WEST KITIKMEOT RESOURCES CORP

Addendum
Appendices A to C

Appendix A
Cumulative Effects Assessment Supplement

A.1 Introduction

The purpose of this Cumulative Effects Assessment (CEA) Supplement is to provide a brief condensation of selected information in response to various Information Requests about the assessment of potential cumulative effects in the Impact Statement (IS). This includes clarifications, summaries and new details, all to assist improved understanding; specifically:

- where one can find information about cumulative effects
- a brief summary of the reasonably foreseeable induced (RFI) scenario
- an overview of a new (not in IS) High Use Development Scenario

A.2 Where Information on Cumulative Effects is in Impact Statement

Information relevant to assessing potential cumulative effects appears throughout the IS. The best place to start to familiarize oneself with this is in Section 32 Cumulative Effects Assessment Overview. The section provides a basic description of what was assessed and why, notably for the RFI scenario, and identifies (Table 32.1) other sections in the IS with relevant information. Figure A.1 below identifies the key CEA sections showing their sequencing and relationship in the IS. By following at least these sections, one will be able to assemble the full CEA "story".

The IS assesses potential effects for various scenarios. These start with the Project alone and then, in the CEA, for possible future scenarios. The following summarizes these:

- The Grays Bay Road and Port Project (the Project) is, most visibly and importantly, a road and a port in Nunavut. During construction and operations some vehicle activity occurs on the road and some marine vessels make the Project a port of call. An airstrip also supports some air-based transport of people and supplies. These components of physical works and activities, together referred to as physical activities, are the Scope of *Project*. That scope does not include any mines. An assessment of the Project's residual effects (i.e., after mitigation) is first made. This assessment does not include cumulative effects.
- Past and present physical activities, the former to the extent they retain some tangible presence, contribute to the baseline conditions. All assessments use these conditions as a reference point in time to determine potential incremental effects.
- Certain future physical activities were not identified, being any that clearly will happen, if not already under construction.
- Reasonably Foreseeable physical activities are the first examples of what may happen. These are not directly associated with the Project and are typically publicly announced by other proponents. There are only a few, and they may still not actually happen. As such, these other physical activities are assessed under the Scope of *Assessment* (so, not the Scope of *Project*).

- Reasonably Foreseeable Induced physical activities are the second example of what may happen. These are directly associated with the Project in the sense that they would only happen, or are highly likely to happen, if the Project was operational. Induced therefore means “to make happen”. These too are assessed under the Scope of *Assessment*.
- The High Use Development Scenario is newly introduced in this Supplement in response to interest in “how big” the Project could become in accommodating transport (by road and ship) of product from other mines for export. A description of this high-use port capacity is provided below. A description, however, of what those additional mines may be (that is, additional to the RFI mines) is not provided, as they would be a third type of future scenario, referred to as hypothetical, for which West Kitikmeot Resources Corp. (WKR) is not aware as to what they could be.

Particular interest has been expressed in the RFI scenario, given that it describes a possible outcome of the Project from mining development. To understand this scenario first read Section 32, then the Project Inclusion List and its Attachments in Section 9. The next section in this Supplement also provides a brief summary, including a figure (based on figures in the Project Inclusion List [PIL] in Volume 4 Section 9) that better illustrates the RFI components.

Figure A.1 Summary of Key Cumulative Effects Information

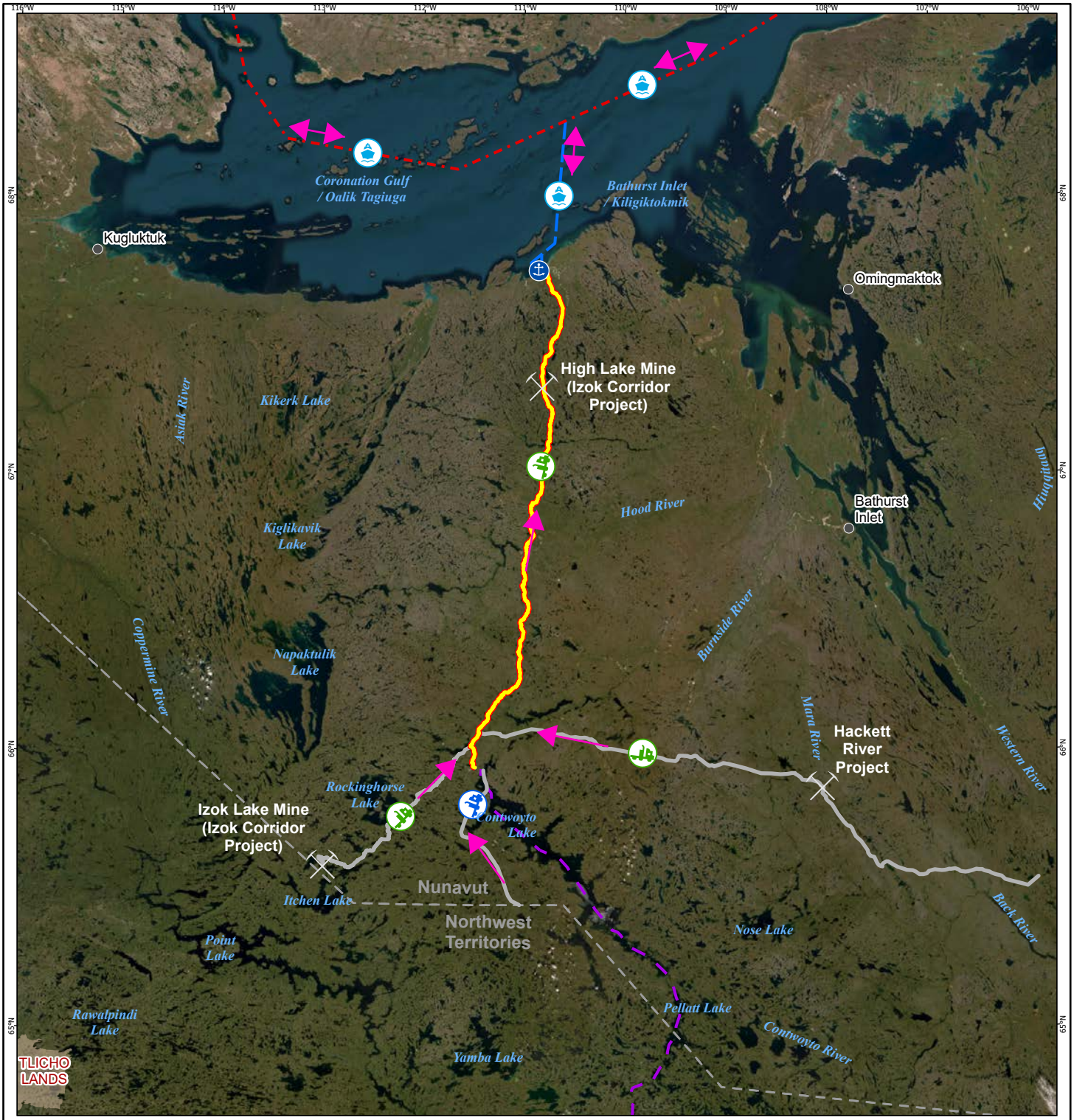


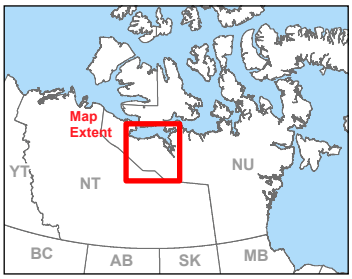
A.3 Summary Description of Reasonably Foreseeable Induced Scenario

Figure A.2 illustrates the RFI scenario, which in summary is as follows:

- construction and operation of three mines:
  - Izok Lake
  - High Lake (Izok and High Lake also referred to together as the Izok Corridor Project)
  - Hackett River
- construction and operation of access roads from those mines to the Grays Bay Road
- movement of trucks (large “dump trucks”) carrying mine concentrate product, and some other smaller vehicles, between the mines and the Grays Bay Port
- bulk cargo marine vessels berthing at the Grays Bay Port for loading of mine product (only during open-water [ice-free] season)
- movement of cargo marine vessels in the Coronation Gulf coming along shipping channels from international destinations and along shipping channels going to international destinations (only during open-water season)
- movement of RFI mine construction and operational support vehicles between those mines and Yellowknife via the Tibbitt to Contwoyto Winter Road (TCWR; which is an existing available route, with the Arctic Economic and Security Corridor, identified as a Reasonably Foreseeable project, a possible future replacement) (only during winter freeze conditions)
- aircraft use of the Project airstrip in support of RFI mines, notably workforce

Further details are provided in the PIL.





Notes
1. Coordinate System: WGS 1984 UTM Zone 12N
2. Data Sources: Governments of Nunavut, Northwest Territories and Canada, Stantec. Bathurst Caribou Herd Range from Environmental Dynamics Inc.

- Reasonably Foreseeable Induced Resource Access Road
- Northwest Passage
- Project Access Corridor
- Road Transporation in Summer
- Road Transporation in Winter
- Marine Transporation (ice free)
- Reasonably Foreseeable Induced Mine
- Grays Bay Port
- Community
- Tibbitt to Contwoyto Winter Road (seasonal January - March)
- Territorial Boundary
- Tlicho Lands

0 25 50 Kilometres
(At original document size of 8.5x11) 1:2,250,000

N

NUNAMI STANTEC LIMITED

WEST KITIKMEOT RESOURCES CORP

Project Location
West Kitikmeot Region, Nunavut

Prepared by DSPRY on 2026-02-05
TR by SLEMAY on 2026-02-05

Client/Project
123514886_201

West Kitikmeot Resources Corp
Grays Bay Road and Port

Figure No.
2

Title
Overview of the Grays Bay Road and Port Project and Reasonably Foreseeable Induced Physical Activities

\\CA0002-PPFSS05\GEOMATICS\Clients\Nunami_Stantec\GBRP\Figures\123514868_201_Addendum_RFI_Illustration.pagx Revised: 2026-05-23 By: dcspry

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

A.4 Summary Description of High Use Development Scenario

A.4.1 Description of High Use Development Scenario

WKR provides below a description of a High Use Development Scenario. This was prepared in response to discussions between WKR and parties during the Nunavut Impact Review Board (NIRB) engagement process, and to certain Information Requests requesting a "Maximum Development Scenario". "High Use" is adopted here versus "Maximum" to reflect its approximate (estimated) nature.

Multiple factors typical of natural resource-based industries, some overlapping in time and by influence, and many with unpredictable specific outcomes, reduce the ability to predict with certainty the quantifications (numbers) provided. As such, the High Use Development Scenario is subject to many limitations, assumptions, uncertainties, and factors outside WKR's care and control. Numerical values other than those directly descriptive of the Project as proposed are to be treated as assumed.

A.4.2 Basis of the High Use Development Scenario

The concept of a High Use Development Scenario was premised on an interest in understanding the implications of Grays Bay Road and Port operating to the fullest reasonable extent, while aligned with the current Basis of Design (BoD) on which the Project is designed and as reflected in the IS. Such implications would include Project operations, focused on the export of mineral concentrate at the Grays Bay Port, and additional induced resource development at upland future mines.

WKR has already described and assessed potential effects of induced mines in the RFI scenario in the CEA. WKR has also indicated that it did not identify and assess additional "hypothetical induced" mines due to no known basis by which they could be described with adequate detail to form the basis of an assessment. As such, while WKR is in part basing the High Use Development Scenario on an assumed hypothetical mine export of mineral concentrate, it is not assessing potential environmental effects arising from such mines.

In the context of the aforementioned requests for more information, this High Use Development Scenario serves as a useful reference for potential accommodation by the Project of additional future mines, although definitive descriptive details are currently unknown.

The basis of the High Use Development Scenario is therefore anchored on an appropriate primary design/operational constraint governing the reasonable maximum mineral concentrate export capacity of the Project. WKR has identified this to be a foreseeable annual number and cargo capacity of bulk ore vessels exporting mineral concentrate from the Grays Bay Port, with associated design and operational considerations.

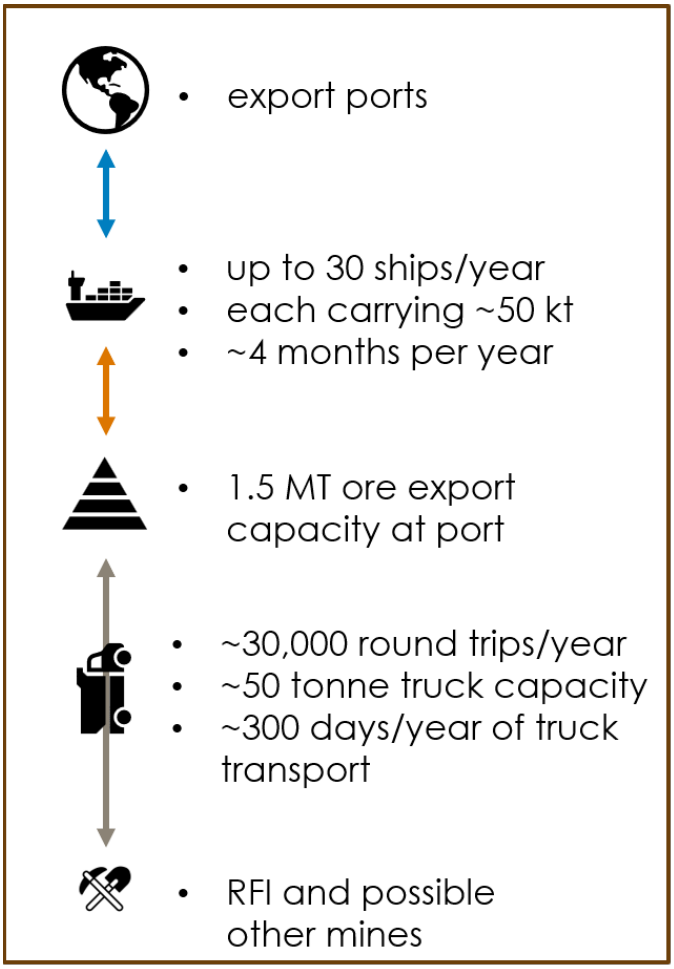
A.4.3 Description of High Use Development Scenario

The High Use Development Scenario (see Figure A.3) is governed by the assumption of up to approximately 30 “Handymax” bulk ore vessels a year, each with a capacity of up to approximately 50,000 deadweight tonnes (DWT). Shipping exports from Grays Bay Port are constrained by the available open-water shipping season of up to four months (July to October). Given this assumed vessel size and operating constraints, up to approximately 1.5 million tonnes (Mt) of mineral concentrate is estimated to be the maximum annual export tonnage from Grays Bay Port under this scenario.

The following provides associated details:

- Approximately seven to eight vessels a month during the open-water season
- Use of one of the two Large Vessel Wharves for mineral concentrate loading (i.e., one vessel at a time being loaded by one ship loader).
- Mineral concentrate is stockpiled throughout the year to provide for vessel loading during the shipping season.
  - It is anticipated that approximately 1.3 Mt of mineral concentrate is stored by the start of the shipping season, while the remaining 0.2 Mt (200 kt) can be trucked to Grays Bay Port over the shipping season.
- Assume 100% use of “B-Train” vehicles with a haul capacity of up to approximately 50 t each (e.g., a tractor with two large “dump truck” trailers).
- A total of approximately 30,000 truck round trips will be required to transport 1.5 Mt of mineral concentrate to Grays Bay Port.
  - A total of approximately 1000 truck round trips (i.e., out to port and back) are required to fill one Handymax vessel.
- A total of approximately 4000 truck round trips are required to meet supplemental delivery requirements during the shipping season (0.2 Mt).
- Assuming 300 operating days for the road during the year.

Figure A.3 High Use Development Scenario Summary



A.4.4 The RFI Scenario in Comparison

The RFI scenario in the IS was described as "up to 30 ships" as the annual *maximum* for the range reflecting the substantial current unknowns of RFI mine production (Volume 4, Attachment 9A2). An assumed approximation within that maximum range is an annual average of 760 kt of mineral concentrate shipped from the three mines during their overlapping operating years based on publicly available production schedules (MMG 2012[1], PEGMC 2009[2]), assuming the Izok Lake and High Lake mines begin production in 2035 and the Hackett River mine begins production in 2040. This requires approximately 15 vessels (based on a capacity of up to approximately 50,000 DWT) calling at the Grays Bay Port per year.

The following provides associated details:

- Approximately four vessels a month during the open-water season
- Use of one of the two Large Vessel Wharves for mineral concentrate loading (i.e., one vessel at a time being loaded by one ship loader).
- Mineral concentrate is stockpiled throughout the year to provide for vessel loading during the shipping season.
  - It is assumed that all 760 kt is trucked to the Port and in storage by the start of the shipping season.
- Assume use of 100% "B-Train" vehicles with a haul capacity of up to approximately 50 t each (e.g., a tractor with two large "dump truck" trailers).
- A total of approximately 15,200 truck round trips, about 51 trips a day (assuming only 300 days per year that truck transport occurs due to weather and other conditions).

It is noted that larger ships (up to around 100,000 DWT capacity) and larger trucks (e.g. up to around 216 t capacity) might be employed by mining customers, reducing the number of vessel transits per year and the number of vehicle trips per day by around half. The Grays Bay Port and Grays Bay Road have been designed to safely accommodate these larger vessels and trucks if required.

[1] Minerals and Metals Group (MMG). 2012. Izok Corridor Project: Project Proposal. Prepared by MMG for Nunavut Impact Review Board (NIRB).
[2] PEG Mining Consultants Inc. 2009. Preliminary Economic Assessment (Update): NI 43-101 Technical Report: Hackett River Project, Nunavut, Canada. Prepare for Sabina Gold & Silver Corp.

Appendix B
Transboundary Effects Assessment Supplement

B.1 Introduction

The purpose of this Transboundary Effects Assessment Supplement is to provide a brief summary of selected information in response to various Information Requests about the assessment of potential transboundary effects in the Impact Statement (IS). The Transboundary Effects Assessment was prepared in accordance with Section 7.4.4 of the Nunavut Impact Review Board (NIRB) IS Guidelines for the Grays Bay Road and Port Project (the Project) and is presented in Volume 10, Section 33 of the IS. Specifically, this Supplement summarizes:

- the three primary pathways by which the Project could cause transboundary effects
- the methodology used to assess transboundary effects including how the assessment is informed by the conclusions of the residual and cumulative effects assessments

B.2 Transboundary Effects Pathways

While Project infrastructure is located entirely within the Kitikmeot Region of the Nunavut Settlement Area (NSA), the Project presents the potential for transboundary effects related to three primary pathways:

1. Use of existing public infrastructure in the Inuvialuit Settlement Region (ISR), Northwest Territories (NT) and other jurisdictions in eastern Canada.
2. Movement of migratory and wide-ranging wildlife species
3. Socioeconomic influences

B.2.1 Existing Public Infrastructure

Materials and equipment for construction and operations are primarily planned to come from Quebec ports via sealift. However, WKR has identified the option of using existing public infrastructure within the ISR such as the Dempster Highway and the Port of Inuvik, to transport materials and supplies more readily available in western Canada to Grays Bay. WKR estimates 3 barges per year from the ISR, which equates to approximately 135 truckloads using the Dempster Highway. Use of infrastructure in the ISR presents economic opportunities for contracting and employment, however it is optional and WKR can rely entirely on sealift from eastern Canada if there is no support for transporting construction materials through the ISR. Although the use of the ISR is presented in the IS as optional, the potential effects, both positive and adverse, are assessed and presented in Volume 10, Section 33 Transboundary Effects Assessment.

In addition to the potential use of infrastructure in the ISR, WKR anticipates using existing public infrastructure in other areas of the NT, primarily the Tibbitt to Contwoyto Winter Road (TCWR) and facilities and services in Yellowknife. Project traffic on the TCWR during the Construction and Operations and Maintenance phases is estimated to represent approximately 15% (1000 trucks) and 0.4% (30 trucks), respectively, of average annual traffic on the TCWR. Infrastructure and services in Yellowknife would also be utilized during Project construction and operations, such as the airport, hotels and other support industries. The potential transboundary effects in the NT, both positive and adverse are assessed and presented in Volume 10, Section 33 Transboundary Effects Assessment.

For both the ISR and the NT, potential transboundary effects were identified and assessed for the following Valued Components (VCs): Noise and Vibration, Wildlife (Caribou, Birds, Muskox, Moose, Grizzly Bear, Wolverine), Marine Mammals, Traditional Land Marine and Resource Use, Food Security, Community Health and Well being, Employment and Economy, and Infrastructure and Services.

B.2.2 Migratory and Wide-Ranging Wildlife Species

The Project is in an area known to be used by migratory species (e.g., caribou, marine mammals, and birds) and species with large home ranges (e.g., bears). Individual species may be exposed to the Project and then leave the NSA and/or vice-versa. Many of the species cross between the NSA and NT and the ISR either overland or via the ocean. For both the ISR and the NT, potential transboundary effects were identified and assessed for the following VCs: Wildlife (Caribou, Birds, Muskox, Moose, Grizzly Bear, Wolverine) and Marine Mammals.

B.2.3 Socioeconomic Influences

The Project will provide employment opportunities and require materials, equipment and services. These goods and services will be obtained both within Nunavut and from other territories and provinces, including the NT and ISR. WKR would preferentially like to source as many services from the NT and ISR as available so that economic benefits from the Project are realized by the Project's closest jurisdictions. As noted previously, the transportation of construction materials through the ISR is optional. If the ISR is not used specifically for the transport of goods and procurement of services, there remains the opportunity for employment for ISR residents. For the purposes of the IS, it is assumed that services can be procured from both NT and ISR, and the potential transboundary effects in the NT and ISR, both positive and adverse, are assessed and presented in Volume 10, Section 33 Transboundary Effects Assessment.

B.3 Transboundary Effects Assessment Methodology

Transboundary effects, by their nature, may be experienced at a large distance from the original source of the interaction. Generally, the magnitude of the effect decreases with distance from the source of the interaction. This leads to the requirement for a pragmatic approach to effect analysis, recognising that certain levels of information are required to predict effects with any degree of confidence.

While the identification of potential transboundary effects is linked to the results of the residual and cumulative effects, through consideration of the effect pathway and magnitude of the residual effect, methodology used for the evaluation of transboundary effects differs from the residual and cumulative effects in two distinct ways:

- Transboundary effects are not defined/constrained within a specific assessment area
- Transboundary effects are evaluated qualitatively and are not characterized using the same definitions as residual effects (i.e., direction, magnitude, duration, frequency, geographic extent, reversibility, timing, likelihood or significance)

The assessment of transboundary effects follows 2 steps.

- Step 1 – Identification of those VCs with the potential to experience transboundary effects;
- Step 2 – qualitative evaluation of potential transboundary effects.

B.3.1 Step 1 – Identification of VCs with potential to experience transboundary effects

The criteria, as presented in Section Volume 10, Section 33.3.1, for selection of VCs that may experience transboundary effects are:

- the "anticipated Project residual effects on the VCs" (i.e., to potentially have a transboundary effect, the VC must experience a residual effect because of the Project)
- the interaction with "Physical activities associated with the Project that cross the NSA boundary" (i.e., Project traffic (trucks or ships) travelling outside of the NSA, primarily in the NT and ISR)
- whether the VC is a migratory and/or wide-ranging wildlife species (i.e., will travel beyond the NSA into other jurisdictions, primarily in the NT and ISR)
- the interaction with "Socioeconomic factors associated with the Project that cross the NSA boundary" (i.e., employment opportunities (construction workforce) and economic benefits outside of the NSA as a result of the Project)

B.3.2 Step 2 – Qualitative evaluation of potential transboundary effects

Study Area

As noted above no 'assessment area' is defined for transboundary effects. Local and Regional Assessment Areas (LAA/RAA) are defined to identify the likely extent of Project residual and cumulative effects. Transboundary effects, by definition, cross boundaries and therefore drawing a line on a map to define an area within which to assess transboundary effects is not practical. As such, it is important to understand that the LAA/RAA's identified for each VC do not constrain the discussion of transboundary effects to those aforementioned areas.

Effects Characterization

Characterising potential transboundary effects with the same categories as residual effects (i.e., magnitude, duration, frequency or significance) is neither practical nor defensible. If a transboundary effect is experienced by a mobile VC (i.e., migratory species), it has often left the area of direct influence of the Project (i.e., a migratory bird), and therefore the categories of effect are either no longer applicable (i.e., duration, frequency) or not possible to measure with any level of confidence.

Although the transboundary assessment does not use the same definition categories as the residual and cumulative effects assessment, it does draw upon the conclusions presented in those sections to inform the transboundary discussion. For example, Volume 10, Section 33.4.4 discusses the potential for transboundary effects on migratory birds. It is recognised that migratory birds may experience

Project effects and carry those effects across boundaries throughout their life cycle. The residual effects assessment, Volume 6, Section 17.4.3, concluded that "*Project residual effects experienced by birds (i.e., changes in habitat or mortality risk) are predicted to be low in magnitude, defined as "a detectable change from baseline conditions but within the range of natural variation and/or accepted standards*". Given this conclusion related to residual effects, the transboundary assessment concluded that "*transboundary effects from the Project are unlikely to be evident to migratory birds as they travel in and out of Nunavut*".

The transboundary discussion is informed by the mitigation and management measures presented in the residual effects assessment. These measures are designed to reduce and manage residual effects from the Project and as such will reduce the potential for transboundary effects.

Appendix C
Engineering Design Memos

C.1 Grays Bay Road and Port Reference Design Memos

WEST KITIKMEOT RESOURCES CORP

Grays Bay Road and Port Project Reference Concept Design Memo-Port and Marine

September 29, 2026

NUNAMI STANTEC LIMITED

Revision	Date	Description
0 (First Draft)	Jul 31/26	• Nunami-Stantec Internal Review
1 (Second Draft)	Aug 11/26	• Nunami-Stantec Internal Review
2 (Final Draft)	Aug 13/26	• Nunami-Stantec Internal Review
3 (Submission for Client Review)	Aug 17/26	• Nunami-Stantec Submission to WKR
4	Sep 20/26	• Nunami-Stantec published for RFP support

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1 General

1.1 Introduction & Purpose

The Grays Bay Road and Port Project (GBRP or Project) is a proposed deep-water port, aerodrome, and all-season road in the Kitikmeot Region of Nunavut. The port and aerodrome would be located at Grays Bay on the Coronation Gulf along the Northwest Passage, with marine operations during the open-water season from approximately June to October. The 230-kilometre, multi-user all-season road would connect the port to Jericho Station (site of the former Jericho mine).

GBRP will establish shared infrastructure for many potential users, including federal and territorial governments, Inuit, communities, resource companies, and defence agencies.

This document is the Reference Design Concept Memo for the deep-water port elements as related to the Major Works scope of the GBRP project. It is a component of the CCDC 32 – 2026, Progressive Design-Build Contract executed between the Owner, West Kitikmeot Resources Corp (WKR), and the Design-Builder.

This document presents the technical bases for design of the Port and Marine infrastructure elements. It contains the essential elements of the infrastructure. It is expected that the Design-Builder will enhance or modify the design as required.

The main purpose of Reference Design Concept Memo is to support the Design-Builder with the development of next phases of the project.

1.2 Design Scope

The scope includes the design of the following marine infrastructures. The main facilities for the Grays Bay port marine site development are:

- East Wharf & medium vessel wharf – Located at approximately 67°48'19"N, 110°52'8"W, wharf structure(s) shall provide two (2) berths to accommodate many of the large vessels traversing arctic waters. These include bulk, breakbulk, and containerized cargo ships, fuel tankers, bulk carriers, and coast guard vessels. Each berth face shall be of adequate length to accommodate the design vessels. A future third party shiploader and conveyance system for export of mineral concentrate shall be located on the West Wharf. Immediately south of the west berth shall be a smaller wharf to provide moorage for medium-sized vessels, such as up to three (3) tug vessels. The scope of works includes the design and dredging work for both the two wharves, the East Wharf and the West Wharf. It should be noted that the West wharf construction is part of potential future infrastructure and is not part of the current project.
- Barge landing area – South of the wharf area shall be a shallower barge landing area for loading and unloading of ocean-going and community barges. This area shall consist of a landmass extending beyond shore, providing a large barge ramp for RORO (Roll-

on/Roll-off) Barge front-end loading / unloading, as well as a separate barge berth for side-access loading / unloading of barges. The barge landing area will provide a laydown area and connexion to the port landside road.

- Small craft harbour – Located at approximately 67°48'6"N, 110°51'12"W, a small craft harbour shall provide safe, seasonal moorage for community recreational and fishing vessels up to 7 m length and 1 m draught. The SCH shall be operational during open-water season only.

The design scope includes the following marine structures and civil work and utilities

Marine Structures

- Dredged berths pockets / approaches required for design vessels of both the West (Berth 1) and the East Wharf (Berth 2);
- Wharf layout and design providing gravity, lateral, and longitudinal support down to the seabed;
- Barge landing area and shore connection, providing one barge berth and a deeper general use ramp;
- Gravel or concrete wearing surface;
- Permanent small crafts launch with access to shore;
- Smaller wharf structure with moorage for medium-sized vessels, such as tugs;
- Mooring hardware such as bollards suitable for design vessels;
- Appurtenances such as safety ladders, wheel guards, etc.;
- Marine Fenders for design vessels.

Civil & Utilities

- Above and below ground utilities to suit accessibility and operations requirements;
- Storm water management;
- Fire water infrastructure;
- Cathodic protection system;
- Accommodate for future electrical ship shore power. e.g. provide shore power pits and any other required basic appurtenances for future power installation. Specific details of power to be determined in the future based on actual vessel requirements.
- Communications - IT / fiber optics / fire alarm wiring;
- Navigational aids at wharf area, barge landing area, and SCH;

- Lighting.

Excluded Components - The following components are to be confirmed and / or not currently covered herein:

- Navigation aids outside the immediate marine facilities (e.g., navigation markers / ranges on islands or along Port approaches);
- Portable cables and cable management for vessel connection to shore power;
- Offshore mooring / anchorage infrastructure (if required).

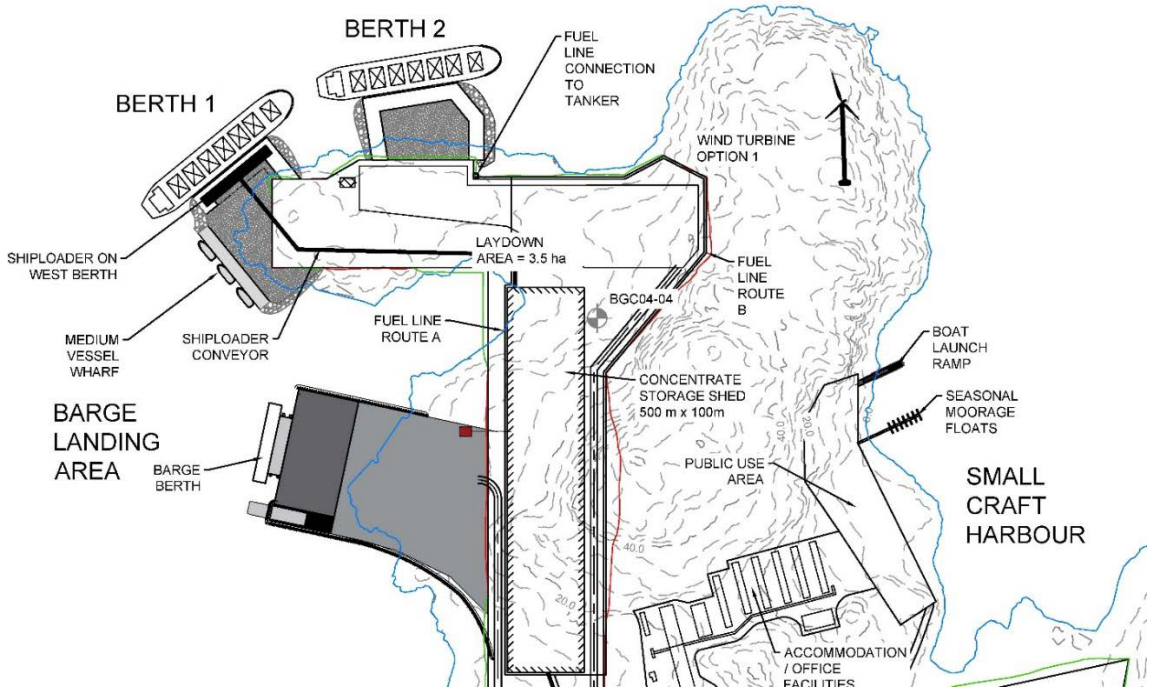
1.3 Study/Project Area

The study/project area in Grays Bay has a peninsula on a rock formation where the marine infrastructures will be built. The water levels increase sharply on the north end of the peninsula. It is shallower on each side of the peninsula and the water depths increase over longer distances.

The following Figure presents the general arrangement of the marine infrastructures, which will include two wharves (West Wharf (Berth 1) and East Wharf (Berth 2) that will be used to accommodate Post-Panamax vessels for the loading of ores in bulk and various cargo, including empty containers. The wharves will also be used to receive containerized cargo and fuel.

West of the two wharves, a medium-size vessel will be built to accommodate tugs and other medium-size vessels.

South of the two wharves, a barge landing will be developed (by Others) to facilitate the initiation of the Major works construction of the two wharves.



1.4 Site Conditions

1.4.1 Meteorological & Oceanographic

The meteorological-ocean criteria include wind, wave, current, temperature, snow, and ice loads. This information is based on measured data and numerical model data analyzed by PND (PND Engineering Inc., 2013). Updated ice conditions have been analyzed more recently since PND's 2013 effort, as summarized herein.

Table 1: Environmental Design Criteria at Grays Bay

Description	Criteria	Design Event
Temperature	- 41°C to 23°C	2.5%; dry
Wind	30 m/s (0.55 kPa) from Northwest	50-year
Waves	2.4 m at 7 seconds from Northeast	50-year
Snow	Ss = 3.4 kPa (0.5 Psi), Sr = 0.1 kPa (0.01 Psi)	50-year
Seismic	Sa(0.2)=0.043, Sa(0.5)=0.025, Sa(1.0)=0.012, Sa(2.0)=0.005, Sa(5.0)=0.001, PGA=0.029, PGV=0.014	2%/50-years
Ice Thickness	2.39 m (estimated)	50-year, 2035
Ice Bending and Crushing	In accordance with ISO 19906	N/A
Maximum Current Speed	1 m/s (all depths)	N/A

1.4.2 Wind

Wind data was measured at Grays Bay from February to August 2010, March to August 2011, and June to September 2012 by MEMS (PND Engineering Inc., 2013). The winds were relatively strong at the station, with the strongest winds from the northwest. Notable winds also

blow from the east along the shoreline. Due to no wind data from the site between the months of October and January, seasonal variation in wind direction frequency cannot be concluded.

The longest wind data records in the region are from Lady Franklin Airport and Byron Bay Airport, two weather stations on the opposite (north) side of Coronation Gulf approximately 125 km from Grays Bay. The wind roses show that the winds are governed by the surrounding topography and that no two stations have similar wind distribution. The closest match to the Grays Bay data is that from Byron Bay Airport, which shows predominant winds from the northwest.

Analyzed wind data from these stations focused on winds only during the shipping season (ice-free months). The 50-year return wind speed is estimated to be approximately 30 m/s for the Lady Franklin Airport and 24 m/s for the Byron Bay Airport. There is no significant difference in the return period estimates between the shipping season data and the data for all months. This is reasonable given that the strongest winds at both stations were recorded during the summer months.

NHC's 2012 design report determined a 100-year return wind speed of about 25 m/s at the Cambridge A weather station, noting that site has lower wind speeds than those observed at Grays Bay (Northwest Hydraulic Consultants Ltd., 2012). The recommended design wind speed for Grays Bay is 30 m/s from the northwest for a 50-year project life (PND Engineering Inc., 2013).

Wind design criteria are provided in Section 1.4.1

1.4.3 Waves

The proposed port site is exposed to large waves generated in the Coronation Gulf from the northeast, as well as waves generated within Grays Bay. Measured wave data from Grays Bay conducted by ASL is available from the August to October 2008 and July to September 2012 periods (ASL Environmental Sciences Inc, 2012). Wave measurements in 2008 indicated a complex wave environment with large waves occurring from all directions. The maximum significant wave height was 1.18 m, recorded by the instrument located at 15 m water depth. Waves greater than 1 m were observed predominantly from the north. Relatively smaller waves with significant wave heights less than 0.5 m were observed predominantly from the northwest. While the design wind direction is from the northwest, waves from this direction are minimized due to the protection Hepburn Island provides Grays Bay. Peak wave periods were typically 2 to 4 seconds, with approximately 38% of the observations exceeding 9 seconds. The largest significant wave height recorded in 2012 was 1.15 m with a 5-second period (ASL Environmental Sciences Inc, 2012).

Computer models were calibrated with this data and were used to predict the design wave height at the Grays Bay port. Fetch limited wave calculation methods were used with the Lady Franklin and Byron Bay Airport wind data to predict deep water waves of 3.6 m (50-year return period) and 1.1 m (1-year return period). A Delft3D numerical model was used to model all of Grays Bay and much of Coronation Gulf. This 3D model predicted deep water waves of 3.0 m (50-year return period). Lastly, a CGWAVE numerical model was used to study the

transformation of waves from deep water to the project site. The 50-year return period wave was modeled at 2.4 m in shallower water approaching the wharf site. All design waves propagate from the northeast.

While not specifically included or modelled at the time, it is assumed the wave effects at the Small Craft Harbour site are the same as the deep water wharf site.

Wave design criteria are provided in Section 1.4.1 An updated / expanded wave analysis is recommended prior to detailed design.

1.4.4 Currents

Current measurements at the project site were performed by ASL during the open water season in 2008 (August to October) and 2012 (June to September) (ASL Environmental Sciences Inc, 2012). The maximum reported currents in 2008 were approximately 0.75 m/s near the surface, 0.4 m/s at mid-depth, and 0.28 m/s at near bottom. The current speeds measured in 2012 were larger with a maximum measured current of 1.04 m/s at the surface, 0.7 m/s at mid-depth, and 0.36 m/s at near bottom. The relatively large difference in the maximum currents between the surface and bottom indicates the presence of a strong vertical shear.

Wind and tidal forcing that led to an increase in current speeds over a few days followed by a slow decrease were observed during the measurements in 2012. Episodes of high currents observed are characterized by rapid onsets of high flows with an equally rapid deceleration. The measurements in 2008 showed a similar pattern where episodes of strong currents were not stable over long periods of time. (ASL Environmental Sciences Inc, 2012).

Current design criteria are provided in Section 1.4.1

1.4.5 Temperature

The nearest station with long-term temperature records is in Kugluktuk, 180 km west of Grays Bay. Mean temperature between 1981 and 2012 was -10.3°C, with an all-time low of -47.3°C and an all-time high of 34.9°C. The data below was obtained from NBCC 2020 for Kugluktuk:

- Design Temperature, January (2.5%) = - 41°C
- Design Temperature, July (2.5%; Dry) = 23°C
- Degree-Days Below 18°C = 10,300

Temperature information is important for analyzing trends in climate change (warming) and calculating ice thickness. Analysis of the data shows that there is a statistically significant warming trend, consistent with observations at other sites in the Canadian Arctic. The daily maximum is increasing at a rate of 0.074°C per year and the daily minimum is increasing at a rate of 0.075°C per year (PND Engineering Inc., 2013).

Temperature design criteria are provided in Section 1.4.1

1.4.6 Precipitation

A weather station was previously installed at the Grays Bay port site and additional / updated precipitation data is planned to be collected. The following snow load data and rainfall data for Kugluktuk, as a relatively nearby reference for the port site, was obtained from NBCC 2020:

- Snow Load (1-in-50-year): Ss = 3.4 kPa, Sr = 0.1 kPa
- One Day Rainfall (1-in-50-year): 65 mm
- Average Annual Rainfall: 140 mm

Rain loads are not considered significant at the Grays Bay port site compared to more prevalent snow loading.

1.4.7 Shoreline & Sediment Transport

The shoreline at Grays Bay consists primarily of bedrock with intermittent sand and gravel beaches. The coastline is rocky and irregular due to glaciers moving along a direction from the north-northwest and scouring away most of the sediments. Sediment is put into the coastal system from the rivers near the project site and from erosion at the shoreline. The effect of the project on longshore sediment transport is likely minimal. Maintenance dredging to maintain adequate depths at the harbour and navigation channels is likely not needed during the project life.

1.4.8 Marine Bathymetry & Water Levels

Tide, water level, and vertical datum information from several sources were evaluated. Tide elevations at Grays Bay, provided by the Canadian Hydrographic Services (CHS), indicate a difference of 0.29 m between higher high water level (HHWL) and lower low water level (LLWL). Tide elevations at various locations in the Coronation Gulf from CHS are summarized in referenced to Chart Datum (CD). The information is from nautical charts 7082, 7778, 7790, and 7793, and from the online tide tables for Cambridge Bay and Kugluktuk.

Table 2: Tide Elevations, Chart Datum

Tide Level (m)	Grays Bay	Bernard Harbour	Cambridge Bay	Kugluktuk	Quadyuk Island	Roberts Bay
Highest Predicted Tide 2012	-	-	1.0	0.5	-	-
Highest Astronomical Tide	0.434	-	-	-	-	-
Higher High Water Level	0.370	1.2	0.9	-	0.7	0.6
Mean Water Level	0.292	0.9	0.6	-	0.4	0.4

Tide Level (m)	Grays Bay	Bernard Harbour	Cambridge Bay	Kugluktuk	Quadyuk Island	Roberts Bay
Lower Low Water Level	0.140	0.6	0.3	-	0.1	0.0
Lowest Astronomical Tide	0.140	-	-	-	-	-
Lowest Predicted Tide 2012	-	-	0.2	0.2	-	-

Water levels were recorded in the previously conducted bathymetric surveys by visually reading a staff gauge 23 times between August 2 and August 10, 2004 (Challenger Geomatics Ltd., 2004). The maximum recorded water level was 0.525 m and the lowest was 0.075 m, a range of 0.45 m. (Note that the water level variation is not necessarily due only to astronomic effects but could also include wind and wave set-up).

Water level measurements were also taken by ASL Environmental Sciences (ASL) from July to September 2012 (ASL Environmental Sciences Inc, 2012). The measured tides were diurnal, and the maximum water level fluctuation observed was 0.7 m. Field observations by PND in 2012 indicate gravel ridge formation due to wave action and seaweed deposits on the shore (PND Engineering Inc., 2013). The gravel ridges are approximately 1.0 m to 1.5 m above sea level; this indicates that storm surges can be significant at Grays Bay.

An astronomic tide range of 0.6 m, defined as the distance between HHWL and LLWL, is recommended at Gray's Bay. In addition, a wind/wave setup/setdown of at least +/-1.0 m should be considered during design. A design high water elevation of +1.6 m CD is considered appropriate for design of the marine facilities (PND Engineering Inc., 2013).

Table 3 below summarizes the design tide elevations for the Grays Bay port facilities.

Table 3: Design Tide Elevations, Chart Datum

Tide Level	Elevation (CD)*
Extreme High Water Level (EHWL)	+1.600 m
Higher High Water Level (HHWL)	+0.600 m
Mean Water Level (MWL)	+0.292 m
Lower Low Water Level (LLWL)	+0.000 m
Extreme Low Water Level (ELWL)	-1.000 m

*Note CD = +1.014 m Canadian Gravimetric Vertical Datum (CGVD)

A Top of Deck elevation of +4.0 m CD to accommodate the design tides over a 50-year return period.

1.4.9 Marine Ice Conditions

Ice conditions dictate that the wharves shall be used to unload / load vessels during the open water season only. Similarly, the SCH shall only be operational during the open water season,

with floats removed over the winter. Use of the Marine Facilities outside of the open water season (i.e., vessel voyages aided by ice breaking) is not currently considered.

Enfotec and PND previously completed ice condition and criteria studies for the Grays Bay Project (Enfotec Technical Services Inc., 2013) (PND Engineering Inc., 2013). Nunami Stantec has since completed an ice study update based on more recent, available historical data, as well as more recent climate change projections with associated estimated effects on ice conditions (Nunami Stantec Limited, 2024).

Shipping in the arctic is regulated by Transport Canada under the Arctic Waters Pollution Prevention Act. The act establishes Shipping Safety Control Zones, and a Zone/Date system. Grays Bay is within Zone 11, and the approach to Grays Bay is from Amundsen Gulf to the west, which is less restrictive and in Zone 12. Enfotec's study reviewed how the shipping season varies with the vessel haul type (Enfotec Technical Services Inc., 2013). For example, the shipping season for strengthened hulls of an ice class 1A vessel in Zone 11 was determined at that time to be July 15 to November 10. The most restrictive shipping season for non-strengthened hulls (Type E) was determined to be July 15 to September 30.

Forces exerted by sea ice on port facilities generally govern wharf designs in the Arctic. Berthing forces and storm wind waves are typically small compared to ice loads. Sheet ice that forms in Grays Bay is generally restricted in movement and is constrained by the surrounding land (PND Engineering Inc., 2013).

However, due to temperature changes, sheet ice will exert lateral forces on in-water structures as it expands and contracts. Grays Bay is relatively confined by Hepburn Island to the north and west and the mainland to the south and east, thereby creating a relatively protected environment. The ice at Grays Bay is considered land fast and there is little opportunity for large ice floes to generate the associated forces required for ice ridging or shoreline pile-up and ride-up. The prevailing wind direction and limited ice movement should result in relatively moderate loads on structures when compared to other regions of the Arctic where ice shifting package under sustained winds exert large forces on marine structures (PND Engineering Inc., 2013).

Nunami Stantec's ice study update reviewed both Enfotec's and PND's past reports to provide an updated ice thickness design criterion for preliminary design of the Grays Bay Port Site (Nunami Stantec Limited, 2024). This study update determined that freeze-up at Grays Bay occurs around October 29 to November 5, and break-up occurs around July 30 to August 6. The ice reaches its maximum thickness around late-May or early-June. The ice then starts to melt, and by July, the ice within Grays Bay has substantially melted. The Coronation Gulf, however, does not become ice free until the beginning of August.

Based on historical data between 1959 and 2023 from the Cambridge Bay ECCC station (located approximately 281 km northeast of Grays Bay), the maximum annual ice thickness was 246 cm in May 1973. Meanwhile, the average maximum ice thickness at the Cambridge Bay station over this data period is approximately 207 cm. The 50-year return period (i.e., 1-in-50-year event, with a 1/50 or 2% probability of occurring within a given year) ice thickness has been estimated to be approximately 2.44 m for today's conditions (Nunami Stantec Limited, 2024). As the Grays Bay Port is currently assumed to begin operations in 2035, a review of projected warming in the Grays Bay area, and its effect on Arctic Sea ice thickness, was

completed to estimate the 2035 future design event. The 1-in-50-year ice thickness design criteria value is recommended to be 2.39 m as of 2035, reflecting an approximate 2% reduction from today's value of 2.44 m (Nunami Stantec Limited, 2024).

The ice thickness design criterion is provided in Section 1.4.1.

1.4.10 Glacial Isostatic Rebound & Sea Levels

Research on glacial rebound indicates the Arctic region around Coronation Gulf may be experiencing glacial rebound at a rate of approximately 4 mm per year with records since 1979 (PND Engineering Inc., 2013). When considering long-term sea level elevations at Grays Bay, any rise in sea level is expected to be offset, and potentially exceeded, by this rebound. Therefore, no allowance for future sea level rise is provided for in the Marine Facilities design.

1.5 Codes, Standards & Design Guidelines

The following identified codes, standards, and design guidelines shall be updated based on the pursued wharf structure type and shall be listed in order of priority.

- British Standards Institute (BSI): British Standard Code of Practice for Marine Structures – Part 1 to 6. BS 6349
- Port Designer's Handbook (Thoresen)
- Unified Facilities Criteria (UFC) 4-152 – Design: Piers and Wharves
- UFC 3-600 – Fire Protection Engineering for Facilities
- UFC 4-150 – Dockside Utilities for Ship Services
- DFO Guidelines for Harbour Accommodation (1985)
- USACE US Army Corps of Engineers – Coastal Engineering Manual CEM-2002 (with changes)
- CSA-C22.1-21, Canadian Electrical Code
- PIANC Guidelines
- Structural Design
- British Standards Institute (BSI): British Standard Code of Practice for Marine Structures – Part 1 to 6. BS 6349
- American Petroleum Association (API), RP 2A, Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms
- API, RP 2N, Recommended Practice for Planning, Designing, and Constructing Structures and Pipelines for Arctic Conditions (ISO 19906 Modified)

- CSA S471: General Requirements, Design Criteria, the Environment, and Loads
- CSA S6: Canadian Highway Bridge Design Code
- CSA S16: Design of Steel Structures
- National Building Code of Canada, 2020 (NBCC)
- Canadian Foundation Engineering Manual
- ASCE 61-14 (Seismic Design of Piers and Wharves)
- PIANC Seismic Design Guidelines for Port Structures
- Steel Sheet Pile - Arcelor Mittal, Design and Execution Manual, AS 500 Straight Web Steel Sheet Piles
- Pile Buck, Sheet Pile Design
- USS Steel Sheet Piling Design Manual
- Concrete:
- CSA A23.1: Concrete Materials and Methods of Concrete Construction
- CSA A23.2: Methods of Test and Standard Practices of Concrete
- CSA A23.3: Design of Concrete Structures
- CSA A23.4: Precast Concrete – Materials and Construction
- Cement Association of Canada – Concrete Design Handbook
- Canadian Institute of Steel Construction (CISC) – Handbook of Steel Construction
- CSA G40.20/G40.21 – General Requirements for Rolled or Welded Structural

1.6 Reference Documents

The following documents were referred to in the preparation of these design criteria:

1.6.1 Geotechnical

Available geotechnical information related to the marine facilities is summarized in the following documents:

- Grays Bay Road and Port, **Deep-Water Wharf** – Preliminary Geotechnical Design Recommendations (Tetra Tech, 2025)
- Grays Bay Road and Port, **Small Craft Harbour** – Preliminary Geotechnical Design Recommendations (Tetra Tech, 2025)
- Grays Bay Road and Port, **Port Landside Infrastructure** – Preliminary Geotechnical Design Recommendations (Tetra Tech, 2025)

Any detailed design or construction must be preceded by a detailed geotechnical study of the project site. Additional geotechnical field investigations coupled with laboratory testing are recommended to better define the geotechnical conditions at the Port Site. Confirmation of the depth to bedrock in all areas and adequate sampling of overlying marine sediments is required as these are critical geotechnical parameters in the design for the marine structures.

1.7 Geotechnical & Seismic Design

There is relatively low seismicity in the Grays Bay area, as seen in Figure 1Figure 2: NBCC 2020, Peak Ground Acceleration (PGA) Map for Canada (Grays Bay indicated by purple arrow). Seismic design criteria were calculated using the NBCC 2020 seismic hazard tool assuming Site Class A and are provided in **Section** Error! Reference source not found..[1] Seismic hazards at the site are not expected to be a governing design factor for the project.

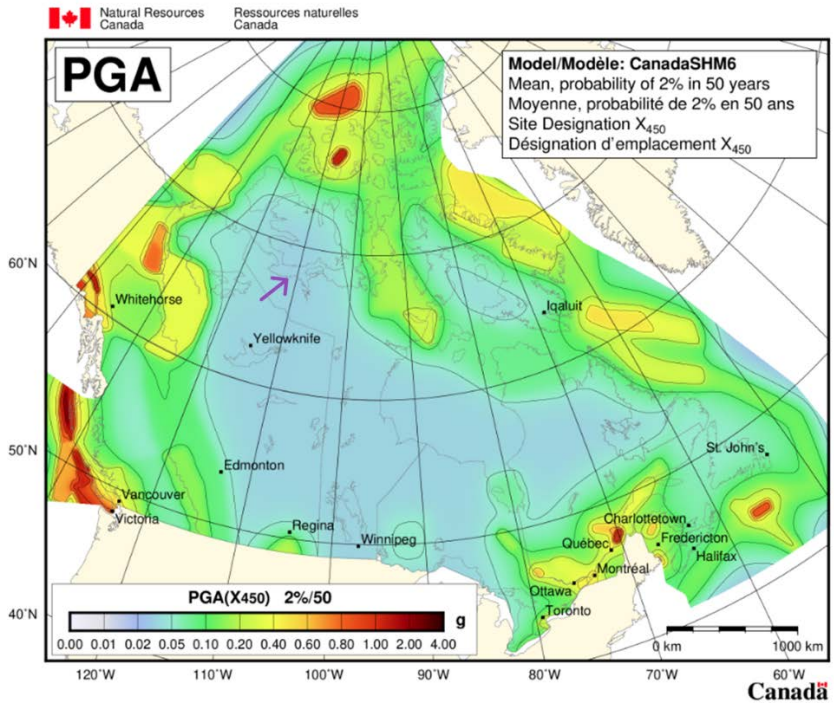


Figure 2: NBCC 2020, Peak Ground Acceleration (PGA) Map for Canada[2] (Grays Bay indicated by purple arrow)

2 Functional Requirements

The port will be the primary means of receiving and shipping commodities, project construction cargo and equipment to support the future mining operations. The port shall have the capacity to export to market various mineral concentrates (e.g., zinc, copper, lead) during the ice-free season. The port shall provide the capacity to receive inbound bulk fuel, project construction cargo, mine construction cargo, mining equipment, port / mine consumables, process equipment, spares parts, and vehicles. It is assumed that most of the inbound goods will be shipped in containers or bulk fuel carriers.

