



**Phase 1 of Regulatory Approvals
for a Wastewater Treatment
Facility in Kimmirut, NU**

August 22, 2018

Prepared for:

Department of Community and Government
Services
Government of Nunavut
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Project No.: 1449-30059

Table of Contents

EXECUTIVE SUMMARY	I
ABBREVIATIONS	V
1.0 INTRODUCTION.....	1.1
1.1 PROJECT BACKGROUND	1.1
1.2 REGULATORY CONTEXT	1.2
1.2.1 Transport Canada and the Kimmirut Airport Zoning Regulations	1.2
1.2.2 GN Department of Health	1.2
2.0 PROJECT DESCRIPTION.....	2.1
2.1 PROJECT LOCATION.....	2.1
2.2 CONCEPTUAL PROJECT DESIGN	2.1
3.0 PROJECT TASKS AND REGULATORY REVIEWS	3.1
3.1 ITEM 1: NAV CANADA REVIEW	3.1
3.2 ITEM 2: GOVERNMENT OF NUNAVUT REVIEW	3.2
3.3 ITEM 3: HAMLET OF KIMMIRUT APPROVAL	3.3
3.4 ITEM 4 TO 6: TRANSPORT CANADA REVIEW	3.4
4.0 PROJECT REGULATORY REVIEW TIMELINE.....	4.1
5.0 CLOSURE.....	5.1
6.0 REFERENCES.....	6.1
LIST OF TABLES	
Table 1: Submissions Requirements for a Transport Canada Exemption Application to the Kimmirut Airport Zoning Regulations.....	3.1
Table 2: Regulatory Review Timeline for a Transport Canada Exemption to the Kimmirut Airport Zoning Regulations	4.1
LIST OF FIGURES	
Figure 1: Proposed Location of the New Wastewater Treatment Facility in Kimmirut, NU	1.3
Figure 2: Conceptual Design of a New Wastewater Treatment Facility at Site 9 in Kimmirut, NU	2.3
LIST OF APPENDICES	
APPENDIX A SITE 9 TOPOGRAPHIC SKETCHES.....	A.1
APPENDIX B TRANSPORT CANADA KIMMIRUT AIRPORT ZONING REGULATIONS EXEMPTION APPLICATION PACKAGE	B.1



Executive Summary

Stantec Consulting Ltd. (Stantec) was retained by the Government of Nunavut, Department of Community and Government Services (GN-CGS), to begin the first phase of regulatory permitting for a proposed new wastewater treatment facility (WWTF) in Kimmirut, Nunavut. Construction of a new WWTF (the Project) has been proposed to replace the community's existing sewage dump. The existing sewage dump has been in operation for over 30 years, but has long been considered unacceptable by the Nunavut Water Board and Indigenous and Northern Affairs Canada because it does not provide adequate treatment (i.e., preliminary treatment only, with some primary treatment during summer when vegetation is present).

The first phase of regulatory approvals involves obtaining an exemption to the federal Kimmirut Airport Zoning Regulations (AZRs; SOR/2012-96), from Transport Canada, to permit the construction and operation of the proposed WWTF. The Kimmirut AZRs were established to prevent lands adjacent to, or in the vicinity of, the Kimmirut Airport from being used or developed in a manner that could be incompatible with the safe operation of an airport or aircraft. The Kimmirut AZRs define an 'outer surface' zone, which includes all lands within a 4,000 m radius of the airport, and within which development activities may be restricted. Section 6(1) of the Kimmirut AZRs further indicates that land activities or uses that attract wildlife – particularly birds – may create a hazard for aviation safety and are prohibited. The site selected for the proposed WWTF is located approximately 1 km south of the Kimmirut Airport and is situated within the Kimmirut AZRs' outer surface zone. The conceptual design for the proposed WWTF also includes a sewage lagoon system (located within the outer surface zone), which is considered a moderate risk land use activity as it may attract birds and, is therefore also an unacceptable land use within identified airport land zones (Transport Canada 2007). An exemption to the Kimmirut AZRs is being sought from Transport Canada to allow for the construction and operation of the proposed new WWTF, based on a site-specific evaluation of risks.

To apply for the AZR exemption from Transport Canada, several other regulatory reviews were required. This included approvals/reviews from the Hamlet of Kimmirut (the Hamlet; as the Land Use Authority), the Government of Nunavut Department of Economic Development and Transportation (GN-EDT; as the Airport Operator), and NAV CANADA (as the responsible authority for air navigation in Canada). One topographical field survey of the proposed WWTF site was also required. Review documents from these agencies, and topographical data, formed part of the AZR exemption application to Transport Canada.

Stantec completed the field topographical survey in early October 2016. In late December 2016, a land use application package was submitted to NAV CANADA, as well as an information package to the GN-EDT. In mid-March 2017, the GN-EDT confirmed that an Airport-Bird Hazard Risk Assessment (ABHRA) was required for the Project, and, following one information request, a Letter of No Objection was received from NAV CANADA in late March 2017. Stantec prepared the ABHRA and, after further consultation with the GN-CGS and wildlife agencies, the final ABHRA was submitted to the GN-EDT for review in early July 2017. A review letter from the GN-EDT was received in mid-July 2017.

Together with approval documentation from the Hamlet, documents from NAV CANADA and the GN-EDT formed part of the application to Transport Canada for an exemption to the Kimmirut AZRs. The AZR exemption application package was submitted to Transport Canada in late July 2017. In October 2017, Transport Canada requested



additional information from the GN-EDT for its review, and the development of a safety case for the Project. This safety case review was completed by the GN-EDT and submitted to Transport Canada in January 2018. After ongoing follow-up with Transport Canada by Stantec and the GN-CGS between February to July, the GN-CGS received an electronic version of the approved AZR exemption in mid-July 2018. The Transport Canada approval is included in this report, immediately following this Executive Summary (page iii). A hard copy of the AZR exemption was mailed to the GN-CGS.





Transport Canada Transports Canada

Civil Aviation
Prairie and Northern Region
Box 8550
344 Edmonton Street
Winnipeg, MB, R3C 0P6

Your file Votre référence

Our file Notre référence

5151-Q399
RDIMS#14230923
ATS-17-18-00047005

July 16, 2018

Ms. Udloriak Hanson
Deputy Minister
Department of Economic Development and Trade
Government of Nunavut
P.O.Box 1000, Stn. 1500
Iqaluit, NU
X0A 0H0

Dear Ms. Hanson,

**EXEMPTION FROM PARAGRAPH 6(1) of the KIMMIRUT AIRPORT
ZONING REGULATIONS**

Pursuant to subsection 5.9(2) of the *Aeronautics Act*, and after taking into account that the exemption is in the public interest and not likely to affect aviation safety, I hereby exempt the Government of Nunavut from the requirements set in Paragraph 6(1) of the Kimmirut Airport Zoning Regulations.

Clause 6(1) of the Kimmirut Airport Zoning Regulations states:

6(1) A person must not use or permit another person to use any of the lands for activities or uses that attract wildlife — particularly birds — that may create a hazard for aviation safety.

PURPOSE

The purpose of this exemption is to allow Government of Nunavut Community and Government Services to construct a wastewater facility on land subject to Kimmirut Airport Zoning Regulations identified as Site 9 (N62 50' 15.04" W69 52' 35.05").

APPLICATION

This exemption applies only to Site 9 (N62 50' 15.04" W69 52' 35.05") Kimmirut, Nunavut.

If Government of Nunavut Community and Government Services goes outside of conditions as outlined in the exemption, the exemption will be void.

CONDITIONS

The exemption is subject to the following conditions:

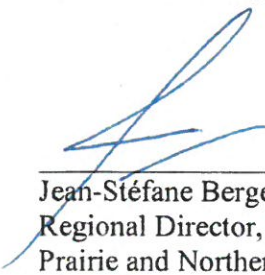
- 1- Nunavut Airports implement ongoing monitoring procedures after construction to ensure the water waste facility is not becoming a bird attractant.
- 2- Nunavut Airports implement mitigation measures to deter bird activity should the site become a bird attractant.
- 3- Nunavut Airports institutes Risk Control strategies identified in the Nunavut Airports Safety Case December 12, 2017 Kimmirut New Waterwaste Facility ver1a 20170106.

VALIDITY

This exemption is in effect until the earliest of:

- 1- The date on which any of the conditions set out in the exemption is breached; or,
- 2- The date, on which this exemption is cancelled in writing, by the Minister, where he is of the opinion it is no longer in the public interest, or that it is likely to affect aviation safety.

Dated at Winnipeg, Manitoba, Canada this 16th day of July 2018 on behalf of the Minister of Transport.



Jean-Stéfane Bergeron
Regional Director, Civil Aviation
Prairie and Northern Region

Abbreviations

km	kilometres
m	metres
mASL	metres above sea level
mm	millimetre
ABHRA	Airport-Bird Hazard Risk Assessment
AZRs	Airport Zoning Regulations
GN-CGS	Government of Nunavut Department of Community and Government Services
GN-DOH	Government of Nunavut Department of Health
GN-EDT	Government of Nunavut Department of Economic Development and Transportation
Hamlet	Hamlet of Kimmirut
Stantec	Stantec Consulting Ltd.
WWTF	Wastewater treatment facility



1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by the Government of Nunavut, Department of Community and Government Services (GN-CGS), to begin the first phase of regulatory permitting for a proposed new wastewater treatment facility (WWTF) in Kimmirut, Nunavut. Construction of a new WWTF has been proposed to replace the community's existing sewage dump.

The first phase of regulatory approvals involves obtaining an exemption to the federal Kimmirut Airport Zoning Regulations (AZRs; SOR/2012-96) from Transport Canada, to permit the construction and operation of the proposed WWTF. Several other regulatory reviews were required in advance of the exemption application to Transport Canada and included approvals/reviews from the Hamlet of Kimmirut, the Government of Nunavut Department of Economic Development and Transportation (GN-EDT), and NAV CANADA. One topographical field survey of the proposed WWTF site was also completed. Review documents from these agencies and the topographical data, formed part of the AZR exemption application to Transport Canada.

This report provides: an overview of the regulatory reviews completed during this first phase of permitting for the proposed WWTF in Kimmirut; a timeline of activities and approvals; and, the application packages and agency review documents. Once this first phase of permitting is complete, the GN-CGS can move forward on detailed design for the proposed WWTF, as well as additional permitting through the Nunavut Water Board (NWB), Nunavut Planning Commission, and Nunavut Impact Review Board.

1.1 PROJECT BACKGROUND

The Hamlet of Kimmirut (the Hamlet) currently collects sewage and wastewater from residences and business, and releases these into a trench near the community's solid waste facility (i.e., landfill), which is situated approximately 700 m south of the community (see Figure 1). Although this location and method of sewage disposal has been in use for more than 30 years, it has long been considered unacceptable by the NWB and Indigenous and Northern Affairs Canada because it does not provide adequate treatment (Nunami Stantec 2015). From the trench, sewage immediately drains down a steep (average 4:1) slope that drops from an elevation of 65 m above sea level (mASL) to 25 mASL (Nunami Stantec 2015). Following the steep slope, sewage flows through an area thickly vegetated with grasses and willows, and eventually into the marine environment of Lake Harbour (Nunami Stantec 2015). It is believed that the current sewage disposal system provides only preliminary treatment, with some further primary treatment during the summer when vegetation is present and active (Nunami Stantec 2015).

A new WWTF, to replace the sewage dump, was constructed in 2001 under the approval of the Nunavut Water Board (NWB); it involved a lagoon system with wastewater treatment by a downstream wetland. This new WWTF was upgraded in 2011 after it was determined to have inadequate capacity for overwinter storage. However, during subsequent NWB licencing for operation of this new WWTF, concerns were expressed over the potential presence of fish in the downstream wetland and Tuullitsut Lake. A fish habitat assessment of the downstream wetland in 2013 found Arctic char (*Salvelinus alpinus*) throughout the wetland and adjoining lakes (Nunami Stantec 2014), indicating that the release of effluent from the lagoons of the proposed 2001 WWTF would have potential to negatively affect



Introduction

Arctic char habitat. The community subsequently decided they did not want a WWTF in this area and, as a result, the 2001 WWTF has never been operational.

Site options for construction of another new WWTF were assessed in an ensuing feasibility study (Nunami Stantec 2015), which suggested that a lagoon system at a small pond (i.e., “Site 9” in Nunami Stantec 2015), approximately 400 m east of the community’s potable water intake at Lake Fundo, was the best option for the Hamlet to pursue (see Figure 1). Site 9 was determined to be the best option given operational requirements, effluent quality requirements, and cost.

Following this, the GN-CGS is now pursuing initial regulatory approvals to construct and operate a new (e.g., 2019) WWTF at Site 9 (the Project). As noted, initial regulatory approvals include: obtaining an exemption to the federal Kimmirut AZRs, as well as approvals/reviews from the Hamlet, the GN-EDT, and NAV CANADA.

1.2 REGULATORY CONTEXT

1.2.1 Transport Canada and the Kimmirut Airport Zoning Regulations

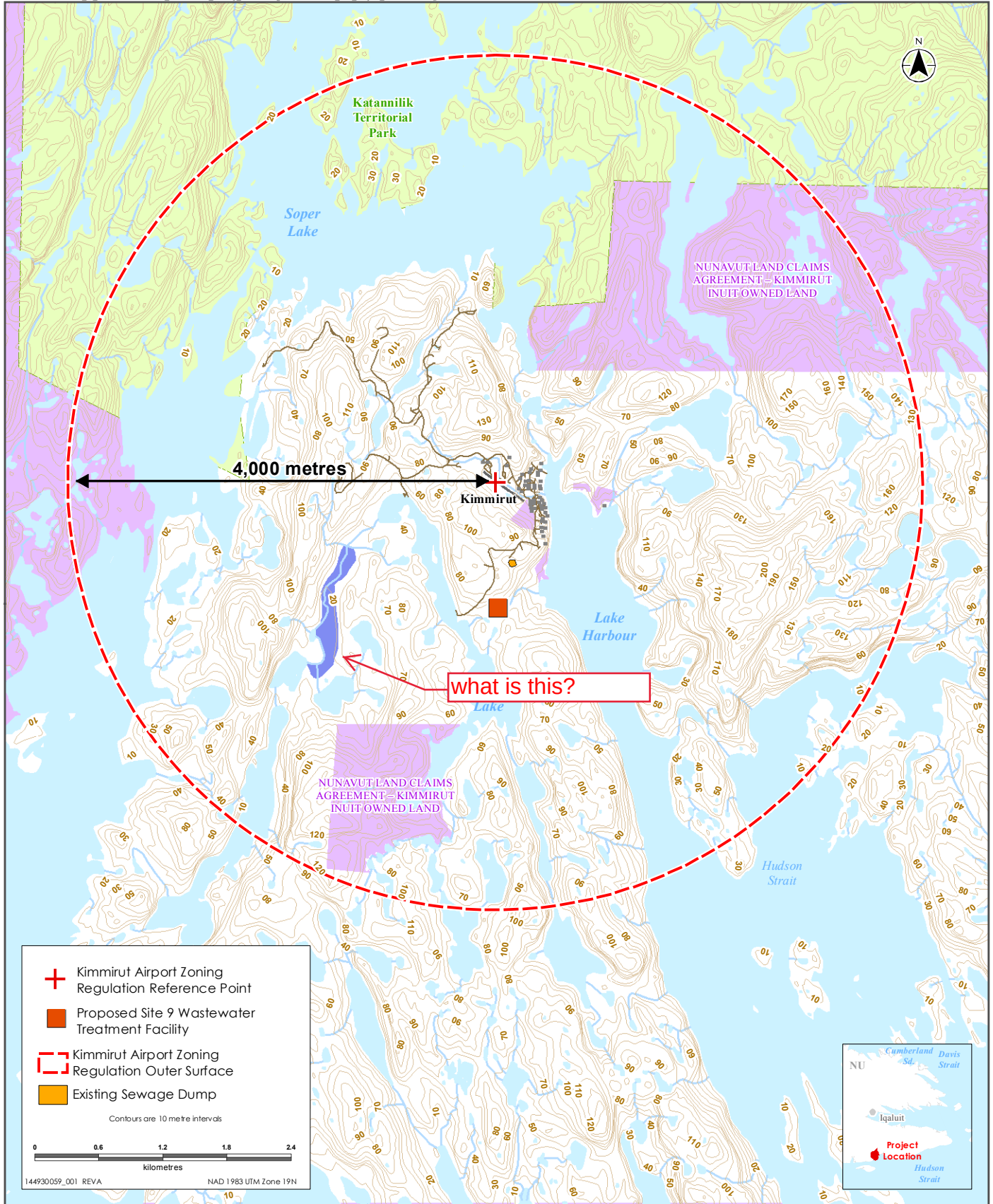
The Kimmirut AZRs (SOR/2012-96) were established to prevent lands adjacent to, or in the vicinity of, the Kimmirut Airport from being used or developed in a manner that could be incompatible with the safe operation of an airport or aircraft. The Kimmirut AZRs define an ‘outer surface’ zone, which includes all lands within a 4,000 m radius of the airport, and within which development activities may be restricted (see Figure 1). Section 6(1) of the Kimmirut AZRs further indicates that land activities or uses that attract wildlife – particularly birds – may create a hazard for aviation safety and are prohibited.

The conceptual design for the proposed WWTF at Site 9 includes a sewage lagoon system and is located within the Kimmirut Airport outer surface zone. Sewage lagoons are considered a moderate risk land use activity as they may attract birds and they are generally an unacceptable land use within identified airport land zones (Transport Canada 2007). Therefore, to construct and operate the proposed WWTF at Site 9, an exemption to the Kimmirut AZRs is being sought from Transport Canada, based on a site-specific evaluation of risks.

1.2.2 GN Department of Health

Initially, preparation of project summary documents for the GN Department of Health (GN-DOH) was also included within the scope of the Project. Review by the GN-DOH review was determined to likely be required given the proximity of Site 9 to the community’s potable water source (i.e., Lake Fundo, approximately 400 m west of Site 9). This was removed from the scope of the Project as the GN-CGS contacted the GN-DOH directly. The GN-CGS received a letter of review from the GN-DOH in February 2017 (see Appendix B).





Sources: Base Data - Natural Earth; Thematic Data - ERBC

Service Layer Credits:

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

Proposed Location of a New Wastewater Treatment Facility in Kimmirut, NU



PHASE 1 REGULATORY APPROVALS FOR A NEW WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU

Figure 1

2.0 PROJECT DESCRIPTION

2.1 PROJECT LOCATION

Kimmirut is situated on southern Baffin Island, Nunavut, approximately 120 km southwest of Iqaluit. The community is located on the shore of Lake Harbour, which is a marine inlet that extends from Hudson Strait. Kimmirut is situated within the Meta Incognita Peninsula ecoregion, of the Northern Arctic ecozone, which has irregular terrain that can reach elevations of 400 to 500 mASL (ESWG 1995). In and around Kimmirut the terrain is undulating and land travel in all directions is limited due to the steep slopes and waterbodies that surround the community. Land cover in the ecoregion is typical shrub tundra vegetation including dwarf birch, willow (*Salix* spp.), avens (*Dryas* spp.), and heath (*Vaccinium* spp.) (ESWG 1995). In the ecoregion, rock outcroppings tend to be interspersed with sandy morainal veneers and frozen organic deposits; cryosols are the dominant soil type, and permafrost is continuous with low to medium ice content (ESWG 1995).

Climate normals, from 1981 to 2010 for the climate station nearest Kimmirut (Iqaluit), show a mean annual temperature of -9.3°C, with mean January temperatures of -26.9°C and mean July temperatures of 8.2°C (ECCC 2018). Total annual precipitation is typically around 400 mm, with approximately 230 mm falling as snow (typically from October through May) and 197 mm falling as rain (typically from June through to September) (ECCC 2018).

2.2 CONCEPTUAL PROJECT DESIGN

The current conceptual design for a new (2019) WWTF at Site 9 includes the extension of an existing road, a truck discharge station and turnaround pad, a sewage retention lagoon, and an overland discharge path with detention/dispersion berms. Figure 2 shows the conceptual design for the new (2019) WWTF at Site 9.

The sewage lagoon is expected to provide secondary treatment by applying wastewater retention for up to one year. The lagoon would be created from the existing small pond at Site 9, with the low permeable retention berm constructed around the pond. The lagoon is anticipated to measure approximately 80 m x 120 m wide while the berm is expected to have a height of 3 to 4 m at its discharge point. The lagoon would have a required storage volume of 22,000 m³, an operating depth of 2 to 3 m, and a surface area of 7,000 to 11,000 m² (Nunami Stantec 2015). The discharge of effluent from the lagoon would involve either a passive decant (i.e., effluent discharge would occur once the water level reaches a certain elevation) or an active pumping system (Nunami Stantec 2015). Effluent discharge would likely occur near the end of the summer, when wastewater would have received the maximum passive treatment by the downstream vegetation.

Once discharged from the lagoon, the effluent would flow through an overland discharge path to the marine environment of Lake Harbour. The overland discharge path is expected to range from 40 to 100 m wide and flow overland approximately 450 m, from the lagoon to Lake Harbour. Up to four detention/dispersion berms would be constructed within the discharge path to maintain an even distribution of the effluent flow and maximize supplementary treatment by existing soil and vegetation (e.g., grasses and willows).



PHASE I OF REGULATORY APPROVALS FOR A WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU

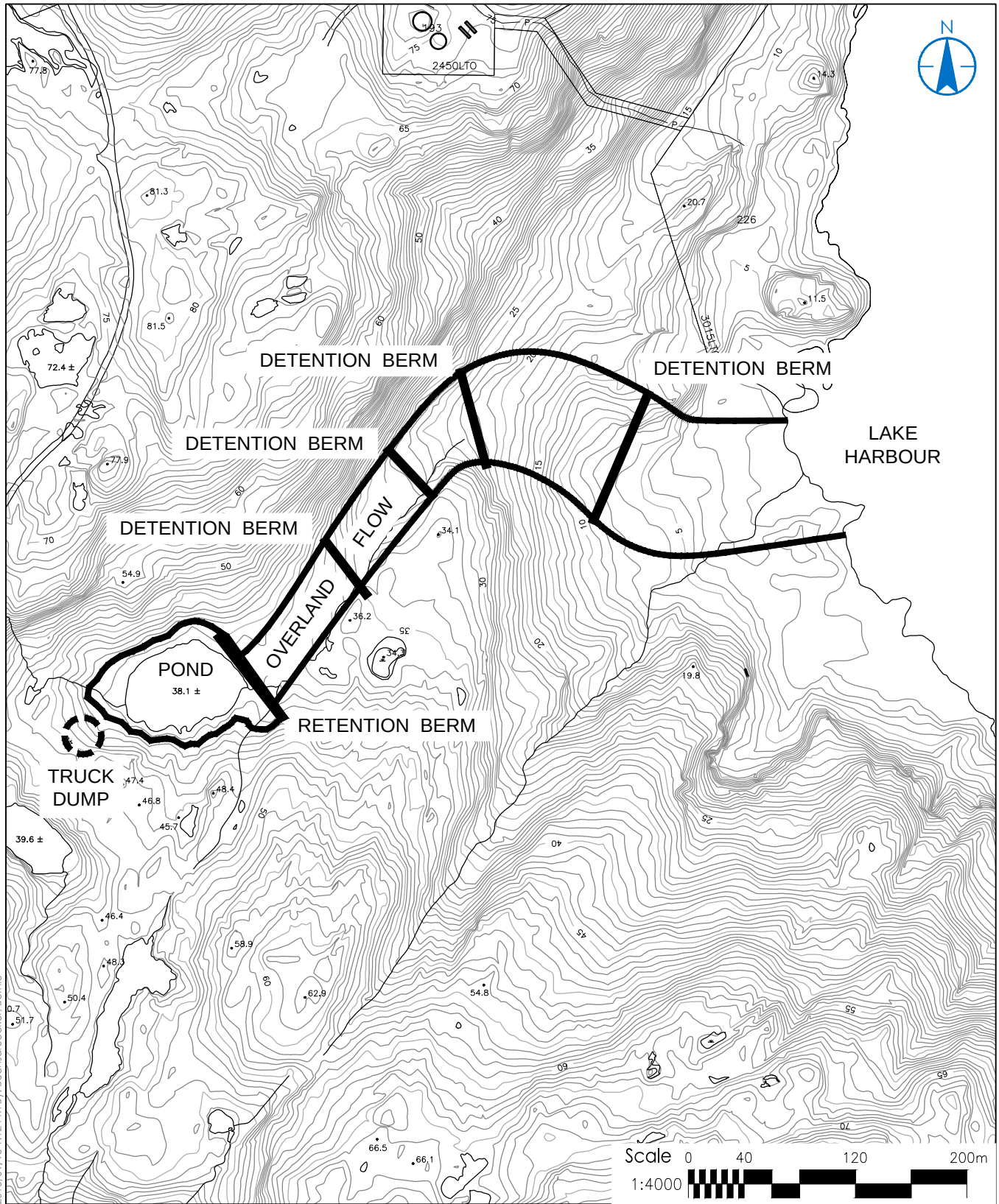
Project Description

The new WWTF at Site 9 also requires a 0.37 km extension/branch from the existing road that leads to the Lake Fundo potable water intake station. The road extension would be constructed in a similar fashion as the existing road, and include compacted granular fill material (approximately 0.5 m embankment) approximately 6 m wide.

A truck discharge station and turnaround pad is also required at the lagoon. The turnaround pad would provide a safe and accessible location for the sewage trucks to discharge into the lagoon during all seasons.



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10160 - 112 Street
Edmonton AB
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Client/Project

GOVERNMENT OF NUNAVUT
KIMMIRUT WASTEWATER
FEASIBILITY STUDY

Figure No.

2

Title

Site 9A

3.0 PROJECT TASKS AND REGULATORY REVIEWS

As previously noted, the GN-CGS is pursuing initial regulatory approvals to construct and operate a new (2019) WWTF at Site 9. The sewage lagoon system at Site 9 is located within the defined outer surface zone of the Kimmirut Airport (as per the Kimmirut AZRs) and is considered an unacceptable land use in the vicinity of airports (Transport Canada 2007). To construct and operate the new (2019) WWTF at Site 9, the GN-CGS requires an exemption to the federal Kimmirut AZRs. To apply for an exemption to the Kimmirut AZRs, several additional regulatory approvals were required. These are outlined in Table 1 and described in the following sections.

Table 1: Submissions Requirements for a Transport Canada Exemption Application to the Kimmirut Airport Zoning Regulations

Item No.	Submission Requirement	Information Necessary to Obtain Submission Document	Information Gaps Identified
1	Letter of No Objection from NAV CANADA	- NAV CANADA Land Use Proposal submission form - Topographic survey - Applicable site plans and drawings	Topographic survey required
2	Letter from the GN-EDT, Nunavut Airports Division (as the Airport Operator), regarding impact	- Project Summary - Airport-Bird Hazard Risk Assessment	Airport-Bird Hazard Risk Assessment
3	Letter of No Objection from the Hamlet of Kimmirut (as the Land Use Authority)	Project Summary	None
4	Cover Letter from the GN-CGS (as the Project Owner)	Legal name information, address, project summary, etc.	None
5	Transport Canada Aeronautical Assessment Form for Obstruction Evaluation (No. 26-0427)	Legal name information, address, project summary, etc.	None
6	Exemption Application Fee (\$475)	None	None

3.1 ITEM 1: NAV CANADA REVIEW

As identified in Table 1, a Letter of No Objection was required from NAV CANADA to support the Transport Canada AZR exemption application. NAV CANADA is responsible for Canada's air navigation system and, as part of their Land Use Program, must assess and approve all proposals for land use near airports and air navigation infrastructure, before construction begins. To obtain the Letter of No Objection, NAV CANADA requires completion of their Land Use Submission form, which also requires a topographical map and survey of the proposed project site. A topographic survey of Site 9 had not previously been completed and this was identified as a data gap.

Stantec completed the topographical survey of the Site 9 area on October 5 and 6, 2016, using Trimble differential GPS units. The final survey sketches for Site 9 were prepared by November 9, 2016, and these are included in Appendix A of this report.



Project Tasks and Regulatory Reviews

Stantec prepared NAV CANADA's Land Use Submission form and assembled an information package to include relevant details such as a project summary letter, the WWTF conceptual design, and the topographic sketches. The draft NAV CANADA application package, including the prepared Land Use Submission form, was provided to GN-CGS for review on November 29, 2016. On behalf of GN-CGS, Stantec submitted the final application package to NAV CANADA on December 21, 2016, via email. The NAV CANADA review processes was expected to take between 8 to 12 weeks.

NAV CANADA confirmed receipt of the application package on January 16, 2017. A request for additional information was received on March 10, 2017 and requested additional information on to the geographic coordinates, ground elevation, and heights of proposed streetlights, as well as the maximum height of any construction equipment. Stantec submitted a response to NAV CANADA's inquiry (via email) on March 15, 2017, on behalf of the GN-CGS. The GN-CGS received a Letter of No Objection from NAV CANADA on March 23, 2017.

The final NAV CANADA application package, response to the information request, and the Letter of No Objection are included in Appendix B of this report, as part of the Transport Canada AZR exemption application package.

3.2 ITEM 2: GOVERNMENT OF NUNAVUT REVIEW

As identified in Table 1, a letter from the GN-EDT, Nunavut Airports Division, was required to support the Transport Canada AZR exemption application. As the Airport Operator, GN-EDT was required to review the proposed (2019) WWTF against the airport's wildlife management plan, and provide a response on the potential impact of the development. Based on Stantec's communication with the GN-EDT in September 2016, the need for an Airport-Bird Hazard Risk Assessment (ABHRA) would be determined upon review of the project details.

Stantec prepared an information package for submission to the GN-EDT that included a description of the regulatory setting, a project background, the WWTF conceptual design, and the topographic sketches. The draft GN-EDT information package was provided to GN-CGS for review on November 29, 2016. Stantec submitted the final information package to GN-EDT on December 21, 2016 (via email), on behalf of the GN-CGS.

Stantec received a response to the information package from GN-EDT March 2, 2017. The requirement to complete an ABHRA was communicated to the GN-CGS and Stantec on March 14, 2017. Stantec began preparation of the desktop ABHRA shortly after this communication.

An ABHRA examines the relationships between land use, expected bird species and behavior, and aircraft movement to assess aviation safety. It is customizable to the various factors that may create risk at a given airport. Based on guidance from Transport Canada (2007), and the Kimmirut AZRs, Stantec identified airport-bird hazard zones for the Kimmirut airport and evaluated land use within these zones relative to various risk elements (e.g., aircraft types, expected bird species), likelihood, and loss events. Telephone interviews were also conducted with four Kimmirut residents, including the local Conservation Officer, the Foreman for the Hamlet of Kimmirut, the Airport Radio Operator, and the Airport Maintainer.

Results of the ABHRA showed that the proposed WWTF at Site 9 is located within the Kimmirut Airport Primary Bird Hazard Zone, and land uses, such as sewage lagoons that are a moderate risk for bird attractants, are not considered appropriate in this zone (Transport Canada 2007). However, it was identified that there are many natural lakes, wetlands, and coastal areas within the Kimmirut bird hazard zones, as well as the community's existing landfill.



Project Tasks and Regulatory Reviews

Further, in the past 11 years (as long as the Airport Radio Operator has been employed), there have been no reports of hazardous bird species (e.g., geese, ducks, gulls) in or near the Kimmirut airport, and there have been no reported bird strikes. Project design elements (e.g., small size, berm around lagoon), as well as natural elements (e.g., anticipated to be frozen for eight months of the year), may further reduce the potential for birds to occupy the proposed WWTF. Overall, the proposed WWTF at Site 9 was identified as having a low to moderate risk to aviation safety, and additional mitigations could further reduce this risk.

The draft ABHRA was provided to the GN-CGS for review on April 21, 2017. Comments were received from the GN-CGS by May 3, 2017. Stantec revised the draft ABHRA based on GN-CGS comments and provided a revised ABHRA and comment table to GN-CGS on May 11, 2017.

Following this, Stantec and the GN-CGS held further discussions on the mitigation options for the proposed WWTF, which were recommended by Stantec to reduce its attractiveness to birds and further minimize any potential effects on aviation safety. Stantec followed-up with the Canadian Wildlife Service on typical bird exclusion techniques used in Nunavut, and completed additional review of bird exclusion options that could be feasible for the proposed WWTF while also balancing cost and the need for site access (e.g., for lagoon maintenance). A review of mitigation options, including “no mitigation” and passive techniques, were included in the final revised ABHRA and it was noted that mitigation options (if any) would require further discussion with regulators. The final ABHRA was submitted to the GN-CGS for review on July 4, 2017, and the GN-CGS provided their approval on July 7, 2017. Stantec submitted the final ABHRA to the GN-EDT, on behalf of the GN-CGS, on July 12, 2017, via email. Subsequently, the GN-EDT, Nunavut Airports Division, sent a letter (via email) on risk of the proposed WWTF on July 14, 2017. The GN-EDT’s letter concurred with the final ABHRA and concluded there would likely be no significant increase in bird activity as a result of constructing and operating the WWTF at Site 9 and, at worst, there could be a minor impact to aviation safety.

The initial information package and final ABHRA sent to the GN-EDT are included in Appendix B of this report, as part of the Transport Canada AZR exemption application package, along with applicable communications and the GN-EDT’s letter of risk.

3.3 ITEM 3: HAMLET OF KIMMIRUT APPROVAL

As identified in Table 1, approval from the Hamlet of Kimmirut (the Hamlet) was required to support the Transport Canada AZR exemption application. As the Land Use Authority, the Hamlet needs to approve the proposed (2019) WWTF, including its placement at Site 9.

