Sabina
GOLD & SILVER CORP.

The BACK RIVER PROJECT

MODIFICATION PACKAGE

October 2020, Version 2

Submitted to:
Nunavut Water Board

Modification Package Plain Language Summary

Sabina Gold & Silver Corp. (Sabina) is a Canadian junior resource company focused on the responsible development of the Back River Project (the Project). The Back River Project is Sabina's 100%-owned, proposed gold mine located in the Kitikmeot Region of western Nunavut and is comprised of two areas interconnected by winter ice roads: Goose Property and the Marine Laydown Area (MLA).

Sabina commenced the Environmental Assessment of the Project in June 2012 with the submission of a Project Proposal to the Nunavut Impact Review Board (NIRB). Sabina received the Project Certificate (PC No. 007) for the Project from the NIRB in December 2017, and the Project's Type A Water Licence (2AM-BRP1831) from the Nunavut Water Board (NWB) in November 2018.

Since receipt of the NIRB Project Certificate and the NWB Type A Water Licence, Sabina has continued to advance Detailed Engineering and additional field work related to Construction, Operations, and Closure of the Project. Through these efforts, Sabina has identified modifications that will further optimize and de-risk the Project. As with all projects, modifications occur throughout the Project lifecycle, and those included in the Modification Package have been reviewed by Sabina in consideration of the following:

- the NIRB Final Hearing Report and Project Certificate;
- the NWB Public Hearing Decision Report and Type A Water Licence;
- ongoing discussions with communities and government departments;
- field work which have tested our assumptions;
- additional Detailed Engineering; and
- refinement of the overall Project plan.

The proposed Back River Project 2020 Modification Package modifications (Modification Package or Application) are provided for regulatory consideration and are presented in the associated sections listed below:

- Section 2. Goose Property
    - Section 2.1. Goose Property Airstrip Extension
    - Section 2.2. Umwelt Underground Extension
    - Section 2.3. Goose Property Total Water Use Increase
- Section 3. Goose Property Waste and Water Management
    - Section 3.1. Waste and Water Management Infrastructure
- Section 4. Marine Laydown Area (MLA)
    - Section 4.1. MLA Fuel Transfer Area
    - Section 4.2. MLA Airstrip Extension
- Section 5. Marine Laydown Area – Shoreline Pad Extension
    - Section 5.1. MLA Shoreline Pad Extension

- Section 6. Winter Ice Road (WIR)
    - Section 6.1. WIR Subbase Upgrade
    - Section 6.2. WIR Service/Emergency Camps
    - Section 6.3. WIR Total Water Use Increase

Sabina assessed each proposed Project modification with respect to Project regulatory precedence, community engagement and traditional knowledge, key management and mitigation measures, as well as modification-specific effects assessments. The Modification Package effects assessment was guided by the same approach used for the Back River Project Final Environmental Impact Statement (FEIS; Sabina 2015) and FEIS Addendum (Sabina 2017b). Sabina has also included discussions in this Application related to the Modification Package cumulative effects, Sabina's Self-Assessment guided by the NIRB Modification Guideline (NIRB 2018), and key compliance considerations for this Application.

Results from the Modification Package effects assessment identified minimal change to the FEIS residual effects, and no change to the overall significance ratings for the FEIS residual effects. Sabina has therefore determined the Modification Package will result in no significant changes to the overall environmental or socio-economic effects previously predicted for the Project.

Sabina reviewed each proposed Project modification against the NIRB Modification Guideline (NIRB 2018), and it is Sabina's view is that these proposed Project modifications are considered minor in the overall scope of the original Environmental Assessment, and that cumulatively, this Modification Package Application be considered a "Non-Significant" amendment to the Project, with screening not required.

Sabina clarifies that mining areas and associated infrastructure already included in the Project Certificate (PC No. 007; NIRB File No. 12MN036) and the Type A Water Licence (2AM-BRP1831) will remain in the amended licence. Sabina confirms that the scope of activities in Part A, Item 1 of licence, 2AM-BRP1831, remain unchanged, that Sabina is not requesting a reduction in Project scope, and that the new scope of activities associated with the 2020 Modification Package will be added to the licence as part of this amendment application.

As mentioned throughout the NIRB Environmental Assessment, Sabina is proceeding with an initial refined mine plan at the Goose Property, which provides a reduced capital investment and financially de-risks the Project. The refined mine plan is a subset of the previously approved permitted mine, and Sabina highlights that, with the continued advancement in detailed engineering and market considerations, the previously approved deposits may be reintegrated into the mine plan at a later date. Sabina acknowledges that if this were to occur, all applicable management plans will be updated to reflect these changes, and Sabina will adhere to all appropriate requirements of the Back River Project Certificate (PC No. 007) and the Type A Water License (2AM-BRP1831).

The Back River Project 2020 Modification Package was submitted to NPC for determination and confirmation regarding land use. NPC confirmed on June 9, 2020 that the application for modification remained outside the area of an applicable regional land use plan, and subsequently forwarded the 2020 Modification Package to NIRB for assessment.

As per NIRB's letter, Direction Regarding the "Back River Project 2020 Modification Package" submitted by Sabina Gold & Silver Corp. in relation to the Back River Project (K. Kaluraq to M. Pickard, dated August 11, 2020, NIRB File No. 12MN036), the NIRB determined that the Back River Project 2020 Modification Package would not constitute a significant modification that requires further assessment by the NIRB.

The Back River Project 2020 Modification Package outlines proposed additions (Section 2 – 6) to the Type A Water Licence, 2AM-BRP1831, and is being provided to the NWB in support of an amendment application for inclusion in the licence.

Sabina has not yet identified the specific timing for these Project modifications within the construction sequence but provides general guidance as to when Sabina plans to proceed.

ᐊᓯᐊᖑᕆᐊᖅᓯᒪᓂᐊ ᑐᑭᓯᓐᓇᖅᓯᒋᐊᖅᓯᒪᑉᓗᒍ ᑎᑎᕋᖅᓯᒪᔪᖅ

ᓴᐲᓇ ᒎᓗ ᐊᒻᒪᓗ ᓴᕕᖕᓄᑦ ᑯᐊᐳᕇᓴᒃᑯᑦ (ᓴᐲᓇ) ᑲᓇᑕᒥ ᐊᑯᕈᑦᑎᓯᒪᔪᖅ ᐱᓇᓱᐊᖅᕕᒃ ᑕᐅᑐᒐᖃᖅᑐᑦ ᐱᔭᒃᓴᐅᑎᖃᖅᑐᒃᑯᑦ ᐱᕙᓪᓕᐊᓂᖃᖅᓗᑎᒃ Hᐊᓐᓂᖓᔪᕐᒥ ᐱᓕᕆᐊᕐᒥᑦ (ᐅᕙᓘᓃᑦ ᐱᓕᕆᐊᖅ). ᑕᒪᓐᓇ Hᐊᓐᓂᖓᔪᒥ ᐱᓕᕆᐊᒃᓴᖅ ᓴᐲᓇᑯᑦ ᑕᐃᒪᐃᑕ ᓇᖕᒥᓂᕆᒪᔾᔪᒃ, ᒍᑦᒥ ᐅᔭᕋᕐᓂᐊᕕᐅᔪᒪᔪᖅ ᕿᑎᕐᒥᐅᑦ ᓄᓇᑕ ᑭᕙᑕᓂ ᓄᓇᕗᒻᒥ ᐊᒻᒪ ᒪᕐᕈᕐᓂᒃ ᐃᓚᖃᖅᓗᓂ ᐅᕐᓂᒃᑕᐅᔪᓐᓇᖅᐸᒃᑐᑦ ᐅᑭᐅᒃᑯᑦ ᓯᑯᒃᑯᑦ ᐊᕐᑯᓯᐅᖅᓯᒪᓕᕋᖓᑕ: Hᐊᓐᓂᖓᔪᑉ ᑲᓇᖕᓇᓂ ᐅᔭᕋᕐᓂᐊᖅᕕᒃ ᐊᒻᒪ ᓯᒡᔭᒥᑦ ᐃᒃᓴᖅᕕᒃ (MLA).

ᓴᐲᓇ ᐊᕙᑎᓕᕆᓂᕐᒥᒃ ᖃᐅᔨᓴᐃᓂᖃᕆᐊᓚᐅᖅᑐᑦ ᐱᓕᕆᐊᕐᒥᑦ ᔫᓂ 2012-ᒥᑦ ᑐᓂᐅᑎᒋᑉᓗᒍ ᐱᓕᕆᐊᕐᒧᑦ ᑐᒃᓯᕋᐅᑎ ᓄᓇᕗᒻᒥ ᐊᕙᑎᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ. ᓴᐱᓐᓇᒃᑯᑦ ᑐᓂᔭᐅᓚᐅᖅᑐᖅ ᐱᓕᕆᔪᑎᒃᓴᒥᑦ (PC ᓈᓴᐅᑎ 007) Hᐊᓐᓂᖓᔪᒥ ᐱᓕᕆᐊᒧᑦ ᐅᑯᓇᖓᑦ ᓄᓇᕗᒻᒥ ᐊᕙᑎᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ ᐃᑲᓂ ᑎᓴᒻᐱᕆ 2017 ᐅᑭᐅᖓᓂ ᐊᒻᒪ ᐃᒪᕐᒧᑦ ᓚᐃᓴᒥᑦ (2AM-BRP1831) ᓄᓇᕗᒻᒥ ᐃᒪᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ ᓄᕕᒻᐱᕆ 2018–ᒥ.

ᑎᒍᒥᐊᓕᖕᒪᑕ ᓄᓇᕗᒻᒥ ᐊᕙᑎᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ (NIRB) ᓇᓗᓇᐃᑯᑕᓂᒃ ᐊᒻᒪ ᓄᓇᕗᒻᒥ ᐃᒪᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᑦ (NWB) Type A ᓚᐃᓴᒥᒃ ᓴᐱᓐᓇᑯᑦ ᑲᔪᓯᔪᓐᓇᓯᑕᐅᖅᑐᑦ ᓇᓗᓇᐃᔭᖅᓯᒪᔪᖅ ᑎᑎᕋᐅᔭᖅᓯᒪᔪᖅ ᐱᓕᕆᔪᑎᒃᓴᖅ ᐊᒻᒪ ᓄᓇᐅᑉ ᖃᖓᓂ ᐱᓕᕆᐊᒃᓴᓂᒃ ᐊᒻᒪ ᐅᑯᐊᖅᑕᐅᓂᖓ ᐱᓕᕆᐊᒃᓴᖅ. ᑕᒪᒃᑯᐊ ᐱᓕᕆᐊᕆᑉᓗᒋᑦ ᓴᐲᓇᒃᑯᑦ ᓇᓗᓇᐃᖅᓯᓚᐅᕐᒪᑕ ᐊᓯᐊᖑᖅᓯᒪᔪᓂᒃ ᐃᓗᐊᓯᒋᐊᕈᑕᐅᓂᐊᖅᓗᑎᒃ ᑭᓇᐅᔭᖅᑐᕈᑕᐅᖏᓐᓂᖅᓴᐅᓗᑎᒃᓗ ᐱᓕᕆᐊᒧᑦ. ᑕᐃᒪᐃᓯᖑᒪᑦ ᐱᓕᕆᓂᐊᖅ ᐊᓯᐊᖑᓯᖑᒪᑕ ᐱᓕᕆᐊᓂᒍᑎᒃᓴᖅ ᐃᓕᖅᑯᓯᕆᒪᒍ, ᐊᒻᒪ ᐃᓚᖃᕆᑉᓗᓂ ᐊᓯᐊᖑᕆᐊᖃᓯᓂᒃ ᕿᒥᕈᔭᐅᓚᐅᕐᒪᑕᓗ ᓴᐲᓇᒃᑯᓐᓄᑦ ᐅᑯᐊ ᐃᓱᒪᒋᓯᒪᑉᓗᒋᑦ ᐃᒪᓐᓇᐃᑦᑐᑦ:

- ᓄᓇᕗᒻᒥ ᐊᕙᑎᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ ᑭᖑᓪᓕᖅᐹᒃᑯᑦ ᐊᒻᒪ ᐱᓕᕆᐊᒧᑦ ᓇᓗᓇᐃᒃᑯᑕᖅ;
- ᓄᓇᕗᒻᒥ ᐃᒪᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᑦ ᑭᒃᑯᑐᐃᓐᓇᕐᓂ ᑐᓴᓚᐅᖅᓗᑎᒃ Type A ᐃᒪᕐᒧᑦ ᓚᐃᓴᓐᓯ;
- ᓂᐅᕈᕙᓗᑎᒃ ᐅᖃᓪᓚᖃᑎᖃᖅᓂᐊᖅᑐᑦ ᓄᓇᓕᐅᔪᓂᑦ ᐊᒻᒪ ᒐᕙᒪᒃᑯᑦ ᐱᓕᕆᕝᕕᖏᓐᓂᑦ;
- ᓄᓇᐅᑉ ᖃᖓᓂ ᖃᐅᔨᒋᐊᕈᓯᒃᑯᑦ ᐃᓱᒪᒋᓯᒪᔭᕗᑦ ᖃᐅᔨᒋᐊᖅᑕᐅᓚᐅᖅᓂᖏᑦ;
- ᐃᓚᒋᔭᒃᓴᖏᑦ ᑎᑎᕋᐅᔭᕈᓯᒃᑯᑦ ᓇᓗᓇᐃᔭᖅᓯᒪᔪᑦ; ᐊᒻᒪ
- ᐊᓯᐊᖑᕆᐊᖅᓴᔪᓗ ᐱᓕᕆᐊᒃᓴᒧᑦ ᖃᓄᐃᓕᐅᕈᑎᒃᓴᖅ.

ᐱᓕᕆᐊᕐᒥᑦ ᐋᖅᑭᒋᐊᖅᓯᓂᐅᔪᒪᔪᖅ (ᐋᖅᑭᒋᐊᖅᓯᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᓂᐊᖅᑐᑦ ᐅᕙᓘᓐᓃᑦ ᑐᒃᓯᕋᐅᑎ) ᑐᓂᔭᐅᔪᑦ ᒪᓕᒐᓕᕆᓂᕐᒧᑦ ᐃᓱᒪᒃᓴᖅᓯᐅᕈᑎᒋᔭᐅᓂᐊᕐᓗᑎᒃ ᑕᐃᒪᐅᑉᓗᑎᒃᓗ ᐊᕕᒃᑐᖅᓯᒪᔪᓂᑦ:

- ᐊᕕᒃᑐᖅᓯᒪᔪᖅ 2. Hᐊᓐᓂᖓᔪᑉ ᑲᓇᖕᓇᓂ ᐅᔭᕋᕐᓂᐊᖅᕕᒃ
  - ᐊᕕᒃᑐᖅᓯᒪᔪᖅ 2.1. Hᐊᓐᓂᖓᔪᑉ ᑲᓇᖕᓇᓂ ᐅᔭᕋᕐᓂᐊᖅᕕᒃ ᒥᑦᑕᕐᕕᒃ ᐅᐃᒍᒋᐊᖅᑕᐅᓗᓂ
  - ᐊᕕᒃᑐᖅᓯᒪᔪᖅ 2.2. ᐊᒻᕕᐅᑦ ᓄᓇᐅᑉ ᐃᓗᐊᓂᑦ ᐅᐃᒍᒋᐊᖅᑕᐅᓗᓂ
  - ᐊᕕᒃᑐᖅᓯᒪᔪᖅ 2.3. Hᐊᓐᓂᖓᔪᑉ ᑲᓇᖕᓇᓂ ᐅᔭᕋᕐᓂᐊᖅᕕᒃ ᑲᑎᑐᒃᑖᖅᓗᒋᑦ ᐃᒪᕐᒥᒃ ᐊᑐᕐᓂᖅ ᐊᖏᒡᓕᒋᐊᖅᑕᐅᓗᓂ
- ᐊᕕᒃᑐᖅᓯᒪᔪᖅ 3. Hᐊᓐᓂᖓᔪᑉ ᑲᓇᖕᓇᓂ ᐅᔭᕋᕐᓂᐊᖅᕕᒃ ᐊᒃᑕᑯᓂᒃ ᐊᒻᒪᓗ ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᖅ
  - ᐊᕕᒃᑐᖅᓯᒪᔪᖅ 3.1. ᐊᒃᑕᑯᓂᒃ ᐊᒻᒪᓗ ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐱᕐᑯᑏᑦ
- ᐊᕕᒃᑐᖅᓯᒪᔪᖅ 4. ᓯᒡᔭᒥᑦ ᐃᒃᓴᖅᕕᒃ ᓂᐅᕋᐃᕝᕕᒃ (MLA)
  - ᐊᕕᒃᑐᖅᓯᒪᔪᖅ 4.1. ᓯᒡᔭᒥᑦ ᐃᒃᓴᖅᕕᒃ ᓂᐅᕋᐃᕝᕕᖕᒥᑦ ᐅᖅᓱᐊᓗᒃᑖᕐᕕᒃ
  - ᐊᕕᒃᑐᖅᓯᒪᔪᖅ 4.2. ᓯᒡᔭᒥᑦ ᐃᒃᓴᖅᕕᒃ ᓂᐅᕋᐃᕝᕕᖕᒥᑦ ᒥᑦᑕᕐᕕᒃ ᐅᐃᒍᒋᐊᖅᑕᐅᓗᓂ
- ᐊᕕᒃᑐᖅᓯᒪᔪᖅ 5. ᓯᒡᔭᒥᑦ ᐃᒃᓴᖅᕕᒃ ᓂᐅᕋᐃᕝᕕᒃ – ᓯᒡᔭᒥᑦ ᑐᙵᕕᒃ ᐅᐃᒍᒋᐊᖅᑕᐅᓗᓂ
  - ᐊᕕᒃᑐᖅᓯᒪᔪᖅ 5.1. ᓯᒡᔭᒥᑦ ᐃᒃᓴᖅᕕᒃ ᓂᐅᕋᐃᕝᕕᖕᒥᑦ ᑐᙵᕕᒃ ᐅᐃᒍᒋᐊᖅᑕᐅᓗᓂ
- ᐊᕕᒃᑐᖅᓯᒪᔪᖅ 6. ᐅᑭᐅᒃᑯᑦ ᓯᑯᒃᑯᑦ ᐊᑉᕐᑯᑎᓴᖅ (WIR)

- ᐊᕕᒃᑐᖅᓯᒪᔪᖅ 6.1. ᐅᑭᐅᒃᑯᑦ ᓱᑯᒃᑯᑦ ᐊᑉᖁᑎᐅᑉ ᐃᓚᖓ ᐱᐅᓯᒋᐊᖅᑕᐅᓗᓂ
- ᐊᕕᒃᑐᖅᓯᒪᔪᖅ 6.2. ᐅᑭᐅᒃᑯᑦ ᓱᑯᒃᑯᑦ ᐊᑉᖁᑎᒧᑦ ᐱᔨᑦᑎᕋᐃᓂᖅ/ᑐᐊᕕᓇᖅᑐᒃᑯᑦ ᑕᖕᒫᕐᕖᑦ
- ᐊᕕᒃᑐᖅᓯᒪᔪᖅ 6.3. ᐅᑭᐅᒃᑯᑦ ᓱᑯᒃᑯᑦ ᐊᑉᖁᑎᒥᑦ ᑲᑎᑐᒃᑖᖅᓱᒋᑦ ᐃᒪᕐᒥᒃ ᐊᑐᕐᓂᖅ ᐊᖏᒡᓕᒋᐊᖅᑕᐅᓗᓂ

ᓴᐲᓇᒃᑯᑦ ᐊᑐᓂᐅᑦᑕᖅᓱᒍ ᐊᓯᐊᖑᓇᐊᓕᒃ ᕿᒥᕈᓚᐅᒪᔾᔪᒃ ᐱᓕᕆᐊᒧᑦ ᒪᓕᒐᖅ ᐱᔾᔪᑎᒋᒪᖅᓱᒍ, ᓂᐅᕈᕙᓂᖅᓱ ᓄᓇᓕᐅᔪᓄᑦ ᐃᓄᐃᑦ ᐃᓕᖁᓯᑐᖃᕐᒥᒃ ᖃᐅᔨᒪᓂᖅ, ᐊᐅᓚᑦᑎᔪᓯᖅᓱ ᐊᒻᒪ ᖃᓄᐃᓕᐅᕆᐊᖃᕈᓯᖅ ᐃᓚᖃᓱᒍ ᐊᓯᐊᖑᓇᐊᕈᑕᐅᓂᐊᖅᑐᓂᒃ. ᑕᒪᓐᓇ ᐊᓯᐊᖑᓇᐊᕈᑎᒃᓴᖅ ᐃᒃᐱᓇᕐᓂᐊᕐᓂᖓ ᐊᑐᓚᐅᖅᑐᖅ ᐅᑯᓂᖓᑦ Hᐊᓐᓂᖓᔪᒥ ᐱᓕᕆᔪᑕᐅᔪᒧᑦ ᐊᑐᖅᑕᐅᔪᓂᒃ FEIS. ᓴᐲᓇᒃᑯᑦ ᐅᖃᓪᓚᓂᐊᕋᖓᒥᒃ ᑕᒪᓐᓇ ᐊᓯᐊᖑᕈᑕᐅᓂᐊᖅᑐᖅ ᐊᒃᑐᐃᔪᑕᐅᓂᐊᕐᓂᖓ, ᓴᐲᓇᑯᑦ ᖃᓄᐃᓕᐅᕆᐊᖃᓂᖏᑦ ᓄᓇᕗᒥ ᐊᕙᑎᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ ᖃᓂᕋᕈᑕᐅᓯᒥᑦ ᐃᑲᖓᑦ (NIRB 2018) ᐊᒻᒪᓗ ᒪᓕᒐᓂᒃ ᒪᓕᒋᐊᖃᕐᓂᖏᑦ ᑕᒪᓐᓇ ᐱᓕᕆᐊᒧᑦ ᐊᑐᑎᖃᖅᑐᓂᒃ.