[1] https://www.earthquakescanada.nrcan.gc.ca/hazard-alea/interpolat/nbc2020-cnb2020-en.php
[2] https://www.earthquakescanada.nrcan.gc.ca/hazard-alea/zoning-zonage/NBCC2020maps-en.php

A minimum Top of Deck elevation of +4.0 m CD to accommodate the design tides over a 50-year return period.

Various mineral concentrates will be primarily loaded in the future by third parties to bulk carriers after ore processing at the mines or port. Some inbound bulk carriers will deliver containers and then be used to export concentrates. Empty export containers may be loaded on the hatch covers of outbound bulk carriers. General cargo vessels and lightering barges may also import / export various cargo.

At this stage of concept design development, two deep-water berths are planned considering the short (open-water) shipping season understood to be available at Grays Bay.

2.1 Design Vessels

The following table summarizes the vessels that the Grays Bay port facilities shall be designed to accommodate.

Specific design vessels and their parameters are currently assumed and are intended to be confirmed with operators / users prior to detailed design (e.g., calls as a % of vessel size, beam, number and total length of concentrate hatches). Tug services are currently assumed to be required and related parameters, including design vessel and mooring / service area, are to be confirmed through further design development and stakeholder engagement.

Table 4

Vessel	Specifications	Usage
Post-Panamax Oil / Bulk Carriers (Ice Class 1A)	100,000 DWT Length: 240 m Beam: 43 m Draught: 15 m [Vessel particulars are assumed; maximum]	The largest vessel intended to be calling at Grays Bay, accommodating fuel import or mineral concentrate export. Comparable existing vessels include the Nordic Nuluujaak, Nordic Quinngua, Nordic Sanngijuq, and Nordic Siku, all being Ice Class v 1A with a 95,000 DWT capacity, 230 m length, 38 m beam, and 15 m draught.
Post-Panamax Bulk Carriers (Ice Class 1A)	75,000 DWT Length: 225 m Beam: 32 m Draught: 14 m	Assumed primary bulk carrier size for mineral concentrate export. Baffinland Iron Mines uses this class of vessel to export concentrate from their mine on Baffin Island. In 2013, the Nordic Orion crossed the Arctic delivering coal from Vancouver to Europe.

Vessel	Specifications	Usage
Harry DeWolf-class Arctic and Offshore Patrol Vessels (AOPV)	Length: 103 metres Beam: 19 metres Displacement: 6,290 T Draught: 5.85 m	Royal Canadian Navy (RCN) - Arctic and Offshore Patrol Vessels
Canadian Coast Guard Polar Vessel[3] (Polar Class)	26,000 DWT Length: 160 m Beam: 28 m Draught: 11 m	CCG's newest and largest ice breaker vessels intended for year-round operations in the Arctic.
Ocean-going Heavy Lift / Container Barge (Class ABS A1)	13,200 DWT Length: 123 m Beam: 32 m Draught: 4.87 m	Towed oversized and containerized cargo with transshipment at Barge Landing Area (ramp). NT 12000 had served western Nunavut for NTCL (now Marine Transportation Services).
Lightering Barge (Non-Ice Class, up to and including series 1500)	1,500 DWT Length: 60 m Beam: 17 m Draught: 2 m	Towed cargo to/from lightered vessels or communities. During construction, barges shall roll off equipment onto a beach. During operations, barges shall transship cargo at Barge Landing Area (ramp or berth). As an option, a lightering barge can be used to simultaneously offload an anchored cargo vessel while wharf area is in use.
Multi-purpose Cargo Vessel (Ice Class 1A)	8,500 DWT Length: 137 m Beam: 19	Import break bulk, bulk commodities, and containers during construction and operations. NEAS operates vessels such as the MV Aujaq. Common practice is to lighter all cargo to beach or Barge Landing Area (ramp or berth) from anchored

Vessel	Specifications	Usage
	Draught: 9 m Cargo Volume: 18,000 m^3	vessel. Option to offload directly from vessel to berth at the wharf area, if available.
Handymax Fuel Tanker (Ice Class 1A)	10,000-13,000 DWT Length: 140 m Beam: TBC Draught: 8-12 m Capacity: up to 15 ML	Alternative to the OBO, offloading fuel directly onto the wharf or by offshore anchor and floating hose.
Tugboat (80 T Pull)	Length: 30 m Beam: 13.25 m Draft: 5 m	Tugs shall be used to escort vessels near the port and assist with berthing operations.
M.V. NUNAKPUT (MTS Tug)	Length: 51.05m (167' 6") Beam: 14.55m (47' 9") Draft: 1.83m (6' 0")	Tug shall be used to haul the barges of Marine Transport Services, NT
M.V. EDGAR KOTOKAK (MTS Tug)	Length: 46.79m (153' 6") Beam: 15.87m (52' 1") Draft: 1.14m (3' 9")	Tug shall be used to haul the barges of Marine Transport Services, NT

3 Assumptions

It is assumed that all the concrete caissons will be fabricated offsite and transported to site using barges. The seabed will have to be leveled using material from the site and the caissons sections will be installed to form one wharf per season of open-sea.

It is assumed that the East wharf (Berth 2) will be built first and have the potential to be used as a work area to store granular material for the construction of the West wharf (Berth 1) and the Medium Vessel Wharf.

4 Constraints, Risks, and Interdependencies

The key constraints are the climatic and oceanic conditions at the site, coupled with a short open sea season. The logistics will require rigorous planning, considering the sailing distances to reach the site. The loading operations of the caissons, equipment and material at their points of origin will require planning and interdependencies will have to be considered, given the limited space on site, specially during the beginning of the construction activities. A detailed logistics plan will have to be developed to insure the optimization of all interdependent activities from fabrications offsite, to the loading from the point of origins, the shipping, the reception, as well as the construction activities.

Earthworks, the production, transportation and storage of granular material on site will have to be planned in order to meet the requirements and schedules. Given the interdependencies of many activities, the logistics plan and the schedule will have to include contingencies to minimize the risks.

A detailed risk analysis will have to be performed to establish the levels of contingencies to be included in the cost and schedules of the activities. Mitigations measures will have to be developed to cover each risk that be identified during the risks analysis.

4.1 Future Expansion Considerations

The Permanent Barge Landing work will be constructed by Others, prior to commencement of the Phase 1 of the major works, which will include the East wharf and the medium size vessel wharf. The West wharf will be constructed as part of a Phase 2, future expansion work.

The construction of laydown and storage areas shall be considered to be included in the Phase 1, in preparation for the Phase 2.

5 Reference Design

The reference design of the marine infrastructures is based on the data collected on the metocean and site conditions, including geotechnical investigations, bathymetric surveys and sub-bottom profiles surveys. The reference design consists in using concrete caissons fabricated offsite for the construction of the wharves. Based on the site metocean data, the top deck elevation of the East and West wharves and the Medium size vessels has been established at +4m CD in the concept design. It is assumed that the concrete caissons will be delivered to site using sinking barges from the fabrication locations.

The reference design also considered the short open-sea season and the climatic environment in which the marine infrastructures will have to be constructed.

The availability of large volumes of granular material onsite was also considered and included to the reference design.

5.1 Design Life

The design life for the wharf and coastal structures shall be 50 years, except for the wharf fender system which shall be 10 to 20 years.

Note adequate inspection and maintenance of the marine facilities is required over their design life, with major replacement / repair anticipated after that time. The service life of the marine facilities is different from their intended design life; service life may be longer or shorter than the design life due to the actual quality of maintenance, usage, extraordinary events, etc.

5.2 Durability

5.2.1 Concrete Structures

To cover the design life span for the facility, a nominal clear cover of 60 mm shall be used for all structures not in contact with soil. This cover complies with CSA A23.3 for beams, girders, walls, etc. exposed to exposure conditions C-1 and S-3. For all soffits and any concrete elements permanently against soil, the concrete cover shall be minimum 100 mm. Exposed edges shall be chamfered 20 mm.

5.2.2 Steel Structures

Corrosion allowance for steel structures shall be added to all primary load carrying elements for the specified design life of the facility. It is assumed that the corrosion allowance shall provide protection against corrosion throughout the durability life of the structures with no benefit from a coating system.

The specific design corrosion rates are to be determined through design development.

6 Quantity Approximations

The following table presents approximations of the quantities of the dredging and materials that will be needed for the construction of the Major Works, mainly the East and West wharves and the Medium size vessels wharf.

Item	Unit	West wharf	East Wharf	Medium-Size vessel wharf
Dredging	M^3	10000	4500	0
Rock armour	M^3	20000	40000	8500
Concrete caissons	M^3	14000	23000	6000
Caissons backfill	M^3	77000	125000	21000
Behind dock backfill	M^3	360000	360000	30000
Bollards	Qty	8	8	8
Fenders	Qty	6	6	12

7 Next Steps for Design Development

The next steps for design development may require additional geotechnical investigations and bathymetric surveys to support the preliminary and detailed designs.

The installation of scientific instruments and the deployment of buoys to measure the currents and wave climate may be considered to collect additional metocean data to be used during the design of the marine infrastructures.

WEST KITIKMEOT RESOURCES CORP

Grays Bay Road and Port Project Reference Concept Design Memo - Port-Landside

September 29, 2026

NUNAMI STANTEC LIMITED

Revision	Date	Description
0	Aug 14	• First draft GA
1	Aug 17	• Draft content review GA/AP
2	Sept 17	• Updates for Second Draft
3	Sept 29, 2026	• Published to support the RFP
4		•

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1 General

1.1 Introduction & Purpose

This document is the Reference Design Concept Memo for the Port-Landside elements as related to the Major Works scope of the GBRP project. It is a component of the CCDC 32 – 2026, Progressive Design-Build Contract executed between the Owner, West Kitikmeot Resources Corp (WKR), and the Design-Builder. This document presents the Port-Landside infrastructure elements and is intended to support the Design-Builder with the development of next phases of the project.

Early Works Port-Landside elements (temporary camp, temporary airstrip, temporary fuel storage, and laydown enabling works) are explicitly excluded from this memo. This document covers Major Works Port-Landside scope only.

1.2 Design Scope

The Port-Landside Major Works scope encompasses all permanent land-side civil, earthworks, building, utility, and infrastructure required to support long-term port operations at Grays Bay. The scope includes the following primary components:

- **Grays Bay Port terminal facilities and associated infrastructure:** permanent residential and administration buildings, maintenance buildings, emergency accommodations, waste management, and site-wide support systems.
- **Port access roads and internal circulation:** site road network connecting the terminal facilities to the wharves, laydown areas, fuel farm, and the all-season highway.
- **Cargo handling and storage areas:** immediate and secondary laydown areas for ship loading/unloading activities, concentrate storage facilities, concentrate truck warming shed, and bulk covered storage.
- **Utility corridors and support infrastructure:** on-site power generation, bulk fuel storage and dispensing, potable water supply and treatment, wastewater treatment, industrial water, and waste disposal facilities.

The Major Works Port-Landside program is organized into two sequential phases. Phase 1 delivers core operational facilities to support approximately 80 permanent staff. Phase 2 expands capacity as operational demands mature.

1.3 Study/Project Area

The Port-Landside infrastructure is located at Grays Bay on the Coronation Gulf, Kitikmeot Region, Nunavut. The site is characterized by extreme Arctic climatic conditions, continuous or discontinuous permafrost, and a marine access season of approximately 77 days per year. The Port-Landside development area is situated landward of and immediately adjacent to the Port Marine facilities (wharves and barge landing area), with the port access road extending southward to connect to the all-season highway corridor.

The site development area encompasses the following functional zones:

- Wharf and cargo Laydown Area A (eastern peninsula immediately adjacent to port facilities, approximately 20,000 to 30,000 sq m).
- Laydown Area B (At Barge Landing Site – 20,000 sq. m.)
- Laydown Area C (Two segments of approximately 150,000 sq m total area, East of Camp Adjacent to Bulk Fuel farm).
- Bulk fuel farm (approximately 50,000 sq m including secondary containment; sited adjacent to Laydown Area C).
- Waste management area (landfill, transfer station, and incinerator, located farther from the coastline where space permits. Location to be approved by Transport Canada with respect to proximity to airfield).
- Power generation facility (adjacent to the maintenance building or residential/administration buildings to minimize transmission and fuel line lengths).

1.4 Codes, Standards & Design Guidelines

Port-Landside infrastructure shall be designed in accordance with the latest applicable editions of the following codes, standards, guidelines, and regulatory requirements, unless otherwise accepted by the Owner:

- National Building Code of Canada (NBCC) 2020 – occupancy classifications, fire separations, and structural requirements.
- National Energy Code of Canada for Buildings (NECB) 2023 – building energy performance requirements.
- National Fire Code of Canada (NFC) – fire protection, fuel storage secondary containment (Part 4.3.7).
- TAC 2017 Geometric Design Guide for Canadian Roads – site road geometric design.

- TAC 1986, Chapter H, Low Volume Road – supplementary road design criteria.
- Nunavut Mines Health and Safety Act and applicable regulations – road width, traffic safety, and operational requirements.
- CAN/CSA S6 – structural design of culverts and site drainage structures.
- Guidelines for Canadian Drinking Water Quality (GCDWQ) – potable water treatment standards.
- Nunavut Public Health Act and accompanying Water Supply System Regulations.
- Fisheries Act and applicable DFO requirements for in-stream works and fish habitat protection.
- API Standard 650 – welded steel tanks for oil storage.
- CSA Z662 – oil and gas pipeline systems (above-ground piping).
- CSA B836-14 and API RP 2003 – fuel dispensing systems.
- ASTM A333 Gr. 6, ASTM A350 LF2 Gr.1, and ASTM A420 WPL6 – low-temperature piping material specifications.
- Applicable federal, territorial, environmental, and permitting requirements.
- Applicable Owner requirements, Project environmental commitments, management plans, and permit conditions.

Where there is a conflict between requirements, the more stringent requirement shall govern unless otherwise accepted by the Owner. The Design-Builder shall identify any proposed departures and obtain acceptance from the Owner prior to implementation.

1.5 Reference Documents

The following project documents were referred to in the preparation of these design criteria:

- Grays Bay Road and Port Project Basis of Design: Road – Jericho Station to Port
- Owner's Statement of Requirements (OSR) – Major Works
- GBRP Major Water Crossings – Master Table
- Hydrotechnical Assessments and Water Crossing Evaluations
- Navigability Assessments for Major Water Crossings
- Preliminary Geotechnical Investigations and Design Recommendations

- Environmental, Fisheries, and Regulatory Studies Relevant to Water Crossing Structures

2 Functional Requirements

2.1 Terminal Facilities and Accommodation

- Provide permanent residential and administration facilities for 80 staff (20 port operations staff plus 60 mining users), including shared dining, offices, medical facilities, kitchen, and connected latrines.
- Provide emergency accommodation for up to an additional 150 transient personnel (high-density sleeping quarters only, without separate kitchen or permanent sanitary services).
- Maintenance building to accommodate interior parking for: two emergency vehicles, one water haul truck, one wastewater haul truck, two crew transport vehicles, and four maintenance vehicles (snow clearing, grading). Exterior parking for up to five B-Train trucks and trailers plus ten additional maintenance vehicles.
- All buildings to meet NBCC 2020 and NECB 2023, with occupancy and fire separation requirements determined by building classification.
- Buildings to prioritise durability and simplicity in finishes and systems. Location and orientation to consider snow drifting and efficient inter-building connectivity.

2.2 Port Access Roads and Internal Circulation

- Site road network designed as a Public Resource Development Road (Subclass Mine Haul – Controlled Access) in accordance with TAC 2017 and Mines Health and Safety Act.
- Main site roads serving DPRT / B-Train access: 10 m width (three times design vehicle width of 3.3 m as required by Mines Health and Safety Act).
- Secondary site roads (accommodations, small craft harbour area): 8.5 m width.
- Design speed: 40 km/h with reduced posted speeds starting approximately 500 m from developed site areas.
- Design vehicle: DPRT or B-Train with side dumps, width 3.3 m, GVW 340 t.
- Maximum gradient: 6%. Crossfall on general roadways: 3.0%. Embankment backslopes: 3h:1v.

- Traffic volumes: 50 vehicles per day plus localized operational traffic (mix of heavy to light trucks, snowmobiles, and ATVs).
- Minimum curve radii to meet the most restrictive vehicle regularly using the site roads.

2.3 Cargo Handling and Storage

- Immediate cargo Laydown Area A: approximately 20,000 to 30,000 sq m located on the peninsula immediately adjacent to the port wharfs, for containerised or breakbulk cargo loading/unloading from barges and freighters.
- Barge cargo Laydown Area B: approximately 20,000 sq m located adjacent to the Barge Landing Area.
- Laydown Area C: approximately 150,000 located in the lowland area south of main facilities on both sides of the access road. To be sized to meet requirements for future third-party developments.
- Cargo laydown facilities to support on-shore mobile cranes, shipboard cranes, loaders, forklifts, and other stevedoring equipment. Areas to provide maneuvering space for heavy equipment and temporary laydown of offloaded goods.
- Concentrate storage: approximately 50,000 sq m, designed to accommodate an estimated 1.3 million tonnes of mineral concentrate for multiple users. Shown conceptually as two buildings, each 95 m wide with a combined total length of approximately 490 m (including 50 m separation). The design, construction, and operation of concentrate storage buildings are the responsibility of third-party users; all site utilities to the structures are the responsibility of the port facility.
- Concentrate truck warming shed: approximately 4-bay, 20 m x 60 m (5 m-wide bays), to allow concentrate trucks to warm box loads during winter months to enable unloading.
- Bulk covered storage: approximately 20 m x 60 m gravel pad area adjacent to the shoreline, potentially one or more tension fabric structures for protection of materials, equipment, and supplies from the elements.
- Public use area: approximately 300 sq m gravel pad with a simple 4 m x 6 m uninsulated shelter building, located uphill of the small craft harbour, accessible by pedestrian access only.

2.4 Utility Corridors and Support Infrastructure

- Power: on-site diesel power generation of approximately 6 MW total installed capacity (4 units: two continuous, two standby) plus 1 MW alternative energy system

(assumed to be solar). Peak load not expected to exceed 4 MW. Generators designed and rated for Low Sulphur Diesel Light (LSDL) P50 Arctic Grade conforming to CAN/CGSB-3.6-2000 or CAN/CGSB-3.517 2000 Type A. Residual jacket water heat recovery system to deliver heat for port site infrastructure.

- Potable water: system to meet GCDWQ and Nunavut Public Health Act. Design consumption 500 L per capita per day.
- Possible raw water source from lake at station 1+355, however other sources are to be considered as within the work.
- The alternate sources to be considered shall include both other lakes close to the port site, and the use of a seawater permanent intake and Reverse Osmosis (RO) water treatment.
- Capacity and recharge rate of the source lake to be confirmed during preliminary design
- Water Treatment Plant (WTP) and truckfill is to be located at raw water intake site.
- Treated water anticipated to be delivered to usage site via truck haul after treatment.
- Truck fill rate from WTP shall be a minimum 1,000 L/min, desirable 1,200 L/min.
- Fire suppression water: minimum 1,000 L/min for 1 hour. Where the WTP cannot achieve the required 1000 L/min truck fill flow rate to fill trucks continuously with treated water in the event of a fire, either a raw water fire flow bypass meeting that flow rate shall be provided or a dedicated reserve amount of fire water storage meeting the minimum required flow rate for 60 minutes be present in the system.
- Wastewater: design flow 500 L per capita per day for 80-person operations, with flexibility for population variation from 20 to 80 persons. Treatment to meet maximum average effluent concentrations: BOD5 ≤ 30 mg/L; TSS ≤ 30 mg/L; FC ≤ 1×10^6 coliform/100 mL; pH 6–9; no visible oil/grease sheen. Discharge to environment at a single monitored discharge point identified in the project water licence.
- Industrial water (dust suppression, vehicle washing, process use): anticipated to be raw, untreated water. Quantity requirements to be evaluated during design to determine whether the proposed source can supply both potable and industrial use.
- Bulk fuel storage: Phase 1 initial build with two 5-million L LSDL tanks within secondary containment. Containment designed for ultimate Phase 2 build-out of additional four 40-million L tanks.
- In addition to the above noted vertical tanks, provide minimum of 2 skid-mounted horizontal tanks for gasoline and potentially for ULSDL and for Jet A1. Provide at least one 90,000 L horizontal tank as a ‘slop tank’ for tank cleaning purposes.

- Total secondary containment area approximately 50,000 sq m. Secondary containment berms to meet NFC Part 4.3.7: contain 110% of the largest tank, or 100% of largest plus 10% of all other tanks. Berm heights limited to 1.3 m where possible.

- Waste management: non-hazardous landfill (inert/non-hazardous materials with environmental and wildlife considerations), hazardous materials transfer station (100% secondary containment, backhaul to licensed facilities), and incinerator (clean-burning, housed in a building, for other wastes). Expected waste management area approximately 125 m x 175 m. Site location to be confirmed with Transport Canada regarding proximity to airfield.

3 Assumptions

The reference concept design for Port-Landside Major Works has been developed based on available information, studies, and investigations completed at the time of preparation. The following assumptions were used in the development of the reference concepts:

- The reference concept design is intended to support procurement, project planning, and future design development and does not constitute a final design.

- Facility configurations, building sizes, and site layouts are preliminary and will be refined by the Design-Builder during subsequent design phases.

- Permanent staff complement of 80 persons (20 port operations staff plus 60 mining users) is used as the basis for sizing water, wastewater, power, and building systems for Phase 1.

- Potable water source is currently anticipated be the lake at station 1+355. Adequacy of this source in terms of capacity and recharge rate has not yet been confirmed and requires evaluation during preliminary design by the Design-Builder. There are concerns with the depth of the lake being insufficient during frozen water season to provide adequate storage and water supply to the port. Analysis demonstrating that the lake has sufficient water availability throughout the winter shall be completed by the Design-Builder.

- Alternate sources including other lakes close to the port site or the use of a seawater permanent intake and Reverse Osmosis (RO) water treatment shall be considered by the Design-Builder.

- Site road design vehicle is the DPRT or B-Train (width 3.3 m, GVW 345 T).

- Shore power requirements for vessels at berth have not been quantified at this stage.

- Concentrate throughput basis for warming shed and storage sizing is approximately 1.3 million tonnes per year with vehicles up to 216 T capacity. Final concentration logistics details (thaw time requirements, operational hours) are not yet confirmed.
- Geotechnical conditions are based on available preliminary investigations. Bedrock depth at all vertical tank locations has not been confirmed; site-specific geotechnical investigations are required prior to detailed design.
- The type of wastewater treatment technology (e.g., mechanical RBC system or lagoon) has not been determined. Selection will be made during preliminary design based on comparative analysis of capital and operating costs, maintenance requirements, and treatment performance.
- Alternative energy system is assumed to be solar (1 MW). The specific technology, configuration, and detailed energy modelling have not been completed at this stage.
- Environmental, fisheries, regulatory, and permitting requirements will continue to be refined through future project development and approval processes.
- Future design development may result in modifications to facility sizes, building configurations, utility capacities, road layouts, and associated infrastructure as additional information becomes available.

4 Constraints, Risks, and Interdependencies

4.1 Constraints

The following constraints represent key project conditions expected to influence the detailed design, procurement, construction, and long-term operation of the Port-Landside infrastructure:

- Remote Arctic location with limited transportation infrastructure, resulting in significant constraints on mobilization, material delivery, equipment access, workforce accommodation, and construction logistics.
- Short annual open-water seasons (approximately 77 days) and weather-dependent access windows that may affect construction sequencing and productivity.
- Permafrost conditions and cold-region engineering requirements that influence foundation design, embankment performance, construction methods, and long-term asset behaviour. Permafrost preservation is critical to the long-term performance of all site development.
- Site development must be constructed primarily on granular fill embankments. Geotechnical investigations are required to confirm ice content and optimize embankment designs for each terrain type.

- Port-Landside facility locations are constrained by the requirement to be immediately adjacent to Port Marine facilities (cargo laydown), by site topography (valley location for camp), and by environmental considerations.
- Environmental, fisheries, and permitting requirements may restrict construction methods, in-water works, and site development activities.
- Availability and proximity of suitable granular materials, quarry sources, and construction materials are key constraints for embankment construction.
- Limited existing geotechnical information at some facility locations, particularly for the large tank foundations, will require additional field investigations to support detailed design.

4.2 Risks

The following risks have been identified and may affect future design development, constructability, cost, schedule, permitting, and long-term performance:

- Variable subsurface conditions may result in foundation systems and embankment designs that differ from current assumptions, potentially affecting cost, schedule, and constructability.
- Future geotechnical investigations may identify challenges associated with ice-rich permafrost, thaw-sensitive soils, or unsuitable foundation materials at key facility locations (particularly the tank farm and maintenance building).
- Delays in environmental approvals, water licences, or other regulatory permits may impact construction sequencing and schedule.
- Extreme weather events and changing climate conditions may affect long-term permafrost stability, embankment performance, and overall site infrastructure resilience.
- Construction logistics risks associated with transporting prefabricated building systems, fuel tanks, mechanical equipment, and large structural components to a remote northern location.
- Potential shortages of qualified construction labour and specialized systems installation expertise for Arctic environments.
- Fuel resupply schedule constraints: tankage and fuel transfer systems must be optimised to manage the limited resupply schedule, and inadequate storage could impact operations if marine delivery is delayed.

- Third-party concentrate throughput and operational requirements are not yet fully defined, which introduces uncertainty in the sizing of concentrate storage, the warming shed, and associated logistics.
- Water source adequacy: if the lake at station 1+355 is found to have insufficient capacity or recharge, an alternative source or supply strategy will be required.

4.3 Interdependencies

Port-Landside infrastructure is closely integrated with several other project disciplines and construction activities. The following interdependencies have been identified:

- Port Marine: cargo laydown areas, concentrate storage, and fuel farm locations are directly dependent on the wharf layout, berth configurations, and marine access road alignment.
- Roadway: the port access road connecting the landside facilities to the all-season highway is designed under the Roadway and Structures discipline. Internal site roads and grades must be coordinated with the approach road geometry.
- Geotechnical Design: foundation systems, embankment thicknesses, and permafrost management strategies depend on geotechnical investigations and recommendations specific to the Port-Landside site.
- Environmental and Regulatory: facility locations, drainage design, wastewater discharge, waste management, and fuel handling must be coordinated with environmental approvals, water licenses, and land use permits.
- Port Marine (Fuel Logistics): fuel storage and dispensing systems at the Port-Landside facility are the primary fuel supply source for Port Marine operations. Coordination of fuel resupply logistics, dispensing flow rates, and piping connections between marine offloading and the tank farm is required.
- Aerodrome: Jet A1 fuel storage at the Port-Landside fuel farm serves aerodrome operations. Fuel logistics coordination with aerodrome operations is required.
- Construction Planning and Logistics: building system procurement (modular/prefabricated units), tank fabrication and delivery, and site preparation sequencing are closely linked to overall project logistics planning and marine delivery windows.
- Progressive Design-Build Development: final facility configurations, system capacities, and building layouts will be refined through collaboration between the Owner, Design-Builder, and technical stakeholders during future project phases.
- Third-Party Concentrate Operations: concentrate storage building design, construction, and operation are the responsibility of third-party users, but port facility

utilities must be provided to the structures. Coordination of utility design with third parties is required.

5 Design Requirements

The Port-Landside infrastructure shall be designed to provide safe, reliable, and durable facilities that support the long-term operation of the Grays Bay Road and Port Project. Design requirements shall address operational demands, durability, constructability, maintenance, environmental conditions, and applicable code requirements throughout the service life of the infrastructure.

5.1 Design Life

Port-Landside Major Works permanent infrastructure shall be designed for a minimum service life of **50 years** consistent with the Port Marine wharf design life. The design shall consider Arctic environmental conditions including freeze-thaw cycles, permafrost effects, and limited maintenance access. Structural systems and building envelopes shall be selected to minimise long-term maintenance requirements.

5.2 Durability

All Port-Landside infrastructure shall be designed for long-term durability under Arctic environmental conditions. Durability considerations shall include freeze-thaw exposure, abrasion, corrosion, ultraviolet exposure, thermal gradients, and other environmental effects relevant to the facility type.

- Buildings: durability and simplicity are the primary design qualities. Buildings shall be designed to meet NECB 2023 energy performance requirements. Cold-rating of walls, windows, and insulation shall be appropriate for the Arctic environment.
- Site earthworks: granular embankments with surface wearing course of 200 mm of 25 mm minus material. Permafrost preservation is critical through appropriate embankment thickness by terrain type (Type I: 0.4 m; Type II: 0.8 m; Type III: 1.4 m; Type IV: 1.95 m).
- Fuel piping: all exterior piping shall be carbon steel ASTM A333 Gr.6. Buried pipelines shall be avoided where possible. Where buried pipe is necessary, double-wall certified pipe meeting current CCME requirements shall be used. Expansion loops shall be provided to manage thermal effects.
- Tanks: vertical tanks designed per API 650, suitable for -45°C operations. Vertical tank heights to be limited to 12.2 m where practical.

- Water and wastewater systems: all exposed piping to be insulated and self-draining with freeze protection and thaw recovery systems. Heat tracing to be replaceable without damage to insulation or piping.

5.3 Design

Site earthworks shall be completed in accordance with the geometric design criteria summarised below:

Table 1: Site Earthworks Geometric Design Criteria

Design Parameter	Criteria	Reference
Road Classification	Public Resource Development Road (Subclass Mine Haul – Controlled Access)	TAC 2017
Design Speed	40 km/h on site	TAC 2017
Main Site Road Width (DPRT/B-Train)	10 m	Mines Health and Safety Act
Secondary Site Road Width	8.5 m	TAC 2017
Design Vehicle	DPRT or B-Train, width 3.3 m, GVW 345 T	Mines Health and Safety Act
Maximum Gradient	6%	TAC 2017
Crossfall	3.0%	TAC 2017
Embankment Backslopes	3h:1v	Safety requirement
Embankment Wearing Course	200 mm of 25 mm minus	GBRP BoD
Embankment Base Course	300 mm of 75 mm minus	GBRP BoD
Embankment Fill	300 mm minus granular or quarry/blast rock	GBRP BoD

5.3.1 Culvert design criteria for site drainage:

- Culverts smaller than 3.0 m diameter in natural stream courses: 1:100 year design return period.
- Culverts smaller than 1.5 m diameter for site runoff grading: 1:25 year design return period.
- Design flows shall pass with a minimum 0.6 m of ice in the culvert, and a 2x design flow without icing.

- Structural design to meet CAN/CSA S6-14 and CL-800 design live load. Project heavy equipment loading to also be considered.
- Minimum embankment cover of 1.0 m over culverts.
- Where stream crossings are necessary, culverts to comply with hydrotechnical, fisheries, environmental, and geotechnical requirements. All in-stream work to comply with DFO requirements and the Fisheries Act.

5.4 Materials

Materials shall be selected to provide long-term durability under Arctic environmental conditions and to support remote maintenance requirements. Key material standards and guidance include:

- Buildings: prefabricated, skid-mounted, insulated self-framing panel style buildings are preferred for fuel dispensing and utility buildings to allow shop installation of process equipment and efficient site delivery.
- Fuel piping: exterior piping – carbon steel ASTM A333 Gr.6 with beveled ends; fittings ASTM A350 LF2 Gr.1 or A420 WPL6; butt-weld fittings ≥50 mm diameter at Schedule 40; piping <50 mm at Schedule 80.
- Vertical Fuel tanks: API 650 welded steel tanks, rated for -45°C, with appurtenances including automatic metric tank level monitoring, pressure/vacuum vents, manholes, painters posts, stairways, and railings.
- Embankment materials: Zone 1 – 25 mm minus granular; Zone 2 – 75 mm minus granular; Zone 3 – 300 mm minus granular or quarry/blast rock. Material selection to consider cost of drill, blast, crush, and quarry operations.
- Water/wastewater system buildings: prefabricated skid-mounted permanent structures meeting applicable building and fire codes.

5.5 Geotechnical & Seismic Design

Geotechnical and seismic design shall be completed in accordance with applicable codes and project-specific geotechnical recommendations. Design shall consider the unique conditions of the Kitikmeot Region, including permafrost, cold-region effects, and long-term infrastructure performance.

- Granular embankment depths shall be confirmed through geotechnical investigations, with minimum thicknesses per terrain type (Type I: 0.4 m; Type II: 0.8 m; Type III: 1.4 m; Type IV: 1.95 m). Understanding ice content is critical to selecting appropriate embankment design.

- Maintenance building: to be located on sound bedrock where possible to avoid permafrost degradation concerns under heavy vehicle loading and heated floor slabs.
- Fuel tank foundations: geotechnical engineering for large vertical tank foundations to be completed prior to detailed design to identify bedrock at all tank locations.
- Additional geotechnical investigations will be required during preliminary and detailed design phases to confirm subsurface conditions, foundation recommendations, and constructability requirements at individual facility locations.
- Seismic design shall be carried out using applicable seismic hazard parameters for the Grays Bay site.

6 Performance Specification

The Port-Landside Major Works infrastructure shall be designed to provide safe, reliable, and operational facilities for the long-term requirements of the GBRP. The performance requirements shall include, at a minimum:

- Support DPRT/B-Train design vehicles on all main site roads without restrictions under normal operating conditions.
- Maintain structural integrity, serviceability, and operational functionality throughout the design life under Arctic environmental loading conditions.
- Provide potable water meeting GCDWQ standards at 500 L/capita/day for up to 80 permanent staff, with storage and system capacity to accommodate population variation from 20 to 80 persons.
- Treat wastewater to meet maximum average effluent concentrations (BOD5 ≤ 30 mg/L; TSS ≤ 30 mg/L; FC ≤ 1×10^6 coliform/100 mL) as required by the project water licence.
- Deliver reliable electrical power at approximately 6 MW total installed capacity with sufficient redundancy (two continuous, two standby diesel generators) to maintain operations under failure or maintenance scenarios.
- Safely manage bulk fuel storage, resupply, and dispensing for port operations, maintaining secondary containment in compliance with NFC Part 4.3.7.
- Accommodate DPRT/B-Train fuel tanker trucks simultaneously filling both trailer tanks at maximum flow rates of 2 × 2,400 L/min (Arctic Diesel), up to 450 L/min (Jet A1), and 38 L/min per hose (Gasoline).

- Provide cargo laydown and handling areas capable of supporting on-shore and shipboard crane operations, forklifts, loaders, and stevedoring activities during vessel calls.
- Provide concentrate storage and logistics capacity consistent with approximately 1.3 million tonnes per year throughput, including winter warming capability.
- Minimise inspection, maintenance, rehabilitation, and replacement requirements given the remote Arctic location and limited access windows.
- Accommodate environmental, regulatory, and permitting requirements for waste management, water treatment, wastewater discharge, fuel handling, and site drainage.

7 Quantities Approximations

The following preliminary quantity approximations are based on the current reference concept and are intended for planning and procurement support only. These are not final design or construction quantities.

Table 2: Preliminary Quantity Approximations

Infrastructure Component	**Quantity / Size**	**Notes**
Residential & Administration Buildings	~80-person permanent occupancy	Phase 1; Phase 2 expands capacity
Emergency Accommodations	Up to 150 additional persons	Modular units
Maintenance Building	Interior bays for ~10 vehicles	Located on bedrock where possible
Concentrate Storage Area	~50,000 sq m	Two buildings, each 95 m wide; ~490 m combined length incl. 50 m separation
Concentrate Truck Warming Shed	~4 bays; ~20 m × 60 m	5 m-wide bays
Immediate Cargo Laydown Area	~20,000 sq m	Eastern peninsula adjacent to wharves
Secondary Laydown Area	Sized for third-party requirements	Lowland south of main facilities
Bulk Covered Storage	~20 m × 60 m gravel pad	Adjacent to shoreline
Public Use Area	~300 sq m pad; 4 m × 6 m shelter	Pedestrian access only
Waste Management Area	~125 m × 175 m	Landfill, transfer station, incinerator

Infrastructure Component	Quantity / Size	Notes
LSDL Bulk Fuel Tanks (Phase 1 initial)	2 × 5-million L	Containment designed for ultimate 4 × 40-million L build-out
Total Fuel Farm Containment Area	~50,000 sq m	Includes secondary containment
Power Generation	~6 MW installed (4 × diesel units)	Plus 1 MW solar (assumed)
Water Treatment Plant	500 L/capita/day design flow	For 80 persons; source: lake at station 1+355
Wastewater Treatment Plant	500 L/capita/day design flow	Flexible for 20–80 persons
Site Roads – Main (DPRT/B-Train)	10 m width	total length not confirmed
Site Roads – Secondary	8.5 m width	total length not confirmed

8 Potential Construction Sequence and Logistics

The following section outlines potential construction approaches, sequencing considerations, and logistics constraints for Port-Landside Major Works. These considerations are preliminary and may be refined as investigations, design development, and construction planning activities are completed.

8.1 Construction Approach and Typical Construction Sequence

Port-Landside Major Works construction will be undertaken within a remote Arctic environment and shall be closely coordinated with Port Marine facility construction, marine delivery windows, the all-season road construction, and Early Works enabling infrastructure. A typical Phase 1 construction sequence may include:

- Mobilization via Early Works barge landing ramp and temporary airstrip; staging from Early Works laydown areas.
- Site preparation: quarry development, drill-blast-crush operations for granular materials, initial grading and working pad establishment.
- Earthworks: granular embankment construction for site roads, building pads, tank farm area, and laydown areas. Embankment depths to be confirmed by terrain type and geotechnical conditions.
- Site drainage: installation of culverts for natural stream crossings and site runoff management.

- Fuel farm: construction of secondary containment berms, tank foundations (on bedrock), installation of Phase 1 tanks and dispensing systems, and piping.
- Building construction: delivery and installation of prefabricated/modular residential, administration, maintenance, and utility buildings.
- Utility systems: installation of power generation plant, water treatment plant, wastewater treatment system, and associated piping and electrical infrastructure.
- Cargo laydown areas: grading and surfacing of immediate and secondary laydown areas.
- Roads: final grading and surface course application for site road network.
- Waste management area: grading, liner installation (where required), and construction of incinerator and transfer station buildings.
- Commissioning, startup support, and final acceptance of all systems.

8.2 Construction Logistics and Duration Considerations

Key logistics and schedule considerations for Port-Landside Major Works include:

- Marine delivery during the approximately 77-day open-water season is the primary method for delivering bulk materials, prefabricated buildings, tanks, and major equipment. Careful sealift ordering and staging is required.
- Large modular building systems, prefabricated utility systems, and fuel tanks require early procurement and logistics planning to meet marine delivery windows.
- Quarry development for granular embankment material must be initiated early to produce and stockpile sufficient material for site earthworks.
- Permafrost-sensitive construction windows and seasonal constraints must be integrated into construction scheduling to minimise permafrost degradation during construction.
- Seasonal fuel resupply via marine barge governs tank farm operational readiness; early tank installation and connection is a critical path item.
- Workforce accommodations during construction may need to leverage Early Works camp infrastructure and progress to permanent residential facilities as they become operational.

9 Quality Assurance and Testing

The Design-Builder shall develop and implement quality assurance and quality control procedures for the design and construction of Port-Landside infrastructure in accordance with applicable codes, standards, specifications, and project requirements identified in Section 1.4.

- Quality assurance requirements shall apply to investigations, design development, material procurement, fabrication, construction, inspection, testing, and commissioning activities.
- Inspection and testing programs shall be established for earthworks, culverts, buildings, fuel systems, water and wastewater treatment systems, power generation, and associated infrastructure.
- Geotechnical quality control shall be applied to embankment construction, including compaction testing by terrain type, to confirm design performance.
- Fuel system testing and commissioning shall meet CSA B836-14 and API RP 2003 requirements, including all safety systems, secondary containment integrity, dispensing equipment calibration, and instrumentation validation.
- Water and wastewater systems shall be commissioned and water quality verified against GCDWQ requirements and applicable wastewater effluent standards before commencing operations.
- Appropriate documentation and records shall be maintained to demonstrate compliance with Project requirements and applicable standards throughout design and construction.

10 Deliverables

The Design-Builder shall develop and submit deliverables necessary to advance Port-Landside Major Works from the reference concept stage through detailed design, procurement, construction, commissioning, and project close-out. At a minimum, the Design-Builder should be expected to provide:

- Port-Landside Basis of Design / Design Criteria Report, including design standards, assumptions, performance requirements, and design methodology.
- Site-specific geotechnical investigation programs, factual reports, and design recommendations for all facility areas, with emphasis on tank foundation bedrock confirmation.
- Site layout plans, road geometry drawings, grading and drainage plans, and embankment cross-sections.

- Structural design reports and drawings for buildings (permanent residential/administration, maintenance, utility), fuel tank foundations, and associated structures.
- Bulk fuel storage system design: tank design calculations, secondary containment design, piping and instrumentation diagrams, and dispensing system design.
- Water supply, treatment, and distribution design documentation, including WTP design, truck haul system design, and system commissioning plan.
- Wastewater treatment system design documentation, including treatment process selection, design calculations, discharge monitoring plan, and commissioning plan.
- Power generation system design documentation, including generator selection, electrical distribution, heat recovery system, and alternative energy system design.
- Waste management facility design, including landfill layout, transfer station design, incinerator system design, and waste management plan.
- Class-based cost estimates, quantity estimates, and supporting basis of estimate documentation.
- Risk registers and risk assessments addressing design, geotechnical, environmental, permitting, logistics, constructability, schedule, and operational considerations.
- Construction sequencing and logistics plans, including marine delivery schedules, material sourcing strategies, access requirements, and construction schedule.
- Environmental, permitting, and regulatory support documentation for all facilities requiring approvals.
- Operations and maintenance documentation, including inspection requirements, maintenance recommendations, and lifecycle performance requirements.
- Issued-for-Construction (IFC) drawings, specifications, design reports, calculations, and supporting technical documentation.

11 Future Expansion Considerations

Major Works Phase 2 expands Port-Landside capacity as operational demand matures. The following future expansion considerations shall be integrated into Phase 1 design to avoid unnecessary rework:

- Bulk fuel storage: Phase 1 secondary containment is designed for the ultimate build-out of four 40-million L LSDL tanks. Tank foundations to be constructed to

accommodate future tank installations. Dispensing piping routing to consider future expansion.

- Accommodations and buildings: Phase 2 expands residential capacity beyond the initial 80-person facility. Site layout and utility infrastructure to accommodate future building additions.
- Alternative energy: 1 MW solar (Phase 1) to be expandable. Phase 2 may include wind energy systems. Site layout to consider future alternative energy infrastructure placement.
- Laydown areas: additional inland laydown areas are anticipated in Phase 2. Site roads and earthworks to be designed to accommodate future expansion of laydown capacity.
- Third-party concentrate handling: the concentrate storage area (50,000 sq m) and the site are allocated for future third-party concentrate shed construction and stakeholder development. Site utility corridors to be designed with provisions for future third-party connections.
- Water and wastewater systems: systems to be designed to accommodate Phase 2 population and operational expansion without full system replacement.

12 Next Steps for Design Development

The current Port-Landside concepts represent a reference design based on information available at the time of preparation. During the Progressive Design-Build Development Phase, the Design-Builder will be responsible for further developing, validating, and optimising the Port-Landside solutions to satisfy the Project requirements, Owner's Statement of Requirements, applicable codes and standards, and site-specific conditions. Key areas for future development are anticipated to include:

- Completion of site-specific geotechnical investigations including drilling, sampling, laboratory testing, and geotechnical characterization of subsurface conditions at all building pads, fuel tank locations, and road corridors.
- Confirmation of water source adequacy (lake at station 1+355): evaluation of lake capacity and recharge rate against combined potable and industrial water demands.
- Selection and design of wastewater treatment technology (mechanical vs. lagoon), based on comparative analysis of operating costs, treatment performance, and operational requirements.
- Optimisation of building configurations, layouts, and interconnectivity based on operational planning input from WKR and project users.

- Detailed fuel farm design including final tank sizing, containment geometry, piping layouts, instrumentation, fire safety and commissioning requirements. Coordination with Port Marine for marine fuel offloading connection sizing, products and flow rates.
- Concentrate storage and warming shed design coordination with third-party mining users to confirm throughput requirements, structural loading, and utility needs.
- Advancement of environmental, permitting, and regulatory requirements for waste management, wastewater discharge, water extraction, and fuel storage.
- Development of detailed construction methodologies, logistics plans, material sourcing strategies, and multi-season construction schedules.
- Refinement of cost estimates, quantity take-offs, and risk assessments as design progresses.
- Coordination with Roadway discipline on port access road interface, transition from site roads to the all-season highway, and maintenance camp facilities.

Grays Bay Road and Port Project Reference Concept Design Memo- Temporary Air Strip and Grays Bay Aerodrome

29 September, 2026

Revision	Date	Description
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1 General

1.1 Introduction & Purpose

The Grays Bay Road and Port Project (GBRP or Project) is a proposed deep-water port, aerodrome, and all-season road in the Kitikmeot Region of Nunavut. The port and aerodrome would be located at Grays Bay on the Coronation Gulf along the Northwest Passage, with marine operations during the open-water season from approximately June to October. The 230-kilometre, multi-user all-season road would connect the port to Jericho Station (site of the former Jericho mine).

GBRP will establish shared infrastructure for many potential users, including federal and territorial governments, Inuit, communities, resource companies, and defence agencies.

This document is the Reference Design Concept Memo for the Temporary Air Strip and Grays Bay Aerodrome works only, which is one of various project elements as related to the Major Works scope of the GBRP project. It is a component of the CCDC 32 – 2026, Progressive Design-Build Contract executed between the Owner, West Kitikmeot Resources Corp (WKR), and the Design-Builder.

This document presents the technical bases for design of the infrastructure elements. It contains the essential elements of the infrastructure. It is expected that the Design-Builder will enhance or modify the design as required.

The main purpose of Reference Design Concept Memo is to support the Design-Builder with the development of next phases of the project.

1.2 Design Scope

The key requirements for both the temporary air strip and Grays Bay aerodrome design works are outlined as follows:

- Determination of runway orientation and windrose analysis.
- Confirmation of design aircraft including Aircraft Group Number (AGN) and aircraft fleet mix.
- Development of obstacle limitation surfaces (OLS) configuration and identification of penetrations of the OLS for the aerodrome.
- Development of a conceptual layout of the aerodrome including high level geometric layout of the runway, taxiway and apron.
- Determination of quantities of cut and fill.

The following reference design components have been completed to date:

- Design of a temporary AGN II non-instrument 1,214ft runway.

- Design of a permanent AGN IIIA non-precision 4,000ft runway (phase 1), with provision to extend to a total length of 6,000ft (phase 2) and AGN IIIB non-precision level of service.
- Provision for AGN IV operations for both 4,000 and 5,000ft runway lengths
- For the Grays Bay Aerodrome, inclusion of a taxiway and apron to service the runway for turbo-prop and C130 aircraft in Phase 1 and AGN IIIB jet aircraft, such as the Boeing 737-800, in Phase 2
- Associated cut/fill quantities
- Airside security fence
- Access road to service the apron

1.3 Study/Project Area

The study/project area for the aerodrome is outlined in Figure 1 below. The location of the temporary air strip is shown in Figure 2.

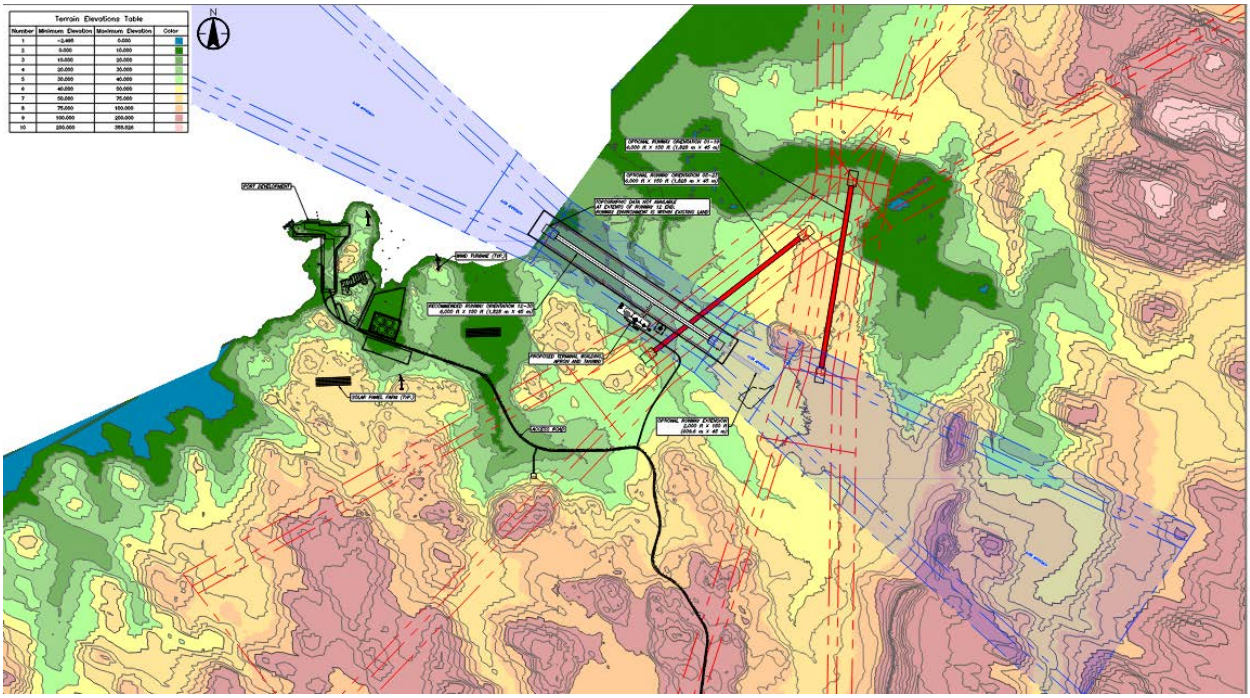


Figure 1: Grays Bay Aerodrome site

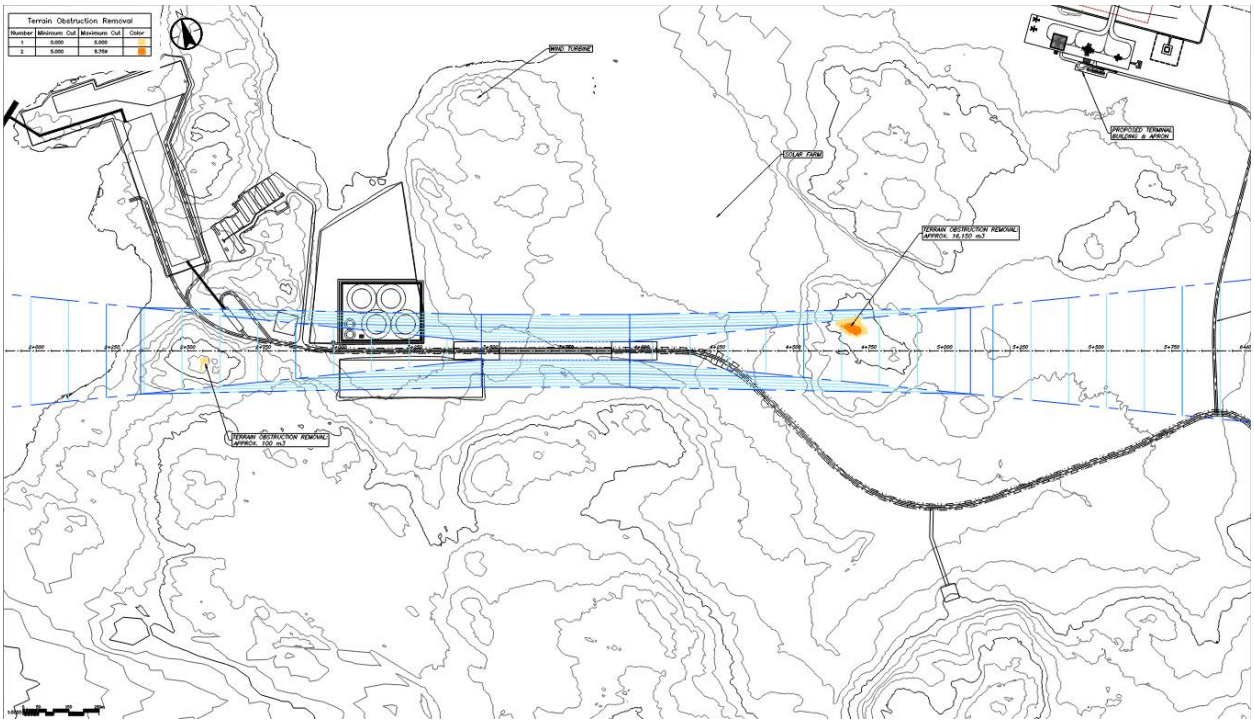


Figure 2: Temporary Air Strip site

1.4 Codes, Standards & Design Guidelines

The Grays Bay aerodrome will be registered and subject to Canadian Aviation Regulations (CARs) Subpart 301 requiring operators to meet basic safety criteria. The temporary air strip will not be registered as its use is temporary.