Stantec initially prepared an information package for submission to the Hamlet that included a description of the regulatory setting, a project background, the WWTF conceptual design, and the topographic sketches. On November 29, 2016, the draft Hamlet information package was provided to GN-CGS for review. On December 21, 2016, the GN-CGS provided Stantec with documentation from the Hamlet that supported the new location of a WWTF at Site 9. Supporting documents included:

- Letter from the Hamlet of Kimmirut, signed by the Senior Administrative Officer
- Council motion 93-2016, supporting the new site (Site 9) for the WWTF
- Council motion 131-2016, rejecting the use of the 2001 constructed WWTF
- Minutes from a public meeting on July 7, 2016, that rejected the use of the 2001 constructed WWTF, and approved the new site
- Attendance register from the July 7 public meeting



Project Tasks and Regulatory Reviews

- Invitation to the public for the July 7 public meeting
- Diagram of the new site
- GoogleEarth image of the new site

These supporting documents from the Hamlet are included in Appendix B of this report, as part of the Transport Canada AZR exemption application package.

3.4 ITEM 4 TO 6: TRANSPORT CANADA REVIEW

Following receipt of the GN-EDT's letter of risk, Stantec began preparation of the draft AZR exemption application to Transport Canada. The draft AZR exemption application was submitted to the GN-CGS for review and signature on July 21, 2017. Stantec received comments and final reviews/signature of the application package from the GN-CGS between July 24 and July 31, 2017. The final AZR exemption application package was couriered to Transport Canada in Winnipeg, MB, on July 31, 2017. The final AZR exemption application package is provided in Appendix B of this report, and includes:

1. Cover Letter from GN-CGS
2. Completed Transport Canada Aeronautical Assessment Form
3. Project Summary with figures and topographic sketches
4. Letter of No Objection from NAV CANADA and the submission made to NAV CANADA (see Section 3.1 above)
5. Letter of No Objection from the GN-EDT, Nunavut Airports Division, and the submission made to the GN-EDT, including the final ABHRA (see Section 3.2 above)
6. Approval from the Hamlet (see Section 3.3 above)
7. Letter of review from the GN-DOH (see Section 1.2.2 above)
8. Application fee (\$475.00)

Transport Canada confirmed receipt of the application package on September 11, 2017. On October 18, 2017, Transport Canada communicated to Stantec that they were completing their risk assessment of the Project and, the following day, requested an updated Wildlife Management Plan for the Kimmirut Airport from the GN-EDT, Nunavut Airports Division. Stantec was copied on further communication between Transport Canada and the GN-EDT on October 25, 2017, where Transport Canada requested a safety case submission for the Project, in relation to the GN-EDT's Safety Management System for Nunavut Airports. On October 30, 2017, Stantec was contacted by WASCO NORTH, who is contracted to manage the GN-EDT's Safety Management System for Nunavut Airports. Stantec was asked to provide the final ABHRA for review and inclusion within the GN-EDT's safety case development. With approval from the GN-CGS, Stantec provided WASCO NORTH with the final ABHRA later the same day.

On November 21, 2017, WASCO NORTH communicated (via email) to Transport Canada, GN-CGS, and Stantec that they accepted the final ABHRA and would prepare a letter for Transport Canada. On January 23, 2018, WASCO NORTH confirmed with the GN-CGS and Stantec that their safety case, on behalf of the GN-EDT, was completed and it had been forward on to Transport Canada. The following day (January 24, 2018), Transport Canada confirmed receipt and acceptance of the GN-EDT's safety case, and that the AZR exemption application was being reviewed by senior management at Transport Canada.

Over the period from February to July 2018, Stantec and the GN-CGS continued to follow-up with contacts at Transport Canada on the status of the application review. On July 16, 2018, the GN-CGS received email communication from Transport Canada that the Kimmirut AZR exemption application had been approved and signed.



PHASE I OF REGULATORY APPROVALS FOR A WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU

Project Tasks and Regulatory Reviews

An electronic version of the approval was also provided in this Transport Canada email while a hard copy of the exemption was mailed to the GN-CGS. The electronic version of the Kimmirut Airport AZR Exemption is included in the Executive Summary of this report.



4.0 PROJECT REGULATORY REVIEW TIMELINE

The timeline for Project regulatory reviews and approvals is summarized in Table 2 below. As outlined in Section 3.0, Stantec initiated work on the Project in early October 2016 with the field topographic survey. The application package to NAV CANADA was submitted in late December 2017 along with the initial information package to GN-EDT. The need for an ABHRA was confirmed by the GN-EDT in mid-March 2017 while a Letter of No Objection was received from NAV CANADA in late March 2017. Stantec prepared the draft ABHRA and submitted this to the GN-CGS for review in late April 2017. The final ABHRA was submitted to the GN-EDT for review in early July 2017 and a letter of risk was received from the GN-EDT a few days later. The AZR exemption application package was couriered to Transport Canada in Winnipeg, MB, in late July 2017. The GN-CGS received notice of the AZR exemption approval in mid-July 2018.

Table 2: Regulatory Review Timeline for a Transport Canada Exemption to the Kimmirut Airport Zoning Regulations

Timeline	Completion Dates	Task Items/Reviews
2016		
October	October 3 to 5	Field topographic survey
November	November 9	Final topographic sketches prepared
	November 29	Draft information/application packages submitted to GN-CGS for review for: NAV CANADA, GN-EDT, and the Hamlet
December	December 21	- Submission of Final Application Package to NAV CANADA, via email - Submission of Information Package to GN-EDT, via email - Stantec received Hamlet review and approvals, via the GN-CGS (email)
2017		
January	January 16	NAV CANADA confirmed receipt of application package, via email
February	–	Follow-up with GN-EDT
March	March 2	GN-EDT confirmed receipt of information package, via email
	March 10	NAV CANADA submitted request for additional information, via email
	March 15	Response submitted to NAV CANADA providing additional information, via email
	March 16	GN-EDT confirmed need for ABHRA, via email
	March 23	GN-CGS received Letter of No Objection from NAV CANADA, via email
April	April 21	Draft ABHRA submitted to GN-CGS for review
May	May 3	Comments received on draft ABHRA from GN-CGS
	May 11	- Revised ABHRA, and comment table, submitted to GN-CGS for review - Further discussion on mitigation options between GN-CGS and Stantec, until June 2017



Table 2: Regulatory Review Timeline for a Transport Canada Exemption to the Kimmirut Airport Zoning Regulations

Timeline	Completion Dates	Task Items/Reviews
2017 (continued)		
June	–	Further discussion on mitigation options between GN-CGS and Stantec
July	July 4	Final revised ABHRA submitted to GN-CGS for review
	July 7	Approval of final ABHRA by GN-CGS
	July 12	Submission of final ABHRA to GN-EDT, via email
	July 14	GN-CGS received GN-EDT's letter of risk for the Project
	July 21	Draft Transport Canada AZR exemption application package submitted to GN-CGS for review
	July 31	Final AZR exemption application package (Appendix B) submitted to Transport Canada, via courier
August	–	Follow-up with Transport Canada
September	September 11	Transport Canada confirmed receipt of AZR exemption application package
October	October 19	Transport Canada requested updated Wildlife Management Plan for Kimmirut airport, from GN-EDT
	October 25	Transport Canada requested a safety case submission from GN-EDT for the Project, in relation to the GN-EDT's Safety Management System for Nunavut Airports
	October 30	- Stantec contacted by WASCO NORTH, on behalf of GN-EDT, to provide the final ABHRA for review - Stantec provides final ABHRA upon approval from GN-CGS
November	November 21	WASCO NORTH, on behalf of GN-EDT, confirms acceptance of the final ABHRA
December	–	Follow-up with WASCO NORTH and Transport Canada
2018		
January	January 23	WASCO NORTH confirms safety case prepared for Project, on behalf of GN-EDT, and submitted to Transport Canada
	January 24	Transport Canada confirms receipt of GN-EDT safety case
February to July	–	Follow-up with Transport Canada
July	July 16	GN-CGS received email communication from Transport Canada that the AZR exemption has been approved and signed; an electronic version of the exemption was provided (see Executive Summary of this report). A hard copy was mailed to GN-CGS



Closure

5.0 CLOSURE

Stantec Consulting Ltd. (Stantec) has prepared this report for the sole benefit of the Government of Nunavut Department of Community and Government Services (GN-CGS) for the purpose of reviewing project activities associated with the first phase of regulatory approvals and reviews for a proposed wastewater treatment facility at Site 9 in Kimmirut, Nunavut. The report may not be relied upon by any other person or entity, other than for its intended purposes, without the express written consent of Stantec and the GN-CGS. Any use of this report by a third party, or any reliance on decisions made based upon it, are the responsibility of such third parties.

The information provided in this report was compiled from existing documents and data provided by the GN-CGS and compiled by Stantec. This report represents the best professional judgment of our personnel available at the time of its preparation. Stantec reserves the right to modify the contents of this report, in whole or in part, to reflect any new information that becomes available. If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

Respectfully submitted,

STANTEC CONSULTING LTD.

Prepared by:

 Digitally signed by Carey Sibbald,
B.Sc., R.P.Bio.
DN: cn=Carey Sibbald, B.Sc., R.P.Bio.,
o=Stantec Consulting Ltd., ou,
email=carey.sibbald@stantec.com,
c=CA
Date: 2018.08.27 09:30:05 -07'00'

Carey Sibbald, B.Sc., R.P.Bio.
Project Manager, Associate
Phone: (867) 633-2400 ext. 130
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Reviewed by:



Erica Bonhomme, M.Sc., P.Geo.
Principal
Phone: (867) 920-2882 ext. 426
Erica.Bonhomme@stantec.com



References

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http://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?searchType=stnProv&lstProvince=NU&txtCentralLatMin=0&txtCentralLatSec=0&txtCentralLongMin=0&txtCentralLongSec=0&stnID=1758&dispBack=0

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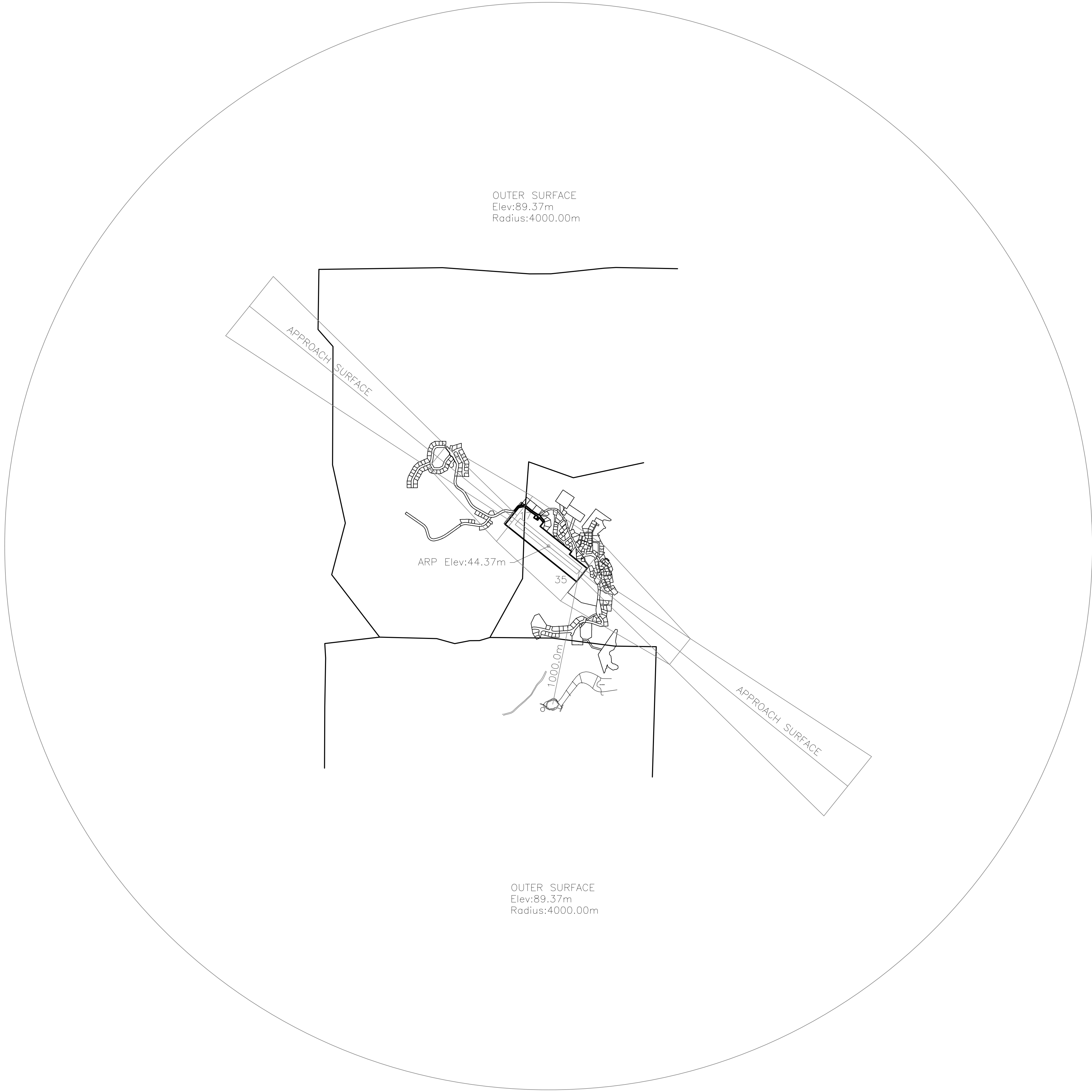
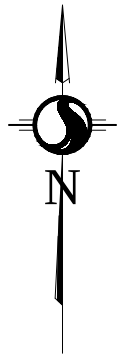
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Appendix A SITE 9 TOPOGRAPHIC SKETCHES



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Ottawa ON
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www.stantec.com

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TOPOGRAPHIC SKETCH of
**PROPOSED WASTE WATER TREATMENT
FACILITY**

KIMMIRUT, NUNAVUT



METRIC CONVERSION
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

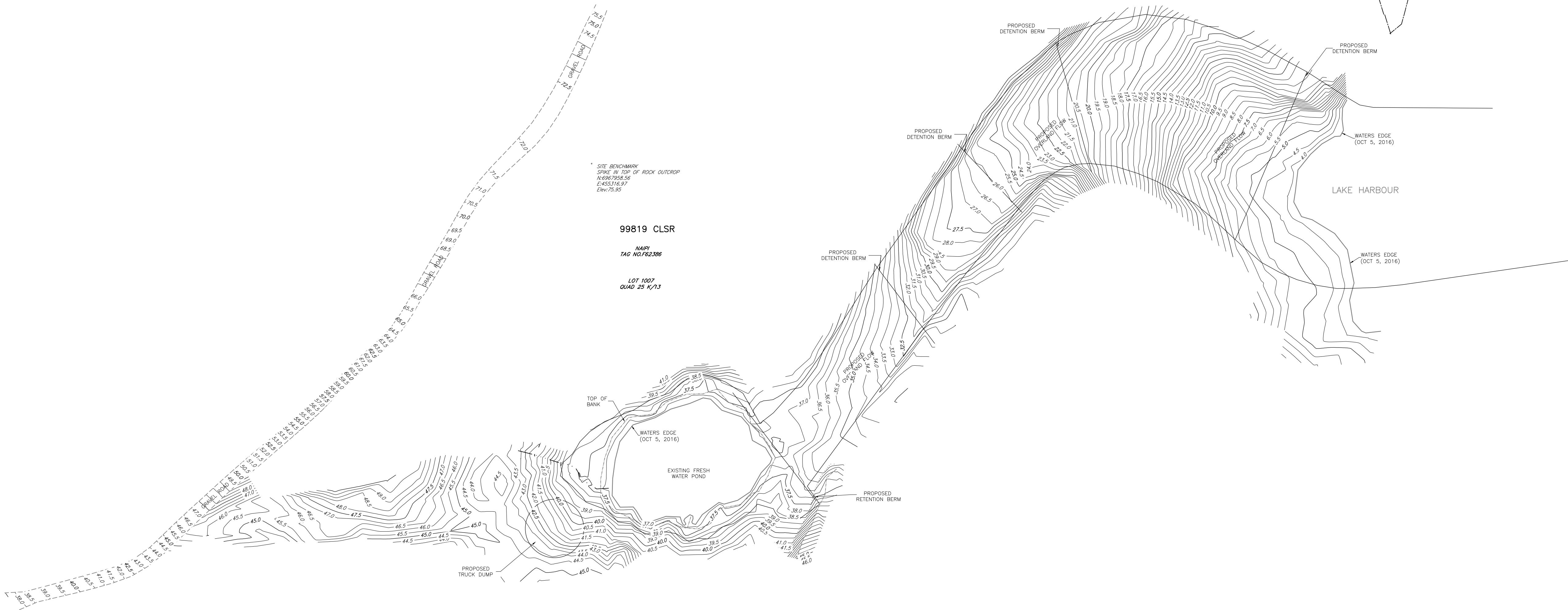
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(UTM, ZONE 19, CM69°00'W)
DATUM: NAD 83 (CSRS)(2010.0)

DISTANCES ON THIS PLAN MAY BE CONVERTED TO GROUND DISTANCES BY DIVIDING BY A COMBINED SCALE FACTOR OF 0.999615.

VERTICAL DATUM NOTE
ELEVATIONS ARE OF GEODETIC ORIGIN AND ARE DERIVED FROM

ELEVATIONS ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD-1928/1978) AND ARE DERIVED FROM STANTEC BENCHMARK MONUMENT No. 1, HAVING A PUBLISHED ELEVATION OF 75.950 METRES. ELEVATION COMPUTED USING PPP (Precise Point Positioning) TECHNIQUES WITH THE CANADIAN GEOID MODEL HT2.0.

LEGEND		
	DENOTES	FOUND MONUMENTS
■	"	SET MONUMENTS
□	"	IRON BAR
IB	"	ROUND IRON BAR
IBØ	"	STANDARD IRON BAR
SIB	"	SHORT STANDARD IRON BAR
SSIB	"	CUT CROSS
CC	"	CONCRETE PIN
CP	"	BENCHMARK
BM	"	CONCRETE MONUMENT
CM	"	COORDINATED CONTROL MONUMENT
CCM	"	NAIL AND WASHER
NW	"	PK NAIL
PKN	"	VERTICAL CONTROL MONUMENT
VCN	"	WITNESS
WIT	"	SPIKE
SPK	"	



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TOPOGRAPHIC SKETCH of PROPOSED WASTE WATER TREATMENT FACILITY (Contours)

KIMMIRUT, NUNAVUT

Scale 1:1250



0 20 40 60 80 METRES

METRIC CONVERSION

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

HORIZONTAL DATUM NOTE

PROJECTION: UNIVERSAL TRANSVERSE MERCATOR
(UTM, ZONE 19, CM69°00'W)
DATUM: NAD 83 (CSRS)(2010.0)

DISTANCES ON THIS PLAN MAY BE CONVERTED TO GROUND DISTANCES BY DIVIDING BY
A COMBINED SCALE FACTOR OF 0.999615.

VERTICAL DATUM NOTE

ELEVATIONS ARE OF GEODETIC ORIGIN AND ARE DERIVED FROM

ELEVATIONS ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD-1928:1978) AND ARE DERIVED FROM STANTEC BENCHMARK MONUMENT No. 1, HAVING A PUBLISHED ELEVATION OF 75.950 METRES. ELEVATION COMPUTED USING PPP (Precise Point Positioning) TECHNIQUES WITH THE CANADIAN GEOID MODEL HT2.0.

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BM	"	BENCHMARK
CM	"	CONCRETE MONUMENT
CCM	"	COORDINATED CONTROL MONUMENT
NW	"	NAIL AND WASHER
PKN	"	PK NAIL
VCM	"	VERTICAL CONTROL MONUMENT
WIT	"	WITNESS
SPK	"	SPIKE



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TOPOGRAPHIC SKETCH OF PROPOSED WASTE WATER TREATMENT FACILITY (Spot Elevations)

KIMMIRUT, NUNAVUT



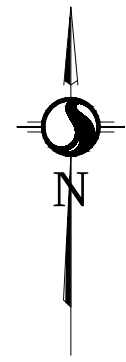
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DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

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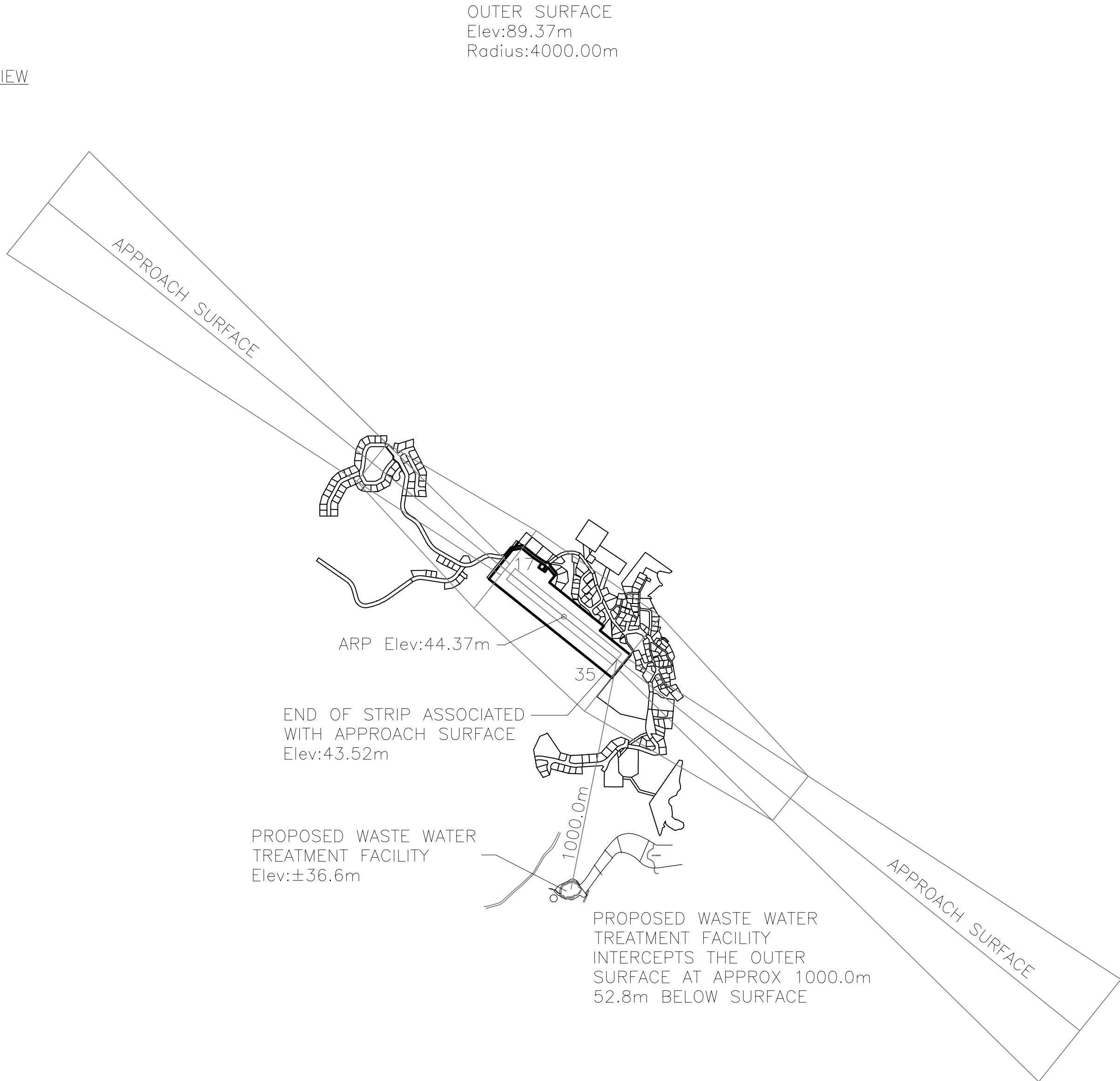
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VERTICAL DATUM NOTE
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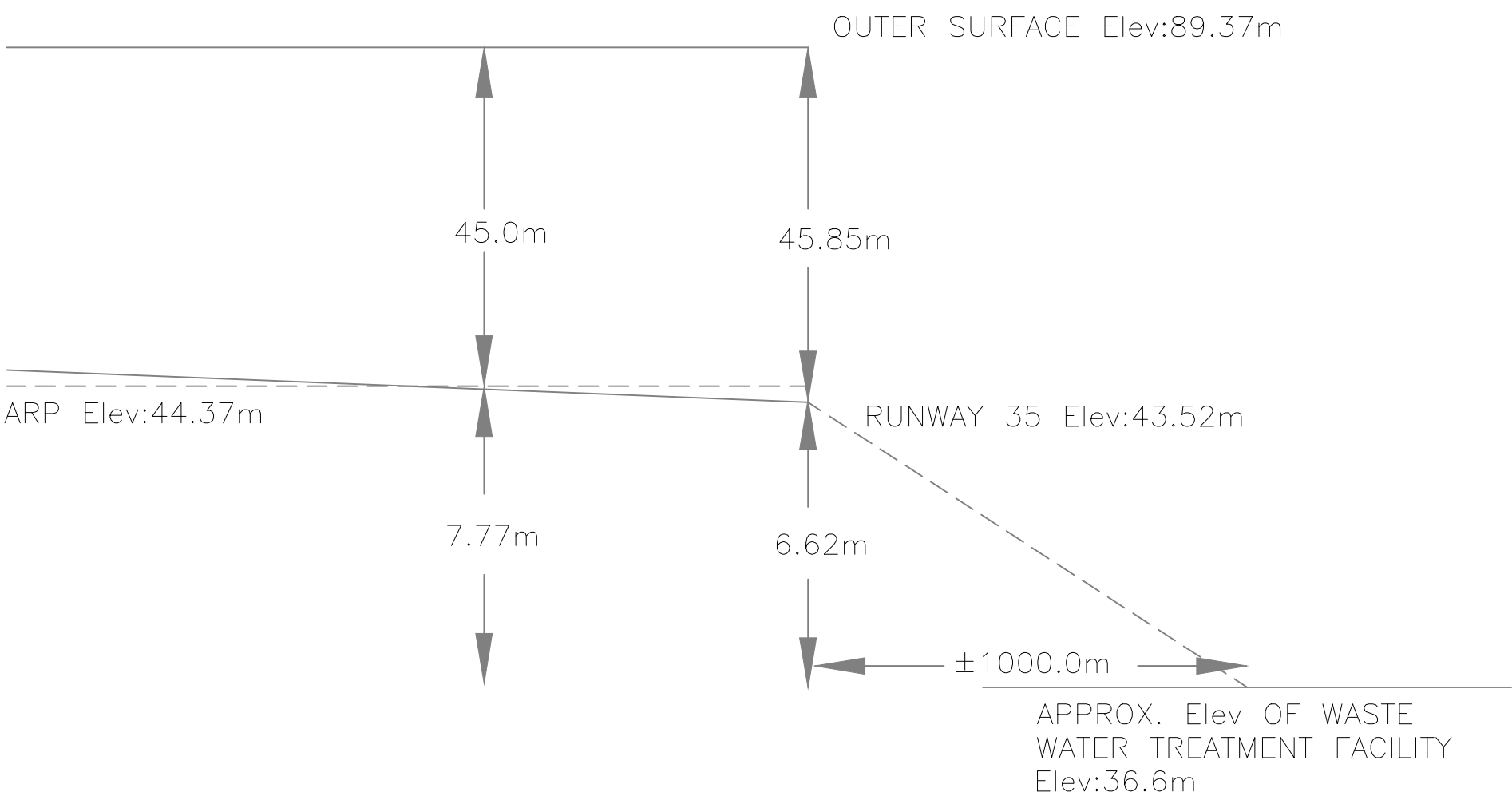
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CCM	"	COORDINATED CONTROL MONUMENT
NW	"	NAIL AND WASHER
PKN	"	PK NAIL
VCM	"	VERTICAL CONTROL MONUMENT
WIT	"	WITNESS
SPK	"	SPIKE



PLAN VIEW



PROFILE VIEW



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TOPOGRAPHIC SKETCH of PROPOSED WASTE WATER TREATMENT FACILITY (OBSTRUCTION SURVEY)

KIMMIRUT, NUNAVUT



METRIC CONVERSION
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

HORIZONTAL DATUM NOTE
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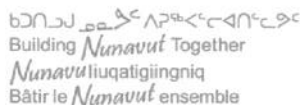
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Appendix B TRANSPORT CANADA KIMMIRUT AIRPORT ZONING REGULATIONS EXEMPTION APPLICATION PACKAGE



Ministère des Services Communautaires et gouvernementaux

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 (867) 899-7330
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Building Nunavut Together
Nunavutluqatigiingniq
Bâtir le Nunavut ensemble

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Department of Community and Government Services
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

5. Letter of No Objection from the Government of Nunavut Department of Economic Development and Transportation [GN-EDT], Nunavut Airports Division (Airport Operator) and submission to GN-EDT, including an Airport-Bird Hazard Risk Assessment (Appendix D)
6. Approval from the Hamlet of Kimmirut (Land Use Authority) (Appendix E)
7. Letter of review from the GN Department of Health (Appendix F)
8. Application Fee (\$475.00)

To obtain an exemption from the Kimmirut AZRs, Stantec, on behalf of the GN-CGS, requests that Transport Canada review the project information provided, and indicate, by written response to GN-CGS, its approval.

CLOSURE

We trust that this application package provides Transport Canada with sufficient information on the location, current conceptual design for the new Kimmirut WWTF at Site 9, and letters of no objection from appropriate agencies, to proceed with the approval process and issuance of an exemption from the Kimmirut AZRs for the GN-CGS. We are available to discuss this project and any further anticipated information requirements, at your convenience. In the meantime, if you have any questions on the project, please do not hesitate to contact Grigor Hope at the GN-CGS at (867) 899-7307 or ghope@gov.nu.ca, or Carey Sibbald at Stantec at (604) 235-1874 or carey.sibbald@stantec.com.

Sincerely,

Bhabesh Roy, M.A.Sc., P.Eng.
Municipal Planning Engineer
Community Government Services
Baffin Region, Government of Nunavut
P.O.Box 379, Pond Inlet, X0A 0S0
Ph-867 899 7314
Fax-867 899 7328
E-mail: broy@gov.nu.ca

Attachment: Appendix A – Aeronautical Obstruction Clearance Form
Appendix B – Project Summary



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Building Nunavut Together
Nunavutluqatigiingniq
Bâtir le Nunavut ensemble

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Department of Community and Government Services
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

Appendix C – NAV CANADA Submission and Letter of No Objection
Appendix D – GN-EDT Nunavut Airports Division Submission and Letter of No Objection
Appendix E – Hamlet of Kimmirut Approval
Appendix F – GN-DOH Review Letter

Copy: Wayne Olson, Regional Director, Infrastructure, GN-CGS
Jason Tologanak, A/Director of Community Support, GN-CGS
Tim Brown, Director of Community Infrastructure, GN-CGS
Sarah Ali, Senior Municipal Officer, Community Infrastructure, GN-CGS
Grigor Hope, Project Manager, GN-CGS, Pond Inlet
Zobayer Ahmed, Regional Manager Projects, GN-CGS, Pond inlet
Carey Sibbald, Stantec Consulting Ltd., Burnaby, BC



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Building *Nunavut* Together
Nunavut iuqatigiingniq
Bâtir le *Nunavut* ensemble

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Department of Community and Government Services
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APPENDIX A – AERONAUTICAL OBSTRUCTION CLEARANCE FORM



AERONAUTICAL ASSESSMENT FORM FOR OBSTRUCTION EVALUATION

Transport Canada number

Applicant number

SECTION 1

Owner's Name Government of Nunavut Community & Gov't Services		Contact Person Bhabesh Roy	
Address P.O. Box 379			
City Pond Inlet		Province Nunavut	Postal Code X0A 0S0
Telephone number (999-999-9999) 867-899-7314	Fax number (999-999-9999) 867-899-7328	Email Address broy@gov.nu.ca	

SECTION 2

Applicant's Name Government of Nunavut Community & Gov't Services		Contact Person Bhabesh Roy	
Address P.O. Box 379			
City Pond Inlet		Province Nunavut	Postal Code X0A 0S0
Telephone number (999-999-9999) 867-899-7314	Fax number (999-999-9999) 867-899-7328	Email Address broy@gov.nu.ca	

SECTION 3

Description of Proposal (or as attached) The GN-CGS is proposing to construct a new wastewater treatment facility in Kimmirut, NU. The facility will include a sewage retention lagoon (approximately 80 m x 120 m, by 4 m deep) and a downstream overland treatment flow path (approximately 100 m x 450 m, with four berms 1 m in height), as well as a truck dump station and turnaround pad (approximately 40 m x 40 m), and a 0.37 km extension of an existing gravel road. See attached for a project summary with figures and maps, Letters of No Objection from NAV CANADA, the GN Dept. of Economic Development & Transportation, Nunavut Airports Division (Airport Operator), and the Hamlet of Kimmirut (Land Use Authority), and a letter of review from the GN Department of Health.
--

SECTION 4

Geographic Coordinates ☒ NAD83 ☐ NAD27 ☐ WGS84	N Latitude deg 62 min 50 sec 15.04
For multiple structures in a grouping, submit geographical coordinates on a separate spreadsheet (e.g. windfarms, transmission lines)	W Latitude deg 69 min 52 sec 35.05

SECTION 5

Nearest Community Kimmirut	Province Nunavut
--------------------------------------	----------------------------

SECTION 6

Nearest Aerodrome Kimmirut Airport
--

SECTION 7

Have you contacted the aerodrome? ☒ Yes ☐ No
--

SECTION 8

Notice of ☒ New Construction ☐ Change to existing structure

SECTION 9

Duration ☒ Permanent ☐ Temporary
--

SECTION 10

Proposed Construction Date Beginning (yyyy-mm-dd)

2019-06-01

SECTION 11

Temporary Structure

From date (yyyy-mm-dd)

To date (yyyy-mm-dd)

SECTION 12

Marking and Lighting Proposed (refer to Standard 621)

☐ Red lights and paint☐ Red and M.I. white lights☐ White M.I. lights☐ Red and H.I. white lights☐ White H.I. lights☒ No painting☒ No lighting☐ Paint marking only☐ Other (provide description)**SECTION 13**

Monitoring to Standard 621, article 4.7

☐ Visual Inspection☐ Remote indicator**SECTION 14**

Catenary/Cable Crossing

☐ Paint supporting structures☐ Cable marker spheres☐ Shore markers☐ Support structure lighting☐ Cable marker lights**SECTION 15**

Feet

Metres

A Ground Elevation (AMSL)

36.6

B Height of an addition to a structure

0

C Total structure height including **B** (AGL)

5

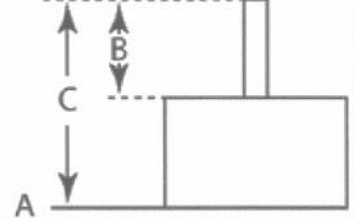
Overall height (**A** plus **C**) (AMSL)

41.6

Structure alone



Structure with an addition

**SECTION 16**Does the proposal comply with *Airport Zoning Regulations*?☐ Yes ☒ No ☐ N/AWhere the location of the object is on lands affected by *Airport Zoning Regulations*, a legal survey is required with the submittal.