ᖃᐅᔨᒋᐊᒪᐅᕐᒪᑕ ᐊᓯᐊᖑᕈᑕᐅᔪᑦ ᖃᓄᖅ ᐊᒃᑐᐃᓂᐊᕐᓂᖏᑦ ᑕᒪᓐᓇ ᒥᑭᔪᒻᒪᓇᐅᓚᐅᖅᑐᖅ ᑭᖑᓪᓕᖅᐹᖅ ᐊᕙᑎᕗᑦ ᐊᒃᑐᖅᑕᐅᓂᖃᕐᓂᐊᖅᑎᓪᓗᒍ ᐅᖃᐅᓯᒃᓴᓕᐊᖅ (FEIS), ᐊᒻᒪ ᐊᓯᐊᖑᖅᓯᒪᖕᒋᑦᑐᖅ ᑭᖑᓪᓕᖅᐹᖅ ᐊᕙᑎᕗᑦ ᐊᒃᑐᖅᑕᐅᓂᖃᕐᓂᐊᖅᑎᓪᓗᒍ ᐅᖃᐅᓯᒃᓴᓕᐊᖅ (FEIS) ᐃᒃᐱᓇᖅᑐᓂᐊᕐᓂᖓ. ᓴᐲᓇᒃᑯᑦ ᐃᓱᒪᖃᖅᑐᑦ ᑕᒪᓐᓇ ᐊᓯᐊᖑᓇᐊᕈᑎᒃᓴᖅ ᐊᒃᑐᐃᓗᐊᔭᖏᑦᑐᖅ ᓄᓇᐅᑉ ᐊᕙᑕᓄᑦ ᐅᕝᕙᓘᓐᓃᑦ ᐃᓄᓯᕐᒧᑦ ᖃᓄᐃᓕᐅᕈᑎᒃᓴᓂᑦ ᐅᒃᑐᖃᖅᑕᐅᓯᒪᓂᐊ Hᐊᓐᓂᖓᔪᒥ ᐱᓕᕆᐊᒧᑦ.

ᓴᐲᓇᒃᑯᑦ ᕿᒥᕈᓯᒪᖕᒪᑕ ᐊᑐᓂ ᐊᓯᐊᖑᓇᐊᕈᑎᒃᓴᐅᔪᓂᒃ ᐊᑐᖅᓱᒍ ᓄᓇᕗᒥ ᐊᕙᑎᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ ᐊᓯᐊᖑᓇᐊᕈᑎᒃᓴᓄᑦ ᖃᓂᕋᕈᑎᖏᓐᓂᒃ (NIRB 2018), ᐊᒻᒪ ᓴᐲᓇᒃᑯᑦ ᐃᓱᒪᖃᖅᑐᑦ ᑕᒪᒃᑯᐊ ᐊᓯᐊᖑᓇᐊᕈᒪᔭᖏᑦ ᐊᖏᓗᐊᕋᓗᖏᓪᒪᑕ ᑕᒪᓐᓇ ᐊᕙᑕᓕᕆᓂᕐᒧᑦ ᐅᒃᑐᕋᐅᑕᐅᓯᒪᔪᖅ ᐊᑐᖅᓱᒍ, ᐊᒻᒪ ᑲᒪᓐᓇ ᐊᓯᐊᖑᓇᐊᕈᑕᐅᔪᒃᓴᖅ ᐃᓱᒪᒋᖁᔭᐅᐸᓗᒍ ᑕᒪᓐᓇ “ᐊᓯᐊᖑᐃᓗᐊᕋᓗᔭᖏᓪᒪ” ᒥᑭᔪᒻᒪᓇᐅᓂᐊᕐᒪᑦ ᐱᓕᕆᐊᒃᓴᖅ ᕿᒥᕈᔭᐅᔭᓇᐊᖅᑲᖏᓪᓕᖅ.

ᓴᐲᓇᒃᑯᑦ ᓇᓗᓇᐃᒃᑲᓐᓂᖅᑐᑦ ᐅᔭᕋᒃᑕᕐᕕᐅᔪᑦ ᐱᖁᑎᖏᑦᑐ ᐃᓚᐅᕚᓂᖓᒪᑕ ᐱᓕᕆᐊᒧᑦ ᓇᓗᓇᐃᒃᑯᑕᕐᒥᑦ (ᐱᓕᕆᐊᕐᒧᑦ ᓇᓗᓇᐃᒃᑯᑕᕐᒥᑦ ᓈᓴᐅᑎᖓ 007; ᓄᓇᕗᒥ ᐊᕙᑎᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᑦᑕ ᑎᑎᖅᑲᖁᑎᖓ ᓈᓴᐅᑎᓕᒃ: 12MN036) ᐊᒻᒪᓗ Type A ᐃᒪᕐᒧᑦ ᓚᐃᓴᓐᓯ (2AM-BRP1831) ᑕᐃᒪᐅᓂᐊᖅᑐᖅ ᐋᖅᑭᒋᐊᖅᓯᒪᔪᖅ ᓚᐃᓴᓐᓯᒥᑦ. ᓴᐲᓇᒃᑯᑦ ᓇᓗᓇᐃᖅᑐᑦ ᖃᓄᐃᓕᐅᕐᓂᐅᔪᑦ ᐊᕕᒃᑐᖅᓯᒪᔪᖅ A-ᒥᑦ, 1-ᖓᓂᑦ ᓚᐃᓴᓐᓯᒥᑦ, 2AM-BRP1831, ᐊᓯᐊᙳᙱᑦᑐᖅ, ᓴᐲᓇᒃᑯᑦ ᒥᒃᓵᓂᒋᐊᖁᔨᙱᖅᓱᑎᒃ ᐱᓕᕆᐊᖑᔪᒥᑦ, ᐊᒻᒪᓗ ᓄᑖᑦ ᖃᓄᐃᓕᐅᕐᓂᐅᔪᑦ ᐱᔾᔪᑎᖃᖅᑐᑦ 2020-ᒥᑦ ᐋᖅᑭᒋᐊᖅᓯᒪᔪᓂᑦ ᐃᓚᔭᐅᓂᐊᖅᑐᑦ ᓚᐃᓴᓐᓯᒧᑦ ᐃᓚᒋᔭᐅᓗᓂ ᐋᖅᑭᒋᐊᖅᓯᓂᕐᒧᑦ ᑐᒃᓯᕋᐅᑎᒧᑦ.

ᐅᖃᐅᓯᐅᓯᒪᓂᖓᑐᑦ ᐊᕙᑎᓕᕆᔨᒃᑯᑦ ᖃᐅᔨᓴᐃᓂᖓᓐᓂᑦ, ᓴᐲᓇᒃᑯᑦ ᑲᔪᓯᓂᐊᖅᑐᑦ ᐱᐅᓯᒋᐊᖅᓯᒪᔪᒥᒃ ᐅᔭᕋᒃᑕᕆᐊᕐᒧᑦ ᐸᕐᓇᐅᑎᒥᑦ ᒨᔅ ᐱᒋᔭᐅᔪᒥᑦ, ᒥᒃᓵᓂᒋᐊᖅᓯᒪᔪᓂᒃ ᐱᖁᑎᖅᔪᐊᖅᑖᖅᓯᒪᔪᑦ ᐊᒻᒪᓗ ᑮᓇᐅᔭᓕᕆᓂᕐᒧᑦ ᐅᓗᕆᐊᓇᙱᑦᑐᓕᐅᕆᐸᓗᓂ ᐱᓕᕆᐊᕐᒧᑦ. ᐱᐅᓯᒋᐊᖅᓯᒪᔪᖅ ᐅᔭᕋᒃᑕᕆᐊᕐᒧᑦ ᐸᕐᓇᐅᑎ ᐃᓚᒋᔭᐅᔪᖅ ᓈᒻᒪᒋᔭᐅᕚᓐᓂᓚᐅᖅᑐᓂᒃ ᐅᔭᕋᒃᑕᕆᐊᕐᒧᑦ, ᐊᒻᒪᓗ ᓴᐲᓇᒃᑯᑦ ᑕᑯᒃᓴᐅᑎᑕᖅᑭᑦ, ᓯᕗᒻᒧᒋᐊᕐᓂᖓᑦ ᓇᓗᓇᐃᔭᖅᓯᒪᔪᒃᑯᑦ ᓱᓇᑐᐃᓐᓇᓕᐅᕆᓂᖅ ᐊᒻᒪᓗ ᓂᐅᕙᐊᒃᓴᙳᖅᑎᑕᐅᓂᖏᓐᓄᑦ ᐃᓱᒪᒃᓴᖅᓯᐅᕆᓂᕐᒧᑦ, ᓈᒻᒪᒋᔭᐅᓯᒫᓂᒃᑐᑦ ᐱᑕᑖᑦ ᐃᓚᓕᐅᑎᔭᐅᒃᑲᓐᓂᕈᓐᓇᕐᓂᐊᖅᑐᑦ ᐅᔭᕋᒃᑕᕆᐊᕐᒧᑦ ᐸᕐᓇᐅᑎᒧᑦ. ᓴᐲᓇᒃᑯᑦ ᖃᐅᔨᒪᖁᔨᔪᑦ ᑕᐃᒪᓐᓇᐃᓐᓇᔭᖅᐸᑦ, ᐊᑐᖅᑐᒃᑖᑦ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐸᕐᓇᐅᑏᑦ ᐅᐸᓗᒥᒨᓕᖅᑐᖅᑕᐅᓂᐊᖅᑐᑦ ᑕᑯᒃᓴᐅᑎᓐᓂᐊᖅᓱᒋᑦ ᐊᓯᐊᙳᖅᑐᑦ, ᐊᒻᒪᓗ ᓴᐲᓇᒃᑯᑦ ᒪᓕᖕᓂᐊᖅᑐᑦ ᐱᔭᕆᐊᖃᖅᑐᑐᒃᑖᓂᒃ Hᐊᓐᓂᖓᔪᒥᑦ ᐱᓕᕆᐊᕐᒧᑦ ᓇᓗᓇᐃᒃᑯᑕᕐᒥᑦ (ᐱᓕᕆᐊᕐᒧᑦ ᓇᓗᓇᐃᒃᑯᑕᕐᒥᑦ ᓈᓴᐅᑎᖓ 007) ᐊᒻᒪᓗ Type A ᐃᒪᕐᒧᑦ ᓚᐃᓴᓐᓯ (2AM-BRP1831).

Hᐊᓐᓂᖓᔪᒥᑦ ᐱᓕᕆᐊᖅ 2020-ᒥᑦ ᐋᖅᑭᒋᐊᖅᓯᓂᖅ ᑐᓂᔭᐅᓚᐅᖅᑐᖅ ᓄᓇᕗᒥ ᐸᕐᓇᐃᔨᒃᑯᓐᓄᑦ (NPC) ᖃᐅᔨᓂᐊᕐᓗᑎᒃ ᐊᒻᒪᓗ ᓇᓗᓇᐃᕐᓗᒍ ᓄᓇᒥᒃ ᐊᑐᕐᓂᖅ. ᓄᓇᕗᒥ ᐸᕐᓇᐃᔨᒃᑯᓐᓄᑦ (NPC) ᓇᓗᓇᐃᓚᐅᖅᑐᑦ ᒪᓐᓃᑦ (ᔫᓂ) 9, 2020-ᒥᑦ ᑐᒃᓯᕋᐅᑕᐅᔪᖅ ᐋᖅᑭᒋᐊᖅᓯᓂᕐᒧᑦ ᓯᓚᑖᓃᖏᓐᓇᓚᐅᖅᑐᖅ ᐊᑐᖅᑐᒧᑦ ᖃᓂᑦᑐᒥᑦ ᓄᓇᒥᑦ ᐊᑐᕐᓂᕐᒧᑦ ᐸᕐᓇᐅᑎᐅᑉ, ᐊᒻᒪᓗ ᑐᓂᔭᐅᓕᖅᓱᑎᒃ 2020 ᐋᖅᑭᒋᐊᖅᓯᔾᔪᑎᑦ ᐊᕙᑎᓕᕆᔨᒃᑯᓐᓄᑦ ᖃᐅᔨᓴᖅᑕᐅᓂᐊᕐᓗᑎᒃ.

ᐊᕙᑎᓕᕆᔨᒃᑯᑦ ᑎᑎᖅᑲᖓᑦ, “ᖃᓄᐃᓕᐅᖁᔨᓂᖅ ᐱᔾᔪᑎᒋᑉᓗᒍ “Hᐊᓐᓂᖓᔪᒥᑦ ᐱᓕᕆᐊᖅ 2020 ᐋᖅᑭᒋᐊᖅᓯᔾᔪᑏᑦ” ᓴᐲᓇᒃᑯᑦ ᑐᓂᔭᐅᓚᐅᖅᑕᖓᑦ ᐱᔾᔪᑎᒋᑉᓗᒍ Hᐊᓐᓂᖓᔪᒥᑦ ᐱᓕᕆᐊᖅ (K. ᑲᓗᕋᖅ-ᒥᑦ M. ᐹᑯᑦ-ᒧᑦ, ᐅᐸᓗᖃᖅᑐᖅ ᐊᑯᑦᓕᕈᕐᕙᒃ (ᐋᒋᓯ) 11, 2020, ᓄᓇᕗᒥ ᐊᕙᑎᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᑦᑕ ᑎᑎᖅᑲᖁᑎᖓ ᓈᓴᐅᑎᓕᒃ: 12MN036), ᐊᕙᑎᓕᕆᔨᒃᑯᑦ ᐃᓱᒪᓕᐅᓕᓚᐅᖅᑐᑦ Hᐊᓐᓂᖓᔪᒥᑦ ᐱᓕᕆᐊᕐᒧᑦ 2020-ᒥᑦ ᐋᖅᑭᒋᐊᖅᓯᔾᔪᑏᑦ ᐊᖏᔪᒥᒃ ᐋᖅᑭᒋᐊᖅᓯᓂᖅᑲᕆᐊᖅᑲᔾᔭᙱᒻᒪᑕ ᖃᐅᔨᓴᐃᓂᖃᒃᑲᓐᓂᕆᐊᖃᕐᓗᑎᒃ ᐊᕙᑎᓕᕆᔨᒃᑯᑦ.

ᐄᐊᓐᓂᖅᓴᓪᒥᑦ ᐱᓕᕆᐊᖅᓯᒪᑦ 2020-ᒥᑦ ᐋᖅᑭᑎᐊᖅᓱᔪᓐᓇᑦ ᑎᑎᕃᖅᓯᒪᔪᑦ ᑐᓴᓯᕃᐅᑕᐅᔪᓂᖅ ᐃᓕᓴᐅᔪᓂᖅ (ᐃᓕᑎᕆᐅᔪᖅ 2-6) Type A ᐃᒪᖏᓪᒧᑦ ᓕᐃᕆᓐᓯᒪᓪᒧᑦ, 2AM-BRP1831, ᐊᓚᒪᓗ ᑐᓂᓴᐅᓂᐊᖅᑐᖅ ᓄᓇᕗᒻᒥ ᐃᒪᓕᕆᔨᖅᑯᓐᓄᑦ ᐃᓕᑎᕆᐅᖏᓐᓂ ᐋᖅᑭᑎᐊᖅᓱᓂᖏᓪᒧᑦ ᑐᓴᓯᕃᐅᑎᓪᒧᑦ ᐃᓕᐅᓂᐊᖏᓪᓗᓂ ᓕᐃᕆᓐᓯᒪᓪᓗᓂ.

ᖃᐅᓇᖅᑯᑦ ᓇᓗᓇᐃᖅᓱᓕᐅᖏᓕᓪᑕᖅ ᖃᐅᑯᓕᓪᓕᖅᖢᖅ ᑕᒪᖅᑯᐊ ᐊᓱᐊᖏᓴᓂᐊᖅᑐᑦ ᐱᑎᐊᕐᕋᓕᖅᓯᑎᕐᓗᒃ ᓇᕐᕿᖅᑎᓚᑎᐊᖅᕿᑕ ᐱᕐᓗᐃ ᑭᓱᐊᓂ ᓇᓗᓇᐃᖅᓱᓂᐊᓂᕋᖅᓯᒪᔪᑦ ᖃᐅᑯᐃ ᖃᐅᖅᑕᐅᓇᖅᓱᓂᐊᕋᓕᖅᓯᒪᓪᓗᓂ.

Ihuaqhigiarutit Atuqtakhat Kangiqhiyaulat Uqauhit Nainaqhimayuq

Sabina Guulit Silverlu Kuapurisan (Sabina) tamna Kanatamiuni angivallangittuq piqaqnit nanminilgit pinahuaqtut havarittiaqninik pivalianit tamna Hanningayuq Kuugaa Havauhikhaq (tamna Havauhikhaq). Tamna Hanningayuq Kuugaa Havauhikhaq piyuq Sabina-kut 100%-nanminiriyat, uuktutauyuq guulit uyarakhiuqvik inilik tahamani Kitikmeotni pingangnaani Nunavut ilaqaqhunilu malruk nunak atatyutiyut ukiumi hikukkut apqutinik: Goose Havauhikhaq tamnalu Tagiumi Iliuqaqvik Nuna (MLA).

Sabina pigiaqtat Avatiliqutit Naunaiyaqni taphuminga Havauhikhaq talvani Juni 2012 tuniyaunianut tamna Havauhikhaq Uuktutauyuq tapkununga Nunavut Avatiliriyit Katimayit (NIRB). Sabina pitaqtat tamna Havanguyuq Titigartaq (PC Nappaa 007) taphumunga Hanningayuq Kuugaa Havauhikhaq tapkunanga Nunavut Avatiliriyit Katimayit (NIRB) talvani Tisaipa 2017, tamnalu Havauhikhap Qanurittunia A Imaqmun Laisa (2AM-BRP1831) tapkunanga Nunavut Imaliriyit Katimayit (NWB) talvani Nuvipa 2018.

Taimanga pitaqnianit tamna Nunavut Avatiliriyit Katimayit (NIRB) Havanguyuq Titigartaq tamnalu Nunavut Imaliriyit Katimayit (NWB) Qanurittunia A Imaqmun Laisa, Sabina atuinaqtat havariyaukhaqnia Unniqtuttiaqhimayuq Qauyimayiuyuq tamnalu ilagiarut maniqami havaq turangayuq Hanayaunianut, Aulataunit, tamnalu Umiktaunia Havauhikhaq. Atuqhugit tahapkuat pinahuaqnit, Sabina naunaiqtai ihuaqhigiarutikhat hulivalliq pivaliqtitniagai hivuranaitpalliqni tamna Havauhikhaq. Taimattauq tamaitnu havauhikhat, ihuaqhigiarutit atuqtauyut atuqtitlugu tamna Havauhikhaq, tahapkuatlu ilaliutiyut tapkununga Ihuaqhigiarut Atuqtakhat naunaiyaqtauyut tapkunanga Sabina ihumagiplugit taha[kuat:

- tapkuat Nunavut Avatiliriyit Katimayit (NIRB) Kingulliqpamik Naalakvik Tuhaqhitaut tamnalu Havanguyuq Titigartaq;
- tapkuat Nunavut Imaliriyit Katimayit (NWB) Inungnik Naalakvik Ihumaliurut Tuhaqhitaut tamnalu Qanurittunia A Imaqmun Laisa;
- atinaqni uqaqatigikni nunaliuyut tapkuatlu kavamatkut timingit;
- maniqami havat tapkuat uuktuqtai ihumapiniarahugiyavut;
- ilagiarutit Unniqtuttiaqhimayut Qauyimayiuyut; tamnalu
- ihuaqhatqikhaqni tamaita Havanguyuq parnaut.