The design standards published by Transport Canada in TP312 5th Edition are required for aerodrome certification. While these are not mandatory for the aerodrome and air strips, they are still of value in airport planning and are used as a guideline for the temporary air strip and Grays Bay Aerodrome. A full listing of codes and standards is given in the following sections.

1.4.1 Aerodrome Facilities

- Transport Canada's Aerodrome Standards and Recommended Practices (TP 312 5th Edition).
- International Civil Aviation Organization Annex 14, Volume I Aerodrome Design and Operations, Ninth Edition
- International Civil Aviation Organization Aerodrome Design Manual, Doc 9157 Part 1, Runways, Fourth Edition.
- Standard 325 - Heliports - Canadian Aviation Regulations (CARs)

1.4.2 Safety

- Canada Labour Code.
- Canadian Occupational Health and Safety Regulations.
- Nunavut Mine and Safety Act.

1.4.3 Materials

Materials to be used in the design shall conform to applicable Canadian / North American standards as listed below. This list is not intended to be exhaustive and additional or alternate specific material standards may be identified in the design drawings.

- Canadian Standards Association (CSA)
- American Concrete Institute (ACI)
- American Society for Testing and Materials (ASTM)
- American Petroleum Institute (API)
- American National Standards Institute (ANSI)

1.4.4 Illuminating Engineering Society (IES):

- RP-37-22 Outdoor Lighting for Airport Environments

1.4.5 Provincial Codes and Standards:

- Alberta Electrical Utility Code, 6th Edition, 2021: Declared in force on September 1, 2022
- National Building Code – 2023 Alberta Edition
- National Fire Code – 2023 Alberta Edition

1.5 Reference Documents

The following documents were referred to in the preparation of these design criteria:

- Canadian Hydrographic Service raster and vector charts

- Government of Nunavut's Municipal Infrastructure Capital Standards and Criteria Manual (2012)
- IPCC Climate Change Assessment Report and applicable guidelines

1.6 Geotechnical & Seismic Design

The design shall account for Arctic geotechnical conditions and potential permafrost-related risks. The infrastructure shall minimize long-term degradation associated with:

- Thaw settlement
- Thermal instability
- Frost heave
- Moisture migration
- Differential movement
- Geotechnical investigation to confirm CBR, frost susceptibility, and permafrost conditions

Geotechnical design to be completed in general accordance with:

- Canadian Geotechnical Society. 2023. Canadian Foundation Engineering Manual. 5th ed. Canadian Geotechnical Society, Richmond, BC.
- Canadian Standards Association. 2010. Technical Guide: Infrastructure in Permafrost—A Guideline for Climate Change Adaptation. Canadian Standards Association, Mississauga, ON.
- Canadian Commission on Building and Fire Codes. 2022. National Building Code of Canada 2020. 15th ed. National Research Council of Canada, Ottawa, ON.
- Transport Canada. 2016. Advisory Circular AC 302-011, Airport Pavement Bearing Strength Reporting. Issue 02. Transport Canada, Ottawa, ON.
- Transport Canada. 2017. Advisory Circular AC 300-004, Unpaved Runway Surfaces. Issue 04. Transport Canada, Ottawa, ON.

2 Functional Requirements

This section addresses the functional and performance requirements of the aerodrome.

2.1 General

The temporary air strip concept shall be designed to support the following operations characteristics:

- Year-round operations
- Day operations only
- Visual meteorological conditions
- Uncontrolled

- Passenger and cargo operations
- Medivac access capability
- Private aircraft including those in support of mining operations

The Grays Bay aerodrome concept shall be designed to support the following operational characteristics:

- Year-round operations
- Day and night operations
- Visual and instrument meteorological conditions
- Uncontrolled
- Passenger and cargo operations
- Medivac access capability
- Private aircraft including those in support of mining operations

2.2 Seasonal Availability

The infrastructure shall support safe and reliable operations throughout all seasons and maximize operational availability and minimize closures related to:

- Snow accumulation
- Ice formation
- Drainage deficiencies
- Surface deterioration
- Frost heave
- Differential settlement
- Extreme weather conditions

2.3 Level of Service

2.3.1 Temporary Air Strip

A non-instrument level of service is required for the temporary air strip.

As a non-instrument runway, siting of the runway shall give particular attention to any obstacles penetrating the obstacle limitation surfaces. Any remaining obstacles shall require removal prior to operation of the air stirp.

2.3.2 Grays Bay Aerodrome

A non-precision level of service is required for the Grays Bay aerodrome to serve flights during instrument meteorological conditions in accordance with TP308, Criteria for the Development of Instrument Procedures.

As an instrument runway, siting of the runway shall give particular attention to areas over which aircraft shall be required to fly when following instrument approach and missed approach

procedures. This is to ensure that obstacles in these areas shall not restrict the operation of the aircraft for which the runway is intended.

As a non-certified, registered aerodrome, an Aerodrome Operator Attestation is required to serve a Non-Precision Approach (NPA) (Approach with Vertical Guidance (APV)) with minima authorized to 250ft HAA (Height Above Aerodrome)[1].

2.3.3 Critical Aircraft and Aircraft Group Number (AGN)

The temporary air strip shall be equipped with a 370m/1,214 ft long gravel runway, which will also form part of the access road during construction works. The critical aircraft shall be the DHC-6 Twin Otter (AGN II).

In Phase 1, the Grays Bay aerodrome shall be equipped with a 1,219m/4,000 ft long gravel runway. The critical aircraft shall be the Q400 (AGN IIIA). The runway shall also be capable of serving the CC-130J Super Hercules (AGN IV), which the Royal Canadian Air Force (CRAF) is expected to operate at the airport occasionally.

The runway shall be sited such that it can be extended to a 1,828 m/6,000ft runway during Phase 2. The critical aircraft in Phase 2 shall be the B737-800 (AGN IIIB).

The aircraft fleet mix is summarized in *Table 1* below.

Table 1: Aircraft Fleet Mix

Fixed Wing Aircraft	**Transport Canada Aircraft Group Number (AGN) Runway Environment**	**Purpose**
Beechcraft King Air 200 & 350	II	Medivac
Dornier 228 & 328	II	Personnel
Saab 340	II	Personnel
Dash 6 Twin Otter	II	Personnel
ATR 42 & 72	IIIA	Personnel and Cargo
Dash 7	IIIA	Personnel and Cargo
Dash 8-300	IIIA	Personnel
BAE 146 (Phase 2)	IIIB	Personnel and Cargo
Dash 8-400	IIIA	Personnel
Boeing 737-200/700/800 (Phase 2)	IIIB	Personnel and Cargo
CC-130 Super Hercules	IV	Military

[1] TP308, Table 1-1 Instrument Procedure and Minima Authorized Versus Aerodrome Status

3 Assumptions

The following list outlines the key assumptions used during the concept design for Grays Bay Temporary Air Strip and Grays Bay Aerodrome:

- Temporary air strip will also act as part of the main access roadway and therefore require coordination with vehicle movements.
  - Grays Bay aerodrome will not require certification, only registration.
  - Assumed Grays Bay aerodrome will remain open and operational 24/7 and therefore require lighting.
  - Assumed meteorological conditions in support of non-precision operations for the Grays Bay aerodrome.
  - Assumed no 737 aircraft operating on 4,000ft runway. Jet operations on gravel for 6,000ft runway assuming gravel treatment will be successful.
  - Grays Bay aerodrome terminal sized for essential flight planning and airport management functions – no passenger processing.
  - Access road sizing and landside road parking sized for 2 x buses at Grays Bay aerodrome.

4 Constraints, Risks, and Interdependencies

The following outlines several constraints, risks and interdependencies relating to the aerodrome concept design.

4.1 Wind data

We note the data used for the windrose analysis works were taken from years 2010-2012, recorded by Grays Bay weather station. At the time of this report, this data is 14-16 years old and therefore carries inherent reliability risk. Prior to progressing the design to the next stage, it is recommended that a renewed windrose analysis with a larger sample size of data (ideally 10 years' worth) is undertaken to verify the prevailing wind conditions, as well as assess the 12-30 orientation used in the concept design.

4.2 LiDAR Survey

The LiDAR survey used to calculate obstacle limitation surface penetrations, as well as runway cut / fill quantities, originated from McElhanney Consulting Services in 2012. At the time of this report, the data is 14 years old and therefore carries inherent reliability risk. The data shall be utilized for concept design only; however, further detailed design should entail a renewed LiDAR survey.

4.3 Future Expansion Considerations

The reference design concept was developed with the understanding that a phased approach would be taken to constructing the ultimate runway length for the Grays Bay aerodrome. Phase 1 consists of a 4,000ft runway, while Phase 2 extends this to a 6,000ft runway to service jet aircraft.

Other concepts were considered for an 8,000ft runway, however, based on analysis completed to date, this would require extensive earthworks considered unfeasible at this time.

4.4 Cut / Fill Quantities

As outlined in the following section, the net fill quantities required for both the temporary air strip and Grays Bay aerodrome runways are approximately two million cubic metres. It is assumed that this is feasible, and that pavement aggregates can be sourced and transported to site.

5 Reference Design

The following sections outline how the current design has been developed, including summary of various analyses completed.

5.1 Wind Rose Analysis

To determine the most favorable runway orientation with maximum wind coverage, a wind analysis was conducted. The analysis determines the usability factor, which is the percentage of time a runway or system of runways is not restricted because of the crosswind component[2]. Crosswind conditions impact all aircraft but have a greater effect on smaller aircraft resulting in less usability of the runway for small aircraft[3]. If crosswinds exceed the aircraft's acceptable limits or the pilot's skill level, pilots can divert the aircraft to another aerodrome or delay flight for safer wind conditions. According to ICAO Annex 14, the Federal Aviation Administration (FAA) Advisory Circular 150-5300-13B and Transport Canada TP 312 5th Edition, the desirable wind coverage for a runway configuration (single or multiple runways) is 95% of the time based on total number of weather observations recorded.

The wind analysis for Grays Bay region was conducted using the FAA Wind Analysis tool with inputs from hourly wind data from 2010 to 2012, recorded by the Grays Bay weather station. Based on results from the wind analysis, the best coverage can be achieved with the 18-36 orientation (when the runway is exactly aligned with North-South direction). It yields 95.8%

[2] Definition of usability factor as per ICAO Annex 14, Volume I, Aerodromes, 9th Edition, Section 1.1 Definitions.
[3] According to the Canadian Aviation Regulations (CARS) Part VI, small aircraft are defined as aircraft of 12,500 lbs/5,690kg or less maximum certificated take-off weight. Examples include single and twin-engine light aircraft such as the Cessna 172 and Piper Navajo (PA-31), respectively.

coverage for aircraft with an allowable crosswind component at 16 knots, 91.4% at 13 knots and 85.5% at 10.5 knots.

Noting the best coverage for wind can be achieved with the 18-36 (180 ° – 360 °) orientation, an initial 6,000ft design option was proposed at 01-19 (10 ° - 190 °) alignment for the Grays Bay aerodrome. When overlaid with the existing topography it was found that this would not be feasible due to the significant magnitude of earthworks required.

Other runway alignment siting options of 05-23 (50 ° – 230 ° True) and 12-30 (120° – 300° True) were evaluated for both wind coverage and relative earthworks. Wind coverage for the 05-23 orientation was found to be 84.6%, while the 12-30 orientation was 81.4% with a 16-knot crosswind component. Relative cut/fill volumes required for the 12-30 option were much more favourable, therefore, runway orientation of the Grays Bay Aerodrome was determined to be 12-30 (120° – 300° True) based on a combination of available wind data and optimization of earthworks completed to date.

The temporary air strip will follow the alignment of the roadway to the port estimated at 109° – 289° True.

Note that all directional information in the Reference Design Concept document refers to True North rather than compass or magnetic North, as this site is located within the Canadian Northern Domestic Airspace region.

The aircraft fleet mix for this aerodrome includes primarily AGN II to AGN IIIB aircraft. **Table 2** shows the maximum allowable crosswind component recommended by the FAA for aircraft types anticipated at Grays Bay.

Table 2: Allowable Crosswind Component by Aircraft Types

Aircraft Types (ICAO codes)	**Transport Canada Aircraft Group Number (AGN)**	**Allowable Crosswind Component (kn)**
DHC7 (Dash 7), DH8C (Dash 8-300), DH8D (Q400), AT43 (ATR42), AT76 (ATR72), B462 (BAe 146-200), B732 (737-200) to B738 (737-800)	IIIA, IIIB	16
DHC6 (Twin Otter), B190 (Beech 1900D), B350 (Beech King Air 350)	II	13
C172 (Cessna 172)	I	10.5

5.2 Runway Design Criteria

For Grays Bay aerodrome Phase 1, the key runway design criteria are summarized in *Table 3*. For Phase 2, the key runway design criteria are summarized in

Table 4**.** The key runway design criteria for the temporary air strip are summarized in *Table 5*.

Table 3: Key Runway Design Criteria – Grays Bay Phase 1 Non-Precision AGN IIIA Gravel Runway

Runway		
Length	1,219 m/4,000 ft	N/A
Width	45 m	TP312 –3.1.1.1
Longitudinal slope	2.0% (1.5% to be used based on future extension to AGN IIIB criteria)	TP312 – 3.1.2.1
Transverse slope	2.5%	TP312 – 3.1.2.6
Runway Strip		
Length	60 m	TP312 – 3.1.4.3
Width	140 m (70 m on either side of C/L)	TP312 – 3.1.4.4
Longitudinal slope	+2.0% ~ -2.0%	TP312 – 3.1.5.6
Transverse slope	0 to minus 3.0%	TP312 – 3.1.5.7
Runway Safety Area		
Width	80 m (40 m on either side of C/L)	TP312 – 3.1.5.2
Transverse slope	0 to minus 3.0%	TP312 – 3.1.5.7
Ditch location	Outside RSA	TP312 – 3.1.5.9

Table 4: Key Runway Design Criteria – Greys Bay Phase 2 Non-Precision AGN IIIB Gravel Runway

Runway		
Length	1,828 m/6,000 ft	N/A
Width	45 m	TP312 –3.1.1.1
Longitudinal slope	1.5%	TP312 – 3.1.2.1
Transverse slope	2.5%	TP312 – 3.1.2.6
Runway Strip		
Length	61 m	TP312 – 3.1.4.3
Width	244 m (122 m on either side of C/L)	TP312 – 3.1.4.4
Longitudinal slope	+1.75% ~ -1.75%	TP312 – 3.1.5.6
Transverse slope	0 to minus 2.5%	TP312 – 3.1.5.7
Runway Safety Area		
Width	150 m (75 m on either side of C/L)	TP312 – 3.1.5.2
Transverse slope	0 to minus 2.5%	TP312 – 3.1.5.7
Ditch location	Outside RSA	TP312 – 3.1.5.9

Table 5: Key Runway Design Criteria – Grays Bay Temporary Gravel Air Strip Non-instrument AGN II

Runway		
Length	370 m/1,214 ft	N/A
Width	23 m	TP312 –3.1.1.1
Longitudinal slope	2.0%	TP312 – 3.1.2.1
Transverse slope	2.5%	TP312 – 3.1.2.6
Runway Strip		
Length	60 m	TP312 – 3.1.4.3
Width	80 m (40 m on either side of C/L)	TP312 – 3.1.4.4
Longitudinal slope	+2.0% ~ -2.0%	TP312 – 3.1.5.6
Transverse slope	0 to minus 3.0%	TP312 – 3.1.5.7
Runway Safety Area		
Width	80 m (40 m on either side of C/L)	TP312 – 3.1.5.2
Transverse slope	0 to minus 3.0%	TP312 – 3.1.5.7
Ditch location	Outside RSA	TP312 – 3.1.5.9

Also, for Phase 1, a check was completed for AGN IV aircraft in a non-instrument scenario. The key runway design criteria for this design check are summarized in *Table 6* below.

Table 6: Key Runway Design Criteria –Non-Instrument AGN IV Gravel Runway

Runway		
Length	1,219 m/4,000 ft	N/A
Width	45 m	TP312 –3.1.1.1
Longitudinal slope	1.5%	TP312 – 3.1.2.1
Transverse slope	2.5%	TP312 – 3.1.2.6
Runway Strip		
Length	60 m	TP312 – 3.1.4.3
Width	150 m (75 m on either side of C/L)	TP312 – 3.1.4.4
Longitudinal slope	+1.5% ~ -1.5%	TP312 – 3.1.5.6
Transverse slope	0 to minus 2.5%	TP312 – 3.1.5.7
Runway Safety Area		
Width	150 m (75 m on either side of C/L)	TP312 – 3.1.5.2
Transverse slope	0 to minus 2.5%	TP312 – 3.1.5.7
Ditch location	Outside RSA	TP312 – 3.1.5.9

5.3 Runway Elevation and Slope

Runway elevation and slope are both critical elements which dictate several downstream design components. Noting the Grays Bay aerodrome runway length of 4,000ft in Phase 1 is planned to

be extended to 6,000ft in Phase 2, the runway elevation and slope design had to be compatible with both phases.

Concept design runway elevation was dictated by the identified permafrost which was assumed to exist just at the surface of the terrain. Therefore, the runway centreline elevation was designed to be a minimum of 5m above the existing terrain for the temporary air strip, as well as both 4,000ft and 6,000ft permanent runway scenarios. While the centreline of the runway was designed to meet this criterion, further analysis would be required through detailed design to ensure the entire runway pavement surface elevation remains above the identified permafrost.

The longitudinal and transverse runway slopes for the both the temporary air strip and Grays Bay aerodrome were designed according to TP312. Transverse slopes were chosen to be the maximum allowable to assist with drainage, while the longitudinal slope required iterative design. The optimisation of the longitudinal slope was intended to minimize cut/fill quantities while maintaining constructability for both the temporary air strip, as well as Phase 1 and Phase 2 scenarios.

Longitudinal slopes reviewed for Phase 1 were 1.0%, 1.1% and 1.5%. Of these options, it was found that 1.1% was the most optimal due to minimized associated earthworks (fill quantities for pavement and cut quantities for the OLS), constructability between Phase 1 and Phase 2, as well as maintaining permafrost clearances.

Longitudinal slopes considered for Phase 2 included continuation of the 1.1% slope, or increasing to 1.5% for the additional 2,000ft (total of 6,000ft length). It was found that continuing the 1.1% longitudinal slope did not meet the requirement for 5m clearance of the existing ground profile above permafrost. Therefore, a 100m vertical curve was designed at the Eastern threshold, in line with TP312 requirements, to increase the longitudinal slope from 1.1% to 1.5%, such that an extension to Phase 1 would minimize demolition to the existing runway pavement. As such, only approximately 50m of the existing Phase 1 pavement will require alteration when Phase 2 construction begins.

Longitudinal slopes for the temporary air strip were designed at +1.5% and -0.5% to minimise the penetrations of the obstacle limitation surfaces, as well as meet the requirements for permafrost mitigation.

5.4 Obstacle Limitation Surface Design

The Obstacle Limitation Surface (OLS) design for each runway length and AGN classification was designed according to TP312 5th Edition. The purpose of designing the OLS is to check this against the existing terrain for any penetrations that may occur.

For key criteria for the obstacle limitation surfaces for Grays Bay Aerodrome Phase 1 and Phase 2 see **Table 7** and **Table 8**. For key criteria for Phase 1 AGN IV Non-instrument OLS, see **Table 9.** The key criteria for the temporary air strip OLS, see **Table 9.**

Table 7: Key Criteria – Grays Bay Obstacle Limitation Surfaces (Phase 1 Non-precision AGN IIIA)

Runway		**RWY 12 / RWY 30**
Approach Surface	Length of Inner Edge (each side of the C/L)	140m (70m)
	Distance from Threshold	60m
	Divergence	10%
	Total Length	2,500m
	First Section Length	2,500m
	First Section Slope	3.33%
	Second Section Length	-
	Second Section Slope	-
Transitional Surface	First Segment Slope	25%
	Second Segment Slope	14.3%
Take-off Surface	Length of Inner Edge (each side of the C/L)	140m (70m)
	Divergence	10%
	Length	4,000m
	Slope	2.5%

Table 8: Key Criteria – Obstacle Limitation Surfaces (Phase 2 Non-precision AGN IIIB)

Runway		**RWY 12 / RWY 30**
Approach Surface	Length of Inner Edge (each side of the C/L)	244m (122m)
	Distance from Threshold	61m
	Divergence	15%
	Total Length	5,000m
	First Section Length	720m
	First Section Slope	2.5%
	Second Section Length	4,280m
	Second Section Slope	2.9%
Transitional Surface	First Segment Slope	25%
	Second Segment Slope	14.3%
Take-off Surface	Length of Inner Edge (each side of the C/L)	150m (75m)
	Divergence	15%
	Length	4,000m
	Slope	2.5%

Table 9: Key Criteria –Temporary Air Strip Obstacle Limitation Surfaces (Modified Non-instrument AGN II)

Runway		**RWY 11/29**
Approach Surface	Length of Inner Edge (each side of the C/L)	120m (60m)
	Distance from Threshold	60m
	Divergence	10%
	Total Length	2,500m
	Point of Divergence Beyond the Strip End	300m
	First Section Length	2,500
	First Section Slope	4%
Transitional Surface	First Segment Slope	50%
	Second Segment Slope	-

Runway		**RWY 11/29**
Take-off Surface	Length of Inner Edge (each side of the C/L)	120m (60m)
	Divergence	10%
	Length	4,000m
	Slope	4.0%

Table 10: Key Criteria – Obstacle Limitation Surface (Phase 1 Non-instrument AGN IV)

Runway		**RWY 12 / RWY 30**
Approach Surface	Length of Inner Edge (each side of the C/L)	150m (75m)
	Distance from Threshold	60m
	Divergence	10%
	Total Length	3,000m
	First Section Length	720m
	First Section Slope	2.5%
	Second Section Length	2,280m
	Second Section Slope	2.9%
Transitional Surface	First Segment Slope	14.3%
	Second Segment Slope	-
Take-off Surface	Length of Inner Edge (each side of the C/L)	150m (75m)
	Divergence	10%
	Length	4,000m
	Slope	2.5%

The Phase 1, 4,000ft runway OLS was designed to AGN IIIA non-precision and did not reflect any penetrations from the surrounding terrain (Figure 3).

The Phase 2, 6,000ft runway OLS was designed to AGN IIIB non-precision and did show several locations with penetrations from the surrounding terrain (Figure 4).

A separate design check was carried out on the Phase 1 4,000ft runway for an AGN IV non-instrument OLS to serve C130 Hercules flights. One minor penetration of this OLS was found when compared with existing terrain topography. Based on this finding, and assuming that the penetration is removed, it is noted that C130 Hercules flights should only be undertaken under non-instrument meteorological conditions to ensure sufficient clearance from obstacles.

The temporary air strip, 1,214ft runway OLS was designed to a modified AGN II non-instrument and did show two locations with penetrations from the surrounding terrain (Figure 5).

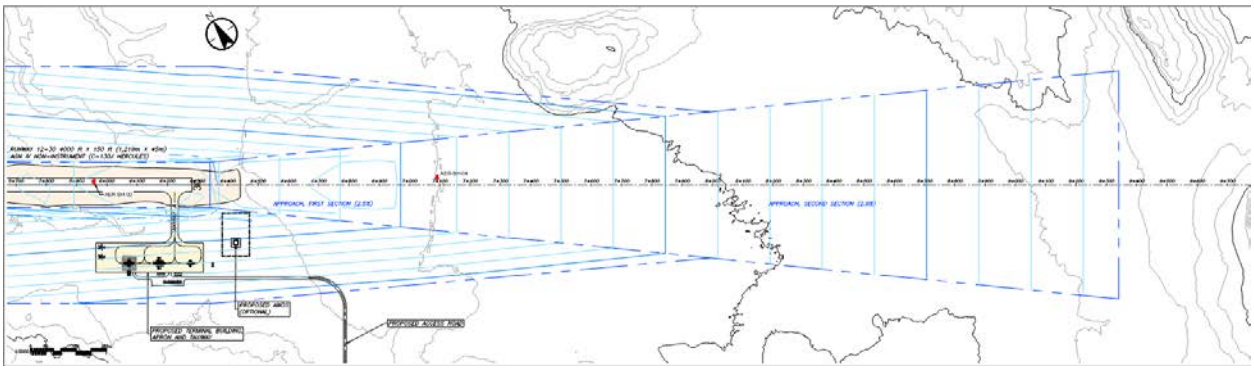


Figure 3: AGN IV 4,000ft non-instrument OLS check showing no penetrations

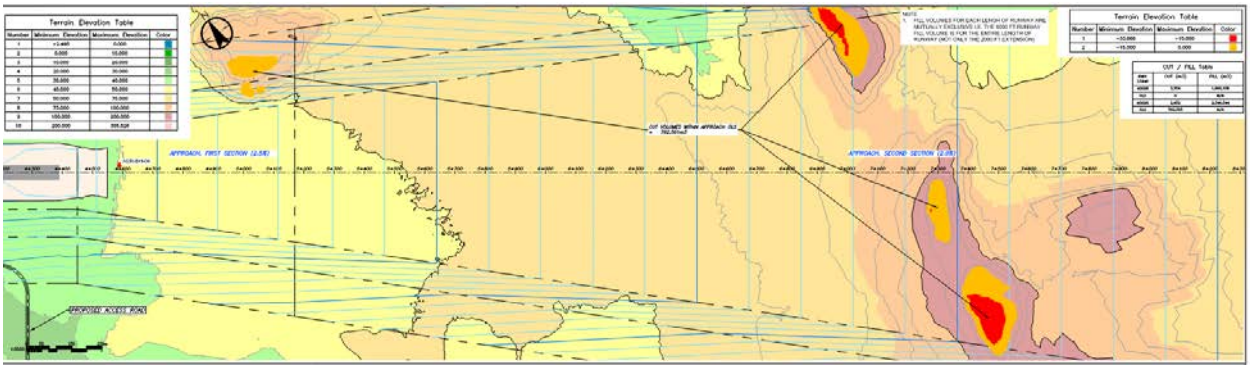


Figure 4: AGN IIIB 6,000ft non-precision OLS check showing various penetrations

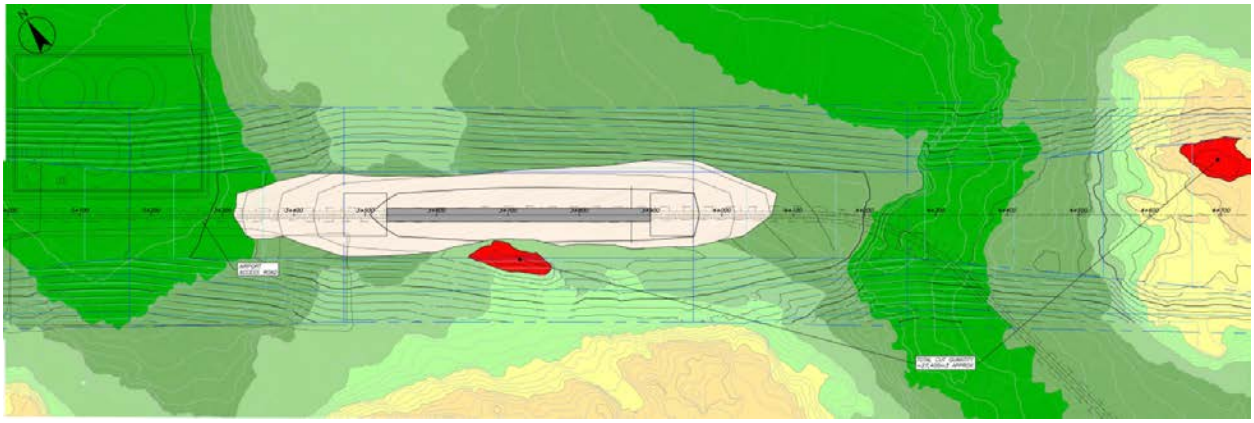


Figure 3: Modified AGN II 1,214ft non-instrument OLS temporary air strip showing two areas of OLS penetration

5.5 Apron and Taxiway

The design of the apron and taxiway for the Grays Bay aerodrome were as such to meet the requirements for both Phase 1 (AGN IIIA) and Phase 2 (AGN IIIB), Phase 2 being the more critical in terms of OLS requirements.

A single taxiway shall connect the runway with an apron. Key taxiway design criteria are summarized in *Table 11* below.

The temporary air strip will not be equipped with a taxiway or apron. It is expected that aircraft will park within the runway strip in such a way that will allow the vehicle corridor to remain open. No aircraft can land / take off while another aircraft is parked.

Table 11: Taxiway Design Criteria (AGN IIIA/IIIB)

Taxiway		
Length	To be determined	N/A
Width	23 m	TP312 – 3.5.1.2
Edge clearance to outer main wheel	4.0m	TP312 – 3.5.1.3
TWY CL to object separation distance	26.0m	TP312 – 3.5.1.4
Longitudinal slope	-1.5%	ICAO Annex 14 – 3.9.8
Transverse slope	Max 1.5 %	ICAO Annex 14 – 3.9.11
Taxiway Strip		
Length	To be determined	N/A
Width	52 m (26 m on either side of C/L)	TP312 – 3.5.1.4
Longitudinal slope	-1.5%	ICAO Annex 14 – 3.9.8
Transverse slope	Max 2.5% + TWY slope. Max 5% below horizontal plane.	TP312 – 3.5.4.6
Taxiway Safety Area		
Width	5m (from taxiway edge)	TP312 – 3.5.4.5
Transverse slope	Max 2.5% + TWY slope. Max 5% below horizontal plane.	TP312 – 3.5.4.6

For the Grays Bay aerodrome a lighted gravel surface apron has been included in the design such that aircraft parked on the side of the apron closest to the runway, with the tail facing the runway, shall not penetrate the Transitional OLS for Phase 2 works non-precision AGN IIIB.

The apron is configured with a taxi route for aircraft and helicopters to avoid parked aircraft and objects. The following wingtip clearances shall be applied while aircraft are taxiing inside the apron:

- 3.0m for AGN I and II aircraft
- 4.5m for AGN IIIA
- 7.5m for the CC-130J Super Hercules

The apron shall be sized with three aircraft parking stands in a power-in/power-out configuration for the following aircraft:

- One AGN II aircraft (Saab 340B)
- One AGN IIIA (Q400)
- One CC-130J Super Hercules

Power-in and power-out maneuvers shall maintain the wingtip clearances from parked aircraft and objects noted for aircraft taxiing in the apron.

One aircraft parking stand shall be provided for fueling aircraft up to the Q400 in size. The aircraft stand shall be configured for power-in and power-out of the full mix of aircraft in Phase 1.

The apron shall also provide space for two helicopter parking stands capable of operating independently and sized for the Augusta Westland AW/CH-149 (also known as Cormorant) which has a rotor diameter of 18.6 m.

The helicopter parking area shall be located adjacent to the fixed wing aircraft parking area with sufficient clearance between the two parking areas (as per Standard 325.25(4)(e)). No buildings or fixed fueling facilities shall be sited near the helicopter parking stands.

5.6 Buildings – Air Terminal Building and Airport Maintenance Equipment Garage

The single air terminal building (ATB) is located at the outer apron edge and accommodates the following facilities:

- Flight Planning and communications office.
- Weather shelter with limited passenger holding area, sized to accommodate up to 20 passengers for DH6 Twin Otter or Dornier flights. Larger aircraft, such as the Q400, shall enplane and deplane directly via bus.
- Weather observation and radio communications equipment
- Toilet facilities

A single airport maintenance equipment garage shall also be located at the outer apron edge. It shall be required for the storage of airport-related equipment for snow removal, gravel maintenance and other vehicles.

Each building has been sited at 276m offset from the runway centreline. The siting of these buildings provides a maximum 32m building height to avoid relocation of the buildings in Phase 2.

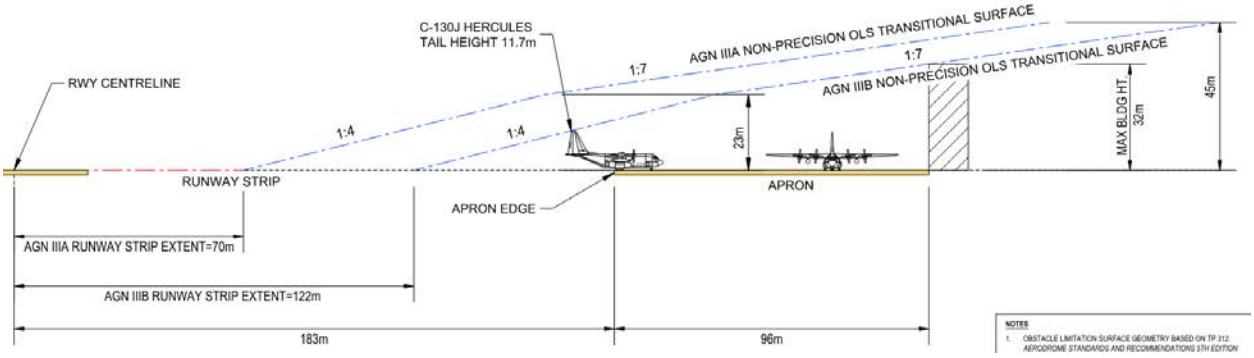


Figure 4: Air terminal building clearance relative to AGN IIIA and AGN IIIB OLS

5.7 Aircraft Fueling Facilities

Aircraft refueling at the aerodrome shall be conducted using bowser trucks for Jet A-1 fuel. These bowser trucks shall be stored in facilities off the aerodrome when not in use and filled at a fuel tank farm, away from the aerodrome, with dedicated Jet A1 storage tanks.

Bowser trucks shall be used to refuel both aircraft and helicopters.

5.8 Airfield Electrical

As the Grays Bay aerodrome shall be equipped with a non-precision approach runway for day and nighttime use, the aerodrome will require visual aids, lighting and signage, as detailed below. No specific electrical layout has been completed as part of the reference design concept.

- Aerodrome Beacon
- Wind Directional Indicators
- Runway Edge Lights, Threshold Lights, and End Lights
- Taxiway / Apron Edge Lights and Apron Intersection Lights
- Movement Area Guidance Signs
- Precision Approach Path Indicators (PAPI)
- Road Holding Position Signs
- Apron Floodlights

Further to the above lighting requirements, the following list of supporting infrastructure will be required to service these.

- Power Distribution for Airfield Lights
- Field Electrical Center (FEC)
- Series Circuits and Constant Current Regulators (CCR)
- Cabling System
- Backup Generator
- Obstruction Lights

- Spare Parts
- Field Electric Centre and Automatic Weather Observation Station
- Radio Communications Equipment
- Instrument Approach Procedures

-
- The temporary air strip will not require lighting as it is intended for daytime use only. Nevertheless, the use of markers (stakes or flags) is required to demarcate the runway section of the air strip from the section used by construction vehicle traffic. A single wind direction indicator is also required to provide pilots with wind direction and speed.

5.9 Design Life

The design life for the aerodrome is 30 years. The runway and apron will require ongoing maintenance and periodic resurfacing to meet that life requirement.

The expected design life for the temporary air strip is only as long as required until the Grays Bay aerodrome becomes functional.

5.10 Durability

There is currently no information regarding available materials for construction of the aerodrome civil works; this will be defined alongside design development.

Granular materials for runway, taxiway, and apron shall meet TP312 and pavement design specifications. Local borrow source investigation to be conducted as part of geotechnical program prior to use, including aggregate quality testing (LA abrasion, soundness, gradation).

6 Quantity Approximations

Approximate quantities for cut and fill, including a net total, for each length of runway designed are outlined in *Table 12* below.

Table 12: Approximate cut fill quantities for each length of runway design considered

Runway Length	OLS Type	Cut (-) m3	Fill (+) m3	Net m3
1,214ft	AGN II Non-instrument	-27,400	+386,000	+358,600
4,000ft	AGN IIIA Non-precision	-3,700	+1,660,000	+1,656,300
4,000ft	AGN IV Non-instrument	-	+1,660,000	+1,660,000
6,000ft	AGN IIB Non-precision	-765,000	+2,345,000	+1,580,000

7 Next Steps for Design Development

Next steps for design development include the following:

    - A site visit to inspect the existing terrain, waterways, bodies of water and coastline;
    - Public consultation in compliance with CARS 307 which requires aerodrome proponents to consult with local land authorities prior to constructing an aerodrome. Summary Report will be submitted to Transport Canada as proof of consultation and requirement for registered aerodromes.
    - A detailed survey of the airfield surfaces and objects and terrain within the approach and take-off paths to 6,000m as measured from the end of each runway. The survey should also include the area below the transitional OLS that extends approximately 300m as measured from the runway centreline.
- Geotechnical investigation.
- Consultation with Nav Canada and instrument procedure designer to develop instrument procedures required for non-precision level of service.
    - Submission of Heliport Registration form to Transport Canada

WEST KITIKMEOT RESOURCES CORP

Grays Bay Road and Port Project Reference Concept Design Memo-Roadways

29 September 2026

NUNAMI STANTEC LIMITED

Revision	Date	Description
0 (First Draft)	Jul 31/26	• Nunami-Stantec Internal Review
1 (Second Draft)	Aug 11/26	• Nunami-Stantec Internal Review
2 (Final Draft)	Aug 13/26	• Nunami-Stantec Internal Review
3 (Submission for Client Review)	Aug 17/26	• Nunami-Stantec Submission to WKR
4	Sept 29/26	• Published to support RFP

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1 General

1.1 Introduction & Purpose

The Grays Bay Road and Port Project (GBRP) is a proposed multi-user transportation infrastructure corridor within the Kitikmeot Region of Nunavut. The Project includes a deep-water port at Grays Bay, an aerodrome, and an approximately 230 km all-season roadway extending between Grays Bay Port and Jericho Station. The roadway is intended to provide year-round access to support resource development, government operations, community access, and other future users.

This Reference Concept Design Memo documents the current status of the roadway component of the Project. The memo summarizes the reference roadway concept, functional requirements, key technical inputs, design criteria, assumptions, constraints, risks, and considerations that have been developed to date. The information is intended to support future design development by the Design-Builder under the Progressive Design-Build delivery model and to provide reference information within the RFP data room.

The roadway reference concept has been developed using available historical project information, desktop assessments, previous engineering studies, and preliminary design criteria. Significant additional investigation and design development remain necessary before the roadway concept can be advanced to detailed design.

1.2 Design Scope

The roadway component shall provide a safe, reliable, and durable transportation corridor between Grays Bay Port and Jericho Station capable of supporting year-round heavy haul operations. The roadway scope includes the all-season roadway, embankments, drainage works, borrow and quarry developments, maintenance facilities, storm shelters, traffic control measures, erosion protection works, wildlife accommodation measures, and associated roadway appurtenances.

The current roadway reference concept establishes the preliminary corridor, geometric design criteria, operational requirements, embankment design philosophy, and supporting infrastructure necessary to advance future design development. The reference concept is intended to support procurement and project planning and does not constitute a final design.

Development of the Grays Bay Road alignment has occurred over several decades through multiple project proponents, engineering teams, and study programs. Earlier phases of corridor development were completed prior to the involvement of the current roadway design team, and the complete history of alignment development was not available at the time of preparation of this memorandum.

Available project records indicate that multiple roadway studies, environmental investigations, hydrotechnical assessments, and engineering evaluations have previously been completed in support of corridor development. More recent project development activities have focused on

reviewing available information, establishing preliminary roadway design criteria, evaluating design vehicle requirements, identifying potential material sources, and advancing the roadway reference concept sufficiently to support procurement activities.

1.3 Study/Project Area

The roadway component of the GBRP extends approximately 230 km between the proposed Grays Bay Port and Jericho Station in the Kitikmeot Region of Nunavut. The corridor traverses a remote Arctic landscape characterized by exposed bedrock, glacial till, glaciofluvial deposits, wetlands, numerous lakes, and watercourses. Permafrost is continuous throughout much of the corridor and is expected to be a governing consideration in roadway design and long-term performance.

Ground conditions, terrain characteristics, drainage conditions, and surficial materials vary significantly throughout the corridor and remain only partially understood. Future terrain mapping, thermal investigations, geotechnical investigations, and hydrotechnical studies will be required to further define corridor conditions and support detailed design development.

Refer to General Location Plan within the Reference Concept Design Drawings for a visual of the project area.

1.4 Codes, Standards & Design Guidelines

The roadway reference concept has been developed using the latest applicable editions of the following standards and guidance documents where appropriate:

- Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads.
- TAC Chapter 11 – Special Roads.
- TAC Traffic Control Manual for Work on Roadways.
- TAC Road Safety Guide.
- TAC Winter Maintenance Guide.
- Alberta Transportation Highway Geometric Design Guide.
- British Columbia Supplement to the TAC Geometric Design Guide.
- Nunavut Mines Health and Safety Act.
- GNWT Standard Specifications for Highway Construction.
- ASTM International standards where applicable.
- MEND guidance documents.
- INAP Global Acid Rock Drainage Guide.
- GNWT/WLWB guidance for geochemical characterization and waste rock management.

1.5 Reference Documents

1.5.1 High Lake Project Water Crossing Report

Prepared by: Adam Rose, E.I.T.
Reviewed by: R. J. Frenette, P.Eng., President, TBT Engineering

May 2007

This report serves as the principal reference document for understanding how watercourse crossings, drainage management, erosion control, sediment control, and environmental protection measures were planned for the transportation infrastructure associated with the High Lake Project, including the Gray's Bay access road corridor. It is intended primarily as an environmental and construction planning document rather than a detailed engineering design report.

Readers seeking information on the environmental considerations associated with road, airstrip, borrow source, and access road construction will find that information in this document. The report identifies potential impacts to streams, lakes, aquatic habitat, drainage patterns, and surrounding terrain, and then establishes mitigation measures that were proposed to reduce those impacts during construction and operation.

This document is the source to consult when looking for:

- The overall water crossing management strategy for the High Lake Project transportation system.
- Descriptions of environmental risks associated with road construction near streams, rivers, lakes, wetlands, and other water bodies.
- The rationale used to assess potential impacts from primary roads, secondary roads, temporary tote roads, the Sand Lake airstrip, and borrow source developments.
- Recommended environmental mitigation measures for construction activities near watercourses.
- Best Management Practices (BMPs) for erosion prevention and sediment control. These include site management practices, scheduling considerations, drainage controls, erosion protection methods, and sediment containment measures.
- Guidance regarding environmental protection requirements during construction, including handling of fuels, materials, equipment operations, and protection of fish habitat.
- Water crossing installation methodologies and dewatering approaches, including descriptions of alternative construction techniques, anticipated construction sequences, potential impacts, and mitigation requirements.
- Drainage management principles intended to maintain natural watershed function and prevent adverse changes to tertiary drainage patterns resulting from road embankments and airstrip construction.

- Inspection, monitoring, and maintenance expectations associated with environmental protection measures during construction.
- The report also functions as an index to a large collection of supporting drawings and appendices. Readers looking for detailed water crossing layouts, crossing-specific environmental recommendations, conceptual crossing designs, drainage concepts, erosion and sediment control details, borrow source protection details, or airstrip drainage plans will find references to those materials throughout the document and within the appendices.

Several appendices provide supporting information that may be useful depending on the topic of interest:

- Appendix A contains a summary table linking project components, potential environmental impacts, and recommended mitigation measures.
- Appendix B contains detailed conceptual plans for the major all-season road water crossings.
- Appendix C provides typical drawings illustrating water diversion and dewatering methods used during construction.
- Appendix D contains erosion and sediment control detail drawings.
- Appendix E contains typical borrow source environmental protection drawings.
- Appendix F contains conceptual designs for access road water crossings.
- Appendix G contains conceptual airstrip drainage plans and associated mitigation concepts.

The document also includes location mapping for the High Lake Project transportation corridor and conceptual examples of roadway cross-sections and water crossing arrangements.

Overall, this report should be considered the primary reference document for anyone seeking information on environmental protection commitments, water crossing construction approaches, drainage management philosophy, erosion and sediment control measures, and supporting conceptual environmental design information developed for the High Lake Project transportation infrastructure.

1.5.2 Flood Hydrology of Streams Along the All Season Road Corridor and Hydraulic Design of Crossings, Izok Corridor Project.

Prepared by: Northwest Hydraulic Consultants Ltd. (NHC)

April 2013

This report serves as the primary hydrotechnical reference for stream crossing design along the proposed all-season road corridor between Izok Lake and Gray's Bay. It documents the hydrologic analyses used to estimate flood flows throughout the corridor and provides

preliminary recommendations for the hydraulic design of road crossings. Readers seeking information related to stream hydrology, flood frequency estimates, crossing design flows, culvert sizing, or bridge crossing requirements will find that information in this document.

The report is the key source for understanding how stream crossings were classified, evaluated, and sized along the road alignment. It describes the methodology used to identify both large and small stream crossings, establish drainage areas, and determine design flood flows for various return periods. The document can be consulted to understand the hydrologic basis used during preliminary infrastructure planning and to identify the assumptions and datasets that supported the development of crossing recommendations.

Readers looking for flood hydrology information will find:

- The hydrologic assessment approach used for the Izok Corridor Project.
- Methods used to derive flood frequency relationships for streams along the road corridor.
- Information regarding regional hydrologic data sources, including Water Survey of Canada records and project-specific monitoring programs.
- Discussion of flood frequency analysis methods used for both large and small drainage basins.
- Development and application of regional flood frequency curves and design discharge relationships.
- Considerations related to watershed size, drainage area characteristics, and lake storage effects on runoff.
- The report should also be consulted when specific crossing design information is required. It contains preliminary hydraulic design recommendations for major river crossings and smaller stream crossings distributed throughout the all-season road corridor. The report links estimated flood flows to proposed crossing infrastructure and establishes preliminary design criteria for future design development.

Readers seeking crossing-specific information will find:

- Drainage area information for individual crossings.
- Geographic coordinates and location information for crossings along the corridor.
- Predicted flood flows for multiple return periods, including 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year flood events.
- Recommended design flood criteria for preliminary engineering design.
- Suggested culvert sizes, culvert quantities, and crossing configurations.
- Identification of locations where bridge structures were recommended instead of culverts.
- Recommendations regarding fish-passage considerations and locations where open-bottom arch culverts were proposed.

The report includes a comprehensive inventory of stream crossings along the corridor and functions as an important lookup document for hydrologic and hydraulic design parameters. Anyone seeking estimated design discharges, drainage basin sizes, or recommended crossing infrastructure for a particular crossing location will generally find that information within the tabulated appendices and crossing summaries contained in this report.

In addition to numerical design information, the report contains preliminary conceptual designs for major stream crossings. These conceptual designs provide information regarding proposed bridge and culvert arrangements, crossing geometry, hydraulic considerations, expected design water levels, and site-specific crossing layouts. The designs are intended for preliminary planning purposes and identify locations requiring future detailed hydraulic analysis and design refinement.

The document also serves as a useful reference for understanding the progression of water crossing design development on the corridor. It identifies major river crossings such as the Hood River, James River, Kennarctic River, Frayed Knots River, and numerous unnamed streams, and provides the hydrologic and hydraulic information used to support the recommended crossing solutions at those locations.

Overall, this report should be regarded as the principal hydrology and hydraulic design reference for the all-season road corridor. Anyone looking for information on flood frequency analysis, watershed drainage areas, design discharges, culvert sizing, bridge requirements, crossing inventories, or preliminary stream crossing designs should consult this document first.

1.5.3 Grays Bay Road & Port – Caribou Road Crossing Areas and Design Criteria

Prepared by: The Grays Bay Road & Port Project Team, including contributions from Nunami Stantec Limited, EDI Environmental Dynamics Inc., and Tetra Tech Inc..

December 2024

This memorandum serves as the primary reference document for understanding how potential caribou road crossing locations were identified along the Grays Bay Road corridor and how those findings were translated into preliminary roadway design criteria. The document links wildlife analysis with engineering design and is intended to support discussions with regulators, Indigenous organizations, and project stakeholders regarding caribou movement across the proposed road alignment.

Readers seeking information about potential caribou crossing locations along the road alignment should consult this document first. It contains the preliminary evaluation of where caribou are most likely to cross the proposed road, how those locations were identified, and how roadway design measures may be applied to facilitate movement across the corridor.

This document is the primary source for:

- The overall approach used to identify potential caribou crossing areas along the Grays Bay Road corridor.

- The rationale behind selecting locations for wildlife-friendly roadway design measures.
- The relationship between environmental studies and engineering design decisions for caribou movement.
- Preliminary recommendations regarding where roadway crossing controls should be considered.
- The basis used to support regulatory engagement related to caribou crossing accommodation.

The memorandum also documents engineering design criteria intended to facilitate caribou movement across the roadway. Readers looking for proposed roadway design measures, limitations, constraints, and implementation assumptions will find that information in this document.

Specifically, the document identifies:

- Conditions where caribou crossing design measures would not be implemented.
- Geometric and topographic constraints that influence crossing feasibility.
- Criteria related to road embankments, side slopes, road width, and crossing surface treatments.
- The proposed relationship between environmental recommendations and future roadway design development.
- The conceptual approach for determining the extent and distribution of roadway crossing controls.

Attached to the memorandum is the Caribou Crossing Preliminary Evaluation Technical Memo prepared by EDI Environmental Dynamics Inc., which provides the technical background supporting the crossing area identification process. This attachment functions as the principal wildlife-analysis reference for the evaluation.

Readers seeking environmental methodology information will find:

- The study approach used to evaluate caribou crossing potential along the proposed road corridor.
- Details regarding the use of GPS collar data from Bathurst and Dolphin-Union caribou herds.
- Information on how historical movement data and field-observed trail information were incorporated into the analysis.
- The methodology used to divide the roadway into assessment segments and assign crossing potential rankings.
- The weighting systems and scoring frameworks used to prioritize crossing areas.

The document should also be consulted when looking for information on how crossing potential was classified and reported. It contains classification systems, scoring approaches, and

summaries of road segments categorized as low, medium, or high crossing potential. It also identifies general corridor areas where concentrations of higher crossing potential were observed.

For project planners and designers, this memorandum serves as a bridge between wildlife baseline data and roadway design development. It explains how environmental information was converted into practical design considerations and documents the feasibility of incorporating caribou crossing measures within the conceptual roadway design.

Overall, this document should be regarded as the primary reference for anyone seeking information on caribou crossing identification, crossing prioritization, wildlife movement analysis, environmental design inputs, roadway design criteria for caribou accommodation, and the integration of ecological considerations into the Grays Bay Road design process.

1.5.4 GBRP: Design Considerations Associated with Updating the MMG/Fluor Base Design on Construction and Operations

Prepared by: Graham Wilkins and Andrew Horwood, Tetra Tech Canada Inc.

September 2025

This technical memorandum serves as a high-level engineering review of the previous MMG/Fluor roadway design and documents key considerations associated with updating the design for the Grays Bay Road and Port Project. The document is intended to support decision-making regarding roadway design philosophy, earthworks strategy, permafrost considerations, long-term maintenance implications, and overall project implementation approach.

Anyone seeking information about why the roadway design was modified from the historic MMG/Fluor concept should consult this document. It identifies the principal engineering issues reviewed during the update process and explains how those issues may affect construction, capital cost, long-term operations, and maintenance requirements.

This document is the primary reference for:

- Engineering considerations associated with updating the historical MMG/Fluor road design.
- A comparison between earlier design assumptions and the approach recommended by Tetra Tech.
- Identification of alignment-related concerns requiring further design development.
- Discussion of how roadway design choices may influence construction cost, long-term maintenance requirements, and operational performance.

The memorandum should be consulted when looking for information regarding roadway alignment risks and optimization opportunities. It contains a review of locations where the alignment approaches lakes and ponds, as well as discussion regarding excavation in challenging terrain and permafrost-sensitive ground conditions. The document outlines

concerns associated with these features and identifies areas that may require redesign or refinement during future stages of engineering.

Readers seeking information related to geotechnical design and permafrost protection will find substantial discussion regarding embankment design philosophy. The memorandum explains the terrain classification system used along the corridor and provides a comparison between previous and proposed embankment thickness recommendations.

Specifically, the document contains:

- Definitions and descriptions of the roadway terrain classifications used for design.
- Discussion of thaw sensitivity and how it influences roadway embankment requirements.
- Comparisons between previous embankment thickness recommendations and updated recommendations.
- Information regarding the relationship between embankment thickness and long-term roadway performance.
- Discussion of risks associated with permafrost degradation, settlement, ground ice, and thaw-sensitive soils.
- Considerations regarding maintenance, rehabilitation, and lifecycle performance of the roadway.

The memorandum is also an important reference for understanding earthworks and construction implications along the alignment. Readers looking for information about excavation challenges, unsuitable materials, waste disposal considerations, embankment volume impacts, and cost implications of different design approaches will find that information in this document.

In addition, the document provides the basis for roadway sideslope design decisions. It compares alternative embankment slope approaches and explains how roadway safety, geotechnical stability, and long-term performance considerations influence the recommended roadway cross-section. Anyone seeking the rationale behind proposed sideslope configurations should consult this memorandum.

The memorandum also contains a review of roadway geometric design. Readers looking for information regarding horizontal alignment, vertical alignment, bridge-related geometry requirements, embankment depth compliance, superelevation constraints, and roadway design criteria conformance will find those discussions in this document.