I hereby certify that all the above statements made by me are true, complete and correct to the best of my knowledge. Also, I agree to mark and/or light and maintain the structure with established marking and lighting standards as necessary.

Bhabesh Roy

Name of person filing notice

Signature

2017-07-31

Date (yyyy-mm-dd)

TRANSPORT CANADA ASSESSMENT

Marking and lighting required (as per Standard 621)

☐ Lighting Required☐ Marking Required☐ Temporary Lighting Required☐ No Lighting or marking required

Comments (Transport Canada use Only)

Completion of this form does not constitute authorization for construction nor replace other approvals or permits. See instruction D and E.

Civil Aviation Inspector

Signature

Date (yyyy-mm-dd)

Note 1: This assessment expires 18 months from the date of assessment unless extended, revised, or terminated by the issuing office.

Note 2: If there is a change to the intended installation, a new submittal is required.



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Building *Nunavut* Together
Nunavut iuqatigiingniq
Bâtir le *Nunavut* ensemble

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Department of Community and Government Services
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

APPENDIX B – PROJECT SUMMARY



July 31, 2017

Project Summary for New Wastewater Treatment Facility in Kimmirut, Nunavut

In September 2016, Stantec Consulting Ltd. (Stantec) was retained by the Government of Nunavut Department of Community and Government Services (GN-CGS) to begin the first phase of environmental permitting for a new wastewater treatment facility (WWTF) in Kimmirut, NU. As part of this first phase of regulatory approvals, the GN-CGS requires an exemption to the Kimmirut Airport Zoning Regulations (AZRs; SOR/2012-96) from Transport Canada to permit the construction and operation of the proposed WWTF. This Project Summary has been prepared to provide an overview of the project's background, the conceptual design, and how the project will benefit the public.

PROJECT BACKGROUND

The hamlet of Kimmirut relies 100% on trucked services for potable water delivery, and sewage collection. Currently, drinking water is withdrawn from Lake Fundo, located approximately 1.2 km southwest of the community and is accessed by a gravel road. Collected sewage is currently discharged to a trench near the community's solid waste facility, located approximately 750 m south of the community and within the Kimmirut AZRs 4,000 m out surface (see Figure 1 attached). From the trench, sewage immediately drains down a steep (average 4:1) slope that drops from an elevation of 65 m above sea level (m asl) to 25 m asl (Nunami, 2015¹). Following the steep slope, sewage flows through an area thickly vegetated with grasses and willows, and eventually into the marine environment of Lake Harbour (Nunami, 2015). It is believed that the current sewage disposal system only provides preliminary treatment, with some further primary treatment during the summer when vegetation is active (Nunami, 2015).

The current sewage disposal location has been active for more than 30 years however it has not been considered an acceptable disposal method for several years due to the minimal treatment it provides. In 2001, a new WWTF was constructed 1.8 km west of the community, under the approval of the Nunavut Water Board, and it consisted of a lagoon system with wastewater treatment by a downstream wetland. The facility was subsequently determined to have inadequate capacity for overwinter storage, and in 2011, the WWTF was upgraded. However, this WWTF has never been active. During licencing for operation of the WWTF, concerns were expressed over the potential presence of fish in the downstream wetland and Tuullitsut Lake. In 2013, Nunami Stantec conducted a fish habitat assessment and found Arctic char (*Salvelinus*

¹ Nunami Stantec Ltd. (Nunami). (2015). Kimmirut Wastewater Treatment Feasibility Study. Final Report. Prepared for the Government of Nunavut Department of Community and Government Services, March 2015.



to maintain an even distribution of the effluent flow and maximize supplementary treatment by existing soil and vegetation (e.g., grasses and willows).

The new WWTF at Site 9 also requires a 0.37 km extension/branch from the existing road that leads to the Lake Fundo potable water intake station. The road extension would be constructed in a similar fashion as the existing road. The road extension would be constructed of compacted granular fill material (approximately 0.5 m embankment) and is expected to be approximately 6 m wide.

A truck discharge station and turnaround pad is also required at the lagoon. The turnaround pad would provide a safe and accessible location for sewage trucks to discharge into the lagoon during all seasons. Lighting will not be installed.

Construction of the new WWTF at Site 9 will not occur until the design for the facility has been finalized and all regulatory approvals obtained, which may not occur until 2019. Construction is expected to occur over the four summer months (i.e., June to September).

BENEFIT TO PUBLIC

As noted above, the current sewage dump has been in operation for over 30 years, however it has not been considered an acceptable sewage disposal method for several years due to the minimal treatment it provides. The community's current sewage disposal method is not licenced by the Nunavut Water Board and needs to be upgraded to meet federal and territorial requirements (e.g., effluent quality), and to meet the Hamlet's current and future disposal needs. Upgrading of the current dump is not feasible so a new location (Site 9) has been selected for a new WWTF. The eventual construction and operation of a new WWTF at Site 9 will:

- Allow the community to achieve licencing and compliance for their municipal wastewater disposal;
- Reduce potential effects of municipal wastewater disposal on the environment by providing enhanced primary treatment, and possibly secondary treatment, of wastewater via an impermeable lagoon; and,
- Meet a 20-year planning horizon for community growth.

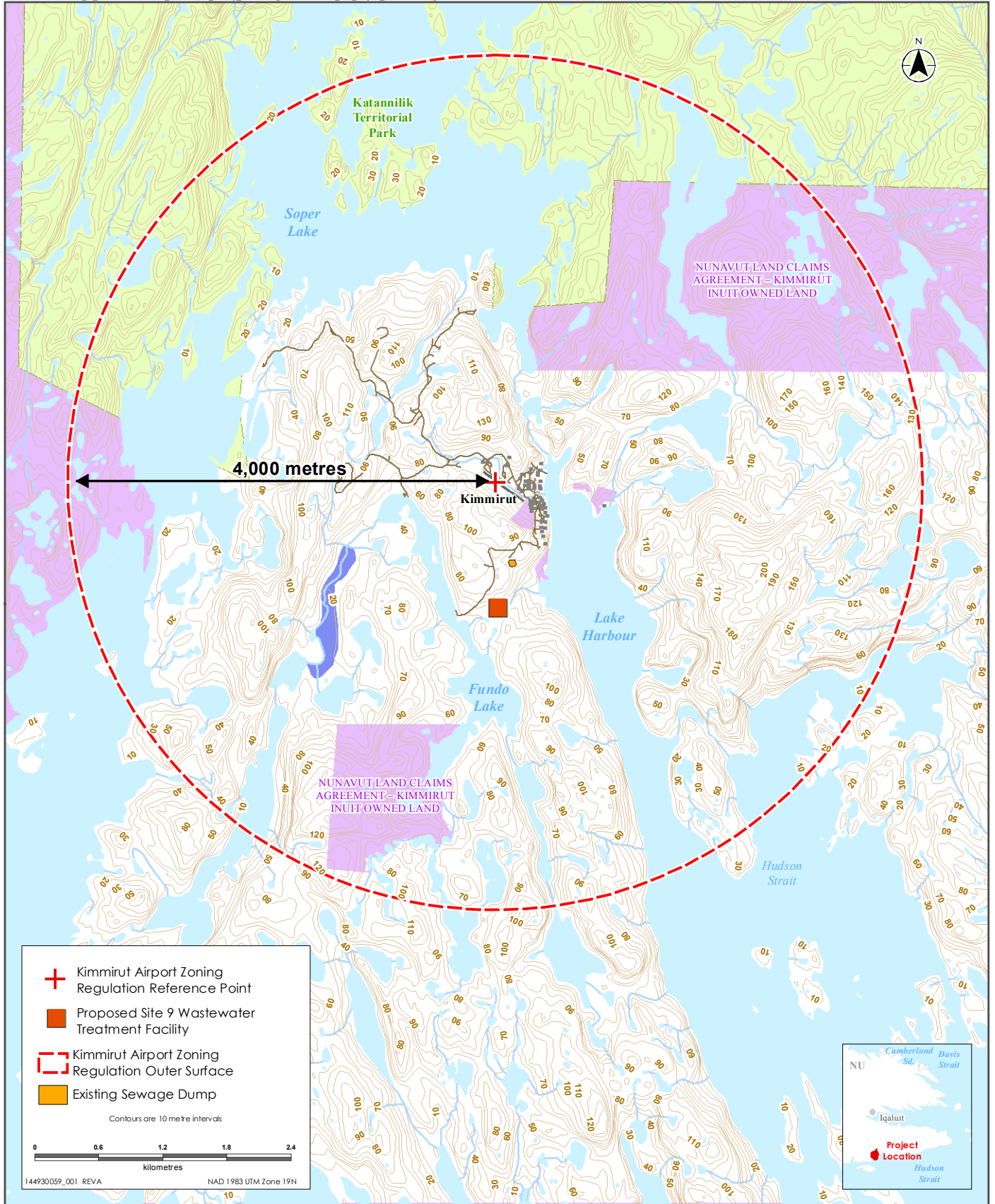


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Building *Nunavut* Together
Nunavut iuqatigiingniq
Bâtir le *Nunavut* ensemble

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Department of Community and Government Services
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

FIGURES AND MAPS



Sources: Base Data - Natural Earth; Thematic Data - ERBC

Service Layer Credits:

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

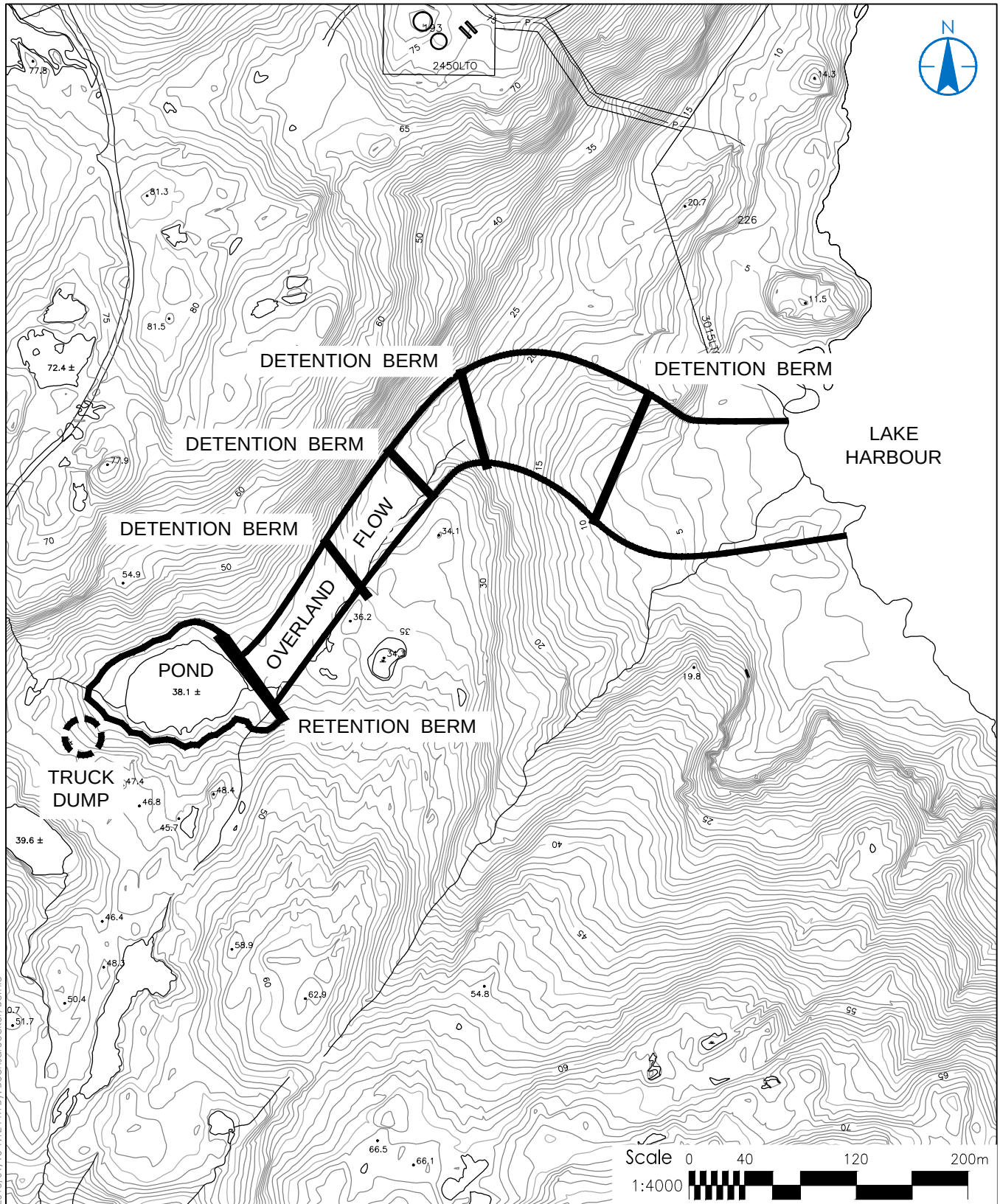
Proposed Location of a New Wastewater Treatment Facility in Kimmirut, NU



PHASE 1 REGULATORY APPROVALS FOR A NEW WASTEWATER TREATMENT FACILITY IN KIMIRUT, NU

Figure 1

V:\1101\active\144920260\figures\current\figure_site-9A.DWG
2015/01/13 1:12 PM By: Buchsdruecker, Bernie



10160 - 112 Street
Edmonton AB
www.stantec.com

Client/Project

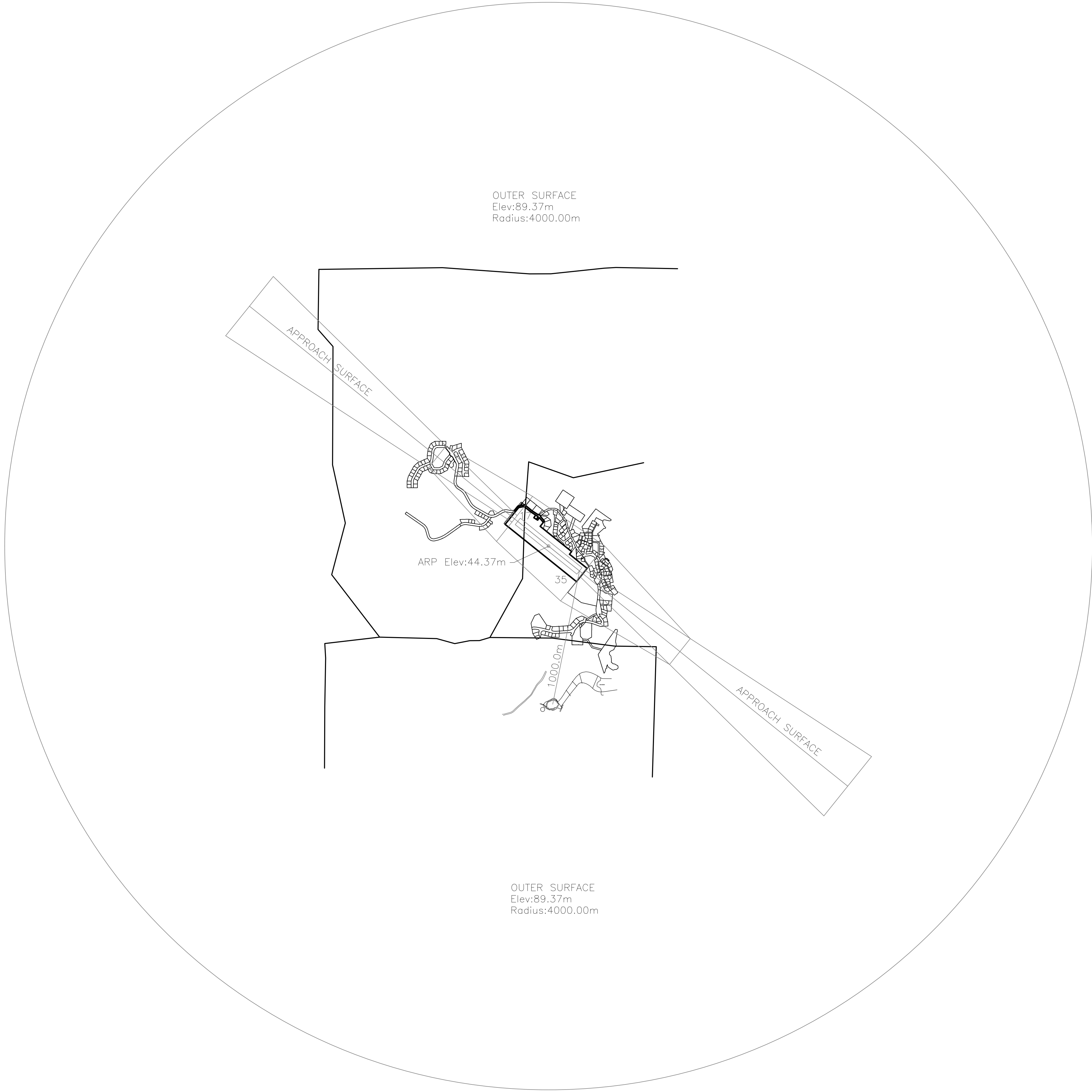
GOVERNMENT OF NUNAVUT
KIMMIRUT WASTEWATER
FEASIBILITY STUDY

Figure No.

2

Title

Site 9A



Stantec Geomatics Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

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TOPOGRAPHIC SKETCH of PROPOSED WASTE WATER TREATMENT FACILITY

KIMMIRUT, NUNAVUT



METRIC CONVERSION
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

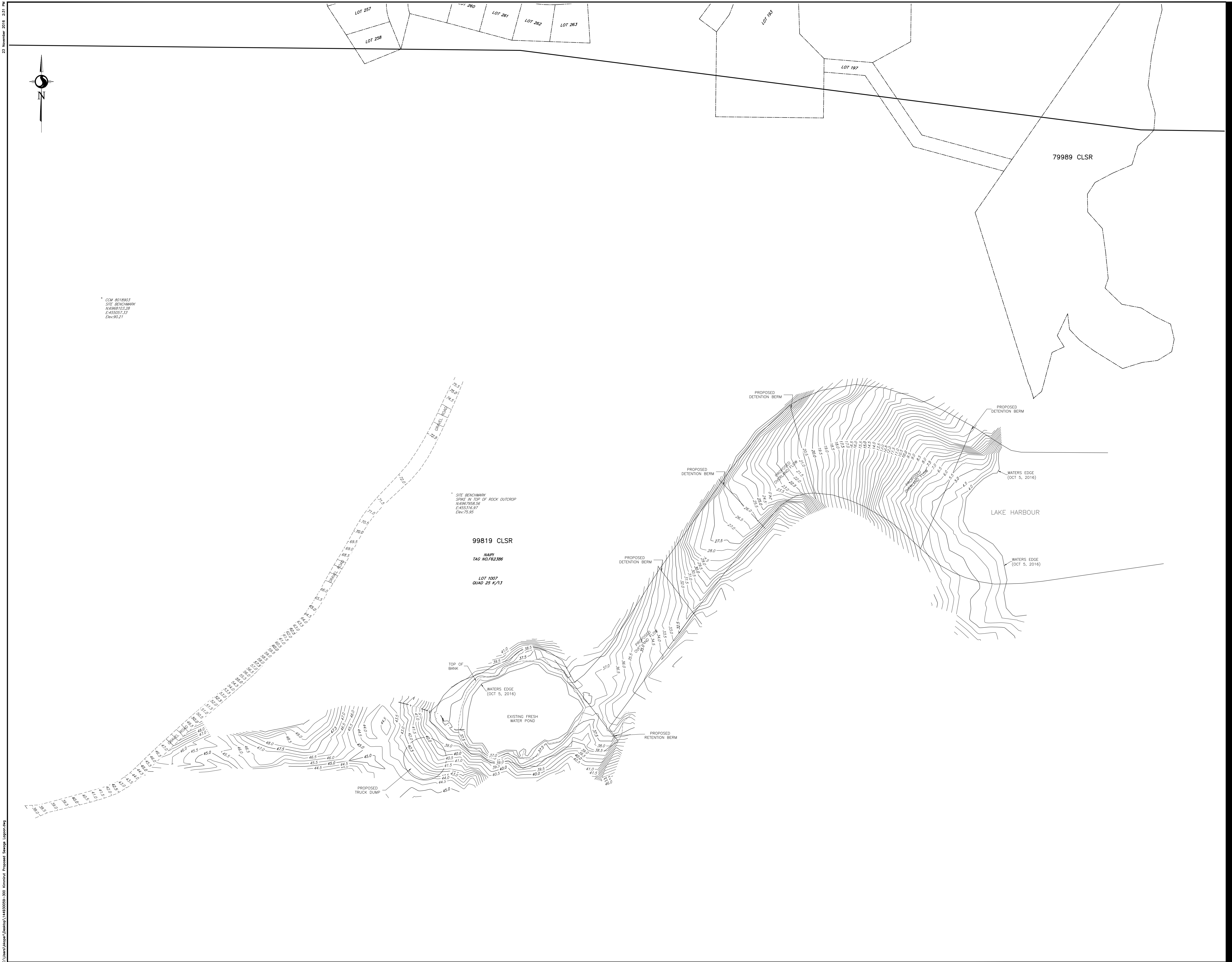
HORIZONTAL DATUM NOTE
PROJECTION: UNIVERSAL TRANSVERSE MERCATOR
(UTM, ZONE 19, CM69°00'W)
DATUM: NAD 83 (CSRS)(2010.0)

DISTANCES ON THIS PLAN MAY BE CONVERTED TO GROUND DISTANCES BY DIVIDING BY A COMBINED SCALE FACTOR OF 0.999615.

VERTICAL DATUM NOTE
ELEVATIONS ARE OF GEODETIC ORIGIN AND ARE DERIVED FROM

ELEVATIONS ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD-1928/1978) AND ARE DERIVED FROM STANTEC BENCHMARK MONUMENT No. 1, HAVING A PUBLISHED ELEVATION OF 75.950 METRES. ELEVATION COMPUTED USING PPP (Precise Point Positioning) TECHNIQUES WITH THE CANADIAN GEOID MODEL HT2.0.

LEGEND		
	DENOTES	FOUND MONUMENTS
■	"	SET MONUMENTS
□	"	IRON BAR
IB	"	ROUND IRON BAR
IBØ	"	STANDARD IRON BAR
SIB	"	SHORT STANDARD IRON BAR
SSIB	"	CUT CROSS
CC	"	CONCRETE PIN
CP	"	BENCHMARK
BM	"	CONCRETE MONUMENT
CM	"	COORDINATED CONTROL MONUMENT
CCM	"	NAIL AND WASHER
NW	"	PK NAIL
PKN	"	VERTICAL CONTROL MONUMENT
VCN	"	WITNESS
WIT	"	SPIKE
SPK	"	



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TOPOGRAPHIC SKETCH of PROPOSED WASTE WATER TREATMENT FACILITY (Contours)

KIMMIRUT, NUNAVUT

Scale 1:1250
20 0 20 40 60 80 METRES

METRIC CONVERSION
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

HORIZONTAL DATUM NOTE
PROJECTION: UNIVERSAL TRANSVERSE MERCATOR
(UTM, ZONE 19, CM69°00'W)
DATUM: NAD 83 (CSRS)(2010.0)

DISTANCES ON THIS PLAN MAY BE CONVERTED TO GROUND DISTANCES BY DIVIDING BY A COMBINED SCALE FACTOR OF 0.999615.

VERTICAL DATUM NOTE
ELEVATIONS ARE OF GEOIDETIC ORIGIN AND ARE DERIVED FROM

ELEVATIONS ARE REFERRED TO THE CANADIAN GEOIDETIC VERTICAL DATUM (CGVD-1928/1978) AND ARE DERIVED FROM STANTEC BENCHMARK MONUMENT No. 1, HAVING A PUBLISHED ELEVATION OF 75.950 METRES. ELEVATION COMPUTED USING PPP (Precise Point Positioning) TECHNIQUES WITH THE CANADIAN GEOID MODEL HT2.0.

LEGEND		
	DENOTES	FOUND MONUMENTS
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□	"	IRON BAR
IB	"	ROUND IRON BAR
IB#	"	STANDARD IRON BAR
SIB	"	SHORT STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
BM	"	BENCHMARK
CM	"	CONCRETE MONUMENT
CCM	"	COORDINATED CONTROL MONUMENT
NW	"	NAIL AND WASHER
PKN	"	PK NAIL
VCM	"	VERTICAL CONTROL MONUMENT
WIT	"	WITNESS
SPK	"	SPIKE



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TOPOGRAPHIC SKETCH OF PROPOSED WASTE WATER TREATMENT FACILITY (Spot Elevations)

KIMMIRUT, NUNAVUT



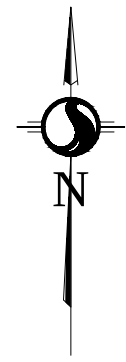
METRIC CONVERSION
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

HORIZONTAL DATUM NOTE
PROJECTION: UNIVERSAL TRANSVERSE MERCATOR
(UTM, ZONE 19, CM69°00'W)
DATUM: NAD 83 (CSRS) (2010.0)

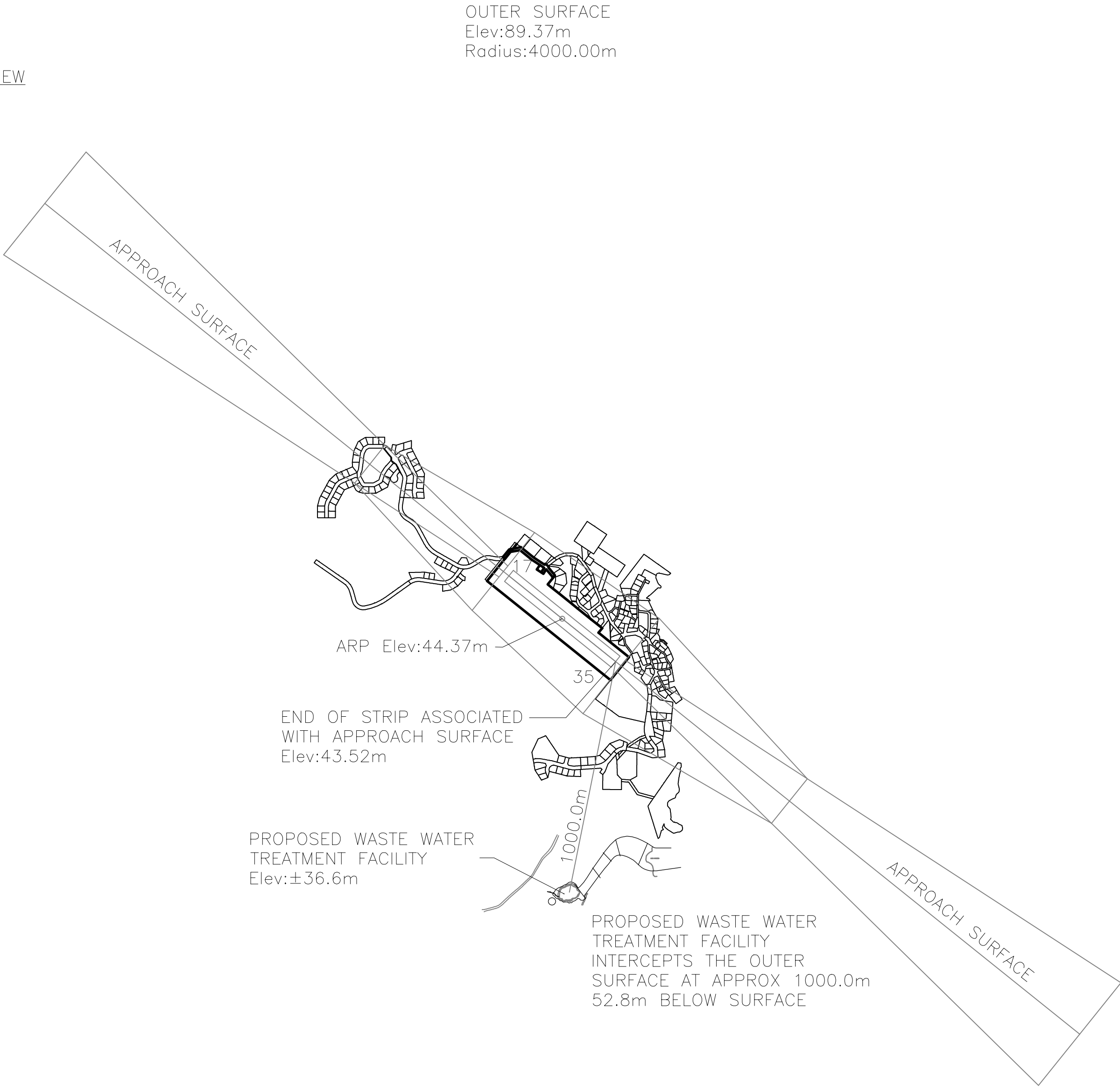
DISTANCES ON THIS PLAN MAY BE CONVERTED TO GROUND DISTANCES BY DIVIDING BY A COMBINED SCALE FACTOR OF 0.999615.

VERTICAL DATUM NOTE
ELEVATIONS ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD-1928:1978) AND ARE DERIVED FROM STANTEC BENCHMARK MONUMENT No. 1, HAVING A PUBLISHED ELEVATION OF 75.950 METRES. ELEVATION COMPUTED USING PPP (Precise Point Positioning) TECHNIQUES WITH THE CANADIAN GEOD MODEL HT2.D.

