-gate cost of the commodity plus any additional costs associated with indirect taxes, wholesale and retail margins, and costs associated with transporting the commodity from the factory gate to the final purchaser.

Royalty: a percentage interest in the value of production from a lease that is retained and paid to the mineral rights owner, in this case the Federal Government.

SWOT: abbreviation for Strengths, Weaknesses, Opportunities, and Threats.

Sunk Costs: costs incurred in the past and unaffected by any future action and thus irrelevant to decision-making. In economics and in business decision-making, sunk costs are costs that have already been incurred and that cannot be recovered to any significant degree. Sunk costs are sometimes contrasted with incremental costs, which are the costs that will change due to the proposed course of action. In microeconomic theory, only incremental costs are relevant to a decision. If sunk costs were to influence a decision, a proposal would not be assessed exclusively on its own merits. Note that sunk costs are still relevant for determining income taxes, as they remain available for write-offs.

Value-Added: a term that is identical to GDP in concept, but that refers to a particular business or occasionally an industry sub-sector.

APPENDIX A AN INPUT-OUTPUT PRIMER

National Accounting (also termed Economic Accounting) assumes a company undertakes two steps in its production process. First, it purchases material inputs from other industries and second, it transforms those material inputs into finished goods (or services) ready for resale. Take as an example a construction company constructing a pipeline. The construction company may buy steel pipe from the steel manufacturing sector. Using other material inputs (e.g., electricity and fuel oil), it transforms the steel pipe into a completed pipeline, which, in turn, is "sold" to the owners of the pipeline at a selling price (equal to the investment cost) higher than the cost of its inputs. The difference between the selling price (investment cost) and the material input cost is the "mark-up" or "value-added". This value-added is used to pay for the labour, any taxes levied by governments, the depreciation of equipment, and any interest costs the construction company may have, and will also generate, the owner hopes, a profit.

National Accounting asserts that the value that the construction sector adds to the economy (hence, the term "value-added") is equal not to the total revenues of the construction sector (equivalently, the investment cost), but only to this "mark-up" value. That is, the value of an industry to an economy is the difference between the value of its output (effectively, total operating revenues) and the cost of its material inputs. In this way, the construction industry does not claim the value of the steel pipe inputs it uses, which should rightly be accounted for by the steel industry. As a result, there is no double counting when measuring the value of the entire economy.

The value-added of the construction industry building the pipeline will be equal to the revenue received (equal to the invested capital) minus all of its material costs for goods or services (material inputs), or:

Value-Added = Revenue (or Capital Invested) - Material Inputs

Another way of defining value-added is that it is the sum of an industry's payments for labour, for indirect taxes, for depreciation and interest costs, and for profit:

Value Added = Labour + Indirect Taxes + Depreciation + Interest Costs + Profit

The resulting value-added of any firm (or industry) is available to be shared among labour (wages, salaries, and benefits), indirect taxes, and "operating surplus." The operating surplus itself is shared between payments for the use of physical capital (depreciation), payments for the use of monetary capital (interest costs), and payments (profits) to the owner(s) of the enterprise. Value-added is an industry's contribution to, or ***direct impact*** on, the economy. The sum of value-added of all industries is termed the country's Gross Domestic Product (GDP).

An important distinction needs to be made between Financial Accounting and National Accounting. Under financial accounting, an industry that has a high value-added (i.e., contributes a lot to the economy) can be unprofitable if, for example, its payments to labour or for interest costs are too high. Alternatively, low value-adding industries can be very profitable to their owners, depending on their usage of labour and their capital structure.

Economists have standardised the measure of the flows of commodities between industries and the inter-relationships of inputs and outputs among industries through the concept of Input-Output (I/O) analysis. The **MAKE** matrix identifies the various types of output the sector produces (the construction industry produces "construction" services). The **USE** matrix highlights all the various types of inputs used to produce that output

(the construction industry uses a variety of inputs including steel pipe, fuel oil, office supplies, etc.).[11] By mathematically manipulating these matrices, it is possible to determine by how much the supply of each commodity will increase when the output of an industry increases by one dollar.

The GDP-to-Output ratio is a measure of the direct contribution to the economy *per dollar of output*. Clearly, an industry that requires a lower dollar value of inputs to produce a given dollar of output is a higher value-adding industry. One must note, however, that a higher GDP-to-Output ratio does *not* imply that the industry is more important to the economy. It merely states that for every dollar of output, the impact on the economy is greater. Obviously, when examining an industry's importance to an economy, one must also take into account the total output of the industry. There is, however, another important characteristic of an industry that must be examined if one is to determine the importance of a sector to the local economy: its ***linkages*** to other industries.