More broadly, the document functions as a decision-support memorandum that identifies the principal engineering trade-offs associated with roadway design development. It discusses the balance between initial construction cost and long-term operating performance, particularly within a northern permafrost environment. As such, it is useful for understanding the reasoning behind major design decisions and the implications of adopting one approach versus another.

Overall, this document should be regarded as the primary reference for anyone seeking information on roadway design philosophy, alignment concerns, earthworks strategy, permafrost-related design decisions, embankment thickness criteria, sideslope design, long-

term maintenance considerations, and the engineering rationale supporting updates to the MMG/Fluor roadway design for the Grays Bay Road and Port Project.

1.5.5 Hydro Technical Engineering Design, Izok Corridor Project

Prepared by: Eugene Yaremko, Principle, Northwest Hydraulic Consultants Ltd. for MMG Resources Inc.

May 2013

This report is the principal hydrotechnical engineering reference for the Izok Corridor Project and provides hydrology, hydraulics, water management, diversion design, water supply, stream crossing, and coastal engineering information for the major project components. Rather than focusing on a single discipline, the document consolidates hydrotechnical assessments completed in support of mine development, transportation infrastructure, and port planning.

Anyone seeking information related to water resources, flood analyses, hydraulic design criteria, water management infrastructure, diversion channels, water supply assessments, stream crossing hydrology, or coastal conditions should consult this document. It provides both the technical basis and engineering recommendations supporting hydrotechnical design throughout the broader Izok Corridor Project.

This report is the primary source for information regarding:

- Hydrotechnical design criteria used throughout the Izok Corridor Project.
- Flood hydrology and hydraulic analyses supporting mine, road, and port infrastructure.
- Water management planning and design assumptions used during feasibility-stage engineering.
- Climate, precipitation, runoff, water balance, and design flood evaluations.

A significant portion of the report focuses on the Izok Lake Mine and associated water management infrastructure. This information may not be specifically related to the GBRP project.

The report should also be consulted when seeking information on **precipitation and hydrologic design inputs** for the project area. It includes precipitation analyses, frequency assessments, climate station evaluations, runoff distributions, and design precipitation values developed specifically for Izok Lake, High Lake, and Grays Bay.

For transportation infrastructure, the report includes **hydrologic information related to the all-season road corridor**. Readers seeking information on stream crossing hydrology, flood frequency estimation, culvert sizing methodology, drainage basin characteristics, and water crossing design parameters should consult this report. It also serves as a bridge to the separate NHC stream crossing design report by summarizing the methodology and design assumptions used for roadway crossing development.

Finally, the report contains the principal **hydrotechnical assessment completed for the proposed Gray's Bay Port**. Readers looking for information on wind conditions, wave climate, coastal hydraulic considerations, fetch analysis, design wave heights, meteorological data sources, or preliminary port planning assumptions will find that information in this document.

Specifically, the report includes:

- Regional wind analyses and weather station evaluations.
- Wave height estimation methodologies and results.
- Effective fetch analyses and coastal hydraulic assessments.
- Preliminary design wave conditions for port infrastructure planning.

Overall, this report should be regarded as the master hydrotechnical design reference for the Izok Corridor Project. Anyone seeking information on flood hydrology, diversion channel design, water management infrastructure, mine water supply assessments, precipitation and climate analyses, stream crossing hydrology, culvert design criteria, coastal engineering studies, wind and wave assessments, or hydrotechnical design assumptions should consult this document first.

1.5.6 Potential Quarry and Borrow Pit Information

Existing information regarding quarry sources is limited to the 330 previously identified potential quarry locations developed during earlier phases of the Project. These potential quarry sites have been made available to the Design-Builder for reference; however, the information is explicitly identified as preliminary and should not be relied upon as confirmation of material quality, quantity, constructability, environmental suitability, permitting feasibility, or long-term viability. The Design-Builder is required to undertake all necessary investigations and testing to characterize quarry sources, confirm material suitability, verify available quantities, assess geotechnical and geochemical conditions, and demonstrate that the selected quarries can support both project construction and long-term roadway maintenance requirements. As such, the current level of confidence in the available quarry information is considered low to moderate, and significant additional investigation will be required before any quarry source can be considered proven or reliable for design and construction purposes.

2 Functional Requirements

The roadway shall provide a controlled-access transportation corridor capable of supporting year-round heavy haul mining operations while accommodating Arctic environmental conditions, permafrost terrain, construction logistics, environmental commitments, wildlife movement, operational requirements, maintainability, and long-term serviceability.

The roadway is currently classified as a Resource Development Road. The design shall accommodate a preliminary design vehicle consisting of a 340-tonne Dual Powered Road Train

approximately 58 m in length. The current roadway concept assumes approximately 22 loaded design vehicle trips per day based on anticipated concentrate hauling requirements.

The roadway shall provide safe operation for heavy haul vehicles, maintenance vehicles, construction equipment, oversize loads, and future corridor users while minimizing long-term maintenance requirements and operational disruptions.

3 Assumptions

The roadway reference concept has been developed based on available information and the following key assumptions:

- The current alignment generally represents a feasible transportation corridor.
- A 340-tonne Dual Powered Road Train remains the governing design vehicle.
- Permafrost conditions can be mitigated through embankment design and material selection.
- Suitable borrow and quarry sources are available within practical hauling distances.
- Future investigations will not identify conditions requiring substantial corridor abandonment or realignment.
- Existing environmental commitments and permitting pathways remain generally consistent with current project assumptions.
- Future design development will refine and optimize the roadway concept.

4 Constraints, Risks, and Interdependencies

4.1 Constraints

The following constraints represent key project conditions that are expected to influence the detailed design, procurement, construction, and long-term operation of the water crossing structures. The items listed below represent key considerations identified to date but should not be considered all-inclusive.

Key project constraints include:

- Remote Arctic location and associated logistics challenges.
- Limited annual construction seasons.
- Continuous permafrost conditions.
- Caribou migration periods and associated restrictions.
- Environmental permitting requirements.

- Availability and haul distance of suitable construction materials.
- Limited existing terrain, thermal, and geotechnical information.

4.2 Risks

The following risks have been identified based on current project information and may affect future design development, constructability, cost, schedule, permitting, and long-term performance. Additional risks may emerge as design, investigations, permitting, and construction planning progress.

Key risks identified to date include:

- Permafrost degradation an associated settlement.
- ARD/ML risks related to borrow and quarry materials.
- Future geotechnical conditions differing from current assumptions.
- Long-term performance of local aggregate sources.
- Design vehicle requirements differing from current assumptions.
- Climate change impacts affecting long-term roadway performance.
- Increased embankment quantities resulting from terrain or thermal conditions. turn2search5L30-L31

4.3 Interdependencies

The roadway discipline is closely linked to:

- Geotechnical investigations and thermal modeling.
- Hydrotechnical assessments and drainage design.
- Structural and bridge design.
- Environmental and wildlife disciplines.
- Archaeological investigations.
- Material source development.
- Regulatory approvals and permitting.

5 Reference Design

The current roadway reference concept represents an early-stage design developed primarily through desktop studies, available historical information, engineering judgement, and project-specific design criteria. Significant design development remains outstanding.

Current status includes:

- Potential quarry and borrow sources have been identified; however, detailed field investigations have not yet been completed.
- A preliminary horizontal alignment has been established but requires refinement to satisfy geometric design criteria and design vehicle requirements.
- The vertical alignment remains conceptual in nature and generally assumes the roadway is positioned approximately 2 m above existing ground.
- Preliminary embankment thickness criteria have been developed but have not yet been fully applied due to incomplete terrain mapping.
- Terrain mapping remains outstanding.
- Geotechnical investigations and thermal assessments have not been completed to the level required for detailed design.
- Existing understanding of subsurface conditions is primarily based on desktop assessments and limited available data.
- Preliminary hydrotechnical information exists but additional study and refinement are required.
- The design vehicle has been assumed and should be validated during future project development.
- Many roadway design criteria are based on preliminary assumptions and require future verification.

5.1 Design Life

The roadway reference concept has been developed assuming a minimum design life of 15 years. This design life applies to the roadway embankment, drainage works, borrow developments, maintenance infrastructure, and associated roadway features. The design life assumption may be refined during future project development phases based on operational requirements, lifecycle assessments, and stakeholder input.

5.2 Durability

Road durability was evaluated recognizing that the roadway will be subjected to significant loading from heavy haul traffic throughout its operating life. While these loads have the potential to accelerate deterioration of both the running surface and the embankment, the operating environment provides several mitigating factors. The roadway is expected to remain frozen for a substantial portion of the year, reducing the susceptibility of the road structure to deformation when compared to roads operating under unfrozen conditions. In addition, seasonal load restrictions during critical thaw periods are anticipated and were considered an important factor in protecting the long-term performance of the roadway.

The durability of the roadway surface is also influenced by the quality and characteristics of available construction materials. Material resistance to degradation under repeated heavy wheel loads will affect the rate of surface wear and, consequently, the frequency of maintenance gravel replacement required over the life of the road. For this reason, material availability and durability were both considered during development of the roadway concept.

The decision to maintain an unsealed gravel running surface provides flexibility in the management of long-term roadway performance. Unlike a sealed surface, which generally requires more substantial rehabilitation when defects develop, a gravel roadway can be maintained through routine grading, periodic resurfacing, and localized repairs. The incorporation of maintenance facilities along the corridor further supports this maintenance strategy. As a result, long-term serviceability is not solely dependent on achieving optimal durability at initial construction, but can be sustained through ongoing maintenance and targeted rehabilitation activities as operating conditions and material performance become better understood.

6 Quantity Approximations

Roadway quantity development remains ongoing. Preliminary earthworks quantities, material balance assessments, borrow source volumes, quarry production estimates, maintenance facility requirements, and storm shelter requirements have not been developed to a level suitable for inclusion within this memorandum.

Quantities are currently under development and will be refined during future design phases.

7 Next Steps for Design Development

The current roadway concept represents a reference design developed from the information available at the time of preparation. Future project development should focus on:

- Completion of terrain mapping and surficial interpretation.
- Completion of thermal assessments.
- Completion of geotechnical investigations.
- Advancement of hydrotechnical assessments and drainage design.
- ARD/ML assessment of borrow and quarry materials.
- Detailed investigations of quarry and borrow sources.
- Refinement of horizontal and vertical alignment geometry.
- Validation of design vehicle assumptions with future roadway users.
- Development of roadway quantities, material balances, and construction strategies.

- Refinement of project risks, costs, and implementation plans as additional information becomes available.

WEST KITIKMEOT RESOURCES CORP

Grays Bay Road and Port Project Reference Concept Design Memo - Water Crossing Roadway Structures

29 Sept, 2026

NUNAMI
STANTEC LIMITED

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1 General

1.1 Introduction & Purpose

The Grays Bay Road and Port Project (GBRP) is a proposed multi-user transportation infrastructure corridor in the Kitikmeot Region of Nunavut, consisting of a deep-water port at Grays Bay and an approximately 230 km all-season, controlled-access road connecting the port to Jericho Station. The roadway corridor includes numerous watercourse crossings that are essential to maintaining safe and reliable year-round access.

This Reference Concept Design Memo documents the current status of the roadway structures component of the Project, including bridges and major culverts. The memo summarizes the reference concept design, functional requirements, key technical inputs, design criteria, assumptions, constraints, and design considerations that have been developed to date. The information is intended to support future design development by the Design-Builder under the Progressive Design-Build delivery model and to provide reference information for the RFP data room.

1.2 Design Scope

The roadway structures will provide safe and reliable crossings of rivers, streams, and drainage features along the corridor while accommodating heavy haul mining traffic, construction vehicles, and public users.

The roadway structures scope includes the planning, design, and construction of water crossing structures, associated foundations, approach works, headslopes, erosion protection measures, drainage interfaces, and safety barriers where required. Bridge and culvert solutions will be developed based on hydrotechnical, geotechnical, environmental, fisheries, operational, and constructability considerations, while addressing Arctic conditions, permafrost, long-term durability, and maintenance requirements.

1.3 Study/Project Area

The roadway structures component of the Grays Bay Road and Port (GBRP) Project is located along the approximately 230 km roadway corridor extending between Grays Bay Port on the Coronation Gulf and Jericho Station in the Kitikmeot Region of Nunavut. Based on the current water crossing assessments, the major crossing inventory includes several significant watercourses requiring bridge or bridge-culvert structures, including crossings at the Burnside River, Hood River, Frayed Knots River, and other major drainage systems along the alignment. The identified crossing locations encompass a range of hydraulic, geotechnical, and terrain conditions, including broad river valleys, lake outlets, braided channels, incised river crossings, and areas influenced by permafrost.

This study area description focuses on the major bridge and culvert crossings only; refer to GBPR Major Water Crossings - Master Table in Section 7 for the complete inventory of potential

crossing locations, design assumptions, recommended crossing types, and associated design considerations.

1.4 Codes, Standards & Design Guidelines

Roadway structures shall be designed in accordance with the latest applicable editions of the following codes, standards, guidelines, and regulatory requirements, unless otherwise accepted by the Owner:

- **Canadian Highway Bridge Design Code**, CAN/CSA S6, including the provisions for bridge design, bridge-culverts, barriers, loads, durability, foundations, and hydraulic effects where applicable.
- **TAC Geometric Design Guide for Canadian Roads**, including guidance for special roads and resource development roads.
- TAC Drainage Manual.
- TAC Guide to Bridge Hydraulics.
- GNWT Design Criteria/Standards: Bridges and Bridge-Culverts, where applicable to northern bridge and culvert design.
- **Nunavut Mine Health and Safety Act** and applicable regulations, where relevant to roadway width, traffic operations, and safety requirements.
- **Fisheries Act** and applicable Fisheries and Oceans Canada requirements for in-stream works, fish passage, and protection of fish habitat.
- Applicable federal, territorial, environmental, fisheries, navigation, and permitting requirements.
- Applicable Owner requirements, Project environmental commitments, management plans, and permit conditions.

Where there is a conflict between requirements, the more stringent requirement shall govern unless otherwise accepted by the Owner. The Design-Builder shall identify any proposed departures from the listed requirements and obtain acceptance from the Owner prior to implementation.

1.5 Reference Documents

The following project documents were referred to in the preparation of these design criteria:

- Grays Bay Road and Port Project Basis of Design: Road – Jericho Station to Port
- Owner's Statement of Requirements (OSR) – Major Works
- GBRP Major Water Crossings – Master Table
- Hydrotechnical Assessments and Water Crossing Evaluations
- Navigability Assessments for Major Water Crossings
- Preliminary Geotechnical Investigations and Design Recommendations
- Environmental, Fisheries, and Regulatory Studies Relevant to Water Crossing Structures

2 Functional Requirements

The roadway water crossing structures shall provide safe, reliable, and durable crossings of rivers, streams, and drainage features along the GBRP roadway corridor while supporting the operation of the all-season, controlled-access road. The structures shall accommodate heavy haul mining traffic, construction vehicles, maintenance vehicles, and public traffic throughout the design service life.

The water crossing structures shall be designed to safely convey hydraulic flows, maintain roadway accessibility, and satisfy applicable environmental, fisheries, and navigability requirements. Structure selection and configuration shall consider site-specific hydrotechnical, geotechnical, environmental, operational, and constructability requirements.

The water crossing structures shall be suitable for remote Arctic conditions and shall address permafrost, seasonal temperature extremes, ice effects, scour potential, durability, maintenance access, and long-term serviceability. Structural systems, foundation concepts, and protection measures shall be selected to minimize maintenance requirements and support reliable long-term operation of the transportation corridor.

3 Assumptions

The reference concept design for the roadway water crossing structures has been developed based on available information, studies, and investigations completed at the time of preparation. The following assumptions were used in the development of the reference concepts:

- The reference concept design is intended to support procurement, project planning, and future design development and does not constitute a final design.
- Crossing configurations, structural systems, hydraulic openings, and foundation concepts are preliminary and will be refined by the Design-Builder during subsequent design phases.
- Hydrotechnical parameters, channel geometry, flood levels, and navigability assessments are based on available studies completed to date and may be updated through future investigations and analyses.
- Preliminary foundation recommendations are based on available geotechnical information, aerial imagery reviews, and site observations. Additional geotechnical investigations will be required to confirm subsurface conditions and foundation design requirements.
- Environmental, fisheries, regulatory, and permitting requirements will continue to be refined through future project development and approval processes.
- Structural concepts have been developed using conventional bridge and culvert systems considered suitable for Arctic conditions, remote construction, and long-term operation.
- Construction access, material availability, and construction logistics can be developed to support the proposed crossing concepts.

- Future design development may result in modifications to crossing locations, crossing types, span arrangements, hydraulic openings, foundation systems, and associated protection works as additional information becomes available.

4 Constraints, Risks, and Interdependencies

4.1 Constraints

The following constraints represent key project conditions that are expected to influence the detailed design, procurement, construction, and long-term operation of the water crossing structures. The items listed below represent key considerations identified to date but should not be considered all-inclusive.

- Remote Arctic location with limited transportation infrastructure, resulting in significant constraints on mobilization, material delivery, equipment access, workforce accommodation, and construction logistics.
- Short annual construction seasons and weather-dependent access windows that may affect construction sequencing and productivity.
- Permafrost conditions and cold-region engineering requirements that influence foundation design, embankment performance, construction methods, and long-term asset behaviour.
- Water crossing locations are governed by the established roadway corridor and alignment geometry, limiting opportunities to optimize crossing locations without broader roadway modifications.
- Environmental, fisheries, navigability, and permitting requirements may restrict construction methods, temporary works, and in-water construction activities.
- Availability and proximity of suitable construction materials, including granular materials, rockfill, riprap, and armour stone, may influence crossing design and construction approaches.
- Limited existing geotechnical information at many crossing locations will require additional field investigations to support detailed design.
- Large river systems, including the Burnside River, Hood River, and Frayed Knots River crossings, present site-specific hydraulic, environmental, and constructability constraints.

4.2 Risks

The following risks have been identified based on current project information and may affect future design development, constructability, cost, schedule, permitting, and long-term performance. Additional risks may emerge as design, investigations, permitting, and construction planning progress.

- Variable subsurface conditions may result in foundation systems that differ from current assumptions, potentially affecting cost, schedule, and constructability.
- Hydraulic conditions, scour potential, ice forces, and channel stability may require larger structures or additional protection measures than currently anticipated.

- Future geotechnical investigations may identify challenges associated with bedrock depth, thaw-sensitive soils, ice-rich permafrost, or unsuitable foundation materials.
- Delays in environmental approvals, fisheries authorizations, or other regulatory permits may impact construction sequencing and schedule.
- Extreme weather events, spring breakup, flooding, and changing climate conditions may affect long-term performance and resilience of water crossing structures.
- Construction logistics risks associated with transporting materials, specialized equipment, and bridge components to remote northern locations.
- Potential shortages of qualified construction contractors, specialized bridge construction expertise, and northern construction capacity.
- Long-term durability risks associated with freeze-thaw cycles, ice loading, erosion, scour, and remote maintenance access requirements.

4.3 Interdependencies

The water crossing structures are closely integrated with several project disciplines, studies, approvals, and construction activities. The following interdependencies have been identified and should be considered during future project development; however, they do not represent all potential project interfaces.

- **Roadway Design:** Bridge and culvert locations, lengths, grades, roadway profiles, and approach embankments are directly dependent on roadway geometry and corridor development.
- **Hydrotechnical Design:** Crossing type selection, hydraulic openings, waterway widths, scour protection, and freeboard requirements depend on hydrologic and hydraulic analyses.
- **Geotechnical Design:** Foundation systems, pile design, settlement performance, slope stability, and permafrost considerations depend on geotechnical investigations and recommendations.
- **Environmental and Fisheries Disciplines:** Crossing configurations, construction methods, timing restrictions, and habitat protection measures must be coordinated with environmental and fisheries requirements.
- **Permitting and Regulatory Approvals:** Detailed design and construction sequencing are dependent on obtaining required permits and regulatory approvals.
- **Material Source Development:** Crossing construction depends on the identification, permitting, and development of suitable quarries, borrow sources, and riprap sources.
- **Construction Planning and Logistics:** Structure sizing, modularization opportunities, erection methods, temporary works, and construction sequencing are closely linked to overall project logistics planning.
- **Drainage and Erosion Protection Design:** Culverts, channel protection works, approach drainage, and erosion control measures must be coordinated with roadway drainage systems.
- **Future Field Investigation Programs:** Additional geotechnical, hydrotechnical, environmental, and survey investigations are required to support detailed design development.

- **Progressive Design-Build Development:** Final structure configurations, foundation solutions, and construction methodologies will be refined through collaboration between the Owner, Design-Builder, and technical stakeholders during future project phases.

5 Design Requirements

The roadway water crossing structures shall be designed to provide safe, reliable, and durable crossings that support the long-term operation of the Grays Bay Road and Port Project. Design requirements shall address operational demands, hydraulic performance, durability, constructability, maintenance, environmental conditions, and applicable code requirements throughout the service life of the crossing structures.

5.1 Design Life

The water crossing structures shall be designed for a minimum service life of **75 years**. This design life applies to bridges, bridge-culverts, major culverts, foundations, retaining elements, erosion protection works, and other structural components forming part of the crossing system.

The design shall consider Arctic environmental conditions, including freeze-thaw cycles, ice loading, scour, erosion, seasonal flooding, permafrost effects, and limited maintenance access. Structural systems and detailing shall be selected to minimize long-term maintenance requirements and support reliable year-round operation of the transportation corridor.

5.2 Durability

The water crossing structures shall be designed to provide long-term durability under Arctic environmental conditions. Durability considerations shall include freeze-thaw exposure, abrasion, corrosion, ice action, erosion, scour, ultraviolet exposure, thermal gradients, and other environmental effects relevant to the crossing location.

Materials, protective systems, detailing, and drainage provisions shall be selected to maximize service life and reduce future maintenance, repair, and replacement requirements. Particular consideration shall be given to remote access constraints and the challenges associated with maintaining infrastructure in northern environments.

5.3 Design

Structural design shall be completed in accordance with the latest applicable editions of the codes, standards, guidelines, and project requirements identified in Section 1.4. Water crossing structures shall be designed to safely accommodate the governing project design vehicles, including the Road Train / B-Train haul vehicle, Dual Powered Road Train (DPRT), CSA S6 CL-800 loading, construction equipment, maintenance vehicles, and public traffic, while satisfying applicable hydraulic, environmental, fisheries, navigability, durability, and operational requirements.

Bridge design shall be carried out using accepted structural analysis methods appropriate for the selected bridge type and level of design development. Analyses shall consider dead loads, live loads, dynamic load effects, hydraulic loading, ice forces, wind loading, temperature effects, fatigue, scour effects, vibration, serviceability requirements, and applicable load combinations. Bridge span arrangements, deck geometry, navigational clearances, freeboard requirements, and foundation systems shall be developed based on site-specific hydraulic, geotechnical, environmental, operational, and constructability considerations.

Culvert and bridge-culvert design shall incorporate hydrologic and hydraulic analyses to establish design flows, waterway opening requirements, flow conveyance capacity, headwater levels, outlet conditions, freeboard requirements, fish passage requirements, and scour protection measures where applicable. Structural analyses shall address earth pressures, embankment loads, traffic loads, frost effects, differential settlement, foundation support conditions, durability requirements, and long-term performance under Arctic operating conditions.

Design development shall consider hydraulic loading, ice loading, scour, vessel navigation requirements where applicable, permafrost conditions, constructability, inspection access, maintenance requirements, and long-term operational performance. Structure selection, span arrangements, foundation systems, and crossing configurations shall be optimized based on site-specific hydraulic, geotechnical, environmental, and operational considerations while recognizing that final structure configurations will be refined during subsequent design phases.

5.4 Materials

Materials shall be selected in accordance with the applicable requirements of the codes, standards, and guidelines identified in **Section 1.4**, including CSA S6 durability and material requirements. Material selection shall consider service life, durability, constructability, availability, maintainability, lifecycle performance, and suitability for the Arctic environment.

Bridge structures may utilize structural steel, reinforced concrete, precast concrete, prestressed concrete, steel piling, and other materials demonstrated to be suitable for the required service life and environmental exposure conditions. Structural steel components shall incorporate appropriate corrosion protection systems, while concrete elements shall incorporate suitable durability measures to resist freeze-thaw deterioration, chloride exposure, abrasion, and other environmental effects.

Culverts and bridge-culverts may utilize corrugated steel pipe, structural plate corrugated steel structures, open-bottom steel arch culverts, concrete culverts, precast concrete culvert systems, or other approved systems appropriate for the site-specific hydraulic, geotechnical, environmental, and operational requirements. Material selection shall consider abrasion, corrosion, frost action, settlement, debris loading, ice effects, and long-term hydraulic performance.

Riprap, armour stone, granular materials, geotextiles, geogrids, and other geosynthetic products may be utilized for erosion protection, scour mitigation, embankment stabilization, drainage control, and foundation support, as required. Materials shall be sourced and specified to

withstand anticipated environmental loading and construction conditions while minimizing future maintenance requirements.

Material selection shall also consider constructability, transportation logistics, availability of northern construction materials, remote maintenance access, and overall lifecycle costs. Alternative materials and systems may be proposed by the Design-Builder provided they satisfy the Project requirements and performance objectives.

5.5 Geotechnical & Seismic Design

Geotechnical and seismic design shall be completed in accordance with the applicable requirements of the codes, standards, and guidelines identified in **Section 1.4**, including the current edition of CAN/CSA S6, applicable geotechnical engineering standards, and project-specific geotechnical recommendations. Design shall consider the unique conditions of the Kitikmeot Region, including permafrost, cold-region effects, remote construction logistics, and long-term infrastructure performance.

Each bridge, bridge-culvert, and major culvert crossing shall require a site-specific geotechnical investigation and assessment to support detailed design. Investigation programs should include drilling, sampling, laboratory testing, geophysical surveys where appropriate, and geotechnical characterization of subsurface conditions at each crossing location. The investigations shall be used to establish foundation design parameters, bedrock elevation, groundwater conditions, soil and rock properties, frost susceptibility, thaw settlement potential, and constructability considerations.

Bridge foundation systems may include steel piles, rock-socketed piles, adfreeze piles, spread footings, or other foundation solutions suitable for the site-specific conditions. Foundation selection shall consider subsurface conditions, scour potential, ice loading, constructability, long-term settlement performance, and lifecycle maintenance requirements. Special consideration shall be given to major river crossings such as the Burnside River, Hood River, Frayed Knots River, and other significant watercourses where deeper foundations, larger hydraulic openings, and more complex geotechnical conditions may be encountered.

Geotechnical design for culverts and bridge-culverts shall consider bearing resistance, settlement, embankment performance, frost action, permafrost degradation, hydraulic scour, erosion protection requirements, and differential movement between the roadway and structure. The design shall also address long-term performance under seasonal freeze-thaw cycles and changing ground thermal conditions.

Seismic design shall be carried out in accordance with the seismic provisions of CAN/CSA S6 using the applicable seismic hazard parameters for each crossing location. Analyses shall consider the interaction between the structure, foundation system, embankments, and supporting soil or rock. Bridge and culvert designs shall also evaluate the potential effects of seismic loading on foundations, approach embankments, retaining elements, and erosion protection systems, as applicable.

Additional investigations and design refinements will be required during the design phase to confirm geotechnical design parameters, foundation recommendations, seismic inputs, and constructability requirements for individual crossing locations.

6 Performance Specification

The water crossing structures shall be designed to provide safe, reliable, and year-round access along the GBRP transportation corridor while accommodating the operational, environmental, and logistical requirements of a remote Arctic heavy-haul roadway.

The performance requirements for water crossing structures shall include, at a minimum:

- Support the project design vehicles, including the Road Train / B-Train haul vehicle, DPRT heavy haul vehicle, CL-800 loading, construction equipment, maintenance vehicles, and emergency vehicles without restrictions under normal operating conditions.
- Maintain structural integrity, serviceability, and operational functionality throughout the 75-year design life.
- Safely convey design flows and flood events without causing unacceptable roadway overtopping, embankment damage, excessive backwater, or adverse impacts to adjacent watercourses.
- Resist scour, erosion, ice forces, debris loading, freeze-thaw effects, frost heave, thaw settlement, and other Arctic environmental loading conditions.
- Maintain long-term stability of foundations, embankments, channel protection systems, and associated roadway approaches.
- Minimize inspection, maintenance, rehabilitation, and replacement requirements considering the remote location and limited access opportunities.
- Facilitate safe access for future inspection, monitoring, maintenance, and repair activities throughout the service life of the structures.
- Accommodate fisheries, environmental, navigability, and regulatory requirements applicable to individual crossing locations.
- Provide resilient infrastructure capable of maintaining service under extreme weather events, seasonal flooding, spring breakup, and changing hydraulic conditions.

Bridge structures shall:

- Provide adequate hydraulic opening and freeboard for the governing design flood.
- Accommodate navigational clearance requirements at navigable watercourses where applicable.
- Safely resist all governing traffic, hydraulic, ice, wind, temperature, and seismic load combinations.
- Limit long-term deterioration and maintain acceptable structural performance throughout the design life.

Culvert and bridge-culvert structures shall:

- Provide sufficient hydraulic capacity for the design discharge without unacceptable headwater conditions.
- Maintain structural performance under embankment loading, heavy haul vehicle loading, frost action, settlement, and differential movement.
- Minimize the risk of blockage from ice, debris, sedimentation, and channel migration.
- Provide fish passage and maintain channel continuity where required by the applicable environmental and fisheries approvals.

7 Quantities Approximations

The preliminary quantities for the water crossing structures are based on the current crossing inventory and reference concept options summarized in the GBRP Major Water Crossings – Master Tables below. These quantities are intended for planning, procurement support, and future design development only and do not represent final design or construction quantities.

Based on the current reference concept summary, the major water crossing structures include:

Table 1 - Bridge Crossings

Structure Type	**Count**	**Bridge Length Range (m)**
Multi-Span Bridges	3	81 m to 173 m
Single Long Span Bridges (≥40m)	4	40 m to 83 m
Single Span Bridges (<40m)	9	22 m to 53 m
Open Bottom Arch Culverts (Major)	2	-
TOTAL BRIDGES	**18**	

Table 2 - Culvert Crossing:

Culvert Type	**Dimensions**	**No. of Locations**	**Total Units**
CSP (Circular)	1600 dia.	7	9
CSP (Circular)	2000 dia.	7	19
	CSP Subtotal	**14**	**28**
SPCSP (Arch)	1600 x 800	12	16
SPCSP (Arch)	2130 x 1120	6	9
SPCSP (Arch)	3050 x 1600	4	5
SPCSP (Arch)	3660 x 1910	3	6
	SPCSP Subtotal	**25**	**36**
GRAND TOTAL		**39**	**64**

Note: Each crossing location may require multiple culvert units of the same type and size to accommodate the stream channel width. The 'Total Units' column reflects the total number of individual culvert structures required.

- **CSP** = Corrugated Steel Pipe (circular culverts)
- **SPCSP** = Structural Plate Corrugated Steel Pipe (open bottom arch culverts, dimensions shown as span x rise)

8 Future Expansion Considerations

Future expansion requirements have not been fully defined; however, future design development should consider opportunities to accommodate increased traffic demands, future corridor improvements, climate resilience requirements, asset monitoring technologies, and potential future project or third-party developments utilizing the GBRP transportation corridor. Any such considerations should be balanced against constructability, cost, and operational requirements

9 Next Steps for Design Development

The current water crossing structure concepts represent a reference design based on information available at the time of preparation. During the Progressive Design-Build Development Phase, the Design-Builder will be responsible for further developing, validating, and optimizing the bridge, bridge-culvert, and culvert solutions to satisfy the Project requirements, Owner's Statement of Requirements, applicable codes and standards, and site-specific conditions. Future design development is expected to include additional investigations, analyses, stakeholder engagement, risk mitigation activities, and constructability assessments to support progression toward the final design solution.

Key areas for future development are anticipated to include:

- Completion of site-specific geotechnical investigations and foundation assessments at individual crossing locations.
- Refinement of hydrologic, hydraulic, scour, navigability, and fish passage assessments to confirm crossing requirements and sizing criteria.
- Optimization of bridge, bridge-culvert, and culvert configurations based on technical, environmental, constructability, cost, and lifecycle considerations.
- Advancement of environmental, fisheries, regulatory, and permitting requirements supporting detailed design and construction planning.
- Development of detailed construction methodologies, temporary works concepts, logistics plans, schedules, and execution strategies appropriate for the remote Arctic environment.
- Refinement of cost estimates, quantities, risk assessments, and implementation plans as the design progresses.

10 References

The following references were consulted during the preparation of this memo. The documents listed below represent selected project references and are not intended to capture every document, study, drawing, or data source associated with the Project.

- GBRP_MajorWorks_CCDC_OSR.docx (Owner's Statement of Requirements – Major Works)
- GBRP_Roadway_Basis_of_Design_20260326.docx (Roadway Basis of Design)
- GBRP Major Water Crossings – Master Table
- Hydrotechnical Assessments and Water Crossing Evaluations.
- Navigability Assessments for Major Water Crossings.
- Preliminary Geotechnical Investigations and Design Recommendations.
- Environmental, Fisheries, and Regulatory Studies Relevant to Water Crossing Structures.
- 113678730_gbrp_project_brief_20260508.docx (GBRP Project Brief)
- 113678730_gbrp_mw_rfq_project_brief_20260601.pdf (Major Works RFQ Project Brief)

113678730_gbrp_construction_phasing_summary_20260602.docx (Construction Phasing and Critical Path Summary)

WEST KITIKMEOT RESOURCES CORP

Grays Bay Road and Port Project Reference Concept Design Memo- Jericho Station Aerodrome and Land Side Infrastructure

29 September 2026

NUNAMI STANTEC LIMITED

Revision	Date	Description
0 (First Draft)	Jul 31/26	• Nunami-Stantec Internal Review
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1 General

1.1 Introduction & Purpose

The Grays Bay Road and Port Project (GBRP or Project) is a proposed deep-water port, aerodrome, and all-season road in the Kitikmeot Region of Nunavut. The port and aerodrome would be located at Grays Bay on the Coronation Gulf along the Northwest Passage, with marine operations during the open-water season from approximately June to October. The 230-kilometre, multi-user all-season road would connect the port to Jericho Station (site of the former Jericho mine).

GBRP will establish shared infrastructure for many potential users, including federal and territorial governments, Inuit, communities, resource companies, and defence agencies.

This document is the Reference Design Concept Memo for the Jericho Aerodrome works and associated landside works only, which is one of various elements as related to the Major Works scope of the GBRP project. It is a component of the CCDC 32 – 2026, Progressive Design-Build Contract executed between the Owner, West Kitikmeot Resources Corp (WKR), and the Design-Builder.

This document presents the technical bases for design of the infrastructure elements. It contains the essential elements of the infrastructure. It is expected that the Design-Builder will enhance or modify the design as required. The main purpose of this Reference Design Concept Memo is to support the Design-Builder with the development of next phases of the project.

2 Aerodrome

2.1.1 Design Scope

The objective of this component of the project is to rehabilitate the Jericho Aerodrome to a usable state for passenger and cargo turbo-prop aircraft as a registered aerodrome.

The key requirements of the aerodrome design works are outlined as follows:

- Obstacle-free approach paths in support of non-instrument flight to the runway.
- Meeting the runway take-off and landing requirements of the critical aircraft
- Accommodating a suitably sized aircraft parking apron.
- Grading and drainage of all runway, taxiway and apron surfaces
- Gravel surface capable of supporting the most demanding aircraft.
- Provision of visual aids for daytime use only.
- Determination of roadway interference with the runway strip and OLS and road re-alignment options.

2.1.2 Study/Project Area

The Jericho Aerodrome is an airstrip at the Jericho Diamond Mine located approximately 420km northeast of Yellowknife. The mine operated for a brief period between 2006 and 2008 and is currently dormant. It is accessible by winter roads with the airstrip providing year-round air access while it was in operation.

While the re-opening of the mine remains unknown, the airstrip represents a key asset to the GBRP since it is located adjacent to the proposed alignment of the road to Grays Bay and provides the project with year-round access by air for workers and supplies.

The study/project area for the aerodrome is outlined in the **Figure 1** below.



Figure 1: Jericho Aerodrome

2.1.3 Codes, Standards & Design Guidelines

The Jericho Aerodrome will be registered and subject to Canadian Aviation Regulations (CARs) Subpart 301 requiring operators to meet basic safety criteria. The design standards published by Transport Canada in TP312 5th Edition are required for aerodrome certification. While these are not mandatory for the aerodrome and air strips, they are still of value in airport planning and are used as a guideline. A full listing of codes and standards is given in the following sections.

2.1.3.1 Aerodrome Facilities

- Transport Canada's Aerodrome Standards and Recommended Practices (TP 312 5th Edition).
- International Civil Aviation Organization Annex 14, Volume I Aerodrome Design and Operations, Ninth Edition
- International Civil Aviation Organization Aerodrome Design Manual, Doc 9157 Part 1, Runways, Fourth Edition.

2.1.3.2 Safety

- Canada Labour Code.
- Canadian Occupational Health and Safety Regulations.
- Nunavut Mine and Safety Act.

2.1.3.3 Materials

Materials to be used in the design shall conform to applicable Canadian / North American standards as listed below. This list is not intended to be exhaustive and additional or alternate specific material standards may be identified in the design drawings.

- Canadian Standards Association (CSA)
- American Concrete Institute (ACI)
- American Society for Testing and Materials (ASTM)
- American Petroleum Institute (API)
- American National Standards Institute (ANSI)

2.2 Reference Documents

Reference documents were not available for the concept design memo. However, the design should obtain Nav Canada publications, such as the Canada Flight Supplement and Canada Air Pilot, that published pilot information for Jericho Aerodrome when the aerodrome was operational between 2006 and 2008.

Other sources of information include the following:

- Canadian Hydrographic Service raster and vector charts
- Government of Nunavut's Municipal Infrastructure Capital Standards and Criteria Manual (2012)
- IPCC Climate Change Assessment Report and applicable guidelines

2.3 Geotechnical & Seismic Design

The design shall account for Arctic geotechnical conditions and potential permafrost-related risks. The infrastructure shall minimize long-term degradation associated with:

- Thaw settlement
- Thermal instability
- Frost heave
- Moisture migration
- Differential movement
- Geotechnical investigation to confirm CBR, frost susceptibility, and permafrost conditions

Geotechnical design to be completed in general accordance with:

- Canadian Geotechnical Society. 2023. Canadian Foundation Engineering Manual. 5th ed. Canadian Geotechnical Society, Richmond, BC.
- Canadian Standards Association. 2010. Technical Guide: Infrastructure in Permafrost—A Guideline for Climate Change Adaptation. Canadian Standards Association, Mississauga, ON.
- Canadian Commission on Building and Fire Codes. 2022. National Building Code of Canada 2020. 15th ed. National Research Council of Canada, Ottawa, ON.
- Transport Canada. 2016. Advisory Circular AC 302-011, Airport Pavement Bearing Strength Reporting. Issue 02. Transport Canada, Ottawa, ON.
- Transport Canada. 2017. Advisory Circular AC 300-004, Unpaved Runway Surfaces. Issue 04. Transport Canada, Ottawa, ON.

2.4 Functional Requirements

This section addresses the functional and performance requirements of the aerodrome.

2.4.1 General

The aerodrome shall support the following operational characteristics:

- Year-round operations
- Daytime operations only
- Visual meteorological conditions
- Uncontrolled
- Passenger and cargo operations
- Medivac access capability
- Private aircraft including those in support of mining operations

2.4.2 Seasonal Availability

The infrastructure shall support safe and reliable operations throughout all seasons and maximize operational availability and minimize closures related to:

- Snow accumulation
- Ice formation

- Drainage deficiencies
- Surface deterioration
- Frost heave
- Differential settlement
- Extreme weather conditions

2.4.3 Level of Service

A non-instrument level of service is required for the runway at Jericho Aerodrome.

2.4.3.1 Critical Aircraft and Aircraft Group Number (AGN)

The Jericho Aerodrome will maintain the gravel surface and existing estimated length of 1,401m/4600ft to serve AGN IIIA aircraft listed in *Table 1*.

Table 1: Aircraft Fleet Mix

Fixed Wing Aircraft	**Transport Canada Aircraft Group Number (AGN) Runway Environment**	**Purpose**
Beechcraft King Air 200 & 350	II	Medivac
Dornier 228 & 328	II	Personnel
Saab 340	II	Personnel
Dash 6 Twin Otter	II	Personnel
ATR 42 & 72	IIIA	Personnel and Cargo
Dash 7	IIIA	Personnel and Cargo
Dash 8-300	IIIA	Personnel
Dash 8-400	IIIA	Personnel

2.5 Assumptions

The following list outlines the key assumptions used during the concept design for Jericho Aerodrome:

- The existing runway provides sufficient length and width for the operation of large turbo-prop aircraft such as the Q400 (minimum width of 45m) and the ATR72.
- An existing apron is located at the south end of the runway with a short taxiway.
- The existing access road can be realigned to avoid OLS penetrations without significant vertical grade breaks.
- Construction of the road realignment would not affect operations on the runway

2.6 Constraints, Risks, and Interdependencies

2.6.1 Future Expansion Considerations

Should Jericho Aerodrome require future expansion, the realignment of the roadway should account for the new runway extent and resulting OLS clearance requirements.

Any future expansion considerations are unknown at the time of this report.

2.7 Reference Design

The following sections outline how the current design has been developed, including summary of various analyses completed.

2.7.1 Runway Orientation

The Jericho Aerodrome will maintain its existing runway orientation of 10° – 190°.

2.7.2 Runway Design Criteria

The key runway design criteria are summarized in *Table 2*.

Table 2: Key Runway Design Criteria – Jericho Gravel Runway (Non-instrument AGN IIIA)

Runway		
Length	1,401m/4600ft	N/A
Width	45 m	TP312 –3.1.1.1
Longitudinal slope	2.0%	TP312 – 3.1.2.1
Transverse slope	2.5%	TP312 – 3.1.2.6
Runway Strip		
Length	60 m	TP312 – 3.1.4.3
Width	80 m (40 m on either side of C/L)	TP312 – 3.1.4.4
Longitudinal slope	+2.0% ~ -2.0%	TP312 – 3.1.5.6
Transverse slope	0 to minus 3.0%	TP312 – 3.1.5.7
Runway Safety Area		
Width	80 m (40 m on either side of C/L)	TP312 – 3.1.5.2
Transverse slope	0 to minus 3.0%	TP312 – 3.1.5.7
Ditch location	Outside RSA	TP312 – 3.1.5.9

2.7.3 Runway Elevation and Slope

No changes are expected to the runway elevation and slope at Jericho Aerodrome.

2.7.4 Obstacle Limitation Surface Design

For key criteria for the obstacle limitation surfaces for Jericho Aerodrome see *Table 3*.

Table 3: Key Criteria – Jericho Obstacle Limitation Surfaces (Non-instrument AGN IIIA)

Runway		**North / South Approach**
Approach Surface	Length of Inner Edge (each side of the C/L)	80m (40m)
	Distance from Threshold	60m
	Divergence	10%
	Total Length	2,500m
	First Section Length	2,500m
	First Section Slope	4.0%
	Second Section Length	-
	Second Section Slope	-
Transitional Surface	First Segment Slope	20%
	Second Segment Slope	-
Take-off Surface	Length of Inner Edge (each side of the C/L)	80m (40m)
	Divergence	10%
	Length	4,000m
	Slope	2.5%

Through the design of the OLS, it was discovered that the existing access road alignment is within the runway strip and therefore requires relocation in order to comply with an obstacle-clear runway strip as per TP312 standards. A 4.3m clearance over the crown of any road is also required, represented in yellow in **Figure 2** below.

The concept design revealed an approximate 60m overlap between the existing roadway alignment and the runway strip (illustrated in **Figure 2**).

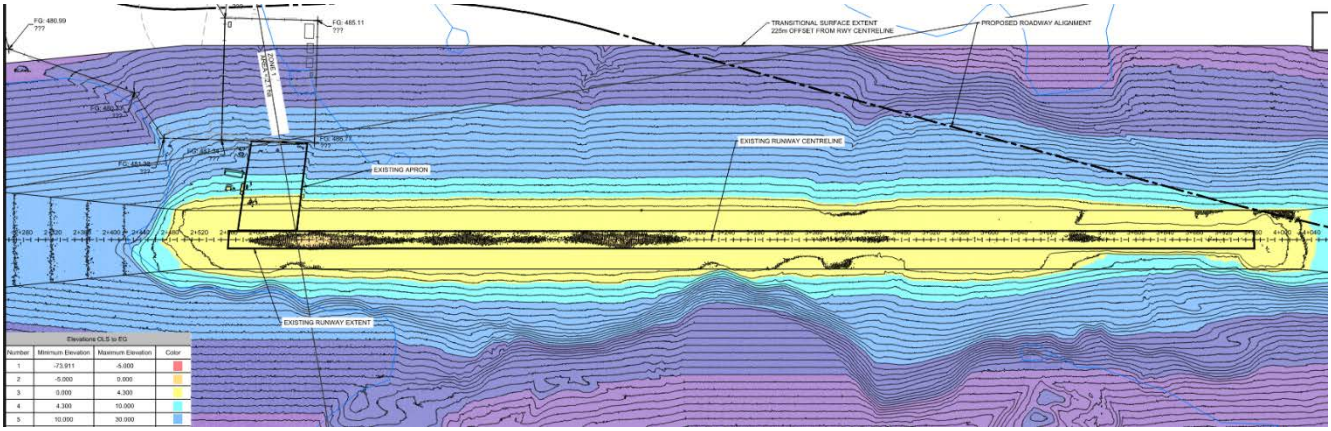


Figure 2: Jericho Aerodrome runway relative to the existing roadway alignment.

2.7.5 Design Life

The existing design life for the Jericho aerodrome remains unknown at the time of this report.

2.7.6 Durability

There is currently no information regarding available materials for construction of the aerodrome civil works; this will be defined alongside design development.

Granular materials for the roadway and airfield surfaces shall meet Transport Canada guidelines and pavement design specifications. Local borrow source investigation to be conducted as part of geotechnical program prior to use, including aggregate quality testing (LA abrasion, soundness, gradation).

2.8 Quantity Approximations

No quantity approximations were undertaken during the concept design for Jericho aerodrome. It is expected that any cut/fill quantities for the realigned roadway would be minimal.

2.9 Next Steps for Design Development

Next steps for design development include the following:

- A site visit to inspect the condition of the gravel surfaces and check for erosion;
- Consultation with potential air carriers to identify the aircraft mix and level of service expectations (i.e., non-instrument versus non-precision);
- Consultation with Nunavut and the diamond mine sector to assess potential reactivation of the mine and the aerodrome;
- Public consultation in compliance with CARS 307 which requires aerodrome proponents to consult with local land authorities prior to constructing an aerodrome. Proof of consultation is required for registered aerodromes.
- A detailed survey of the airfield surfaces and objects and terrain within the approach and take-off paths to 4,000m as measured from the end of the runway. The survey should also include the area below the transitional OLS that extends approximately 265m as measured from the runway centreline.
- Geotechnical investigation.

3 Jericho Landside Infrastructure

3.1 Facilities

The main facilities for the Jericho Station landside infrastructure development include:

3.2 Laydown Areas

- Laydown Area A - Laydown and material handling area located adjacent to the existing airstrip apron. This area is anticipated to be approximately 200,000 sq. m. in size, and include a 20,000 sq. m. area with the site buildings, fuel storage and maintenance vehicle parking.
- Laydown Area B – Large laydown and long-term storage area located up south of the runway. This area is anticipated to be at least 125,000 sq. m. in size.



Figure 3: Jericho Laydown Areas

3.3 Accommodation and Auxiliary Buildings

- Permanent Accommodations for 7 to 12 shall be provided
- Emergency Accommodations for up to 40 in heated, insulated high density bunk buildings
- Separate Storage, Maintenance and Operations Buildings



Figure 4: Jericho Buildings

3.4 Power Generation

- On-site power generation is required. Power generation is to be generated by minimum 2 separate similar size diesel units, one continuous to meet 100% of routine demand and one standby to meet occasional peaks and emergency needs due to disruption. A 10 kw alternative energy system (assumed to be solar) shall be part of the overall generation to offset diesel consumption.
- Diesel generators are to be to be containerized and skid mounted.
- The diesel engines shall be designed and rated to operate on either Low Sulphur Diesel Light (LSDL) P50 Arctic Grade light distillate fuel conforming to CAN/CGSB-3.6-2000 or CAN/CGSB-3.517 2000 Type A.

3.5 Fuel Facilities

- Provide storage and dispensing facilities for arctic grade LSDL fuel and for Jet A1 aviation fuel.
    - 2 – 90,000 litre arctic grade LSDL fuel
    - 2 – 25, 000 litre Jet A1
    - All horizontal tanks to be double walled meeting CAN/ULC-S601
    - Barrel Storage for gasoline - 100 Barrels
- Provide provisions in design for future fuel systems, which may include up to 5M litres of arctic grade LSDL fuel.

3.6 Water Facilities

- Potable Water storage for 12 individuals, 500 lpd, x 14 days. Minimum capacity of 84,000 litres.
- Water Transportation from Port Site to be by Trucked Service, twice weekly.
- Fire Suppression Water. Fire water storage of 120,000 litres with required fire pumps.

3.7 Waste Facilities

- Wastewater storage for 12 individuals, 500 lpd, x 14 days. Wastewater storage shall be at a minimum 110% of the potable water storage.
  - Effluent Disposal to Port Site by Trucked Services, twice weekly
  - Solid Waste Storage & Transfer Facilities shall be provided.

3.8 Communications

Key Components for the Jericho Site Communications Network shall include:

- Connectivity Backhaul (External):
- Satellite (Low Earth Orbit): Starlink business satellite service as primary with a backup secondary provider.
- On-Site Network Backbone (Internal):
- Modular UPS
- Batteries
- Diesel generator backup

WEST KITIKMEOT RESOURCES CORP

Grays Bay Road and Port Project Reference Concept Design Memo – Geotechnical

29 September 2026

NUNAMI
STANTEC LIMITED

Revision	Date	Description
0 (First Draft)	September 23, 2026	• Initial Draft of Reference Concept Design Memo – Geotechnical
1 (Second Draft)		•
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1 General

1.1 Project Summary

The proposed Grays Bay Road and Port Project (GBRP or Project) is located within the Kitikmeot region of Nunavut and includes the construction and operation of an all-weather road extending from the Jericho Mine site northward to Grays Bay, where a deep-water seaport would be constructed and operated. The Project is comprised of a deep-water wharf, small craft harbour, port landside infrastructure, aerodrome, and facilities at the Jericho Station (site of the former Jericho Mine).

The Project will establish shared infrastructure for many potential users, including federal and territorial governments, Inuit communities, resource companies, and defense agencies.

1.2 Project Components

The following list describes the primary project components proposed for the development of the Grays Bay project:

- **Port (Marine Facilities) –** Construction of new marine based infrastructure, including two (2) large vessel wharves, tug/medium vessel wharf, barge landing area, marine navigational aids, and a small craft harbour including boat launch ramp
- **Port (Landside Infrastructure) –** Construction of new landside infrastructure, including permanent accommodations, and other buildings; all-season gravel access roadways; public use area; bulk fuel storage facility, fuel pipelines, and refueling facilities; water intakes, desalination, and treatment plants; utilities, waste management facilities, laydown, and storage areas (temporary and permanent), renewable power generation, and diesel generators
- **Aerodrome –** Construction of a new facility, including an approximately 1,800 m airstrip and taxiway, apron, all-season access road, vehicle parking, and associated infrastructure, east of the Grays Bay Port.
- **All Weather Roadway –** Construction of new infrastructure, including a 230 km all-season, controlled access road connecting the Grays Bay Port to Jericho Station. Access to the Grays Bay Road will be gated and on Inuit Owned Land and includes area for construction and final siting of multiple watercourse crossings (bridges and culverts), quarries, mobile construction camps, and staging and storage areas.
- **Jericho Station –** Construction of new facility components and upgrading of existing infrastructure at Jericho Station (within the area of the former Jericho mine site) including an airstrip and taxiway, access road and parking, staging and storage areas, permanent accommodations and associated infrastructure, and refueling facilities.

2 Reference Geotechnical Documents

The following documents have been previously prepared for this project site and have been used as a reference during the preparation of this memorandum:

- Historical BGC Reports:
  - BGC Engineering Inc. (2006). 2005 Dock Site Investigations Grays Bay, NU. High Lake Project. May 29, 2006.
  - BGC Engineering Inc. (2006). 2004-2005 Geotechnical Investigations Report. High Lake Project. October 23, 2006.
  - BGC Engineering Inc. (2012). Draft Geotechnical Evaluation, Grays Bay Port, Nunavut. Izok Corridor Project. September 12, 2012.
  - BGC Engineering Inc. (2013). Izok Corridor Project – Izok Road. Geotechnical Design Criteria. Izok Corridor Project. April 19, 2013.
- Nunami Stantec and Tetra Tech 2024/2025 Basis of Design Reports:
  - Nunami Stantec and Tetra Tech (2024). Grays Bay Road and Port Project Basis of Design: Jericho Infrastructure. Grays Bay Road and Port Project. August 26, 2024.
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- Nunami Stantec and Tetra Tech 2025 10% Concept Design Plans and documents:
  - Nunami Stantec (2025). 10% Conceptual Design: Deep-Water Wharf Area and Small Craft Harbour. Grays Bay Road and Port Project. Last reviewed February 5, 2025.
  - Nunami Stantec (2025). 10% Conceptual Design: Port Landside. Grays Bay Road and Port Project. February 5, 2025.
  - Nunami Stantec (2025). 10% Conceptual Design: Port Aerodrome Airfield. Grays Bay Road and Port Project. Last reviewed February 5, 2025.
  - Nunami Stantec (2025). 10% Conceptual Design: Road General Arrangement Plan. Grays Bay Road and Port Project. Last reviewed February 5, 2025.
  - Nunami Stantec (2025). 10% Conceptual Design: Roadway Structures. Grays Bay Road and Port Project. Last reviewed February 5, 2025.