LEGEND		
	DENOTES	FOUND MONUMENTS
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□	"	IRON BAR
IB	"	ROUND IRON BAR
IB#	"	STANDARD IRON BAR
SIB	"	SHORT STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
BM	"	BENCHMARK
CM	"	CONCRETE MONUMENT
CCM	"	COORDINATED CONTROL MONUMENT
NW	"	NAIL AND WASHER
PKN	"	PK NAIL
VCM	"	VERTICAL CONTROL MONUMENT
WIT	"	WITNESS
SPK	"	SPIKE



PLAN VIEW



OUTER SURFACE
Elev:89.37m
Radius:4000.00m

ARP Elev:44.37m

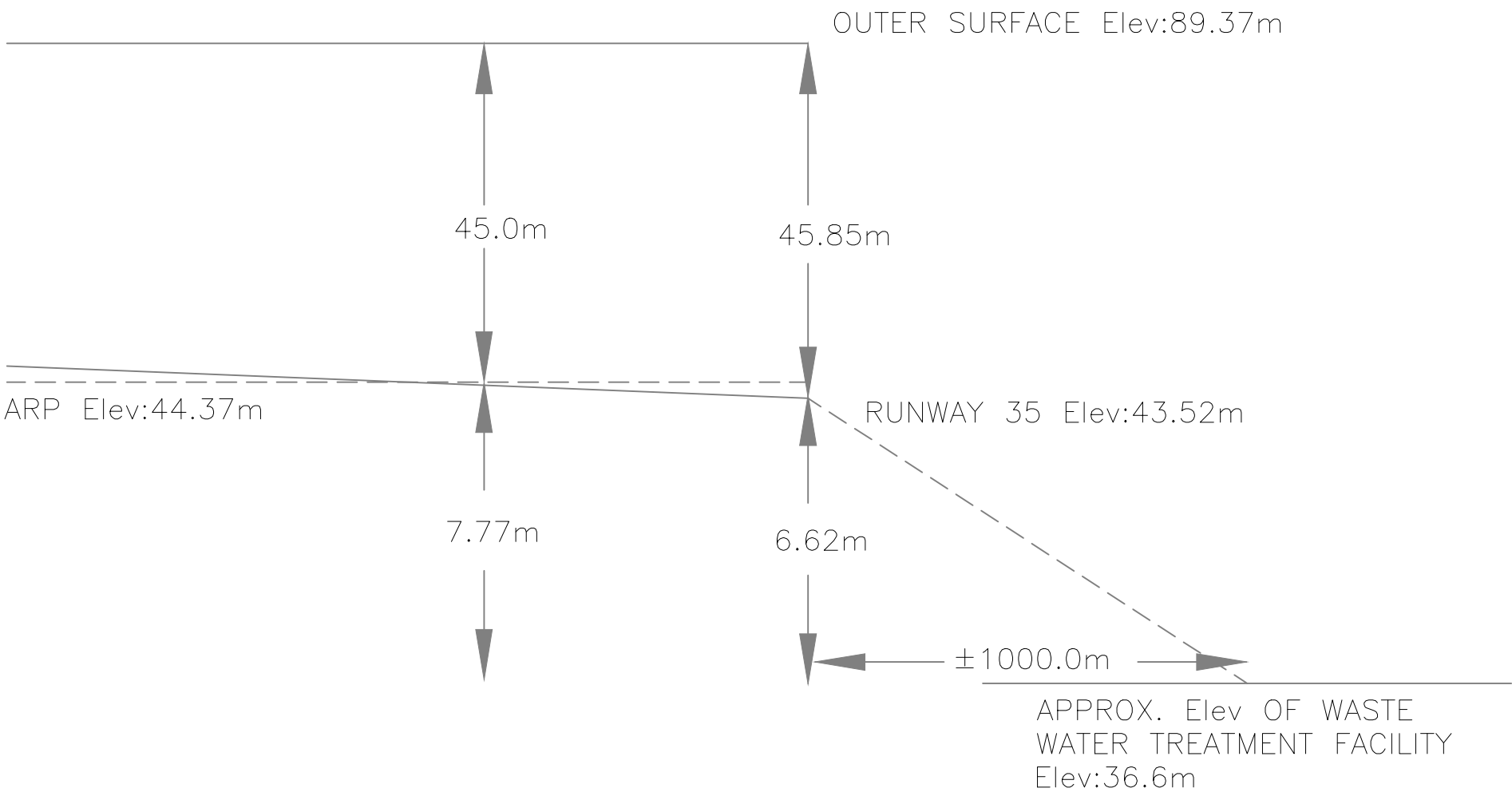
END OF STRIP ASSOCIATED
WITH APPROACH SURFACE
Elev:43.52m

PROPOSED WASTE WATER
TREATMENT FACILITY
Elev:±36.6m

PROPOSED WASTE WATER
TREATMENT FACILITY
INTERCEPTS THE OUTER
SURFACE AT APPROX 1000.0m
52.8m BELOW SURFACE

OUTER SURFACE
Elev:89.37m
Radius:4000.00m

PROFILE VIEW



OUTER SURFACE Elev:89.37m

45.0m

45.85m

ARP Elev:44.37m

RUNWAY 35 Elev:43.52m

7.77m

6.62m

±1000.0m

APPROX. Elev OF WASTE
WATER TREATMENT FACILITY
Elev:36.6m



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TOPOGRAPHIC SKETCH of PROPOSED WASTE WATER TREATMENT FACILITY (OBSTRUCTION SURVEY)

KIMMIRUT, NUNAVUT



METRIC CONVERSION
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

HORIZONTAL DATUM NOTE
PROJECTION: UNIVERSAL TRANSVERSE MERCATOR
(UTM, ZONE 19, CM6°00'W)
DATUM: NAD 83 (CSRS)(2010.0)

DISTANCES ON THIS PLAN MAY BE CONVERTED TO GROUND DISTANCES BY DIVIDING BY A COMBINED SCALE FACTOR OF 0.999615.

VERTICAL DATUM NOTE
ELEVATIONS ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD-1928:1978) AND ARE DERIVED FROM STANTEC BENCHMARK MONUMENT No. 1, HAVING A PUBLISHED ELEVATION OF 75.950 METRES. ELEVATION COMPUTED USING PPP (Precise Point Positioning) TECHNIQUES WITH THE CANADIAN GEOD MODEL HT2.D.

LEGEND

	DENOTES	FOUND MONUMENTS
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NW	"	PK NAIL
PKN	"	VERTICAL CONTROL MONUMENT
VCM	"	WITNESS
WIT	"	SPIKE
SPK	"	



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Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

APPENDIX C – NAV CANADA SUBMISSION AND LETTER OF NO OBJECTION



March 23, 2017

Your file
Kimmirut Site 9 Lagoon
Our file
16-3496

Mr. Bhabesh Roy
Government of Nunavut
PO Box 379
Pond Inlet, NU
X0A 0S0

**RE: Other Permanent Structure(s): Water Treatment Plant - Kimmirut, NU
(N62° 50' 15.04" W69° 52' 35.05" / 22' AGL / 142.0787' AMSL)**

Mr. Roy,

We have evaluated the captioned proposal and NAV CANADA has no objection to the project as submitted.

NAV CANADA does not require notification of construction; however, if you should decide not to proceed with this project, please advise us accordingly so that we may formally close the file. If you have any questions, contact the Land Use Department by telephone at 1-866-577-0247 or e-mail at landuse@navcanada.ca.

NAV CANADA's land use evaluation is valid for a period of 12 months. Our assessment is limited to the impact of the proposed physical structure on the air navigation system and installations; it neither constitutes nor replaces any approvals or permits required by Transport Canada, Industry Canada, other Federal Government departments, Provincial or Municipal land use authorities or any other agency from which approval is required. Industry Canada addresses any spectrum management issues that may arise from your proposal and consults with NAV CANADA Engineering as deemed necessary.

Yours truly,

A handwritten signature in blue ink, appearing to read "Gheorghe Adamache".

Gheorghe Adamache | NAV CANADA
Manager - AIM IFP Service Delivery

cc NOPR - Northern and Prairie Region, Transport Canada
CYLC - KIMMIRUT



LAND USE PROPOSAL SUBMISSION FORM

Date Received by NAV CANADA		NC file N° / Ref N°		TC File N° / Ref N°	
GENERAL INFORMATION:					
Company/Owner Name: Government of Nunavut, Dept. CGS			Contact Person: Bhabesh Roy		
Address: P.O. Box 379			City: Pond Inlet	Prov: NU	Postal Code: X0A 0S0
Tel: 867-899-7314	Fax: 867-899-7328	Email: broy@gov.nu.ca	24 Hour Emergency Number: n/a		
Applicant: Gov. of Nunavut, Dept. Community & Gov't Services			Contact Person: Bhabesh Roy		
Address: P.O. Box 379			City: Pond Inlet	Prov: NU	Postal Code: X0A 0S0
Tel: 867-899-7314	Fax: 867-899-7328	Email: broy@gov.nu.ca	24 Hour Emergency Number: n/a		
Airport Authority : Gov. of Nunavut, Dept. ED&T, Airports Div. (If within 6 km of a lighted aerodrome)			Airport Manager: Ben Fredlund		
Address: P.O. Box 560			City: Rankin Inlet		Prov: NU
Postal Code: X0C 0G0	Tel: 867-645-8223	Fax: 867-645-8246	Email: bfredlund@gov.nu.ca		
DETAILS OF PROPOSAL:					
▪ Please provide the data in the highest resolution as it was obtained. ▪ For geographic coordinates, provide <u>up to</u> four (4) decimal places of a second. ▪ For ground elevation and tower height, provide <u>up to</u> four (4) decimal places of a metre or foot.					
Project #, Street Address, etc.: Kimmirut Site 9 Lagoon			Nearest Town, Province: Kimmirut, NU		
Geographic Coordinates of Site in NAD 83: Degrees Minutes Seconds Lat. N 62 / 50 / 15.04 Long. W 69 / 52 / 35.05					
Linear Structures: Lat. N / / Long. W / / /					
Type of Structure: Sewage lagoon & associated infrastructure		New Structure? ☒ Yes ☐ No		Height Added (If Existing)	
Cranes to be used? ☐ Yes ☒ No <i>If Yes, see instructions</i>		Ground Elevation (Above Sea Level)		36.6 ☐ ft ☒ m	
Dimensions: 100 x 500 m (overall footprint; see Comments)		Structure Height (Above Ground Level)		5 ☐ ft ☒ m	
Materials & Roof Shape (If Building): n/a		Total Height (Above Sea Level) Structure Height + Ground Elevation		41.6 ☐ ft ☒ m	
Proposed Construction Start Date: July 2019			Approximate Duration of Construction: Four (4) months		
If Temporary Structure, indicate Removal Date:			From: 0700 hrs		To: 1900 hrs
Comments: Conceptual design of a new wastewater treatment facility consists of a sewage retention lagoon (approximately 80 x 120 m, by 4 m tall) and a downstream overland treatment flow path (approximately 100 x 450 m, with four 1 m tall berms), as well as a truck dump station and turnaround pad (approximately 40 x 40 m) with associated lighting (estimate up to two solar-powered street lights, up to 5 m tall) and a 0.37 km extension of an existing gravel road. See attached for a project summary with figures and maps.					
ELECTRONIC / TELECOMMUNICATION INTERFERENCE (Check off the items which may cause interference and provide details)					
High Voltage Equipment		☐ Details			
Arc Welding		☐ Details			
Radar Emission		☐ Details			
High Powered Transmissions		☐ Details			
VHF Radio		☐ Details			
Other		☐ Details			

OBSTRUCTION TO VISION ON AIRPORT WITH NAV CANADA SERVICES/CONTROL TOWER, FSS, CARS:**Check the items which may cause obstructions to vision to the installation:**

Line of Sight	☐ Details
Generation of Smoke/Vapour	☐ Details
Reflectivity	☐ Details
Aircraft Parking	☐ Details
Exterior Lighting	☒ Details It is anticipated that up to two (2) solar-powered street lights may be constructed on the truck turnaround pad to assist with visibility and sewage disposal in the winter months.

MAPS/DRAWINGS (Required for Supporting Documentation)**Proposals for structures not adjacent to an airport OR on airport without NAV CANADA Services**

- 1:50,000 topographical map section with the location of the proposed structure clearly marked. The map must contain a legend indicating the map datum (NAD27 or 83) and the contour interval.
- Legal survey (if available)

Proposals adjacent within 2 km from an airport with FSS, Control Tower, Localizer or ILS navigational aids

- 1:50,000 topographical map section with the location of the proposed structure clearly marked. The map must contain a legend indicating the map datum (NAD27 or 83) and the contour interval.
- For localizer/ILS runways, site plan at 1:2000 scale, with distance bar, showing 90° distances to nearest runway centre line/centre line extension, and distance to nearest runway threshold. Note: reference TP 1247 to determine requirement when along an extended centerline of a localizer/ILS runway up to 6 km.
- For buildings, architectural drawings in both plan view (with north arrow indicator) detailing orientation of building and dimensions; and profile view detailing maximum height of building (including rooftop structures) and elevation at grade level.

Proposals on an airport with FSS or Control Tower Services, Weather Services, Localizer or ILS navigational aids

- 1:50,000 topographical map section with the location of the proposed structure clearly marked. The map must contain a legend indicating the map datum (NAD27 or 83) and the contour interval.
- Airport plan at 1:500 scale, with distance bar, showing orientation of structures including vehicle and aircraft entry/exit points.
- For sites with localizer/ILS runways site plan at 1:2000 scale, with distance bar, showing 90° distances to nearest runway centre line/centre line extension, taxiway, and distance to nearest runway threshold. Note: will require drawings for structures up to 6km along the extended centreline of the localizer/ILS runway.
- Site plan depicting entire airport and location of proposed structures and excavations/trenching include depth.
- Site plans at 1:2000 scale, with distance bar, showing line of sight to the mandatory viewing areas (runways and taxiways) identifying existing structures along the sightline in both cross section (profile) view and plan view format. Refer to NAV CANADA sightline requirements for criteria of mandatory viewing areas.
- For buildings, architectural drawings in both plan view (with north arrow indicator) detailing orientation of building and dimensions; and profile view detailing maximum height of building (including rooftop structures) and elevation at grade level.

Applicant/Representative Signature



Print Name

BHABESH ROY

Date

Dec. 20, 2016

For a detailed description on NAV CANADA's requirements and additional information, refer to the NAV CANADA website at www.navcanada.ca > PRODUCTS & SERVICES > Land Use Program.

NAV CANADA's evaluation of land use proposals and construction proposals neither constitutes nor replaces any approvals or permits required by Transport Canada, other Federal Government Departments, Provincial or Municipal land use authorities, or any agency from which any approval is required.

Please Submit by email to landuse@navcanada.ca

Processing Times

NAV CANADA will endeavour to provide a response within 8 to 12 weeks of receipt of the proposal. The accuracy and completeness of the initial documentation provided to NAV CANADA, and consequently the cooperation of the proponent to quickly rectify any deficiencies/inaccuracies will go far to expedite the process and ensure a timely response. Electronic submissions will also decrease the time required to properly assess a submission.

Obstruction Marking and Lighting

Transport Canada is required to perform an assessment on the requirement for obstruction marking and lighting of man-made structures per Canadian Aviation Regulations (CAR). Obstructions are assessed by Transport Canada through the Aeronautical Obstruction Clearance Form Process. *Note: outages in obstruction lighting deemed a requirement by Transport Canada are to be reported to Transport Canada as per CAR 601.28.*

Contact Us

NAV CANADA
Aeronautical Information Services
Data Collection Unit / Land Use Office
1601 Tom Roberts
P.O. Box 9824, Station T
Ottawa, ON
K1G 6R2

Website: www.navcanada.ca > PRODUCTS & SERVICES > Land Use Program

Toll Free: (866) 577-0247

Fax: (613) 248-4094

Email: landuse@navcanada.ca ****Preferred method for submission**

Land Use Proposal Submission Form Instructions

This section provides additional instructions for each section of the Land Use Submission Form.

24 Hour Emergency Number: This number may be required for aviation safety purposes.

Airport Authority: If site location is within 6 km of a lighted aerodrome provide the name of the airport and contact information.

Applicant: If not the same as owner, the name of consultant, contractor, or other who is applying on behalf of the owner. Note: all correspondence will be forwarded to the applicant.

Approximate Duration of Construction: Specify time of operation for temporary structures of short duration. This may be required for NOTAMing purposes.

Arc Welding: If any construction taking place on your site requires arc welding, please complete this field. Specify the anticipated duration of arc welding. Welders can potentially interfere with the reliability of the ILS systems of an airport and must therefore be brought to our attention.

Blasting Operations: The following additional information will be required for blasting activities for a Land Use Assessment and possible NOTAM / publication action:

Blast Area: Geographic coordinates (latitude & longitude in NAD83) of the blasting area corners or centre coordinates with a blasting radius.

Blasting Times: specify period during the day (for example, daylight hours or 0800 to 1600 local time Monday to Friday, one-time event, etc.).

Duration of Operation: estimated amount of time (months/years) expected to operate at specified location.

Elevations: Highest ground elevation (above sea level) within blasting zone, maximum height of fly rock or debris (above ground level), and shockwave/overpressure height (above ground level, if applicable). Indicate use of blast mats (if applicable).

Topographical map: (1:50 000 scale) depicting the blasting area.

Company/Owner Name: Owner of the proposed structure or development.

Cranes: For construction projects (such as a new building, placement of roof top structures, flare stack, etc.) where a crane will be required and where the maximum operating height will be higher than the overall height of the proposed structure, the applicant is to provide details for both mobile and temporary cranes on a separate submission form **at least 30 working days in advance**. We ask that crane application(s) be cross referenced to the associated construction project and provide detailed crane specifications such as maximum height, boom length and swing radius. A drawing detailing the crane specifications and type would be beneficial, please reference the NAV CANADA Land Use Program web page for more details. *Note: A drawing showing the required specifications indicated below will be beneficial.*

Maximum Swing Radius: In a manner similar to a large structure, a crane with a large swing radius can create a severe horizontal angle with respect to Navigation/Communication/Surveillance equipment, thereby compromising coverage. The maximum swing radius shall be provided so we can properly assess the situation and determine whether or not the swing radius is within an acceptable level. *Note: maximum swing radius refers to the maximum that will be achieved during construction and not the maximum achievable swing of the crane (unless that specific setting is being used in the construction).*

Boom Length: This information is needed to determine the vertical angle of the crane with respect to any nearby NAV CANADA facilities.

Max Height Achieved During Construction: This information is needed to determine the worst case scenario for vertical angles between the crane and nearby NAV CANADA facilities.

Date Received: Represents the date the application was received by NAV CANADA Land Use.

Details of Proposal: Project Number, Street address, etc.: A project name, number or street address that can be traced should the owner/applicant require follow-up status on a project.

Dimensions: Indicate structure design specifications. Certain equipment used by NAV CANADA (the radar equipment in particular) can potentially be disrupted by those structures which possess large horizontal dimensions. Such scenarios are assessed by determining the structure's horizontal angle with respect to the NAV CANADA site. For Cranes, include maximum height to which the crane will be raised, boom length and swing radius. A drawing with the specs is desired.

From / To:

Indicate the time of the day when the structure will be raised. For example: 08:00, 13:00

Indicate the time of the day when the structure will be lowered. For example: 11:00, 17:00

Geographic Coordinates: The geographic location in latitude and longitude of the proposed structure/development. Coordinates must be provided in degrees, minutes, and seconds for NOTAM and database updating purposes. It is an ICAO (International Civil Aviation Organization) requirement to provide accuracy to within 1/100th of a second. For example, N46° 06' 44.67" W064° 40' 43.25".

Geodetic Datum: Coordinates are to be provided in NAD83 only. NAD 27 or UTM coordinates must be converted into the required format; the following are Natural Resources Canada online transformation links (these may change without notice):

NAD 27/83 and Geographic/UTM conversions: <http://webapp.geod.nrcan.gc.ca/geod/tools-outils/ntv2.php?locale=en>

NAD 27/83 and Geographic/UTM conversions: <http://webapp.geod.nrcan.gc.ca/geod/tools-outils/trx.php>

Reference the [Natural Resources Canada webpage](#) for information on this topic.

Ground Elevation: Should be consistent with the contour interval details shown on the 1:50,000 topographical chart. *Note: GPS readings (when not surveyed) or Google Earth readings are not considered reliable information. Please refer to topographical maps containing contour information or surveyed data. Where ground elevation has been surveyed, the finished grade is to be provided.*

Height Added: The structure currently exists. Specify any increase in height due to an addition.

High Powered Transmission: Such transmissions include AM, FM, or television broadcast signals. Such equipment should typically be located at least 8 km from NAV CANADA facilities. However, any equipment at the proposed site which falls under this category must be mentioned here.

High Voltage Equipment: Any equipment which carries a voltage of at least 2 kV must be mentioned here as such equipment can create electrical interference with NAV CANADA's radar systems. Voltages over 100 kV are especially worthy of mention, as they will potentially interfere with, not only the radar systems, but the ILS systems as well.

Linear Group of Structures: Cable crossing, telephone or power line, should have a beginning and end point of the line. Should there be intersection points along the route, applicant to provide a spreadsheet containing the geographic coordinates and ground elevation.

Note: Groups of Structures (Linear or Non-Linear): Groups of structures that are sufficiently close together can disrupt line of sight radio frequency (RF) coverage in a manner similar to a single, large structure. Therefore, a drawing of the group's layout is required in order to determine its bearing with respect to a NAV CANADA facility. From here, a horizontal angle between the site and the group of structures can be determined in order to assess the risk of coverage shadowing. *Note: this requirement will be in addition to the map requirements listed on page 2 of the Land Use Proposal Submission Form.*

MAPS/DRAWINGS

1:50,000 topographical map 8.5"x11" sectional with the location of the proposed structure clearly marked. The map submission must contain a legend indicating the map datum (NAD27 or 83) and the contour interval: NAV CANADA will accept the equivalent to the topographical maps produced by Natural Resources Canada which can be obtained digitally (by various mapping software companies) or in paper copy at most map supply stores. This will allow the Land Use Office to confirm possible discrepancies between the location shown on the map and the ground and geographic coordinates provided on the form. It will assist us in referencing where the proposed structure is with respect to the nearest airport, as well as any nearby NAV CANADA sites, and to reference the structures location within an instrument procedure design to determine possible penetration of the obstacle limitation surface on published instrument flight procedures.

Site Plan Depicting Entire Airport and Location of proposed structures: In cases where the proposed structure is close to an airport, within 6 km, or on an airport with a localizer/ILS (Instrument Landing System) runway, it is important to determine where the structure is with respect to any ILS at the airport. For this reason, site plans should include the *entire airport* and have the airport zoomed in as close as possible while still showing the proposed site in its entirety.

Proposals adjacent within 2 km from an airport with FSS or Control Tower: Certain equipment used by NAV CANADA (the radar equipment in particular) can potentially be disrupted by structures that possess large horizontal dimensions. Such scenarios are assessed by determining the structure's horizontal angle with respect to the site in question. This angle cannot be determined unless all horizontal dimensions and orientation of the structure are provided as well as the structure's bearing (that is, the map should include a north arrow).

For localizer/ILS runways, site plan with distance bar at 1:2,000 scale measure distances based at 90° to nearest runway centerline/extended runway centerline, and distance to nearest runway threshold. *Note: reference TP1247 to determine requirement when along an extended centerline of a localizer runway up to 6 km.*

Materials and Roof Shape: Indicate only the dominant materials of the structure, along with any metal which may exist. Indicate whether or not the roof (if applicable) of the structure is flat or sloped. *Note: Certain materials (such as metal) can cause undesirable reflections if they are sufficiently close to NAV CANADA equipment. Mentioning every material being used in the development is unnecessary, but metal in particular is worthy of mention, regardless of whether or not it is the dominant component of the structure. For example: A windmill made entirely of fibreglass with metal strips outlining the blades.*

Metres/Feet: Please identify whether heights provided are in feet or metres. All values will be converted into feet in the Land Use assessment and Notice of Construction as this is the required format for aeronautical publications and database purposes.

All metric/imperial conversions will be calculated as follows:

- Feet to Metres: To obtain metres, multiply the value (in feet) by 0.3048.
- Metres to Feet: To obtain feet, divide the value (in metres) by 0.3048.

NC File Number: If this submission is an amendment or is associated to a previous submission, applicant to indicate NAV CANADA file number assigned to the associated land use submission. For example, Revision to 07-0001 or Reference 07-0001 (building application).

Nearest Town: Closest town to where the development/project will take place.

New Structure: Replacement of a structure is considered a new structure; however, details on the old location and original owner are to be provided in the comments section for NAV CANADA database management. If submitting for an existing structure, NAV CANADA will consider the structure as 'new' if it is not currently recorded in our obstacle database.

OBSTRUCTION TO VISION ON OR ADJACENT TO AN AIRPORT WITH NAV CANADA SERVICES / CONTROL TOWER, FSS CARS: Controller/Specialist visibility requirements are based on dimensions defined in TP312, Aerodrome Standards & Recommended Practices and TP308, Criteria for the Development of Instrument Procedures. These Transport Canada publications define the airspace around aerodromes that has to be maintained free from obstacles to protect aircraft during either "an entirely visual approach or during the visual segment of an instrument approach". An aircraft on approach should be somewhere within this defined airspace, thus, controllers and specialists require line-of-sight to the areas overlying (above) these obstacle limitation surfaces. It is important to note that structures which meet these obstacle limitation surfaces could still interfere with controller/specialist line-of-sight.

Line of Sight: All aerodrome manoeuvring surfaces, unobstructed line-of-sight from the Tower Cab to the mandatory viewing area shall be provided. Line-of-sight is defined as a straight line from the 'ideal' controller/specialist eye-level position, established at 122 cm (48 in or 4 ft) above the floor and 91 cm (36 in) back from the perpendicular glass line, to any object in the mandatory viewing area. Line-of-sight shall not be obstructed by structures, parked aircraft, large vehicles and surrounding terrain/landscaping. Line-of-sight over buildings or other structures shall have a suitable margin of clearance to allow for snow build-up.

Generation of Smoke/Vapour: Line-of-sight can be impaired by visible contaminants such as steam, or heat distortion patterns. Consideration shall also be given to local weather phenomena that would restrict visibility due to fog or industrial haze from off airport sources.

Reflectivity: Line-of-sight can be impaired by direct or indirect sun glare and external light sources such as apron lights, parking area lights, street lights, or reflective surfaces (water pooling).

Aircraft Parking: Line-of-sight can be obstructed by structures such as parked aircraft, large vehicles and surrounding terrain/landscaping.

Exterior Lighting: Line-of-sight can be impaired by external light sources such as apron lights, parking area lights, street lights.

Other: Any high-powered electronic or telecommunications equipment which does not fall under the preceding categories should be brought to our attention if they can potentially interfere with equipment.

Radar Emission: High powered radio frequencies (in the GHz range) will potentially interfere with NAV CANADA radar performance. Any high powered frequencies originating from your proposed structure must be brought to the attention of NAV CANADA.

Reference: TP1247 Land Use in the Vicinity of Airports

Runway Certification Changes: To ensure Instrument Procedures meet design criteria requirements, NAV CANADA must be informed of any changes to runway certification (for example, precision to non-precision, non-precision to non-instrument, etc.). This includes temporary certification changes or changes occurring during a runway closure (the instrument procedure serving a closed runway may still be used for circling or other purposes).

Structure Height: This is the overall height of the structure above ground level.

Buildings: Include roof top structures such as, antennas, advertising boards, architectural features or mechanical rooms above the building height.

Communication Towers: Include the tower structure itself plus all appurtenances such as antennas, lightning rods, equipment, and obstruction lights.

Wind turbines: Overall height of the structure including blade radius (blade in the 12 o'clock position); and to include height at the hub and blade length.

Cranes: Maximum heights to which the crane will be raised when on site include height of mobile crane if used to install a tower crane.

TC Number: Applicant to provide the Transport Canada file number if known.

Temporary Structure: For structures with a planned removal date such as drilling rigs, cranes, meteorological towers, etc., please indicate the estimated removal date.

Total Height: Ground elevation plus the structure height at its highest point.

Type of Structure: The type of structure; for example, Hotel, Drilling Rig, Cranes, Hangar, Development, Wind Turbine, Communication Tower, Meteorological Tower, Flare Stack, Telephone/Transmission line, Cable Crossing, etc. *Note, where the structure is a flag pole, dimensions of maximum flag size is to be stipulated.* Should cranes be required during building construction, please refer to the Cranes section.

Tower or Support Structures: Applicant to indicate whether they are guyed or self-support structures

Guyed Towers: Applicant may be required to provide drawing with specifications on number of guyed lines, orientation of the structure (with north arrow) in both plan and profile view if available. Drawings may be required if the proposed structure is in close proximity to a NAV CANADA facility.

Self-Support Towers: Applicant to provide a profile view detailing the dimensions of the structure if available. *Note: may be required if the proposed structure is located within 2 km of a NAV CANADA facility.*

Buildings: Require architectural drawings in both plan view (with a north arrow indicator detailing the orientation of the building) and a profile (elevation) view (detailing maximum height of building including rooftop structures such as mechanical room, air conditioners, elevator shaft, etc. with the ground elevation at grade level). The North arrow indicator is particularly important in order to identify how the structure is oriented for azimuth calculations. *Note: should cranes be required during construction an additional land use submission will be required for assessment.*

VHF Radio: Frequency and Transmitter Power

VHF consists of all frequencies between 30 MHz and 300 MHz. Such frequencies will potentially cause interference with NAV CANADA's communications equipment. Any frequencies originating from the proposed site which fall within this range must be mentioned here, in order to rule out the possibility of interference.

For situations in which VHF radio will exist at a proposed site, NAV CANADA engineers must perform intermodulation studies in order to ensure that the performance of NAV CANADA communication sites is not compromised. These studies cannot be performed unless the proponent indicates the *specific* VHF frequencies being used onsite. Specify the transmitter power, as this is required to determine whether or not an overlap in coverage will take place.

Wind Farm: For clusters consisting of more than one turbine, the applicant can use one land use proposal submission form with a spreadsheet listing all turbines including turbine number, geographic coordinates (latitude/longitude) in NAD83, ground elevation and structure height. The 'Multiple Obstacle Template' spreadsheet sample is provided on the 'Proposal Submission Procedures' portion of the web site.



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Building *Nunavut* Together
Nunavut liuqatigiingniq
Bâtir le *Nunavut* ensemble

ᐅᑕᑎᑕᑦ ᐅᑕᑎᑕᑦ ᐅᑕᑎᑕᑦ ᐅᑕᑎᑕᑦ
Department of Community and Government Services
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

Attention: AIS Data Collection and Land Use Office

December 20, 2016

NAV CANADA

1601 Tom Roberts Road, P.O. Box 9824
Ottawa, ON K1G 6R2

Dear Sir/Madam,

Reference: Request to Review Land Use Proposal Submission and Project Summary for New Wastewater Treatment Facility in Kimmirut, Nunavut

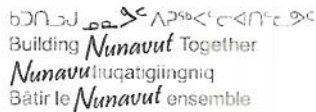
In September 2016, Stantec Consulting Ltd. (Stantec) was retained by the Government of Nunavut Department of Community and Government Services (GN-CGS) to begin the first phase of environmental permitting for a new wastewater treatment facility (WWTF) in Kimmirut, NU. This new WWTF is proposed to be located within the 4,000 m outer surface zone identified within the Kimmirut Airport Zoning Regulations (AZRs; SOR/2012-96). As part of this first phase of regulatory approvals, the GN-CGS requires a "letter of no objection" from NAV CANADA to apply for a Transport Canada AZR exemption to construct and operate the new WWTF in the proposed location.

In efforts to obtain a "letter of no objection", Stantec, on behalf of the GN-CGS, has prepared this letter, with accompanying Land Use Proposal Submission Form and associated figures/maps (Appendix A of this letter), to provide NAV CANADA with the location and conceptual design of the proposed new WWTF, and background of the project. We request a review of the project information provided and indicate, by written response to GN-CGS, whether or not NAV CANADA objects to the GN-CGS proceeding with its application to construct and operate a new WWTF within the 4,000 m limit of the Kimmirut AZR.

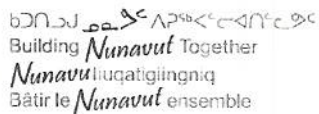
BACKGROUND

The hamlet of Kimmirut relies 100% on trucked services for potable water delivery, and sewage and wastewater collection. Collected sewage is currently discharged to a trench near the community's solid waste facility, located approximately 750 m south of the community (Nunami, 2015¹) and within the Kimmirut AZRs 4,000 m limit (see Figure 1 in Appendix A). The current sewage treatment system consists of a simple overland flow system that is only partially effective at providing treatment before the sewage discharges to the marine environment. The current sewage disposal location has been active for more than 30 years however it has not been considered an acceptable disposal method for several years due to the minimal treatment

¹ Nunami Stantec Ltd. (Nunami). (2015). Kimmirut Wastewater Treatment Feasibility Study. Final Report. Prepared for the Government of Nunavut Department of Community and Government Services, March 2015.