When inputs such as steel pipe are purchased by the construction sector, the industries supplying those goods and services (in this case, the steel industry) increase their own economic activity. This increased activity itself creates demand for other products. The steel industry, for example, may need more iron ore. Iron ore producers themselves may need more chemicals and fuel oil. The demand for extra chemicals and fuel oil will, in turn, stimulate activity in the chemical and hydrocarbon industries. The increased activity in the chemical industry will create greater demand for its own inputs, perhaps some other primary chemicals. And so it continues down the chain of industries. The sum effects of all this additional economic activity are known as ***indirect impacts***.

Such indirect impacts (also known as "multiplier effects" or "spin-offs") on the economy clearly are important. They should not be ignored (as they usually are with financial accounting) if we are to measure the true benefits of an industry or an investment to an economy. An interesting observation is that while it is true that high value-adding industries have low indirect impacts, those industries with relatively lower direct impacts have relatively higher indirect impacts. This is because, by definition, low value-adding industries consume more inputs per dollar of output and thus have a greater impact on their supplying industries. It should be noted, however, that the level of indirect impacts is highly influenced by the type of goods and services demanded and by the propensity of the companies (or the economy) to import those particular goods and services. The higher the propensity to import the required goods and services, the lower will be the effects on the local economy. Indeed, an industry that imports all its inputs will have virtually no indirect impact on the economy, save the small level of distributive activity (wholesale, retail, and transportation margins) that the imports may generate.

Increased industrial activity or investment has a third effect on the economy. When additional wages and salaries are paid out, those dollars (appropriately adjusted for taxes and savings) are available to be re-spent on consumer goods and services. Take, for example, an additional $1 million in wages resulting in, say, an increase of $750,000 in disposable income. Depending on the spending patterns, this may result in extra consumer spending of, say, $500,000 in the retail sector (the remaining being spent in the entertainment sector, restaurant sector, etc.). This will increase the economic activity of the manufacturers and other suppliers of consumer goods to the retail sector who, in turn, will increase their own employment and their own wage payments. The sum effects of this additional activity due to increased wages are known as ***induced impacts***. Again, it should be clear that, like indirect impacts, induced impacts are highly influenced by the economy's propensity to import as well as by the economy's taxation and savings rates, the level of wages paid to employees, and the level of capacity at which the economy is operating.

The following question arises: given that there are many levels of indirect and induced spending that affect many different firms and industrial sectors, how can we estimate these impacts on the economy? Fortunately, economists have developed a method to estimate these impacts by using the same input-output tables to which we already have been introduced.[12] However, since the base information is coming from financial statement

[11] Output is closely associated with industry revenues, but there are important differences. Likewise, inputs are highly related to industry expenses. But, again, the differences are important. For a summary of these differences, see the next sub-section: *Technical Differences*.

[12] For a detailed discussion of the underlying mathematics of Input-Output analysis, see *Input-Output Analysis: Foundations and Extension*, Ronald E. Miller and Peter D. Blair, Prentice Hall, 1985

data directly provided by operators, it is critical to understand how financial statement data are re-structured to meet National Accounting standards. These differences are discussed below.

Technical Differences

Although the National Accounting (Input-Output) measurement of the value and impacts of an industry begins with the same set of data as the financial results of the industry, a number of adjustments are required in order to conform to strict National Accounting standards. To avoid possible confusion, these technical differences between Financial Accounting and National Accounting should be understood, although not all the differences relate to the construction industry or to other industries involved in the MGP. The intent here is not to provide a comprehensive or definitive discussion of these differences, however, but rather to provide a cursory overview. For a more in-depth discussion of the differences and of the methodology underlying National Accounting, the interested reader is referred to the National Accounting compendium published by the UN.[13]

The following outlines the major differences:

1. The first and perhaps most important difference is that National Accounting measures all non-tax related revenues and expenses related to production, even those not itemized on the corporate income statement. Hence, gratuities paid to staff are included as output. This increases output but not material inputs, and therefore it increases the estimate of GDP (Output – Input) by precisely the amount of gratuities. Using our other definition of GDP (GDP = indirect taxes + wages, salaries and benefits + operating surplus), we see that the increase in GDP is reflected in an increase in wages and salaries equal to the reported gratuities.

2. Another (usually) off-budget item is an estimate of the value of imputed room and board provided to employees. On the Output side there is an increase in lodging revenues and, since the provision of room and board is a value to the employee, it is considered equivalent to a wage, and thus contributes to overall GDP equal to the value of the imputed room and board. Statistics Canada has standard values that it uses to assess the value of this room and board.