Tukhiutigiyauyuq Havauhikhamut Aadlangurninnga (Aadlangurninnga Taiguagakhat Puuqmi unaluuniit Uuktuutikhanginnik) tuniyauhimayut munariniqmut ihumagiyakhangit tuniyauyut hapkunani titiraqhimaninngani:

- Ilangani 2. Goose Havakvia
    - Ilangani 2.1. Goose Havakvia Milvinganik Angikliyuumiqniq
    - Ilangani 2.2. Umwelt Nunapataani Angikliyuumiqniq
    - Ilangani 2.3. Goose Havakvia Atauttimut Imaqmik Aturninnga Amigairyuumiqtuq
- Ilangani 3. Goose Havakvia Iqqakunik Imanganiklu Munariniq
    - Ilangani 3.1. Iqqakunik Imanganiklu Munariniq Aulapkaidjutikhanik
- Ilangani 4. Tagiumi Iliuqaqvik Nuna (MLA)
    - Ilangani 4.1. Tagiumi Iliuqaqvik Nuna Urhuqyuamik Nuutiqtirvinga

- Ilangani 4.2. Tagiumi Iliuqaqvik Nuna Milvinganik Angikliyuumiqniq

o Ilangani 5. Tagiumi Iliuqaqvik Nuna – Hinaani Iliurainininnganik Angikliyuumiqniq

- Ilangani 5.1. Tagiumi Iliuqaqvik Nuna Hinaani Iliurainininnganik Angikliyuumiqniq

o Ilangani 6. Ukiumi Hikukkut Apqut (WIR)

- Ilangani 6.1. Ukiumi Hikukkut Apqut Nunap Qaangani Ihuarhainiq
- Ilangani 6.2. Ukiumi Hikukkut Apqut Havaanga/Qilamiuqtuqaliqqat Nayugangit
- Ilangani 6.3. Ukiumi Hikukkut Apqut Atauttimut Imaqmik Aturninnga Amigairyuumiqtuq

Sabina naunaiyaqtai atuni uuktutit Havauhikhaq ihuaqhigiarutit piplugu tamna Havauhikhaq maligaqnu atuhimayugaluit, nunaliuyuq piqataupkaqni pitquhitlu ilihimanit, aturniqhat aulatyutit piyaunit, tapkualuttauq ihuaqhigiarutit-taihimani aktuanit naunaiyautit. Tamna Ihuaqhigiarut Atuqtakhat aktuayai naunaiyaqni hivuliqtauyut atauttimit pityuhiqmin atuqtauyuq talvani Hanningayuq Kuugaa Havauhikhaq Kingulliqmik Avatiliqutit Aktuani Uqauhit (FEIS). Sabina ilaliutikmiyaittauq uqaqatigini uumani tukhirautmi turangayuq tapkununga Ihuaqhigiarut Atuqtakhat katitaqninut aktuanit, Sabina-kut Inmingnik-Naunaiyaqni hivuliqtauyut tapkunanga Nunavut Avatiliriyit Katimayit (NIRB) Ihuaqhigiarutit Hivulirutai Maligait (NIRB 2018), aturniqhatlu malikhaqnit ihumagiyauni uumunga tukhirautmun.

Qanuritnit tapkunanga Ihuaqhigiarutit Atuqtakhat aktuanit naunaiyautit naunaiqnit mikiyumik ahianguqni tapkununga Kingulliqmik Avatiliqutit Aktuani Uqauhit (FEIS) haniragut aktuanit, alangungittutlu tamaitnut hutyuhinut aktilangi taphumunga Kingulliqmik Avatiliqutit Aktuani Uqauhit (FEIS) haniragut aktuanit. Sabina taimaittumik naunaiqhiyut tapkuat Ihuaqhigiarutit Atuqtakhat pityutauniat piitnit angiyumik alanguqnit tamaitnut avatiliqutit uvaluniit inuliqutit maniliurutit aktuanit hivuani nalautagaunit taphumunga Hanningayuq Kuugaa Havauhikhaq.

Sabina naunaiyaqtai atuni uuktutit Havauhikhaq ihuaqhigiaqni tapkunanga Nunavut Avatiliriyit Katimayit Hivulirutai Maligait (NIRB 2018), piyatlu Sabinakut ihumagiyai tahapkuat uuktutauyut Havauhikhaq ihuaqhigiarutit ihumagini mikiyangit tamaitnut havakhat atuqaqtainut avatiliqutit naunaiyaqnit, tapkuatlu katittaqninut, una Ihuaqhigiarutit Atuqtakhat Tukhiraut ihumagiyauyukhaq tamna “Angivallangittungittuq” ihuaqhigiarut taphumunga Havauhikhaq, naunaiyaqtaungitkaluaqlutik piyaqangitmat.

Sabina uingaiqta tapkuat uyarakhiuqvit inai piqatailu nappaqhimayut ilaliutitaqtut talvani Havanguyuq Titiraqtaq (Havanguyuq Titiiraqtaq Nappaa 007; NIRB Titigaquta Nappaa 12MN036) ramnalu Qanurittunia A Imaqmun Laisa (2AM-BRP1831) huniumaittuq ihuaqhigiaqhimayumi laisa. Sabina naunaiqtat tamna havakhat huliniit talvani Ilanga A, Titiraq 1 laisauyumi, 2AM-BRP1831, huniumaittuq allangungittuq, tapkuat Sabina tukhirangittut mikhigiaqnianik tamna Havanguyuq havakhat, tamnalu nutaq havakhat huliniit piqatai taphumunga 2020 Ihuaqhigiarut Titiqat ilaliutiniat laisamun ilagilugu uumunga ihuaqhigiarut tukhiraut.

Taima uqauhiagut atuqniani tamna Nunavut Avatiliqiyikkut Katimayit (NIRB) Avatiliqutinut Naunaiyainiq, Sabina kayuhiyuq hivulliqnut ihuaqhatqikhaqni uyarakhiuqvik parnaut talvani Goose Havakvia, tamna piqaqtitiyuq mikhigiaqni angiyunut hanivaqhimayut kiinauyaliqutitlu hivuranaitpalliqni taphuma Havanguyuq. Tamna ihuaqhatqikhaqnia uyarakhiuqvik parnaut ilagiya tapkuat hivuani angiqtauyut pilarutit uyarakhiurniq, tapkuatlu Sabina akhuqyumiyat tamna, atuinaqniagut hivunmuktitnia unniqtuttiaqnigut qauyimayiuyut niuvrutaunitlu ihumagiyaunit, tamna hivuani angiqtauyuq tuniyaunit ilaliutitqikhalat talvunga uyarakhiuqvik parnaut kinguagut ubluani. Sabina naunaiqtitat una aturniqat, tamaita atuqtut aulatyutinut parnautit nutanguqtigauniat piplugit tahapkuat allanguqnit, tapkuatlu

Sabina naalakniaqtai tamaita atuqnilgit aturialgit taphumunga Hanningayuq Kuugaq Havanguyuq Titiraqtaq (Havanguyuq Titiiraqtaq Nappaa 007) tamnalu Qanurittunia A Imaqmut Laisa (2AM-BRP1831).

Tamna Hanningayuq Kuugaq Havanguyuq 2020 Ihuaqhigiarut Titiqat tuniyauyuq tapkununga Nunavut Parnaiyiit Kamisan (NPC) naunaiqnianut angiqnialu piplugu nuna atuqnia. Nunavut Parnaiyiit Kamisan (NPC) angiqtat tamna Juni 9, 2020 tapkuat tukhiraut ihuaqhigiaqnianut huniumaittuq hilataani inaa taphuma atuqtup nunaliit avikhimaniani nuna atuqnia parnaut, kinguagutlu tuniyat tamna 2020 Ihuaqhigiarut Titiqat tapkununga Nunavut Avatiliqiyikkut Katimayit (NIRBnaunaiyaqtakhat.

Malikhugu Nunavut Avatiliqiyikkut Katimayitkut (NIRB-kut) titiraq, “Tiliurut Piplugu tamna Hanningayuq Kuugaq Havanguyuq 2020 Ihuaqhigiarut Titiqat” tuniyat tapkuat Sabina Guulit Silverlu Kuapurisan piplugu tamna Hanningayuq Kuugaq Havanguyuq (K. Kaluraq talvunga M. Pickard, ubluliqhimayuq Aagasi 11, 2020, NIRB Titigaquta Nappaa 12MN036), tapkuat Nunavut Avatiliqiyikkut Katimayit (NIRB) ihumaliuqtut tamna Hanningayuq Kuugaq Havanguyuq 2020 Ihuaqhigiarut Titiqat pilaittuq ilaqaqnia angiyumik ihuaqhigiarut piyaqaqtita naunaiyatqikhaqnia tapkunanga Nunavut Avatiliqiyikkut Katimayit (NIRB).

Tamna Hanningayuq Kuugaq Havanguyuq 2020 Ihuaqhigiarut Titiqat titiqtai uuktutit ilagiarutit (Nakataani 2-6) tapkuat Qanurittunia A Imaqmut Laisa, 2AM-BRP1831, tamnalu tuniyauyuq tapkununga Nunavut Imaliriyit Katimayit (NWB) ikayuqtuqhugu ihuaqhigiarut tukhiraut tapkuat ilaliutyaqni laisauyumun.

Sabina huli naunaingitat taihimania pivikha tahapkuat Havauhikhaq ihuaqhigiaqtauni tapkunani hanayauninut tuklirikhait kihimik piqaqtitai tamaitnuthivulirutikhat qakugu Sabina parnakni pigiaqvikha.

BACK RIVER PROJECT
MODIFICATION PACKAGE

Table of Contents

List of Images

List of Tables

List of Appendices

Revision Log

Version	Date	Section	Page	Revision
1	June 2020	All	All	Submitted to Nunavut Planning Commission (NPC) and Nunavut Impact Review Board (NIRB).
2	October 2020	All	All	Submitted as a Supporting Document for the Type A Water Licence Amendment Application to the Nunavut Water Board (NWB).

Acronyms

CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
DFO	Fisheries and Oceans Canada
ECCC	Environment and Climate Change Canada
FEIS	Final Environmental Impact Statement
GN	Government of Nunavut
HTO	Hunters and Trappers Organization
ICRP	Interim Closure and Reclamation Plan
IIBA	Inuit Impact Benefit Agreement
KIA	Kitikmeot Inuit Association
LSA	Local Study Area
MDMER	Metal and Diamond Mining Effluent Regulations
MLA	Marine Laydown Area
NIRB	Nunavut Impact Review Board
NTKP	Naonaiyaotit Traditional Knowledge Project
NuPPAA	*Nunavut Planning and Project Assessment Act*
NWB	Nunavut Water Board
PDA	Potential Development Area
the Project	Back River Project
Sabina	Sabina Gold & Silver Corp.
TC	Transport Canada
TK	Traditional Knowledge
VEC	Valued Ecosystem Components
VSEC	Valued Socio-Economic Components
WRSA	Waste Rock Storage Area
WMP	Water Management Plan

1. Modification Package Introduction

1.1 PROJECT MODIFICATON OVERVIEW

Since receipt of the Nunavut Impact Review Board (NIRB) Project Certificate (PC No. 007) and the Nunavut Water Board (NWB) Type A Water Licence (2AM-BRP1831), Sabina Gold & Silver Corp. (Sabina) continued to advance Detailed Engineering and additional field work related to Construction, Operations, and Closure of the Back River Project (the Project). Through this Detailed Engineering and additional efforts, Sabina has identified modifications that will further optimize and de-risk the Project.

The proposed Project Modifications (Modification Package or Application) are provided for regulatory consideration and are presented in the following sections:

- Section 2. Goose Property
  - Section 2.1. Goose Property Airstrip Extension
  - Section 2.2. Umwelt Underground Extension
  - Section 2.3. Goose Property Total Water Use Increase
- Section 3. Goose Property Waste and Water Management
  - Section 3.1. Waste and Water Management Infrastructure
- Section 4. Marine Laydown Area (MLA)
  - Section 4.1. MLA Fuel Transfer Area
  - Section 4.2. MLA Airstrip Extension
- Section 5. Marine Laydown Area – Shoreline Pad Extension
  - Section 5.1. MLA Shoreline Pad Extension
- Section 6. Winter Ice Road (WIR)
  - Section 6.1. WIR Subbase Upgrade
  - Section 6.2. WIR Service/Emergency Camps
  - Section 6.3. WIR Total Water Use Increase

Sabina clarifies that mining areas and associated infrastructure already included in the Project Certificate (PC No. 007; NIRB File No. 12MN036) and the Type A Water Licence (2AM-BRP1831) will remain in the amended licence. Sabina confirms that the scope of activities in Part A, Item 1 of licence, 2AM-BRP1831, remain unchanged, that Sabina is not requesting a reduction in Project scope, and that the new scope of activities associated with the 2020 Modification Package will be added to the licence as part of this amendment application.

As mentioned throughout the NIRB Environmental Assessment, Sabina is proceeding with an initial refined mine plan at the Goose Property, which provides a reduced capital investment and financially de-risks the Project. The refined mine plan is a subset of the previously approved permitted mine, and Sabina highlights that, with the continued advancement in detailed engineering and market considerations, the previously approved deposits may be reintegrated into the mine plan at a later date. Sabina acknowledges that if this were to occur, all applicable management plans will be updated to reflect

these changes, and Sabina will adhere to all appropriate requirements of the Back River Project Certificate (PC No. 007) and the Type A Water License (2AM-BRP1831).

As with all projects, modifications occur throughout the Project lifecycle, and those included in the Modification Package have been reviewed by Sabina in consideration of the following:

- NIRB Final Hearing Report (NIRB 2017a) and Project Certificate (NIRB 2017b);
- NWB Public Hearing Decision Report (NWB 2018a) and Type A Water Licence (NWB 2018b);
- ongoing discussions with communities and government departments;
- field work which have tested our assumptions;
- additional Detailed Engineering; and
- refinement of the overall Project plan.

Each proposed Project modification section includes key design details and, where required, updated figures; an overview of previous and regulatory history specific to the modification; key management and mitigation measures; a discussion on community engagement and Traditional Knowledge; an effects assessment for each proposed modification; and Sabina's conclusions on each proposed modification. The above information associated with each proposed modification is presented in each individual section:

- Overview;
- Regulatory History;
- Modification Details;
- Management and Mitigation;
- Community Engagement and Traditional Knowledge;
- Effects Assessment; and
- Conclusion.

Sabina has also included discussions in this Application related to the Modification Package cumulative effects (Section 1.6), Sabina's Self-Assessment guided by the NIRB Modification Guideline (NIRB 2018) (Section 1.7), and key compliance considerations for the Application as a whole (Section 1.8). Section 1.7 also includes details on NIRB's determination (NIRB 2020).

As a general comment, Sabina's view is that the majority of these proposed modifications are considered minor in the overall scope of the original environmental assessment and permitted mine and are considered "non-significant modifications" to the Project.

The Back River Project 2020 Modification Package was submitted to NPC for determination and confirmation regarding land use. NPC confirmed on June 9, 2020 that the application for modification remained outside the area of an applicable regional land use plan, and subsequently forwarded the 2020 Modification Package to NIRB for assessment.

As per NIRB's letter, Direction Regarding the "Back River Project 2020 Modification Package" submitted by Sabina Gold & Silver Corp. in relation to the Back River Project (K. Kaluraq to M. Pickard, dated August 11, 2020, NIRB File No. 12MN036), the NIRB determined that the Back River Project 2020 Modification Package would not constitute a significant modification that requires further assessment by the NIRB.

Sabina has not yet identified the specific timing for these components within the construction sequence, but provides general guidance as to when Sabina plans to proceed.

The Back River Project 2020 Modification Package outlines proposed additions (Section 2 – 6) to the Type A Water Licence, 2AM-BRP1831, and is being provided to the NWB in support of an amendment application for inclusion in the licence.

1.2 REGULATORY HISTORY AND CONSIDERATION OVERVIEW

Sabina commenced the environmental assessment of the Project in June 2012 with the submission of a Project Proposal to the NIRB (NIRB File No. 12MN036). The NIRB provided Project Guidelines for the production of an Environmental Impact Statement (EIS) in April 2013. Sabina subsequently submitted a conformant Back River Project Final Environmental Impact Statement (FEIS) for consideration by the NIRB in November 2015. In July 2017, the NIRB concluded in their Revised Final Hearing Report issued to the responsible Ministers that the Project should be allowed to proceed to the regulatory stage. Following the completion of a Project Certificate workshop held in December 2017, the NIRB issued the final Project Certificate (PC No. 007) pursuant to Section 12.5.12 of Article 12 of the Nunavut Agreement.

In October 2017, Sabina submitted the Type A Water Licence Application and supporting documents to the NWB in accordance with the regulatory framework provided in the Nunavut Agreement and the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and Nunavut Water Regulations. In September 2018, the Sabina received a copy of the NWB's recommendation to the Minister of Intergovernmental Affairs, Northern Affairs and Internal Trade, the responsible Federal Minister that the Project's Type A Water Licence should be issued with proposed terms and conditions. In November 2018, Sabina received confirmation that the Minister approved the Type A Water Licence with no changes to the terms and conditions.

Sabina and the Kitikmeot Inuit Association (KIA) announced in April 2018 that the parties had finalized terms under a Framework Agreement setting out rights and obligations with respect to surface land access on Inuit owned land on the Project.

Sabina has also received key additional permits and regulations from other Federal parties; namely, Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Department of Fisheries and Oceans Canada (DFO), Environment and Climate Change Canada (ECCC), and Transport Canada (TC). A complete list of existing permits and authorizations for the Project is included in Section 1.8.

Sabina reviewed each proposed Project modification with respect to any additional regulatory processes that may be required; the processes associated with individual proposed Project modifications are noted within each respective section.

The Back River Project 2020 Modification Package was submitted to NPC for determination and confirmation regarding land use. NPC confirmed on June 9, 2020 that the application for modification remained outside the area of an applicable regional land use plan, and subsequently forwarded the 2020 Modification Package to NIRB for assessment.

As per NIRB's letter, Direction Regarding the "Back River Project 2020 Modification Package" submitted by Sabina Gold & Silver Corp. in relation to the Back River Project (K. Kaluraq to M. Pickard, dated August 11, 2020, NIRB File No. 12MN036), the NIRB determined that the Back River Project 2020 Modification Package would not constitute a significant modification that requires further assessment by the NIRB.

The Back River Project 2020 Modification Package outlines proposed additions (Section 2 – 6) to the Type A Water Licence, 2AM-BRP1831, and is being provided to the NWB in support of an amendment application for inclusion in the licence.

1.3 MANAGEMENT AND MITIGATION OVERVIEW

Sabina has developed a set of Project management plans that provide a framework for the environmental and socio-economic monitoring activities to be implemented throughout the life of the Project. Within this framework, individual management plans have been drafted to address all aspects of Project activities and contain the detailed mitigation measures and monitoring programs to be implemented to eliminate or minimize potential effects. These management plans reflect conditions established through the Project's authorizations, as well as legal requirements pertaining to relevant Federal and Territorial laws and regulations. Sabina requires all Project employees and contractors to comply with these management plans.

As a part of this Application, Sabina reviewed key management plans related to each proposed Project modification. Sabina has concluded the potential effects from all proposed modifications are similar in nature to previously permitted activities. As such, management and mitigation measures outlined in the FEIS and FEIS Addendum (Sabina 2015, 2017b) and the Type A Water Licence Application (Sabina 2017a) and approved plans continue to appropriately address potential effects related to this Modification Package. Table 1.3-1 provides a summary of all current and approved Management Plans associated with the Back River Project.

To facilitate regulatory review, Sabina has chosen to update and include the Back River Project Water Management Plan (WMP; Appendix B), as well as key figures and drawings as part of the Modification Package.

Sabina commits to including Project modification details for each of the proposed modifications in the next iteration of key management plans, which are outlined in each respective Management and Mitigation section. Sabina would also include any requirements identified during the regulatory review process of the 2020 Modification Package. Sabina will adopt and adhere to all applicable Project management and mitigation protocols during the construction and operation of the proposed modifications.

Sabina anticipates that an amendment to the Type A Water Licence (2AM-BRP1831) may be required to update the approved Interim Closure and Reclamation Plan and cost estimate (ICRP; 2AM-BRP1831 Part B, Item 14g) to reflect changes associated with the 2020 Modification Package, as well as potential advancements in operation and technology. Sabina recognizes that additional consultation and discussion with KIA, and CIRNAC, in conjunction with oversight from NWB, will be required to address any monetary and/or staging changes associated with this application. Sabina will follow all appropriate NWB processes associated with this amendment, and will work in a timely, collaborative manner with KIA, CIRNAC, and NWB on any related Project security revisions in consideration of the 2020 Modification Package. The current monetary amount, staging, and regulatory divisions between KIA and CIRNAC, required in Part C or the Type A Water Licence (2AM-BRP1831), remains valid until otherwise approved by the NWB.