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 (867) 899-7330
www.gov.nu.ca



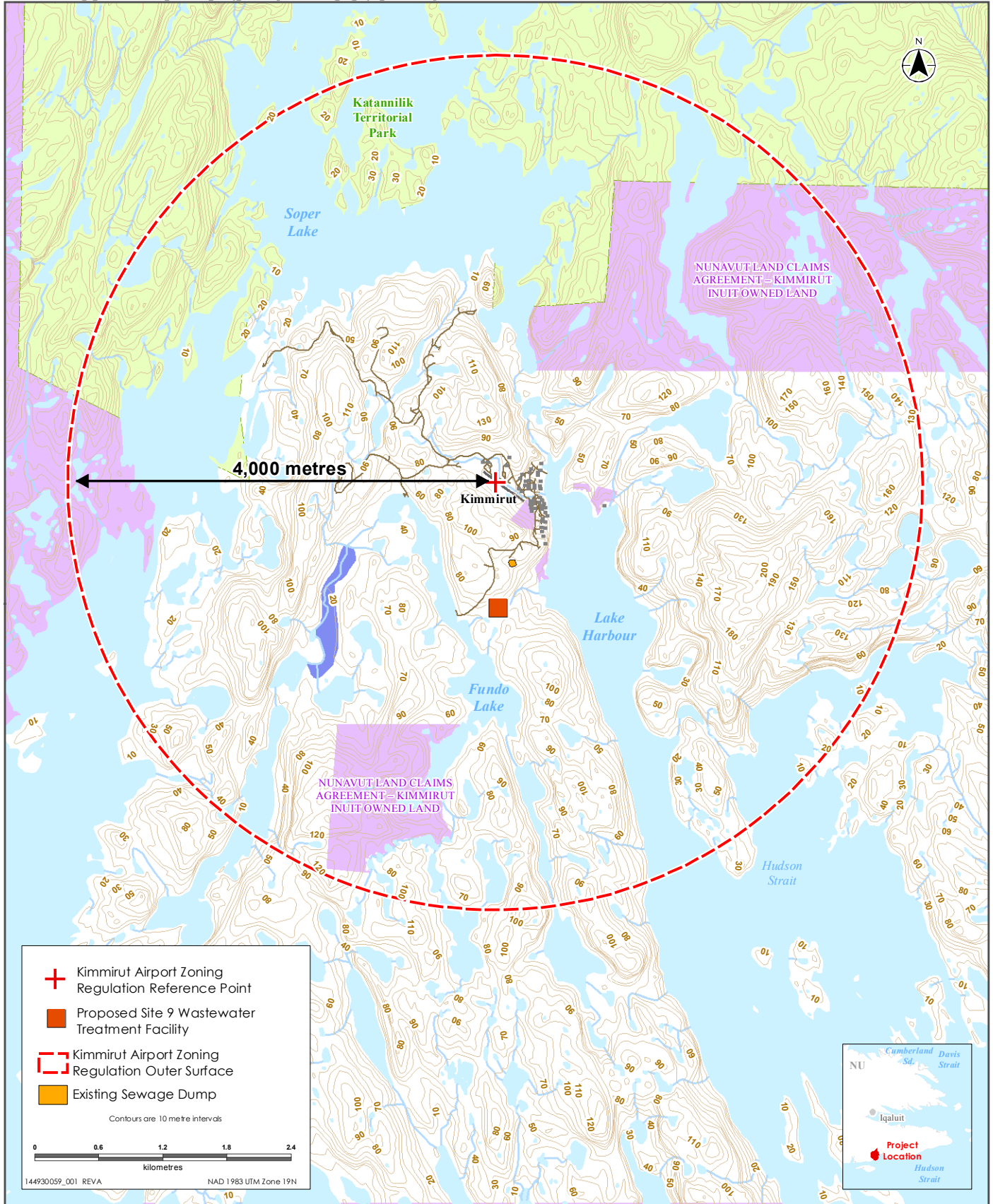
Department of Community and Government Services
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

C.P. Box 379
Pond Inlet, Nunavut X0A 0S0

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Qiuqutaa 379
Mittimatalik Nunavu X0A 0S0

(867) 899-7314
 (867) 899-7330
www.gov.nu.ca



Sources: Base Data - Natural Earth; Thematic Data - ERBC

Service Layer Credits:

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

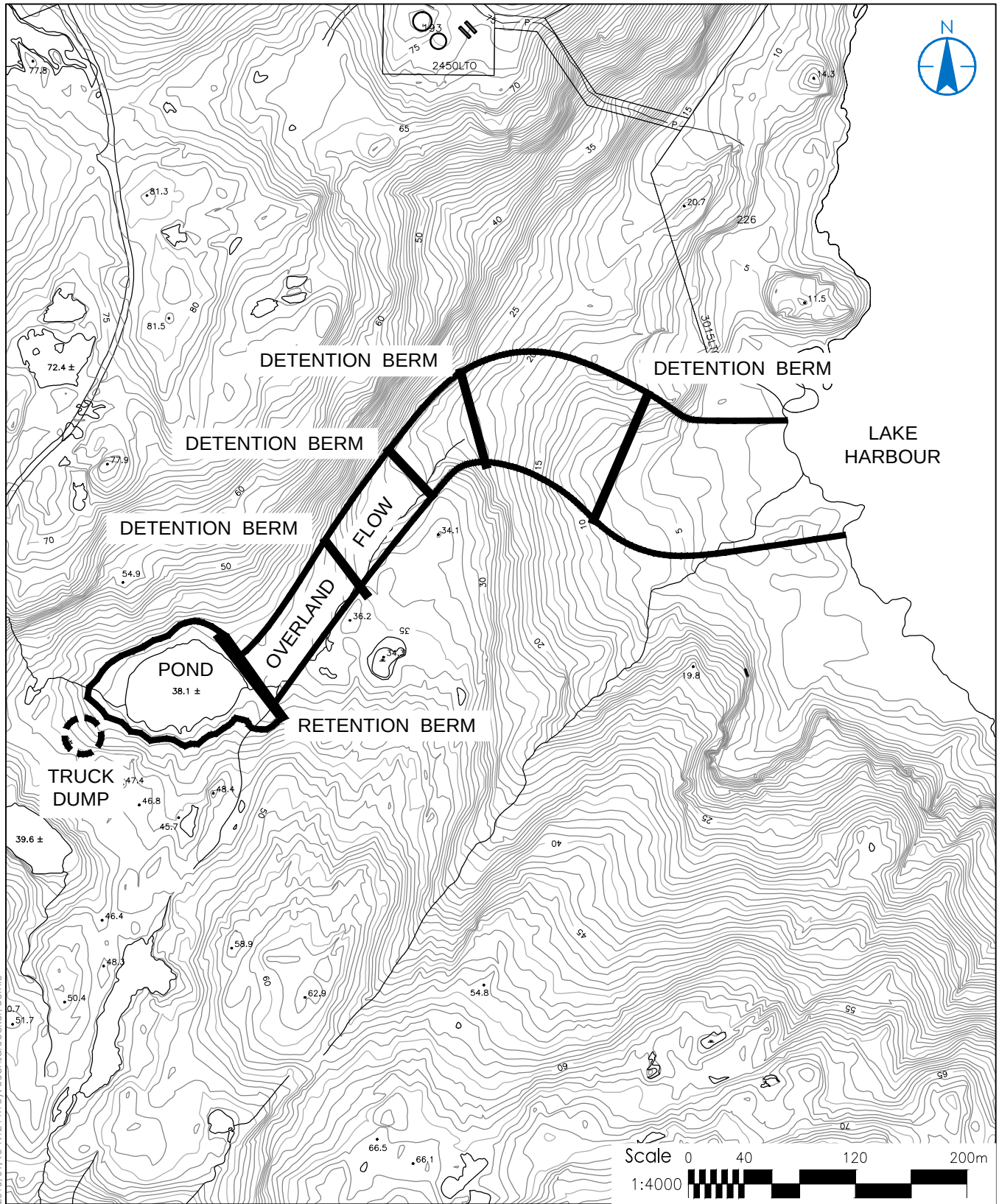
Proposed Location of a New Wastewater Treatment Facility in Kimmirut, NU



PHASE 1 REGULATORY APPROVALS FOR A NEW WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU

Figure 1

V:\1101\active\14492020\figures\current\figure_site-9A.DWG
2015/01/13 1:12 PM By: Buchsdruecker, Bernie



10160 - 112 Street
Edmonton AB
www.stantec.com

Client/Project

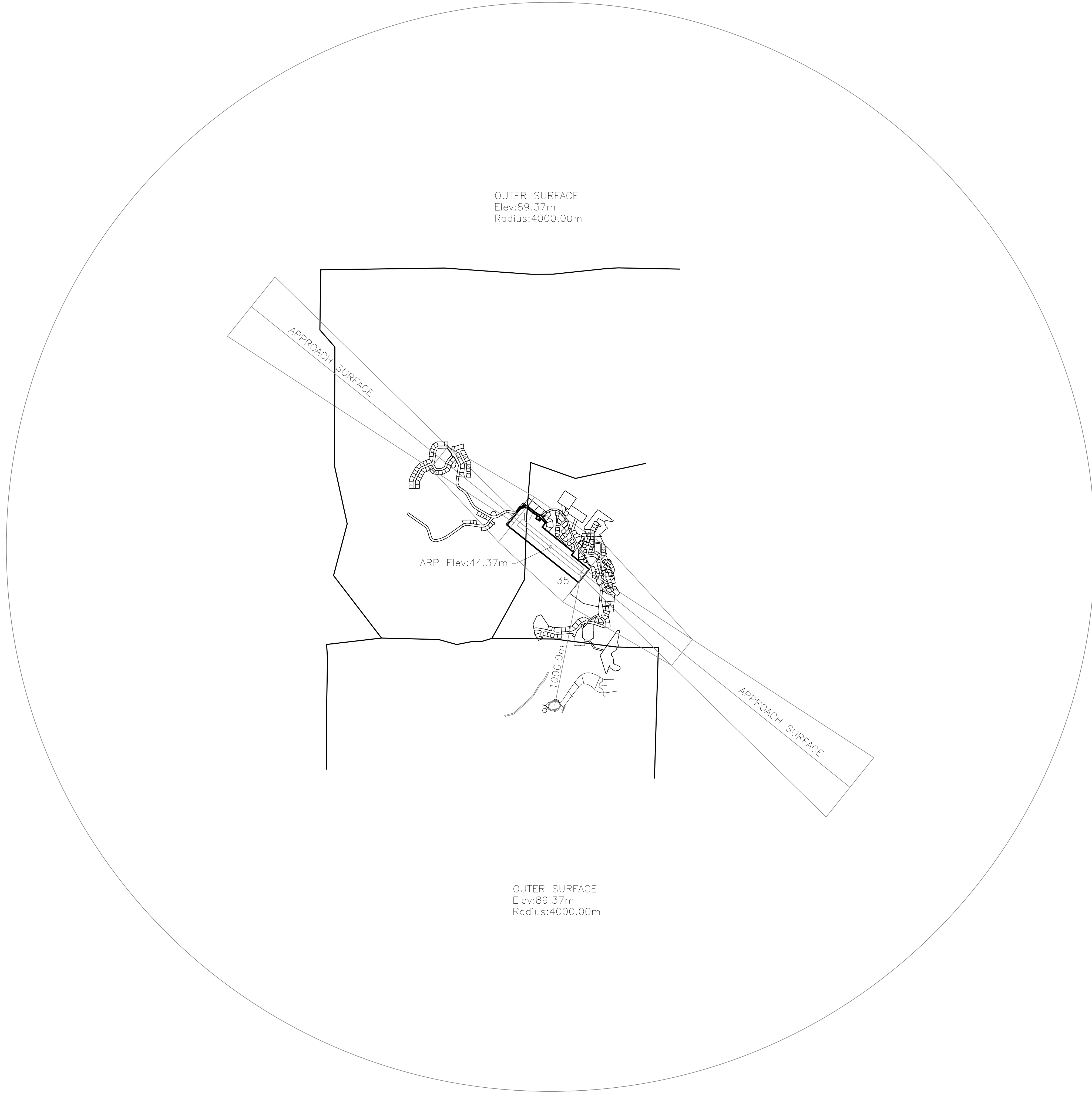
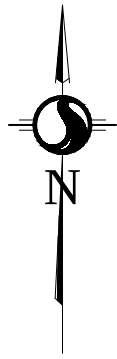
GOVERNMENT OF NUNAVUT
KIMMIRUT WASTEWATER
FEASIBILITY STUDY

Figure No.

2

Title

Site 9A



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Ottawa ON
Tel. 613.722.4420
www.stantec.com

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TOPOGRAPHIC SKETCH of PROPOSED WASTE WATER TREATMENT FACILITY

KIMMIRUT, NUNAVUT



METRIC CONVERSION
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

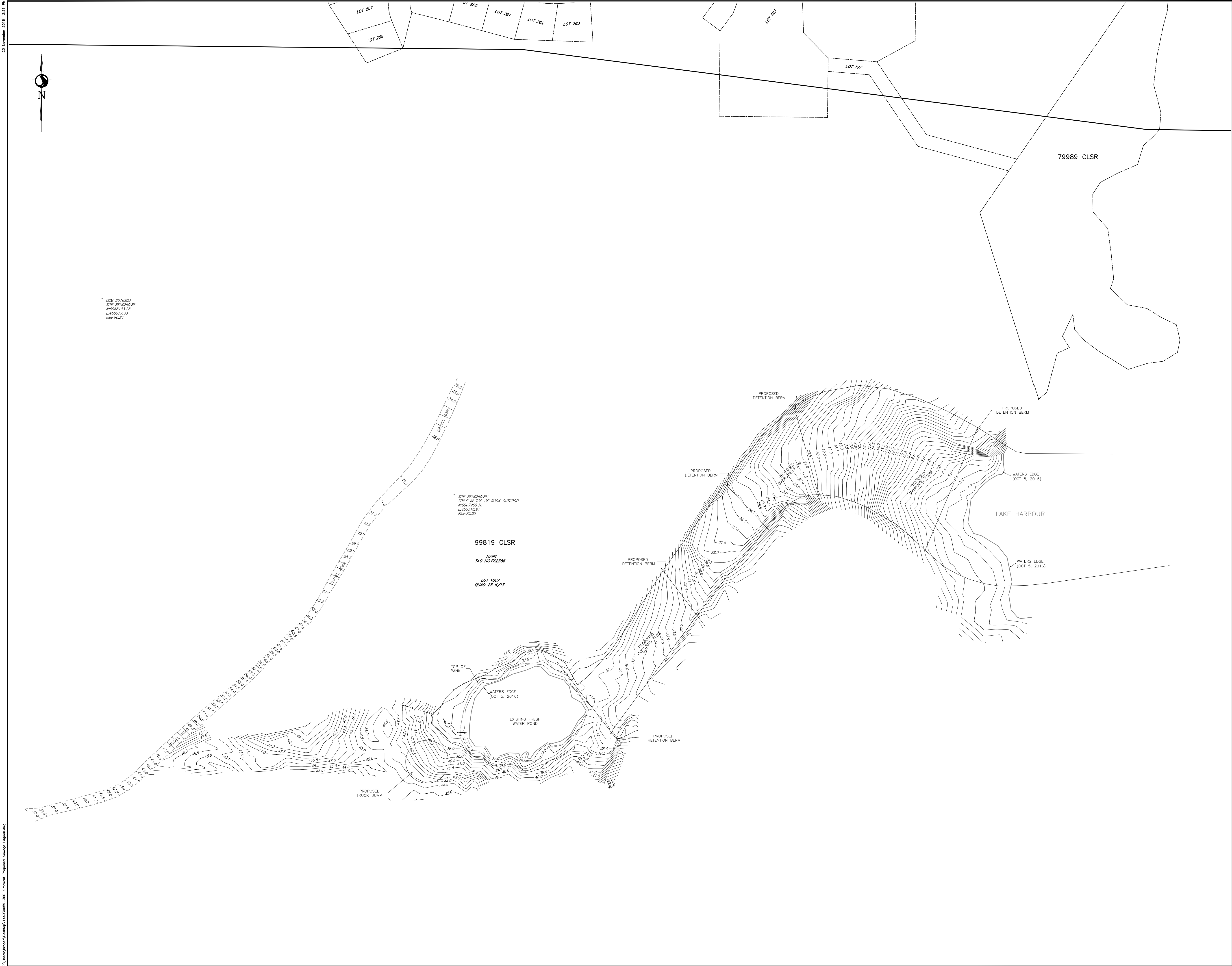
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(UTM, ZONE 19, CM69°00'W)
DATUM: NAD 83 (CSRS) (2010.0)

DISTANCES ON THIS PLAN MAY BE CONVERTED TO GROUND DISTANCES BY DIVIDING BY A COMBINED SCALE FACTOR OF 0.999615.

VERTICAL DATUM NOTE
ELEVATIONS ARE OF GEODETIC ORIGIN AND ARE DERIVED FROM

ELEVATIONS ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD-1928/1978) AND ARE DERIVED FROM STANTEC BENCHMARK MONUMENT No. 1, HAVING A PUBLISHED ELEVATION OF 75.950 METRES. ELEVATION COMPUTED USING PPP (Precise Point Positioning) TECHNIQUES WITH THE CANADIAN GEOID MODEL HT2.0.

LEGEND		
	DENOTES	FOUND MONUMENTS
■	"	SET MONUMENTS
□	"	IRON BAR
IB	"	ROUND IRON BAR
IBØ	"	STANDARD IRON BAR
SIB	"	SHORT STANDARD IRON BAR
SSIB	"	CUT CROSS
CC	"	CONCRETE PIN
CP	"	BENCHMARK
BM	"	CONCRETE MONUMENT
CM	"	COORDINATED CONTROL MONUMENT
CCM	"	NAIL AND WASHER
NW	"	PK NAIL
PKN	"	VERTICAL CONTROL MONUMENT
VCN	"	WITNESS
WIT	"	SPIKE
SPK	"	



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TOPOGRAPHIC SKETCH of PROPOSED WASTE WATER TREATMENT FACILITY (Contours)

KIMMIRUT, NUNAVUT

Scale 1:1250
20 0 20 40 60 80 METRES

METRIC CONVERSION
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

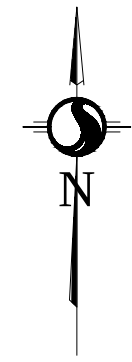
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(UTM, ZONE 19, CM69°00'W)
DATUM: NAD 83 (CSRS)(2010.0)

DISTANCES ON THIS PLAN MAY BE CONVERTED TO GROUND DISTANCES BY DIVIDING BY A COMBINED SCALE FACTOR OF 0.999615.

VERTICAL DATUM NOTE
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LEGEND		
	DENOTES	FOUND MONUMENTS
■	"	SET MONUMENTS
□	"	IRON BAR
IB	"	ROUND IRON BAR
IB#	"	STANDARD IRON BAR
SIB	"	SHORT STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
BM	"	BENCHMARK
CM	"	CONCRETE MONUMENT
CCM	"	COORDINATED CONTROL MONUMENT
NW	"	NAIL AND WASHER
PKN	"	PK NAIL
VCM	"	VERTICAL CONTROL MONUMENT
WIT	"	WITNESS
SPK	"	SPIKE



* CCM 8010803
SITE BENCHMARK
N4698103.28
E455037.11
Elev:90.21

* SITE BENCHMARK
SPLINE IN TOP OF ROCK OUTCROP
N4697928.56
E455016.97
Elev:75.92

99819 CLSR

NAPI

TAG NO.F82386

LOT 1007
QUAD 25 K/13

TOP OF BANK
WATERS EDGE
(OCT 5, 2016)

EXISTING FRESH WATER POND

PROPOSED RETENTION BERM

PROPOSED DETENTION BERM

PROPOSED DETENTION BERM

PROPOSED DETENTION BERM

LAKE HARBOUR

WATERS EDGE
(OCT 5, 2016)

WATERS EDGE
(OCT 5, 2016)

79989 CLSR

LOT 194

LOT 197

LOT 257

LOT 258

LOT 260

LOT 261

LOT 262

LOT 263



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TOPOGRAPHIC SKETCH OF PROPOSED WASTE WATER TREATMENT FACILITY (Spot Elevations)

KIMMIRUT, NUNAVUT

Scale 1:1250
20 0 20 40 60 80 METRES

METRIC CONVERSION
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

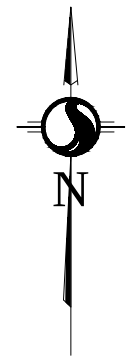
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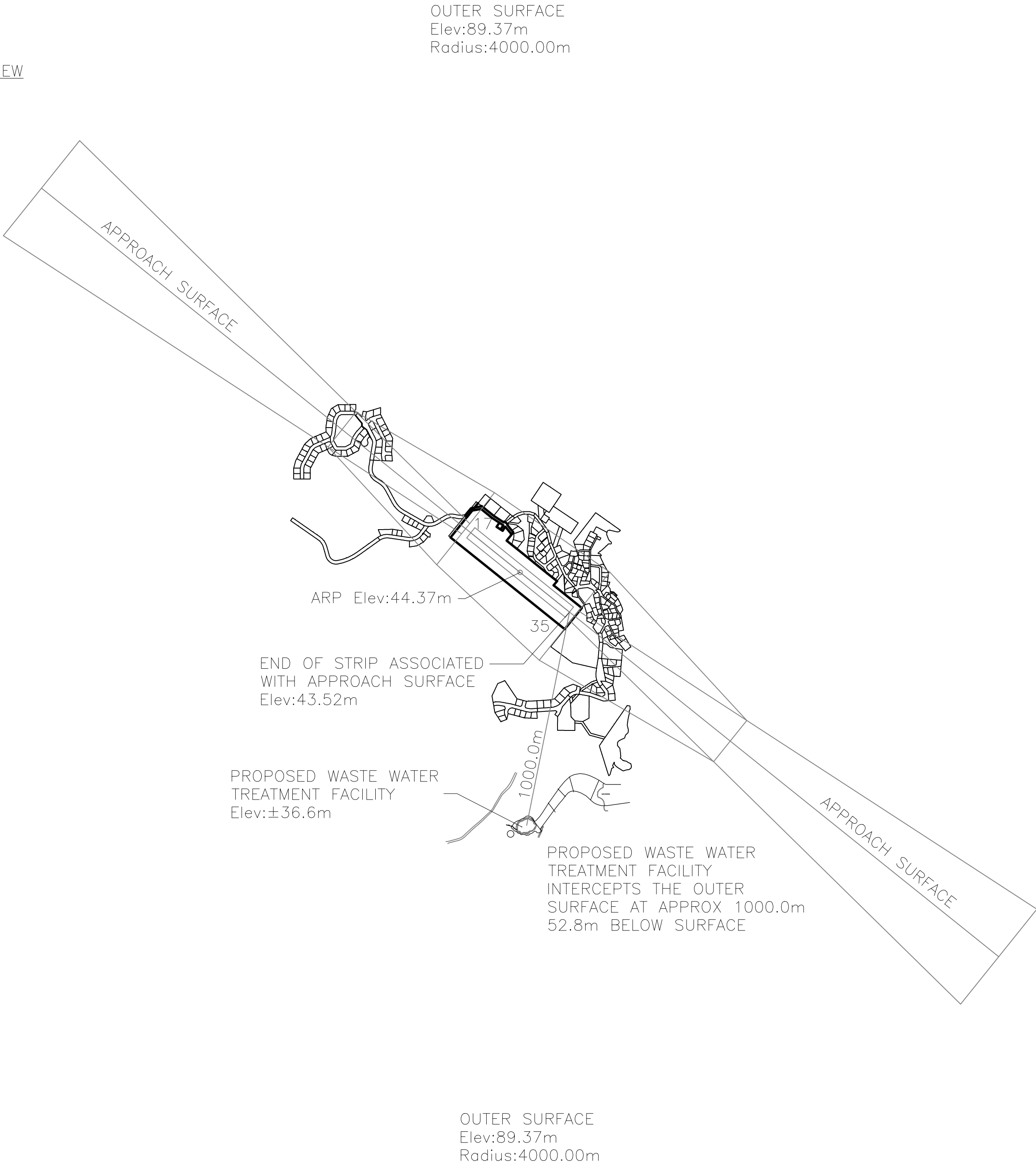
VERTICAL DATUM NOTE
ELEVATIONS ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD-1928:1978) AND ARE DERIVED FROM STANTEC BENCHMARK MONUMENT No. 1, HAVING A PUBLISHED ELEVATION OF 75.950 METRES. ELEVATION COMPUTED USING PPP (Precise Point Positioning) TECHNIQUES WITH THE CANADIAN GEOD MODEL HT2.D.

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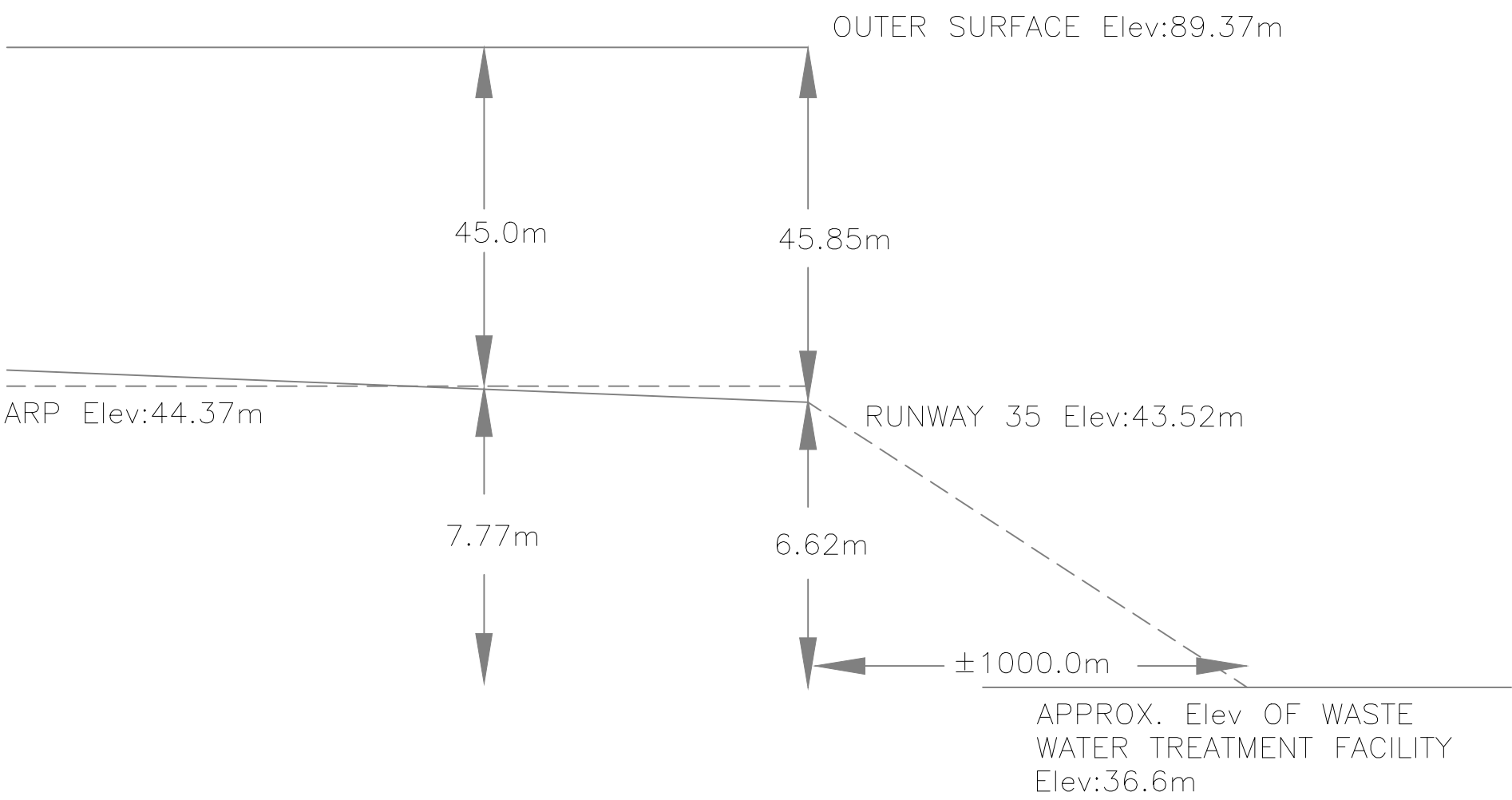
	DENOTES	FOUND MONUMENTS
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SIB	"	SHORT STANDARD IRON BAR
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CC	"	CUT CROSS
CP	"	CONCRETE PIN
BM	"	BENCHMARK
CM	"	CONCRETE MONUMENT
CCM	"	COORDINATED CONTROL MONUMENT
NW	"	NAIL AND WASHER
PKN	"	PK NAIL
VCM	"	VERTICAL CONTROL MONUMENT
WIT	"	WITNESS
SPK	"	SPIKE



PLAN VIEW



PROFILE VIEW



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TOPOGRAPHIC SKETCH of PROPOSED WASTE WATER TREATMENT FACILITY (OBSTRUCTION SURVEY)

KIMMIRUT, NUNAVUT



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HORIZONTAL DATUM NOTE
PROJECTION: UNIVERSAL TRANSVERSE MERCATOR
(UTM, ZONE 19, CM6°00'W)
DATUM: NAD 83 (CSRS)(2010.0)

DISTANCES ON THIS PLAN MAY BE CONVERTED TO GROUND DISTANCES BY DIVIDING BY A COMBINED SCALE FACTOR OF 0.999615.

VERTICAL DATUM NOTE
ELEVATIONS ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD-1928:1978) AND ARE DERIVED FROM STANTEC BENCHMARK MONUMENT No. 1, HAVING A PUBLISHED ELEVATION OF 75.950 METRES. ELEVATION COMPUTED USING PPP (Precise Point Positioning) TECHNIQUES WITH THE CANADIAN GEOD MODEL HT2.D.

LEGEND

	DENOTES	FOUND MONUMENTS
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IBØ	"	STANDARD IRON BAR
SIB	"	SHORT STANDARD IRON BAR
SSIB	"	CUT CROSS
CC	"	CONCRETE PIN
CP	"	BENCHMARK
BM	"	CONCRETE MONUMENT
CM	"	COORDINATED CONTROL MONUMENT
CCM	"	NAIL AND WASHER
NW	"	PK NAIL
PKN	"	VERTICAL CONTROL MONUMENT
VCM	"	WITNESS
WIT	"	SPIKE
SPK	"	

Sibbald, Carey

From: Sibbald, Carey
Sent: Wednesday, March 15, 2017 1:51 PM
To: 'Baggs, Susan'
Cc: Pinard, Paul; Hope, Grigor
Subject: RE: 16-3496 - RE: Land Use Proposal Submission - Kimmirut, NU

Hi Susan,

As the project is still in conceptual design, we do not have exact coordinates. However, in speaking with our wastewater engineers further, we would not be putting in any street lights at this location; this is typically not done for northern wastewater lagoons. Please remove this component from the application. The maximum height of any permanent structures is expected to be 10 feet (3 m), and these would be bollards to prevent trucks from backing up too far to the discharge location.

As for the construction equipment, the maximum height of any equipment would be 22 feet (6.7 m); this is the maximum height of a large excavator with its bucket extended.

Please let me know if you need any further information

Cheers,
Carey

From: Baggs, Susan [mailto:Susan.Baggs@navcanada.ca]
Sent: Friday, March 10, 2017 8:13 AM
To: Sibbald, Carey <Carey.Sibbald@stantec.com>
Cc: Pinard, Paul <PinardP@navcanada.ca>
Subject: 16-3496 - RE: Land Use Proposal Submission - Kimmirut, NU

Hello Carey,

Could you please provide the geographic co-ordinates, ground elevation and heights for the street lights? I have included a spreadsheet that you can submit this information on.

Also, what will be the maximum height of any construction equipment used in the construction of this site.

Thank you for your assistance in this matter.

Regards,

Susan Baggs
AIM Land Use Specialist
NAV CANADA
tel toll-free (866) 577-0247
fax (613) 248-4094

From: Sibbald, Carey [mailto:Carey.Sibbald@stantec.com]
Sent: March-09-17 10:58 AM
To: Land Use

Cc: Pinard, Paul

Subject: RE: 16-3496 - RE: Land Use Proposal Submission - Kimmirut, NU

Hi Susan,

Thank you for your response. I was aware of the processing times and understand how pressed for time and busy things can get, especially if you have reduced capacity. My client has been inquiring with me so I was checking in with you. I'll pass this along and let you know of any further questions or concerns on our end. If/when the review occurs, please let me know if you have any questions at all.

Cheers,
Carey

From: Land Use [<mailto:LandUse@navcanada.ca>]

Sent: Thursday, March 09, 2017 4:29 AM

To: Sibbald, Carey <Carey.Sibbald@stantec.com>

Cc: Pinard, Paul <PinardP@navcanada.ca>

Subject: RE: 16-3496 - RE: Land Use Proposal Submission - Kimmirut, NU

Hello Carey,

NAV CANADA Land Use proposals are entered in our queue sequentially as they are received. Some projects have a higher priority than others due to the nature of the proposal, such as Airport projects or other activities that have a higher risk to impact the safety of the Air Navigation System. Below is what we currently advertise as our process times.

Processing times vary, but NAV CANADA attempts to respond within 8 to 12 weeks of receiving a complete proposal. The accuracy and completeness of the initial documentation and your cooperation and promptness in remedying deficiencies or inaccuracies will help to expedite the review process.

NAV CANADA Land Use has steadily been receiving a higher number of complex, high priority proposals year to year. The Spring to Fall months is when most construction activities transpire with the number of proposals received peaking during this period. We also have experienced a reduction in capacity within the Land Use department. The combination of these factors has led to very lengthy response times for lower priority files. We work with proponents where the lack of the NAV CANADA response will delay a specific project on a file by file basis.

Measures have been taken to increase our capacity which we should see positive results in the coming months.

We apologize for these delays and any inconvenience these delays may cause you and ask for your patience during the time that we require to increase our capacity to meet our response timeline goals.

Susan Baggs
AIM Land Use Specialist
NAV CANADA
tel toll-free (866) 577-0247
fax (613) 248-4094

From: Sibbald, Carey [<mailto:Carey.Sibbald@stantec.com>]
Sent: March-08-17 4:30 PM
To: Land Use
Subject: RE: 16-3496 - RE: Land Use Proposal Submission - Kimmirut, NU

Good day,

I'm just wondering if you can provide any updates on the noted Land Use Proposal Submission? As outlined in the email chain below, we submitted our proposal package just before Christmas and received word in mid-January that it was received and being reviewed. We haven't heard since so wanted to check in.

Thank you,
Carey

From: Land Use [<mailto:LandUse@navcanada.ca>]
Sent: Monday, January 16, 2017 10:15 AM
To: Sibbald, Carey <Carey.Sibbald@stantec.com>
Subject: 16-3496 - RE: Land Use Proposal Submission - Kimmirut, NU

Hello,

We have indeed received your submission; please note the Land Use file number is 16-3496.

Your file will be assessed in sequence.

Thank you.

Diane Levesque
Land Use
Aeronautical Information Management (AIM)
NAV CANADA
613-936-5135
toll-free (866) 577-0247
fax (613) 248-4094
e-mail: diane.levesque@navcanada.ca

From: Sibbald, Carey [<mailto:Carey.Sibbald@stantec.com>]
Sent: January-16-17 1:05 PM
To: Land Use
Subject: RE: Land Use Proposal Submission - Kimmirut, NU

Hi there,

We submitted a Land Use Proposal Submission form for the Government of Nunavut's proposed new wastewater treatment facility in Kimmirut, NU (situated within an AZR), just before Christmas. See my original email below on December 21st. As things can get lost over holiday breaks in mounting emails and inbox sizes, I just wanted to follow up quickly to confirm that our submission was received.

Can you please confirm receipt? I can re-send if needed.

Thank you,

From: Sibbald, Carey
Sent: Wednesday, December 21, 2016 9:23 AM
To: landuse@navcanada.ca
Cc: Hope, Grigor <GHope@GOV.NU.CA>
Subject: Land Use Proposal Submission - Kimmirut, NU

Good morning,

Attached, please find a completed Land Use Proposal Submission form for a proposed wastewater treatment facility in Kimmirut, Nunavut. A letter is also attached that provides some background on the project, its conceptual design, as well as several figures and topographic drawings from a recent survey. We are submitting these on behalf of the Government of Nunavut, Department of Community and Government Services (GN-CGS, the Applicant).

We are hoping NAV CANADA can review the attached and advise, in writing, whether or not they object to the proposed facility and its location within the 4,000 m Kimmirut Airport Zoning Regulations. Your review will ultimately support a subsequent application to Transport Canada for an AZR exemption.