    - Nunami Stantec (2025). 10% Conceptual Design: Jericho Station. Grays Bay Road and Port Project. Last reviewed February 5, 2025.
    - Nunami Stantec (2025). Grays Bay Road and Port – Wharf Structure Type Selection – DRAFT. Grays Bay Road and Port Project. August 13, 2025.
    - Tetra Tech (2025). GBRP: Design Considerations Associated with Updating the MMG/Fluor Base Design on Construction and Operations. Grays Bay Road and Port Project. September 2, 2025.
- Nunami Stantec Project Soils, Terrain and Permafrost Baseline Report and Appendices:
    - Nunami Stantec (2025). Grays Bay Road and Port Project Soils, Terrain and Permafrost Baseline Report. Grays Bay Road and Port Project. June 2025.
    - Nunami Stantec (2025). Grays Bay Road and Port Project Soils, Terrain and Permafrost Baseline Report. Appendix A: Soils and Terrain Assessment Areas. March 3, 2025.
    - Nunami Stantec (2025). Grays Bay Road and Port Project Soils, Terrain and Permafrost Baseline Report. Appendix A: Regional Bedrock Geology. February 24, 2025.
    - Nunami Stantec (2025). Grays Bay Road and Port Project Soils, Terrain and Permafrost Baseline Report. Appendix B: Ground Temperature Monitoring Sites and Boreholes. March 18, 2025.
    - Nunami Stantec (2025). Grays Bay Road and Port Project Soils, Terrain and Permafrost Baseline Report. Appendix D: RAA Surficial Geology. March 18, 2025.
    - Nunami Stantec (2025). Grays Bay Road and Port Project Soils, Terrain and Permafrost Baseline Report. Appendix E: LAA Terrain and Soil Mapping. March 18, 2025.
- Tetra Tech 2025 Geotechnical Investigation Report and Geotechnical Design Recommendation Memos:
    - Tetra Tech (2025). 2025 Geotechnical Investigation Drilling Program Geotechnical Data Report. Grays Bay Road and Port Project. July 21, 2025.
    - Tetra Tech (2025). Grays Bay Road and Port (GBRP) Aerodrome – Preliminary Geotechnical Design Recommendations. Grays Bay Road and Port Project. October 30, 2025.
    - Tetra Tech (2025). Grays Bay Road and Port (GBRP) Deep-Water Wharf – Preliminary Geotechnical Design Recommendations. Grays Bay Road and Port Project. October 30, 2025.
    - Tetra Tech (2025). Grays Bay Road and Port (GBRP) Port Landside Infrastructure – Preliminary Geotechnical Design Recommendations. Grays Bay Road and Port Project. October 30, 2025.
    - Tetra Tech (2025). Grays Bay Road and Port (GBRP) Small Craft Harbour – Preliminary Geotechnical Design Recommendations. Grays Bay Road and Port Project. October 30, 2025.

3 Site Conditions

The available investigations indicate highly variable geotechnical conditions across the Project area. Surficial materials across the Project area are highly variable and consist predominantly of exposed bedrock, glacial till, glaciofluvial deposits, and glaciomarine to marine sediments. Bedrock across the Project area consists primarily of granitic and granodioritic intrusive rocks, gneiss, and volcanic bedrock, with localized occurrences of diorite and mafic intrusive rocks. The overall Project area is located within the Kitikmeot region of Nunavut, extending from the Jericho Station northward to Grays Bay within a region of continuous permafrost (defined as 90 to 100% of the land area underlain by permafrost).

3.1 Port (Marine Facilities)

3.1.1 Deep-Water Wharf

The 2006 BGC Engineering Inc. (BGC- geotechnical investigation consisted of 11 offshore boreholes (DS-BGC06-01 to DS-BGC06-12, excluding DS-BGC06-10) and the 2025 Tetra Tech geotechnical investigation consisted of two (2) offshore boreholes (WRF-BH-01 and WRF-BH-04) completed at the proposed wharf location. Boreholes were advanced through approximately 1.4 m to 2.1 m of sea ice and encountered water depths ranging from approximately 13 m to 18 m. Subsurface conditions generally consisted of a thin veneer of marine sediments, typically less than 3 m thick, overlying bedrock. The underlying bedrock consisted predominantly of fresh to slightly weathered granodiorite and diorite classified as very strong to extremely strong. Local basalt and granite dikes were also encountered during the 2006 investigation. Overall, both investigations identified competent bedrock suitable for supporting heavy marine infrastructure.

3.1.2 Small Craft Harbour

The 2025 Tetra Tech geotechnical investigation was the first geotechnical assessment carried out at the Small Craft Harbour (SCH) site and consisted of four (4) offshore boreholes. Boreholes were advanced through approximately 1.5 m to 1.7 m of sea ice. Measured water depths increased progressively from nearshore to offshore, reaching more than 27 m at the deepest location. Subsurface conditions generally consisted of soft to very soft, fully saturated silty clay deposits of low to medium plasticity. In the nearshore area, mafic volcanic bedrock was encountered beneath the marine sediments in two (2) boreholes, whereas the offshore boreholes terminated within thick clay deposits, indicating substantially greater sediment thickness across much of the proposed harbour basin.

3.2 Port (Landside Facilities)

The 2004 BGC geotechnical investigation consisted of two (2) boreholes (BGC04-04 and BGC04-05) completed at the proposed dock site in Grays Bay. Subsurface conditions generally consisted of organic deposits overlying glaciomarine clay, interbedded with gravel and silt and

visible stratified ice. Bedrock consisted of frost-affected dacitic and granite to intact dacite and mafic volcanic rock. The bedrock was moderately strong at depth.

The proposed dock site in Grays Bay is located within the zone of continuous permafrost. Although characterization of the frozen overburden was limited by the use of warm-water drilling methods, the investigation identified frozen glaciomarine sediments overlying competent bedrock. Ground temperature monitoring conducted at borehole BGC04-04 indicated a mean ground temperature of approximately -5.1°C at a depth of 10 m. The active layer thickness is inferred to be 1.5 m and may be deeper (exceeding 3 m depth) in areas with bedrock outcrop or dry beach gravels. The marine-derived soils were interpreted to be potentially saline and thaw-sensitive.

3.3 Aerodrome

The 2025 Tetra Tech geotechnical investigation was the first geotechnical assessment carried out at the aerodrome site and consisted of two (2) boreholes (AER-BH-02 and AER-BH-04). Subsurface conditions generally consisted of a thin organic layer overlying sand of variable thicknesses, underlain by clayey silts and silty clays extending to the termination depths of the boreholes. The sand deposits contained abundant visible ground ice, including ice seams and a massive ice lens. The underlying fine-grained soils were classified as low-plasticity silts and clays.

The aerodrome site is located within the zone of continuous permafrost. Ground temperature measurements indicated temperatures ranging from approximately -5.9°C to -7.1°C at depths of 9.5 m to 13 m below ground surface, respectively, with an estimated active layer thickness of approximately 1 m to 2 m. Porewater salinities indicate the presence of saline permafrost, which may be more susceptible to thaw and creep deformation under sustained loading. The investigation findings confirm that the aerodrome site is underlain by thaw-sensitive, frost-susceptible soils that, without appropriate geotechnical design, could undergo settlement, heave, and long-term degradation, compromising embankment stability and performance.

3.4 All-Weather Roadway

The 2004 and 2005 geotechnical and hydrogeological investigation programs consisted of 15 geotechnical boreholes and four (4) long-term permafrost monitoring boreholes located at the Grays Bay dock site, the High Lake property, and the Ulu Mine site. Although these investigation areas were generally situated within the broader corridor of the proposed all-weather road, no boreholes were advanced directly along the roadway alignment or at proposed major bridge and culvert crossings. The boreholes include eight (8) shallow thermistors and four (4) deep thermistors. The boreholes were drilled with summer temperature (warm) water as the drilling fluid, which disturbed the frozen overburden samples, resulting in poor core recovery and very limited observations of ground ice conditions.

While the all-weather road is located within the region of continuous permafrost, the available investigations do not provide sufficient subsurface information to characterize local geotechnical or permafrost conditions along the all-weather road or at the proposed major bridge and culvert

crossing locations. Additional geotechnical investigations would be required to characterize geotechnical and permafrost conditions along the all-weather roadway.

3.5 Jericho Station

No boreholes were identified at the Jericho Mine site within the historical geotechnical investigations reviewed as part of this assessment. Consequently, site-specific information regarding subsurface conditions, bedrock characteristics, ground ice content, and permafrost conditions at the Jericho site are limited.

While the Jericho site is located within the region of continuous permafrost, the available investigations do not provide sufficient subsurface information to characterize local geotechnical or permafrost conditions. The available historical investigations were focused on the Grays Bay dock site, High Lake property, and Ulu Mine site, therefore, additional geotechnical investigations or historical mine records would be required to characterize geotechnical and permafrost conditions at the Jericho site.

4 Limitations and Gap Analysis

4.1 Port (Marine Facilities)

4.1.1 Deep Water Wharf

- The 2006 BGC geotechnical investigation consisted of 11 offshore boreholes (DS-BGC06-01 to DS-BGC06-12, excluding DS-BGC06-10).
- The 2025 Tetra Tech geotechnical investigation originally planned for a total of 14 boreholes, which included five (5) boreholes at the wharf site. Due to weather delays, the field program was adjusted during execution. In the end, eight (8) boreholes were completed, which include two (2) offshore boreholes at the wharf site (WRF-BH-01 and WRF-BH-04).
- Offshore borehole logs and factual data for investigations prior to 2025 are currently missing or not provided through historical documents.
- Available ground temperature data is from 2006, however, temperature monitoring cables were not installed in any of the 2025 wharf boreholes.

4.1.2 Small Craft Harbour

- No previous offshore geotechnical studies had been conducted at the SCH site prior to the 2025 program. The 2025 investigation information represents the first assessment of subsurface conditions in this area.
- The 2025 Tetra Tech geotechnical investigation originally planned for a total of 14 boreholes, which included five (5) boreholes at the small craft harbour site. Due to weather delays, the field program was adjusted during execution. In the end, eight (8) boreholes were completed, which include four (4) offshore boreholes at the SCH site.
- Temperature monitoring cables were not installed in any of the 2025 SCH boreholes.

- Quarry source for SCH breakwater armour rock has not been identified yet.

4.2 Port (Landside Facilities)

- The 2004 BGC geotechnical investigations consisted of two (2) boreholes (BGC04-04 and BGC04-05) drilled near the port. The boreholes were drilled with summer temperature (warm) water as the drilling fluid, which disturbed the frozen overburden samples, resulting in poor core recovery and very limited observations of ground ice conditions.
- One (1) thermistor was installed by BGC in borehole BGC04-04.
- At MMG Resources Inc.'s (MMG) insistence, no further boreholes were drilled in the area in 2012. In July 2012, BGC conducted a reconnaissance of the port area to observe ground conditions. The 2012 BGC report was based on two (2) boreholes drilled in 2004 (BGC04-04 and BGC04-05), a field reconnaissance completed in 2012, and the general arrangement drawings prepared by Fluor Canada Ltd. that same year (dated August 29, 2012).
- In spring 2025, planned drilling coordinated by Tetra Tech at the landside tank farm location could not be completed due to weather, leaving subsurface conditions there unconfirmed.
- Neither the 2004 BGC program nor the 2025 Tetra Tech program drilled at the tank farm site, and the 2004 drilling did not provide information on the ground ice conditions in the overburden soils; thus, the 2012 BGC evaluation remains the only basis for design for the port landside infrastructure.

4.3 Aerodrome

- The 2025 Tetra Tech geotechnical investigation originally planned for a total of 14 boreholes, which include three (3) at the aerodrome site. However, due to weather delays, the field program was adjusted during execution. In the end, eight (8) boreholes were completed, which include two (2) at the aerodrome site.
- No previous geotechnical studies had been conducted at the aerodrome site prior to the 2025 program. The 2025 investigation information represents the first assessment of subsurface conditions in this area.
- The 2025 findings confirm that the aerodrome site is underlain by thaw-sensitive, frost-susceptible soils that, without appropriate geotechnical design, could undergo settlement, heave, and long-term degradation, compromising embankment stability and performance.
- A quarry source for the Aerodrome site has not been identified yet.

4.4 All Weather Roadway

- The 2004 and 2005 investigations consisted of a total of 15 geotechnical boreholes and four (4) long-term permafrost monitoring boreholes located at the Grays Bay dock site, the High Lake property, and the Ulu Mine site.
- The boreholes include eight (8) shallow thermistors and four (4) deep thermistors installed in 2004.

- No boreholes were advanced directly along the roadway alignment or at proposed major bridge and culvert crossings.
- No boreholes were completed for the 2013 BGC Izok Road Design Criteria Report. The design was developed using surficial observations, terrain mapping, LiDAR, air photos, and helicopter reconnaissance.
- The Morse et al. (2023) study compiled data from 11 historical geotechnical borehole reports. Summarized borehole data is available via an Excel spreadsheet but does not contain the original borehole records.

4.5 Jericho Station

- No boreholes were completed near the Jericho site during the 2004 and 2005 BGC investigation.
- No boreholes were completed near the Jericho site for the 2013 BGC Izok Road Design Criteria Report. The design was developed using surficial observations, terrain mapping, LiDAR, air photos, and helicopter reconnaissance.
- The Morse et al. (2023) study compiled data from 11 historical geotechnical borehole reports. Summarized borehole data is available via an Excel spreadsheet but does not contain the original borehole records.

5 Next Steps for Design Development

The below sections summarize the minimum additional next steps based on the current understanding of the project. Depending on the conditions encountered during the execution of this work, additional geotechnical information may be deemed necessary.

5.1 Port (Marine Facilities)

5.1.1 Deep Water Wharf

- Bathymetric and geophysical surveys: Undertake detailed mapping of the wharf footprint to confirm rock slopes, seabed morphology, and sediment distribution.
- Foundation design development: Evaluate and compare foundation alternatives.
- Prepare preliminary design drawings and reference technical specifications to guide a Design-Build tender process.
- Geotechnical acceptance criteria: Establish measurable requirements for construction, such as allowable pile or caisson bearing capacities, minimum socket depths, grout bond strength, etc.

5.1.2 Small Craft Harbour

- Bathymetric and sub-bottom surveys: Complete a detailed survey program to define basin geometry, dredge limits, and sediment thickness, ensuring alignment of elevations with Chart Datum.

- Geotechnical modelling: Assess slope stability and consolidation behaviour of the soft clay profile under potential staged dredging or excavation scenarios. This analysis will help determine the practicability of basin deepening and guide excavation sequencing if pursued.
- Foundation design for marine appurtenances: Develop detailed foundation designs for seasonal floats, anchors, and the boat launch ramp.
- Ice and freeze–thaw durability considerations: Evaluate the performance of seasonal mooring systems, ramp structures, and protective measures under seasonal freeze–thaw conditions and lateral ice shove.
- Protective works evaluation: If coastal protection or a breakwater becomes part of the scope, then advance design options.
- Investigate potential quarry source for small craft harbour breakwater armour rock, including potential rock suitability, quarry yield and rock size, collecting rock sample for hardness, density and chemical analysis.

5.2 Port (Landside Infrastructure)

- Additional drilling and sampling at facility sites (fuel tank farm, concentrate storage pads, buildings). Complete additional drillholes (using chilled brine and/or test pits in the footprints of all critical structures to assess ground ice content, pore water salinity of the marine silts and clays, and rock mass nature.
- Permafrost thermal modeling to project active layer deepening under climate change scenarios.
- Settlement analyses for embankment sections over thaw-sensitive terrain.
- Aggregate testing of local quarry rock, including crushing trials and durability tests and concrete mix designs and compatibility tests.
- Determine aggregate testing requirements for acceptable ARD/ML concentrations.
- Conduct thermal analyses for thermal protection of foundations.

5.3 Aerodrome

- One (1) full year of ground temperature monitoring is recommended to support development of a thermal model, which will inform embankment thickness and geometry, insulation requirements, and assess thaw settlement and long-term creep considerations.
- Additional boreholes should be advanced along the proposed runway alignment and apron.
- Quarry source investigations should be advanced to confirm aggregate quality for embankment construction and surface courses. Preliminary specifications for material gradation and compaction should be prepared for tender documents.
- Reference designs for embankments, surface structures, and pile foundations should be developed to guide contractor proposals during the Design-Build procurement process.

5.4 All Weather Roadway

- Drilling and sampling at the major crossing locations and at regular intervals along the road alignment to characterize subsurface conditions, permafrost, groundwater, and foundation requirements at major water crossings along the alignment.
- Completion of topographic and bathymetric surveys at major crossings. Requires fieldwork in the summer. In stream works should be completed outside of restricted activity periods

5.5 Jericho Station

- Additional drilling and sampling at facility sites. Complete additional drillholes (using chilled brine and/or test pits in the footprints of all critical structures to assess ground ice content, pore water salinity of the marine silts and clays, and rock mass nature).
- Permafrost thermal modeling to project active layer deepening under climate change scenarios.
- Settlement analyses for embankment sections over thaw-sensitive terrain.
- Aggregate testing of local quarry rock, including crushing trials and durability tests and concrete mix designs and compatibility tests.
- Determine aggregate testing requirements for acceptable ARD/ML concentrations.
- Conduct thermal analyses for thermal protection of foundations.

6 Basis of Information and Data Limitations

This memorandum summarizes geotechnical information obtained from available reports and investigations completed by third parties. Nunami Stantec has not independently verified the accuracy, completeness, or conclusions of these data sources. Nunami Stantec accepts no responsibility, liability, or risk associated with the use of, or reliance upon, third-party information summarized herein. The information presented herein is provided solely as a summary of available background information and should not be construed as an independent geotechnical assessment or relied upon for detailed design without further investigation and evaluation. Any interpretations, conclusions, or recommendations contained within the original source documents remain the responsibility of their respective authors.

NUNAMI
STANTEC LIMITED

Memo

To:	Steve Ash, Engineering Manager	From:	Nadia Van Der Vinne
	West Kitikmeot Resources Corp		James Bigelow
	Click or tap here to enter text.		Calgary
Project/File:	Grays Bay Road and Port Project	Date:	September 29, 2026

Reference: Roadway Crossing Hydrotechnical Analysis for Grays Bay Road and Port Project

1 Introduction

This report is prepared by Nunami Stantec Limited (Nunami) to summarize the findings of the hydrotechnical analysis completed in 2025 for the Grays Bay Road and Port Project (GBRP or Project). The hydrotechnical analysis was intended to provide the documentation for the hydrotechnical component of the roadway crossing structure engineering scope of the Project. The overall Project is progressing through the regulatory requirements of the Nunavut Impact Review Board (NIRB), with engineering continuing to be advanced to a stage where the Project is ready to proceed through licensing by regulatory authorities and a study of feasibility.

The Project includes the design of an approximately 230 km long road from the area of the former Jericho Mine site to the proposed Grays Bay Port site on the Coronation Gulf in northwest Nunavut.

2 Project Background

This hydrotechnical analysis was completed to support the conceptual design of the Grays Bay Road. This conceptual alignment includes 58 watercourse crossings, with 18 of those considered major road crossings, and the other 40 are minor crossings.

As part of the Flood Hydrology of Streams Along the All-Season Road Corridor and Hydraulic Design of Crossings (NHC 2013) the crossings' drainage areas along the Grays Bay Road alignment were delineated (see Data Room for reference). In 2025, as a part of their hydrotechnical scope Stantec re-assessed the delineation of the drainage areas of the 58 crossings using the publicly available High Resolution Digital Elevation Model (Government of Canada 2025). The results of both the 2013 and 2025 drainage area assessments are shown below in *Table 1*.

Table 1. Drainage Areas from NHC 2013 and Stantec 2025

Crossing ID	NHC Drainage Areas (km2)	Stantec Drainage Areas (km2)	Crossing ID	NHC Drainage Areas (km2)	Stantec Drainage Areas (km2)
62	654	778	**85**	5.1	4.9
63	203	205	**86**	3.6	3.7

Crossing ID	NHC Drainage Areas (km2)	Stantec Drainage Areas (km2)	Crossing ID	NHC Drainage Areas (km2)	Stantec Drainage Areas (km2)
68	302	301	**88A**	3	0.1
71	75	77.1	**90**	16.4	17.5
72	26.9	27.3	**93**	3	0.7
87	17.5	17.3	**95B**	8.2	7.9
88	10.1	10.6	**98**	3.3	3.2
94	4513	4458	**99**	12.6	12.5
104	786	784.9	**101**	22	20
105	140	140	**103**	1.6	1.7
115	1561	1562	**106A**	1.4	1.8
123	17.4	17.1	**109**	9.9	9.8
127A	132	131.8	**111A**	8.7	8.6
D44	452	451.5	**113A**	0.2	0.2
D42	85	86.6	**117A**	1.7	1.6
DM2	792	792	**118**	0.6	0.6
D2	16.1	16.9	**133I**	3.7	3.8
1002	160	159	**133D1**	24.7	49.4
D115	2.2	2.2	**133D2**	24.7	
67	5.1	5	**133D3**	12.4	
69	7.6	7.6	**133D4**	12.4	
70	3.9	3.8	**133B**	7.6	6.8
74	5.9	5.7	**D43A**	2.5	2.2
76	5.5	5.7	**D41**	2.5	2.2
79	2.9	2.8	**D20**	4.9	4.2
81A	1.7	1.6	**D19**	1.1	1
81B	1.7	1.6	**D15**	23.9	24.6
81C	3.6	3.7	**D14**	18.7	18.3
81D	3.6	3.7	**1001**	2.1	2.2

Both assessments generally agree with some larger discrepancies in area size at crossings 62, 133D1-D4, and 93.

3 Precipitation and Climate Data

Data from both the Ulu and Kugluktuk climate stations in Nunavut were reviewed to develop an understanding of the historic precipitation and climate data. These stations were determined to be the closest available information to the site due to their proximity to the proposed roadway. The Kugluktuk Environment and Climate Change Canada (ECCC) climate station is located approximately 100 km northwest of the project site and is the closest Government of Canada station to the project site, and long-term climate normals are available for this station. *Table 2* shows the normal precipitation and temperature data at the Kugluktuk station data from 1991 to 2020.

Table 2. Kugluktuk, NU Climate Station Normal Precipitation and Temperature Data from 1991-2020

Period	Rainfall (mm)	Snowfall (cm)	Average Daily Temperature (°C)
January	0.2	23.7	-26.6
February	0.0	20.0	-27.0
March	0.0	22.6	-24.6
April	0.1	19.3	-16.4
May	4.0	18.2	-4.5
June	15.0	2.5	5.9
July	46.4	0.0	11.2
August	42.5	0.0	9.6
September	29.2	6.5	3.6
October	4.7	38.4	-5.9
November	0.0	28.2	-17.1
December	0.0	27.2	-24.1
Annual	**142.1**	**206.6**	

The Ulu station is within the project area but has only a short data record available, only operates in spring and summer and, unlike the Kugluktuk station, it does not differentiate between rainfall and snowfall. Table 3 shows the average precipitation and climate data at the Ulu station data from 2023 to 2025.

Table 3. Ulu, NU Climate Station Average Precipitation Data to 2023-2025

Period	Average Mean Daily Temperature (°C)	Monthly Precipitation (mm)
April	-10.5	0.0
May	-0.5	0.3
June	8.9	15
July	14.6	16
August	13.7	13
September	6.7	12

The data from both stations indicate that average daily temperatures typically transition from negative to positive between May or June with snowfall ending in June.

The Natural Resources Canada (2017) hydrology databases were also reviewed to support this assessment. The database for the date of formations and loss of snow cover using data from 1955 to 1972 was reviewed. The date of snow cover formation (2.5 cm of snow occurs and remains for more than seven days) is estimated to occur at the project site in early October and loss of snow cover (less than 2.5 cm remains absent for more than seven days) is expected to occur in mid-June. These dates correspond with the climate station data based on when snowfall starts/ends and when average daily temperatures change from negative to positive.

4 Freshet, Snowpack and Melt Times

The Kugluktuk climate station data also includes monthly recorded snowpack data as shown below in *Table 4*.

Table 4. Kugluktuk, NU Climate Station Normal Snow Depth Data from 1991 to 2020

Period	Average Snow Depth (cm)
January	30
February	32
March	35
April	34
May	21
June	1
July	0
August	0
September	0
October	8
November	17
December	23

The Natural Resources Canada (2017) database for the mean maximum depth of snow using data from 1955 to 1972 was reviewed. In the project area the estimated mean maximum depth of snow is approximately 50 cm occurring in March, which is consistent with the climate normal for Kugluktuk station showing a maximum snow depth in March.

Stantec also reviewed the hydrometric data provided by ECCC stations near the project site. Since there are no ECCC stations located on any of the watercourses that intersect the proposed road alignment, several stations were reviewed within Nunavut. Most of the ECCC stations in the area are on very large watercourses and, due to the topography being characterized by the large presence of kettle lakes, are likely to include large ineffective flow areas within their catchments. The flow rates at these ECCC stations are therefore not readily translatable to the project road crossings but provide adequate information about freshet and melt timing in the region to support estimating trends within the project area.

The ECCC stations with medium and long data records closest to the project site are shown in *Table 5*. ECCC stations immediately downstream of large lakes were excluded from this assessment as instantaneous flow rates are likely significantly attenuated by the lakes. The average date of breakup in *Table 5* is based on when the station recorded open flow in the channel without ice cover.

Table 5. ECCC Stations Break-Up and Maximum Flow Rate Time of Year

Station ID	Years of Data	Distance from Project Site	Average Break-Up Date	Observed Maximum

				Instantaneous Flow Rates Month
Tree River near the Mouth (10QA001)	1969-2025	50 km west of site	June	July
Hood River near the Mouth (10QB001)	1993-2005	81 km east of site	Early June	June
Burnside River near the Mouth (10QC001)	1976-2025	99 km east of site	Early June	June
Coppermine River Above Copper Creek (10PC004)	1987-2011	220 km west of site	Early June	Early June

The data in *Table 5* indicates that a correlation can be observed between snowmelt timing, break up timing, and observed maximum instantaneous flow rates. The four sites all experience their maximum instantaneous flows within approximately two weeks of break up along the rivers.

Canadian River Ice Database (Government of Canada 2020) includes ice data for the Burnside River ECCC station between 1983 to 2015. The spring break-up dates agree with the findings from the ECCC station data presented in *Table 5* and the date of spring break up peak water levels correspond to the peak instantaneous flow rate dates.

Natural Resources Canada (2017) estimates freeze-up and break-up dates of rivers and lakes across Canada prior to 1975. In the project area river break-up is estimated to occur in late June. There are no corresponding peak flow rates presented with these break-up times, but this timeframe of break-up is consistent with the data from the ECCC hydrometric stations.

5 Major Crossing Flow Rates Conditions Hydraulic Analysis

As part of their *Flood Hydrology of Streams Along the All-Season Road Corridor and Hydraulic Design of Crossings* report (NHC 2013) Northwest Hydraulics Consultants (NHC) provided 1:2, 1:5, 1:10, 1:25, 1:50, and 1:100-year flood flow rates at each of crossing they assessed. These flood flow rates at the 18 major crossings are provided in *Table 6*. Stantec did not re-assess the flows at these crossings as a part of the 2025 hydrotechnical assessment.

Table 6. NHC (2013) Flood Flow Events

Crossing ID	1:2-Year Flood Flow Rate (m3/s)	1:5-Year Flood Flow Rate (m3/s)	1:10-Year Flood Flow Rate (m3/s)	1:25-Year Flood Flow Rate (m3/s)	1:50-Year Flood Flow Rate (m3/s)	1:100-Year Flood Flow Rate (m3/s)
62 (Burnside)	73	96	113	137	156	178
63	39	51	60	73	83	95
68	48	64	75	91	104	118
71	21	28	33	40	45	52
72	9	12	14	17	19	22
87	6	8	9	11	13	14
88	3	4	5	6	7	8
94 (Hood)	174	229	270	326	373	424
104 (Frayed Knots)	80	105	124	150	171	195
105	31	41	48	59	67	76
115 (James)	110	145	171	207	237	270
123	6	8	9	11	13	14
127A	30	40	47	57	65	73
D44 (Kennarctic)	60	79	93	113	129	147
D42	23	30	36	43	49	56
DM2 (Kennarctic)	80	105	124	150	172	195
D2	5	7	8	10	12	13

1. Crossing 1002 excluded as it was not included in NHC (2013) analysis.

6 Permeability, Seepage, and Infiltration

Stantec was asked to provide a qualitative, desktop-based discussion on permeability, seepage and infiltration as part of the hydrotechnical analysis. There is little information available about the drainage basins and their permeability and infiltration near the project site. Hydrology of Floods in Canada (NRC 1989) discusses the characteristics of floods in the various regions throughout Canada. The closest area discussed in the project area is “east of Mackenzie Valley”. This area experiences less than 200 mm of rainfall every year on average, as seen in Section Precipitation and Climate Data3 of this memorandum. Because of the low levels of precipitation during the open flow season, it is expected that annual maximum discharges are dominated by snowmelt runoff, with only limited contribution from precipitation events. During freshet, the ground and some water bodies in the area are expected to be still frozen and therefore to have low levels of infiltration capacity. In contrast, during the summer months according to NRC (1989) storage is provided by many surface lakes and by the “spongy” ground.

As shown *Table 5*, annual maximum flow rates are experienced in the weeks following break up at all the ECCC gauged rivers. The annual maximum flow rates in general occur before the highest rainfall levels (experienced in July and August) and instead correspond more closely with the snowpack decreasing from May to June (*Table 4*). The climate data and flow rate data agree with the conclusions in Hydrology of Floods in Canada (NRC 1989) that peak flows in the project area are driven by snow melt rather than precipitation events.

7 Hydraulic Assessment

Based on flow rates provided by NHC (2013) Stantec modelled the 1:2-year and 1:100-year flood events for the 18 major crossings in one-dimension HEC-RAS 6.4.1 models. The geometry of the crossings was based off the LiDAR from 2012. Potential bridge abutment locations were included in each of the cross-sections to model constrictions on the water level. The bridge abutments were outside of the 1:2-year water level for all the crossings except Crossing 68, 71, 72, 105, D42, and DM2 which have bridge abutments within the 1:2-year water level. *Table 7* shows the water surface elevation and water surface width for 1:2-year and 1:100-year flood events for the 18 major crossings based on model results with the bridge abutments.

Table 7. Surface Water Elevation and Width for Major Crossings

Crossing ID	1:2-year Surface Water Elevation (m)	1:2-year Surface Water Elevation Width (m)	1:100-year Surface Water Elevation (m)	1:100-year Surface Water Elevation Width (m)
62 (Burnside)	426.6	67.0	426.8	68.7
63	432.5	36.0	433.0	38.0
68	443.1	73.3	443.4	75.0
71	467.7	24.5	468.1	26.1
72	496.3	17.9	496.5	18.9
87	496.3	20.0	496.5	22.5
88	482.9	21.0	483.0	25.5
94 (Hood)	360.1	27.0	361.0	39.4
104 (Frayed Knots)	339.0	44.0	339.5	46.3
105	341.1	32.6	341.7	34.8
115 (James)	269.5	35.0	270.3	38.1
123	278.5	63.0	278.7	63.3
127A	223.3	19.0	223.8	21.1
D44 (Kennarctic)	195.3	109.0	195.6	110.0
D42	190.5	21.4	190.6	22.8
DM2 (Kennarctic)	145.3	42.9	146.0	45.6
D2	2.7	13.0	3.0	14.2

Crossing ID	1:2-year Surface Water Elevation (m)	1:2-year Surface Water Elevation Width (m)	1:100-year Surface Water Elevation (m)	1:100-year Surface Water Elevation Width (m)
1002	451.3	43.0	451.6	43.9

8 Navigation Assessment

Stantec conceptually assessed the navigability of each of the major crossings based on the 2012 LiDAR, discussions with Transport Canada in 2025, and publicly available aerial imagery as show in *Table 8*. All minor crossings are considered non-navigable.

Table 8. Navigation Assessment for Major Crossing

Crossing ID	Navigable	Navigation Commentary
62 (Burnside)	Navigable	Named watercourse, geometry is deep and wide enough, no major obstructions.
63	Navigable	Geometry is deep and wide enough, no major obstructions.
68	Navigable	Geometry is deep and wide enough, no major obstructions.
71	Non-navigable	Braided stream immediately upstream, boulder run downstream.
72	Non-navigable	Too many boulders for navigation.
87	Non-navigable	Too many boulders for navigation.
88	Non-navigable	Too many boulders for navigation.
94 (Hood)	Navigable	Named watercourse, geometry is deep and wide enough, watercraft trips available on this river.
104 (Frayed Knots)	Navigable	Named watercourse, geometry is deep and wide enough.
105	Navigable	Geometry is deep and wide enough.
115 (James)	Navigable	Named watercourse, geometry is deep and wide enough
123	Non-navigable	Not navigable due to rocky substrate.
127A	Navigable	Geometry is deep and wide enough.
D44 (Kennarctic)	Navigable	Named watercourse, geometry is deep and wide enough, lots of rocks.
D42	Non-navigable	Too rocky for a watercraft to pass.
DM2 (Kennarctic)	Navigable	Geometry is deep and wide enough.
D2	Non-navigable	Geometry is not wide enough.
1002	Navigable	Geometry is wide enough, watercourse continuous throughout crossing reach.

9 Next Steps

All analysis in this report is based on desktop study. Further detailed analysis is required prior to final design and construction, based on additional field data and surveys.

10 Closure

If there are any questions or concerns, please contact the undersigned.

Stantec Consulting Ltd.

Prepared by _____
(signature)
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Reviewed by _____
(signature)
James Bigelow P.Eng.
River Engineer
Phone: (403) 716-8034
james.bigelow@stantec.com

11 References

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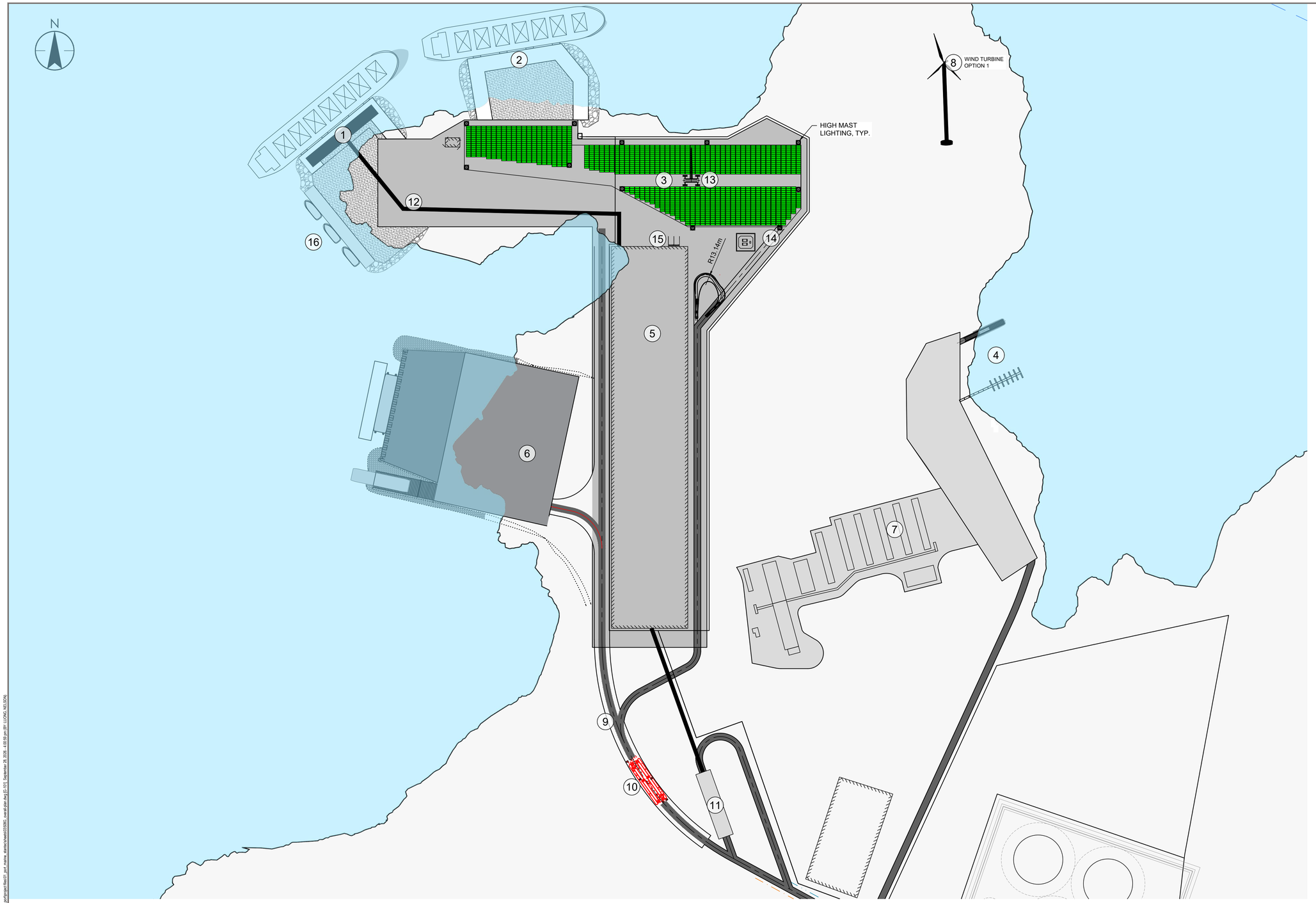
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C.2 Grays Bay Road and Port Reference Design Drawings



KEY NOTES:

1. *WEST WHARF (FUTURE)*
2. EAST WHARF
3. CONTAINER YARD (1585 TGS)
4. SMALL CRAFT HARBOUR
5. STORAGE SHED (538,000 FT^2)
6. BARGE LANDING AREA (BY OTHERS)
7. LABOUR CAMP AREA
8. WIND TURBINE AREA (OPTION 1)
9. PORT ACCESS ROAD
10. 2-LANE TRUCK GATE
11. TRUCK DUMP & WARMING SHED
12. CONVEYANCE SYSTEM (THIRD PARTY)
13. REACHSTACKER
14. FUELING STATION
15. REACHSTACKER PARKING (2 STALLS)
16. MEDIUM-SIZE VESSELS WHARF

GENERAL NOTES:

1. SCH DESIGNED FOR 1.7m LOA DESIGN VESSEL.
2. BERTH 1 & 2 DESIGNED FOR PANAMAX DESIGN VESSEL.

0 100
Scale: 1: 2 500 (metres)

LEGEND

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REVISIONS

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WEST KITIKMEOT RESOURCES CORP

NUNAMI
STANTEC LIMITED

GRAYS BAY ROAD AND PORT
NUNAVUT, CANADA

OVERALL SITE PLAN

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	BB	GM	0	MA0101
DATE:	SHEET No.	DWN	APP	STATUS	
2026.09.25	1 of 9	NL	AF	DFT	

C:\Users\nlucy\DOCS\Documents\Stantec consulting\144903508_Grays Bay_Road_&_Port\plan files\01_port_marine_stantec\sheets\MA0101_overall plan.dwg [LSS] September 29, 2026 - 4:03:59 pm (BY: LUCAS, NELSON)

N

POST-PANAMAX OIL/BULK CARRIER, ICE CLASS 1A (APPROX. 240m LENGTH, 43m BEAM, 15m DRAUGHT), TYP.

A 0202

APPROX. 125m CONCEPTUAL BERTH LENGTH

DREDGE LIMITS NOT SHOWN AND TO BE DETERMINED THROUGH FURTHER DESIGN

30m APPROX. CLEARANCE

ENGINEERED BACKFILL WITH WEARING SURFACE, TYP.

RIP-RAP SLOPE, TYP.

MODULAR CONCRETE CAISSON STRUCTURE, TYP.

FENDER FACE

WHARF FACE

WHARF FACE FENDER SYSTEM, TYP.

APPROX. 125m CONCEPTUAL BERTH LENGTH

CONCEPTUAL SHIPLOADER LOCATION

EAST WHARF (BERTH 2)

CONCEPTUAL FUEL PIPELINE, ROUTE OPTIONS

WRF-BH-04

WEST WHARF (BERTH 1)

WRF-BH-01

MARINE OPERATION & CONTROL OFFICE

LAYDOWN AREA - APPROX. 3.5 Ha

THREE, 80 T TUGS SHOWN

CONCEPTUAL CONVEYANCE ROUTE

APPROX. 30m CONCEPTUAL BERTH LENGTH

9m

30m

10m

B 0242

MODULAR CONCRETE CAISSON STRUCTURE, TYP.

RCN ARCTIC AND OFFSHORE PATROL SHIP

MODULAR CONCRETE CAISSON STRUCTURE SHOWN

CONCENTRATE STORAGE SHED

ACCESS ROAD

-40.0 -38.0 -36.0 -34.0 -32.0 -30.0 -28.0 -26.0 -24.0 -22.0 -20.0 -18.0 -16.0 -14.0 -12.0 -10.0 -8.0 -6.0 -4.0 -2.0 0.0

NOTES:

1. 2004 CHALLENGER BATHYMETRIC DATA SHOWN, 2012 McELHANNEY TOPOGRAPHIC DATA SHOWN
2. BM 16-1979 SHOULD HAVE AN ELEVATION OF 1.932 METRES. BASED ON McELHANNEY CONTROL BM 16-1979 IS ASSIGNED 2.946 METRES. TO MATCH CHART DATUM ALL McELHANNEY AND McELHANNEY BASED ELEVATIONS MUST BE REDUCED BY -1.014 METRES.

LEGEND

- FILL LINE
- CUT LINE
- CONTOURS
- 2025 DRILLED BOREHOLE

0 50

Scale: 1: 1000 (metres)

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	2026.09.25	NL	BB	AF	ISSUED FOR MAJOR WORK RFP

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WEST KITIKMEOT RESOURCES CORP

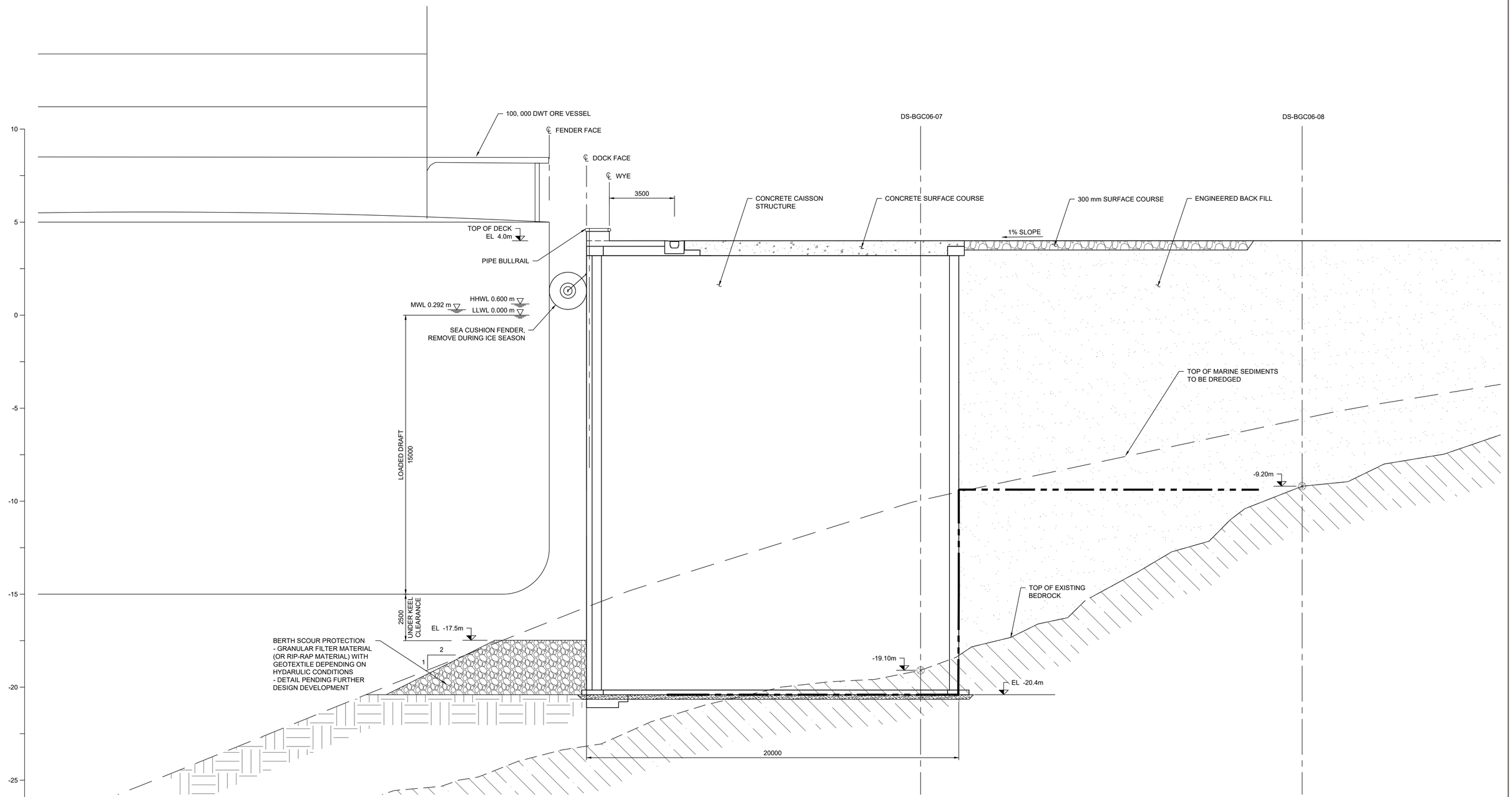
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GRAYS BAY ROAD & PORT
NUNAVUT, CANADA

DEEP-WATER WHARF AREA
CAISSON CONCEPT
GENERAL ARRANGEMENT

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A 202 TYPICAL SECTION
SCALE: 1:100

NOTES:
1. 2004 CHALLENGER BATHYMETRIC DATA SHOWN, 2012 McELHANNEY TOPOGRAPHIC DATA SHOWN
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3. DIMENSIONS ARE IN MILLIMETERS AND ELEVATIONS IN METERS UNLESS NOTED OTHERWISE.

LEGEND

0 5
Scale: 1: 100 (metres)

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0	2026.09.25	NL	BB	AF	ISSUED FOR MAJOR WORK RFP
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DEEP-WATER WHARF AREA
CAISSON CONCEPT
TYPICAL SECTIONS

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
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2026.09.25	3 of 9	NL	AF	DFT	

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BOLLARD

GUIDING SPUDS

LIGHTERING BARGE
(NON-ICE CLASS)

MARINE LANDMASS AREA
APPROX. 1.3 Ha

GUIDING SPUDS

LANDMASS FOOTPRINT
APPROX. 3.0 Ha

RETAINING WALL BOX

1500 B - BARGE

BOLLARD

RAMP AT 11%± SLOPE

COASTLINE

ACCESS ROAD

CONCENTRATE
STORAGE SHED

NOTES:
1. 2004 CHALLENGER BATHYMETRY SHOWN, 2012 McELHANNEY TOPOGRAPHY SHOWN
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BARGE LANDING AREA LAYOUT
SCALE: 1:750

LEGEND

FILL LINE
CUT LINE
CONTOURS

0 25
Scale: 1: 750 (metres)

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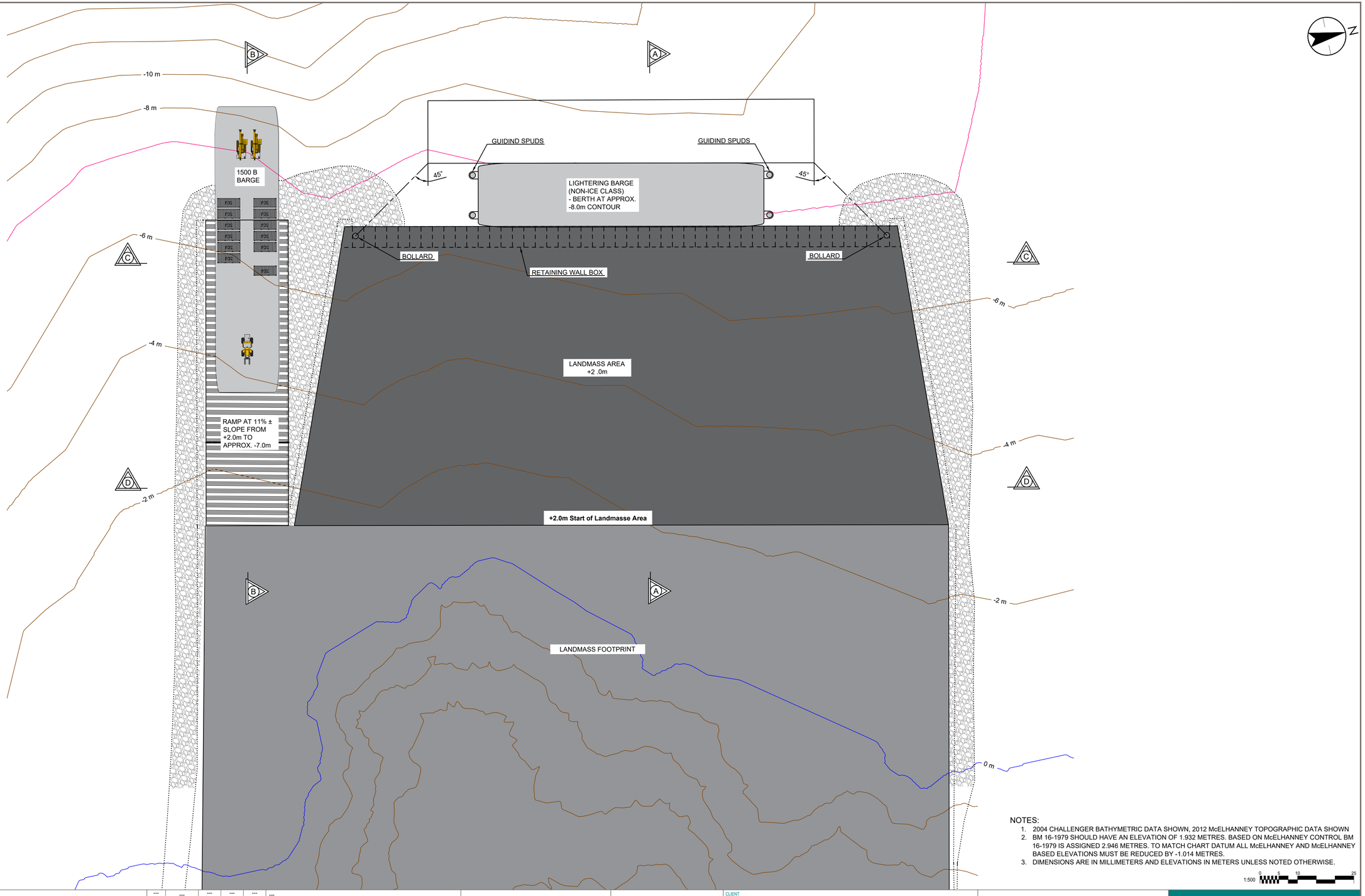
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BARGE LANDING AREA
GENERAL ARRANGEMENT

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
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DATE	SHEET No.	DWN	APP	STATUS	
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NOTES:

1. 2004 CHALLENGER BATHYMETRIC DATA SHOWN, 2012 McELHANNEY TOPOGRAPHIC DATA SHOWN
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3. DIMENSIONS ARE IN MILLIMETERS AND ELEVATIONS IN METERS UNLESS NOTED OTHERWISE.