Table 1.3-1. Current and Approved Management Plans

Back River Project Management Plans	Project Certificate No. 007	Type A Water Licence 2AM-BRP1831
Explosives Management Plan	Version 1 November 2015	~
Noise Abatement Plan	Version 1 November 2015	~
Occupational Health and Safety Plan	Version 1 November 2015	~
Cultural and Heritage Resources Protection Plan	Version 1 November 2015	~
Road Management Plan	Version 1 November 2015	Version 2 October 2017
Borrow Pits and Quarry Management Plan	Version 1 November 2015	Version 2 October 2017
Water Management Plan	Version 2 June 2020	Version 3 October 2020
Ore Storage Management Plan	Version 1 November 2015	Version 2 October 2017
Mine Waste Rock Management Plan	Version 1 November 2015	Version 2 October 2017
Tailings Management Plan	Version 1 November 2015	Version 2 October 2017
Landfill and Waste Management Plan	Version 1 November 2015	Version 2 October 2017
Landfarm Management Plan		Version 2 October 2017
Hazardous Materials Management Plan	Version 1 November 2015	Version 2 October 2017
Fuel Management Plan	Version 1 November 2015	Version 2 October 2017
Spill Contingency Plan	Version 1 November 2015	Version 2 October 2017
Environmental Management and Protection Plan	Version 1 November 2015	Version 2 October 2017
Aquatic Effects Management Plan	Version 1 November 2015	Version 2 October 2017
Quality Assurance/Quality Control Plan	~	Version 1 October 2017
Interim Closure and Reclamation Plan	Version 1 November 2015	Version 2 October 2017
Marine Monitoring Plan	~	Version 1.1 May 2018
Oil Pollution Emergency Plan*	Version 3 August 2018	Version 2 October 2017
Risk Management and Emergency Response Plan*	Version 3 August 2018	Version 2 October 2017
Shipping Management Plan	Version 2 August 2018	~
Business Development Plan	Version 2 December 2018	~
Human Resources Plan	Version 2 December 2018	~

Back River Project Management Plans	Project Certificate No. 007	Type A Water Licence 2AM-BRP1831
Socio-economic Monitoring Plan	Version 2 December 2018	~
Community Involvement Plan	Version 2 December 2018	~
Fish Offsetting Plan*	Version 3 June 2019	Version 2 October 2017
Air Quality Monitoring and Management Plan	Version 2 July 2019	~
Incineration Management Plan*	Version 3 July 2019	Version 2 October 2017
Wildlife Mitigation and Monitoring Program Plan	Version 10 October 2019	~
Vegetation Monitoring Plan (ICRP Appendix)	Version 2 January 2020	~
Saline Water Management Plan (WMP Appendix)	Version 2 June 2020	Version 3 October 2020

** Sabina notes a more recent version of this plan was submitted to the NIRB. In accordance with the Type A Water Licence (2AM-BRP1831 Part B Item 17), Sabina intends to submit updated versions to the NWB in due course; this may occur during the regulatory review process or subsequent to any direction of the NWB resulting from the request for amendment. This WMP (Version 3) was developed using the most current information Sabina has on file with the NIRB and/or NWB, where applicable.*

1.4 COMMUNITY ENGAGEMENT AND TRADITIONAL KNOWLEDGE OVERVIEW

Sabina notes and recognizes the amendment to the Type A Water Licence is subject to the NWB's mandate over the use of water and disposal of waste in the context of the changes proposed in the 2020 Modification Package; however, to support the completeness and fulsomeness of the amendment application, Sabina has included the Community Engagement and Traditional Knowledge Overview previously reviewed by the NIRB (NIRB 2020).

1.4.1 Community Engagement

Sabina has acquired the key permits and authorizations for construction and operation of the Project, notably: the NIRB Project Certificate (NIRB PC No. 007), the NWB Type A Water Licence (2AM-BRP1831), and a Framework Agreement with the KIA which includes a signed Inuit Impact Benefit Agreement (IIBA). All permits included extensive community consultation, and Traditional Knowledge and Inuit Qaujimajatuqangit (hereby referred to as TK throughout the Application), to be incorporated into the application processes. In the NIRB's revised Final Hearing Report that recommended the Project proceed, the NIRB specifically commended Sabina on their extensive community consultation record (NIRB 2017: page 25):

> *"As recognized by the Intervenors and Community Representatives who participated in both the 2016 Final Hearing and the supplemental Final Hearing, Sabina's FEIS Addendum and revisions to the Proponent's plans are substantive and were the product of extensive consultation with Intervenors and communities."*

Sabina utilized industry and northern best practices to develop its public consultation and engagement program for the Project and continues to receive positive feedback on its approach from community and government representatives, regulators, and other Project stakeholders.

Consultation allows for information on a vast range of topics to be provided and discussed with communities. The process creates an open forum for people to ask questions, make comments, or raise concerns on topics of their choosing. Questions, comments, and concerns are subsequently addressed and logged under topic headings in a community engagement database for future reference. Sabina's original FEIS Community Engagement Database, which spans the years from 2012 through 2017, contains approximately 165 topic headings/directories. Sabina continues to collect and record community consultation information in a new, post-FEIS Community Engagement Database from 2018 forward.

As of December 2019, Sabina has held in excess of 215 community meetings or engagements in the Kitikmeot Region on the Project, as shown in Image 1.4-1. Values in black represent the total number of meetings held in or with individual communities.

Image 1.4-1. Back River Project Community Meeting or Engagements in the Kitikmeot

During community meetings, Sabina updates and consults with communities on many aspects of the Project including, but not limited to, plans for construction and design, permitting, and Inuit employment and contracting opportunities. Throughout these engagement activities, communities have provided comments and expressed specific interest on several topics. The FEIS (Sabina 2015) categorized these comments under three main themes: community benefits and engagement, employment and training, and environmental management and monitoring. Below is a generalized overview of comments received.

Community Benefits and Engagement

- Inuit culture, harvesting, and livelihoods should not be negatively affected by the Project.
- Kitikmeot communities should receive maximum benefit from the Project.
- Concern the Project may not be built (e.g., due to economic factors) and/or operate for a long enough period of time. Fears have also been expressed the Project will prematurely shut down, promised benefits won't be realized, and negative socio-economic effects will result.
- Communities should be regularly engaged about the Project, throughout the mineral development process.
- Inuit should play a role in Project-related environmental management and monitoring.
- Mechanisms pertaining to the permitting, regulation, and oversight of the Project are unclear in some instances.

Employment and Training

- Preferential employment opportunities should be made available to Inuit from the Kitikmeot Region.
- Training and apprenticeship programs should be established to help those without mining skills and experience become meaningfully employed.
- Mandatory criminal record checks will mean many Kitikmeot residents will not be considered for employment.
- Youth should be a focus of the employment and training initiatives developed by Sabina.
- Routing employees through Yellowknife should be avoided as it leads to issues pertaining to substance abuse, absenteeism, and family instability.
- Programs should be developed to support workers and their families dealing with personal, financial, and employment-related issues.

Environmental Management and Monitoring

- A comprehensive environmental management and monitoring program should be developed. Key areas of concern for local communities include:
    - Caribou
    - Fish and water quality
    - Mine tailings and contaminants
    - Other wildlife resources
- Archaeological sites within the Project footprint must be protected.
- Project-related shipping must be conducted safely and responsibly and impacts to the marine environment must be avoided.
- Spill training, avoidance, and response capabilities must be developed by the Sabina.
- Concerns pertaining to the navigability of Bathurst Inlet, placement of dock infrastructure, and the alignment of winter roads for the Project must be remedied.
- Cumulative and transboundary effects of the Project must be assessed and managed.
- Guarantees must be in place that mine closure will be done properly.

Information obtained through public consultation and engagement has played a role in the planning and design of the Project including baseline data collection, impact prediction, significance assessment, and the development of mitigation and monitoring programs. Ongoing public consultation and engagement will also provide new information to be considered as the Project advances. For example, Sabina's Community Involvement Plan (Sabina 2018a) commits to regular meetings and community engagement with Sabina throughout the Project's development and operation.

Sabina has also reflected public comments and concerns in the development of many other management plans. Sabina has developed policies and plans that address key areas of concern for local communities including caribou, fish and water quality, mine tailings and contaminants, other wildlife resources, and shipping. Sabina has additionally committed to providing various opportunities to the Kitikmeot Region including preferential employment, contracting, training for local Inuit, continued implementation of a Kitikmeot-focused donation policy, and the payment of all applicable taxes and royalties to governing bodies. Further information on Sabina's community engagement program and the commitments Sabina has made to address public comments and concerns is provided in the following volumes of the FEIS (Sabina 2015) and FEIS Addendum (Sabina 2017b): Public Consultation, Government Engagement, and Traditional Knowledge (Volume 3), and Management Plans (Volume 10).

Sabina has engaged communities specifically regarding the Modification Package Application. Details of the proposed modifications in the Modification Package were presented during public meetings (September 2019) in Cambridge Bay and Kugluktuk, and at the KIA Annual Board Meeting in Kugaaruk. In addition, Sabina discussed its need to complete detailed engineering and further refinement of the Project's execution plan during public meetings held in each Kitikmeot Region community in May 2019: Cambridge Bay, Gjoa Haven, Kugaaruk, Kugluktuk, and Taloyoak.

Community engagement summaries for each proposed modification are included within each specific section of the Modification Package. These summaries include information from both of Sabina's Community Engagement Databases: FEIS (2012-2017) and post-FEIS (2018+); in addition, these summaries include details from community concerns, comments, and recommendations documented in Appendix III of KIA (2014)[1].

1.4.2 Traditional Knowledge

Sabina has collected and incorporated a significant amount of regional and Project-specific TK within the FEIS (Sabina 2015). Sabina recognizes the inherent value of TK and the importance of its use in the environmental assessment of proposed developments. Sabina has made notable efforts to engage local communities through incorporation of their TK and land use information into the Project's planning, design, operation, and closure. Sabina's Public Consultation, Government Engagement, and Traditional Knowledge (FEIS Volume 3) describes Sabina's approach to TK and the methods used to collect and interpret it, and Sabina's Human Environment (FEIS Volume 8) further describes considerations for current land use.

Sabina's commitment to the meaningful inclusion of TK throughout the environmental assessment was highlighted by the NIRB in the Back River Project Revised Final Hearing Report (NIRB 2017: page 14):

[1] This appendix accompanies the results report from the August 2013 KIA TK workshops held in Kugluktuk and Cambridge Bay. As well as collecting TK, Sabina requested that KIA solicit opinions and recommendations from the TK consultants on the Project. These opinions and recommendations are contained within this appendix

> *"The Board also wishes to recognize the collective efforts of Sabina, the Kitikmeot Inuit Association, Elders, harvesters and community members to ensuring that Inuit Qaujimaningit and Traditional Knowledge contributions have been incorporated into this assessment in a meaningful way."*

Sabina partnered with the KIA in two major elements of its TK study: preparation of a Naonaiyaotit Traditional Knowledge Project (NTKP) database report, and execution of theme-based TK workshops. The basis of this partnership was a TK Agreement signed between Sabina and the KIA in May 2012. The foundation of this agreement is that regional TK should be collected, owned, and managed by Inuit directly, and not by a specific Proponent. Signing of this agreement provided Sabina with access to TK held by the KIA in the NTKP database. The agreement also outlined the terms and conditions pertaining to Sabina's use of the TK. Sabina and the KIA additionally cooperated in the collection and reporting of new (or otherwise unrecorded) TK in the Project area. Two TK reports were subsequently prepared by the KIA for Sabina, which were utilized within the FEIS and provided the majority of TK considered.

Sabina also commissioned a review of publicly available TK from Northwest Territories Aboriginal groups, as well as a current land use study for the Project area utilizing a series of Kitikmeot Inuit focus groups and interviews. In addition, Sabina and the Kugluktuk Hunters and Trappers Organization (HTO) collected TK information related to the Bernard Harbour Fisheries Offset. This information was subsequently provided to the KIA for their future use and entry into the NTKP database.

As a result of these efforts, five reports were produced and provided within the FEIS (four focused on TK and one on land use and socio-economics), and the information was considered in all relevant sections of the FEIS. The referenced reports are:

- *Inuit Traditional Knowledge of Sabina Gold & Silver Corp., Back River (Hannigayok) Project, Naonaiyaotit Traditional Knowledge Project (NTKP) (FEIS Appendix V3-3A)*
- *Naonaiyaotit Traditional Knowledge Project - Hannigayok (Sabina Gold & Silver Corp. Proposed Back River Project). Results from Data Gaps Workshops, Final Report (June 2014) (FEIS Appendix V3-3B)*
- *Back River Project: Existing and Publicly Available Traditional Knowledge from Selected Aboriginal Groups in the Northwest Territories (FEIS Appendix V3-3C)*
- *Traditional Knowledge Study Report on the Arctic Char Fishery in the Nulahugyuk Creek – Hingittok Lake Area (Bernard Harbour), Nunavut (FEIS Appendix V3-3D)*
- *Back River Project: 2012 Socio-Economic and Land Use Baseline Report (FEIS Appendix V8-3A).*

Through these reports, comprehensive information on Inuit land use and harvesting has been documented. TK referenced in this Project Modification Application focuses on the reports prepared by KIA (2012; 2014) and FEIS Volume 8 (Human Environment) of Sabina (2015); these reports provide the most detailed information on Inuit use of the Project area.

Extensive Inuit travel and occupation were documented to occur throughout the western Kitikmeot Region, generally. While widespread Inuit use of northern and southern Bathurst Inlet was also documented in KIA (2012; 2014), the MLA was not identified as a major camp/gathering place or described as a key destination for harvesting[2]. However, nearby areas such as Aniakhiokvik (Fishing

[2] KIA (2012; 2014) notes the major camps of the Kiligiktokmiut were located on Kilingoyak (Kent Peninsula), Kingaok (Bathurst Inlet community), and a number of locations on both shores of Kiligiktokmik (Bathurst Inlet). Katimanak, at the junction of Hanimok (Mara River) and Ayapakpaktokvik (Burnside River), and the junction of James River and Hivogahik (Hood River), were locations of major camps, as were several locations on Huikkittak and Kilokgiktok (Western River). Hanningayuk (Beechey Lake) was also an important area for Inuit identified in the reports.

Lake/Creek) and Ekalokhiokvik (Tahikafalok Lake) were identified as important land use destinations. The Goose Property was described as a site of traditional Inuit occupation in KIA (2014). Features such as 'travel routes and stopping points', 'cabins and camps', and 'burial sites' located nearby or overlapping the Goose Property were additionally noted. Like the MLA, the Goose Property was not identified as a major camp/gathering place or described as a key destination for harvesting.

KIA (2014) notes Sabina's winter roads overlap traditional Inuit travel routes in the area. Features such as 'cabins and camps' and 'travel routes and stopping points' along the Winter Ice Road corridor were identified, with locations such as Tahikafalok (Bathurst Lake) and Kilokgiktok (Western River) noted to be traditional Inuit camps.

Sabina's FEIS (Sabina 2015) provides additional information on current Inuit land use activities around the Project, obtained through interviews with HTO representatives and local hunters, and focus groups with active hunters. Hunting, trapping, fishing, and gathering activities continue to take place throughout the land use Local Study Area (LSA). However, land use within the LSA also reflects current land use patterns throughout the western Kitikmeot Region. Land users indicated specific locations of use within the land use LSA but also use the surrounding areas to conduct harvesting activities.

Traditional Knowledge summaries for each proposed modification are included within each specific section of the Modification Package. These summaries include information from the reports referenced above that were produced and provided within the FEIS.

1.4.3 Ongoing Socio-Economic Monitoring

Sabina has developed a Socio-Economic Monitoring Plan (Sabina 2018f) to monitor the socio-economic performance of the Project as it progresses from construction through operations and eventual closure. Sabina has provided its 2018 Socio-Economic Monitoring Report to NIRB (JPCSL 2019) and is in the process of preparing its 2019 report. These reports provide data on several indicators, two of which are directly relevant to monitoring Inuit land use and harvesting in the Project area: Number of recorded land use visitor person-days at Project sites, and number of times public use of Project winter ice roads reported.

In the ten years Sabina has operated the Project, no Inuit land users have been observed in the vicinity of the Goose Property (i.e., when the camp has been open), or using any vehicle, including boats, canoes/kayaks, or ATVs for subsistence purposes. Formal tracking of visits to the MLA began in 2018, when a total of 36 land use visitor person-days were recorded[3]. A total of 46 land use visitor person-days were also recorded in 2019, which included informal visits, visits to pick up freight/fuel and, in one instance, a five-day visit by a non-Inuit expeditioner travelling through the area. Harvesting does not appear to have been a primary motive for these visits. Formal tracking of public use of Project winter ice roads began in 2019, where one use by a non-Inuit expeditioner travelling through the area was recorded.

Project monitoring and reporting will continue throughout the life of the Project.

[3] Because groups of individuals may travel together and/or utilize Project sites over multiple days, person-days are useful for calculating the extent of site visitations in a year (i.e., one person-day is equal to one person visiting a site during one day, while ten person-days could equal one person visiting a site during ten days or five people visiting a site during two days). Individuals must have travelled to or through Project sites on their own accord (e.g., via snow machine, boat, or ATV) to be counted.

1.5 EFFECTS ASSESSMENT OVERVIEW

The Modification Package effects assessment was guided by the same approach used for the Project FEIS and FEIS Addendum (Sabina 2015, 2017b). The effects assessment evaluated the potential effects of each proposed Project modification on all Valued Ecosystem Components (VECs) and Valued Socio-Economic Components (VSECs) that were assessed in the FEIS.

The Back River Project 2020 Modification Package was submitted to NPC for determination and confirmation regarding land use. NPC confirmed on June 9, 2020 that the application for modification remained outside the area of an applicable regional land use plan, and subsequently forwarded the 2020 Modification Package to NIRB for assessment.

As per NIRB's letter, Direction Regarding the "Back River Project 2020 Modification Package" submitted by Sabina Gold & Silver Corp. in relation to the Back River Project (K. Kaluraq to M. Pickard, dated August 11, 2020, NIRB File No. 12MN036), the NIRB determined that the Back River Project 2020 Modification Package would not constitute a significant modification that requires further assessment by the NIRB.

Sabina notes and recognizes the amendment to the Type A Water Licence is subject to the NWB's mandate over the use of water and disposal of waste in the context of the changes proposed in the 2020 Modification Package; however, to support the completeness and fulsomeness of the amendment application, Sabina has included the Effects Assessment Overview previously reviewed by the NIRB (NIRB 2020).

1.5.1 FEIS Effects Assessment

The Project's VECs/VSECs are the highest priority aspects for a particular region, community, or to society as a whole. The value of a component not only relates to its role in the ecosystem, but also to the value placed on it by humans. The selection of potential VECs/VSECs in the FEIS was based on the NIRB scoping process, Sabina-led public consultations, consideration of TK, regulator consultations and considerations, and recommendations presented in the NIRB EIS guidelines (NIRB 2013).

The VECs/VSECs established for the Project in the FEIS (Sabina 2015) were:

- Atmospheric Environment (FEIS Volume 4)
  - Air Quality; and
  - Noise and Vibration.
- Terrestrial Environment (FEIS Volume 5)
  - Vegetation and Special Landscape Features;
  - Caribou;
  - Grizzly Bear;
  - Muskox;
  - Wolverine and Furbearers;
  - Migratory Birds; and
  - Raptors.
- Marine Environment (FEIS Volume 7)
  - Water Quality;
  - Sediment Quality;
  - Fish and Aquatic Habitat;
  - Fish Community (Arctic Char);
  - Seabirds and Seaducks; and
  - Ringed Seals.
- Human Environment (FEIS Volume 8)
  - Archaeology;
  - Economic Development;
  - Business Opportunities;
  - Employment
  - Education and Training;
  - Health and Community Well-Being; Non-traditional Land Resource Use;
  - Subsistence Economy and Land Use; and
  - Country Foods.

- Freshwater Environment (FEIS Volume 6)
    - Surface Hydrology;
    - Water Quality;
    - Sediment Quality; and
    - Fish and Aquatic Habitat.

Once VECs/VSECs were established, the next step was to identify interactions between the Project and individual VECs/VSECs, and then describe that potential effect using quantitative and qualitative techniques. If a potential effect was identified, then mitigation and management measures were applied to eliminate or reduce potential effects; effects predicted to VECs/VSECs that remained after the application of mitigation and management measures were characterized as residual effects.

If residual effects to VEC/VSECs were identified, detailed characterization was conducted to assess how significant the effect would be. Wherever possible, these studies included quantitative methods. If the application of mitigation measures completely eliminated a potential effect, then the effect was not carried forward as a residual effect, and no additional analysis was undertaken. Additional details on effect assessment methodologies, underlying assumptions, and data limitations are documented in the FEIS (Volumes 4 through 9; Sabina 2015).

In the FEIS, results from the Project-related effects assessment identified non-significant residual effects, but no significant residual effects. All identified residual effects were either of low magnitude, confined to a localized area, reversible, or short-term once mitigation and management measures were considered. Positive residual effects were identified for the VSECs economic development, business opportunities, employment, and education and training. Hence, the overall affect of the Project on the atmospheric, terrestrial, freshwater, marine, and human environments is determined to be Not Significant. NIRB confirmed the additions in scope outlined in the Back River Project 2020 Modification Package would not constitute a significant modification that requires further assessment by the NIRB (NIRB 2020). Refer to Section 1.7 for additional information.

1.5.2 Modification Package Effects Assessment

As stated above, the Modification Package effects assessment was guided by the same approach used for the Project FEIS and FEIS Addendum (Sabina 2015, 2017b). The effects assessment evaluated the potential effects of each proposed Project modification on all VECs/VSECs that were assessed in the FEIS.

In the Modification Package, the effects assessment associated with each proposed Project modification can be found in the respective Effects Assessment section; this includes identification and discussion of potential effects as well as residual effects.

In general, predicted effects associated with the Modification Package include air quality and disturbance effects related to construction dust and noise, footprint loss within the previously assessed area of impact (both terrestrial and marine), water withdrawals, and water quality effects. Once management and mitigation measures were considered, Modification Package residual effects were either within the effects previously assessed (e.g., terrestrial footprint loss) or were of low magnitude, confined to a localized area, reversible, and/or short term in nature.

The Modification Package Effects Assessment (See Table 1.5-1) summarizes all potential interactions of the Project modifications with each VEC/VSEC. This table outlines whether each of these interactions are expected to result in any potential effects, any change to the residual effects, and whether these interactions resulted in a change to the Project's overall effect on each VEC/VSEC. VECs/VSECs with no interactions are explicitly identified within the table. Based on these assessments, the overall effect of

the modifications on the atmospheric, terrestrial, freshwater, marine, and human environments is predicted to be Not Significant. Sabina notes and recognizes the amendment to the Type A Water Licence is subject to the NWB's mandate over the use of water and disposal of waste in the context of the changes proposed in the 2020 Modification Package; however, to support the completeness and fulsomeness of the amendment application, Sabina has included Table 1.5-5 previously reviewed by the NIRB (NIRB 2020).