3. At the same time, National Accounting omits revenues not directly related to the production process. Generally, these incomes are limited to interest and dividend earnings, but include non-operating revenues related to rental incomes, commissions, and the like.

4. A third difference is that under National Accounting, the value of each input in the USE matrix is stated in "producer" prices. That is, all wholesale, retail, and transportation costs included in the "purchaser" price of a commodity are removed, as are all commodity taxes, indirect taxes, and import duties. These "distributive and tax margins", as they are called, are explicitly recognized in the USE matrix as separate line items. For the construction industry, the purchase cost of steel pipe will be equal to the "producer" cost of steel pipe (the cost at the manufacturer's plant gate) plus the cost of transporting the pipe to the NWT (the "transportation" margin) plus any retail/wholesale mark-ups plus any indirect taxes. The reader should understand that this does not in any way reduce the total cost of inputs to the industry; it simply re-assigns the costs to different input categories.

5. A fourth difference lies in the treatment of merchandise sales. National Accounting treats the purchase of merchandise as partly a purchase from the manufacturer of the good (equal to the cost price of the good less distributive and tax margins) and partly a purchase from the retailer (equal to the mark-up for the good). Consequently, in an input-output table for a sector selling some retail goods, there is no recognition of the cost of the merchandise on the input (USE) side, and only the mark-up value is recognized on the output (MAKE) side. The cost of the merchandise is captured in the manufacturing sector as output.

[13] *System of National Accounts*, Statistical Papers Series F No 2 Rev. 4, New York, 1993

6. Related to this unusual approach to merchandise sales is the treatment of "service margins." When a firm purchases a product (such as liquor, beer, or wine) and re-sells it with a mark-up without any fundamental change to it, National Accounting recognizes only the mark-up or "service margin" as output. It then treats the purchase cost of the product (less distributive and tax margins) as an output to the original producer of the good. The main instance that affects most industries (besides retail sales) is alcohol sales. In this case, only the service margins are recognized as output, and the costs are assigned to the alcohol manufacturing sectors (beer, wine, and liquor distillers).

APPENDIX B OIL AND GAS INDUSTRY INTERVIEWS

Bob Ball, BP Operations Manager, North American Arctic Exploration, (per. com. June 16, 2009).

Intuitively, an AWR should reduce the cost of constructing the Mackenzie Gas Pipeline (MGP) and other oil and gas operations in the area. BP has a significant off-shore presence and a limited on-shore presence. The off-shore tracts are currently the focus of BP's exploration activities The typical exploration cycle begins with seismic work followed with exploration drilling and concludes with development and then production of hydrocarbon resources, if found. Based on this cycle BP would not not expect to undertake any drilling on its new lease until at least 2013, and if hydrocarbon resources of sufficient quantity are discovered, production would occur many years beyond that.

For BP's on-shore leases, an AWR would probably not make that big an impact except for in logistics and its associated costs. Current constraints include the Ft. McPherson and Tsiigehtchic crossings during the shoulder seasons (spring and fall) when neither ferry nor ice road crossing is possible. The AWR from Inuvik to Tuktoyuktuk would not make much of a difference for our onshore activities, and could actually be a disadvantage depending on the location of the AWR and if the government ice roads were no longer supported.

BP's off-shore is a stand-alone operation in that it requires minimal on-land support other than the provision of consumables and fuel from supply bases. Off-shore work is similar throughout the world and there is a true and tried method of doing the work that for the most part does not need to rely on AWR access. It would be nice to have a supply base nearby, and a port on the Arctic Ocean linked to a road connected to the North American road system during exploration, but it is not necessary and would not significantly effect the cost of off-shore seismic programs.

BP's seismic program in the Beaufort Sea includes two supply ships and a seismic vessel. The supply ships will obtain their supplies from Tuktoyuktuk; supplies that will have already mobilized to Tuktoyuktuk by barge. Helicopters transport crew changes between the ships and Tuktoyuktuk. A port harbour connected by a AWR would be advantageous, but may not make a big difference in cost to the seismic and exploration drilling work. BP's greatest constraint is the off-shore operational time in that it needs open water between June and September; and, the movement of ships/barges through Point Barrow Alaska where the ice breaks up latter than the Beaufort Sea area.

If sufficient hydrocarbon resources are discovered (Sic. economic) BP could enter into a field development phase. If oil is found it could be loaded onto tankers and shipped for refinement. If gas is found an AWR should reduce operating costs and provide efficiencies for the construction of gas transport infrastructure and eliminate the shoulder season (spring/fall) overland transportation constraint.