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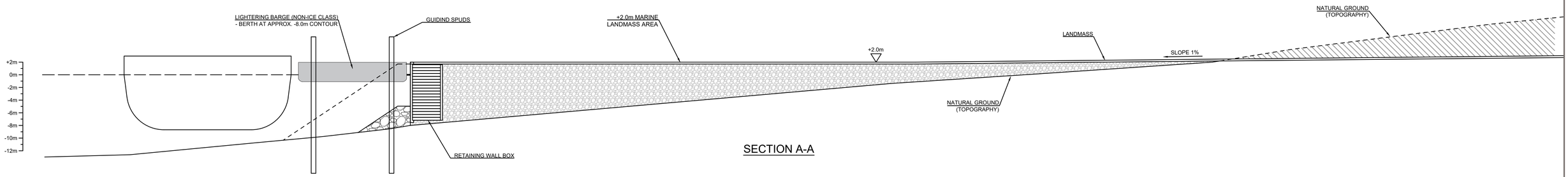
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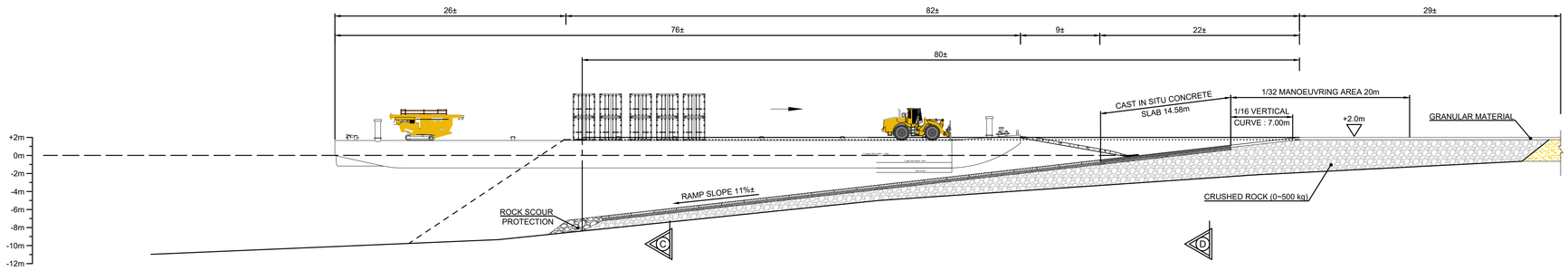
PORT MARINE
BARGE LANDING AREA

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	BB	GM	0	MA0222
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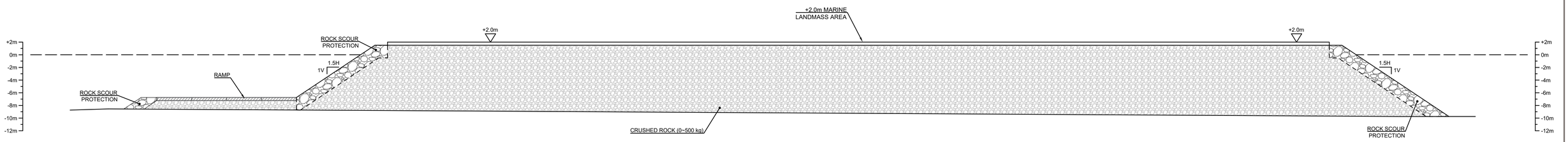
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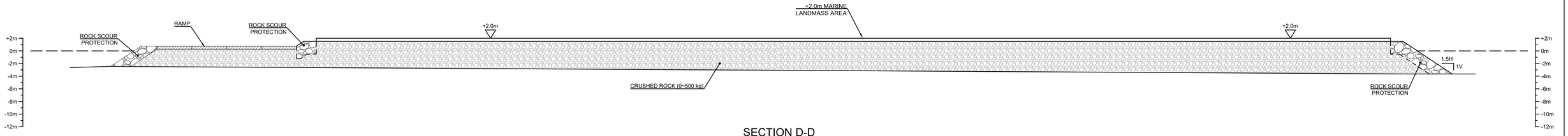
SECTION A-A



SECTION B-B



SECTION C-C



SECTION D-D

NOTES:

1. 2004 CHALLENGER BATHYMETRIC DATA SHOWN, 2012 McELHANNEY TOPOGRAPHIC DATA SHOWN
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3. DIMENSIONS AND ELEVATIONS IN METERS UNLESS NOTED OTHERWISE.

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LEGEND

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	2026.09.25	NL	BB	AF	ISSUED FOR MAJOR WORK RFP

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NUNAMI
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PORT MARINE
BARGE LANDING AREA
CROSS SECTION

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	BB	GM	0	MA0223
DATE:	SHEET No.	DWN	APP	STATUS	
2026.09.25	6 of 9	NL	AF	DFT	

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ANCHORED MOORING BUOYS PROPOSED TO BE INSTALLED SEASONALLY FOR TEMPORARY USE

-6.00

-4.00

-2.00

A
0243

4.00 2.00

0.0

APPROX. 57000

BOAT LAUNCH RAMP - TOE AT APPROX. -2.0M DEPTH

POTENTIAL AREA FOR TEMPORARY BEACHING OF COMMUNITY VESSELS

FINGER FLOATS FOR APPROXIMATELY 24 SMALL VESSELS TO BE INSTALLED SEASONALLY

APPROX. 87285

0.0

PUBLIC USE AREA, APPROX. 2.2 Ha

ACCOMMODATIONS AND SITE FACILITIES

N

NOTES:

1. 2024 SATELLITE-DERIVED BATHYMETRIC DATA SHOWN, 2012 McELHANNEY TOPOGRAPHIC DATA SHOWN
2. DREDGE LIMITS NOT SHOWN AND TO BE DETERMINED BASED ON PENDING BATHYMETRIC SURVEY DATA
3. BM 16-1979 SHOULD HAVE AN ELEVATION OF 1.932 METRES. BASED ON McELHANNEY CONTROL BM 16-1979 IS ASSIGNED 2.946 METRES. TO MATCH CHART DATUM ALL McELHANNEY AND McELHANNEY BASED ELEVATIONS MUST BE REDUCED BY -1.014 METRES.
4. DIMENSIONS ARE IN MILLIMETERS AND ELEVATIONS IN METERS UNLESS NOTED OTHERWISE.

LEGEND

- FILL LINE
- CUT LINE
- CONTOURS
- 2025 DRILLED BOREHOLE

0 50

Scale: 1: 1000 (metres)

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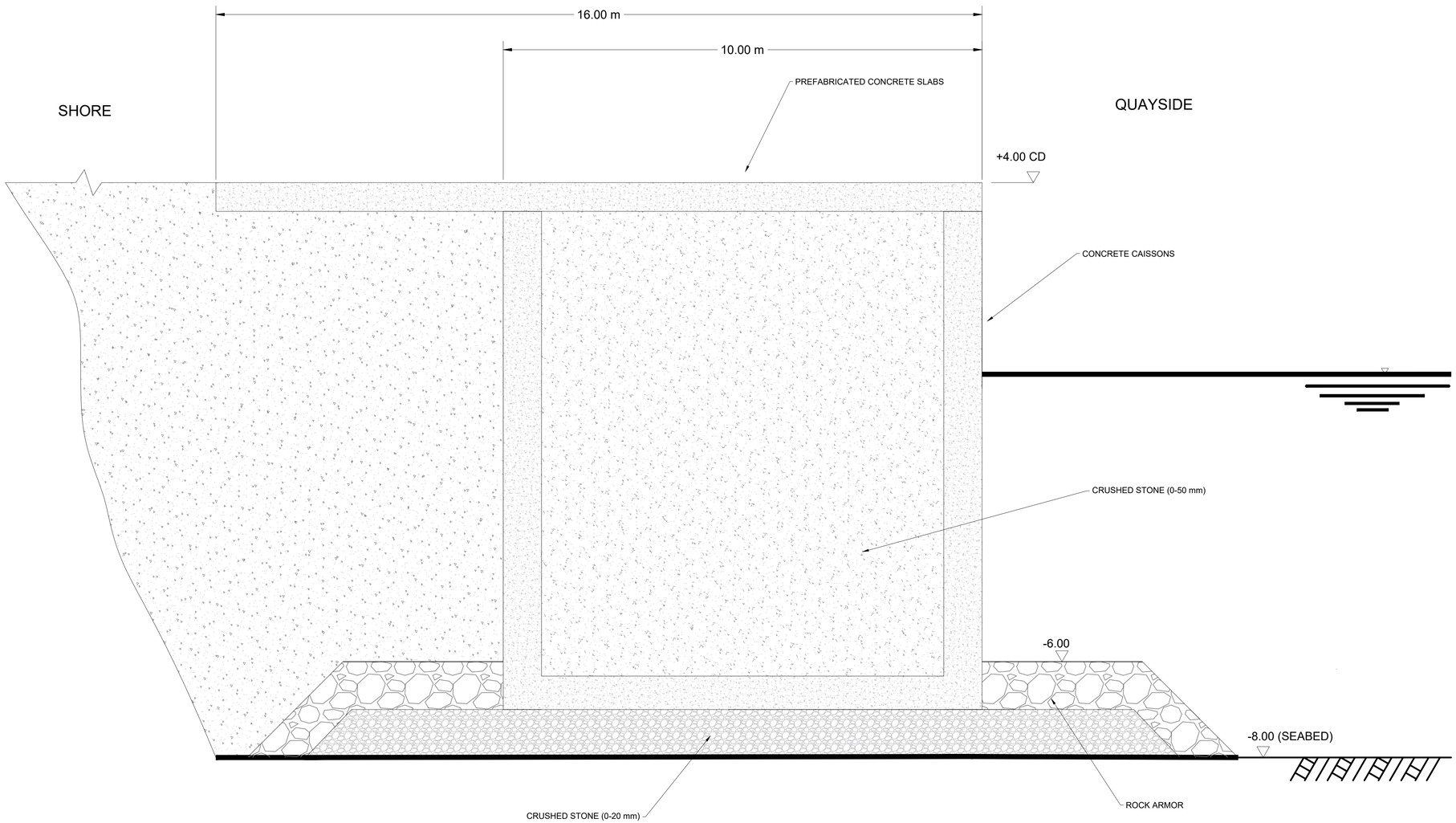
NUNAMI
STANTEC LIMITED

GRAYS BAY ROAD & PORT
NUNAVUT, CANADA

SMALL CRAFT HARBOUR
GENERAL ARRANGEMENT

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	BB	GM	0	MA0241
DATE:	SHEET No.	DWN	APP	STATUS	
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B 0242 MEDIUM-SIZE VESSELS WHARF CROSS SECTION
SCALE: 1:50

NOTES:
1. 2004 CHALLENGER BATHYMETRIC DATA SHOWN, 2012 McELHANNEY TOPOGRAPHIC DATA SHOWN
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LEGEND

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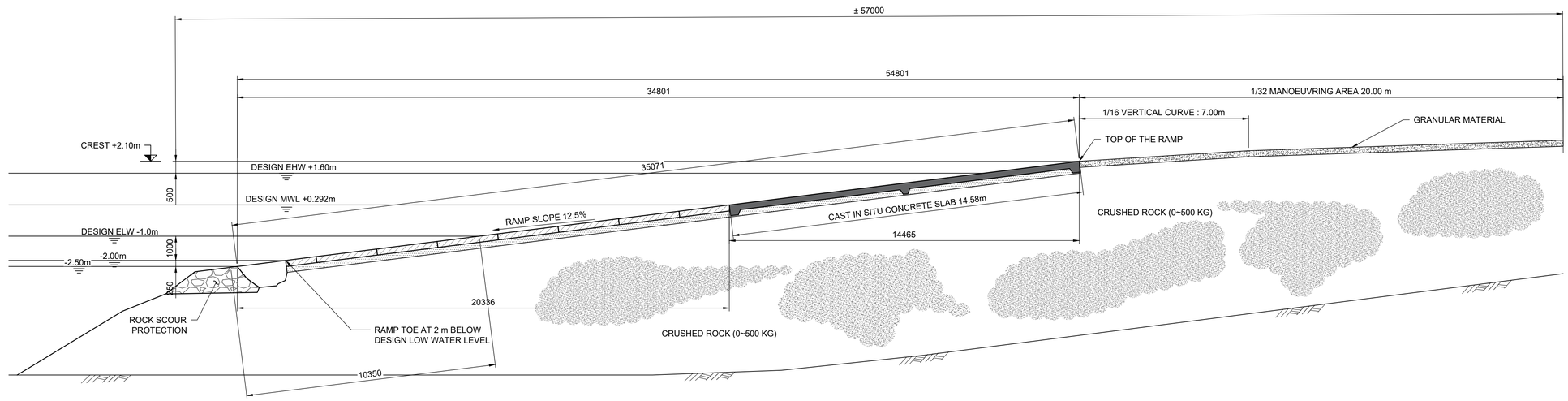
CLIENT
WEST KITIKMEOT RESOURCES CORP

NUNAMI
STANTEC LIMITED

PORT MARINE
MEDIUM SIZE VESSEL WHARF
CROSS SECTION

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
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DATE:	SHEET No.	DWN	APP	STATUS	
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A 0243 SMALL CRAFT HARBOUR LAUNCH RAMP CROSS SECTION
SCALE: 1:100

NOTES:
1. 2004 CHALLENGER BATHYMETRIC DATA SHOWN, 2012 McELHANNEY TOPOGRAPHIC DATA SHOWN
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CLIENT

WEST KITIKMEOT RESOURCES CORP

NUNAMI
STANTEC LIMITED

PORT MARINE
SMALL CRAFT HARBOUR
LAUNCH RAMP CROSS SECTION

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	BB	GM	0	MA0243
DATE:	SHEET No.	DWN	APP	STATUS	
2026.09.25	9 of 9	NL	AF	DFT	

C:\Users\nunaml\DOCUMENTS\Documents\ac consulting\144903508_yyk_2yr_cad_&_pm\project files\01_part_marine_structures\mt\0308_r_MA0243.dwg [MA0243] September 25, 2026 - 4:54:27 pm [BY: LIONEL KELSON]

DRAFT
FOR INFO ONLY

N

EAST WHARF

WEST WHARF

FUEL LINE CONNECTION TO TANKER

WIND TURBINE OPTION 1

LAYDOWN AREA A
AREA = 3.5 ha

SHIPLOADER ON WEST BERTH

FUEL LINE ROUTE B

BGC04-04

MEDIUM VESSEL WHARF

SHIPLOADER CONVEYOR

FUEL LINE ROUTE A

BOAT LAUNCH RAMP

CONCENTRATE STORAGE SHED
500 m x 100m

SEASONAL MOORAGE FLOATS

BARGE LANDING AREA

BARGE BERTH

PUBLIC USE AREA

SMALL CRAFT HARBOUR

WIND TURBINE OPTION 2

LAYDOWN AREA B
AREA = 3.0 ha

ACCOMMODATION / OFFICE FACILITIES

200 m LOADING CONVEYOR

LAYDOWN AREA C-1
AREA = 9.0 ha

TRUCK WARMING SHED AND TRUCK DUMP

BGC04-05

MAINTENANCE SHOP AND GENERATOR BUILDING

TANK FARM
AREA = 4.7 ha

SOLAR PV OPTION 1
AREA = 2.7 ha

LAYDOWN AREA C-2
AREA = 5.8 ha

WIND TURBINE OPTION 3

SOLAR PV OPTION 2
AREA = 2.7 ha

AERODROME BEYOND DRAWING EXTENT
REFER TO AERODROME DRAWINGS

DRILLED AERODROME
BOREHOLES NOT SHOWN

ROADWAY TO JERICHO MINE
REFER TO ROADWAY DRAWINGS

1:5000 0 50 100 250

GENERAL SHEET NOTES

1. ALL DIMENSIONS IN METER UNLESS STATED OTHERWISE.
2. ALL DIMENSIONS ARE APPROXIMATE AND CONCEPTUAL.
3. CONTOUR INTERVALS
   MAJOR - 20 m
   MINOR - 4 m

LEGEND

- GRADING CUT
- GRADING FILL
- ℄ OF ROADWAY
- EDGE OF ROAD
- TOE OF ROAD LEFT
- TOE OF ROAD RIGHT
- EDGE OF WATER
- CONTOUR MINOR EX
- CONTOUR MAJOR EX
- TANKS CLEARANCE CIRCLE
- TANKS
- TANK BERM
- 2004 DRILLED BOREHOLES

NUM	DATE	DWN	CKD	APR	DESCRIPTION
---	---	---	---	---	---
0	2026.09.25	NL	GM	AF	ISSUED FOR MAJOR WORK RFP

REVISIONS

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CLIENT

WEST KITIKMEOT RESOURCES CORP

NUNAMI
STANTEC LIMITED

GRAYS BAY ROAD & PORT
NUNAVUT, CANADA

PORT LANDSIDE
OVERALL PLAN

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	WO	GM	0	GA0101
DATE: 2026.09.25	SHEET No. 1 of 4	DWN NL	APP AF	STATUS DFT	

C:\Users\nlung\DOCS\Documents\ca-stantec\144903508_grays_bay_road_&_port\port_land\ga_arrangement\ga0000_ga0101_20260731.dwg (GA0101 September 29, 2026 - 4:09:29 pm BY LUONG, NIELSON)

DRAFT FOR INFO ONLY

N

AERODROME BEYOND DRAWING EXTENT
REFER TO AERODROME DRAWINGS

FG: 6.05
EG: 2.50
FG: 8.01
EG: 4.22
FG: 7.05
EG: 3.81
FG: 6.02
EG: 1.78
FG: 6.47
EG: 4.03
FG: 6.34
EG: 7.49
FG: 9.01
EG: 25.77
FG: 6.50
EG: 7.58
FG: 6.63
EG: 0.19
FG: 2.00
EG: -3.04
FG: 2.00
EG: -7.49
FG: 3.52
EG: 10.61
FG: 9.50
EG: 15.90
FG: 2.00
EG: -4.69
FG: 2.00
EG: -7.33
FG: 2.58
EG: 5.30
FG: 7.76
EG: 12.14
FG: -7.00
EG: -9.33
FG: 2.00
EG: -2.08
FG: 3.52
EG: 8.61
FG: 8.00
EG: 18.47
FG: 11.17
EG: 30.83
FG: 7.64
EG: 9.01
FG: 6.93
EG: 8.00
FG: 8.51
EG: 6.40
FG: 11.93
EG: 14.97
FG: 7.56
EG: 4.39
FG: 7.04
EG: 6.12
FG: 8.07
EG: 7.36
FG: 13.22
EG: 13.90
FG: 8.62
EG: 5.80
FG: 17.73
EG: 17.49
FG: 10.44
EG: 10.68
FG: 16.96
EG: 17.49
FG: 12.05
EG: 11.80
FG: 10.10
EG: 9.00
FG: 8.54
EG: 7.49
FG: 7.51
EG: 7.48
FG: 19.57
EG: 16.47
FG: 10.53
EG: 18.98
FG: 16.91
EG: 15.00
FG: 24.47
EG: 21.20
FG: 20.61
EG: 17.98
FG: 15.23
EG: 23.51
FG: 16.93
EG: 14.12
FG: 14.47
EG: 4.81
FG: 13.01
EG: 10.18
FG: 15.31
EG: 13.07
FG: 17.22
EG: 14.25

ROADWAY TO JERICHO MINE
REFER TO ROADWAY DRAWINGS

1:5000 0 50 100 250

GENERAL SHEET NOTES

1. ALL DIMENSIONS IN METER UNLESS STATED OTHERWISE.
2. ALL DIMENSIONS ARE APPROXIMATE AND CONCEPTUAL.
3. CONTOUR INTERVALS
   MAJOR - 20 m
   MINOR - 4 m

LEGEND

- GRADING CUT
- GRADING FILL
- ℄ OF ROADWAY
- EDGE OF ROAD
- TOE OF ROAD LEFT
- TOE OF ROAD RIGHT
- EDGE OF WATER
- CONTOUR MINOR EX
- CONTOUR MAJOR EX
- TANKS CLEARANCE
- CIRCLE
- TANKS
- TANK BERM

NUM	DATE	DWN	CKD	APR	DESCRIPTION
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0	2026.09.25	NL	GM	AF	ISSUED FOR MAJOR WORK RFP

REVISIONS

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CLIENT

WEST KITIKMEOT RESOURCES CORP

NUNAMI
STANTEC LIMITED

GRAYS BAY ROAD & PORT
NUNAVUT, CANADA

PORT LANDSIDE
GRADING PLAN

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144935508	YK	WO	GM	0	CI0301
DATE: 2026.09.25	SHEET No. X of 4	DWN NL	APP AF	STATUS DFT	

C:\Users\nlaurin\OneDrive - Stantec\Documents\Projects\144935508_gray_bay_port_&_port\part\files\01_port_landside_roadwork\144935508_gray_bay_port_&_port(part)files\01_port_landside_roadwork\144935508_gray_bay_port_&_port(part)_v2026.09.25.rvt, 2026.09.25 11:04:24 AM, NICOLAS LAURIN, NEJSON

DRAFT FOR INFO ONLY

N

CONCENTRATE STORAGE SHED

1 - 20 PORT OPERATIONS STAFF ACCOMMODATIONS

2 x 30 PORT USER ACCOMMODATIONS

2 x 49 EMERGENCY ACCOMMODATIONS

1 - 49 OPT ADDITIONAL ACCOMMODATIONS

PUBLIC USE AREA

LIGHT VEHICLE PARKING

CAMP OFFICE / MEETING AREA

DINING / RECREATION

WALKWAY

SERVICE VEHICLE GARAGE

UTILITY BUILDING

ACCESS ROAD

1:500 0 5 10 25

LEGEND

- BUILDINGS
- GRADING CUT
- GRADING FILL
- ℄ OF ROADWAY
- EDGE OF ROAD
- TOE OF ROAD LEFT
- TOE OF ROAD RIGHT
- CONTOUR MINOR EX
- CONTOUR MAJOR EX
- TANKS CLEARANCE
- CIRCLE
- TANKS
- TANK BERM

NUM	DATE	DWN	CKD	APR	DESCRIPTION
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0	2026.09.25	NL	GM	AF	ISSUED FOR MAJOR WORK RFP

REVISIONS

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WEST KITIKMEOT RESOURCES CORP

NUNAMI

STANTEC LIMITED

GRAYS BAY ROAD & PORT
NUNAVUT, CANADA

PORT LANDSIDE
PRIMARY BUILDINGS AREA, PLAN

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	WO	GM	0	AR0701
DATE:	SHEET No.	DWN	APP	STATUS	
2026.09.25	X of 4	NL	AF	DFT	

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DRAFT
FOR INFO ONLY

N

4 - 64.5 m x 12.2m
39,860,000 LITER ARCTIC DIESEL

TOE OF BERM

TOP OF BERM

2 - 23.0 m x 12.2m
5,070,000 LITER JET A1

FUEL LINE
ROUTE A & B

DISPENSER / PUMP
BUILDING

3 - 90,000 LITER GASOLINE

8.0

12.0

1:500 0 5 10 25

GENERAL SHEET NOTES

1. ALL DIMENSIONS IN METER UNLESS STATED OTHERWISE.
2. ALL DIMENSIONS ARE APPROXIMATE AND CONCEPTUAL.
3. CONTOUR INTERVALS
   MAJOR - 20 m
   MINOR - 4 m

LEGEND

- GRADING CUT
- GRADING FILL
- ℄ OF ROADWAY
- EDGE OF ROAD
- TOE OF ROAD LEFT
- TOE OF ROAD RIGHT
- CONTOUR MINOR EX
- CONTOUR MAJOR EX
- TANKS CLEARANCE CIRCLE
- TANKS
- TANK BERM

NUM	DATE	DWN	CKD	APR	DESCRIPTION
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0	2026.09.25	NL	GM	AF	ISSUED FOR MAJOR WORK RFP

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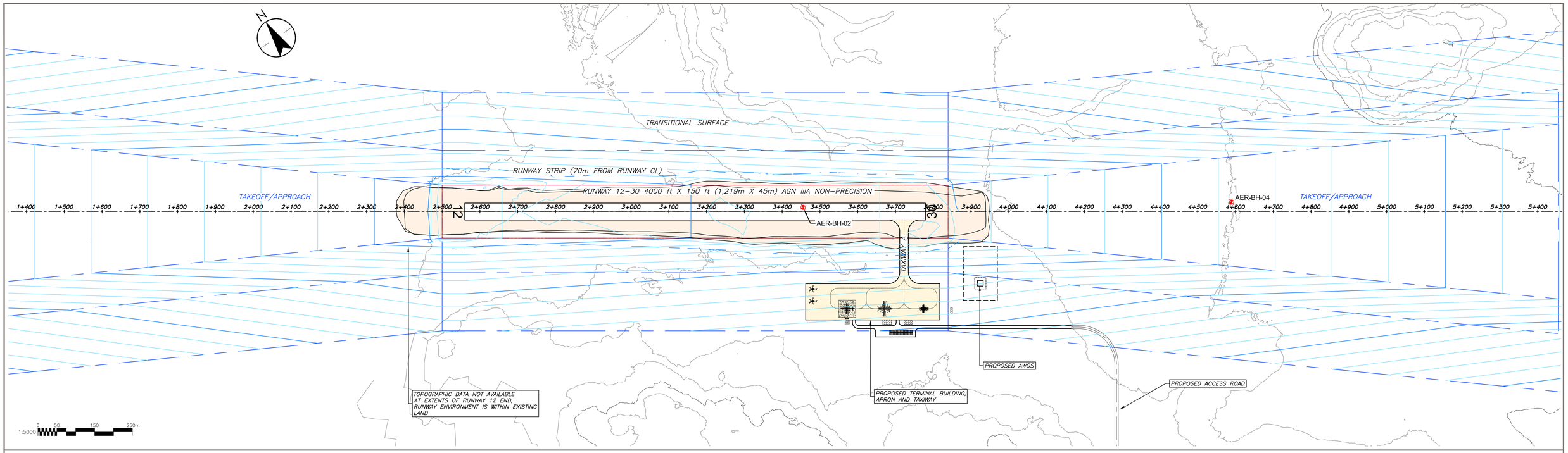
NUNAMI
STANTEC LIMITED

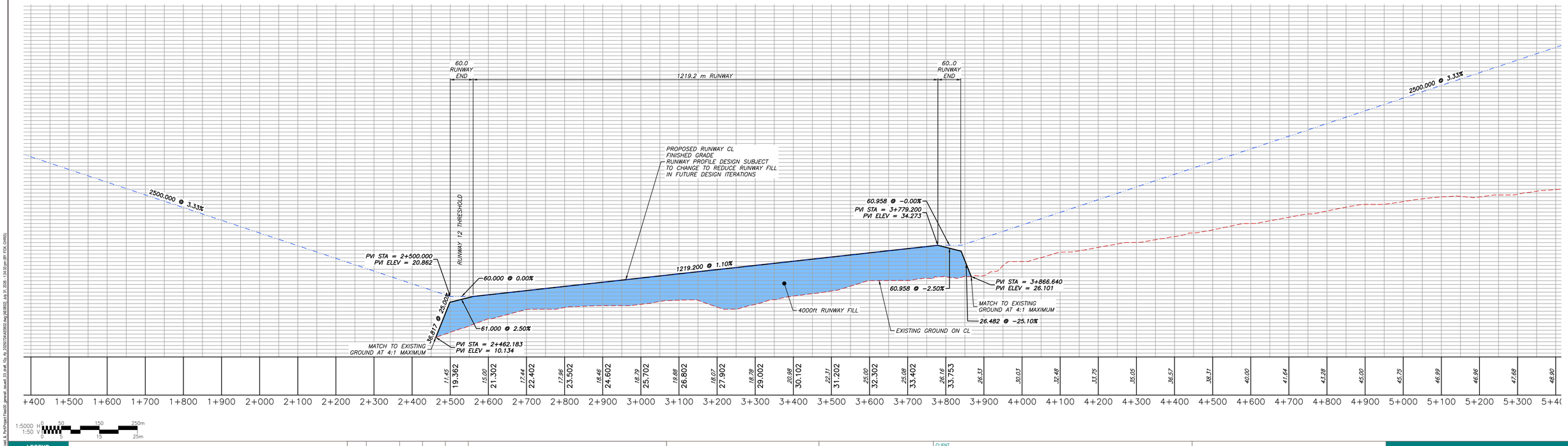
GRAYS BAY ROAD & PORT
NUNAVUT, CANADA

PORT LANDSIDE
FUEL STORAGE TANK FARM, PLAN

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	WO	GM	0	FU0601
DATE:	SHEET No.	DWN	APP	STATUS	
2026.09.25	X of 4	NL	AF	DFT	

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LEGEND

2025 DRILLED BOREHOLE

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	2026.09.25	JL	AM		ISSUED FOR DRAFT MAJOR WORK RFP

REVISIONS

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CLIENT

WEST KITIKMEOT RESOURCES CORP

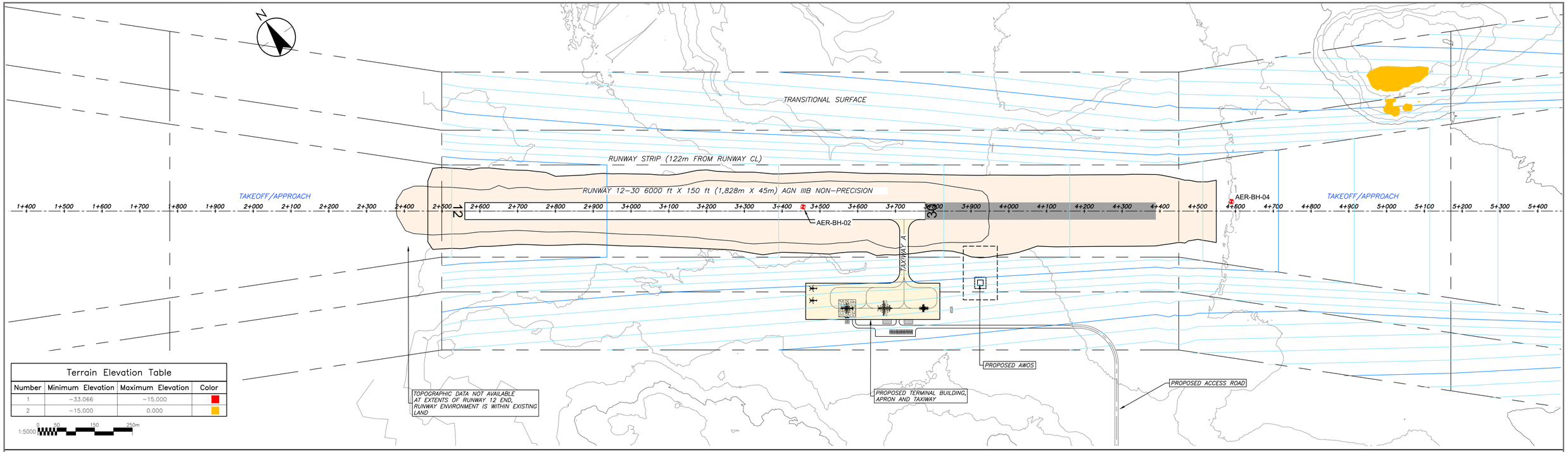
NUNAMI STANTEC LIMITED

GRAYS BAY ROAD AND PORT
NUNAVUT, CANADA

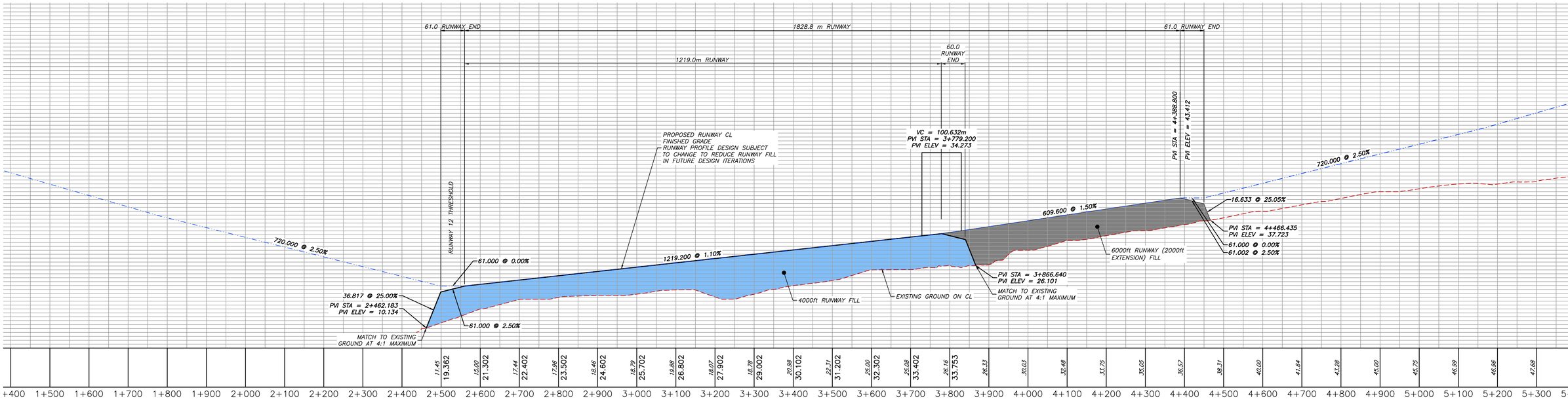
PORT AERODROME
RUNWAY 12-30 4000ft
PLAN & PROFILE

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	VANC	AM	AM	0	AE0802
DATE: SEP 25, 2026	SHEET No. 2 of 15	DWN JL	APP AM	STATUS FINAL	

C:\Users\mcCHACO\Documents\Carlson Civil 2024\Projects\144903508 Grays Bay Road & Port\Plans\Sheets\AE0802 grayspl issued_03.dwg, 9/25/2026 3:44:03 pm, BY FOX, CHRIS



Terrain Elevation Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	−33.066	−15.000	
2	−15.000	0.000	



LEGEND

2025 DRILLED BOREHOLE

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	2026.09.25	JL	AM		ISSUED FOR DRAFT MAJOR WORK RFP

REVISIONS

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WEST KITIKMEOT RESOURCES CORP

NUNAMI STANTEC LIMITED

GRAYS BAY ROAD AND PORT
NUNAVUT, CANADA

PORT AERODROME
RUNWAY 12-30 4000ft TO 6000ft
PLAN & PROFILE

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	VANC	AM	AM	0	AE0803
DATE: SEP 25, 2026	SHEET No. 3 of 15	DWN JL	APP AM	STATUS FINAL	

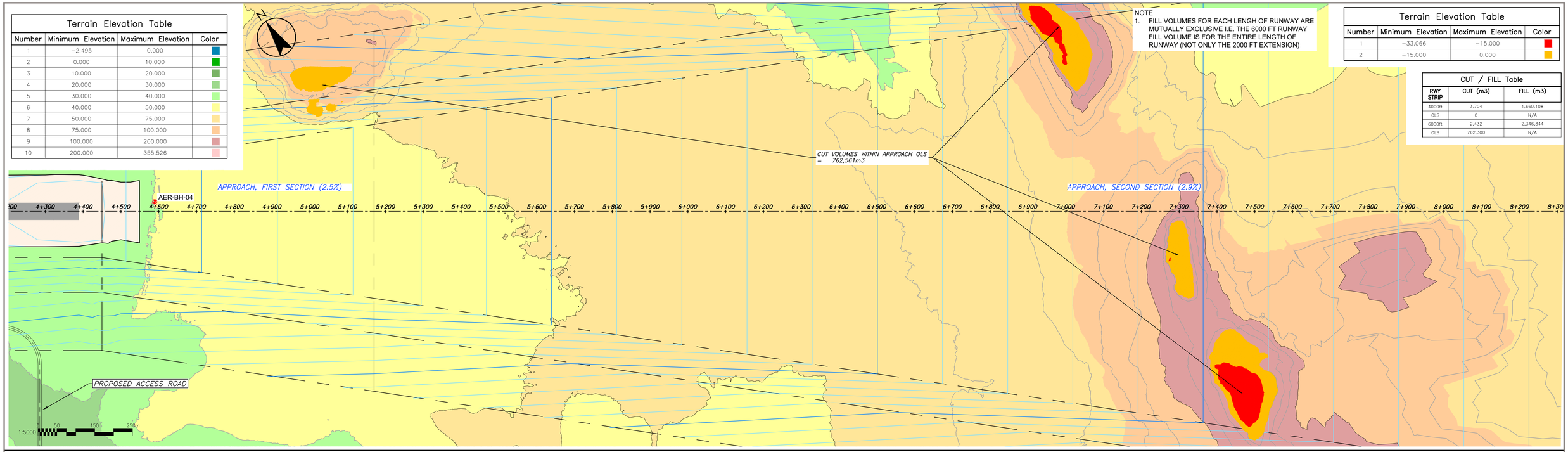
C:\Users\mfox\DOCS\Documents\New Consulting\144903508 Grays Bay Road & Port\Project Files\02 general\ issued\ 03 draft\ 26p\ 8p 20260304AE0803.dwg (AE0803), July 31 2026 - 13:50 pm (BY FOX, CHRIS)

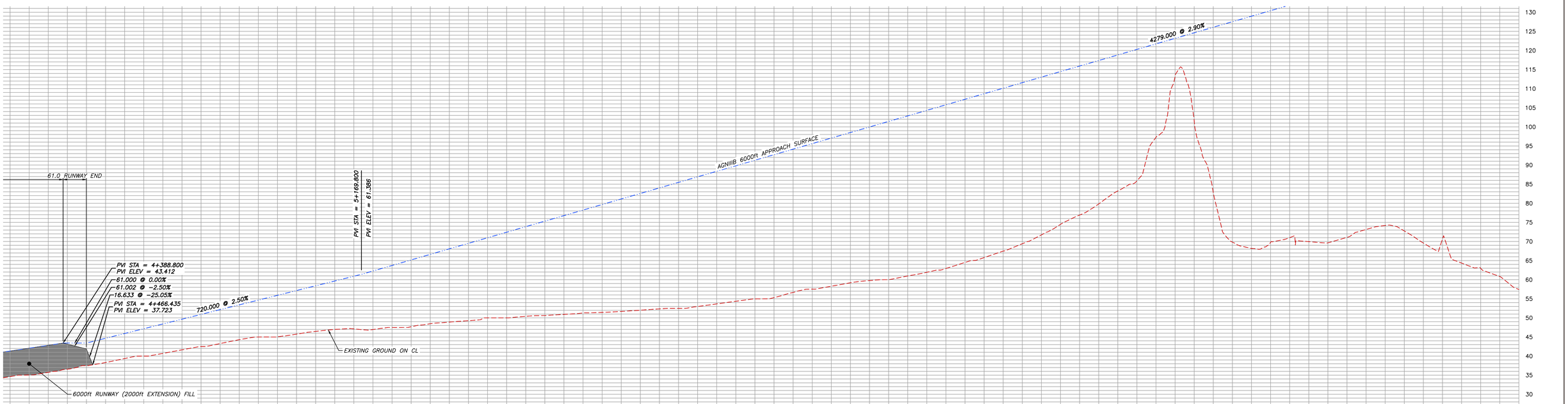
Terrain Elevation Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	−2.495	0.000	
2	0.000	10.000	
3	10.000	20.000	
4	20.000	30.000	
5	30.000	40.000	
6	40.000	50.000	
7	50.000	75.000	
8	75.000	100.000	
9	100.000	200.000	
10	200.000	355.526	

NOTE
1. FILL VOLUMES FOR EACH LENGH OF RUNWAY ARE MUTUALLY EXCLUSIVE I.E. THE 6000 FT RUNWAY FILL VOLUME IS FOR THE ENTIRE LENGTH OF RUNWAY (NOT ONLY THE 2000 FT EXTENSION)

Terrain Elevation Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	−33.066	−15.000	
2	−15.000	0.000	

CUT / FILL Table		
RWY STRIP	CUT (m3)	FILL (m3)
4000ft	3,704	1,660,108
OLS	0	N/A
6000ft	2,432	2,346,344
OLS	762,300	N/A





1:5000 H 0 50 150 250m
1:50 V 0 5 15 25m

LEGEND

2025 DRILLED BOREHOLE

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	2026.09.25	JL	AM		ISSUED FOR DRAFT MAJOR WORK RFP

REVISIONS

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WEST KITIKMEOT RESOURCES CORP

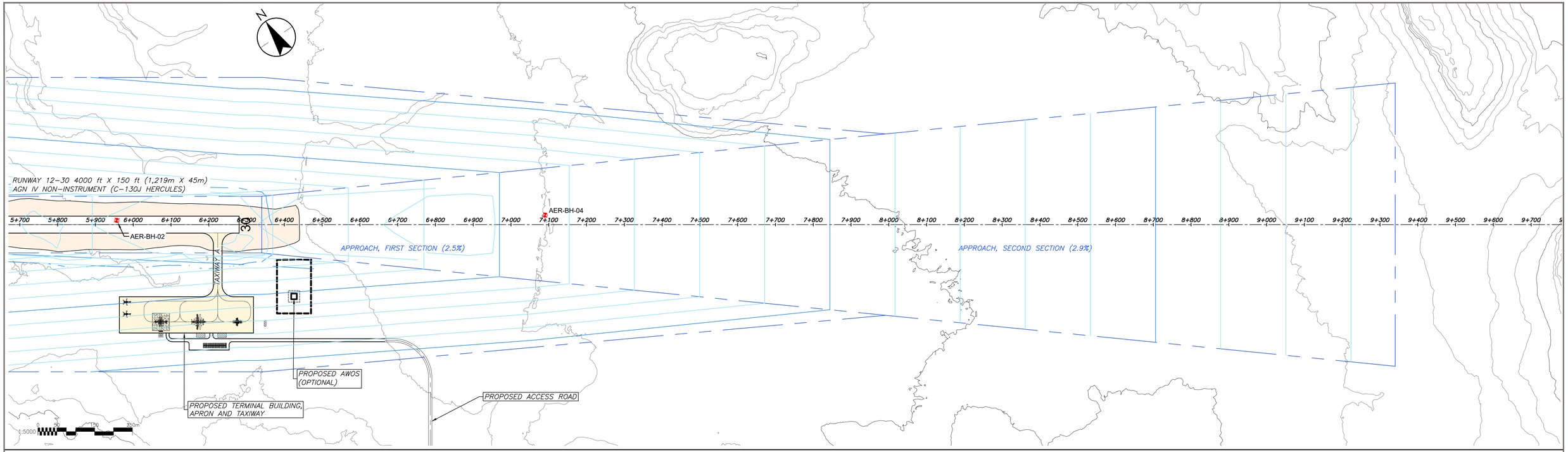
NUNAMI
STANTEC LIMITED

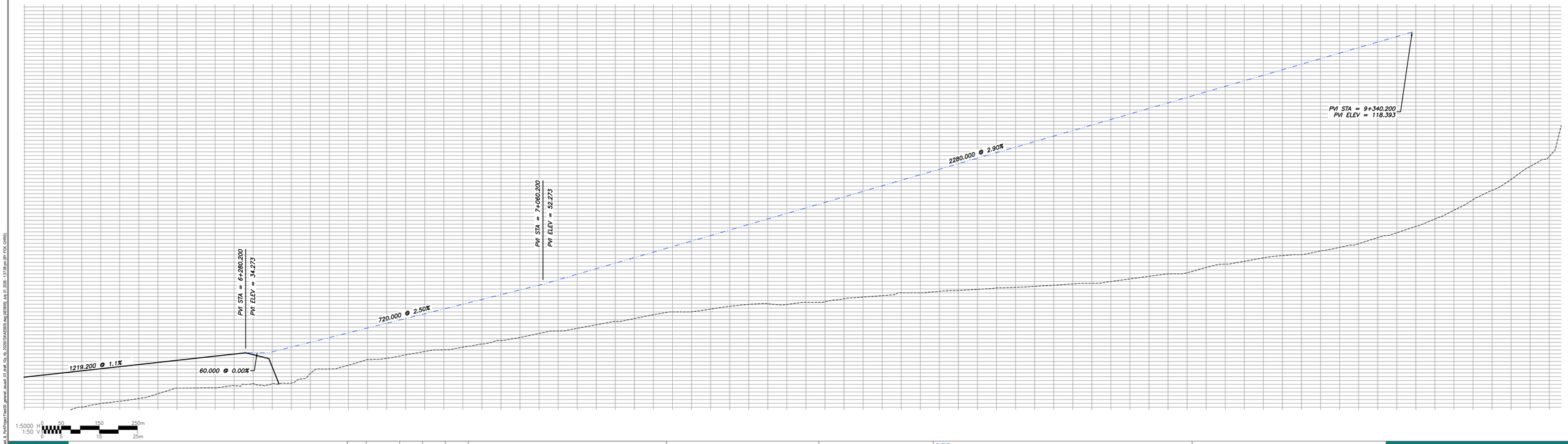
GRAYS BAY ROAD AND PORT
NUNAVUT, CANADA

PORT AERODROME
RUNWAY 12-30 4000ft TO 6000ft
OLS APPROACH PLAN & PROFILE

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
1449035608	VANC	AM	AM	0	AE0804
DATE	SHEET No.	DWN	APP	STATUS	
SEP 25, 2026	4 of 15	JL	AM	FINAL	

C:\Users\mfortin\DOCS\Documents\Drawing\1449035608_Grays_Bay_Road_&_Port\Project Files\05_general_issued_03.dwg, 10p, by 2026/09/24 8:58:04 AM (GMT) (FOX, CHRIS)





LEGEND

2025 DRILLED BOREHOLE

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	2026.09.25	JL	AM		ISSUED FOR DRAFT MAJOR WORK RFP

REVISIONS

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WEST KITIKMEOT RESOURCES CORP

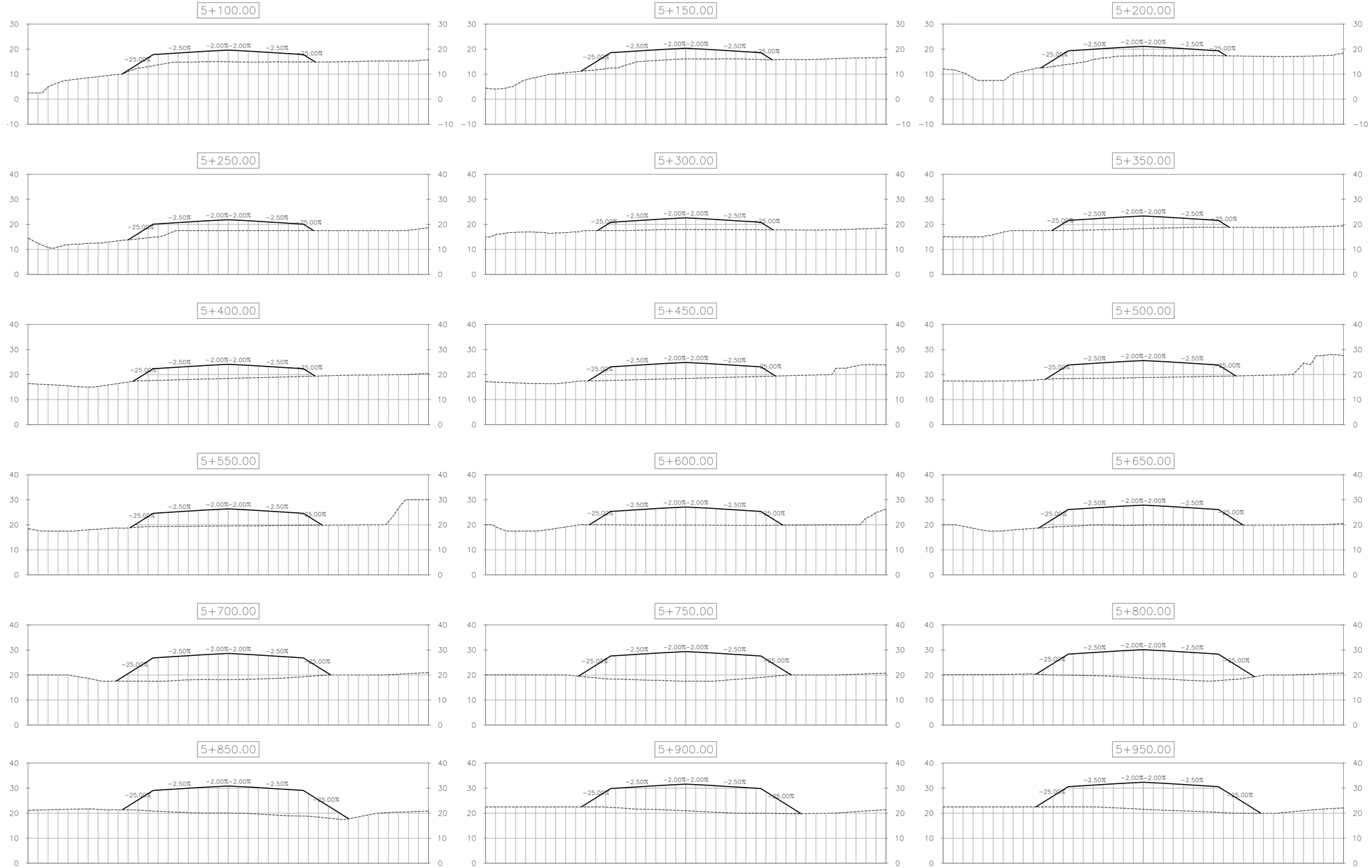
NUNAMI
STANTEC LIMITED

GRAYS BAY ROAD AND PORT
NUNAVUT, CANADA

PORT AERODROME
RUNWAY 12-30 C-130J HERCULES
AGN IV 4000ft PLAN & PROFILE

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	VANC	AM	AM	0	AE0805
DATE: SEP 25, 2026	SHEET No. 5 of 15	DWN JL	APP AM	STATUS FINAL	

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LEGEND

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	2026.09.25	CDZ	CDZ	WO	ISSUED FOR DRAFT MAJOR WORK RFP

REVISIONS

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WEST KITIKMEOT RESOURCES CORP

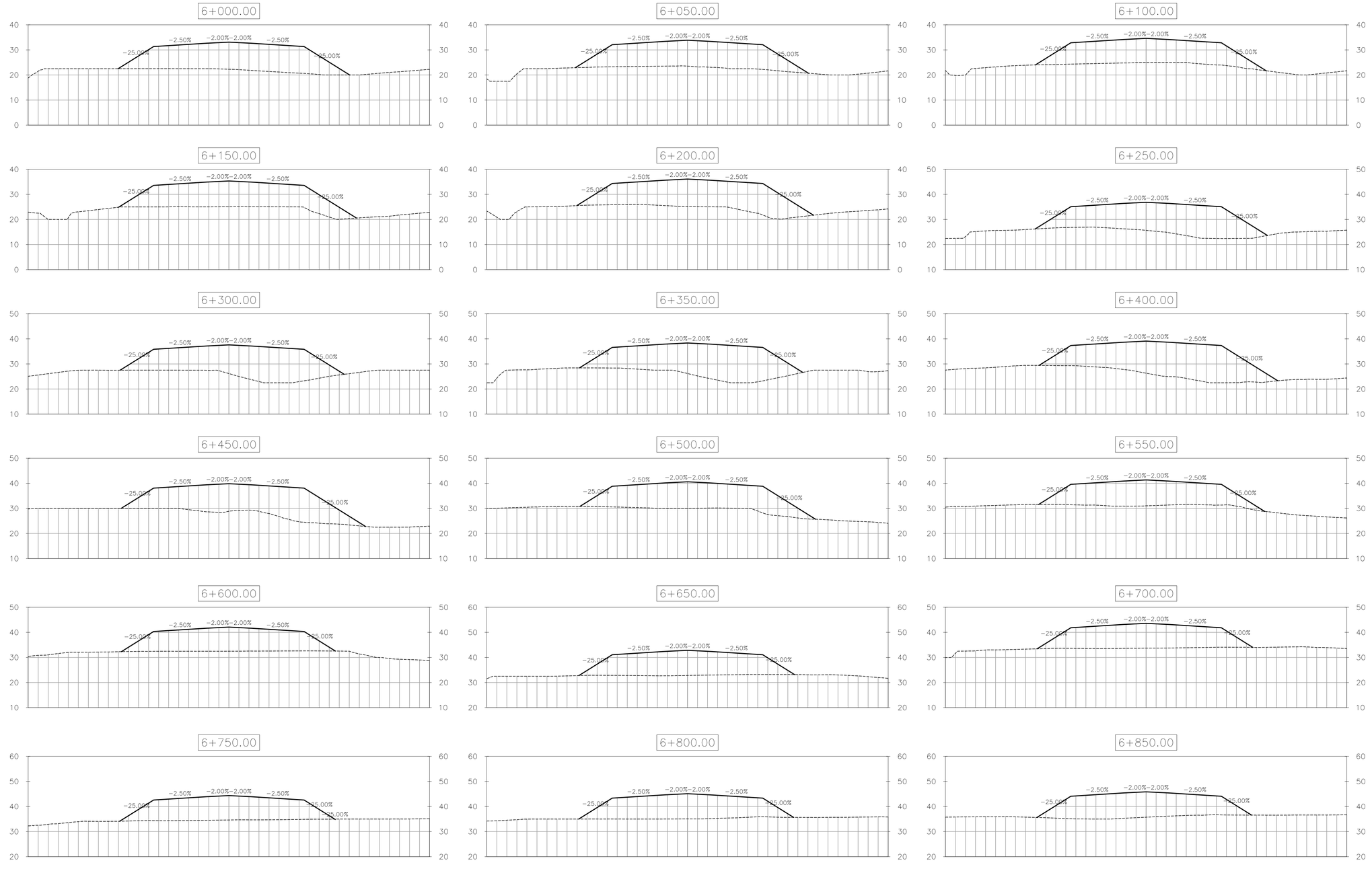
NUNAMI
STANTEC LIMITED

GRAYS BAY ROAD AND PORT
NUNAVUT, CANADA

PORT AERODROME
RUNWAY 12-30 6000ft
DESIGN SECTIONS I

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903608	YK	CDZ	AM	0	AE0806
DATE: SEP 25, 2026	SHEET No. 6 of 15	DWN CDZ	APP AM	STATUS FINAL	

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LEGEND

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	2026.09.25	CDZ	CDZ	WO	ISSUED FOR DRAFT MAJOR WORK RFP

REVISIONS

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CLIENT

WEST KITIKMEOT RESOURCES CORP

NUNAMI

STANTEC LIMITED

GRAYS BAY ROAD AND PORT
NUNAVUT, CANADA

PORT AERODROME
RUNWAY 12-30 6000ft
DESIGN SECTIONS II

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144935508	YK	CDZ	AM	0	AE0807
DATE:	SHEET No.	DWN	APP	STATUS	
SEP 25, 2026	7 of 15	CDZ	AM	FINAL	

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RUNWAY

AGN IIIA NON-PRECISION

AGN IIIA = 70m

RUNWAY STRIP

TAXIWAY

23m

355m

96m

Ø27.4m

34.0m

HELICOPTER PARKING
EH101 (CORMORANT)

45m

46m

STAND 3
AGN IIIA
MAX: Q400

STAND 2
AGN IV
MAX: C-130J

C-130J-30 Hercules

STAND 1
AGN II
MAX: SAAB-340B

FUTURE AVIATION
FUEL TANKS

CONCRETE
PAD

TERMINAL

AIRPORT MAINTENANCE GARAGE

LANDSIDE ACCESS ROAD

PARKING

AUTOMATED WEATHER
OBSERVATION SYSTEM
(AWOS)

90m

AWOS PROTECTION ZONE

90m

FIELD ELECTRICAL
CENTRE

NOTES

1. TAXIWAY CENTRELINES ARE SHOWN FOR PLANNING PURPOSES ONLY AND WILL NOT BE MARKED ON GRAVEL APRON.
2. AIRCRAFT CAN PARK WITH NOSE FACING IN DIAMETRICALLY OPPOSITE DIRECTION DEPENDING ON PRE-DOMINANT WIND DIRECTION.
3. HELICOPTER STAND DIMENSIONS AND CLEARANCES BASED ON *STANDARD 325 - HELIPORTS - CANADIAN AVIATION REGULATIONS*

1:750 0 7.5 22.5 37.5m

LEGEND

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	2026.09.25	CDZ	CDZ	WO	ISSUED FOR DRAFT MAJOR WORK RFP

REVISIONS

CONCEPTUAL ONLY

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CLIENT

WEST KITIKMEOT RESOURCES CORP

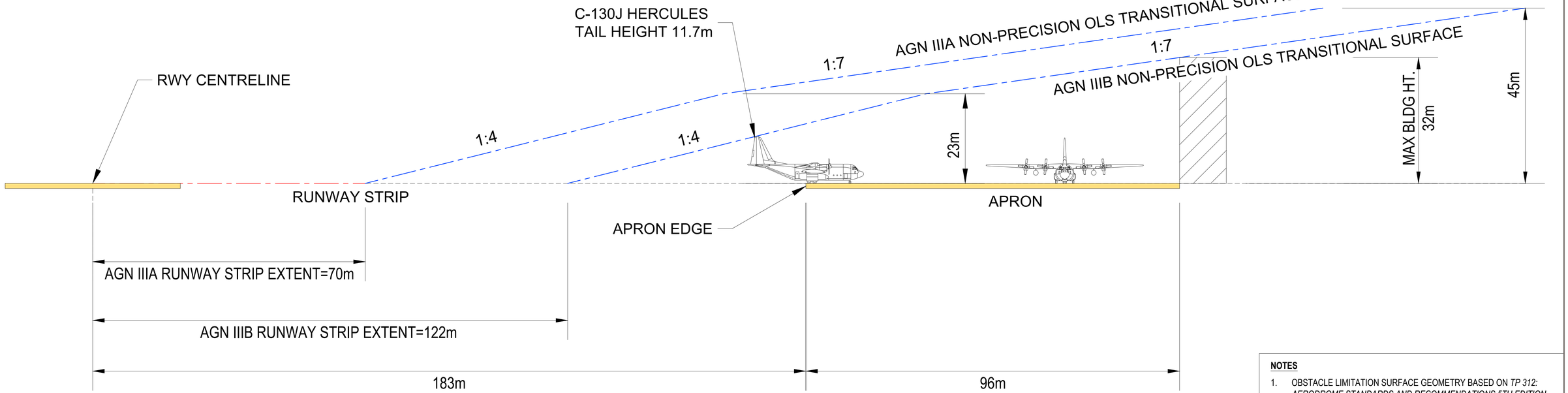
NUNAMI
STANTEC LIMITED

GRAYS BAY ROAD AND PORT
NUNAVUT, CANADA

PORT AERODROME
APRON
LAYOUT

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	TK	AM	0	AE0808
DATE: SEP 25, 2026	SHEET No. 8 of 15	DWN TK	APP AM	STATUS FINAL	

C:\Users\tkhoo\OneDrive - Stantec\Documents\Grays Bay Road & Port\Project Files\01 - general - issued_03 draft_15p.rtp, 2026/09/25 - 1:37:34 pm (EP, CDZ, CHRIS)



NOTES

1. OBSTACLE LIMITATION SURFACE GEOMETRY BASED ON *TP 312: AERODROME STANDARDS AND RECOMMENDATIONS 5TH EDITION*
2. FOR PLANNING PURPOSES, THE ELEVATIONS OF RUNWAY AND APRON ARE ASSUMED TO BE EQUAL.
3. SITING OF THE APRON PERMITS PARKING OF AGN IIIA AND C-130J AIRCRAFT WITH TAIL FACING THE RUNWAY AND EXTENDING BEYOND THE APRON EDGE WITHOUT INFRINGEMENT OF TRANSITIONAL OLS. THE C-130J IS SHOWN AS ONE OF THE MOST DEMANDING AIRCRAFT IN TERMS OF TAIL HEIGHT AND FUSELAGE LENGTH.