NIRB confirmed the additions in scope outlined in the Back River Project 2020 Modification Package would not constitute a significant modification that requires further assessment by the NIRB (NIRB 2020). Refer to Section 1.7 for additional information.

Table 1.5-1. 2020 Modification Package Effects Assessment

Valued Ecosystem Component/ Valued Socio-Economic Component	Modification Package Potential Effects	Modification Package Residual Effects	Modification Package Residual Effects Significance Rating	Effects Conclusion	
				Project Certificate No. 7	Modification Package
Atmospheric Environment					
Air Quality	The Modification Package potential effects are the same as those identified in the FEIS: SO_2; NO_2; CO; TSP; PM_{10}; and $PM_{2.5}$; dust deposition; and acid deposition. No new potential effects were identified.	Residual effects identified in the FEIS are: SO2; NO2; CO; TSP; PM_{10}; and $PM_{2.5}$. The Modification Package will result in minor increases to the following residual effects: TSP; PM_{10}; and $PM_{2.5}$. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Air Quality is predicted to be Not Significant.	The Project's overall effect on Air Quality remains Not Significant with the addition of the Modification Package.
Noise and Vibration	The Modification Package potential effects are the same as those identified in the FEIS, including seven (7) to humans: sleep disturbance; interference with speech communications; complaints; high annoyance; noise-induced rattling; noise-induced hearing loss; and cosmetic/structural damage of buildings, as well as two (2) potential effects to wildlife: loss of habitat; and disturbance. No new potential effects were identified.	The Modification Package will result in minor increases to the same residual effects as identified in the FEIS: sleep disturbance; habitat loss; and disturbance to wildlife. Refer to Terrestrial Environment for residual effects applicable to wildlife. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Noise and Vibration is predicted to be Not Significant.	The Project's overall effect on Noise and Vibration remains Not Significant with the addition of the Modification Package.
Terrestrial Environment					
Vegetation and Special Landscape Features	The Modification Package potential effects are the same as those identified in the FEIS: loss of vegetation and special landscape features; and degradation of vegetation. No new potential effects were identified.	The Modification Package will result in no changes to residual effects identified in the FEIS: loss of vegetation and special landscape features. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Vegetation and Special Landscape Features is predicted to be Not Significant.	The Project's overall effect on Vegetation and Special Landscape Features remains Not Significant with the addition of the Modification Package.
Caribou	The Modification Package potential effects are the same as those identified in the FEIS: habitat loss; disturbance due to noise; disruption to movement; direct morality and injury; indirect mortality; attraction; exposure to contaminants; and reduction in reproductive productivity. No new potential effects were identified.	Residual effects identified in the FEIS are: habitat loss; disturbance due to noise; and reduction in reproductive productivity. The Modification Package will result in minor increases to the following residual effects: disturbance due to noise; and reduction in reproductive productivity. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Caribou is predicted to be Not Significant.	The Project's overall effect on Caribou remains Not Significant with the addition of the Modification Package.
Grizzly Bear	The Modification Package potential effects are the same as those identified in the FEIS: habitat loss; disturbance due to noise; disruption to movement; direct morality and injury; indirect mortality; attraction; exposure to contaminants; and reduction in reproductive productivity. No new potential effects were identified.	Residual effects identified in the FEIS are: habitat loss; disturbance due to noise; and reduction in reproductive productivity. The Modification Package will result in minor increases to the following residual effects: disturbance due to noise; and reduction in reproductive productivity. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Grizzly Bear is predicted to be Not Significant.	The Project's overall effect on Grizzly Bear remains Not Significant with the addition of the Modification Package.
Muskox	The Modification Package potential effects are the same as those identified in the FEIS: habitat loss; disturbance due to noise; disruption to movement; direct morality and injury; indirect mortality; attraction; exposure to contaminants; and reduction in reproductive productivity. No new potential effects were identified.	Residual effects identified in the FEIS are: habitat loss; disturbance due to noise; and reduction in reproductive productivity. The Modification Package will result in minor increases to the following residual effects: disturbance due to noise; and reduction in reproductive productivity. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Muskox is predicted to be Not Significant.	The Project's overall effect on Muskox remains Not Significant with the addition of the Modification Package.
Wolverine and Furbearers	The Modification Package potential effects are the same as those identified in the FEIS: habitat loss; disturbance due to noise; disruption to movement; direct morality and injury; indirect mortality; attraction; exposure to contaminants; and reduction in reproductive productivity. No new potential effects were identified.	Residual effects identified in the FEIS are: habitat loss; disturbance due to noise (wolverine and grey wolf); and reduction in reproductive productivity (wolverine only). The Modification Package will result in minor increases to the following residual effects: disturbance due to noise; and reduction in reproductive productivity. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Wolverine and Furbearers is predicted to be Not Significant.	The Project's overall effect on Wolverine and Furbearers remains Not Significant with the addition of the Modification Package.
Migratory Birds	The Modification Package potential effects are the same as those identified in the FEIS: habitat loss; disturbance due to noise; disruption to movement; direct morality and injury; indirect mortality; attraction; exposure to contaminants; and reduction in reproductive productivity. No new potential effects were identified.	Residual effects identified in the FEIS are: habitat loss; and disturbance due to noise. The Modification Package will result in minor increases to the following residual effects: disturbance due to noise. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Migratory Birds is predicted to be Not Significant.	The Project's overall effect on Migratory Birds remains Not Significant with the addition of the Modification Package.
Raptors	The Modification Package potential effects are the same as those identified in the FEIS: habitat loss; disturbance due to noise; disruption to movement; direct morality and injury; indirect mortality; attraction; exposure to contaminants; and reduction in reproductive productivity. No new potential effects were identified.	Residual effects identified in the FEIS are: habitat loss; disturbance due to noise; attraction; direct mortality and injury; and reduction in reproductive productivity. The Modification Package will result in minor increases to the following residual effects: disturbance due to noise; and reduction in reproductive productivity. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Raptors is predicted to be Not Significant.	The Project's overall effect on Raptors remains Not Significant with the addition of the Modification Package.

Valued Ecosystem Component/ Valued Socio-Economic Component	Modification Package Potential Effects	Modification Package Residual Effects	Modification Package Residual Effects Significance Rating	Effects Conclusion	
				Project Certificate No. 7	Modification Package
Freshwater Environment					
Surface Hydrology	The Modification Package potential effects are the same as those identified in the FEIS: alteration of stream flows; and alteration of lake volumes. No new potential effects were identified.	The Modification Package will result in minor increases to residual effects identified in the FEIS: alteration of streamflows; and alteration of lake volumes. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Surface Hydrology is predicted to be Not Significant.	The Project's overall effect on Surface Hydrology remains Not Significant with the addition of the Modification Package.
Water Quality	The Modification Package potential effects are the same as those identified in the FEIS: water quality changes due to construction and decommissioning activities; winter ice roads; site contact water; mine contact water; water use; quarries and borrow pits; explosives; fuels, oils and polycyclic aromatic hydrocarbons (PAH); treated sewage discharge; and dust deposition. No new potential effects were identified.	The Modification Package will result in no changes to residual effects identified in the FEIS: construction and decommission activities; site contact water; mine contact water; and explosives. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Freshwater Water Quality is predicted to be Not Significant.	The Project's overall effect on Freshwater Water Quality remains Not Significant with the addition of the Modification Package.
Sediment Quality	The Modification Package potential effects are the same as those identified in the FEIS: sediment quality changes due to construction and decommissioning activities; site contact water; mine contact water; quarries and borrow pits; explosives; fuels, oils and polycyclic aromatic hydrocarbons (PAH); treated sewage discharge; and dust deposition. No new potential effects were identified.	The Modification Package will result in no changes to residual effects identified in the FEIS: construction and decommission activities; site contact water; mine contact water; and explosives. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Freshwater Sediment Quality is predicted to be Not Significant.	The Project's overall effect on Freshwater Sediment Quality remains Not Significant with the addition of the Modification Package.
Fish and Fish Habitat	The Modification Package potential effects are the same as those identified in the FEIS: loss of fish/aquatic habitat; and direct fish mortality or reduction in fish health, and indirect reduction in biological resources of fish due to changes in water and sediment quality. No new potential effects were identified.	As a result of mitigation (Fish Offsetting Plan), no residual effects were identified in the FEIS which also applies to the Modification Package. No new residual effects identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Freshwater Fish and Fish Habitat is predicted to be Not Significant.	The Project's overall effect on Freshwater Fish and Fish Habitat remains Not Significant with the addition of the Modification Package.
Marine Environment					
Water Quality	The Modification Package potential effects are the same as those identified in the FEIS: changes to water quality. No new potential effects were identified.	The Modification Package will result in no changes to residual effects identified in the FEIS: changes to water quality. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Marine Water Quality is predicted to be Not Significant.	The Project's overall effect on Marine Water Quality remains Not Significant with the addition of the Modification Package.
Sediment Quality	The Modification Package potential effects are the same as those identified in the FEIS: changes to sediment quality. No new potential effects were identified.	The Modification Package will result in minor increases to residual effects identified in the FEIS: changes to sediment quality. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Marine Sediment Quality is predicted to be Not Significant.	The Project's overall effect on Marine Sediment Quality remains Not Significant with the addition of the Modification Package.
Fish and Fish Habitat	The Modification Package potential effects are the same as those identified in the FEIS: permanent alteration or destruction (PAD) of fish/aquatic habitat; and changes in water and sediment quality resulting in direct fish mortality or reduction in fish health and indirect reduction in biological resources of fish. No new potential effects were identified.	The Modification Package is predicted to result in a localized permanent loss of marine fish habitat underlying the MLA Shoreline Pad Extension in-water footprint.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Marine Fish and Fish Habitat is predicted to be Not Significant.	The Project's overall effect on Marine Fish and Fish Habitat remains Not Significant with the addition of the Modification Package.
Fish Community (Arctic Char)	The Modification Package potential effects are the same as those identified in the FEIS: direct mortality and population abundance changes; and changes in water and sediment quality resulting in indirect mortality, and reduction in health. No new potential effects were identified.	The Modification Package will result in no changes to residual effects identified in the FEIS: direct mortality; and population abundance. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Fish Community (Arctic Char) is predicted to be Not Significant.	The Project's overall effect on Fish Community (Arctic Char) remains Not Significant with the addition of the Modification Package.
Seabirds/Seaducks	The Modification Package potential effects are the same as those identified in the FEIS: habitat alteration; disturbance due to noise; direct mortality and injury; indirect mortality; exposure to contaminants; and reduction in productivity. No new potential effects were identified.	The Modification Package will result in no changes to residual effects identified in the FEIS: disturbance; and reduced reproductive productivity. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Seabirds/Seaducks is predicted to be Not Significant.	The Project's overall effect on Seabirds/Seaducks remains Not Significant with the addition of the Modification Package.
Ringed Seals	The Modification Package potential effects are the same as those identified in the FEIS: habitat alteration; disturbance due to noise; direct mortality and injury; indirect mortality; exposure to contaminants; and reduction in productive productivity. No new potential effects were identified.	No residual effects were identified in the FEIS nor the Modification Package. No new residual effects identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Ringed Seals is predicted to be Not Significant.	The Project's overall effect on Ringed Seals remains Not Significant with the addition of the Modification Package.

Valued Ecosystem Component/ Valued Socio-Economic Component	Modification Package Potential Effects	Modification Package Residual Effects	Modification Package Residual Effects Significance Rating	Effects Conclusion	
				Project Certificate No. 7	Modification Package
Human Environment					
Archaeology	The Modification Package potential effects are the same as those identified in the FEIS: disturbance of known archaeological sites; and disturbance of unknown archaeological sites. No new potential effects were identified.	The Modification Package will result in no changes to residual effects identified in the FEIS: disturbance of known archaeological sites; and disturbance of unknown archaeological sites. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Archaeology is predicted to be Not Significant.	The Project's overall effect on Archaeology remains Not Significant with the addition of the Modification Package.
Economic Development	The Modification Package potential effects are the same as those identified in the FEIS: changes to economic growth, diversity, and performance. No new potential effects were identified.	No residual effects were identified in the FEIS nor the Modification Package. No new residual effects identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Economic Development is predicted to be Not Significant.	The Project's overall effect on Economic Development remains Not Significant with the addition of the Modification Package.
Business Opportunities	The Modification Package potential effects are the same as those identified in the FEIS: changes to the growth and diversity of Inuit and Northern businesses. No new potential effects were identified.	No residual effects were identified in the FEIS nor the Modification Package. No new residual effects identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Business Opportunities is predicted to be Not Significant.	The Project's overall effect on Business Opportunities remains Not Significant with the addition of the Modification Package.
Employment	The Modification Package potential effects are the same as those identified in the FEIS: changes to employment and income levels; changes to the capacity of the labour force; and changes to competition for local labour. No new potential effects were identified.	The Modification Package will result in no changes to residual effects identified in the FEIS: changes to competition for local labour. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Employment is predicted to be Not Significant.	The Project's overall effect on Employment remains Not Significant with the addition of the Modification Package.
Education and Training	The Modification Package potential effects are the same as those identified in the FEIS: changes to the demand for education and training; and changes to youth attitudes and behaviors towards education and training. No new potential effects were identified.	No residual effects were identified in the FEIS nor the Modification Package. No new residual effects identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Education and Training is predicted to be Not Significant.	The Project's overall effect on Education and Training remains Not Significant with the addition of the Modification Package.
Health and Community Well-Being	The Modification Package potential effects are the same as those identified in the FEIS: changes to life skills of individuals; changes to individual and family spending; and changes to family/household structure. No new potential effects were identified.	The Modification Package will result in no changes to residual effects identified in the FEIS: changes to individual and family spending; and changes to family and household structure. No new residual effects were identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Health and Community Well-Being is predicted to be Not Significant.	The Project's overall effect on Health and Community Well-Being remains Not Significant with the addition of the Modification Package.
Non-Traditional Land and Resources Use	The Modification Package potential effects are the same as those identified in the FEIS: changes to the experience of the natural environment. No new potential effects were identified.	No residual effects were identified in the FEIS nor the Modification Package. No new residual effects identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Non-Traditional Land and Resource Use is predicted to be Not Significant.	The Project's overall effect on Non-Traditional Land and Resource Use remains Not Significant with the addition of the Modification Package.
Subsistence Economy and Land Use	The Modification Package potential effects are the same as those identified in the FEIS: changes in access to land and resources; changes to the experience of the natural environment; and changes in abundance and distribution of resources. No new potential effects were identified.	The Modification Package will result in no changes to residual effects identified in the FEIS: changes in access to land and resources; changes to the experience of the natural environment; and changes in abundance and distribution of resources. No new residual effects identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Subsistence Economy and Land Use is predicted to be Not Significant.	The Project's overall effect on Subsistence Economy and Land Use remains Not Significant with the addition of the Modification Package.
Country Foods/Human Health	The Modification Package potential effects are the same as those identified in the FEIS: human health effects from exposure to contaminants through consumption of country foods. to country foods (and the quality of country foods on human health) were characterized by assessing the surrounding environmental media (i.e., air, vegetation/soil, water, and sediment). Refer to Air Quality, Vegetation and Special Landscape Features, Freshwater Water Quality, Freshwater Sediment Quality, Marine Water Quality, and Marine Sediment Quality. No new potential effects were identified.	No residual effects were identified in the FEIS nor the Modification Package. No new residual effects identified.	Overall significance ratings for residual effects remains unchanged.	The Project's overall effect on Country Foods/Human Health is predicted to be Not Significant.	The Project's overall effect on Country Foods/Human Health remains Not Significant with the addition of the Modification Package.

1.6 CUMULATIVE EFFECTS ASSESSMENT

Sabina notes and recognizes the amendment to the Type A Water Licence is subject to the NWB's mandate over the use of water and disposal of waste in the context of the changes proposed in the 2020 Modification Package; however, to support the completeness and fulsomeness of the amendment application, Sabina has included the Cumulative Effects Assessment previously reviewed by the NIRB (NIRB 2020).

The potential for cumulative effects to occur arises when the residual effects of a Project affect (i.e., overlap and interact with) the same resource/receptor that is affected by the residual effects of other past, existing or reasonably foreseeable projects or activities. Section 7.11 of the FEIS guidelines (NIRB 2013) provides the following definition:

> A cumulative effect (or effect) can be defined as the effect on the environment that results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions.

For the purposes of the assessment of the Modification Package, Sabina evaluated cumulative effects in two steps: first, as the cumulative effect of the Modification Package residual effects added to what was originally assessed (as outlined in the FEIS); and, secondly, as also combined with any other past, present, and reasonably foreseeable future actions.

In the Potential Effects Assessment overview of the FEIS (Volume 1, Section 6.8), Table 6.8-1 summarizes the Project-related residual effects and their significance. Sabina has reproduced this table below (Table 1.6-1) for the purpose of highlighting the limited changes to these previous assessments given the inclusion of the Project modifications. Any changes from the FEIS significance rankings in FEIS Table 6.8-1 are highlighted as shaded cells in Table 1.6-1 of the Modification Package.

NIRB confirmed the additions in scope outlined in the Back River Project 2020 Modification Package would not constitute a significant modification that requires further assessment by the NIRB (NIRB 2020). Refer to Section 1.7 for additional information.

Consequently, the cumulative effect of these Project modifications, when combined with the effects of the previously approved Project, remain predicted to be Not Significant for all VECs/VSECs.

Due to the limited changes in cumulative Project effects and the absence of notable changes to relevant past, present or reasonably foreseeable future actions since originally assessed in 2015, the overall effect of the Project to act cumulatively on the atmospheric, terrestrial, freshwater, marine, and human environments also remains the same as identified in the FEIS effects assessment: Not Significant. NIRB confirmed that in "considering the cumulative effects, the [NIRB] finds that the proposed modifications do not represent a significant modification to the Back River Project and do not require amendments to, or reconsideration of, the existing Terms and Conditions" (NIRB 2020).

Table 1.6-1. Summary of Cumulative Project-related Residual Effects and Significance (Original Project + Proposed 2020 Project Modifications)

Description of Residual Effect	Significance Criteria			Likelihood of Occurrence			Overall Significance Rating		
	Direction	Magnitude	Duration	Frequency	Geographic Extent	Reversibility	Probability	Confidence	Significance
Air Quality									
TSP	Negative	Moderate	Medium	Continuous	Local	Reversible	Likely	High	Not Significant
PM10	Negative	Moderate	Medium	Continuous	Local	Reversible	Likely	High	Not Significant
SO2	Negative	Moderate	Medium	Continuous	Local	Reversible	Likely	High	Not Significant
NO2	Negative	Moderate	Medium	Continuous	Local	Reversible	Likely	High	Not Significant
CO	Negative	Moderate	Medium	Continuous	Local	Reversible	Likely	High	Not Significant
PM2.5	Negative	Moderate	Medium	Continuous	Local	Reversible	Likely	High	Not Significant
Noise and Vibration									
Increased Noise Levels at Onsite Human Receptors	Negative	Moderate	Medium	Sporadic	Project Footprint	Reversible	Likely	High	Not Significant
Vegetation and Special Landscape Features									
Vegetation Loss	Negative	Low	Long	Once	Footprint	Irreversible	Likely	Medium	Not Significant
Special Landscape Feature Loss	Negative	Low	Long	Once	Footprint	Irreversible	Likely	Medium	Not Significant
Caribou									
Habitat Loss	Negative	Low	Long	Sporadic	Footprint	Irreversible	Likely	Medium	Not Significant
Disturbance due to Noise	Negative	Low	Medium	Sporadic	Local	Reversible	Likely	High	Not Significant
Reduction in Reproductive Productivity	Negative	Low	Medium	Sporadic	Regional	Reversible	Unlikely	Medium	Not Significant
Grizzly Bear									
Habitat Loss	Negative	Low	Long	Sporadic	Footprint	Irreversible	Likely	Medium	Not Significant
Disturbance due to Noise	Negative	Low	Medium	Sporadic	Local	Reversible	Likely	High	Not Significant
Attraction	Negative	Low	Medium	Sporadic	Footprint	Reversible	Moderate	Medium	Not Significant
Reduction in Reproductive Productivity	Negative	Low	Medium	Continuous	Regional	Reversible	Unlikely	Medium	Not Significant
Muskox									
Habitat Loss	Negative	Low	Long	Sporadic	Footprint	Irreversible	Likely	Medium	Not Significant
Disturbance due to Noise	Negative	Low	Medium	Sporadic	Local	Reversible	Moderate	Medium	Not Significant
Reduction in Reproductive Productivity	Negative	Low	Medium	Sporadic	Regional	Reversible	Unlikely	Medium	Not Significant
Wolverine and Furbearers									
Habitat Loss (Wolverine)	Negative	Low	Long	Sporadic	Footprint	Irreversible	Likely	Medium	Not Significant
Habitat Loss (Grey Wolf)	Negative	Low	Long	Sporadic	Footprint	Irreversible	Likely	Medium	Not Significant
Habitat Loss (Wolverine)	Negative	Low	Long	Sporadic	Footprint	Irreversible	Likely	Medium	Not Significant
Habitat Loss (Grey Wolf)	Negative	Low	Long	Sporadic	Footprint	Irreversible	Likely	Medium	Not Significant
Disturbance due to Noise (Wolverine)	Negative	Low	Medium	Sporadic	Local	Reversible	Likely	High	Not Significant
Disturbance due to Noise (Grey Wolf)	Negative	Low	Medium	Sporadic	Local	Reversible	Likely	High	Not Significant
Attraction (Wolverine)	Negative	Low	Medium	Sporadic	Footprint	Reversible	Moderate	Medium	Not Significant