If you have any questions on the attached or on the project, please do not hesitate to contact myself, or Grigor Hope (cc'd here) with the GN-CGS.

Thank you, and Happy Holidays!
Carey

Carey Sibbald, B.Sc., R.P.Bio

Environmental Biologist
Project Manager
Stantec
2nd Floor 4910 53 Street, PO Box 1777, Yellowknife NT X1A 2P4
Phone: (604) 235-1874
Cell: (867) 446-7644
Carey.Sibbald@stantec.com



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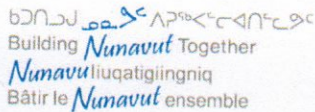


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Bâtir le *Nunavut* ensemble

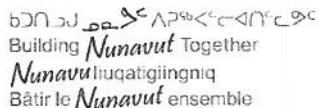
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Department of Community and Government Services
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

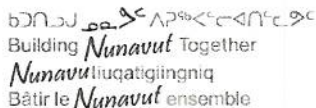
APPENDIX D – GN-EDT NUNAVUT AIRPORTS DIVISION SUBMISSION AND LETTER OF NO OBJECTION



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 🖨(867) 645-8246
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 (867) 899-7330
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Assessment may be required. However, in previous email correspondence between Stantec and the GN-EDT (13 September 2016), it was suggested that the location of the new WWTF will determine the level of information required to assess and approve a WWTF at Site 9.

Therefore, to obtain a “letter of no objection” from GN-EDT Nunavut Airports Division, Stantec, on behalf of the GN-CGS, has prepared this Project Summary to outline the project’s background, and the location and conceptual design of the new wastewater treatment facility (WWTF) at Site 9. We request a review of the project information provided and indicate, by written response to GN-CGS, whether or not the GN-EDT Nunavut Airports Division objects to the GN-CGS proceeding with its application to construct and operate a new WWTF within the 4,000 m limit of the Kimmirut AZR.

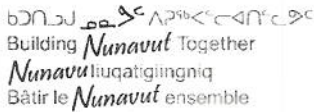
PROJECT BACKGROUND

The hamlet of Kimmirut relies 100% on trucked services for potable water delivery, and sewage collection. Currently, drinking water is withdrawn from Lake Fundo, located approximately 1.2 km southwest of the community and is access by a gravel road. Collected sewage is currently discharged to a trench near the community's solid waste facility, located approximately 750 m south of the community and within the Kimmirut AZRs 4,000 m limit (see Figure 1 in Appendix A). From the trench, sewage immediately drains down a steep (average 4:1) slope that drops from an elevation of 65 m above sea level (m asl) to 25 m asl (Nunami, 2015¹). Following the steep slope, sewage flows through an area thickly vegetated with grasses and willows, and eventually into the marine environment of Lake Harbour (Nunami, 2015). It is believed that the current sewage disposal system only provides preliminary treatment, with some further primary treatment during the summer when vegetation is active (Nunami, 2015).

The current sewage disposal location has been active for more than 30 years however it has not been considered an acceptable disposal method for several years due to the minimal treatment it provides. In 2001, a new WWTF was constructed 1.8 km west of the community, under the approval of the Nunavut Water Board, and involved a lagoon system with wastewater treatment by a downstream wetland. The facility was subsequently determined to have inadequate capacity for overwinter storage, and in 2011, the WWTF was upgraded. However, this WWTF has never been active. During licencing for operation of the WWTF, concerns were expressed over the potential presence of fish in the downstream wetland and Tuullitsut Lake. In 2013, Nunami Stantec conducted a fish habitat assessment and found Arctic char (*Salvelinus alpinus*) throughout the wetland and adjoining lakes (Nunami 2014²). The release of effluent from the

¹ Nunami Stantec Ltd. (Nunami). (2015). Kimmirut Wastewater Treatment Feasibility Study. Final Report. Prepared for the Government of Nunavut Department of Community and Government Services. March 2015.

² Nunami Stantec Ltd. (Nunami). (2014). Kimmirut Fish Habitat Assessment Project, Final Summary Report. Prepared for Government of Nunavut. March 2014.



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granular fill material (approximately 0.5 m embankment) and is expected to be approximately 6 m wide.

A truck discharge station and turnaround pad is also required at the lagoon. The turnaround pad would provide a safe and accessible location for sewage truck to discharge into the lagoon during all seasons. Lighting (e.g., solar-powered street lights up to 5 m tall) may be installed on the turnaround pad to assist with visibility and sewage discharge during the winter months.

Construction of the new WWTF at Site 9 will not occur until the design for the facility has been finalized and all regulatory approvals obtained, which may not occur until 2019. Construction is expected to occur over the four summer months (June to September).

CLOSURE

We trust that this letter has provided the GN-EDT Nunavut Airports Division with sufficient information on the location and current conceptual design for the new Kimmirut WWTF at Site 9, to proceed with the approval process and issuing a "letter of no objection" to the GN-CGS. We are available to discuss this project and any further anticipated information requirements, at your convenience. In the meantime, if you have any questions on the project, please do not hesitate to contact Grigor Hope at the GN-CGS, or Carey Sibbald at Stantec.

Sincerely,

BC

Bhabesh Roy, M.A.Sc., P.Eng.
Municipal Planning Engineer
Community Government Services
Baffin Region, Government of Nunavut
P.O.Box 379, Pond Inlet, X0A 0S0
Ph-867 899 7314; Fax-867 899 7328
E-mail: broy@gov.nu.ca

Attachment: Appendix A – Figures and Maps

Copy: Eiryn Devereaux, ADM/ Acting Regional Director, Infrastructure, GN-CGS

Ralph Ruediger, Director of Community Development, GN-CGS

Tim Brown, Director of Community Infrastructure, GN-CGS

Sarah Ali, Senior Municipal officer, Community Infrastructure, GN-CGS

Grigor Hope, Project Manager, GN-CGS, Pond Inlet

Zobayer Ahmed, Regional Manager Projects, GN-CGS, Pond inlet

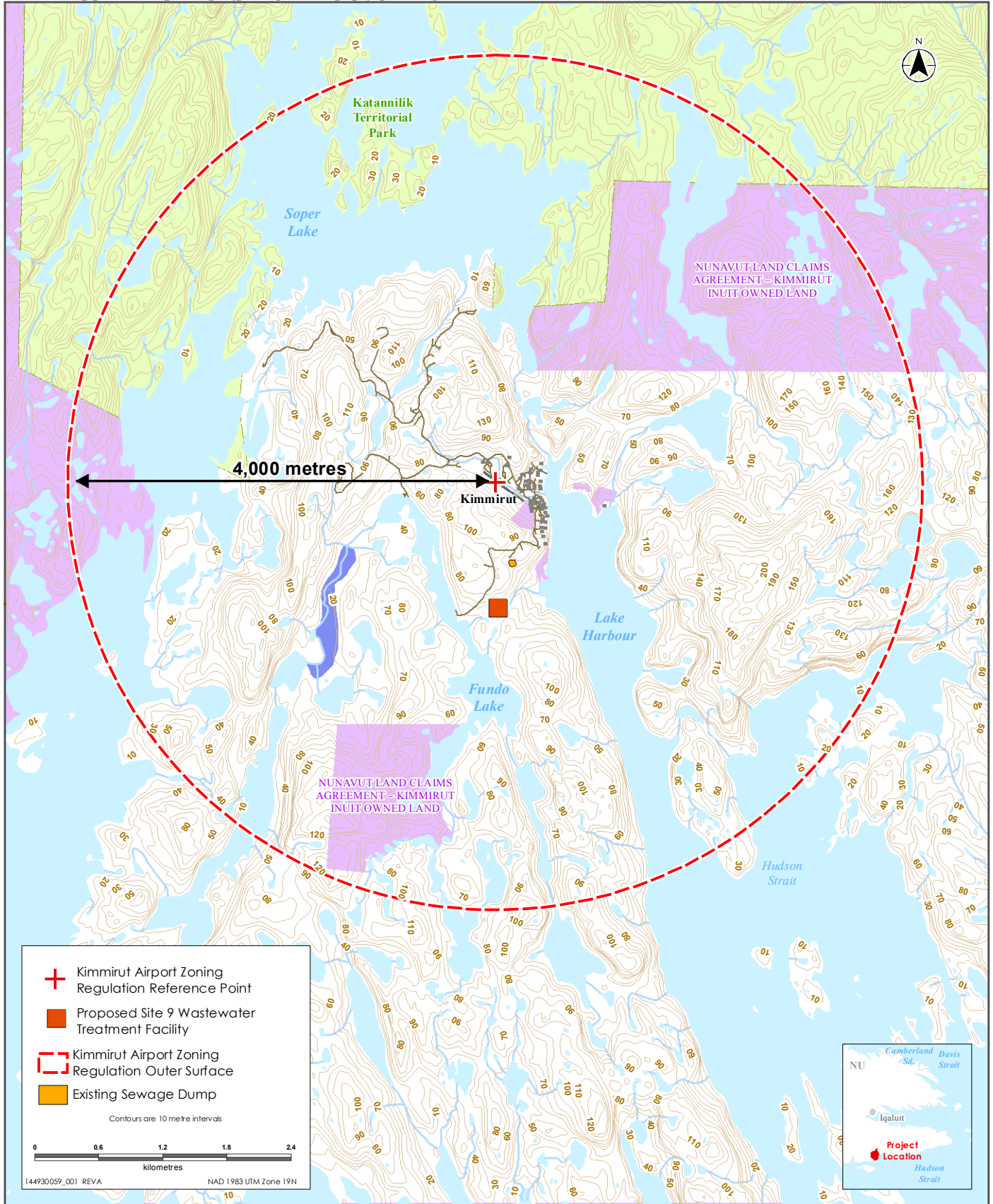
Carey Sibbald, Stantec Consulting Ltd., Yellowknife, NT



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Building *Nunavut* Together
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Bâtir le *Nunavut* ensemble

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APPENDIX A – FIGURES AND MAPS



Sources: Base Data - Natural Earth; Thematic Data - ERBC

Service Layer Credits:

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

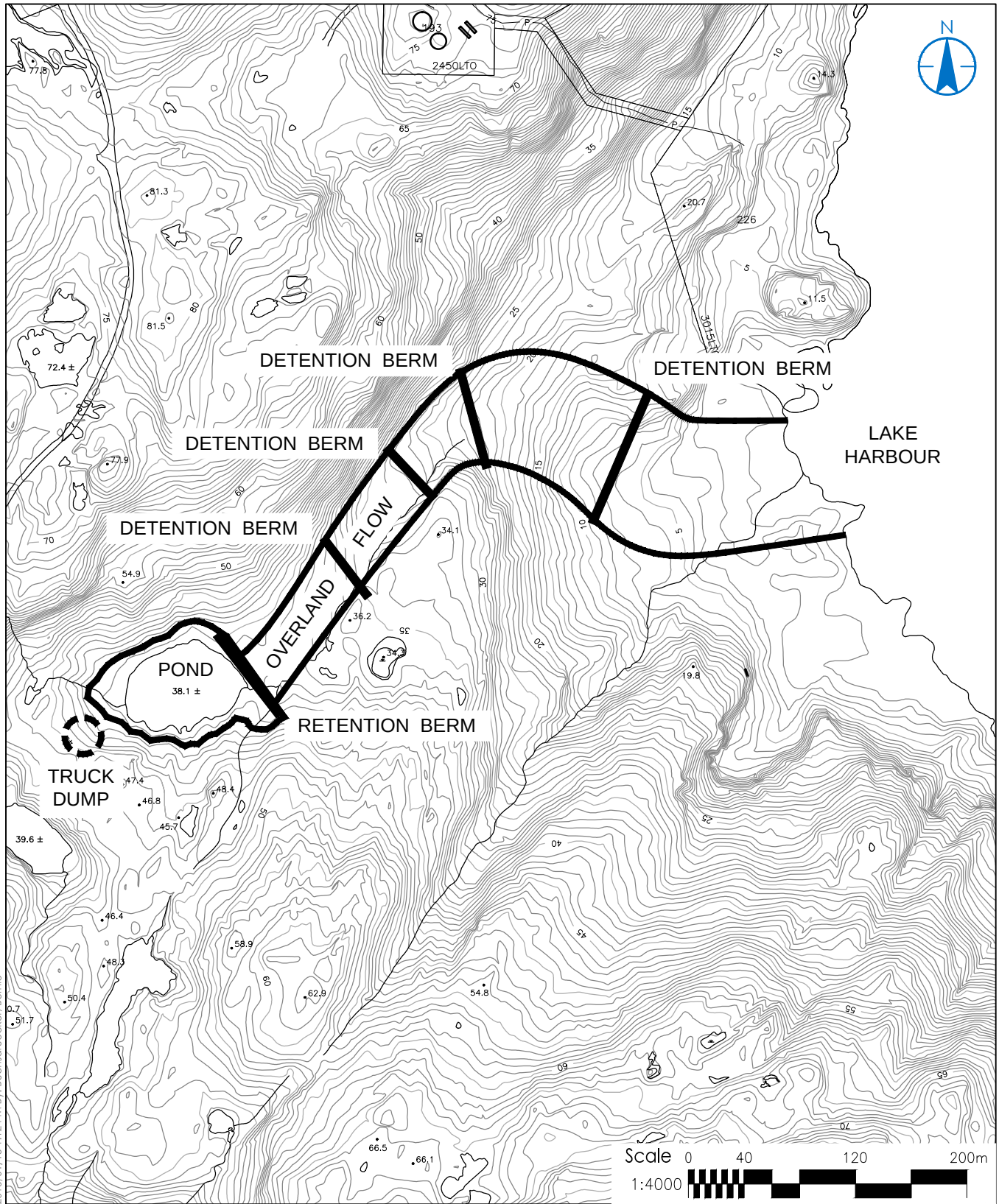
Proposed Location of a New Wastewater Treatment Facility in Kimmirut, NU



PHASE 1 REGULATORY APPROVALS FOR A NEW WASTEWATER TREATMENT FACILITY IN KIMIRUT, NU

Figure 1

V:\1101\active\14492020\figures\current\figure_site-9A.DWG
2015/01/13 1:12 PM By: Buchsdruecker, Bernie



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Edmonton AB
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Client/Project

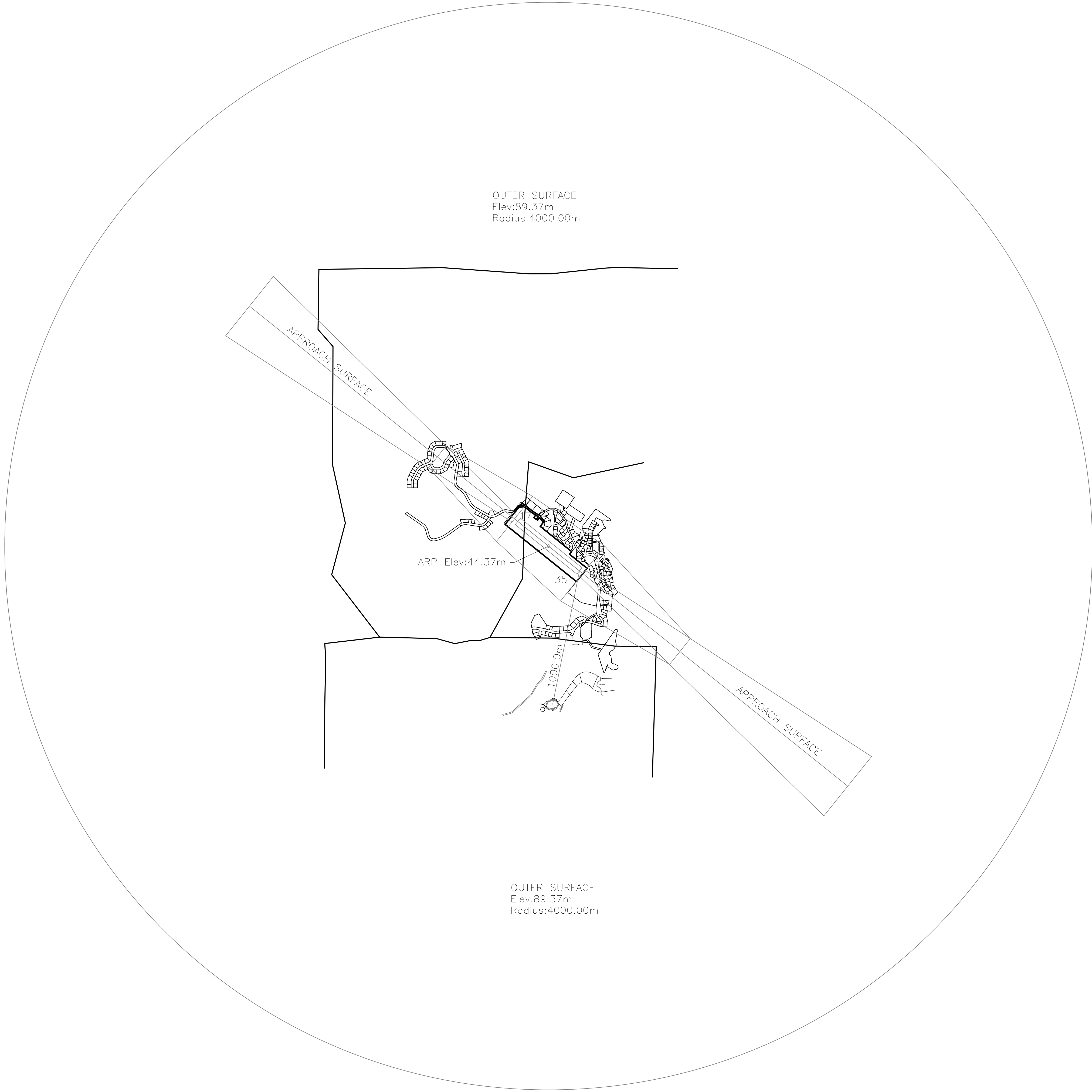
GOVERNMENT OF NUNAVUT
KIMMIRUT WASTEWATER
FEASIBILITY STUDY

Figure No.

2

Title

Site 9A



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TOPOGRAPHIC SKETCH of PROPOSED WASTE WATER TREATMENT FACILITY

KIMMIRUT, NUNAVUT



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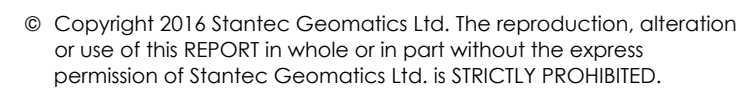
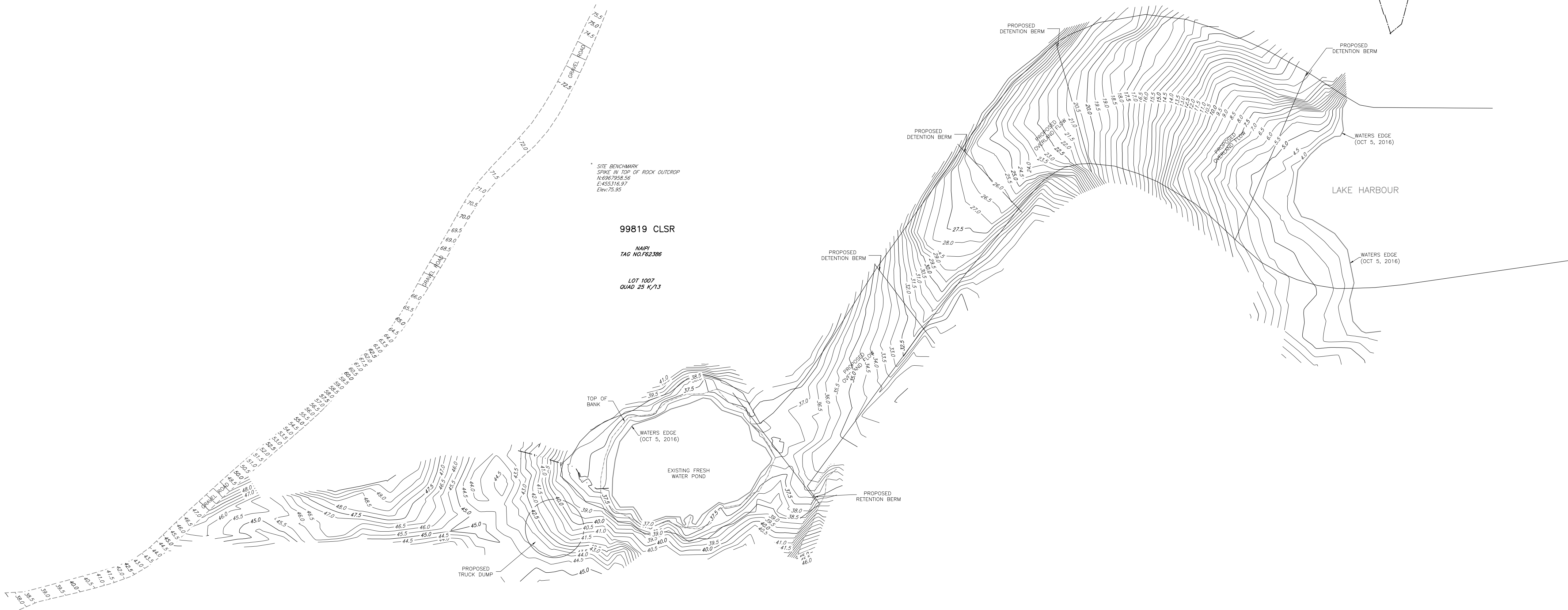
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CP	"	BENCHMARK
BM	"	CONCRETE MONUMENT
CM	"	COORDINATED CONTROL MONUMENT
CCM	"	NAIL AND WASHER
NW	"	PK NAIL
PKN	"	VERTICAL CONTROL MONUMENT
VCN	"	WITNESS
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KIMMIRUT, NUNAVUT

METRIC CONVERSION
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TOPOGRAPHIC SKETCH OF PROPOSED WASTE WATER TREATMENT FACILITY (Spot Elevations)

KIMMIRUT, NUNAVUT

Scale 1:1250
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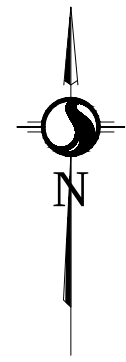
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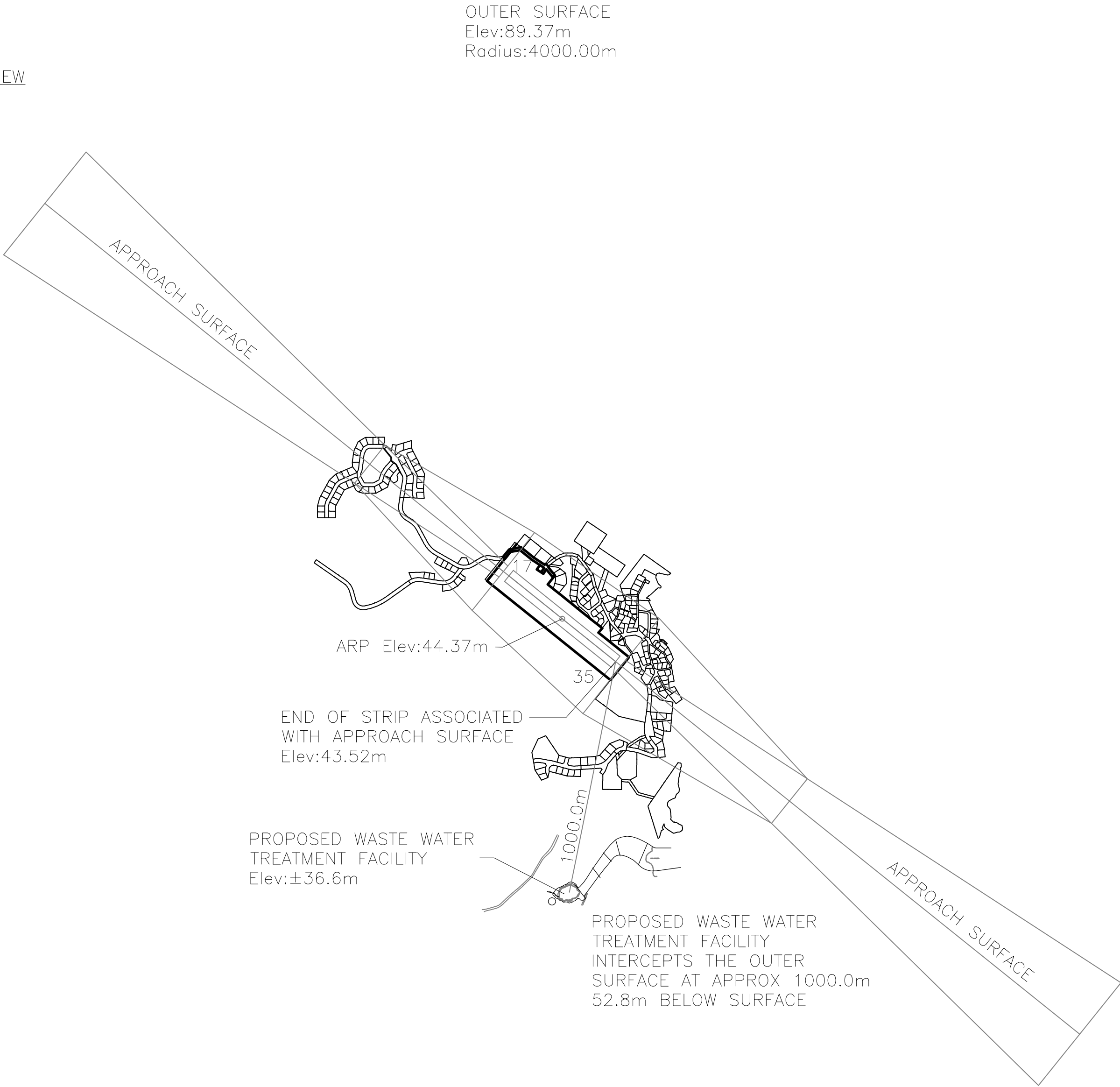
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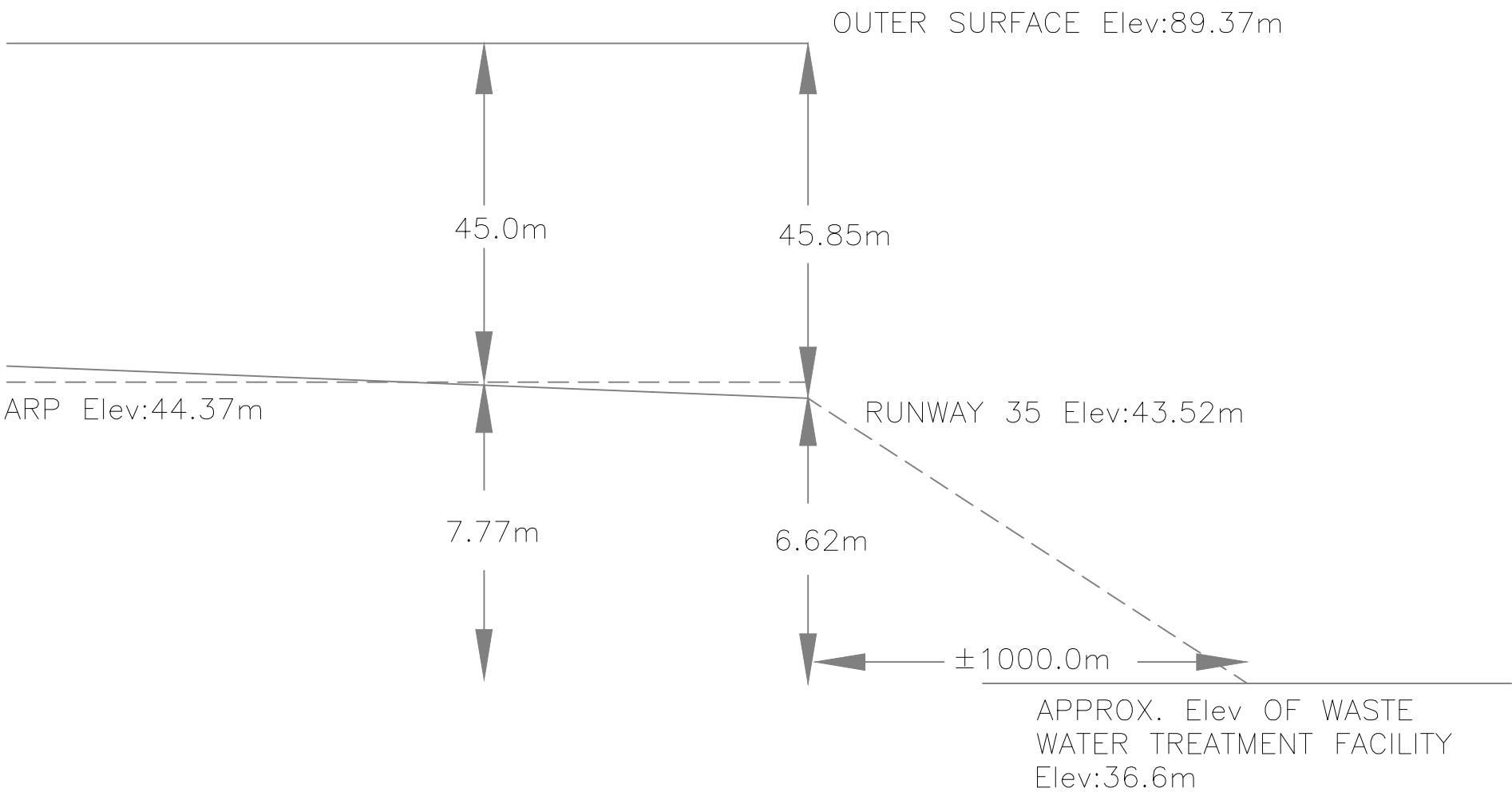
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SPK	"	SPIKE



PLAN VIEW



PROFILE VIEW



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TOPOGRAPHIC SKETCH of PROPOSED WASTE WATER TREATMENT FACILITY (OBSTRUCTION SURVEY)

KIMMIRUT, NUNAVUT



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NW	"	PK NAIL
PKN	"	VERTICAL CONTROL MONUMENT
VCM	"	WITNESS
WIT	"	SPIKE
SPK	"	

Sibbald, Carey

From: Fast, Fred <FFast@GOV.NU.CA>
Sent: Tuesday, March 14, 2017 12:00 PM
To: Sibbald, Carey
Cc: Lamothe, Pierre; Hope, Grigor; Roy, Bhabesh
Subject: RE: AZR Exemption
Attachments: let_gn-cgs_to_gn-edt_proj_summ_20161221_fnl.pdf

Hi Carey,

I see that the proposed sewage lagoon is located just south of the current location which situates it slightly further from the runway.

As you are aware, Transport Canada has cited concerns with sewage lagoons which is why this prohibition is now included in the newly issued AZRs.

The Kimmirut AZRs state: **6. (1) A person must not use or permit another person to use any of the lands for activities or uses that attract wildlife — particularly birds — that may create a hazard for aviation safety.**

So in order to obtain an exemption from Transport Canada, they will need to be satisfied that a new sewage lagoon installation will not impose a hazard to aviation safety. It will be incumbent on the proponent to complete a thorough bird study that clearly shows that safety to aviation will not be compromised and this may include mitigation strategies. You may want to consult with the local wildlife officer, the airport maintainer, airport radio operator (Community Aerodrome Radio Station Observer Communicator), and Hamlet staff and specifically the sewage truck drivers that visit the present sewage lagoon daily and make daily observations of which birds are attracted to the lagoon at various times of the year. You may also want to contact the local pilots with Kenn Borek Air based in Iqaluit.

Before the GN-EDT Nunavut Airports can provide a letter of no objection we would also need to see that due diligence was undertaken and a sufficient investigation completed providing evidence and if required what mitigation strategies would be implemented.

If you require further assistance, please don't hesitate to contact me.

I have cc'd the new Transportation Programs Manager for Baffin South, Pierre Lamothe.

Regards,

Fred Fast

Manager, Standards and Program Development
Nunavut Airports, ED&T
PO Box 560, Rankin Inlet, NU X0C 0G0
Ph (867) 645 8212 Fax (867) 645 8246
ffast@gov.nu.ca

From: Sibbald, Carey [mailto:Carey.Sibbald@stantec.com]
Sent: March 9, 2017 9:51 AM
To: Fast, Fred
Subject: RE: AZR Exemption

Hi Fred – have you had a chance to review the project proposal yet? Just wanted to check in that you received my earlier email and if you had any preliminary questions.

Thanks,
Carey

From: Sibbald, Carey
Sent: Thursday, March 02, 2017 8:40 AM
To: 'Fast, Fred' <FFast@GOV.NU.CA>
Cc: Fredlund, Ben <BFredlund@GOV.NU.CA>
Subject: RE: AZR Exemption

Hi Fred,

Sure, no problem. Please see attached for the original submission. My original email is in the thread below. Thank you for your response!

Carey

From: Fast, Fred [<mailto:FFast@GOV.NU.CA>]
Sent: Thursday, March 02, 2017 8:03 AM
To: Sibbald, Carey <Carey.Sibbald@stantec.com>
Cc: Fredlund, Ben <BFredlund@GOV.NU.CA>
Subject: RE: AZR Exemption

Hi Carey,

Can you forward the letter and submission with supporting documents to myself as well?

Regards,
Fred

Fred Fast

Manager, Standards and Program Development
Nunavut Airports, ED&T
PO Box 560, Rankin Inlet, NU X0C 0G0
Ph (867) 645 8212 Fax (867) 645 8246
ffast@gov.nu.ca

From: Sibbald, Carey [<mailto:Carey.Sibbald@stantec.com>]
Sent: March 1, 2017 7:50 PM
To: Fredlund, Ben
Cc: Fast, Fred
Subject: RE: AZR Exemption

Hi Ben,

I'm just following up again on the project summary letter we submitted on behalf of the GN-CGS for the proposed wastewater treatment facility in Kimmirut. As noted in the email chain, I submitted this to you just before Christmas and haven't heard back from you yet. I just called and left you another voicemail as well. Can you confirm that you received our submission? Do you have any questions that you'd like to discuss?