BP has not evaluated the impact of an AWR on their operations but a 15% savings from having an AWR seems to be a reasonable estimate.

There is a need for a Port connected to an AWR road link for a number of reasons including: i) if BP goes into development and production it will need a vastly improved connected harbour than currently exists at Tuktoyuktuk to support the level of activity that will occur and the type of vessels that will be frequenting the Beaufort Sea ii) National sovereignty and security.

Gary Bunio, Vice President Operations & COO MGM Energy Corporation (per. com. June 16, 2009).

Scheduling is the key driver in an exploration/development program. With that in mind, the key question is how will an AWR affects scheduling (as it will probably not effect project scope). An AWR will allow rig transfer inside the NWT and allow additional timing flexibility that will not otherwise exist. Currently, MGM's operating window begins on about December 1, and concludes early-to-mid April, and requires equipment redundancy to accommodate unforeseen events that might require shipping in equipment at exorbitant cost. Therefore, an AWR will reduce scheduling risk and costs.

For Development and production, MGM will undertake summer exploration/production work in the Mackenzie Delta using helicopter supported drill rigs that are built onto piles. This provides MGM at least an additional 2-month operating window keeping in mind this method applies to production wells, not exploration wells.

Currently, logistics costs comprise between 25%-40% of exploration and production costs (in the Delta it is between 40%-50% of exploration/production cost) with the key factor driving logistics costs being the distance from an exploration/production well and support infrastructure and services. That is why exploration around Norman Wells and Inuvik are less expensive. An AWR will not eliminate or reduce the need to carry redundant equipment during exploration and therefore will not effect exploration costs too much. However, if a company is in its development and production phase an AWR will reasonably reduce logistics costs by 15%.

A constraint in the Mackenzie Delta is the April 10 – June 15 window when break-up makes winter roads and ice bridges impassable. In the development phase of a gas field having a shorter overland/winter road route (spur roads) off an AWR can save a company a few days time (shorter winter roads/ice roads) and reduce redundancy costs. It is important to keep in mind that oil/gas companies will spend money to the point that scheduling risks are eliminated. If too much money is needed the project won't proceed.

Not having an AWR results in freeze-up and break-up logistics constraints. That is, right after freeze-up there is an influx of labour, materials, supplies etc. into communities and drilling areas. Conversely, at the end of a season there is a rush to relocate equipment etc. This results in seasonal spikes in demand and associated cost increases for companies and communities. These cyclical spikes in demand not only draw away from needed community resources, but in some instances increase the community costs for those resources by as much as 25%. An AWR will dampen the spikes in demand, reduce demand driven cost increases to communities and oil and gas companies, and allow for a more efficient use of all resources.

The NWT needs to build an AWR north of Wrigley as soon as possible because there is no means of economic transportation other than barging with its inherent limitations and seasonality. In the long-term, an AWR is vital to the social and economic evolution of the NWT.

Rod Maier, Manager, Frontier Development, and Doug Connon, Mackenzie Delta Coordinator Chevron Canada Ltd. (per. com. June 16, 2009).

Chevron Canada operates in the outer reaches of the Mackenzie Delta; and being a delta, there will still be the need for over river winter roads and barges to access specific areas for exploration and production purposes. Therefore, there will not be direct AWR access to each drill site/production facility, and year-round logistics via an AWR will still not be available; albeit the length of winter roads necessary could be reduced. However, given the proposed routing of the AWR from Inuvik to Tuktoyuktuk, the AWR will not profoundly reduce Chevrons logistics costs in the Delta area.

Because of the seasonality of the work in the NWT (being dependent on winter roads), there are significant seasonal fluctuations on the draw of human and local service resources, particularly during

start of the season and end of the work season. The result is increased competition for scarce resources (particularly people and equipment) and inflationary pressures on budgets. An AWR could help spread the work out over a longer period of time where spur roads off an AWR or marine access from the AWR were feasible, thus reducing the cyclical intensity of activity and the associated inflationary pressures. Additionally, an AWR will allow for the mobilization of more equipment from southern contractors, increase competition among contractors, and reduce costs for industry. In short, new hydrocarbon fields could be developed sooner, more efficiently and with a lower overall cost structure.