(continued)

Table 1.6-1. Summary of Cumulative Project-related Residual Effects and Significance (Original Project + Proposed 2020 Project Modifications) (continued)

Description of Residual Effect	Significance Criteria			Likelihood of Occurrence			Overall Significance Rating		
	Direction	Magnitude	Duration	Frequency	Geographic Extent	Reversibility	Probability	Confidence	Significance
Reduction in Reproductive Productivity (Wolverine)	Negative	Low	Medium	Sporadic	Regional	Reversible	Unlikely	Medium	Not Significant
Upland Birds and Waterbirds									
Habitat Loss	Negative	Low	Long	Sporadic	Footprint	Irreversible	Likely	High	Not Significant
Disturbance due to Noise	Negative	Low	Medium	Sporadic	Local	Reversible	Likely	High	Not Significant
Raptors									
Habitat Loss	Negative	Low	Long	Sporadic	Footprint	Irreversible	Likely	High	Not Significant
Disturbance due to Noise	Negative	Low	Medium	Sporadic	Local	Reversible	Likely	High	Not Significant
Direct Mortality and Injury	Negative	Low	Medium	Sporadic	Local	Reversible	Moderate	High	Not Significant
Attraction	Negative	Low	Medium	Sporadic	Footprint	Reversible with Effort	Likely	High	Not Significant
Reduction in Reproductive Productivity	Negative	Low	Medium	Sporadic	Local	Reversible	Unlikely	High	Not Significant
Surface Hydrology									
Change in streamflows	Negative	Low	Medium	Continuous	Local	Reversible	Likely	High	Not Significant
Change in lake volumes	Negative	Low	Medium	Continuous	Footprint	Reversible	Likely	High	Not Significant
Freshwater Water Quality									
Water Quality changes due to mobilization and construction, and decommissioning	Negative	Low	Short	Sporadic	Local	Reversible	Moderate	Medium	Not Significant
Water Quality changes due to Site Contact Water	Negative	Low	Short	Sporadic	Local	Reversible	Moderate	Medium	Not Significant
Water Quality changes due to Mine Contact Water	Negative	Low to	Short to Medium	Sporadic	Local	Reversible	High	High	Not Significant
Water Quality changes due to explosives	Negative	Moderate	Short	Sporadic	Local	Reversible	High	High	Not Significant
Freshwater Sediment Quality									
Sediment Quality changes due to mobilization and construction, and decommissioning	Negative	Low	Short	Sporadic	Local	Reversible	Moderate	Medium	Not Significant
Sediment Quality changes due to Site Contact Water	Negative	Low	Short	Sporadic	Local	Reversible	Moderate	Medium	Not Significant
Sediment Quality changes due to Mine Contact Water	Negative	Low to Moderate	Short to Long	Sporadic	Local	Partially Reversable	Moderate	Medium	Not Significant
Sediment Quality changes due to explosives	Negative	Low	Short	Sporadic	Local	Reversible	Moderate	Medium	Not Significant
Marine Water Quality									
Water Quality changes due to Shipping – Propeller Wash	Negative	Low	Medium	Sporadic	Local	Reversible	Moderate	High	Not Significant
Water Quality changes due to mobilization and construction, and decommissioning	Negative	Low	Short	Sporadic	Local	Reversible	Moderate	Medium	Not Significant
Water Quality changes due to Site Contact Water	Negative	Moderate	Medium	Sporadic	Local	Reversible	Moderate	High	Not Significant

(continued)

Table 1.6-1. Summary of Cumulative Project-related Residual Effects and Significance (Original Project + Proposed 2020 Project Modifications) (completed)

Description of Residual Effect	Significance Criteria			Likelihood of Occurrence			Overall Significance Rating		
	Direction	Magnitude	Duration	Frequency	Geographic Extent	Reversibility	Probability	Confidence	Significance
Marine Sediment Quality									
Sediment Quality changes due to Shipping – Propeller Wash	Negative	Low	Medium	Sporadic	Local	Reversible	Moderate	High	Not Significant
Sediment Quality changes due to mobilization and construction, and decommissioning	Negative	Low	***Long***	Sporadic	Local	***Irreversible***	Moderate	Moderate	Not Significant
Sediment Quality changes due to Site Contact Water	Negative	Low	Medium	Sporadic	Local	Reversible	Moderate	Moderate	Not Significant
Marine Fish/Aquatic Habitat									
Habitat loss due to in-water footprint of Lightering Barge Terminal	Negative	***Low***	***Long***	Sporadic	Footprint	***Irreversible***	Likely	High	Not Significant
Habitat loss due to in-water footprint of intake and discharge pipes	Negative	Negligible	Short	Once	Footprint	Reversible	Likely	High	Not Significant
Marine Fish Community (Arctic Char)									
Direct Mortality and Population Abundance: Shipping Noise	Negative	Low	Short	Sporadic	Regional	Reversible	Moderate	Medium	Not Significant
Seabirds and Seaducks									
Disturbance due to Noise	Negative	Moderate	Medium	Sporadic	Regional	Reversible	Likely	High	Not Significant
Reduction in Reproductive Productivity	Negative	Low	Medium	Sporadic	Regional	Reversible	Unlikely	Medium	Not Significant
Archaeology									
Impact to Known Archaeological Sites	Negative	Low	Long	Once	Local	Irreversible	High	High	Not Significant
Impact to Unknown Archaeological Sites	Negative	Low	Long	Once	Local	Irreversible	Low	Medium	Not Significant
Socio-economics									
Changes to Competition for Local Labour (Employment)	Negative	Low	Medium	Sporadic	Local	Reversible	Moderate	Medium	Not Significant
Changes to Individual and Family Spending (Community Well-being)	Positive/Negative	Low	Long	Continuous	Local/ Regional	Reversible	Moderate	Medium	Not Significant
Changes to Family and Household Structure (Community Well-being)	Negative	Low	Medium	Continuous	Local/ Regional	Reversible	Moderate	High	Not Significant
Land Use									
Changes to the Experience of the Natural Environment (Non-traditional Land and Resource Use)	Negative	Moderate	Medium	Sporadic	Local/ Footprint	Reversible with Effort	Likely	High	Not Significant
Changes in Access to Land and Resources (Subsistence Economy and Land Use)	Negative	Moderate	Medium	Sporadic	Local/ Footprint	Reversible with Effort	Likely	High	Not Significant
Changes to the Experience of the Natural Environment (Subsistence Economy and Land Use)	Negative	Moderate	Medium	Sporadic	Local/ Footprint	Reversible with Effort	Likely	High	Not Significant
Changes to Abundance and Distribution of Resources (Subsistence Economy and Land Use)	Negative	Moderate	Medium	Sporadic	Local	Reversible with Effort	Likely	High	Not Significant

Note: Highlighted values indicate a change from original FEIS characterization of residual effect aspect.

1.7 SABINA SELF-ASSESSMENT OVERVIEW AND NIRB DETERMINATION

In February 2018, the NIRB issued guidelines that outlined how to address proposed modifications to projects that have been previously assessed and approved to proceed under the *Nunavut Planning and Project Assessment Act* (NuPPAA). Sections 146(1) and 235(2) of NuPPAA require that significant modifications to previously-approved projects undergo further assessment by the Nunavut Planning Commission and, in some cases, also the NIRB; these requirements must be satisfied before any licences, permits, and other approvals required to carry out the activities can be granted by the respective regulatory authority.

While Sabina recognizes that there are no specific self-assessment guidelines associated with non-NuPPAA project modification applications, Sabina has chosen to conservatively adhere to the guidelines presented in the Nunavut Impact Review Board Modification Guideline (NIRB 2018). Sabina has reviewed this guideline and separately assessed each proposed Project modification with respect to the criteria outlined by the NIRB (Table 1.7-1).

Table 1.7-1. Modification Package NIRB-Self Assessment Summary Table

Modification Package Section	Proposed Project Modification	NIRB Self-Assessment Conclusion
Section 2	Goose Property Airstrip Extension	Non-significant Amendment: NIRB Assessment Not Required
	Umwelt Underground Extension	Non-significant Amendment: NIRB Assessment Not Required
	Goose Property Total Water Use Increase	Non-significant Amendment: NIRB Assessment Not Required
Section 3	Waste and Water Infrastructure	Non-significant Amendment: NIRB Assessment Not Required
Section 4	MLA Fuel Transfer Area	Non-significant Amendment: NIRB Assessment Not Required
	MLA Airstrip Extension	Non-significant Amendment: NIRB Assessment Not Required
Section 5	MLA Shoreline Pad Extension	Non-significant Amendment: Screening Not Required; Implications for NIRB Monitoring Program
Section 6	WIR Subbase Upgrade	Non-significant Amendment: NIRB Assessment Not Required
	WIR Service/Emergency Camps	Non-significant Amendment: NIRB Assessment Not Required
	WIR Total Water Use	Non-significant Amendment: NIRB Assessment Not Required

Sabina has also cumulatively assessed all of the above Project modifications and Sabina believes that the Modification Package Application as a whole is best categorized as "Non-significant Amendment: Screening Not Required; Implications for NIRB Monitoring Program" and as such is "not a significant modification to the original Project" (NIRB 2018). This conclusion is based on the following factors:

- All Project modifications are located within the FEIS total area of impact assessed (Potential Development Areas [PDAs] and LSA);
- The individual areas of the Project modification footprints are limited, and, overall, create a net reduction in total infrastructure footprint when compared to the infrastructure areas defined in the FEIS at the MLA and Goose Property;
- The disturbance characteristics are analogous to previously proposed activities (e.g., general construction activities, water withdrawal, waste rock and water management);
- The overall effect of these Project modifications is not anticipated to substantially change the residual effects identified in the FEIS; and
- The cumulative Project effects remain predicted to be Not Significant with respect to all VECs/VSECs.

Sabina believes this categorization aligns with NIRB's use of the 'Crown Pillar Recovery amendment to the Doris North Project (NIRB File No. 05MN047)' as an example of a modification appropriately characterized as being a "Non-significant Amendment: Screening Not Required; Implications for NIRB Monitoring Program" (NIRB 2018).

As per the NIRB modification guideline related to a "Non-significant Amendment: Screening Not Required; Implications for NIRB Monitoring Program", Sabina anticipates that this modification may have implications for the NIRB's monitoring program and required reporting, and that, as a result, NIRB may wish to invite comments on whether Project Certificate No. 007 Terms and Conditions need reconsideration.

As per NIRB's letter, Direction Regarding the "Back River Project 2020 Modification Package" submitted by Sabina Gold & Silver Corp. in relation to the Back River Project (K. Kaluraq to M. Pickard, dated August 11, 2020, NIRB File No. 12MN036), the NIRB determined that the Back River Project 2020 Modification Package would not constitute a significant modification that requires further assessment by the NIRB.

NIRB confirmed the additions in scope outlined in the Back River Project 2020 Modification Package would not constitute a significant modification that requires further assessment by the NIRB (NIRB 2020). Refer to Section 1.7 for additional information.

In addition, NIRB confirmed that in "considering the cumulative effects, the [NIRB] finds that the proposed modifications do not represent a significant modification to the Back River Project and do not require amendments to, or reconsideration of, the existing Terms and Conditions" (NIRB 2020).

1.8 COMPLIANCE OVERVIEW

Where possible, Sabina has ensured all proposed Project modifications comply with the existing terms and conditions associated with the Project Certificate (NIRB PC No. 007), Type A Water Licence (2AM-BRP1831), KIA Framework Agreement/Commercial Leases, and other Project authorizations. A complete list of existing permits and authorizations for the Back River Project is included in Table 1.8-1.

Table 1.8-1. Sabina Existing Permit and Authorization Registry

Authorization No.	Expiry (yr-mo-day)	Agency	Description
PC No. 007	N/A	NIRB	Back River Project NIRB Project Certificate
2AM-BRP1831	2031-12-31	NWB	Back River Type A Water Licence
N/A	2038-06-31	KIA	Inuit Impact and Benefit Agreement
KTCL-18D001	2038-04-20	KIA	Commercial Lease - Goose
KTCL-18D002	2038-04-20	KIA	Commercial Lease - MLA
KTCL-18D003	2038-04-20	KIA	Commercial Lease – Winter Road
KTAEL-18C001	2023-04-20	KIA	Advanced Exploration Lease – George
LUL-XX	5 years from Effective Date	KIA	Land Use Licence as per KIA Framework Agreement
KTL312C004	2020-04-25	KIA	Wishbone-Malley Exploration Activities (renewal submitted)
N2018F0021	2023-10-29	CIRNAC	CAT Train Beechy Lake Area
N2017F0016	2022-07-20	CIRNAC	CAT Train connecting Bathurst Inlet - Back River Project

(continued)

Table 1.8-1. Sabina Existing Permit and Authorization Registry (completed)

Authorization No.	Expiry (yr-mo-day)	Agency	Description
N2016C0011	2021-10-26	CIRNAC	Back River Exploration Activities
N2018F0017	2023-10-11	CIRNAC	Winter Ice Road Back River Project
Lease No. 76J/12-7-2	2048-08-14	CIRNAC	Marine environment land lease – adjacent to MLA
Lease No. 76J/9-1-2	2048-04-26	CIRNAC	Goose Lake Tailings Storage Facility
PC 2020-0333	N/A	ECCC	Amendment to the Metal and Diamond Mining Effluent Regulations Schedule II allowing for the operation of the Tailings Storage Facility
2BE-GOO2028	2028-02-18	NWB	Goose Water Licence (Type B)
2BE-GEO2025	2025-05-29	NWB	George Water Licence (Type B)
2BE-MLL1722	2022-06-29	NWB	Wishbone-Malley Water Licence (Type B)
2BC-BRP1819	2019-04-30	NWB	Type B Development Works Water Licence (Replaced by Type A)
12-HCAA-CA7-00007	2031-12-31	DFO	*Fisheries Act* Authorization – Back River Project
18-HCAA-00185	N/A	DFO	Letter of Authorization – Gander Culvert
18-HCAA-00971	N/A	DFO	Letter of Authorization – MLA
18-HCAA-01626	N/A	DFO	Letter of Authorization – Winter Ice Road
04 009 19R-M	2020-12-31	NRI	Back River Project Scientific Research License (renewal submitted)
2012-600767-002	N/A	TC	*Navigation Protection Act* – MLA Discharge Pipeline Authorization
2012-600767-003	N/A	TC	*Navigation Protection Act* – MLA Intake Pipeline Authorization
2012-600767-006	N/A	TC	*Navigation Protection Act* – MLA Lightering Barge Authorization
2012-600767-004	N/A	TC	*Navigation Protection Act* – Umwelt Lake Dewatering Authorization
2012-600767-005	N/A	TC	*Navigation Protection Act* – Llama Lake Dewatering Authorization

Sabina has not identified any necessary changes to existing Project Certificate (NIRB PC No. 007) Terms and Conditions or to the KIA Framework Agreement/Commercial Leases related to this Modification Package.

Amendments to Type A Water Licence (2AM-BRP1831) are anticipated as being necessary to increase water use allowance and in consideration of potential changes associated with the Project Interim Closure and Reclamation Plan (2AM-BRP1831 Part B, Item 14g) are appropriately addressed. Sabina will follow all appropriate NWB processes associated with this amendment, and will work cooperatively with KIA, CIRNAC, and NWB on any related Project security revisions. The current monetary amount, staging, and regulatory divisions between KIA and CIRNAC, required in Part C or the Type A Water Licence (2AM-BRP1831), remains valid until otherwise approved by the NWB. In addition, Sabina will review the existing Water Licence Terms and Conditions to integrate 2020 Modification Package amendments and will provide a draft amended version during the Water Licence regulatory review phase.

Sabina clarifies that mining areas and associated infrastructure already included in the Project Certificate (PC No. 007; NIRB File No. 12MN036) and the Type A Water Licence (2AM-BRP1831) will remain in the amended licence. Sabina confirms that the scope of activities in Part A, Item 1 of licence, 2AM-BRP1831, remain unchanged, that Sabina is not requesting a reduction in Project scope, and that the new scope of activities associated with the 2020 Modification Package will be added to the licence as part of this amendment application.

As mentioned throughout the NIRB Environmental Assessment, Sabina is proceeding with an initial refined mine plan at the Goose Property, which provides a reduced capital investment and financially de-risks the Project. The refined mine plan is a subset of the previously approved permitted mine, and Sabina highlights that, with the continued advancement in detailed engineering and market considerations, the previously approved deposits may be reintegrated into the mine plan at a later date. Sabina acknowledges that if this were to occur, all applicable management plans will be updated to reflect these changes, and Sabina will adhere to all appropriate requirements of the Back River Project Certificate (PC No. 007) and the Type A Water License (2AM-BRP1831).

Sabina anticipates, and has confirmed with the DFO, that an update is necessary to the existing DFO Letter of Advice (18-HCAA-00971) to reflect planned in-water works related to the MLA Shoreline Pad Extension. Sabina will also prepare an application addressed to TC to ensure any in-water works will not substantially interfere with navigation, as is required under the *Navigation Protection Act*.

Sabina will review the Back River Project Marine Environment Land Lease (CIRNAC #76J/12-7-2), and the Winter Ice Road Land Use Licence (CIRNAC #N2018F0017), for possible revisions as a result of the Modification Package and adhere to any applicable processes.

Where additional regulatory processes may be required for individual Project modifications, Sabina will work cooperatively with all interested parties to ensure appropriate compliance.

1.9 MODIFICATION PACKAGE CONCLUSION

Sabina has advanced Detailed Engineering since receipt of the NIRB Project Certificate (PC No. 007) in 2015 and the NWB Type A Water Licence (2AM-BRP1831) in 2018. Through this additional effort, Sabina has identified design improvement modifications that would optimize and de-risk the Project.

Sabina assessed each proposed Project Modification with respect to Project regulatory precedence, community engagement and Traditional Knowledge, key management and mitigation measures, as well as modification-specific effects assessments.

Results from the Modification Package effects assessment identified minimal change to the FEIS residual effects, and no change to the overall significance ratings for the FEIS residual effects. As a result, Sabina confirms that the overall effect of the Project on the atmospheric, terrestrial, freshwater, marine, and human environments remains the same as the FEIS effects assessment: Not Significant.

Sabina reviewed each proposed Project modification against the Nunavut Impact Review Board Modification Guideline (NIRB 2018), and it is Sabina's view is that these proposed Project modifications are considered minor in the overall scope of the original environmental assessment, and that cumulatively, this Modification Package Application be considered a “Non-Significant” amendment to the Project, with screening not required.

The Back River Project 2020 Modification Package was submitted to NPC for determination and confirmation regarding land use. NPC confirmed on June 9, 2020 that the application for modification remained outside the area of an applicable regional land use plan, and subsequently forwarded the 2020 Modification Package to NIRB for assessment.

As per NIRB’s letter, Direction Regarding the “Back River Project 2020 Modification Package” submitted by Sabina Gold & Silver Corp. in relation to the Back River Project (K. Kaluraq to M. Pickard, dated August 11, 2020, NIRB File No. 12MN036), the NIRB determined that the Back River Project 2020 Modification Package would not constitute a significant modification that requires further assessment by the NIRB.

The Back River Project 2020 Modification Package outlines proposed additions (Section 2 – 6) to the Type A Water Licence, 2AM-BRP1831, and is being provided to the NWB in support of an amendment application for inclusion in the licence.

2. Goose Property

The Modification Package Section 2 includes the following proposed Project modifications:

- 2.1. Goose Property Airstrip Extension;
- 2.2. Umwelt Underground Extension; and
- 2.3. Goose Property Total Water Use Increase.

Details on the individual Project modifications can be found in the sections below. Relevant figures can be found in Appendix A of the Project Modification Package.

2.1 GOOSE PROPERTY AIRSTRIP EXTENSION

2.1.1 Overview

Sabina currently operates land-based airstrips at the Goose Property and the Marine Laydown Area (MLA), as well as seasonal ice airstrips at both locations. Sabina is proposing a modification to the Project to allow an extension of the already permitted Goose Property all-weather 5,000-ft by 150-ft airstrip. Sabina intends to extend the permitted all-weather airstrip to 6,000 ft by 200 ft, which would allow aircraft of different sizes to land year-round with an increased degree of success; this modification will provide greater flexibility in the movement of freight and personnel, and improved emergency response. Seasonal logistical constraints are one of the Project's most significant challenges; the Goose Property Airstrip Extension will allow Sabina to more efficiently construct, operate, and close the Project. This longer all-weather airstrip will also improve medivac capabilities at the Goose Property (Modification Package Figure 3).

2.1.2 Regulatory History and Consideration

Sabina currently operates land-based airstrips at the Goose Property and the MLA. These airstrips are currently approved, or are recently covered, under the following approvals:

- NIRB Project Certificate (NIRB PC No. 007);
- NIRB Screening Decision (NIRB 2012);
- Type B Water Licence (2BE-GOO1520);
- Type B Water Licence (2BC-BRP1819);
- Type A Water Licence (2AM-BRP1831); and
- KIA Back River Project Framework Agreement/Commercial Lease for the Goose Property (KTCL-18D001).

Sabina's FEIS and FEIS Addendum (Sabina 2015, 2017b) and Type A Water Licence Application (Sabina 2017a) for the Project included an all-weather airstrip of up to 5,000 ft long and 150 ft wide (1,524 m by 45 m) at the Goose Property. The KIA Back River Project Framework Agreement/Commercial Lease (KTCL-18D001) authorizes construction of an all-weather airstrip at the Goose Property.