Please let me know,

Thanks,
Carey

From: Sibbald, Carey
Sent: Thursday, February 02, 2017 9:01 AM
To: 'Fredlund, Ben' <BFredlund@GOV.NU.CA>
Subject: RE: AZR Exemption

Hi Ben,

I'm just following up again on the project summary letter we submitted on behalf of the GN-CGS for the proposed wastewater treatment facility in Kimmirut. Can you confirm that you received our submission? Do you have any questions that you'd like to discuss?

Please let me know,

Thanks,
Carey

From: Sibbald, Carey
Sent: Monday, January 16, 2017 10:03 AM
To: 'Fredlund, Ben' <BFredlund@GOV.NU.CA>
Subject: RE: AZR Exemption

Hi Ben,

We submitted a project summary letter for the GN-CGS' proposed new wastewater treatment facility in Kimmirut just before Christmas. See my original email below on December 21st. As things can get lost over holiday breaks in mounting emails and inbox sizes, I just wanted to follow up quickly to confirm that you did receive our submission.

Can you please confirm? I can re-send if needed.

Thank you,
Carey

From: Sibbald, Carey
Sent: Wednesday, December 21, 2016 8:32 AM
To: Fredlund, Ben <BFredlund@GOV.NU.CA>
Cc: Hope, Grigor <GHope@GOV.NU.CA>
Subject: RE: AZR Exemption

Hi Ben,

As per our last communication on a proposed new wastewater treatment facility in Kimmirut (see below, in September), I'm sending you a letter and project summary for the facility, on behalf of the GN-CGS. Please see attached. The attached letter provides a review of the regulatory setting, and our requirement for approval from the GN-EDT Nunavut Airports Division and Transport Canada, as well as background on the project and the conceptual design. Several figures and drawings are also included.

We'd like the GN-EDT Nunavut Airports Division to review the attached and confirm, in writing, whether or not they object to the proposed facility and its location within the 4 km Kimmirut Airport Zoning Regulation.

If you have any questions on the attached, or on the project, please feel free to contact myself, or Grigor Hope (cc'd here) with the GN-CGS.

Thank you, and Happy Holidays!
Carey

From: Fredlund, Ben [<mailto:BFredlund@GOV.NU.CA>]
Sent: Tuesday, September 13, 2016 11:20 AM
To: Sibbald, Carey <Carey.Sibbald@stantec.com>
Subject: RE: AZR Exemption

Good day Carey, You can send the info (proposal) to me and I will forward on to be reviewed. It will all depend on where the Locations is to determine what we will want to see.
Thanks



Ben Fredlund

Manager, Transportation Programs (Kivalliq Region)
Department of Economic Development and Transportation
Nunavut Airports Division
PO Box 560
Rankin Inlet, NU X0C-0G0
P# 867.645.8223 F# 867.645.8246
bfredlund@gov.nu.ca

24/7 NAD Emergency cell # 867-645-6565

From: Sibbald, Carey [<mailto:Carey.Sibbald@stantec.com>]
Sent: September 7, 2016 3:17 PM
To: Fredlund, Ben
Subject: AZR Exemption

Hi Ben,

On behalf of the GN-CGS, I'm in the process of assessing information requirements to obtain an exemption to the Kimmirut Airport Zoning Regulation (AZR) for construction of a new wastewater treatment facility. I have spoken with a contact at Transport Canada and they have advised me of the overall information requirements to obtain the exemption, and, as you may know, one of the submission requirements is a letter from the Airport Operator regarding the potential impact of the development. As the GN is the operator of airports in Nunavut, I've been attempting to contact individuals in the Airports Division to discuss the process for submission, but have not been successful. Would you know, or be able to point me to someone, who can provide further information on the process? I am assuming an Airport Bird Hazard Risk Assessment will be required as part of our submission, but would like to discuss this further. Any information you can provide would be greatly appreciated.

Thank you,
Carey

Carey Sibbald, B.Sc., R.P.Bio

Environmental Biologist
Project Manager
Stantec
2nd Floor 4910 53 Street, PO Box 1777 Yellowknife NT X1A 2P4
Phone: (604) 235-1874

Cell: (867) 446-7644
Carey.Sibbald@stantec.com



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**Airport-Bird Hazard Risk
Assessment for the Proposed
Wastewater Treatment Facility
in Kimmirut, NU
FINAL REPORT**

Revision 1



Prepared for:
Government of Nunavut
Department of Community and
Government Services

Prepared by:
Stantec Consulting Ltd.
2nd Floor, 4910 53 Street
Yellowknife, NT X1A 2P3

July 4, 2017

**AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN
KIMMIRUT, NU
FINAL REPORT**

Table of Contents

EXECUTIVE SUMMARY	I
ABBREVIATIONS.....	III
1.0 INTRODUCTION	1
1.1 BACKGROUND	1
1.2 REGULATORY CONTEXT	2
2.0 PROJECT DESCRIPTION	4
2.1 PROJECT LOCATION.....	4
2.2 CONCEPTUAL PROJECT DESIGN.....	4
3.0 METHODS.....	6
3.1 DESKTOP ANALYSIS	6
3.2 BIRD HAZARD RISK ASSESSMENT PROCESS	6
3.2.1 Classification of Risk.....	7
3.2.2 Elements of Risk.....	7
3.2.3 Airport Bird Hazard Zone Development	9
4.0 RESULTS	11
4.1 DESKTOP ANALYSIS	11
4.1.1 Telephone Interviews	11
4.1.2 Environmental Setting	12
4.2 BIRD HAZARD RISK ASSESSMENT	13
4.2.1 Classification of Risk.....	13
4.2.2 Elements of Risk.....	13
4.3 OVERALL ASSESSMENT OF RISK.....	17
5.0 MITIGATION REVIEW	18
6.0 CONCLUSION.....	20
7.0 CLOSURE.....	21
8.0 LITERATURE CITED	22
LIST OF TABLES	
Table 1 Bird Hazard Ranking System (from Transport Canada 2007)	8
Table 2 Bird Species that have Potential to Occur in the Kimmirut AZR Boundary	13
LIST OF FIGURES	
Figure 1 Proposed Location of Wastewater Treatment Facility in Kimmirut, NU.....	3
Figure 2 Runoff Location of Wastewater Treatment Facility in Kimmirut, NU	5
Figure 3 Proposed Location of Wastewater Treatment Facility and Bird Hazard Zones in Kimmirut, NU	16

Executive Summary

Construction of a new wastewater treatment facility (WWTF; "the Project") in Kimmirut, Nunavut, has been proposed to replace the existing sewage dump, which does not provide adequate treatment of wastewater. The conceptual design for the new WWTF currently includes a sewage lagoon system with passive or active decant during summer months, and secondary treatment of effluent by a downstream wetland, as well as additional infrastructure (e.g., access road, truck turnaround pad). The proposed location for the new WWTF is within the 4,000 m outer surface zone of the *Kimmirut Airport Zoning Regulations* (AZR; SOR/2012-96), where specific land uses that may attract wildlife, particularly birds, are not permitted. A sewage lagoon, which is part of the WWTF conceptual design, may attract birds that could potentially pose a threat to aviation safety, and, in general, sewage lagoons are considered a moderate risk land use activity within the AZR (Transport Canada 2007). Therefore, an exemption to the AZR is required to construct and operate the new WWTF, and to apply for an exemption to the AZR, a bird hazard risk assessment is required to evaluate the potential risk of the Project.

A bird hazard risk assessment examines the relationship between land use, bird species and behavior, and aircraft movement to assess aviation safety. It is a customizable process that allows evaluation of the factors that may create risk at a specific airport. To complete this assessment for the proposed new WWTF in Kimmirut, Stantec used a combination of desktop analysis and telephone interviews with members of the community. Information assessed included potential bird species and movement patterns, land use types within the AZR, parks and protected areas, flight frequency, paths, phases, and types of aircraft that operate from the Kimmirut airport.

Airport Bird Hazard Zones (i.e., Primary, Secondary, and Special) within the Kimmirut AZR were developed based on aircraft type, flight phase, and land use type, following Transport Canada (2007). The Project is located within the Kimmirut airport Primary Bird Hazard Zone. As Transport Canada (2007) notes, sewage lagoons are considered moderate risk land uses, and land use types considered high, moderate, or low risk are not considered appropriate in the Primary Bird Hazard Zone.

However, there are many natural wetlands, lakes, and coastal areas within the AZR that are attractive to birds, as well as land use types, such as the community's existing landfill, which is considered a high-risk land use type (Transport Canada 2007). Despite these factors, bird species considered hazardous (e.g., geese, ducks, and gulls) have not been reported making flights near the Kimmirut airport, and there have been no reported bird strike events for at least the past 11 years (P. Onalik, pers. comm.). Further, these hazardous bird species are only expected to be present for a portion of the year (e.g., typically from May to September during annual migrations). The proposed sewage lagoon is also expected to be frozen for eight months of the

**AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN
KIMMIRUT, NU
FINAL REPORT**

year, from approximately October to May, and not be available as a bird attractant for resident or other bird species.

In addition, Project design elements may reduce the potential for birds occupying the proposed WWTF. The lagoon will be relatively small (less than 1 ha), and a berm around the lagoon will discourage birds from walking into the site. As a result, with the Project design elements, and the relative infrequency of aircraft flights, the Project is expected to result in an overall moderate to low risk for Category A and Category B loss events at the Kimmirut airport.

The risk of a sewage lagoon to aviation safety may be reduced with the application of mitigation. Mitigation measures were reviewed that could further reduce the risk of bird collisions with aircraft. Mitigation reviewed included a "no mitigation" option, and passive management techniques, given the variability and uncertainty in bird numbers and movement patterns in the Kimmirut area. Passive management techniques reviewed included cannons (i.e., noise disturbance), flagging, scarecrows/effigies, overhead wires or netting, bird deterrent balls (i.e., floating lagoon covers), and vegetation management. The overall effectiveness of each method depends on several factors including targeted bird species, habitat conditions, weather, and time of year. These factors, as well as installation, maintenance, and cost considerations, may factor in the decision whether any of these methods, or none at all, are required to reduce the risk of collision. Discussions with applicable regulatory agencies should occur to determine which mitigations, if any, are most appropriate for the Kimmirut WWTF.

**AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN
KIMMIRUT, NU
FINAL REPORT**

Abbreviations

AGL	Above ground level
AZR	Airport Zoning Regulation
FAR	Federal Aviation Regulations
GN-CGS	Government of Nunavut Department of Community and Government Services
GN-EDT	Government of Nunavut Department of Economic Development and Transportation
km	kilometre
m	metre
Stantec	Stantec Consulting Ltd
WWTF	Wastewater treatment facility

AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU FINAL REPORT

Introduction
July 4, 2017

1.0 INTRODUCTION

Construction of a new wastewater treatment facility (WWTF) ("the Project") in Kimmirut, Nunavut, has been proposed to replace the existing sewage dump. Stantec Consulting Ltd. (Stantec) was retained by the Government of Nunavut Department of Community and Government Services (GN-CGS) to begin the first phase of environmental permitting for the Project.

This document provides an airport bird hazard risk assessment to examine the level of risk that the proposed WWTF, which includes a sewage lagoon, may pose to the existing Kimmirut airport and aviation safety. The proposed location for the new WWTF is within the 4,000 m outer surface exclusion zone of the *Kimmirut Airport Zoning Regulations* (AZR; SOR/2012-96), where specific land uses that may attract wildlife, particularly birds, are not permitted (s. 6[1]). Sewage lagoons may attract birds that could potentially pose a threat to aviation safety, and are considered a moderate risk land use activity (Transport Canada 2007). As such, to construct and operate the new WWTF at the proposed location, an exemption to the Kimmirut AZR is required from Transport Canada. Approval from the Government of Nunavut Department of Economic Development and Transportation (GN-EDT), Nunavut Airports Division (i.e. the Airport Operator), is required as part of the Transport Canada application process. During the GN-EDT Nunavut Airports Division's review of the Project, an airport-bird hazard risk assessment was requested to evaluate the potential risk of the Project on aviation safety.

1.1 BACKGROUND

The Hamlet of Kimmirut currently releases sewage, collected from residences and businesses, into a trench near the solid waste facility (i.e., landfill), situated 537 m south of the community (Figure 1). Although this location and method of sewage disposal has been in use for more than 30 years, it has long been considered unacceptable because it does not provide adequate treatment (Nunami Stantec 2015). A new WWTF, to replace the sewage dump, was constructed in 2001, and upgraded in 2011. However, during the Nunavut Water Board Water License review process for the application to operate the new WWTF, the presence of fish in a downstream wetland and Tuullitsut Lake was highlighted as a concern (Nunami Stantec 2014). A 2013 fish habitat assessment identified Arctic char (*Salvelinus alpinus*) in the wetland and adjoining lakes (Nunami Stantec 2014), and the community decided that a WWTF should not operate in this area. As such, the new WWTF has never been operational.

Site options for the construction of a new WWTF (the Project) were assessed in a feasibility study (Nunami Stantec 2015), in which the current Project Site (Site 9) was selected as the most suitable option based on operational requirements, effluent quality requirements, and cost.

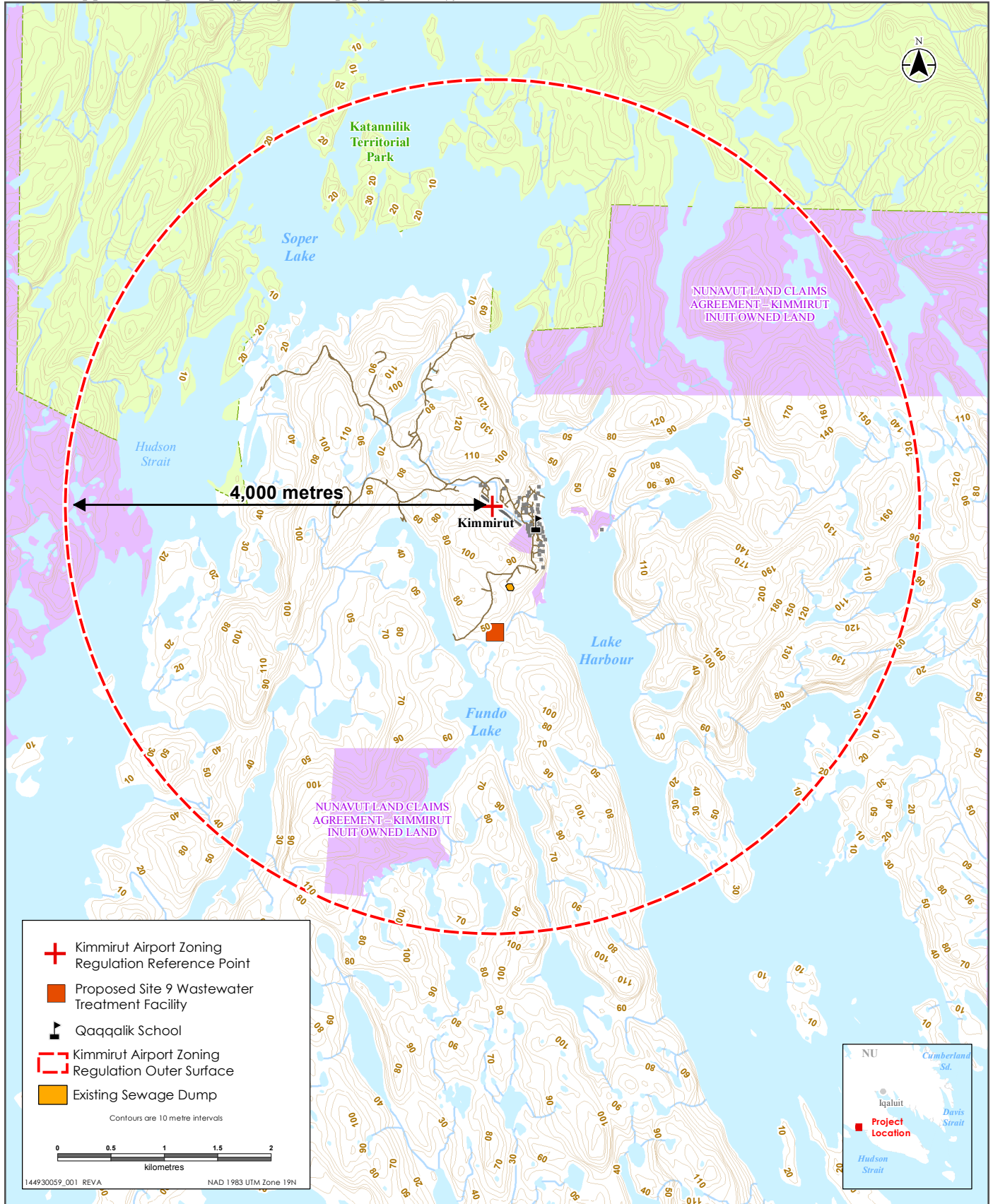
AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU FINAL REPORT

Introduction
July 4, 2017

1.2 REGULATORY CONTEXT

The Kimmirut AZR defines the outer surface of the airport as all lands within a 4,000 m radius of the airport (Government of Canada 2013). The Project site is located within 4,000 m from the airport.

Section 6(1) of the AZR indicates that land activities or uses that attract wildlife, particularly birds, that could create a hazard for aviation safety are prohibited. The Project consists of a sewage lagoon system. As sewage lagoons may attract birds that could potentially pose a threat to aviation safety, they are considered a moderate risk land use activity and are an unacceptable land use within identified airport bird hazard zones (Transport Canada 2007). Therefore, an exemption to the AZR from Transport Canada is required for the construction and operation of the Project.



Sources: Base Data - Natural Earth; Thematic Data - ERBC

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

Proposed Location of Wastewater Treatment Facility in Kimmirut, NU



PHASE 1 REGULATORY APPROVALS FOR A NEW WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU

Figure 1

AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU FINAL REPORT

Project Description
July 4, 2017

2.0 PROJECT DESCRIPTION

2.1 PROJECT LOCATION

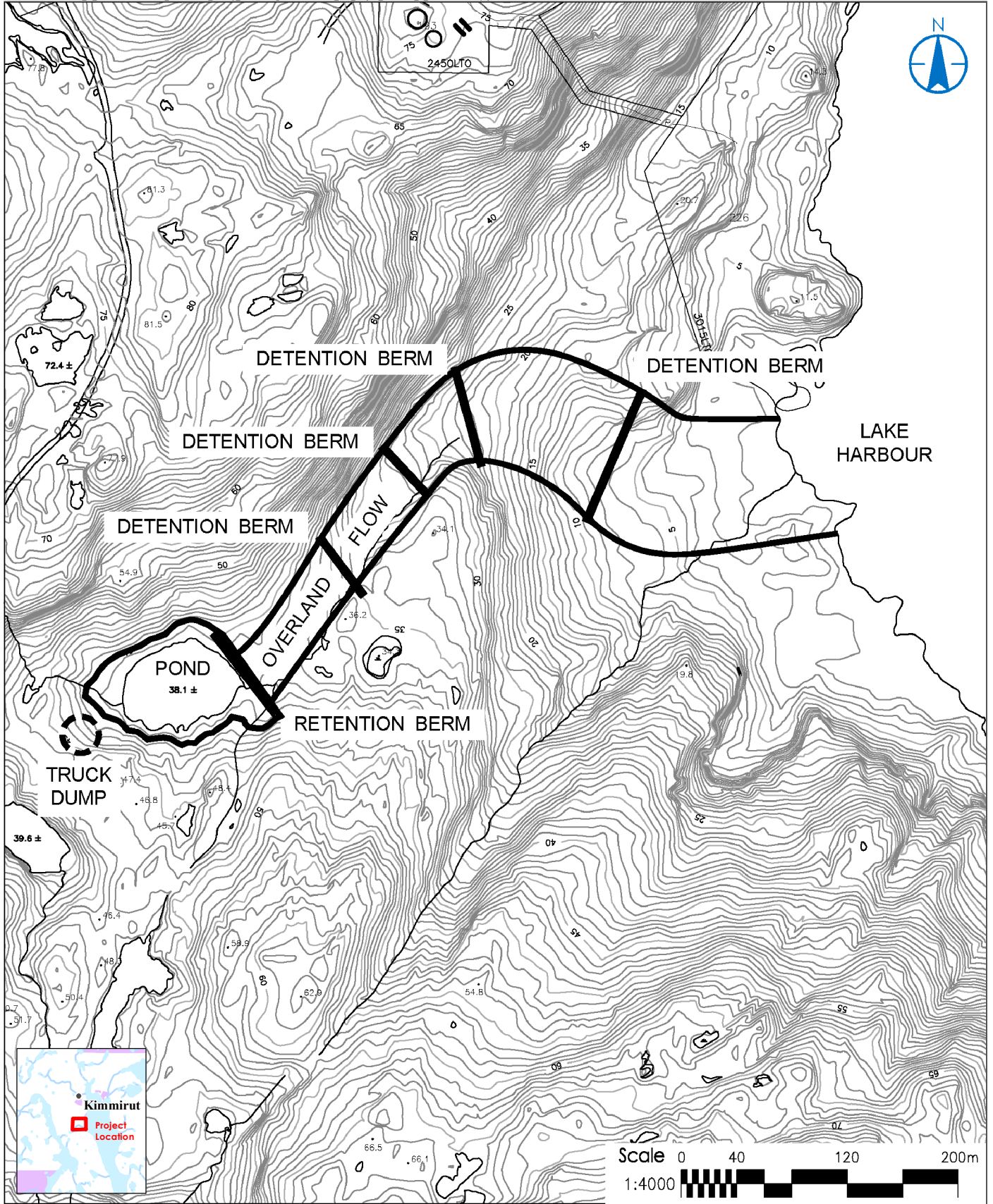
Kimmirut is situated on southern Baffin Island, Nunavut, approximately 120 km southwest of Iqaluit. It is located approximately 23 m from the open sea. The terrain in, and adjacent to Kimmirut is hilly. Land travel in all directions is limited due to the steep slopes and waterbodies that surround the community.

The Project Site is located 1,016 m south of the Kimmirut Airport at an existing natural pond, and is within the 4,000 m outer surface zone as outlined in the Kimmirut AZR (Figure 1).

2.2 CONCEPTUAL PROJECT DESIGN

The proposed new WWTF will consist of a sewage retention lagoon, an overland discharge path with retention and detention berms, a discharge station for trucks, a truck turnaround pad, and an extension of an existing road (Figure 2). The sewage lagoon will be created from the existing pond at the Project Site, and measure approximately 80 m x 120 m (0.96 ha), have an estimated storage volume of 22,000 m³, a depth of 2 to 3 m, and surface area of 7,000 to 11,000 m² (Nunami Stantec 2015). A retention berm will be built around the lagoon, with a height of 3 to 4 m at the discharge point.

The effluent discharge will occur through a passive decant or an active pumping system (Nunami Stantec 2015), and will likely take place at the end of summer, when maximum passive treatment of wastewater would have occurred. During the winter months, the lagoon will be frozen, however, sewage discharge into the lagoon will occur year-round.



**Runoff Location of Wastewater Treatment Facility
in Kimmirut, NU**

AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU FINAL REPORT

Methods
July 4, 2017

3.0 METHODS

3.1 DESKTOP ANALYSIS

The information used to conduct the bird hazard risk assessment was obtained through a combination of consultation with Kimmirut community members and desktop analysis. Consultation consisted of telephone interviews, and were conducted with a local wildlife officer, airport staff, and an employee of the Hamlet of Kimmirut familiar with current sewage collection and disposal practices. The purpose of the interviews was to obtain information on bird species occurrence, and behaviour and movement patterns in the Kimmirut area, as well as aircraft flight frequency, flight paths, flight phases, and types of aircraft that operate from the Kimmirut airport. Desktop analysis included a review of aerial imagery, Kimmirut airport approach plates (NAV CANADA; draft 2017), a review of existing documents related to environmental and wastewater treatment facility feasibility work (Nunami Stantec 2014 and 2015). Protected areas and areas of recognized importance for birds and biodiversity were reviewed, including Important Bird Areas (IBA 2015), Territorial Parks (Government of Nunavut 2017), National Parks (Parks Canada 2017), and Migratory Bird Sanctuaries (Environment and Climate Change Canada 2016).

Bird species potentially breeding in, or near Kimmirut, or making stopovers during migration, were assessed based on current knowledge of species ranges (Baldassarre 2014, Cornell Lab of Ornithology 2017). Information on general movement patterns and behaviours of species groups was considered.

3.2 BIRD HAZARD RISK ASSESSMENT PROCESS

A bird hazard risk assessment examines and evaluates the relationship between land use, bird species and behavior, and aircraft movement relative to aviation safety, and is customizable to the factors that may create risk at a given airport (Transport Canada 2007). As outlined in the *Airport Wildlife Management Bulletin No. 38* (Transport Canada 2007), a bird hazard risk assessment establishes a framework that links land use types to bird-related risks and aviation safety, and categorizes relationships between land use types found near airports, bird species, and various safety risks to aviation during different phases of aircraft flight. There are five key steps in the bird hazard risk assessment process:

1. Evaluation of aircraft risks – identifying and analyzing types, frequency of arrivals and departures, flight paths and flight phases of aircraft that operate at the airport
2. Determination of bird hazards – identifying and analyzing resident and migratory bird species that may create a risk to aviation safety
3. Categorizing relative risk by aircraft type and particular phases of flight (e.g., takeoff, landing)
4. Determining high-risk bird species and land use types that may attract these birds

AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU

FINAL REPORT

Methods

July 4, 2017

5. Creating bird hazard zones by integrating aircraft type and phase of flight, bird species and land use types

3.2.1 Classification of Risk

Relative risk to aviation safety is evaluated using the data described above to create airport-specific bird hazard zones. In the bird hazard risk assessment, worst-case scenarios are considered, and three classes of damage or losses to aircraft or occupants are applied (Transport Canada 2007):

Category A – Catastrophic loss, defined as complete loss of aircraft or loss of more than one life following a bird strike event

Category B – Major damage, defined as significant damage to the airframe, failure of one or more engines and/or one or more aircraft systems, serious injury to one or more occupants or the loss of life of one occupant

Category C – Minor damage to the airframe, engines, or aircraft systems

3.2.2 Elements of Risk

To develop the framework to assess the risk between birds and aviation safety, the following risk elements are considered:

Risk Element I – Aircraft-related

Exposure and severity of bird strike events is evaluated by determining aircraft-related information relevant to the airport being assessed. Information considered includes:

- Aircraft types and Federal Aviation Regulations (FAR) airframe and engine certification standards
- Aircraft movements (e.g., number of daily flights)
- Dimensions of lateral and vertical flight paths
- Various phases of flight (e.g., take off, initial climb); critical phases of flight are considered those at, or below, 1,500 feet above ground level (AGL) and are takeoff, initial climb, approach, landing and missed approach.

With the information outlined above, high-risk flight paths can be created and superimposed over maps of the local area, and represent flight paths in which Category A or Category B loss events are most likely to occur.

AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU

FINAL REPORT

Methods
July 4, 2017

Risk Element II – Bird species related

Different bird species groups may pose varying hazards to aircrafts, based on body weight, nesting, feeding, flocking, and flying behaviors. Bird behavior may vary with weather, seasons and time of day, and bird hazard zones should account for variability in behavior. Large birds cause more damage than smaller birds, and weight is more important to consider than body size, as bird density determines damage. Flocking behavior is an important consideration, as the probability of more than one bird being involved in a strike event increases with flock size. Flight behavior may vary with season and local land use. High altitude migration flights may pose a risk to aircraft, but are not considered further in this assessment as these flights are independent of land use type. Some migrating birds may be attracted to land use types near an airport for foraging or shelter, and it is these birds, as well as resident birds, that make local, daily flights around an airport, that are of most concern to aircraft safety.

A bird hazard ranking system, as outlined in Transport Canada (2007), takes physical characteristics and behavior of birds into consideration, and defines a level of risk to aircraft relative to airframe and engine certification standards. The bird hazard ranking system uses six risk levels that varies from highest risk (Level 1) to least risk (Level 6). The bird hazard ranking system (following Transport Canada 2007) is outlined in Table 1 below.

Table 1 Bird Hazard Ranking System (from Transport Canada 2007)

Level of Risk	Characteristics	Example Species /Species Groups
Level 1	Very large (>1.8 kg); flocking	Geese, cranes
Level 2	Very large (>1.8 kg); solitary Large (1 – 1.8 kg); flocking	Ducks, gulls, vultures
Level 3	Large (1 – 1.8 kg); solitary Medium (0.3 – 1 kg); flocking	Hawks, American crow, common raven
Level 4	Medium (0.3 – 1 kg); solitary Small (0.05 – 0.3 kg); flocking	Dunlin, red knot, Baird's sandpiper
Level 5	Small (0.05 – 0.3 kg); solitary Very small (<0.05 kg); flocking	Swallows, snow bunting, red-necked phalarope
Level 6	Very small (<0.05 kg); solitary	Warblers, sparrows

Risk Element III – Land use related by hazardous species

The third step is to assess and evaluate the land use types that may attract species included in Bird Hazard Levels 1 through 4 (Table 1), termed “hazardous bird species”. Bird and land-use related factors such as species, numbers, behavior, frequency of use, location and scope of land use may influence hazards to aircraft safety (Transport Canada 2007).

AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU

FINAL REPORT

Methods
July 4, 2017

Land use types near airports are ranked based on severity of risk. Examples of high, moderate, low, and limited risk land use types are outlined below:

High Risk Land Use: putrescible waste land fill, hog farms, wildlife refuges and waterfowl feeding stations

Moderate Risk Land Use: cattle paddocks, sewage lagoons, golf courses

Low Risk Land Use: dry waste landfill, marshes, swamps, commercial shopping malls, fast food restaurants

Limited Risk Land Use: natural habitats, inactive agricultural fields

3.2.3 Airport Bird Hazard Zone Development

The evaluation of Risk Elements I, II and III, provides the basis for the development of bird hazard zones around an airport. There are four categories of airport bird hazard zones, which are defined below (Transport Canada 2007):

Primary Bird Hazard Zone – defined as the area in which aircraft are at, or below, 1,500 feet AGL during critical phases of flight. Hazardous bird species (i.e., Levels 1 through 4; Table 1) are most commonly flying at these altitudes, and bird strike events are most likely to result in a Category A loss.

Secondary Bird Hazard Zone – a buffered zone outside of the Primary Bird Hazard Zone which accounts for variability, including pilot technique, environmental factors, and bird behavior.

Category B Event Zone – defined as the area in which Category B events are most likely to occur. This zone is typically used for airports that host a range of aircraft that use flight paths not parallel to runways (e.g., recreational aircraft and helicopters).

Special Bird Hazard Zone – land use types beyond Primary, Secondary and Category B zones that may attract birds which would cross other zones, and pose a risk to aircraft.

3.2.3.1 Airport Bird Hazard Zones

The dimensions and shapes of airport bird hazard zones are dependent on the flight paths of aircraft at a given airport during critical phases of flight. Predictable shapes and bird hazard zone dimensions can be created, based on the FAR certification standard for various aircraft types.

The shapes of bird hazard zones are the same for most airports, irrespective of aircraft type. The dimensions of these zones vary with FAR certification category, and the location and shape

AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU FINAL REPORT

Methods
July 4, 2017

of special bird hazard zones are dependent on land use types around individual airports. Departure paths, airport traffic patterns, arrival paths, and missed approach paths were considered during the development of bird hazard zone shapes for Kimmirut (Transport Canada 2007).

Dimensions for bird hazard zones based on FAR certification category and bird hazard zone shapes are outlined in Transport Canada (2007) (see Table 5, and Figures 1-3, respectively).

3.2.3.2 Land Use in Bird Hazard Zones

The evaluation of hazardous land use types, outlined in Risk Element III, determines the appropriateness of various land use types within bird hazard zones. For a complete summary of appropriateness of land use types within bird hazard zones, refer to Transport Canada (2007; Table 4).

In summary, land use types considered high, moderate, or low risk are not considered appropriate in the Primary Bird Hazard Zone, and land use types categorized as high and moderate risk are not appropriate for the Secondary Bird Hazard Zone. In the Special Bird Hazard Zone, land use defined as high risk is not considered appropriate and typically requires effective mitigation. Land use activities considered to be a moderate or low risk are considered acceptable.

AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU FINAL REPORT

Results
July 4, 2017

4.0 RESULTS

4.1 DESKTOP ANALYSIS

Telephone interviews were conducted with four residents in March and April 2017. These residents are familiar with Kimmirut wildlife, sewage disposal and landfill practices, and/or local aviation and aircraft. Participants were informed of the purpose of the interviews. Information obtained during the interviews are described below.

4.1.1 Telephone Interviews

The local Conservation Officer, Sean Noble, indicated that flocks of waterfowl (i.e., geese and ducks) begin arriving in the Kimmirut area in May each year. Kimmirut is located approximately 300 km southeast of the Dewey Soper Migratory Bird Sanctuary, and some birds may use the Kimmirut area as a stopover area during spring migration. Within the community, birds are primarily observed in small flocks in wetlands, ponds, and on land, and typically move between wet areas. Fall migration south to overwintering grounds typically occurs in September and October.