1:500 0 5 15 25m

LEGEND

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	2026.09.25	CDZ	CDZ	WO	ISSUED FOR DRAFT MAJOR WORK RFP

REVISIONS

CONCEPTUAL ONLY

FOR INTERNAL USE ONLY

PERMIT

PROFESSIONAL SEAL

CLIENT

WEST KITIKMEOT RESOURCES CORP

NUNAMI

STANTEC LIMITED

GRAYS BAY ROAD AND PORT
NUNAVUT, CANADA

PORT AERODROME
APRON SITING
OLS PROFILE

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	TK	AM	0	AE0809
DATE: SEP 25, 2026	SHEET No. 9 of 15	DWN TK	APP AM	STATUS FINAL	

C:\Users\tkoh\DC\ACDocs\Stantec Consulting\144903508 Grays Bay Road & Port\Project Folder\02 general issued\02_01 arch_10p_rfp_20250923\AE0809_AE0811.rvt | AE0809 July 31, 2026 - 12:39 pm BY TOH, CHRIS

LEGEND

NOSE GEAR PATH

OUTER MAIN WHEEL TO TAXIWAY/APRON EDGE CLEARANCE

WINGTIP CLEARANCE

RUNWAY CENTRELINE

70m

RUNWAY STRIP

TAXIWAY

23m

183m

3m

3m

355m

3m

3m

45m

46m

96m

C-130J-30 Hercules

HELICOPTER PARKING
EH101 (CORMORANT)

STAND 3
AGN IIIA
MAX: Q400

STAND 2
AGN IV
MAX: C-130J

STAND 1
AGN II
MAX: SAAB-340B

FUTURE AVIATION FUEL TANKS

CONCRETE PAD

TERMINAL

AIRPORT MAINTENANCE GARAGE

LANDSIDE ACCESS ROAD

PARKING

AUTOMATED WEATHER OBSERVATION SYSTEM (AWOS)

90m

90m

AWOS PROTECTION ZONE

FIELD ELECTRICAL CENTRE

NOTES

1. AIRCRAFT MOVEMENTS SIMULATED AT A SPEED OF 10 KM/H.
2. FOR POWER-OUT OPERATIONS, 3m FORWARD ROLL ASSUMED PRIOR TO INITIATING TURN
3. WINGTIP CLEARANCE ACCORDING TO STANDARDS SPECIFIED IN *ICAO ANNEX 14 VOLUME 1: AERODROME DESIGN AND OPERATIONS*
4. MAIN GEAR CLEARANCE ACCORDING TO *TP 312: AERODROME STANDARDS AND RECOMMENDATIONS 5TH EDITION*

1:750 0 7.5 22.5 37.5m

LEGEND

3m WINGTIP CLEARANCE

3m MAIN GEAR CLEARANCE

COCKPIT PATH

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	2026.09.25	CDZ	CDZ	WO	ISSUED FOR DRAFT MAJOR WORK RFP

REVISIONS

CONCEPTUAL ONLY

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PERMIT

PROFESSIONAL SEAL

CLIENT

WEST KITIKMEOT RESOURCES CORP

NUNAMI

STANTEC LIMITED

GRAYS BAY ROAD AND PORT
NUNAVUT, CANADA

PORT AERODROME
STAND 1 MOVEMENTS
WEST

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	TK	AM	0	AE0810
DATE: SEP 25, 2026	SHEET No. 10 of 15	DWN TK	APP AM	STATUS FINAL	

C:\Users\tkin\DOCS\Docs\Stantec Consulting\144903508 Grays Bay Road & Port\Revit Files\R_general_issued_03_grays_bay_rpp_R25DTSAE0809_AE0810.rvt, Sep 25, 2026/3:40:43 PM, Tkin, PDF Export Sheets - general - issued_03_grays_bay_Road_& Port*Revit Files*R_general_issued_03_grays_bay_rpp_R25DTSAE0809_AE0810.rvt, July 31, 2025 - 12:40:49 PM, Tkin, DWG)

RUNWAY CENTRELINE

70m

RUNWAY STRIP

TAXIWAY

23m

183m

3m

3m

355m

3m

3m

96m

45m

46m

HELICOPTER PARKING
EH101 (CORMORANT)

STAND 3
AGN IIIA
MAX: Q400

STAND 2
AGN IV
MAX: C-130J

STAND 1
AGN II
MAX: SAAB-340B

FUTURE AVIATION
FUEL TANKS

CONCRETE
PAD

TERMINAL

AIRPORT MAINTENANCE GARAGE

LANDSIDE ACCESS ROAD

PARKING

AUTOMATED WEATHER
OBSERVATION SYSTEM
(AWOS)

90m

90m

AWOS PROTECTION ZONE

FIELD ELECTRICAL
CENTRE

LEGEND

NOSE GEAR PATH

OUTER MAIN WHEEL TO TAXIWAY/APRON
EDGE CLEARANCE

WINGTIP CLEARANCE

NOTES

1. AIRCRAFT MOVEMENTS SIMULATED AT A SPEED OF 10 KM/H.
2. FOR POWER-OUT OPERATIONS, 3m FORWARD ROLL ASSUMED PRIOR TO INITIATING TURN
3. WINGTIP CLEARANCE ACCORDING TO STANDARDS SPECIFIED IN *ICAO ANNEX 14 VOLUME 1: AERODROME DESIGN AND OPERATIONS*
4. MAIN GEAR CLEARANCE ACCORDING TO *TP 312: AERODROME STANDARDS AND RECOMMENDATIONS 5TH EDITION*

1:750 0 7.5 22.5 37.5m

LEGEND

3m WINGTIP CLEARANCE

3m MAIN GEAR CLEARANCE

COCKPIT PATH

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	2026.09.25	CDZ	CDZ	WO	ISSUED FOR DRAFT MAJOR WORK RFP

REVISIONS

CONCEPTUAL ONLY

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PROFESSIONAL SEAL

CLIENT

WEST KITIKMEOT RESOURCES CORP

NUNAMI
STANTEC LIMITED

GRAYS BAY ROAD AND PORT
NUNAVUT, CANADA

PORT AERODROME
STAND 1 MOVEMENTS
EAST

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	TK	AM	0	AE0811
DATE: SEP 25, 2026	SHEET No. 11 of 15	DWN TK	APP AM	STATUS FINAL	

C:\Users\tkoo\DCAD\Documents\www Consulting\144903508_Grays Bay_Revit_tk_Port\Project Files\00_general - detail_03_draft_15y_tk_20250924\AE0809-AE0811.dwg | AE0811 | July 31, 2025 - 1:37:42 pm | BY: TOK (CHRD)

LEGEND

NOSE GEAR PATH

OUTER MAIN WHEEL TO TAXIWAY/APRON EDGE CLEARANCE

WINGTIP CLEARANCE

RUNWAY CENTRELINE

70m

RUNWAY STRIP

TAXIWAY

23m

183m

7.5m

7.5m

355m

1.5m

1.5m

45m

46m

96m

HELICOPTER PARKING
EH101 (CORMORANT)

STAND 3
AGN IIIA
MAX: Q400

STAND 2
AGN IV
MAX: C-130J

C-130J-30 Hercules

STAND 1
AGN II
MAX: SAAB-340B

FUTURE AVIATION FUEL TANKS

CONCRETE PAD

TERMINAL

AIRPORT MAINTENANCE GARAGE

LANDSIDE ACCESS ROAD

PARKING

AUTOMATED WEATHER OBSERVATION SYSTEM (AWOS)

90m

AWOS PROTECTION ZONE

90m

FIELD ELECTRICAL CENTRE

NOTES

1. AIRCRAFT MOVEMENTS SIMULATED AT A SPEED OF 10 KM/H.
2. FOR POWER-OUT OPERATIONS, 3m FORWARD ROLL ASSUMED PRIOR TO INITIATING TURN
3. WINGTIP CLEARANCE ACCORDING TO STANDARDS SPECIFIED IN *ICAO ANNEX 14 VOLUME 1: AERODROME DESIGN AND OPERATIONS*
4. MAIN GEAR CLEARANCE ACCORDING TO *TP 312: AERODROME STANDARDS AND RECOMMENDATIONS 5TH EDITION*

1:750 0 7.5 22.5 37.5m

LEGEND

7.5 m WINGTIP CLEARANCE

1.5 m MAIN GEAR CLEARANCE

COCKPIT PATH

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	2026.09.25	CDZ	CDZ	WO	ISSUED FOR DRAFT MAJOR WORK RFP

REVISIONS

CONCEPTUAL ONLY

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PERMIT

PROFESSIONAL SEAL

CLIENT

WEST KITIKMEOT RESOURCES CORP

NUNAMI
STANTEC LIMITED

GRAYS BAY ROAD AND PORT
NUNAVUT, CANADA

PORT AERODROME
STAND 2 MOVEMENTS
WEST

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	TK	AM	0	AE0812
DATE: SEP 25, 2026	SHEET No. 12 of 15	DWN TK	APP AM	STATUS FINAL	

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LEGEND

NOSE GEAR PATH

OUTER MAIN WHEEL TO TAXIWAY/APRON EDGE CLEARANCE

WINGTIP CLEARANCE

RUNWAY CENTRELINE

70m

RUNWAY STRIP

TAXIWAY

23m

183m

7.5m

7.5m

355m

1.5m

1.5m

45m

46m

96m

HELICOPTER PARKING
EH101 (CORMORANT)

STAND 3
AGN IIIA
MAX: Q400

STAND 2
AGN IV
MAX: C-130J

C-130J-30 Hercules

STAND 1
AGN II
MAX: SAAB-340B

FUTURE AVIATION FUEL TANKS

CONCRETE PAD

TERMINAL

AIRPORT MAINTENANCE GARAGE

LANDSIDE ACCESS ROAD

PARKING

AUTOMATED WEATHER OBSERVATION SYSTEM (AWOS)

90m

AWOS PROTECTION ZONE

90m

FIELD ELECTRICAL CENTRE

NOTES

1. AIRCRAFT MOVEMENTS SIMULATED AT A SPEED OF 10 KM/H.
2. FOR POWER-OUT OPERATIONS, 3m FORWARD ROLL ASSUMED PRIOR TO INITIATING TURN
3. WINGTIP CLEARANCE ACCORDING TO STANDARDS SPECIFIED IN *ICAO ANNEX 14 VOLUME 1: AERODROME DESIGN AND OPERATIONS*
4. MAIN GEAR CLEARANCE ACCORDING TO *TP 312: AERODROME STANDARDS AND RECOMMENDATIONS 5TH EDITION*

1:750 0 7.5 22.5 37.5m

LEGEND

7.5 m WINGTIP CLEARANCE

1.5 m MAIN GEAR CLEARANCE

COCKPIT PATH

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	2026.09.25	CDZ	CDZ	WO	ISSUED FOR DRAFT MAJOR WORK RFP

REVISIONS

CONCEPTUAL ONLY

FOR INTERNAL USE ONLY

PERMIT

PROFESSIONAL SEAL

CLIENT

WEST KITIKMEOT RESOURCES CORP

NUNAMI

STANTEC LIMITED

GRAYS BAY ROAD AND PORT
NUNAVUT, CANADA

PORT AERODROME
STAND 2 MOVEMENTS
EAST

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	TK	AM	0	AE0813
DATE:	SHEET No.	DWN	APP	STATUS	
SEP 25, 2026	13 of 15	TK	AM	FINAL	

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LEGEND

NOSE GEAR PATH

OUTER MAIN WHEEL TO TAXIWAY/APRON EDGE CLEARANCE

WINGTIP CLEARANCE

RUNWAY CENTRELINE

70m

RUNWAY STRIP

TAXIWAY

23m

4.5m

4.5m

183m

355m

4m

4m

45m

46m

96m

HELICOPTER PARKING
EH101 (CORMORANT)

STAND 3
AGN IIIA
MAX: Q400

STAND 2
AGN IV
MAX: C-130J

C-130J-30 Hercules

STAND 1
AGN II
MAX: SAAB-340B

FUTURE AVIATION FUEL TANKS

CONCRETE PAD

TERMINAL

AIRPORT MAINTENANCE GARAGE

LANDSIDE ACCESS ROAD

PARKING

AUTOMATED WEATHER OBSERVATION SYSTEM (AWOS)

90m

AWOS PROTECTION ZONE

90m

FIELD ELECTRICAL CENTRE

NOTES

1. AIRCRAFT MOVEMENTS SIMULATED AT A SPEED OF 10 KM/H.
2. FOR POWER-OUT OPERATIONS, 3m FORWARD ROLL ASSUMED PRIOR TO INITIATING TURN
3. WINGTIP CLEARANCE ACCORDING TO STANDARDS SPECIFIED IN *ICAO ANNEX 14 VOLUME 1: AERODROME DESIGN AND OPERATIONS*
4. MAIN GEAR CLEARANCE ACCORDING TO *TP 312: AERODROME STANDARDS AND RECOMMENDATIONS 5TH EDITION*

1:750 0 7.5 22.5 37.5m

LEGEND

4.5m WINGTIP CLEARANCE

1.5 m MAIN GEAR CLEARANCE

COCKPIT PATH

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	2026.09.25	CDZ	CDZ	WO	ISSUED FOR DRAFT MAJOR WORK RFP

REVISIONS

CONCEPTUAL ONLY

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PERMIT

PROFESSIONAL SEAL

CLIENT

WEST KITIKMEOT RESOURCES CORP

NUNAMI
STANTEC LIMITED

GRAYS BAY ROAD AND PORT
NUNAVUT, CANADA

PORT AERODROME
STAND 3 MOVEMENTS
WEST

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	TK	AM	0	AE0814
DATE: SEP 25, 2026	SHEET No. 14 of 15	DWN TK	APP AM	STATUS FINAL	

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LEGEND

NOSE GEAR PATH

OUTER MAIN WHEEL TO TAXIWAY/APRON EDGE CLEARANCE

WINGTIP CLEARANCE

RUNWAY CENTRELINE

70m

RUNWAY STRIP

TAXIWAY

23m

4.5m

4.5m

183m

355m

4m

4m

45m

46m

96m

HELICOPTER PARKING
EH101 (CORMORANT)

STAND 3
AGN IIIA
MAX: Q400

STAND 2
AGN IV
MAX: C-130J

C-130J-30 Hercules

STAND 1
AGN II
MAX: SAAB-340B

FUTURE AVIATION FUEL TANKS

CONCRETE PAD

TERMINAL

AIRPORT MAINTENANCE GARAGE

LANDSIDE ACCESS ROAD

PARKING

AUTOMATED WEATHER OBSERVATION SYSTEM (AWOS)

90m

AWOS PROTECTION ZONE

90m

FIELD ELECTRICAL CENTRE

NOTES

1. AIRCRAFT MOVEMENTS SIMULATED AT A SPEED OF 10 KM/H.
2. FOR POWER-OUT OPERATIONS, 3m FORWARD ROLL ASSUMED PRIOR TO INITIATING TURN
3. WINGTIP CLEARANCE ACCORDING TO STANDARDS SPECIFIED IN *ICAO ANNEX 14 VOLUME 1: AERODROME DESIGN AND OPERATIONS*
4. MAIN GEAR CLEARANCE ACCORDING TO *TP 312: AERODROME STANDARDS AND RECOMMENDATIONS 5TH EDITION*

1:750 0 7.5 22.5 37.5m

LEGEND

4.5m WINGTIP CLEARANCE

3m MAIN GEAR CLEARANCE

COCKPIT PATH

NUM	DATE	DWN	CKD	APR	DESCRIPTION
0	2026.09.25	CDZ	CDZ	WO	ISSUED FOR DRAFT MAJOR WORK RFP

REVISIONS

CONCEPTUAL ONLY

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PERMIT

PROFESSIONAL SEAL

CLIENT

WEST KITIKMEOT RESOURCES CORP

NUNAMI

STANTEC LIMITED

GRAYS BAY ROAD AND PORT
NUNAVUT, CANADA

PORT AERODROME
STAND 3 MOVEMENTS
EAST

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	TK	AM	0	AE0815
DATE:	SHEET No.	DWN	APP	STATUS	
SEP 25, 2026	15 of 15	TK	AM	FINAL	

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OLD JERICHO MINE SITE

CONTWOYTO LAKE

BURNSIDE RIVER

1101+350

1002

1105+000

1110+000

1115+000

62 (BURNSIDE)

1120+000

63

1125+000

1130+000

68

000+350

1140+000

71

72

1145+000

1150+000

74 75 76 77 78 79 80 80A 82 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

0 500 1000 2500

1:50000

N

RD0401

RD0402

RD0403

RD0404

RD0405

LEGEND

- ROAD CENTERLINE (5 KM MAJOR STA, 1 KM TICK)
- ROAD CORRIDOR (2 KM WIDE)
- (92) POTENTIAL QUARRY SITE
- ID # BRIDGE CROSSINGS

NUMBERS ASSOCIATED WITH QUARRIES DENOTE LOCATIONS IDENTIFIED IN PAST STUDIES:
- FLUOR 2013 ISSUED FOR FEASIBILITY DESIGN FOR MMG'S IZOK CORRIDOR PROJECT
- 2018 JERICHO TIE–IN CONCEPTUAL DESIGN FOR KIA/NRC

NOTE:
POTENTIAL QUARRY SITE PROPERTIES ARE SHOWN ON DRAWINGS RD0407 & RD0408.

NUM	DATE	DWN	CKD	APR	DESCRIPTION
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0	2026.09.25	MD	GM	AF	ISSUED FOR MAJOR WORK RFP

REVISIONS

CONCEPTUAL ONLY

FOR INTERNAL USE ONLY

PERMIT

PROFESSIONAL SEAL

CLIENT

WEST KITIKMEOT RESOURCES CORP

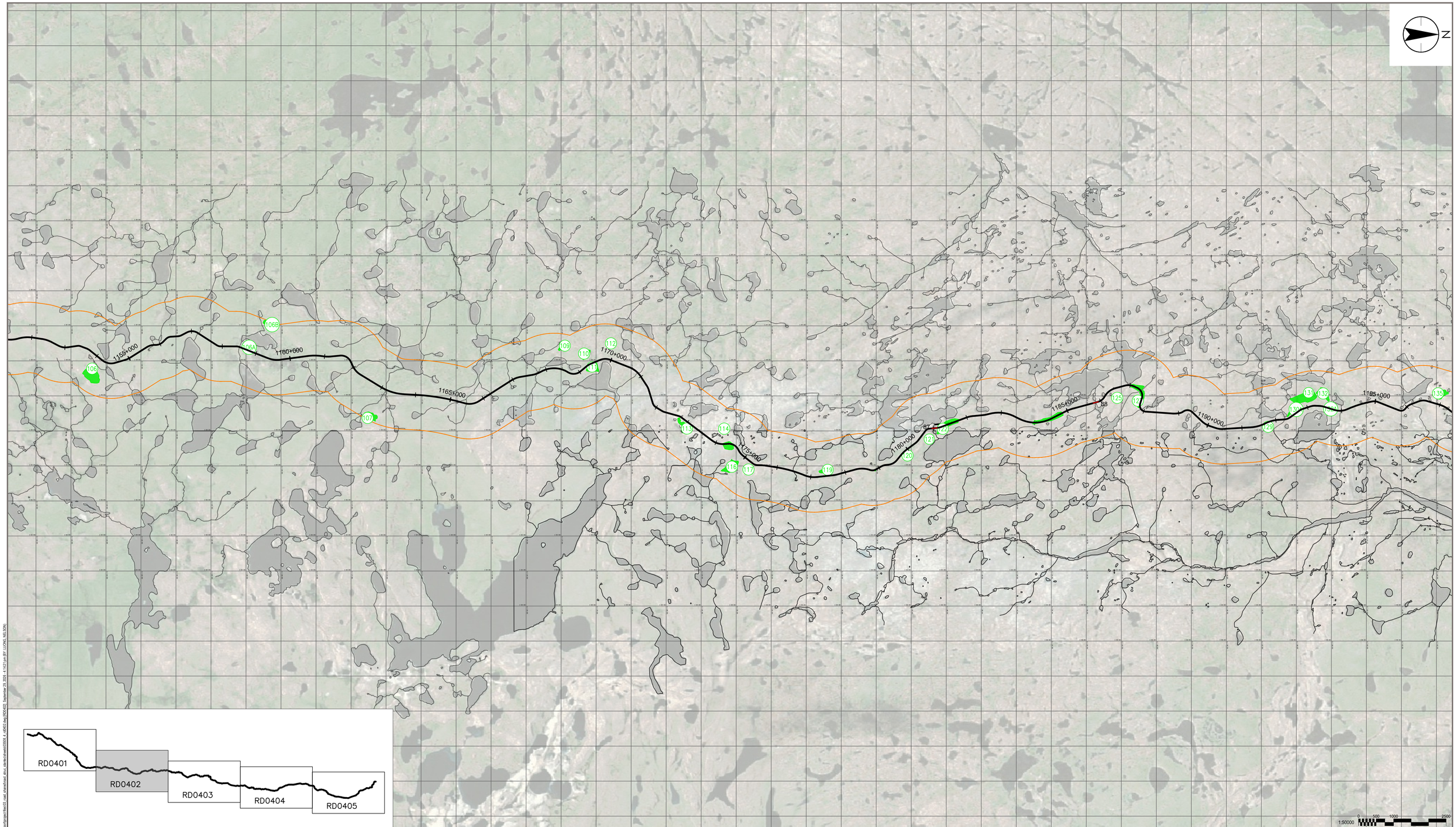
NUNAMI
STANTEC LIMITED

GRAYS BAY ROAD & PORT
NUNAVUT, CANADA

ROADWAY
STA. 1101+350 - STA. 1151+000

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	JK	GM	0	RD0401
DATE: 2026.09.25	SHEET No. 1 of 5	DWN MD	APP AF	STATUS DFT	

C:\Users\mdyck\OneDrive - Stantec\Documents\projects\144903508_grays_bay_road_&_port\report files\03_road_drawings\road_plan_profile\144903508_4_rd0401.dwg [RD0401] September 29, 2026 - 4:12:03 pm (BY: LUONG, NGUYEN)



LEGEND

- ROAD CENTERLINE (5 KM MAJOR STA, 1 KM TICK)
- ROAD CORRIDOR (2 KM WIDE)
- (92) POTENTIAL QUARRY SITE
- ID # BRIDGE CROSSINGS

NUMBERS ASSOCIATED WITH QUARRIES DENOTE LOCATIONS IDENTIFIED IN PAST STUDIES:
- FLUOR 2013 ISSUED FOR FEASIBILITY DESIGN FOR MMG'S IZOK CORRIDOR PROJECT
- 2018 JERICHO TIE-IN CONCEPTUAL DESIGN FOR KIA/NRC

NOTE:
POTENTIAL QUARRY SITE PROPERTIES ARE SHOWN ON DRAWINGS RD0407 & RD0408.

NUM	DATE	DWN	CKD	APR	DESCRIPTION
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0	2026.09.25	MD	GM	AF	ISSUED FOR MAJOR WORK RFP

REVISIONS

CONCEPTUAL ONLY

FOR INTERNAL USE ONLY

PERMIT

PROFESSIONAL SEAL

CLIENT

WEST KITIKMEOT RESOURCES CORP

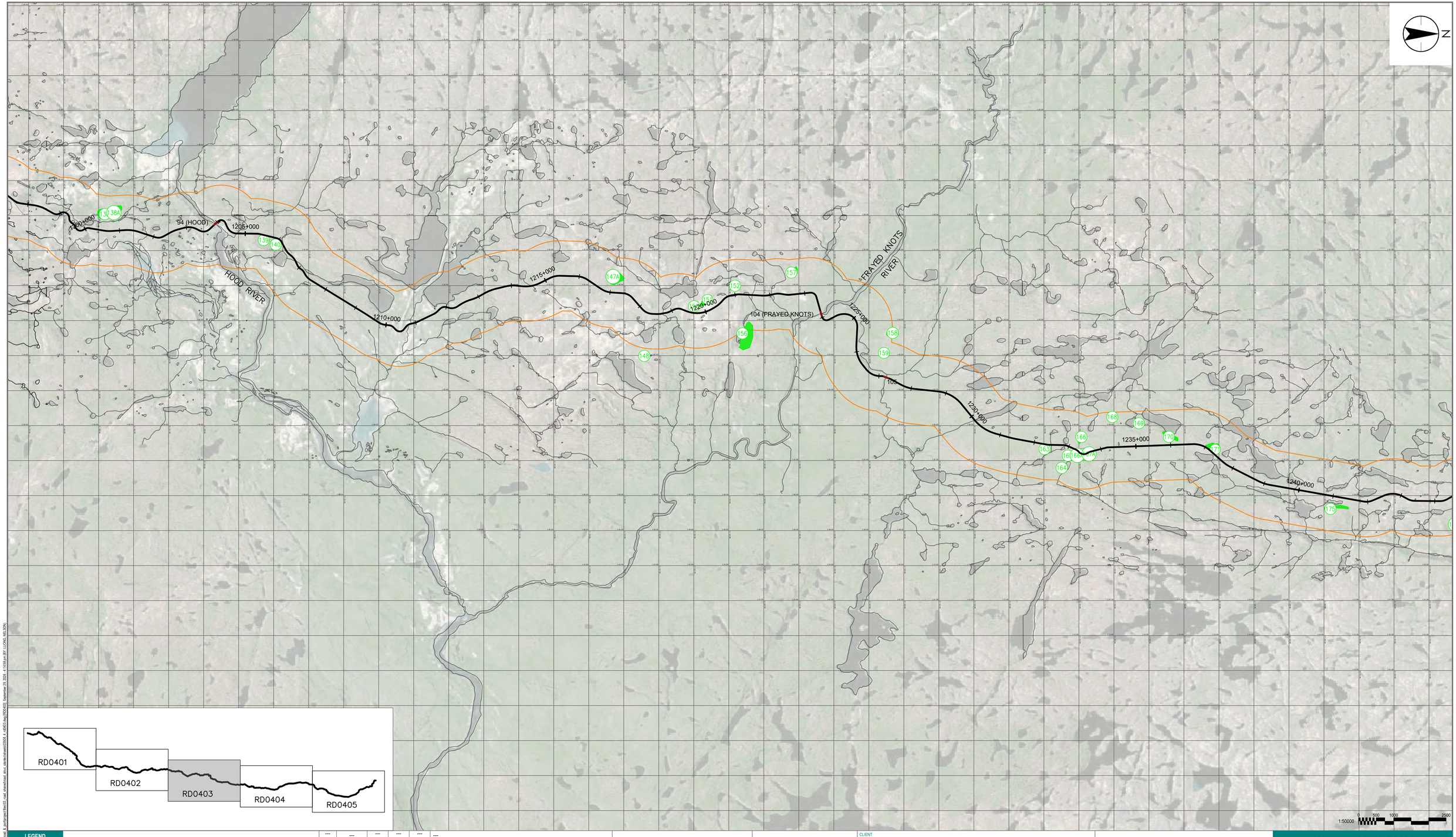
NUNAMI
STANTEC LIMITED

GRAYS BAY ROAD & PORT
NUNAVUT, CANADA

ROADWAY
STA. 1151+000 - STA. 1197+500

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	JK	GM	0	RD0402
DATE:	SHEET No.	DWN	APP	STATUS	
2026.09.25	2 of 5	MD	AF	DFT	

\\stantec\data\YK\Projects\active\144903508 grays bay port & portproject files\03 road alignment\road alignment.dwg, 2026.09.25 14:21:23 PM BY LUCAS, NELSON



1:50000 0 800 1000 2500

LEGEND

- ROAD CENTERLINE (5 KM MAJOR STA, 1 KM TICK)
- ROAD CORRIDOR (2 KM WIDE)
- (92) POTENTIAL QUARRY SITE
- ID # BRIDGE CROSSINGS

NUMBERS ASSOCIATED WITH QUARRIES DENOTE LOCATIONS IDENTIFIED IN PAST STUDIES:
- FLUOR 2013 ISSUED FOR FEASIBILITY DESIGN FOR MMG'S IZOK CORRIDOR PROJECT
- 2018 JERICHO TIE-IN CONCEPTUAL DESIGN FOR KIA/NRC

NOTE:
POTENTIAL QUARRY SITE PROPERTIES ARE SHOWN ON DRAWINGS RD0407 & RD0408.

NUM	DATE	DWN	CKD	APR	DESCRIPTION
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0	2026.09.25	MD	GM	AF	ISSUED FOR MAJOR WORK RFP

REVISIONS

CONCEPTUAL ONLY

FOR INTERNAL USE ONLY

PERMIT

PROFESSIONAL SEAL

CLIENT

WEST KITIKMEOT RESOURCES CORP

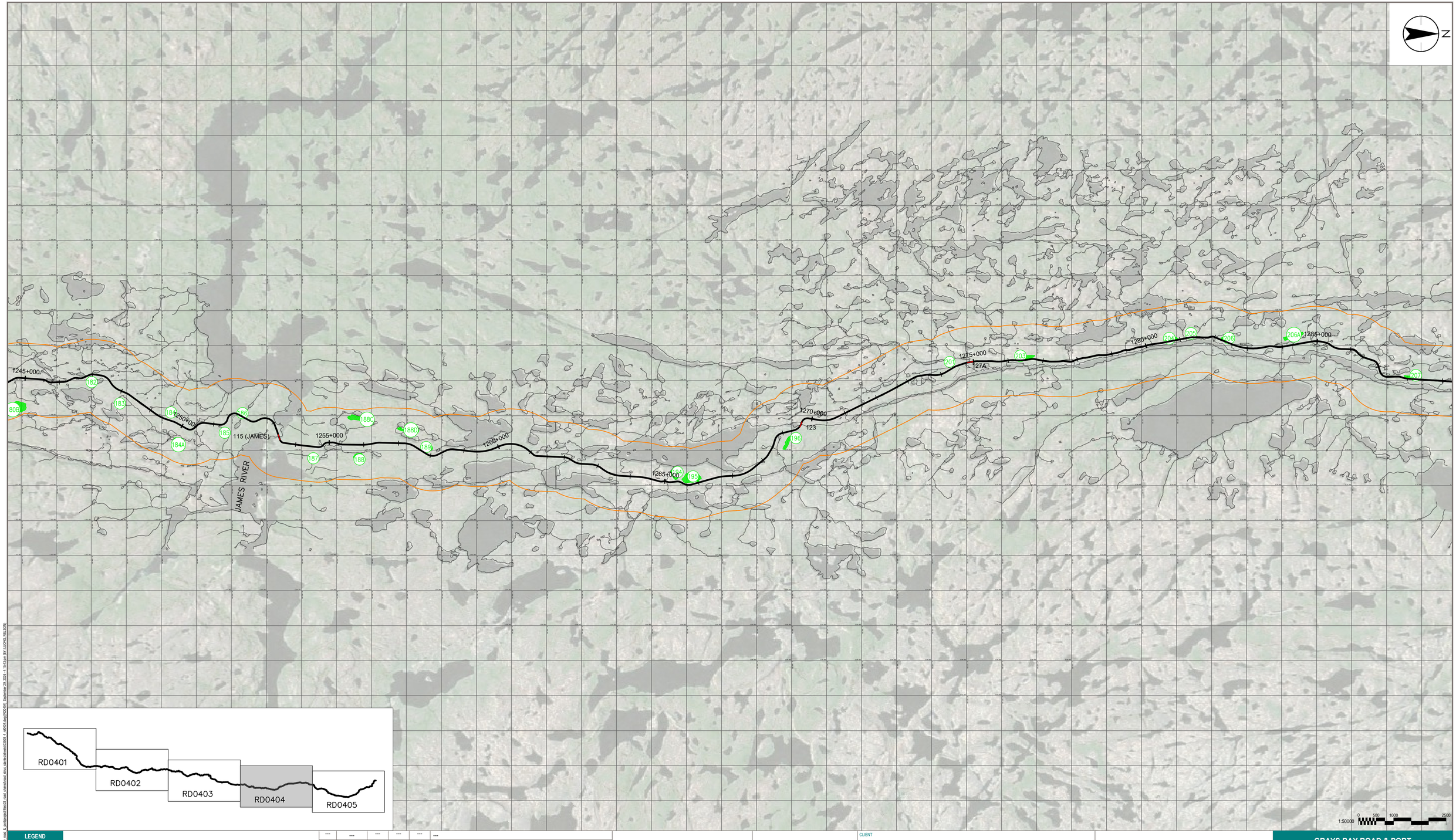
NUNAMI
STANTEC LIMITED

GRAYS BAY ROAD & PORT
NUNAVUT, CANADA

ROADWAY
STA. 1197+500 - STA. 1244+500

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	JK	GM	0	RD0403
DATE: 2026.09.25	SHEET No. 3 of 5	DWN MD	APP AF	STATUS DFT	

C:\Users\mdavis\DOCS\Documents\Projects\144903508_grays bay road & port\planning\Drawings\144903508_grays bay road & port_planning sheets.dwg, Layout Model, plotted by mdavis on 9/25/2026 4:14:59 pm BY LUONG, NICLSON)



LEGEND

- ROAD CENTERLINE (5 KM MAJOR STA, 1 KM TICK)
- ROAD CORRIDOR (2 KM WIDE)
- (92) POTENTIAL QUARRY SITE
- ID # BRIDGE CROSSINGS

NUMBERS ASSOCIATED WITH QUARRIES DENOTE LOCATIONS IDENTIFIED IN PAST STUDIES:

- FLUOR 2013 ISSUED FOR FEASIBILITY DESIGN FOR MMG'S IZOK CORRIDOR PROJECT
- 2018 JERICHO TIE-IN CONCEPTUAL DESIGN FOR KIA/NRC

NOTE;
POTENTIAL QUARRY SITE PROPERTIES ARE SHOWN ON DRAWINGS RD0407 & RD0408.

NUM	DATE	DWN	CKD	APR	DESCRIPTION
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0	2026.09.25	MD	GM	AF	ISSUED FOR MAJOR WORK RFP

REVISIONS

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WEST KITIKMEOT RESOURCES CORP

NUNAMI
STANTEC LIMITED

GRAYS BAY ROAD & PORT
NUNAVUT, CANADA

ROADWAY
STA. 1244+500 - STA. 1289.890

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	JK	GM	0	RD0404
DATE:	SHEET No.	DWN	APP	STATUS	
2026.09.25	4 of 5	MD	AF	DFT	

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GRAYS BAY

N

D44 (KENNARCTIC)

1290+000

D42

1295+000

1300+000

DM2 (KENNARCTIC)

1305+000

1310+000

1315+000

1320+000

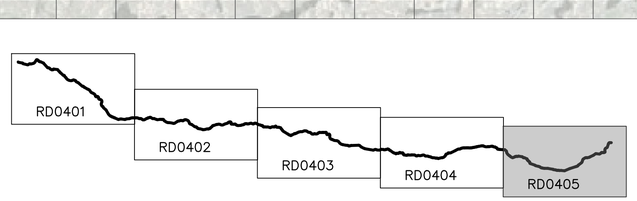
1325+000

1330+000

D2

1333+000

208 209 212A 212 217 218 219A 220 221 222 224 227 228 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 250A 252 254 255



1:50000 0 500 1000 2500

LEGEND

- ROAD CENTERLINE (5 KM MAJOR STA, 1 KM TICK)
- ROAD CORRIDOR (2 KM WIDE)
- (92) POTENTIAL QUARRY SITE
- ID # BRIDGE CROSSINGS

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NOTE:
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NUM	DATE	DWN	CKD	APR	DESCRIPTION
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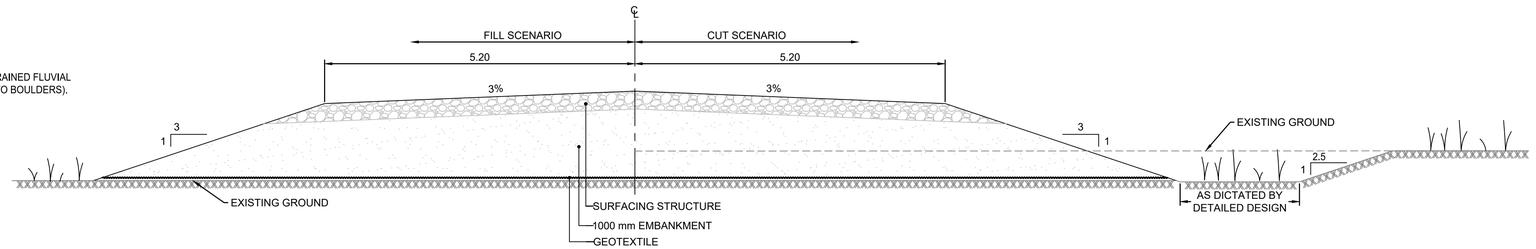
GRAYS BAY ROAD & PORT
NUNAVUT, CANADA

ROADWAY
STA. 1289+290 - STA. 1333+000

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	JK	GM	0	RD0405
DATE:	SHEET No.	DWN	APP	STATUS	
2026.09.25	5 of 5	MD	AF	DFT	

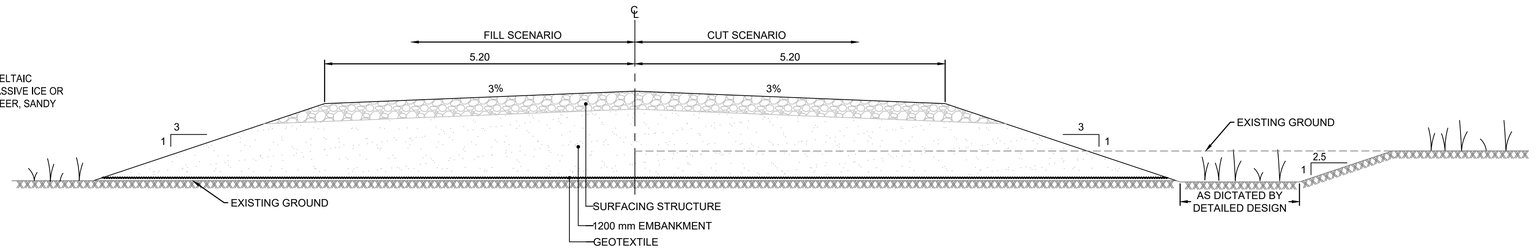
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SURFICIAL GEOLOGY:
BEDROCK, COARSE-GRAINED FLUVIAL SEDIMENTS (GRAVEL TO BOULDERS).



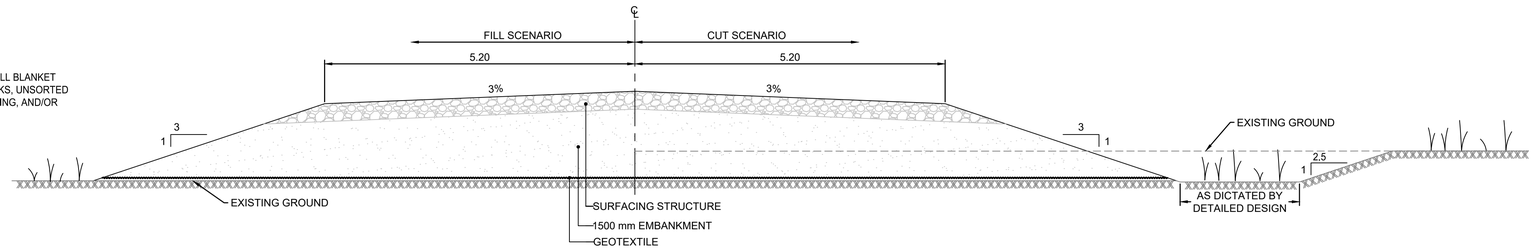
1 - TYPICAL ROAD SECTION - VERY LOW THAW SENSITIVITY
1:50

SURFICIAL GEOLOGY:
GLACIOFLUVIAL AND DELTAIC DEPOSITS WITH NO MASSIVE ICE OR ICE WEDGES, TILL VENEER, SANDY TILL BLANKET.



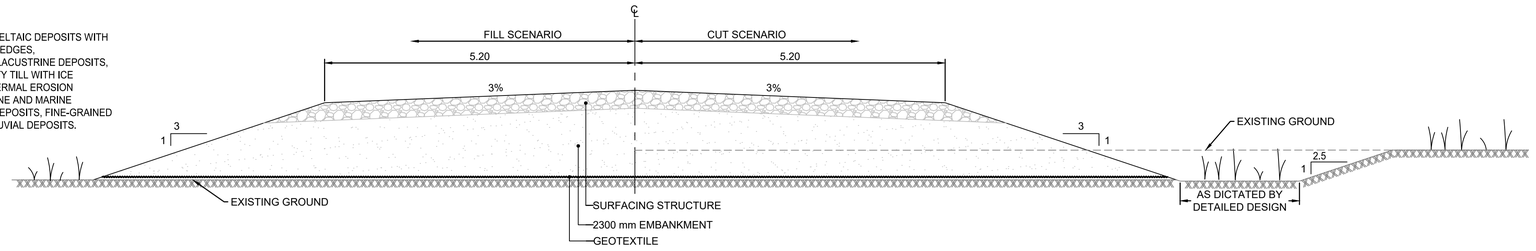
2 - TYPICAL ROAD SECTION - LOW THAW SENSITIVITY
1:50

SURFICIAL GEOLOGY:
SILTY TILL BLANKET, TILL BLANKET WITH EARTH HUMMOCKS, UNSORTED CIRCLES, FROST HEAVING, AND/OR SOLIFLUCTION.



3 - TYPICAL ROAD SECTION - MEDIUM THAW SENSITIVITY
1:50

SURFICIAL GEOLOGY:
GLACIOFLUVIAL AND DELTAIC DEPOSITS WITH MASSIVE ICE OR ICE WEDGES, GLACIOLACUSTRINE / LACUSTRINE DEPOSITS, ABLATION TILL OR SILTY TILL WITH ICE WEDGES AND / OR THERMAL EROSION GULLIES, GLACIOMARINE AND MARINE DEPOSITS, ORGANIC DEPOSITS, FINE-GRAINED FLUVIAL OR GLACIOFLUVIAL DEPOSITS.



4 - TYPICAL ROAD SECTION - HIGH THAW SENSITIVITY
1:50

NOTES:
1. GEOTEXTILE TO BE INCLUDED AT THE DESIGNERS DISCRETION.
2. SURFACING STRUCTURE MAY BE INCLUDED IN EMBANKMENT HEIGHT.