Sabina also notes that the Project Description for the Back River Project, submitted to the NIRB in June 2012 (120614-12MN036-Back River Project Description), included construction of all-weather airstrips up to 8,200 ft in length and 150 ft in width (2,500 m by 45 m) at the Goose Property.

Moving forward, additional regulatory processes associated with the Goose Property Airstrip Extension, which may be required prior to construction, include: DFO, and TC. Sabina will follow all appropriate processes associated with this modification and will work cooperatively with all interested parties to ensure regulatory compliance.

2.1.3 Modification Details

The Goose Property Airstrip Extension would include an increased length of 1,000 ft (305 m) and an increased width of 50 ft (15 m) beyond the currently approved airstrip dimensions of 5,000 ft by 150 ft (Image 2.1-1). This extension is proposed in the same general location and orientation as the previously assessed and current Goose Property all-weather airstrip (Image 2.1-2). This increase in airstrip dimensions, which totals approximately 4 ha, remains within the previously assessed area of impact (PDA) in the FEIS (5,358 ha) and is shown on Modification Package Figure 3.

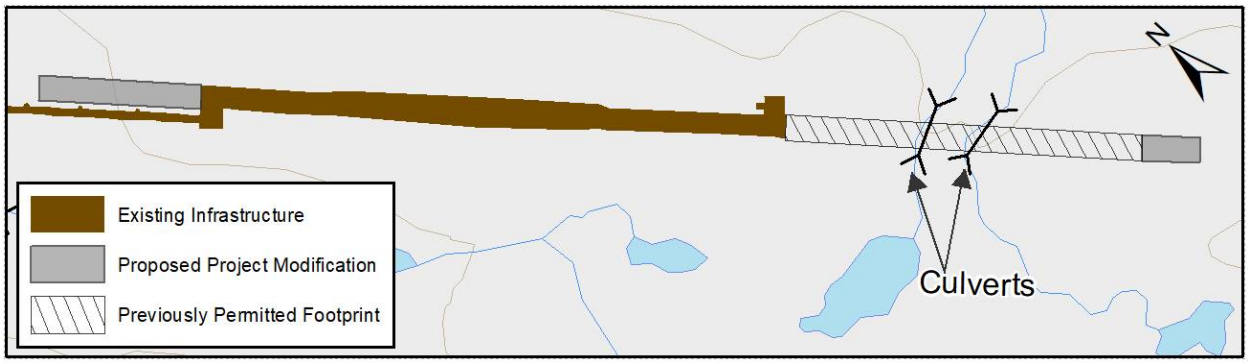


Image 2.1-1. Goose Property Airstrip – Permitting Overview

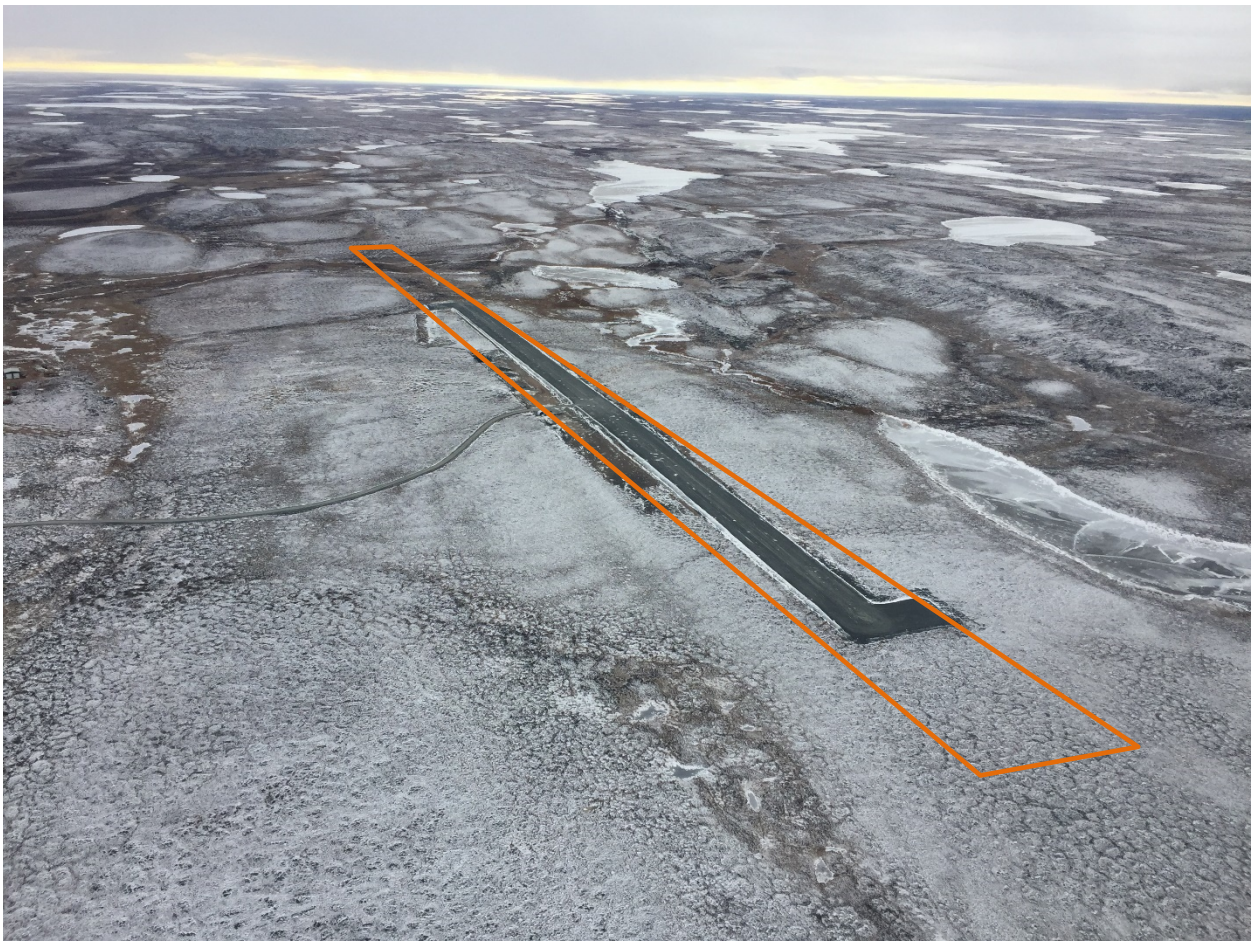


Image 2.1-2. Proposed Goose Property Airstrip Extension (in orange) overlaying the existing Goose All-Weather Airstrip (2017), looking South

2.1.4 Management and Mitigation

As part of the Modification Package, Sabina conducted a comprehensive review of the approved management plans (PC No. 007 and Water Licence 2AM-BRP1831) to determine whether additional management and mitigation measures are necessary or appropriate given the proposed Project modifications. The approach taken in this review is provided in Section 1.3 of this Application.

Sabina has confirmed that the current, approved plans provide sufficient management measures to mitigate the proposed modification of the Goose Property Airstrip Extension. Key management plans include:

- Air Quality Monitoring and Management Plan (Sabina 2019a);
- Water Management Plan (Appendix B); and
- Wildlife Mitigation and Monitoring Plan (Sabina 2019b).

The Project modification details associated with the Goose Property Airstrip Extension will be included in the next iteration of these management plans. These revisions will be submitted as an addendum to the Annual Report in accordance with the NIRB Project Certificate (PC No. 007) or as directed by NIRB (NIRB 2020). Sabina notes that an updated WMP has been included in the Modification Package for ease of regulatory review (Appendix B), and any further revisions will be subject to the direction of the NWB following regulatory review of the amendment application.

Sabina will also adopt and adhere to all applicable management and mitigation protocols described in the FEIS during the construction and operation of the Goose Property Airstrip Extension. The potential effects of this modification are equivalent in nature to previously proposed activities, such as the originally assessed and approved airstrip. As such, management and mitigation measures outlined in the Project Certificate (PC No. 007; NIRB File No. 12MN036) and the Type A Water Licence (2AM-BRP1831) will continue to appropriately address potential effects of this modification.

2.1.5 Community Engagement and Traditional Knowledge

2.1.5.1 Community Engagement

During the historic Project consultation process (2012 to 2017), some general comments on Project air traffic were recorded and concerns related to low altitude flights, helicopters, and interactions with wildlife (namely caribou) were documented. Some comments on wildlife adaptability to air traffic were additionally recorded. A limited number of questions and comments on the size and operation of the Goose Airstrip were recorded during Project consultation activities. No questions or comments on the location of the Goose Airstrip were noted.

No comments were made specific to the Goose Property Airstrip Extension modification through more recent consultation (2018 to 2019). Consultation specific to proposed Project modifications was carried out in September 2019. There were no questions or comments related to the proposed modification.

2.1.5.2 Traditional Knowledge

The Goose Property was included in the study area for TK studies that have been completed, and comprehensive information on Inuit land use and harvesting in the Project vicinity has been documented (see summary presented in Introduction - Section 1.5.2). While some historic travel, occupation, and wildlife harvesting in and around the Goose Property has been noted by KIA (2012; 2014), it was not identified as a major camp/gathering place or described as a key destination for harvesting. Rather, Inuit land use activities reflected those also documented elsewhere in the broader study area. Land use baseline information provided in Sabina's FEIS (Sabina 2015) provides additional information on current Inuit land use activities in the Project vicinity. This information confirmed the Goose Property continues to be located within a much larger area accessed by Inuit for land use and harvesting activities; activities undertaken in and around the Goose Property reflect current land use patterns throughout the western Kitikmeot Region. Project monitoring results are consistent with the above and suggest no significant Inuit use of the Goose Property is currently occurring. In the ten years Sabina has operated the Project, no Inuit land users have been observed in the vicinity of the Goose Property (i.e., when the camp has been open).

2.1.6 Effects Assessment

The Goose Property Airstrip Extension effects assessment was guided by the same approach used for the Project FEIS and FEIS Addendum (Sabina 2015, 2017b). This modification assessment evaluated the potential effects of the proposed airstrip extension on all VECs/VSECs that were assessed in the FEIS.

Associated with Goose Property Airstrip Extension, Sabina identified the following notable potential interactions with VECs/VSECs: Air Quality, Noise and Vibration, Vegetation and Special Land Features, terrestrial wildlife, and Archaeology. Potential effects to Vegetation and Special Land Features, terrestrial wildlife, and Archaeological sites may result from the expansion of the airstrip footprint. However, this expanded footprint will be constructed in the area already assessed for potential development (i.e., within the PDA), and no archaeological sites have been identified at this location. As a result, no additional residual effects are anticipated to Vegetation and Special Land Features, wildlife, or Archaeology beyond those already identified in the FEIS (Sabina 2015). Should a previously unidentified archaeological site be discovered in conflict with the airstrip extension, Sabina will address this prior to construction through appropriate Government of Nunavut (GN) processes.

Sabina identified potential Air Quality, and Noise and Vibration effects related to the construction of the Goose Property Airstrip Extension. In consideration of adherence to the mitigation and management measures outlined in the FEIS and applicable management plans (see Section 2.1.4), the residual effects to Air Quality, and Noise and Vibration are expected to be negligible, short-term, and localized. The addition of these residual effects to those assessed in the FEIS and FEIS Addendum (Sabina 2015, 2017b) is not predicted to change the significance of the cumulative Project residual effects.

The Modification Package Effects Assessment Table (See Table 1.5-1) summarizes all potential interactions of the Project modifications with each VEC/VSEC. This table outlines whether each of these interactions are expected to result in any potential effects, any change to the residual effects, and whether these interactions resulted in a change to the Project's overall effect on each VEC/VSEC. VECs/VSECs with no interactions are explicitly identified within the table. This table can be found in Section 1.5.2 of the Introduction.

Sabina has determined that, with the inclusion of the Goose Property Airstrip Extension, the overall effect of the Project on all VECs/VSECs remains Not Significant. The NIRB has agreed with this determination (NIRB 2020); refer to Section 1.7 for additional information.

2.1.7 Conclusion

The addition of the Goose Property Airstrip Extension to the previously approved Back River Project is expected to result in no significant residual negative effects to the atmospheric, terrestrial, freshwater, marine, and human environments, and is deemed by Sabina to be a "Non-significant Amendment: NIRB Assessment Not Required". Sabina notes that no amendments are anticipated to the Type A Water Licence (2AM-BRP1831), nor the KIA Framework Agreement/Commercial Lease (KTCL-18D001). The NIRB has confirmed that the Back River Project 2020 Modification Package does not require changes to the existing terms and conditions of Project Certificate No. 007 (NIRB 2020).

2.2 UMWELT UNDERGROUND EXTENSION

2.2.1 Overview

Ongoing Exploration drilling at the Goose Property has identified additional high-grade reserves below the permitted Umwelt Underground. Sabina is proposing a modification to the Project to allow an extension of the previously permitted Umwelt Underground mine with a depth of 650 m. Sabina intends to extend the permitted underground mining operations to approximately 900 m depth below surface and to target this area earlier in the mine life, which would allow sufficient financial payback and further de-risk the Project. In addition, this earlier advancement of underground activity and advanced Exploration will allow Sabina greater understanding of this deposit earlier in the Life of Mine, which would open up the full resource value of the deposit and lead to greater geological knowledge throughout the Project life. Sabina intends to utilize the currently planned mining infrastructure previously considered by locating the Umwelt Underground portal within the Goose Plant Site footprint (Modification Package Figure 3).

2.2.2 Regulatory History and Consideration

Sabina is currently permitted to operate underground mining operations at the Goose Property. These underground operations are currently approved, or are recently covered, under the following approvals:

- NIRB Project Certificate (NIRB PC No. 007);
- NIRB Screening Decision (NIRB 2009, 2012);
- Type A Water Licence (2AM-BRP1831); and
- KIA Back River Project Framework Agreement/Commercial Lease for the Goose Property (KTCL-18D001).

Sabina's FEIS and FEIS Addendum (Sabina 2015, 2017b) and Type A Water Licence Application (Sabina 2017a) for the Project included underground mining operations at the Umwelt deposit to an approximate maximum depth of 650 m from the surface at the Goose Property. The KIA Back River Project Framework Agreement/Commercial Lease (KTCL-18D001) authorizes mining activities at the Goose Property.

Sabina also notes that the Project Description for the Back River Project, submitted to the NIRB in June 2012 (120614-12MN036-Back River Project Description), included underground mining operations at the Umwelt deposit up to a depth of 680 m from surface at the Goose Property.

Moving forward, additional regulatory processes associated with the Umwelt Underground Extension, which may be required prior to construction, include the Nunavut Worker's Safety Compensation Commission (WSCC) *Mine Health and Safety Act* and the NWB. Sabina will follow all appropriate processes associated with this modification and will work cooperatively with all interested parties to ensure regulatory compliance.

2.2.3 Modification Details

The Umwelt Underground Extension, proposed to extend approximately 900 m below ground surface, would include an increased mining depth of approximately 250 m beyond the currently approved underground mine of 650 m. This underground extension would be in the same general location and orientation as the permitted Umwelt Underground (Image 2.2-1). The Umwelt Underground portal has been relocated closer to the Ore Stockpile at the Goose Plant Site for improved hauling efficiency and reduced fuel consumption (Modification Package Figure 3). Sabina anticipates approximately 450,000 tonnes of additional waste rock associated with this modification; this additional waste rock has been

accounted for in the previously permitted Waste Rock Storage Areas. Sabina also anticipates additional groundwater inflows and this additional volume has been accounted for in the WMP (Appendix B). The development of Umwelt Underground will also begin earlier in the mine life, and potentially well in advance of other mining operations. This early development would allow for additional efficient Exploration and deposit understanding, and to increase economic return earlier in the life of the Project. The Umwelt Underground Extension, which includes the updated portal location (Image 2.2-2), remains within the previously assessed area of impact (Potential Development Area; PDA) in the FEIS (5,358 ha).

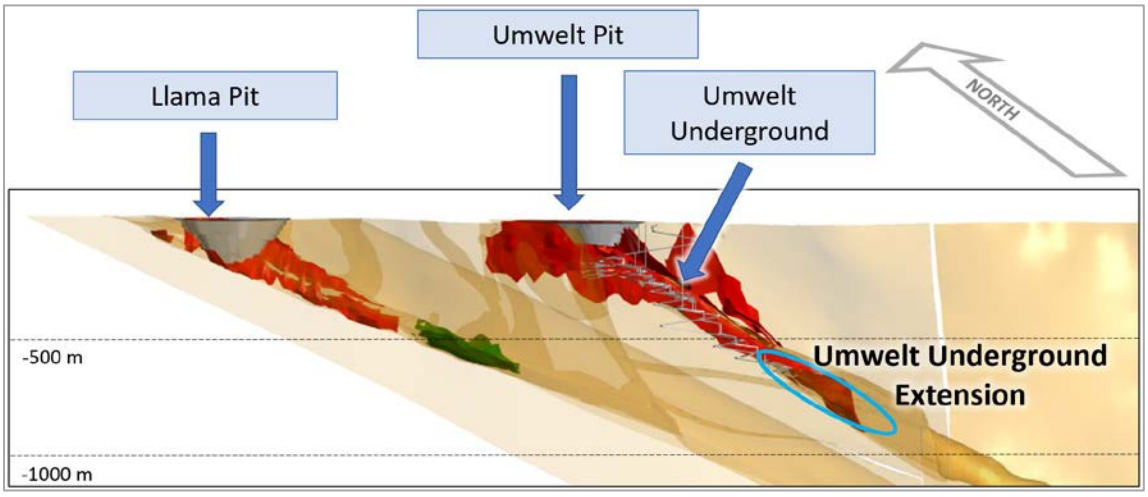


Image 2.2-1. Umwelt Underground Mine including Umwelt Underground Extension, looking Northeast

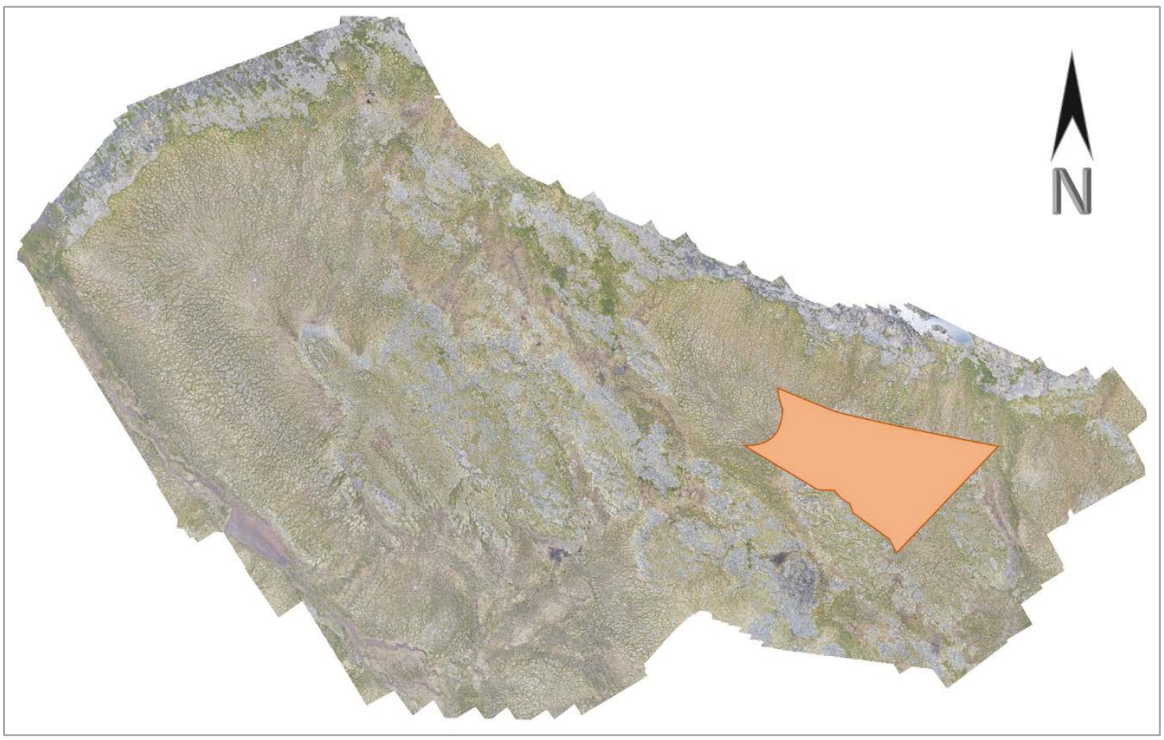


Image 2.2-2. Umwelt Underground Laydown Area (in orange), East of Plant Site Area

2.2.4 Management and Mitigation

As a part of the Modification Package, Sabina conducted a comprehensive review of the approved management plans (PC No. 007 and Water Licence 2AM-BRP1831) to determine whether additional management and mitigation measures are necessary or appropriate given the proposed Project modifications. The approach taken in this review is provided in Section 1.3 of this Application.

Sabina has confirmed that the current, approved plans provide sufficient management measures to mitigate the proposed modification of the Umwelt Underground Extension. Key management plans include:

- Water Management Plan (Appendix B);
- Saline Water Management Plan (Appendix C of the WMP); and
- Mine Waste Rock Management Plan (2AM-BRP1831 Part B, Item 14j).