Guy Audlakak, the Foreman for the Hamlet of Kimmirut, manages local water delivery and wastewater pickup and disposal. Mr. Audlakak stated that beginning in late April and through May of each year, gulls, loons, geese (e.g., Canada goose [*Branta canadensis*] and snow goose [*Chen caerulescens*]), and snow buntings (*Plectrophenax nivalis*) are observed in Kimmirut; he suggested that geese seem to avoid areas where humans are present to avoid being hunted. Mr. Audlakak also indicated that geese, snow buntings, and ravens (*Corvus corax*) are most typically observed in the community during spring and summer. Birds are observed migrating south during September and October, and only ravens overwinter in Kimmirut. During the summer months, Mr. Audlakak has observed only ravens and aggregations of gulls (approximately 100 individuals) around the landfill site, near the existing sewage dump (Figure 1), and mentioned gulls move around Kimmirut to scavenge. Further, he mentioned that birds do not congregate around the current sewage dump as the discharged material does not pool. Mr. Audlakak further indicated that numbers of migratory birds observed around Kimmirut seems to vary with seasonal wind patterns. He indicated that when strong easterly winds occur, there appear to be higher numbers of migratory birds in, and around, the community¹. He indicated that wetlands and lakes around Kimmirut begin to freeze in October, and thaw by May or June. Mr. Audlakak has not heard of bird-related issues at the airport.

¹ Kimmirut does not have an Environment and Climate Change Canada meteorological station to assess predominant wind direction. The nearest communities (i.e., Cape Dorset and Iqaluit) do however, and, based on 1981 to 2010 climate normals, winds are primarily from the west in Cape Dorset, and the northwest in Iqaluit (Environment and Climate Change Canada 2017).

AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU

FINAL REPORT

Results

July 4, 2017

The Kimmirut Airport Radio Operator, Paul Onalik, has not observed large flocks of birds moving between wetlands around the airport, but has observed flocks of Canada geese making high-altitude flights (i.e., higher than aircraft). He indicated that he has only observed ravens in Kimmirut during winter months. Over the past 11 years of his employment at the airport, Mr. Onalik has not experienced any bird strike incidents. He indicated that there are up to 30 flights per week at the Kimmirut airport, and Twin Otters and PC-12 single-engine Turboprops are the primary types of aircraft, with a few helicopter flights during the summer. Mr. Onalik confirmed that the airport runway is 579 m in length, and 23 m wide.

Timela Ikkidluak has been the Airport Maintainer for 20 years, and has observed Canada geese in the Kimmirut area in the spring, though only in small flocks. He stated that ravens remain in Kimmirut throughout the year. Mr. Ikkidluak stated that dependent on cargo coming into the community, there are up to four flights per day, typically Twin Otter aircraft, and helicopters only use the airport a few times per year.

4.1.2 Environmental Setting

There are five distinct watersheds within the 4,000 m AZR surrounding Kimmirut, which contain marine, freshwater, and brackish waterbodies. The watershed catchments drain into the marine environments of Lake Harbour, Glasgow Inlet, and Pleasant Inlet, the freshwater Soper River and brackish Soper Lake, and many smaller freshwater lakes and waterbodies associated with these watersheds (Nunami Stantec 2015). Tundra vegetation communities around Kimmirut consist primarily of mosses, lichens, grasses, and areas of willow. Land use types within the 4,000 m AZR outer surface include a school (located 123 m southeast the airport; Figure 1), dwellings, other buildings, and associated infrastructure for the community of approximately 389 individuals (Statistics Canada 2017). Existing municipal infrastructure within the 4,000 m AZR outer surface consists of the existing sewage dump and landfill, which are located approximately 536 m south of the airport (Figure 1).

One territorial park, Katannilik Territorial Park, is located approximately 1,482 m north of the airport (Government of Nunavut 2017), within the 4,000 m AZR outer surface. There are no Important Bird Areas (IBA)s within the 4,000 m AZR outer surface, however, there are several IBAs on Baffin Island that are considered significant for waterbirds (IBA 2015). There are two National Parks on Baffin Island and both are more than 400 km from Kimmirut: Auyuittuq National Park and Sirmilik National Park, located 446 km and 1,038 km from Kimmirut, respectively. The Dewey Soper Migratory Bird Sanctuary is also located on Baffin Island (Environment and Climate Change Canada 2016; Parks Canada 2017), and is 315 km from Kimmirut.

AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU FINAL REPORT

Results
July 4, 2017

4.2 BIRD HAZARD RISK ASSESSMENT

A bird hazard risk assessment was completed for the Kimmirut airport using the information obtained from the desktop analysis and telephone interviews with residents of Kimmirut. The type of aircraft used at the Kimmirut airport are considered FAR 23 (Commuter Aircraft).

4.2.1 Classification of Risk

As outlined in Transport Canada (2007), Category A or B losses are possible for a FAR 23 commuter aircraft in the event of a bird strike.

4.2.2 Elements of Risk

4.2.2.1 Risk Element I

A maximum of two arriving and departing flights per day (four flights total) was assumed resulting in an estimate of 28 flights per week. During the critical phases of flight, FAR 23 commuter aircraft typically have flight altitudes from 0 to 3,000 feet AGL (see Table 2 in Transport Canada 2007).

4.2.2.2 Risk Element II

Migratory birds have been documented using sewage lagoons as stopover sites, and many bird species breed near sewage lagoons (Zimmerling 2006). Bird species and species groups that fall within Risk Levels 1 to 4 (Table 1, with 1 being the highest risk) may pose significant safety hazards to aircraft, based on the history of bird strike incidents, while Risk Levels 5 and 6 have typically not been the source of significant accidents, but minor damage is possible (Transport Canada 2007). Therefore, only bird species within Risk Level 1 to 4 that are most likely to be attracted to aquatic environments (e.g., waterbirds and shorebirds) and scavengers (e.g., gulls and common raven) were further considered for this assessment. It is not known which bird species and how many individuals are found in the Kimmirut area, but there are 33 species that may potentially use the proposed WWTF's sewage lagoon during the migration or breeding season (Table 2).

Table 2 Bird Species that have Potential to Occur in the Kimmirut AZR Boundary

Common Name	Latin Name	Level of Risk
Snow goose	<i>Chen caerulescens</i>	1
Ross's goose	<i>Chen rossii</i>	1
Brant	<i>Branta bernicla</i>	1
Canada goose	<i>Branta canadensis</i>	1
Tundra swan	<i>Cygnus columbianus</i>	1
Northern pintail	<i>Anas acuta</i>	2

**AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU
FINAL REPORT**

Results
July 4, 2017

Table 2 Bird Species that have Potential to Occur in the Kimmirut AZR Boundary

Common Name	Latin Name	Level of Risk
Harlequin duck	<i>Histrionicus</i>	2
Long-tailed duck	<i>Clangula hyemalis</i>	2
Red-breasted merganser	<i>Mergus serrator</i>	2
Sandhill crane	<i>Grus canadensis</i>	1
American golden-plover	<i>Pluvialis dominica</i>	4
Semipalmated plover	<i>Charadrius semipalmatus</i>	4
Ruddy turnstone	<i>Arenaria interpres</i>	4
Red knot	<i>Calidris canutus</i>	4
Sanderling	<i>Calidris alba</i>	4
Dunlin	<i>Calidris alpina</i>	4
Purple sandpiper	<i>Calidris maritima</i>	4
Baird's sandpiper	<i>Calidris bairdii</i>	4
White-rumped sandpiper	<i>Calidris fuscicollis</i>	4
Pectoral sandpiper	<i>Calidris melanotos</i>	4
Semipalmated sandpiper	<i>Calidris pusilla</i>	4
Red-necked phalarope	<i>Phalaropus lobatus</i>	5
Red phalarope	<i>Phalaropus fulicarius</i>	5
Sabine's gull	<i>Xema sabini</i>	2
Herring gull	<i>Larus argentatus</i>	2
Thayer's gull	<i>Larus thayeri</i>	2
Iceland gull	<i>Larus glaucoides</i>	2
Glaucous gull	<i>Larus hyperboreus</i>	2
Arctic tern	<i>Sterna paradisaea</i>	4
Red-throated loon	<i>Gavia stellata</i>	2
Pacific loon	<i>Gavia pacifica</i>	2
Common loon	<i>Gavia immer</i>	2
Common raven	<i>Corvus corax</i>	3

4.2.2.3 Risk Element III

There are several land use types within the 4,000 m Kimmirut AZR outer surface that might attract bird species considered hazardous to aviation safety (i.e., Level of Risk 1 to 4). The landfill and school yard are considered a high risk and low risk land use types, respectively. The proposed

AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU

FINAL REPORT

Results

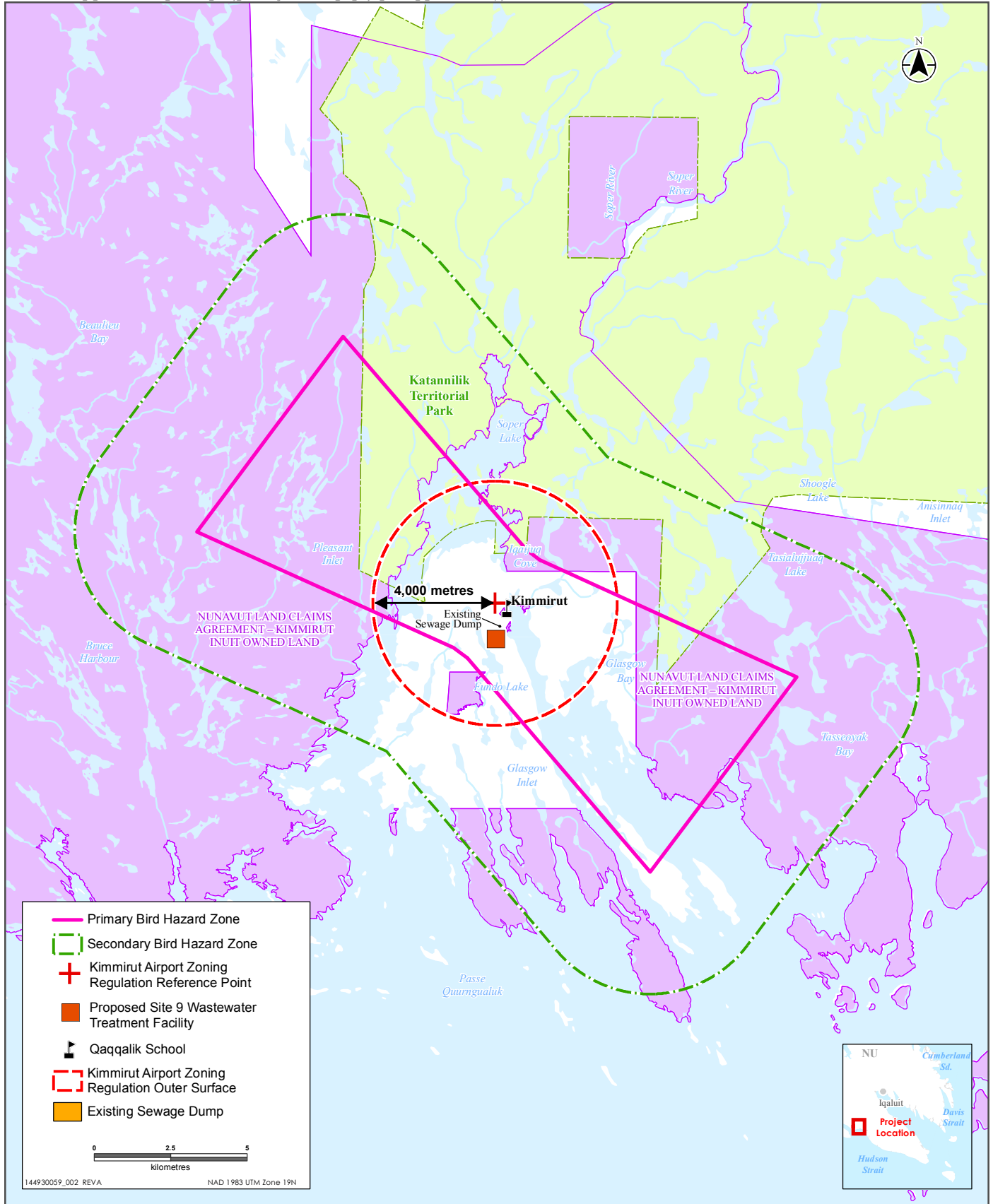
July 4, 2017

WWTF with sewage lagoon is considered a moderate risk land use type. The natural habitat, including Katannilik Territorial Park, bordering the community is considered a limited risk land use type. The current sewage dump does not use a lagoon system and is not considered a hazardous land use type.

Consistent with Transport Canada (2007), Primary and Secondary Bird Hazard Zones were created for the Kimmirut airport for FAR 23 (commuter aircraft) (see Figure 3). A buffer of 2,000 m was added to both sides of the runway, and 9,000 m was added to each end of the runway; the areas at either end of the runway were expanded to 4,000 m from either side of the runway centerline (Figure 3). A buffer of 4,000 m was added around the Primary Bird Hazard Zone to create the Secondary Bird Hazard Zone (Figure 3).

Land use types considered attractive to bird species, and hazardous to aviation safety (as per Transport Canada 2007), were identified in Kimmirut and occur within the Primary Bird Hazard Zone; this includes the existing landfill/solid waste facility (high-risk) and the Qaqqalik School yard (low-risk) (see Figure 3). Therefore, creation of Special Bird Hazard Zones was not required. Furthermore, a Category B Event Zone was not required as the Kimmirut airport primarily hosts small commuter aircraft, which operate parallel to the runway.

The Project is located within the Primary Bird Hazard Zone (Figure 3). Because sewage lagoons are considered a moderate-risk land use (Transport Canada 2007), they are typically discouraged in Primary or Secondary Bird Hazard Zones. Therefore, mitigation may be required to further reduce the potential use of the Project Site by hazardous bird species.



Sources: Base Data - Natural Earth; Thematic Data - ERBC

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

Proposed Location of Wastewater Treatment Facility and Bird Hazard Zones in Kimmirut, NU

AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU

FINAL REPORT

Results

July 4, 2017

4.3 OVERALL ASSESSMENT OF RISK

Waterbirds make regular, low altitude flights between roosting areas and feeding areas (APLIC 2012, Johnson et al. 2014), and may be attracted to sewage lagoons for these activities (Zimmerling 2006, APLIC 2012). The addition of a WWTF with sewage lagoon 1,015 m from the airport may increase, or alter bird movement in a manner that could pose a risk to aviation safety, particularly during spring and fall migration, when waterbird abundance is highest (Kelly et al. 2001). Geese, which are in the highest risk level to aviation safety (see Table 1), have been observed in relatively low numbers compared to ducks in wastewater ponds (Flake and Cieminski 1998). Based on the results of the bird hazard risk assessment, the proposed new WWTF, with sewage lagoon, falls within the Primary Bird Hazard Zone of the Kimmirut airport, and, according to Transport Canada (2007), is not considered an appropriate land use type within the Primary or Secondary Bird Hazard Zones. However, the risk of land use types that are not appropriate within a Bird Hazard Zone may be reduced if mitigation is employed (Transport Canada 2007).

Existing conditions within the Kimmirut AZR should be considered when assessing the potential risk to aviation safety. The number of flights arriving and departing from the Kimmirut airport is relatively low, and while hazardous bird species or species groups have been observed around the community, they have not been observed making regular flights in the vicinity of the airport. There are several natural wetlands, lakes, and coastal areas within the AZR that are larger than the Project, which may be attractive to birds, and it is not uncommon for airports to be located near such habitats (Matyjasiak 2008). Given the climate of Kimmirut, these areas are typically frozen from October to May; the WWTF's sewage lagoon would also be frozen during this period, further limiting the time available for birds to potentially use the site.

There are other existing land use types within the Primary Bird Hazard Zone, such as the landfill/solid waste facility and the Qaqqalik School yard, which are also not considered appropriate within this zone. These land use types are both located closer to Kimmirut airport than the Project site. Despite these land use types, and the natural wetland areas within the AZR, there have been no incidences of bird strikes at the Kimmirut airport for at least the past 11 years (P. Onalik, pers. comm.). Further, the Project design, including the relatively small lagoon size (< 1 ha), may reduce the number of birds utilizing the sewage lagoon; the berm around the lagoon will also discourage birds (e.g., nestlings) from walking into the site.

Overall, the Project is expected to result in a moderate to low risk for Category A and Category B loss events at the Kimmirut airport.

AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU

FINAL REPORT

Mitigation Review
July 4, 2017

5.0 MITIGATION REVIEW

Mitigation measures were reviewed that could further reduce the risk of bird collisions with aircraft, resulting in Category A or Category B loss events. Mitigation measures reviewed included no mitigations, and passive management techniques.

A “no mitigation” option was reviewed given that the Project is expected to result in a moderate to low risk for loss events. It is noted, however, that the number of birds using the waterbodies near the airport, as well as their detailed movement patterns, are not known. Furthermore, bird numbers and flight paths are likely to vary year to year depending on several factors (e.g., easterly winds). Therefore, it is important to recognize there is some uncertainty associated with our ability to predict local bird numbers and movement patterns near the Kimmirut airport. Because of this variability and uncertainty, passive management mitigation techniques were reviewed that could further reduce risk.

Passive management includes techniques such as habitat manipulation and exclusion practices that render sites unattractive or inaccessible to birds (Transport Canada 1998, MacKinnon et al. 2004, Hesse et al. 2010). In the case of the proposed WWTF in Kimmirut, the elimination of habitat is not possible, therefore, the attractiveness of the Project Site to birds should be reduced. Passive management techniques may be costly, but are considered a long-term solution (Matyjasiak 2008); birds will continue to be excluded as long as the mitigation measure selected is maintained (Transport Canada 1998).

There are a variety of bird deterrent techniques available as means to reduce bird attractiveness to the Project Site. These include cannons (i.e., noise disturbance), flagging, scarecrows/effigies, overhead wires or netting, bird deterrent balls (i.e., floating lagoon covers), and vegetation management. The overall effectiveness of each method depends on several factors including targeted bird species, habitat conditions, weather, and time of year. These factors, as well as installation, maintenance, and cost considerations, may factor in the decision whether any of these methods, or none at all, are required to reduce the risk of collision. Deterrent techniques each have both potential benefits and disadvantages. Specifically:

- Gas cannons (noise) might be effective during day and night, but birds can become habituated to them, which reduces their effectiveness. Moreover, noise disturbance may not be appropriate given the proximity of the Project Site to the community.
- Similar to audio deterrents, visual deterrents such as flagging and effigies are also susceptible to habituation over time (Ronconi and Cassidy St. Clair 2006).
- Bird deterrent balls are relatively easy to install and provide an effective means to prevent birds from landing on sewage lagoons, however they are more expensive than other methods and would require removal during frozen conditions.
- Fine netting or an overhead wire grid system are made from a variety of materials and mesh sizes, can be customized depending on the bird species to be excluded, and are

AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU

FINAL REPORT

Mitigation Review
July 4, 2017

recommended for smaller areas (Transport Canada 1998). However, they may be costly to adequately maintain in a small remote community such as Kimmirut, and may preclude access to the lagoon for maintenance activities.

- Vegetation removal, specifically grass, around the sewage lagoon would discourage use of the area by hazardous bird species by removing habitat for feeding, cover, and nesting (MacKinnon 2004). But, this technique may be difficult to maintain annually in a remote community with limited equipment and resources.
- Habitat conditions around the lagoon could further be modified by installing riprap around the lagoon edge to reduce its attractiveness to birds and discourage loafing, or loitering. Granular sources in Nunavut communities can be limited however and installation of riprap can be costly, or just not available.

Several of these bird exclusion techniques are used at tailings pond sites on active mine sites in Nunavut (e.g., vegetation management around tailings ponds, netting over smaller ponds), however it is not known if bird exclusion techniques have been used for sewage lagoons, or other structures, in other communities in Nunavut. Of the nine Nunavut communities with AZRs, seven of these have sewage lagoons as part of their WWTFs and it appears that six of these have been operational since before the AZRs came into effect (i.e., grandfathered in). As a result, there appears to be a lack of precedence for this type of mitigation related to sewage lagoons and AZRs in Nunavut. These bird exclusion mitigations should be discussed in consultation with regulators to determine the most appropriate techniques for the Kimmirut WWTF, if any.

AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU FINAL REPORT

Conclusion
July 4, 2017

6.0 CONCLUSION

Overall, the Project is expected to result in a moderate low to low risk for Category A and Category B loss events at the Kimmirut airport, with no mitigations. The relative infrequency of aircraft flights indicates there is limited exposure to birds, resulting in a reduced probability for bird strike events. Although the majority of bird species and species groups considered high-risk may be present within the Kimmirut AZR outer surface, they only occur during a portion of the year, which further limits the exposure time of birds to aircraft. Moreover, there are existing land use types within the Kimmirut AZR outer surface that are considered low to high-risk land use types (e.g., landfill), yet there have been no reported bird strike events. These factors suggest there is a moderate to low risk for bird strike events to occur near the Kimmirut airport, including a Category A or Category B event loss. Additional mitigation measures would further limit birds from landing in, or being attracted to, the WWTF's sewage lagoon, however discussions with applicable regulatory agencies should occur to determine which mitigations, if any, are most appropriate for the Kimmirut WWTF.

**AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU
FINAL REPORT**

Closure
July 4, 2017

7.0 CLOSURE

Stantec Consulting Ltd. (Stantec) has prepared this report for the sole benefit of the Government of Nunavut Department of Community and Government Services (GN-CGS) for the purpose of assessing the airport-bird hazard risk of the proposed wastewater treatment facility (Site 9) in Kimmirut, Nunavut. The report may not be relied upon by any other person or entity, other than for its intended purposes, without the express written consent of Stantec and the GN-CGS. Any use of this report by a third party, or any reliance on decisions made based upon it, are the responsibility of such third parties.

The information provided in this report was compiled from existing documents and data provided by the GN-CGS, and compiled by Stantec. This report represents the best professional judgment of our personnel available at the time of its preparation. Stantec reserves the right to modify the contents of this report, in whole or in part, to reflect any new information that becomes available. If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

Respectfully submitted,

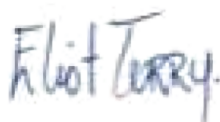
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**AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU
FINAL REPORT**

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July 4, 2017

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AIRPORT-BIRD HAZARD RISK ASSESSMENT FOR THE PROPOSED WASTEWATER TREATMENT FACILITY IN KIMMIRUT, NU

FINAL REPORT

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Building *Nunavut* Together
Nunavut iuqatigiingniq
Bâtir le *Nunavut* ensemble

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Department of Community and Government Services
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

APPENDIX E – HAMLET OF KIMMIRUT APPROVAL



Hosea Mpofu, MAcc, RPA
Senior Administrative Officer

HQALLCJC PLGPIL
PLGPIC, MJC, X0A 0N0 (867) 939-2247

HAMLET OF KIMMIRUT

Kimmirut, Nunavut, X0A 0N0 (867) 939-2247

ARQINICILIC JC: 93 - 2016 DCJL: LD 10, 2016
Motion Number: 93 - 2016 Date: May 10, 2016

ARQINICILIC:

Moved by: LCJL

QDCLIC:

Seconded by: LCJL

DLALC: HQALLCJC BNLICILIC QLLICIC
QLLILICILIC MJC CLILICILIC
DLICILICILIC DLICILICILIC QLLILICILIC
HQALLCJC BNLICILIC.

That: The Hamlet Council agree on the site marked for The new Sewage Lagoon be approved by Hamlet Council.

LCJL
LDL/Mayor

LCJL
QCLILICILIC/S.A.O.

ለጥላባዊነት ምርመራ: 131 - 2016 ዓ.ም.: ጥቅምት 4, 2016
Motion Number: 131 - 2016 Date: July 4, 2016

Moved by: LCB = AC

ልረገጥ፡ ወላጅዎችን ማረጋገጥና ማቆም
 ለጥሪ 2012 ዓ.ም. ለሚከተሉት
 ምዕራፍዎች ዘላቂነት ከሚገኝበት
 ሁኔታ ለሚገኝ ልማት ማረጋገጥ

That: The use of the Sewage Lagoon built in 2012 be rejected by Hamlet Council as it will affect the fishing lakes.

LΔ7/5
LΔ7/Mayor



 A.C. 67422/S.A.O.

**Meeting # 2 - 2016 Minutes - Public Meeting, Akavak Centre, Kimmirut July 7, 2016
7:00 p.m.**

Present:

Mayor:	Maliktoo Lyta
Deputy Mayor:	Terry Pitsiulak
Councillors:	Mialiralaa Judea
	Pea Padluq
	Simonie Akavak
	Palanga Lyta
	Itee Temela
	Joe Arlooktoo
SAO:	Hosea Mpofu
Interpreter/Minute Taker:	Martha Ikkidluak
Absent:	
Councillor	Joe Arlooktoo
Councillor	Susie Onalik

Public

Name	Address
Akulujuk Judea	104
Joanasie Etuangat	204C
Martha Ikkidluak	211
Nicotye Padluq	10A
George Arlooktoo	202C
Lysee Itulu	7A
Padluk Judea	207C
Mikidluq Kolola	103
Anugakulu Qirmirpik	216
Tommy Akavak	151
Akeego Killiktee	108
Daniel Nungusuituq	101
Brian Padluq	
Terry Itulu	211D

1. Call to Order (Prayer)

The meeting was opened by Mayor, Maliktoo Lyta with a prayer by Councillor Itee Temela at 7:30 p.m.

2. Adoption of Agenda – The agenda was adopted.

3. Business – New site for the sewage lagoon

The Senior Administrative Officer made a presentation, showing a map and pictures of the proposed site of the new sewage lagoon. He explained that the public had rejected use of the new sewage lagoon built in 2012. The public communicated this at the meeting held on February 16, 2016 at Akavak Centre. Following that meeting, Council met and came up with a new site (shown in red on the attached map). The site is south of the existing lagoon between the dump site and Fundo Lake. This meeting is to find out from the public whether or not this site is acceptable for development of a new sewage lagoon. The public agreed that the site can be developed on condition that the existing trail is accommodated.

The SAO is to notify the public about the decision of the meeting with invitations for any objections to be submitted to the SAO by Thursday July 14, 2016. If no objections are made, the decision will be communicated to the Department of Community and Government Services for action.

4. Adjournment

The meeting adjourned at 8:15 p.m.

Mayor/mw/

SAO/xMtmE4

MUNICIPALITY OF Kimmirut

PUBLI MEETING TO DISCUSS NEW SITE FOR THE SEWAGE LAGOON

AKAVAK CENTRE JULY 7 2016 7p.m.

PRESENT:

MAYOR

DEPUTY MAYOR

COUNCILOR

COUNCILOR

COUNCILOR

COUNCILOR

COUNCILOR

COUNCILOR

COUNCILOR

— MALIKTOO LYTA CO03

— TERRY PITSINLAK COS8

— MIALIRALAAQ JUDEA CO62

— SIMIONIE AKAVAK CO43⁸⁹⁻¹

— PEA PADUQ CO47

— ITEE TEMELA CO17

— PALANGA LYTA CO64

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	NAME	HOUSE NO	SIGNATURE
1	AKUNJUK JUDEA	104	
2	Joanasie Etuangat	204 C.	Joanasie Etuangat
3	Martha IKKULUAK	211.	Martha IKKULUAK
4	Nicotye Padluq	10A.	
5	George Alooktoo	202 C.	George Alooktoo
6	Lysee Itulu	7A.	
7	Padluk Judea	207 G.	
8	Mikullug Kobla	103.	
9	Anugakulu Qimurpik	216.	
10	Tommy Akavak	151.	
11	Akeego Killiktee	108	
12	Daniel Nungetcherite	101	Nungusuitug
13	Brian Padluq		
14	Terry Itulu	211-D.	Terry Itulu
15			

please post



Municipality of Kimmirut

Box 120, Kimmirut, NU X0A 0N0

Ph. (867) 939-2247 Fx. (867) 939-2045

NOTICE

To: Residents of Kimmirut

After due notice, a public meeting attended by the Hamlet Council of Kimmirut and members of the public was held on July 7, 2016 at 7:30 at the Akavak Centre. The members of the public agreed with council for a new sewage lagoon to be developed on the site indicated on the attached map. The site is between the dump site and Fundo Lake. If any member of the public has any objections to the site please contact the Senior Administrative Officer before 5 pm on Wednesday July 13, 2016. If no objections are received the site will be communicated to the Department of Community Services for action.

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His Worship

Mayor Maliktoo Lyta

Hamlet of Kimmirut

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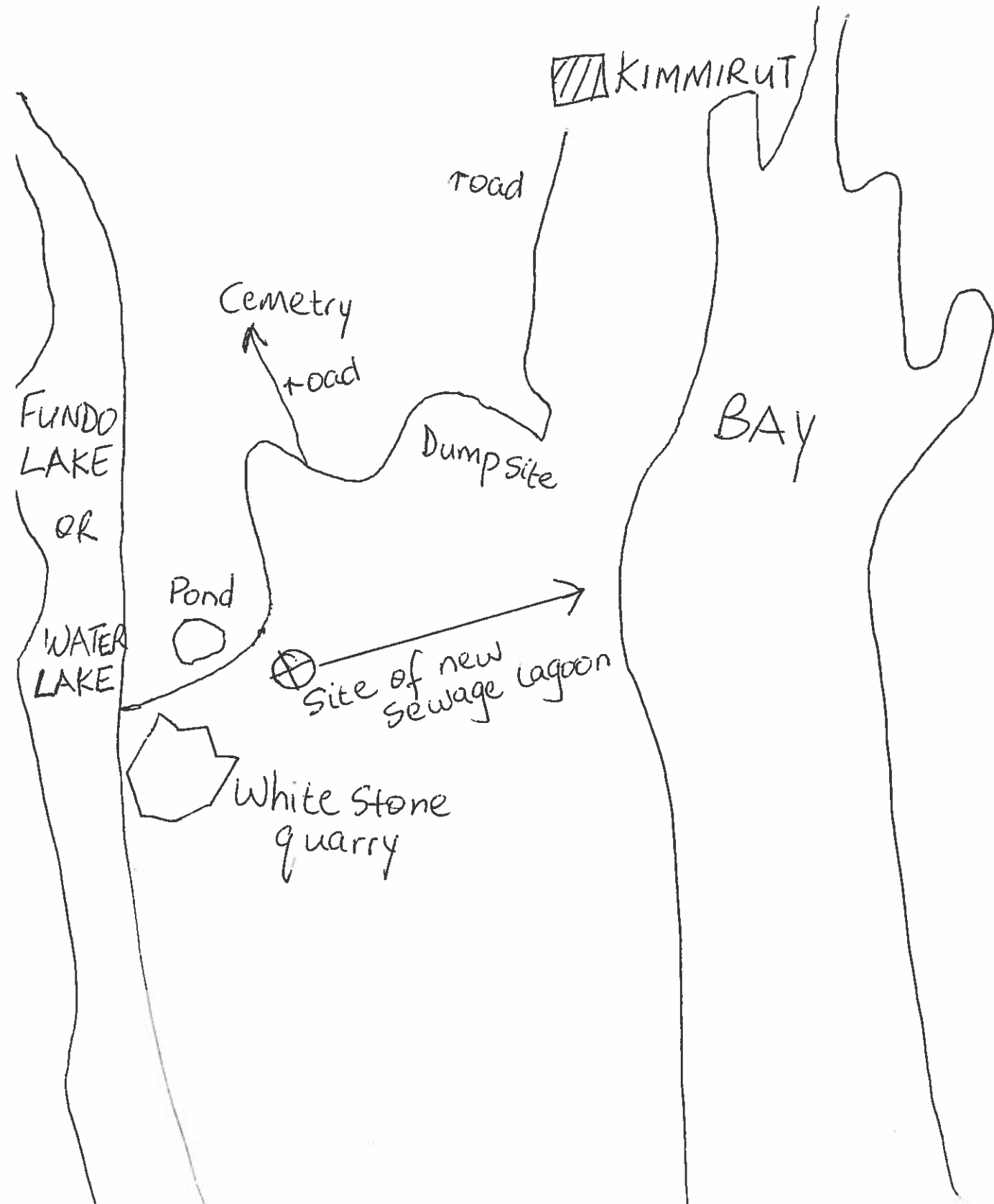
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MUNICIPALITY OF KIMMIRUT

PROPOSED SITE OF NEW SEWAGE LAGOON APPROVED AT PUBLIC MEETING ON JULY 7, 2016



CGS is requesting the Council's approval of the below site for a future sewage lagoon (red circle) and marshland (arrow) treatment





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Building *Nunavut* Together
Nunavut iuqatigiingniq
Bâtir le *Nunavut* ensemble

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Department of Community and Government Services
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

APPENDIX F – GN-DOH REVIEW LETTER



Office of The Chief Medical Officer of Health
Department of Health, Government of Nunavut
P.O. Box 1000, Stn. 1000
Iqaluit, NU X0A 0H0
Ph: 867-975-5772 Fax: 867-975-5755



**Department of Health
Munaqhiliqiyitkut
Ministère de la Santé**

Please continue to keep the Department of Health in the loop with respect to any proposed upgrades or alterations to the work, timelines or the proposed plan.

In keeping with the proposed project, Greg Thibault should be communicated with regularly to provide support and technical assistance. You can reach Greg at 867-975-4817 or gthibault@gov.nu.ca.

Sincerely,

Subtle,

Dr. Kim Barker, MD, CCFP, MPH, FRCP(C)

Chief Medical Officer of Health
Department of Health
Government of Nunavut

Médecin-hygiéniste en chef
Ministère de la Santé
Gouvernement du Nunavut

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 Cc: Greg Thibault , REHO
 Erik Allain INAC
 Sarah Ali CGS
 Babbhesh Roy CGS

Atanilluaq Aanniaqarnaittuliqinirmut
Munaqhiliqiyitkut
Nunavut Kavamanga