An AWR will provide an alternative to using NTCL, and that will increase logistics competition and likely result in lower logistics costs; particularly if Chevron Canada did not have to front-load the cost of its equipment (rigs etc.) and could simply truck it into place. Having an AWR will also do away with some of the redundancies in resources and equipment currently barged up because it could be trucked in if needed. Furthermore, having an AWR should allow for certain resources and equipment to be permanently available in the region e.g., Inuvik resulting in significant mobilization savings, i.e., not having to move it from Alberta to Inuvik every year. Currently, equipment standby charges are fairly high because of having to barge rigs and equipment into the NWT in the summer and not being able to use them until after freeze up when overland access by winter road is possible.

Year-round access will also provide for more efficient use of rigs and equipment. That is, Chevron Canada could avoid having to pay stand-by costs for the rigs and equipment when they are not being used, as the equipment could be de-mobilized to other projects in the north or western Canada. There will still be some restrictions in the Delta, as logistics will still rely on seasonal transportation to and from the Delta to the AWR staging point in Inuvik. The benefit may be more profound further down the Mackenzie Valley where the geography was more amenable to year-round access using spur roads off an AWR.

The top three areas where savings will be result from having an AWR are: i) logistics, ii) construction, and iii) drilling and well servicing. An AWR will provide industry with greater control of its logistics and planning functions and not be limited by third parties such as NTCL, local supplier/contractor availability, and standby costs will be dramatically reduced.

From a broader socio-economic perspective, having an AWR may provide residents of the Mackenzie Valley and the Delta more opportunities to interact and engage with others in the NWT and abroad. This will broaden their understanding and views regarding oil and gas development and possibly increase their comfort with the oil and gas sector. From a global competitive standpoint, cost structure is overriding, and an AWR could reduce the cost structure of working in the Mackenzie Delta and the Mackenzie Valley. Lowering the cost structure will in-turn open up the NWT to more smaller oil and gas companies, and increase oil and gas activity in the NWT. Fundamentally, it is not just about building a road. It is about supporting a vital sector of the NWT and Canadian economy that can probably run for the next 50-60 years. The hydrocarbon potential has been shown to exist; now AWR road access is needed to fulfill that long-term potential.

Confidential interviewee and company (per. com. June 16, 2009).

Rigs: There are different types of rigs and each type has its own unique logistics and operational requirements. The Arctic Class rigs are capable of handling 2 **-3** lengths of drill pipe at a time and can drill down 2,500 **-** 5,500m. The design of the Arctic Class rigs makes them optimal for the harsh northern climate and terrain.

The process that ultimately leads to use of drilling rigs involves the following steps:

1. Obtain access to possible oil and gas through an open bidding process as per *Canada Oil and Gas Operations Act* (COGOA) based on work bid commitments. Highest work bid wins. Only lands that are put up for the bidding process are eligible (that is, not all land all lands in the NWT are open to hydrocarbon exploration at any one time) and these lands are pre-approved for hydrocarbon exploration and possibly production by the landowners.
2. The successful firm undertakes seismic work to find / delineate a potential hydrocarbon resource. This takes at least one winter season as **land** seismic work is not allowed in the summer in the Delta.
3. The successful firm (upon finding a hydrocarbon resource) obtains authorizations and negotiates benefits agreements (Government, landowners) to undertake drilling. This can take upwards of 1 year.
4. Concurrent to point iii above, the successful firm sources equipment to undertake exploration drilling. If authorizations do not come through in time, the successful firm could be end up paying for equipment it cannot use in the field. That is, if the equipment has been barged northward and frozen into place in anticipation of winter drilling activity and authorizations do not come through in time, the successful company still has to pay for rental of the rig.
5. Once authorizations are secured, there is a 30-90 day operating window in which to drill and back-haul the rig on a winter road to the nearest all-weather road.

For example, a typical drilling season will begin in September when a rig is barged and left to freeze in place. Then, as soon as winter road travel is possible (ranges from mid-December to mid-January), crews are dispatched to set-up the camp and drill rig. This can happen anywhere from mid-December to mid-January depending on environmental conditions. Then, if the rig has to be moved to another drilling location, another winter road has to be constructed, the rig dismantled, moved, and reconstructed.

An AWR will make the overall rig deployment process somewhat less planning intensive but the need for overland winter road access remains a constraint. Currently in the Inuvialuit Settlement region, only minimal overland winter road travel is allowed, and in the Sahtu Settlement area, only minimal frozen water road travel is allowed (such as ice bridges). In places like Fort Liard where there is an AWR near by and no community objections to constructing all season access roads off the main highway system, drilling can happen all year round. If a general set of land use guidelines were prepared that enabled permanent overland access, where possible, the full benefits of the AWR could be achieved. Furthermore, without such guidelines in place, it will not be economically possible to drill enough exploration and production wells to bring the MGP up to 1.8 Bcf/day production.

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