LEGEND

NUM	DATE	DWN	CKD	APR	DESCRIPTION
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0	2026.09.25	MD	GM	AF	ISSUED FOR MAJOR WORK RFP

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ROADWAY
TYPICAL CROSS SECTIONS

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	JK	GM	0	RD0406
DATE	SHEET No.	DWN	APP	STATUS	
2026.09.25	1 of 1	MD	AF	DFT	

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QUARRY NUMBER	ELEVATION	AVERAGE SLOPE	AREA	EASTING	NORTHING	ROCK TYPE	ARD POTENTIAL	VOLUME	ROAD CUT	QUARRY	NOTES
74	490.015 m	3.28° [5.74%]	0.02994 sq km	477206.7	7327384.0	Agb	Low	45612		Y	May require small stream crossing to access quarry
75	491.412 m	6.07° [10.63%]	0.02558 sq km	478280.7	7327813.0	Agb	Low	113274		Y	Expandable to south and east
76	520.841 m	4.47° [7.81%]	0.0601 sq km	478825.5	7329642.0	Agk	Low	380535		Y	Likely needs benches and slopes
77	510.034 m	9.30° [16.37%]	0.0592 sq km	479137.1	7330326.0	Agk	Low	623558		Y	Possible dyke system. Expandable to south and east. Will require stream buffer.
78	518.827 m	2.89° [5.05%]	0.105 sq km	478780.0	7331922.0	Avm	Low	296492		Y	Far from road. Uncertain on rock type.
79	511.869 m	4.25° [7.44%]	0.01912 sq km	480215.8	7332278.0	Avf	Low	64417		Y	May be difficult to find blast face, can be expanded to NW
80	535.229 m	3.51° [6.13%]	0.0737 sq km	480180.8	7333139.0	Avf	Low	238204		Y	Expandable to west
80A	510.583 m	6.33° [11.08%]	0.02856 sq km	480646.2	7332926.0	Avf		188020		Y	Potential quarry location. Limited information.
82	451.175 m	2.83° [4.94%]	0.0786 sq km	482455.3	7336262.0	Agk	Low	367698		Y	May be difficult to find blast face. May also contain Ath rocks (split)
86	472.428 m	2.89° [5.05%]	0.0417 sq km	484294.7	7338922.0	Agk	Low	101323		Y	Possible dyke system and rock type change. May be difficult to find blast face.
87	452.577 m	1.67° [2.92%]	0.01985 sq km	484909.4	7339259.0	Agk	Low	21384		Y	Very difficult to find cut face.
88	455.418 m	10.49° [18.52%]	0.0256 sq km	485132.6	7340804.0	Agb	Low	189705		Y	Will require benches. Will require stream buffer.
89	487.412 m	3.03° [5.29%]	0.03229 sq km	485153.0	7341091.0	Agb	Low	77737		Y	Close to alignment. Expandable to north. Possible cut and fill of road. Overburden thin.
90	487.306 m	3.59° [6.28%]	0.01322 sq km	485309.6	7342446.0	Avm	Low	17270		Y	May require stream buffer
91	514.266 m	4.86° [8.51%]	0.0532 sq km	486664.4	7342809.0	Avm	Low	226930		Y	Uncertain of extent (outside of coverage). May require benches. Thick overburden.
92	512.173 m	2.93° [5.12%]	0.0438 sq km	487925.1	7345173.0	Avm	Low	139127		Y	Thick overburden. May require benches. Expandable to south and east
93	510.408 m	2.83° [4.95%]	0.03133 sq km	488064.2	7345872.0	Avm	Low	90995		Y	Expandable to east.
94	450.478 m	3.23° [5.65%]	0.01106 sq km	490511.4	7349559.0	Avm	Low	16378		Y	Thick overburden. May require stream crossing to access. Possibly Ams rock type
95	489.094 m	3.52° [6.16%]	0.0669 sq km	492794.8	7350216.0	Agk	Low	240552		Y	Thick overburden. Will require stream buffer. Expandable to NE.
96	511.531 m	4.32° [7.55%]	0.04107 sq km	493225.2	7351579.0	Agk	Low	165368		Y	Thick overburden
97	480.629 m	2.03° [3.54%]	0.04151 sq km	495092.1	7352373.0	Agk	Low	109056		Y	Substantial overburden and permafrost. Requires small water crossing to access.
98	497.163 m	2.62° [4.57%]	0.0524 sq km	496505.9	7352450.0	Agk	Low	192015		Y	Thick overburden, may be hard to find blast face.
99	513.256 m	4.08° [7.14%]	0.04397 sq km	497777.4	7354779.0	Agk	Low	121304		Y	May require benches.Will require lake buffer
100	531.07 m	5.52° [9.67%]	0.03516 sq km	497118.9	7356591.0	Agk	Low	231117		Y	Expandable to west and north. Will require benches.
101	529.457 m	2.27° [3.97%]	0.03422 sq km	497898.6	7357691.0	Agk	Low	66873	Y	Y	On road alignment. Thick overburden. Possibly expandable to south (thicker overburden).
103	541.656 m	3.33° [5.82%]	0.0622 sq km	497280.3	7359752.0	Agk	Low	227859		Y	Expandable to west.
106	542.245 m	4.23° [7.39%]	0.1581 sq km	498223.3	7363605.0	Agk	Low	1065635		Y	Sloped quarry from 530 to 541 m.
106A	537.589 m	0.00° [0.00%]	0.0433 sq km	497610.9	7368091.0	Agk		101240		Y	May have thick overburden. Sloped from 533 to 537.5
106B	538.203 m	0.00° [0.00%]	0.04587 sq km	496964.8	7368746.0	Agk		169754		Y	Sloped from 533.5 to 535.5. Will require small rock fill crossing to access
107	543.259 m	4.60° [8.04%]	0.0606 sq km	499629.7	7371474.0	Agk	Low	379249		Y	Uncertain extent (out of Lidar boundaries). May be expandable to east.
109	531.938 m	6.77° [11.88%]	0.02067 sq km	497567.4	7377109.0	Agb	Low	60977		Y	Expandable to north. Thick overburden
110	523.401 m	4.21° [7.36%]	0.03851 sq km	497792.4	7377656.0	Agb	Low	188631		Y	Thick overburden
111	524.244 m	6.46° [11.33%]	0.0678 sq km	498173.6	7377884.0	Agb	Low	356129		Y	On road alignment. Requires lake buffer. Thick overburden.
112	507.051 m	3.61° [6.31%]	0.01797 sq km	497501.3	7378424.0	Agb	Low	27957		Y	Expandable to NW.
113	515.169 m	3.86° [6.75%]	0.04573 sq km	499932.2	7380594.0	Agb	Low	76222		Y	Very rugged knobs. May be difficult to find blast face. Will require lake buffer
114	522.221 m	6.93° [12.15%]	0.1461 sq km	499935.6	7381659.0	Agb	Low	471286		Y	Very rugged. Multiple knobs. Uncertain on rock type (junctions). Will require lake buffer
116	535.921 m	6.41° [11.24%]	0.0926 sq km	501023.1	7381876.0	Avm	Low	455379		Y	Will require lake buffer.Uncertain on rock type (Junction). Possibly Avm or Avf?
117	533.934 m	10.95° [19.35%]	0.01644 sq km	501103.0	7382352.0	Avm	Low	81273		Y	Uncertain rock types Avm or Avf possible.
119	534.081 m	2.41° [4.22%]	0.03965 sq km	501111.4	7384615.0	Avf	Low	62706		Y	May be difficult to find blast face
120	515.342 m	9.06° [15.95%]	0.02111 sq km	500701.5	7386894.0	Agb	Low	81314		Y	Likely not Agb. Avf? Dyke or sill.
121	508.39 m	9.86° [17.38%]	0.01688 sq km	500235.3	7387518.0	Agb	Low	82713		Y	Gravel cap. Likely not Agb, possibly Avf? Dyke or sill.
122	508.706 m	8.75° [15.39%]	0.02537 sq km	499939.9	7387902.0	Agb	Low	81164		Y	Likely not Agb. Dyke or sill (Avf?)
125	501.757 m	5.58° [9.78%]	0.0882 sq km	499055.5	7392882.0	Avm	Low	331584		Y	Can be expanded by sloping to SE. Will require lake buffer. May be Avm or Agb rock type
127	506.741 m	4.03° [7.05%]	0.0567 sq km	499138.9	7393473.0	Agb	Low	325775		Y	Will require benches.
129	467.733 m	3.98° [6.95%]	0.0674 sq km	499882.5	7397193.0	Agb	Low	251712		Y	On road alignment.
130A	465.338 m	8.51° [14.97%]	0.02394 sq km	499387.5	7397997.0	Agb	Low	139729		Y	Very close to road cut.
131	473.543 m	5.38° [9.42%]	0.1575 sq km	498908.9	7398349.0	Agb	Low	1189067		Y	Can be expanded to the west. Will require lake buffer. Will require benches. Uncertain rock type. May include volcanics (Avf?)
132	477.144 m	6.94° [12.18%]	0.0673 sq km	498931.1	7398767.0	Avf	Low	279242		Y	Can be expanded to the east if sloped.
132A				499372.0	7398981.0						Potential quarry location. Limited information.
135	482.232 m	5.09° [8.91%]	0.0579 sq km	498928.3	7402049.0	Agb	Low	302810		Y	Can be expanded by sloping to west. May be capped by gravels. Will require lake buffer
138	421.131 m	8.07° [14.17%]	0.0511 sq km	499958.6	7405176.0	Agb	Low	211066		Y	Sloped quarry from 411.5 to 422.5 m
138A	424.219 m	6.20° [10.87%]	0.0899 sq km	499914.9	7405436.0	Agb		244628		Y	Sloped quarry from 416.5 to 426.5 m
139	441.468 m	5.62° [9.84%]	0.1667 sq km	500700.3	7409717.0	Avm		0			Will require benches. Very large ridge. Uncertain rock type (lots of terranes)
140				500829.0	7410060.0						Potential quarry location. Limited information.
147A	445.019 m	0.00° [0.00%]	0.0926 sq km	501744.2	7419696.0	Agk		557278		Y	Sloped quarry from 434.5/443.5
148	433.313 m	12.69° [22.52%]	0.01036 sq km	504007.8	7420587.0	Avm	Low	65506		Y	Very far from road, will require stream crossing to access. Uncertain of extent (out of Lidar coverage)
150	416.055 m	9.90° [17.46%]	0.02419 sq km	502590.7	7422009.0	Agk	Low	122576		Y	Expandable if sloped to east
151	428.154 m	11.61° [20.55%]	0.02992 sq km	502401.3	7422392.0	Agk	Low	244418		Y	Expandable to the NW. Very lrage ridge. Uncertain geology, complex terranes.
152	430.285 m	10.14° [17.88%]	0.0468 sq km	502003.1	7423179.0	Agk	Low	364355		Y	Expandable if sloped to north
156	391.924 m	4.42° [7.72%]	0.2111 sq km	503367.4	7423390.0	Agk	Low	0			Falls outside of Lidar contour coverage. Far from road, will require stream crossing to access.
157	417.699 m	5.99° [10.50%]	0.04283 sq km	501626.9	7424789.0	Atm	Moderate	137372		Y	Expandable if sloped to north
158				503351.0	7427682.0						Potential quarry location. Limited information.
159				503924.0	7427430.0						Potential quarry location. Limited information.
163	425.634 m	6.75° [11.83%]	0.01846 sq km	506669.2	7432020.0	Aam	Moderate	85663		Y	Very close to road alignment. May have thick overburden.
164	417.449 m	8.65° [15.21%]	0.01862 sq km	507207.0	7432511.0	Avf	Low	111024		Y	Will require lake buffer.
165				506859.0	7432685.0						Potential quarry location. Limited information.
166A	425.209 m	5.19° [9.08%]	0.02202 sq km	506850.6	7432954.0	Avf	Low	43102	Y	Y	Can be used as road cut/quarry. Sloped from 419.5 to 428 m
167A	435.752 m	6.21° [10.89%]	0.0517 sq km	506810.0	7433290.0	Avf	Moderate	374873	Y	Y	Side slope cut
168				505753.0	7433955.0						Potential quarry location. Limited information.
169	428.298 m	9.24° [16.28%]	0.01292 sq km	505934.1	7434716.0	Avf	Moderate	55677		Y	May require stream or lake buffer
170				506321.0	7435570.0						Potential quarry location. Limited information.
171	436.162 m	5.49° [9.62%]	0.0647 sq km	506679.6	7436893.0	Avf	Low	366143		Y	Expandable to SE, along road alignment.
175	410.295 m	9.99° [17.61%]	0.0502 sq km	508379.6	7440187.0	Avm	Low	364983		Y	Expandable to east. Will require benches. Will require lake buffer. May require small stream crossing to access. May be Avm or Aal rock type
180B	391.476 m	7.69° [13.50%]	0.1182 sq km	508825.7	7443761.0	Avm		765444			Sloped quarry from 378.5 to 391.5 m
182	382.251 m	8.76° [15.40%]	0.01674 sq km	508041.7	7446014.0	Aal	Moderate	121379		Y	May require benches. Will require lake buffer.
183	359.098 m	6.98° [12.25%]	0.02634 sq km	508650.7	7446819.0	Aal	Moderate	81633			Possibly expandable to SW
184				508907.0	7448277.0						Potential quarry location. Limited information.
184A	321.717 m	0.00° [0.00%]	0.03453 sq km	509830.5	7448490.0	Avm		85168		Y	Sloped quarry from 318 to 320.5 m. Will require field confirmation of rock type.
185	328.829 m	9.09° [16.00%]	0.01485 sq km	509488.0	7449815.0	Aal	Moderate	86629			Expandable if sloped to north and east
186				508927.0	7450321.0						Potential quarry location. Limited information.
187	305.435 m	9.05° [15.93%]	0.02006 sq km	510217.1	7452345.0	Aal	Moderate	69071		Y	Possibly enlarged if sloped to south
188				510252.0	7453664.0						Potential quarry location. Limited information.
188C	355.019 m	5.24° [9.16%]	0.0675 sq km	509105.0	7453878.0	Avm		204391		Y	Does not maintain buffer to lake to west.
188D	357.872 m	8.93° [15.72%]	0.068 sq km	509408.5	7455131.0	Avm		348469		Y	Sloped quarry from 350.5 to 355 m

LEGEND

NUM	DATE	DWN	CKD	APR	DESCRIPTION
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GRAYS BAY ROAD & PORT
NUNAVUT, CANADA

ROADWAY
QUARRY TABLE - SHEET 1

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	JK	GM	0	RD0407
DATE:	SHEET No.	DWN	APP	STATUS	
2026.09.25	1 of 2	MD	AF	DFT	

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QUARRY NUMBER	ELEVATION	AVERAGE SLOPE	AREA	EASTING	NORTHING	ROCK TYPE	ARD POTENTIAL	VOLUME	ROAD CUT	QUARRY	NOTES
189				509896.0	7455566.0						Potential quarry location. Limited information.
194	330.231 m	11.75° [20.80%]	0.0565 sq km	510609.0	7462744.0	Avm	Low	494147		Y	Will require benches. Expandable to south.
195	331.625 m	11.01° [19.45%]	0.1154 sq km	510734.3	7463189.0	Avm	Low	1283666		Y	Multiple knobs. Will require benches
196	330.421 m	12.36° [21.91%]	0.0587 sq km	509641.3	7466129.0	Avm	Low	612184		Y	Will require benches. Expandable to north and east
201				507462.0	7470517.0						Potential quarry location. Limited information.
203	263.626 m	24.19° [44.91%]	0.03543 sq km	507290.9	7472539.0	Avm	Low	836678		Y	Will require benches. Expandable to south. Uncertain rock types (combinations): Avm or As?
204	236.536 m	14.60° [26.05%]	0.02329 sq km	506789.2	7476792.0	Avm	Low	211068		Y	Side cut. Requires stream and lake buffer, benches. Uncertain rock types (mixtures): Avm or Avf.
205	237.427 m	17.47° [31.47%]	0.02089 sq km	506649.3	7477410.0	Avm	Low	249375		Y	Side cut, close to road. Requires lake and stream buffer, benches. Uncertain rock type: Avm or Avf?
206	226.579 m	7.78° [13.66%]	0.01535 sq km	506786.7	7478494.0	Avm	Low	62575		Y	Will require stream and lake buffer. May be thick overburden, uncertain rock quality
206A	238.134 m	16.36° [29.35%]	0.0595 sq km	506684.8	7480351.0	Avm		1050204		Y	Large quarry. May require benches. May have thick overburden.
207	222.834 m	11.11° [19.64%]	0.02294 sq km	507847.3	7483833.0	Avm	Low	156602		Y	Close to road alignment. Will require lake buffer.
208	230.498 m	15.17° [27.11%]	0.03846 sq km	508561.1	7486018.0	Avf	Low	480733	Y	Y	On road alignment. Expandable to the north,
209	229.095 m	11.10° [19.61%]	0.1102 sq km	509306.1	7485804.0	Avm	Low	836738		Y	Expandable if sloped to north. Avm or Atl rock type
212	293.323 m	17.57° [31.67%]	0.02445 sq km	510514.0	7489484.0	Pg	Low	436811		Y	Very expandable. Good cut face, may require benches
212A	227.602 m	9.53° [16.79%]	0.04267 sq km	509979.3	7489579.0	Pg		345700		Y	Sloped quarry from 216.5 to 222.5
217	200.608 m	14.18° [25.26%]	0.04989 sq km	512668.4	7493278.0	Atl	Moderate	529280		Y	May have sensitive overburden
218	185.205 m	6.88° [12.07%]	0.01719 sq km	512482.1	7493981.0	Atl	Moderate	72283		Y	Will need to be sloped to south, may have sensitive overburden
219A	179.407 m	0.00° [0.00%]	0.0874 sq km	514078.9	7495517.0	Agb		1390196		Y	Will require field check for rock type and ARD potential. Sloped from 155 to 172 m.
220	191.294 m	8.41° [14.78%]	0.04954 sq km	513747.6	7495951.0	Atl	Moderate	336664		Y	May have sensitive overburden
221	196.989 m	10.35° [18.25%]	0.04088 sq km	513241.3	7496221.0	Atl	Moderate	346840		Y	Will require lake buffer
222	187.257 m	12.16° [21.55%]	0.02234 sq km	514048.2	7497033.0	Atl	Moderate	106257		Y	Sensitive overburden and surroundings
224	211.964 m	15.71° [28.12%]	0.0646 sq km	513688.8	7499563.0	Agb	Low	1418567		Y	May have sensitive overburden
227				514952.0	7501094.0						Potential quarry location. Limited information.
228	201.936 m	21.00° [38.39%]	0.0276 sq km	513995.9	7501182.0	Agb	Low	633311		Y	May be expanded to NW
229	177.159 m	19.70° [35.80%]	0.02268 sq km	514683.5	7502384.0	Agb	Low	377896		Y	Side cut, expandable to west. Sensitive thick overburden
230	195.607 m	20.45° [37.30%]	0.03638 sq km	514766.8	7503174.0	Agb	Low	931742		Y	Side cut. Thick sensitive overburden
231	147.014 m	15.47° [27.67%]	0.01237 sq km	515078.7	7505121.0	Agb	Low	117710		Y	Expandable to west, thick sensitive overburden
232	166.518 m	13.40° [23.83%]	0.0695 sq km	515139.4	7506026.0	Agb	Low	871146		Y	Expandable to the north. Will require benches
233	195.584 m	14.34° [25.57%]	0.0694 sq km	515271.3	7506942.0	Agb	Low	1046670		Y	Expandable to north, will require benches
234	156.059 m	10.72° [18.93%]	0.02716 sq km	515534.3	7507290.0	Agb	Low	192497		Y	Will require sloping to NE. Uncertain rock type, possibly Pg.
235	156.768 m	12.91° [22.91%]	0.01838 sq km	515194.6	7507913.0	Pg	Low	78403		Y	Likely Pg rock type, not Agb. Expandable if sloped to NE
236	165.839 m	17.84° [32.19%]	0.0545 sq km	514797.2	7507926.0	Agb	Low	1027794		Y	Will require benches
237	153.934 m	16.41° [29.45%]	0.01665 sq km	514982.0	7508285.0	Pg	Low	132138		Y	Possibly expandable to the NW and SE. Likely Pg rock type, not Agb.
238	128.734 m	23.90° [44.32%]	0.0124 sq km	513404.3	7509105.0	Agb	Low	127027		Y	Requires major stream crossing to access.
239	134.718 m	24.57° [45.73%]	0.01604 sq km	513712.3	7509522.0	Agb	Low	268117		Y	Expandable to east. Will require stream buffer
240	140.504 m	15.35° [27.45%]	0.0722 sq km	513464.8	7510577.0	Agb	Low	941039		Y	Expandable to east. Thick sensitive overburden
241	124.852 m	15.09° [26.97%]	0.0556 sq km	512425.0	7510456.0	Pg	Low	714421		Y	Expandable to west. Thick sensitive overburden
242	141.473 m	18.83° [34.11%]	0.0605 sq km	512074.1	7511024.0	Pg	Low	1389072		Y	High blast face available. Expandable to west.
243	151.903 m	17.44° [31.42%]	0.03012 sq km	511110.5	7511813.0	Agb	Low	388804		Y	Slope to southwest. Thick sensitive overburden
244	164.038 m	17.16° [30.88%]	0.02139 sq km	511324.3	7512103.0	Agb	Low	375073		Y	Expandable to west.
245	195.851 m	19.60° [35.60%]	0.03737 sq km	510844.7	7512840.0	Pg	Low	573727		Y	Very expandable to east. Good blast face. Will require benches
246	207.079 m	26.52° [49.90%]	0.01545 sq km	510965.8	7513381.0	Pg	Low	565190		Y	Very expandable to east. Will require benches.

QUARRY NUMBER	ELEVATION	AVERAGE SLOPE	AREA	EASTING	NORTHING	ROCK TYPE	ARD POTENTIAL	VOLUME	ROAD CUT	QUARRY	NOTES
247	215.643 m	15.19° [27.16%]	0.1249 sq km	510493.3	7514614.0	Pg	Low	3640532		Y	Large blast face. Will require benches.
248	93.068 m	13.17° [23.41%]	0.01467 sq km	510211.5	7516808.0	Agb	Low	111025		Y	Thick and sensitive overburden. Uncertain rock type: Agb or Avm?
249				509920.0	7517799.0						Potential quarry location. Limited information.
250				509213.0	7518814.0						Potential quarry location. Limited information.
251	65.341 m	18.26° [33.00%]	0.01148 sq km	509205.7	7519102.0	Agb	Low	95767		Y	Thick, sensitive overburden. Uncertain rock type: Avm or Agb
252				508028.0	7519208.0						Potential quarry location. Limited information.
254				506465.0	7519493.0						Potential quarry location. Limited information.
255				506013.0	7520301.0						Potential quarry location. Limited information.

LEGEND

NUM	DATE	DWN	CKD	APR	DESCRIPTION
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0	2026.09.25	MD	GM	AF	ISSUED FOR MAJOR WORK RFP

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WEST KITIKMEOT RESOURCES CORP

NUNAMI STANTEC LIMITED

GRAYS BAY ROAD & PORT
NUNAVUT, CANADA

ROADWAY
QUARRY TABLE - SHEET 2

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	JK	GM	0	RD0408
DATE:	SHEET No.	DWN	APP	STATUS	
2026.09.25	2 of 2	MD	AF	DFT	

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OPTION 1:
BACKWALL PROTECTION WITH WELD WIRE MESH BASKETS W/ RIPRAP
OPTION 2 (NOT SHOWN):
STEEL BINWALLS C/W WELD WIRE MESH BASKETS W/RIPRAP FOR BACKWALL PROTECTION

TL-2 THRIE BEAM BRIDGERAIL WITH TRANSITION TO W-BEAM (TYP BOTH SIDES)

THRIE BEAM TRANSITION SECTION

W-BEAM GUARDRAIL

THRIE BEAM

APPROACH RAIL TRANSITION

BALLAST WALL

℄ BRG ABUT 1

℄ BRG ABUT 2

EQUATION
ROAD STA XX+XXX.XXX
EL XXX.XXX
CREEK STA XX+XXX.XXX
EL XXX.XXX

SPAN: 60 m > L > 14 m

THRIE BEAM BRIDGERAIL

℄ CREEK

CREEK FLOW

℄ BRIDGE/CREEK

0.50 (TYP) CURB

5.00

3.30

ROAD VARIES AT BRIDGE APPROACH

℄ ROAD/ BRIDGE

WP1

WP2

2 (MIN):1 (TYP)

ABUTMENT BACKWALL PROTECTION REQUIRED (TYP)

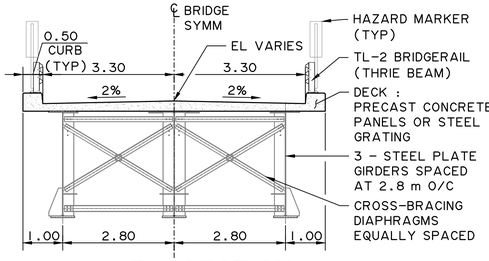
CREEK EDGE

TOE OF SLOPE (TYP)

HEADSLOPE RIPRAP PROTECTION REQUIRED (TYP EACH SIDE)

N

PLAN
1:200



A — SECTION
1:75

SOUTH

NORTH

SPAN: 60 m > L > 14 m

℄ BRG ABUT 1 STA XX+XXX.XX EL XXX.XXX

℄ BRG ABUT 2 STA XX+XXX.XX EL XXX.XXX

℄ BRIDGE/CREEK

FINISHED ALL SEASON ROAD PROFILE

BALLAST WALL (TYP)

GUARDRAIL

WP1

TL-2 THRIE BEAM BRIDGERAIL REQUIRED (TO BE ADJUSTED FOR SPECIAL REQUIREMENTS)

T/O DECK EL XXX.XXX

1.00

0.0XX

XX.XXX m LONG STEEL GIRDER BRIDGE W/ PRECAST CONCRETE PANEL DECK OR STEEL GRATING DECK AND STEEL BRIDGERAIL

APPROACH RAIL TRANSITION TO W-BEAM GUARDRAIL (TYP EACH SIDE)

WP2

GUARDRAIL

APPROACH FILL

T/O PILE CAP EL XXX.XXX

MIN BTM FLANGE EL XXX.XXX

2.5 (2 MIN)

1.00 CLEAR MIN FREE BOARD

100 YR WL EL XXX.X

1:2 YR WL EL XXX.X

SURVEY WL EL XXX.X

CREEK BTM EL XXX.X

1

10

ORIGINAL GROUND AT ℄ ROAD

ABUTMENT BACKWALL PROTECTION REQUIRED (SEE PLAN, TYP)

APPROX PILE TIP EL XXX.XX (TYP)

HEADSLOPE RIPRAP PROTECTION REQUIRED (TYP)

STEEL PILE CAP (TYP)

GRANULAR BACKFILL (TYP)

DRIVEN STEEL PILES/ ADFREEZING PILES/ROCK SOCKET PILES (TYP EACH SIDE)
NOTE:
PILES TO BE DESIGNED ACCORDING TO GEOTECHNICAL REPORT

ELEVATION
1:200

GENERAL NOTES

SURVEY BY

- SURVEY DONE BY: XXX
- THE COORDINATES INDICATED ON THIS PLAN ARE BASED ON GRID NAD83(CSRS) ZONE 12N. ALL COORDINATES AND STATIONING SHOWN ON THIS PLAN ARE BASED ON THE ABOVE GRID COORDINATES VALUES
- A COMBINED SCALE FACTOR OF 0.XXXXXX HAS BEEN ADOPTED FOR THIS PROJECT
- ALL DIMENSIONS INDICATED ON THESE DRAWINGS ARE GROUND DISTANCE
  - GRID DISTANCE = GROUND DISTANCE x 0.XXXXXX
  - GROUND DISTANCE = GRID DISTANCE / 0.XXXXXX

CONTROL POINTS

- CP1 NORTHING EASTING EL XXX.XXX
- CP2 NORTHING EASTING EL XXX.XXX

HYDROTECHNICAL NOTES

- HYDROTECHNICAL REPORT: XXX
  BY: XXX
  DATED: YR-M-D
- DRAINAGE AREA = XXX km^2
- 1:100 YEAR
  - WATER LEVEL = EL XXX.XX m
  - MEAN VELOCITY = X.XX m/s
  - DESIGN FLOOD FLOW = XXX.X m^3/s
- 1:2 YEAR
  - WATER LEVEL = EL XXX.XX m
  - FLOOD FLOW = XX.X m^3/s

GEOTECHNICAL NOTES

- GEOTECHNICAL REPORT XXX
  BY: XXX
  DATED: YR-M-D

DESIGN NOTES

- ALL DIMENSIONS ARE IN METERS UNLESS NOTED OTHERWISE
- BRIDGE DESIGN:
  - CAN/CSA-S6-25
  - LIVE LOAD CL800 & PROJECT-SPECIFIC HEAVY HAUL VEHICLES

NOT FOR CONSTRUCTION

LEGEND

NUM	DATE	DWN	CKD	APR	DESCRIPTION
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0	2026.09.25	MB	RK	GM	ISSUED FOR MAJOR WORK RFP

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CLIENT

WEST KITIKMEOT RESOURCES CORP

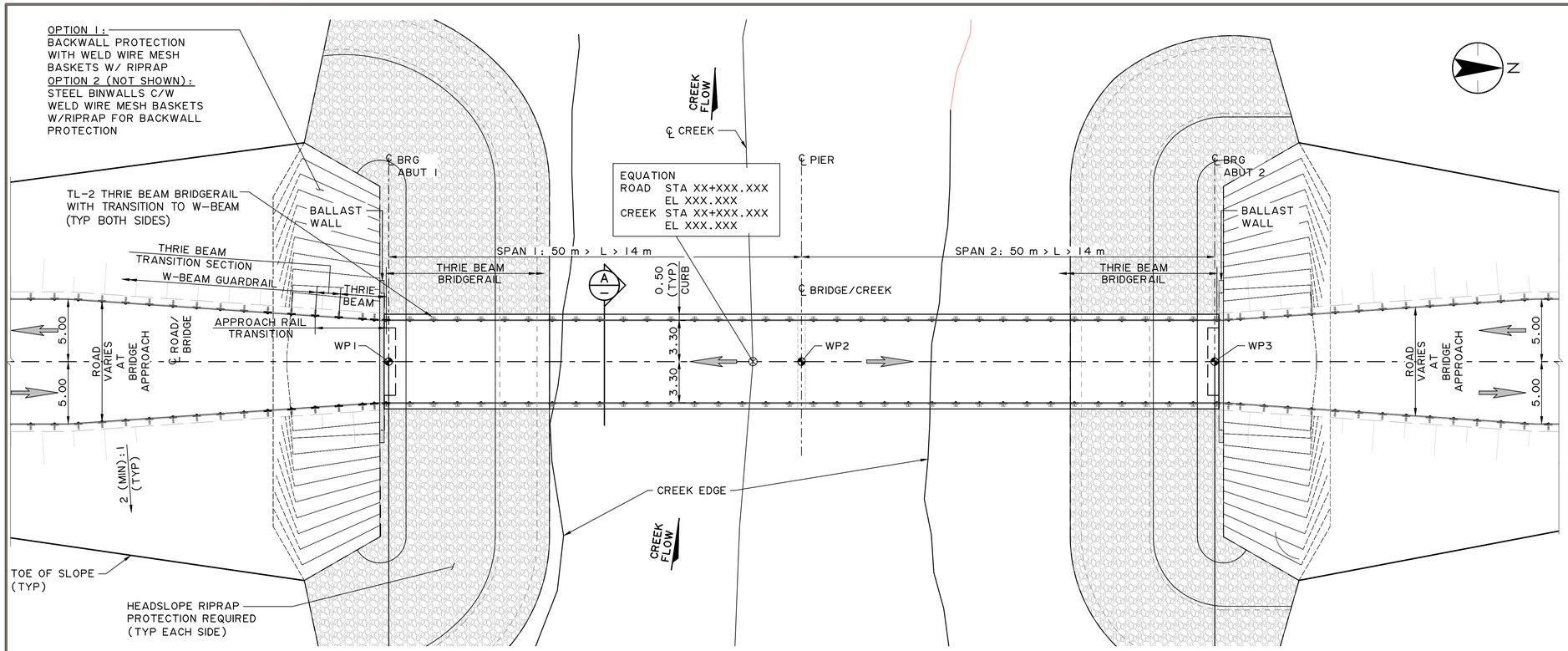
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STANTEC LIMITED

GRAYS BAY ROAD & PORT
NUNAVUT, CANADA

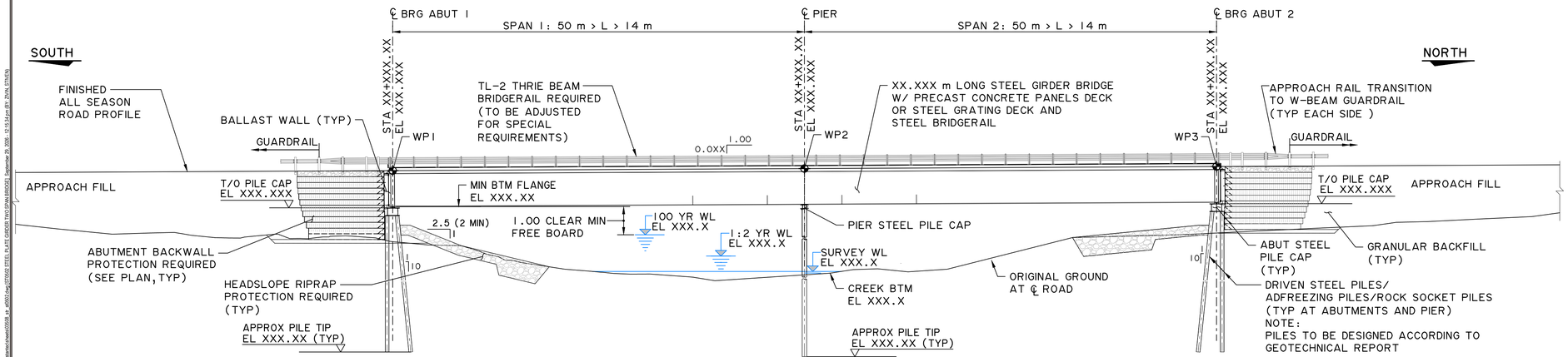
ROADWAY STRUCTURES
STEEL PLATE GIRDER
SINGLE SPAN BRIDGE

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	EDMONTON	RK	RK	0	ST0501
DATE: 2026.09.25	SHEET No. 1 of 4	DWN MB	APP GM	STATUS DFT	

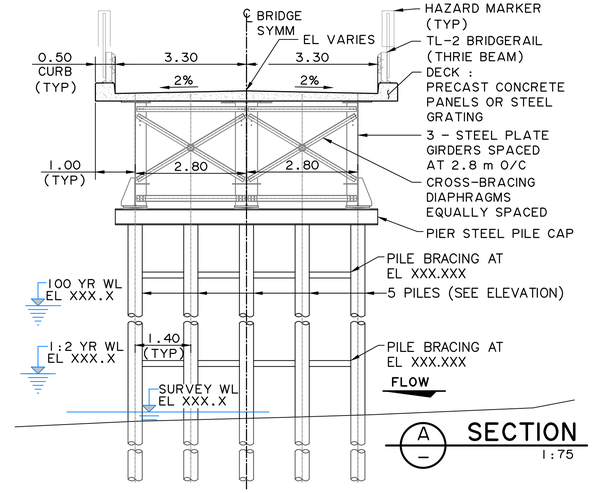
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PLAN
1:200



ELEVATION
1:200



SECTION
1:75

GENERAL NOTES

SURVEY BY

- SURVEY DONE BY: XXX
- THE COORDINATES INDICATED ON THIS PLAN ARE BASED ON GRID NAD83(CSRS) ZONE 12N. ALL COORDINATES AND STATIONING SHOWN ON THIS PLAN ARE BASED ON THE ABOVE GRID COORDINATES VALUES
- A COMBINED SCALE FACTOR OF 0.XXXXXX HAS BEEN ADOPTED FOR THIS PROJECT
- ALL DIMENSIONS INDICATED ON THESE DRAWINGS ARE GROUND DISTANCE
  - GRID DISTANCE = GROUND DISTANCE x 0.XXXXXX
  - GROUND DISTANCE = GRID DISTANCE / 0.XXXXXX

CONTROL POINTS

- CP1 NORTHING EASTING EL XXX.XXX
- CP2 NORTHING EASTING EL XXX.XXX

HYDROTECHNICAL NOTES

- HYDROTECHNICAL REPORT: XXX
  BY: XXX
  DATED: YR-M-D
- DRAINAGE AREA = XXX km²
- 1:100 YEAR
  - WATER LEVEL = EL XXX.XX m
  - MEAN VELOCITY = X.XX m/s
  - DESIGN FLOOD FLOW = XXX.X m³/s
- 1:2 YEAR
  - WATER LEVEL = EL XXX.XX m
  - FLOOD FLOW = XX.X m³/s

GEOTECHNICAL NOTES

- GEOTECHNICAL REPORT XXX
  BY: XXX
  DATED: YR-M-D

DESIGN NOTES

- ALL DIMENSIONS ARE IN METERS UNLESS NOTED OTHERWISE
- BRIDGE DESIGN:
  - CAN/CSA-S6-25
  - LIVE LOAD CL800 & PROJECT-SPECIFIC HEAVY HAUL VEHICLES

NOT FOR CONSTRUCTION

LEGEND

NUM	DATE	DWN	CKD	APR	DESCRIPTION
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0	2026.09.25	MB	RK	GM	ISSUED FOR MAJOR WORK RFP

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WEST KITIKMEOT RESOURCES CORP

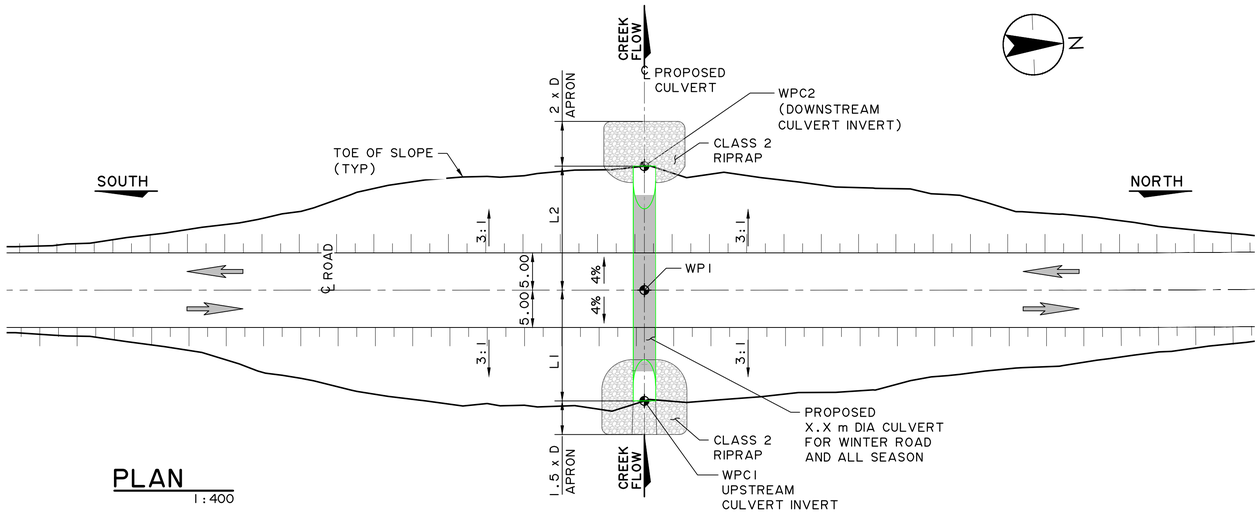
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GRAYS BAY ROAD & PORT
NUNAVUT, CANADA

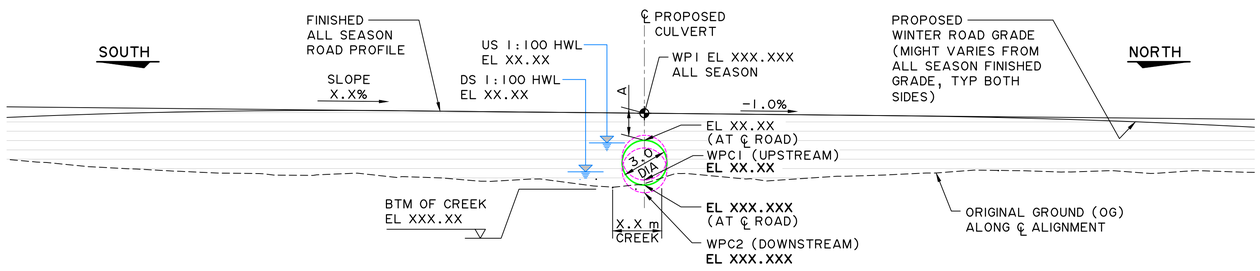
ROADWAY STRUCTURES
STEEL PLATE GIRDER TWO SPAN BRIDGE

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	EDMONTON	RK	RK	0	ST0502
DATE:	SHEET No.	DWN	APP	STATUS	
2026.09.25	2 of 4	MB	GM	DFT	

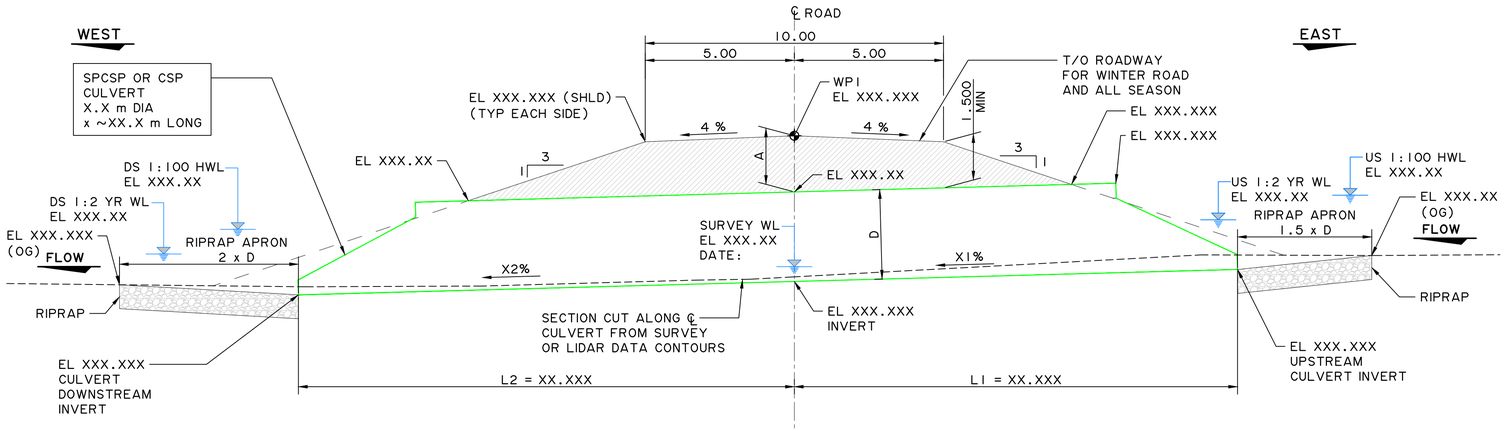
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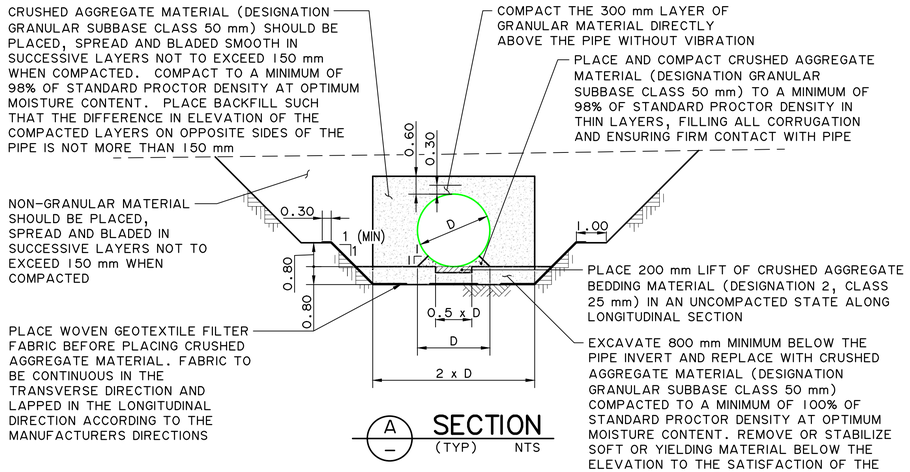
PLAN
1:400



ROAD PROFILE WITH CULVERT
1:200



LONGITUDINAL SECTION WITH CULVERT
(LOOKING NORTH) 1:100



A — SECTION
(TYP) NTS

GENERAL NOTES

HYDROTECHNICAL NOTES

- HYDROTECHNICAL REPORT: XXX
  BY: XXX
  DATED: YR-M-D
- DRAINAGE AREA = XXX km²
- 1:100 YEAR
  - UPSTREAM (US) WATER LEVEL = EL XXX.XX m
  - DOWNSTREAM (DS) WATER LEVEL = EL XXX.XX m
  - MEAN VELOCITY IN CULVERT = X.XX m/s
  - DESIGN FLOOD FLOW = XXX.X m³/s
- 1:2 YEAR
  - WATER LEVEL = EL XXX.XX m
  - MEAN VELOCITY IN CULVERT = X.XX m/s
  - FLOOD FLOW = XX.X m³/s

GEOTECHNICAL NOTES

- GEOTECHNICAL REPORT XXX
  BY: XXX
  DATED: YR-M-D

SURVEY BY

- SURVEY DONE BY: XXX
- THE COORDINATES INDICATED ON THIS PLAN ARE BASED ON GRID NAD83(CSRS) ZONE 12N. ALL COORDINATES AND STATIONING SHOWN ON THIS PLAN ARE BASED ON THE ABOVE GRID COORDINATES VALUES

CONTROL POINTS

- CP1 NORTHING EASTING EL XXX.XXX
- CP2 NORTHING EASTING EL XXX.XXX

PROPOSED STRUCTURE

- 1 - D mm DIA SPCSP (OR CSP) CULVERT
  (OR 2 - D mm DIA SPCSP (OR CSP) CULVERTS
- XXX.XXX m INVERT LENGTH
- XXX x XXX mm CORRUGATION PROFILE
- X.X mm PLATE THICKNESS
- GALVANIZED COATING OF 610 g/m²
- 0° SKEW (PERPENDICULAR TO CL ROAD)
  (OR XX° SKEW RHF/LHF, INCREASE ROAD CHANAGE)
  AT WP1: STA XX+ XXX.XXX EL XXX.XX

DESIGN NOTES

- ALL DIMENSIONS ARE IN METERS UNLESS NOTED OTHERWISE
- BRIDGE DESIGN:
  - CAN/CSA-S6-25
  - LIVE LOAD CL800 & PROJECT-SPECIFIC HEAVY HAUL VEHICLES

NOT FOR CONSTRUCTION

LEGEND

NUM	DATE	DWN	CKD	APR	DESCRIPTION
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0	2026.09.25	MB	RK	GM	ISSUED FOR MAJOR WORK RFP

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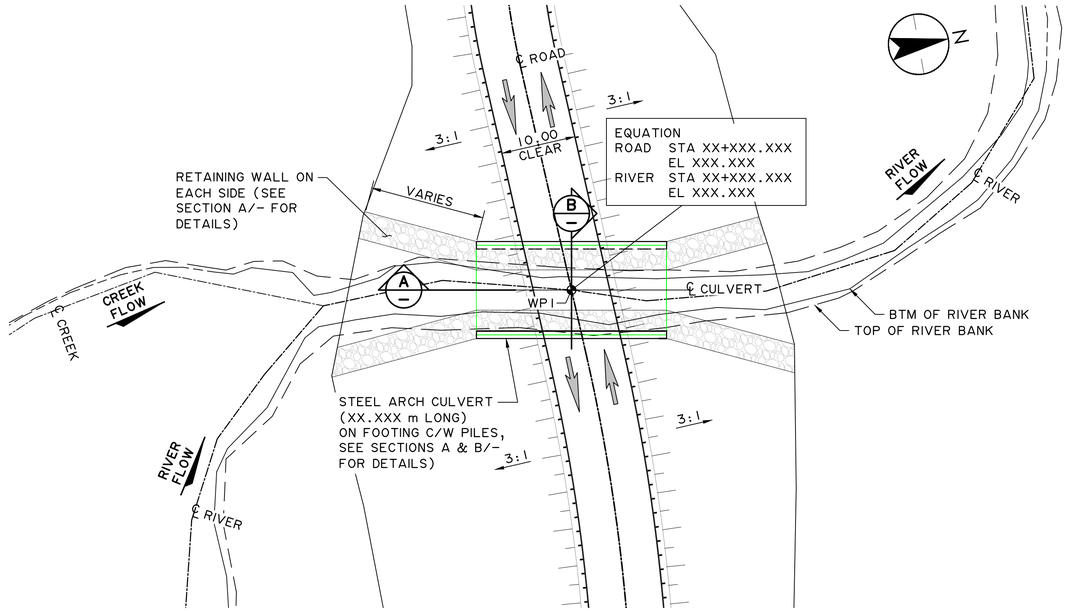
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GRAYS BAY ROAD & PORT
NUNAVUT, CANADA

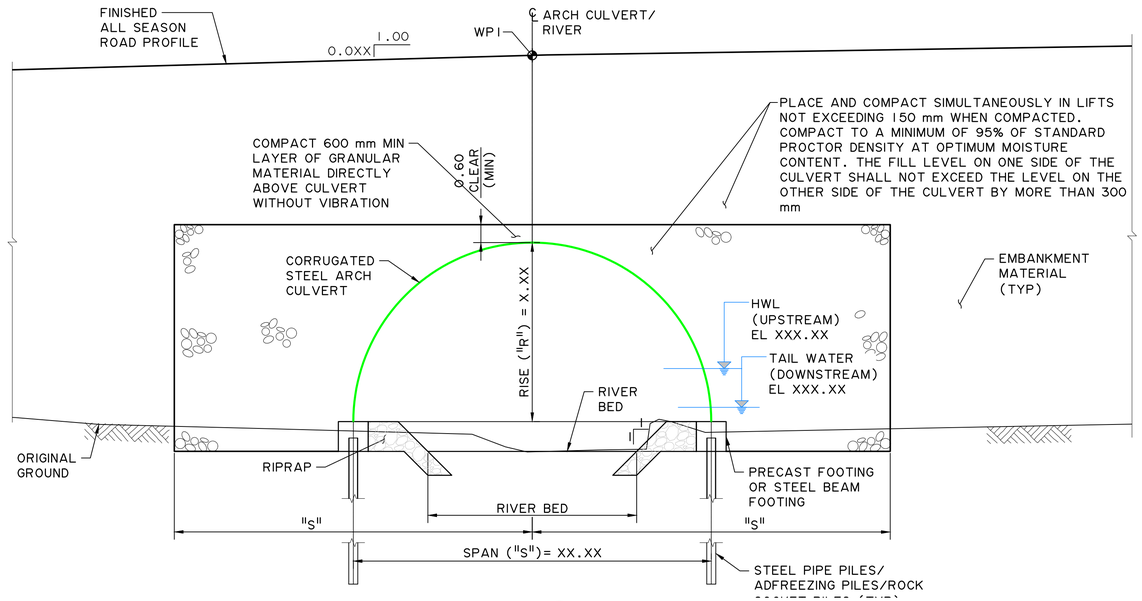
ROADWAY STRUCTURES
SPCSP OR CSP CULVERT

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	EDMONTON	RK	RK	0	ST0503
DATE: 2026.09.25	SHEET No. 3 of 4	DWN MB	APP GM	STATUS DFT	

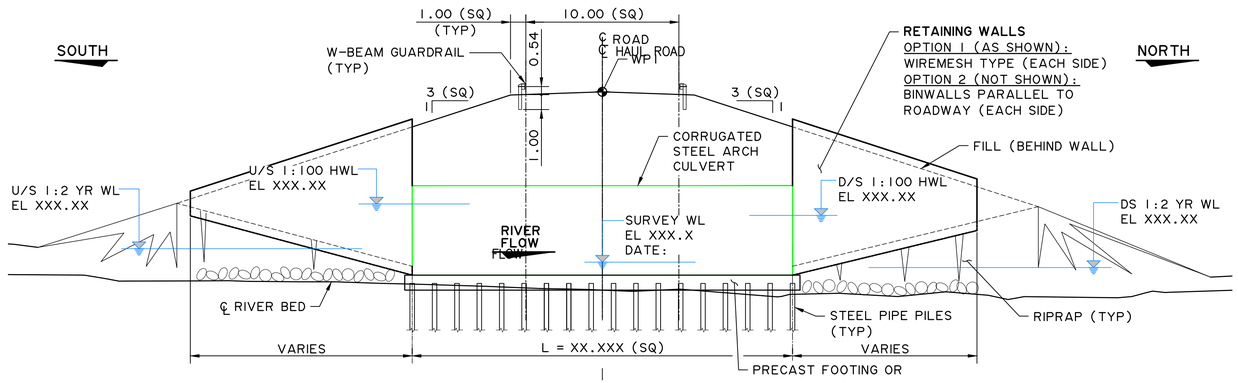
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PLAN WITH ARCH CULVERT
RIVER CROSSING 1:400



B – SECTION
1:100



A – LONGITUDINAL SECTION
1:200

GENERAL NOTES

SURVEY BY
- SURVEY DONE BY: XXX
- THE COORDINATES INDICATED ON THIS PLAN ARE BASED ON GRID NAD83(CSRS)(2010) UTM9 CGVD2013. ALL COORDINATES AND STATIONING SHOWN ON THIS PLAN ARE BASED ON THE ABOVE GRID COORDINATES VALUES

CONTROL POINTS
- CP1 NORTHING EASTING EL XXX.XXX
- CP2 NORTHING EASTING EL XXX.XXX

HYDROTECHNICAL NOTES
- HYDROTECHNICAL REPORT: XXX
  BY: XXX
  DATED: YR-M-D
- DRAINAGE AREA = XXX km²
- 1:100 YEAR
  - UPSTREAM (US) WATER LEVEL = EL XXX.XX m
  - DOWNSTREAM (DS) WATER LEVEL = EL XXX.XX m
  - MEAN VELOCITY IN CULVERT = X.XX m/s
  - DESIGN FLOOD FLOW = XXX.X m³/s
- 1:2 YEAR
  - WATER LEVEL = EL XXX.XX m
  - MEAN VELOCITY IN CULVERT = X.XX m/s
  - FLOOD FLOW = XX.X m³/s
  - FISH MIGRATION DISCHARGE = XX.X m³/s
  - MEAN VELOCITY FOR FISH MIGRATION DISCHARGE THROUGH THE PROPOSED OPENING = X.XX m/s

GEOTECHNICAL NOTES
- GEOTECHNICAL REPORT XXX
  BY: XXX
  DATED: YR-M-D

PROPOSED STRUCTURE
- 1 – CORRUGATED STEEL ARCH CULVERT
  SPAN ("S") = XX.XXX, RISE ("R") = XX.XXX
- XXX.XXX m INVERT LENGTH
- XXX x XXX mm CORRUGATION PROFILE
- X.X mm PLATE THICKNESS
- GALVANIZED COATING OF 610 g/m²
- 0° SKEW (PERPENDICULAR TO CL ROAD)
  (OR XX° SKEW RHF/LHF, INCREASE ROAD CHANAGE)
  AT WP1: STA XX+XXX.XXX EL XXX.XX
- INLET/OUTLET OF CULVERT MIGHT REQUIRED CONCRETE COLLAR AROUND (X.XX m x X.XX m MIN)

DESIGN NOTES
- ALL DIMENSIONS ARE IN METERS UNLESS NOTED OTHERWISE
- BRIDGE DESIGN:
  - CAN/CSA-S6-25
  - LIVE LOAD CL800 & PROJECT-SPECIFIC HEAVY HAUL VEHICLES
- DESIGN LIFE: 75 YEARS

NOT FOR CONSTRUCTION

LEGEND

NUM	DATE	DWN	CKD	APR	DESCRIPTION
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0	2026.09.25	MB	RK	GM	ISSUED FOR MAJOR WORK RFP

REVISIONS

CONCEPTUAL ONLY
FOR INTERNAL USE ONLY
PERMIT

PROFESSIONAL SEAL

CLIENT
WEST KITIKMEOT RESOURCES CORP

NUNAMI
STANTEC LIMITED

GRAYS BAY ROAD & PORT
NUNAVUT, CANADA

ROADWAY STRUCTURES
STEEL ARCH CULVERT WITH FOOTINGS ON PILES

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	EDMONTON	RK	RK	0	ST0504
DATE: 2026.09.25	SHEET No. 4 of 4	DWN MB	APP GM	STATUS DFT	

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DRAFT
FOR INFO ONLY

N

FG: 485.11
EG: 484.15

FG: 486.77
EG: 484.26

LAYDOWN AREA A-1
AREA = 2.1 ha

FG: 484.85
EG: 483.59

EXISTING AIRSTRIP

FG: 487.34
EG: 484.92

EXISTING APRON

FG: 481.38
EG: 480.38

FG: 481.32
EG: 480.32

FG: 480.73
EG: 479.73

FG: 481.48
EG: 480.48

PROPOSED ROADWAY ALIGNMENT

FG: 480.99
EG: 479.99

FG: 481.31
EG: 480.31

FG: 480.96
EG: 479.96

FG: 480.22
EG: 479.22

LAYDOWN AREA A-2
AREA = 15.5 ha

FG: 482.22
EG: 481.22

FG: 479.56
EG: 478.56

FG: 480.42
EG: 479.42

LAYDOWN AREA B
AREA = 11.4 ha

FG: 477.38
EG: 476.38

1:2500 0 25 50 125

LEGEND

EDGE OF WATER
SITE BOUNDARY
CONTOUR MINOR EX
CONTOUR MAJOR EX

NUM	DATE	DWN	CKD	APR	DESCRIPTION
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0	2026.09.25	NL	GM	AF	ISSUED FOR MAJOR WORK RFP

REVISIONS

CONCEPTUAL ONLY
FOR INTERNAL USE ONLY
PERMIT

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CLIENT
WEST KITIKMEOT RESOURCES CORP

NUNAMI
STANTEC LIMITED

GRAYS BAY ROAD & PORT
NUNAVUT, CANADA

JERICHO STATION, OVERALL PLAN

PROJECT No.	OFFICE	DES	CKD	REV	DRAWING
144903508	YK	WO	GM	0	GA0102
DATE	SHEET No.	DWN	APP	STATUS	
2026.09.25	1 of 1	NL	AF	DFT	

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