The Project modification details associated with the Umwelt Underground Extension will be included in the next iteration of these management plans. These revisions will be submitted as an addendum to the Annual Report in accordance with the NIRB Project Certificate (PC No. 007) or as directed by NIRB (NIRB 2020). Sabina notes that an updated WMP has been included in the Modification Package for ease of regulatory review (Appendix B), and any further revisions will be subject to the direction of the NWB following regulatory review of the amendment application.

Sabina will also adopt and adhere to all applicable management and mitigation protocols described in the FEIS during the construction and operation of the Umwelt Underground Extension. The potential effects of this modification are equivalent in nature to previously proposed activities, such as the originally assessed and approved underground mining activities. As such, management and mitigation measures outlined in the Project Certificate (PC No. 007; NIRB File No. 12MN036) and the Type A Water Licence (2AM-BRP1831) remain suited to addressing the potential effects of this modification.

2.2.5 Community Engagement and Traditional Knowledge

2.2.5.1 Community Engagement

During the historic Project consultation process (2012 to 2017), general questions and comments related to Project development, Exploration, and geology were noted. Topics where interest was expressed included Exploration techniques, quantities/grades of gold, and location/size of gold deposits (including open pits) at the Project. Questions and comments related to long-term Project viability and success were also noted. For example, several concerns about premature Project Closure were raised, and many references were made to other mining operations in the region that had prematurely closed. Interest was expressed in the role of global gold prices and market conditions in ensuring Project viability and success. Several questions on the length of time the Project would operate were also asked. A desire for long-term employment and other Project-related benefits to be maintained was expressed, and interest in extending the Project's lifespan was noted.

No comments were made specific to the Umwelt Underground Extension modification through more recent consultation (2018 to 2019). Consultation specific to proposed Project modifications was carried out in September 2019. There were no questions or comments related to the proposed modification.

2.2.5.2 Traditional Knowledge

The Goose Property was included in the study area for TK studies that have been completed, and comprehensive information on Inuit land use and harvesting in the Project vicinity has been documented (See Section 1.4).

2.2.6 Effects Assessment

The Umwelt Underground Extension effects assessment was guided by the same approach used for the Project FEIS and FEIS Addendum (Sabina 2015, 2017b). This modification assessment evaluated the potential effects of the proposed underground extension on all VECs/VSECs that were assessed in the FEIS.

Associated with the Umwelt Underground Extension, Sabina identified the following notable interactions with VECs/VSECs: Archaeology, Air Quality, and Noise and Vibration. Sabina found there are no changes to the residual effects of each of these VECs/VSECs. For noise and dust generation associated with the underground extension, the modification will result in negligible, short-term, localized changes to residual effects, prior to returning to baseline levels. For Archaeology, the updated underground portal location will be constructed in the area already assessed for potential development (i.e., within the PDA), and no archaeological sites have been identified at this location. Should a previously unidentified archaeological site be discovered in conflict with the airstrip extension, Sabina will address this prior to construction through appropriate GN processes. Note that waste and water management aspects of this modification package are assessed in Section 3 of this Application.

The Modification Package Effects Assessment Table (See Table 1.5-1) summarizes all potential interactions of the Project modifications with each VEC/VSEC. This table outlines whether each of these interactions are expected to result in any potential effects, any change to the residual effects, and whether these interactions resulted in a change to the Project's overall effect on each VEC/VSEC. VECs/VSECs with no interactions are explicitly identified within the table. This table can be found in Section 1.5.2 of the Introduction.

Sabina has determined that, with the inclusion of the Umwelt Underground Extension, the overall effect of the Project on all VECs/VSECs remains Not Significant. The NIRB has agreed with this determination (NIRB 2020); refer to Section 1.7 for additional information.

2.2.7 Conclusion

The addition of the Umwelt Underground Extension to the previously approved Back River Project is expected to result in no significant residual negative effects to the atmospheric, terrestrial, freshwater, marine, and human environments and is deemed by Sabina to be a "Non-significant Amendment: NIRB Assessment Not Required". Sabina notes that no amendments are anticipated to the Type A Water Licence (2AM-BRP1831), nor the KIA Framework Agreement/Commercial Lease (KTCL-18D001). The NIRB has confirmed that the Back River Project 2020 Modification Package does not require changes to the existing terms and conditions of Project Certificate No. 007 (NIRB 2020).

2.3 GOOSE PROPERTY TOTAL WATER USE INCREASE

2.3.1 Overview

Sabina currently withdraws water for Exploration and Construction purposes from Goose Lake at the Project site. During the Operations Phase, Sabina is permitted to utilize Goose Lake and Big Lake as a freshwater source for Sabina's Process Plant. The Process Plant will use a combination of site contact water and freshwater to process ore at the Project. Through the advancement of Detailed Engineering, Sabina has learned that additional freshwater will be required to support milling activities at the Goose Property. Sabina acknowledges that an effective process plant is essential to the financial success of mining projects in the North. Sabina proposes the Goose Property Total Water Use Increase volume to reflect this additional water withdrawal requirement. This additional water will further de-risk milling operations during the Operations Phase of the Project (Modification Package Figure 3).

2.3.2 Regulatory History and Consideration

Sabina is currently permitted to withdraw water at the Goose Property during Construction, Operations, and Closure of the Project. This water withdrawal is currently approved, or is recently covered, under the following approvals:

- NIRB Project Certificate (NIRB PC No. 007);
- NIRB Screening Decision (NIRB 2012);
- Type A Water Licence (2AM-BRP1831);
- DFO *Fisheries Act* Authorization (12-HCAA-CA7-00007) (DFO 2018); and
- KIA Back River Project Framework Agreement/Commercial Lease for the Goose Property (KTCL-18D001).

The Project FEIS and FEIS Addendum (Sabina 2015, 2017b) assessed a total freshwater withdrawal volume of 518,000 m^3/yr at the Goose Property; 390,000 m^3 from Goose Lake, and 128,000 m^3 from Big Lake. The Project Type A Water Licence (2AM-BRP1831) permits a total combined water use for the Goose Property and Marine Laydown Area at 578,000 m^3 per year for domestic, construction, operation and associated uses, including mining and milling activities at the Goose Property (2AM-BRP1831 Part E, Item 3). At the Goose Property, a total water withdrawal of 468,000 m^3/yr is divided between Goose Lake (390,000 m^3) and Big Lake (78,000 m^3). Sabina notes that water use at Big Lake was inadvertently reduced in the Type A Water Licence Application relative to the volumes outlined in the FEIS. A summary of current and proposed water usage for proposed modification is provided in Table 2.3-1.

Table 2.3-1. Back River Project Current and Proposed Water Usage Summary

Water Source	FEIS [m^3/yr]	Type A Water Licence Approved Quantities [m^3/yr]	Additional Amount Requested [m^3/yr]	Total Water Use as per Modification Package Type A Water Licence Amendment [m^3/yr]
Total Water Use: Goose Property and MLA		**578,000[a]**	**414,450**	**992,450**
Total Water Use: Goose Property	**518,000**	**468,000**	**414,450**	**882,450**
Goose Lake	390,000	390,000[b]	218,700	608,700
Big Lake	128,000	78,000[c]	195,750	273,750
Total Water Use: MLA		**110,000[d]**	**No change**	**110,000**
Total Water Use: Dewatering		**1,400,000[e]**	**No change**	**1,400,000**
Total Water Use: Winter Ice Road		**675 m^3/km[f]**	**1,350 m^3/km**	**2,025 m^3/km**

a Total Use for domestic, construction operation and associated use including mining and milling as per Type A Water Licence 2AM-BRP1831 Part E, Item 3.

b As per Type A Water Licence 2AM-BRP1831 Part E, Item 3a.

c As per Type A Water Licence 2AM-BRP1831 Part E, Item 3b.

d As per Type A Water Licence 2AM-BRP1831 Part E, Item 3c.

e As per Type A Water Licence 2AM-BRP1831 Part E, Item 4.

f As per Type A Water Licence 2AM-BRP1831 Part E, Item 5.

Moving forward, additional regulatory processes associated with Goose Property Total Water Use Increase, which may be required prior to implementation, include: DFO authorization or letter of advice, and an NWB Type A Water Licence amendment. Sabina acknowledges that an amendment to the Type A Water Licence (2AM-BRP1831) is required for this proposed modification. Sabina will follow all appropriate NWB processes and will work cooperatively with DFO and all interested parties to ensure regulatory compliance.

2.3.3 Modification Details

The Goose Property Total Water Use Increase proposes the total freshwater volume authorized in the Type A Water Licence be increased at the Goose Property to 882,450 m^3/yr from the previously assessed volume of 518,000 m^3/yr (FEIS) and currently authorized 468,000 m^3/yr (Type A Water Licence).

As part of the Modification Package, Sabina undertook an iterative evaluation of effects under different water withdrawal scenarios at the Goose Property; this assessment is provided in the Hydrological Assessment of Effects from Increased Goose Lake and Big Lake Withdrawals Memo (Appendix C). As a result of this evaluation, Sabina proposes that total water use at the Goose Property be increased by 218,700 m^3/yr from Goose Lake (Image 2.3-1) and 145,750 m^3/yr from Big Lake. Water will be withdrawn from these lakes in the same manner as proposed in the FEIS (Sabina 2015) and Type A Water Licence Application (Sabina 2017a); see Modification Package Figure 3 for proposed Goose and Big lakes intake locations.

Water management and discharge will also continue to occur in the same manner as outlined in the FEIS, and discharge to the environment will only occur during Closure and in compliance with pre-established discharge criteria as previously assessed and permitted. Sabina has provided additional details of adjustments to the water management processes and infrastructure in Section 3 of this Application.

Image 2.3-1. Goose Lake and Goose Camp, looking Northwest

2.3.4 Management and Mitigation

As a part of the Modification Package, Sabina conducted a comprehensive review of the approved management plans (PC No. 007 and Water Licence 2AM-BRP1831) to determine whether additional management and mitigation measures are necessary or appropriate given the proposed Project modifications. The approach taken in this review is provided in Section 1.3 of this Application.

Sabina has confirmed that the current, approved plans provide sufficient management and mitigation measures to address the proposed modification of the Goose Property Total Water Use Increase. The key management plans related to this modification are:

- Water Management Plan (Appendix B);
- Aquatic Effects Management Plan (2AM-BRP1831 Part B, Item 14a); and
- Fish Offsetting Plan (Sabina 2019c).

The Aquatic Effects Management Plan describes monitoring to be conducted in the lakes and streams to quantify potential Project effects and the Fish Offsetting Plan describes the mitigation proposed to offset effects to fish and fish habitat, including the use of screens on water intakes to prevent the impingement and entrainment of fish. Both plans continue to appropriately address the Project activities and do not require any modifications to the monitoring programs or mitigation measures. The WMP, which includes monitoring of water use and flow monitoring related to the potentially affected lake outflows, also already provides sufficient management and mitigation measures to address the Goose Property Total Water Use Increase. Sabina notes that an updated WMP has been included in the Modification Package for ease of regulatory review (Appendix B).

Sabina will also continue to adhere to all applicable management and mitigation protocols described in the FEIS. The potential effects of this modification are equivalent in nature to previously proposed activities, such as the originally assessed and approved Project water uses. As such, management and mitigation measures outlined in the Project Certificate (PC No. 007; NIRB File No. 12MN036) and the Type A Water Licence (2AM-BRP1831) remain suited to addressing the potential effects of this modification.

2.3.5 Community Engagement and Traditional Knowledge

2.3.5.1 Community Engagement

During the historic Project consultation process (2012 to 2017), Sabina received some comments, questions, and concerns pertained to water quality, watershed protection, and water use/management at the Project more generally. One community member raised concerns about water capacity shortages related to the influx of employees at the Project site. Additional concerns were raised regarding the contamination and treatment of drinking water sources, potential effects on freshwater habitats affected by Project activities, and how water quality would be tested and monitored. Inuit observations of receding water levels, and the loss of local lakes and streams due to shifts in weather and precipitation patterns were noted.

No comments were made specific to the Goose Property Total Water Use Increase modification through more recent consultation (2018 to 2019). Consultation specific to proposed Project modifications was carried out in September 2019. There were no questions or comments related to the proposed modification.

2.3.5.2 Traditional Knowledge

The Goose Property was included in the study area for TK studies that have been completed, and comprehensive information on Inuit land use and harvesting in the Project vicinity has been documented (See Section 1.4). This includes information on water sources and quality (e.g., KIA 2012, 2014).

2.3.6 Effects Assessment

The Goose Property Total Water Use Increase effects assessment was guided by the same approach used for the Project FEIS and FEIS Addendum (Sabina 2015, 2017b). This modification assessment evaluated the potential effects of the additional water withdrawal on all VECs and VSECs that were assessed in the FEIS.

Sabina identified the following notable potential interactions with VECs/VSECs associated with the Goose Property Total Water Use Increase: Fish, Fish Habitat, and Surface Hydrology. The potential for effect on these VECs was related to reduction in lake and/or stream volumes as well as discharges. In consideration of the Goose Property Total Water Use Increase, Sabina proposes that total water use at the Goose Property be increased by 218,700 m3/yr from Goose Lake and 145,750 m3/yr from Big Lake to a maximum of 608,700 m^3/yr and 273,750 m^3/yr from Goose and Big Lake, respectively.

A hydrological assessment was undertaken to determine the potential impact on surface water quantity of the proposed Goose Property Total Water Use Increase (Appendix C). In summary, this assessment determined that the proposed increase would reduce water quantity within the Goose Lake and Big Lake drainages in the LSA, but that changes would be negligible at the RSA boundary. Under ice water reductions in both Goose and Big Lake are predicted to remain within DFO winter withdrawal guidelines (DFO 2010). It was determined that the magnitude of impacts to stream flows and lake levels remained consistent with those predicted in the FEIS (Sabina 2015). All hydrological indicators had a low magnitude category for effects and the assessment concluded that predicted changes remained within acceptable environmental guidelines at the Local Study Area (LSA) boundaries. As a result, no water quantity-related impacts to Fish Habitat or, subsequently, Fish are predicted by these withdrawals.

Potential impacts of this increased water use are additionally mitigated by continued adherence to management and mitigation measures outlined in the FEIS and those outlined in Sabina's management plans (see Section 2.3.4). This includes the requirement that discharge be contingent upon criteria

protective of the environment as outlined in the Water Licence, Metal and Diamond Mining Effluent Regulations (MDMER; Canada Gazette 2017), and Sabina's ICRP (2AM-BRP1831 Part J, Item 1).

Based on the hydrological assessment of the potential withdrawal impacts (Appendix C), as well as the proposed mitigation and management measures, residual effects on Fish, Fish Habitat, and Surface Hydrology of this modification are anticipated to be of low effect, short-term duration, and reversable in nature. The addition of these residual effects to those assessed in the FEIS (Sabina 2015) does not change the significance of the cumulative residual effects. As a result, with the inclusion of the Goose Property Total Water Use Increase, the overall effect of the Project on all VECs/VSECs remains Not Significant. The NIRB has agreed with this determination (NIRB 2020); refer to Section 1.7 for additional information.

The Modification Package Effects Assessment Table (See Table 1.5-1) summarizes all potential interactions of the Project modifications with each VEC/VSEC. This table outlines whether each of these interactions are expected to result in any potential effects, any change to the residual effects, and whether these interactions resulted in a change to the Project's overall effect on each VEC/VSEC. VECs/VSECs with no interactions are explicitly identified within the table. This table can be found in Section 1.5.2 of the Introduction.

2.3.7 Conclusion

The addition of the Goose Property Total Water Use Increase to the previously approved Back River Project is expected to result in no significant residual negative effects to the atmospheric, terrestrial, freshwater, marine, and human environments and is deemed by Sabina to be a "Non-significant Amendment: NIRB Assessment Not Required". Sabina notes that no amendments are anticipated to the KIA Framework Agreement/Commercial Lease (KTCL-18D001). The NIRB has confirmed that the Back River Project 2020 Modification Package does not require changes to the existing terms and conditions of Project Certificate No. 007 (NIRB 2020). Sabina acknowledges that an amendment to the Type A Water Licence (2AM-BRP1831) is required for this proposed modification, and Sabina will follow all of the appropriate NWB processes.

3. Goose Property Waste and Water Management

The Modification Package Section 3 includes the following proposed Project modification:

- 3.1. Waste and Water Management Infrastructure.

Details on individual Project modifications can be found in the sections below. Relevant figures can be found in Appendix A of the Project Modification Package.

3.1 WASTE AND WATER MANAGEMENT INFRASTRUCTURE

3.1.1 Overview

Sabina has advanced Detailed Engineering on the Back River Project since receipt of the Project Certificate (NIRB PC No. 007), and the Type A Water Licence (2AM-BRP1831). Detailed Engineering was completed on a refined mine plan at the Goose Property, which provides a reduced capital investment, financially de-risks the Project, and increases the likelihood of operational success (Modification Package Figure 3). This refined mine plan is a subset of the previously permitted mine plan, with a reduced number of open pit and underground areas, and a smaller throughput Process Plant. Adjustments to waste management and water management infrastructure at the Goose Property were completed in response to the refined mine plan, as well as additional field efforts including geotechnical drilling. Holistically, Sabina's approach to waste and water management remains unchanged, though it's noted that the timing of deposit development and infrastructure construction has consequently shifted. As such, Sabina is proposing the Project modification of Waste and Water Management Infrastructure to capture these adjustments at the Goose Property. No additional water management ponds will be generated, no additional waste rock storage areas (WRSAs) are required, no change to tailings management methodology is proposed, Site Specific Water Quality Objectives will continue to be met, and no adjustment to closure methodology is proposed.

3.1.2 Regulatory History and Consideration

Sabina is currently permitted for mining operations and associated waste and water management at the Goose Property under the following approvals:

- NIRB Project Certificate (NIRB PC No. 007);
- NIRB Screening Decision (NIRB 2009, 2012);
- Type A Water Licence (2AM-BRP1831);
- KIA Back River Project Framework Agreement/Commercial Lease for the Goose Property (KTCL-18D001).

Sabina's FEIS and FEIS Addendum (Sabina 2015, 2017b) and Type A Water Licence Application (Sabina 2017a) for the Back River Project included the following key activities and works at the Goose Property:

- Withdrawal and use of water from Big Lake and Goose Lake for camp, mining, construction, and associated activities;
- Construction, operation, maintenance of the following project components/activities:
    - Open pit mines at Llama, Umwelt, Echo, and Goose Main;
    - Underground mines at Llama, Umwelt, Echo, and Goose Main;

- Construction, operation, maintenance of the following Water Use and Management components/ activities:
    - Goose Property Water Supply Facilities;
    - Flood control, diversion, alteration of flow, or storage by means of dykes or dams;
    - Runoff management for the Ore Stockpile, Waste Rock Storage Areas, laydown areas, bulk fuel storage, and other mine infrastructure; and
    - Saline Water Storage.
- Construction, operation, maintenance of the following Waste Disposal and Management components/ activities:
    - Landfarm;
    - Landfills;
    - Waste Rock Storage Areas;
    - Tailings Storage Facility and Tailings Facilities; and
    - Effluent discharge.

In recognition that the refined mine plan (see Section 3.1.3 for details) is a subset of the previously approved permitted mine plan (as outlined above), Sabina acknowledges that, with the continued advancement in Detailed Engineering and market consideration, the previously approved deposits may be reintegrated into this updated mine plan; namely: Llama Underground, Goose Main Underground, Echo Open Pit, and Echo Underground. Should Sabina choose to include these mining areas in the future mine plan, all applicable management plans will be updated to reflect these changes, and Sabina will adhere to all appropriate requirements of the Back River Project Certificate (PC No. 007) and the Type A Water Licence (2AM-BRP1831).

Moving forward, additional regulatory processes associated with the Waste and Water Management Infrastructure, which may be required prior to construction, include: NWB, CIRNAC, the KIA, and ECCC. Sabina will follow all appropriate processes associated with this modification and will work cooperatively with all interested parties to ensure regulatory compliance.

3.1.3 Modification Details

Through the advancement of Detailed Engineering and mine plan refinement, adjustments to waste management and water management infrastructure at the Goose Property were completed. A summary of these optimizations can be seen in Table 3.1-1.

Sabina clarifies that mining areas and associated infrastructure already included in the Project Certificate (PC No. 007; NIRB File No. 12MN036) and the Type A Water Licence (2AM-BRP1831) will remain in the amended licence. Sabina confirms that the scope of activities in Part A, Item 1 of licence, 2AM-BRP1831, remain unchanged, that Sabina is not requesting a reduction in Project scope, and that the new scope of activities associated with the 2020 Modification Package will be added to the licence as part of this amendment application.

As mentioned throughout the NIRB Environmental Assessment, Sabina is proceeding with an initial refined mine plan at the Goose Property, which provides a reduced capital investment and financially de-risks the Project. The refined mine plan is a subset of the previously approved permitted mine, and Sabina highlights that, with the continued advancement in detailed engineering and market considerations, the previously approved deposits may be reintegrated into the mine plan at a later date. Sabina acknowledges that if this were to occur, all applicable management plans will be updated to reflect these changes, and Sabina will adhere to all appropriate requirements of the Back River Project Certificate (PC No. 007) and the Type A Water License (2AM-BRP1831).

The updated Construction Phase is slightly shorter (3 years compared to the previous 4 years), Operations Phase is slightly longer (12 years when compared to the previous 10 years), and all other Phase durations remain the same (i.e., Closure and Post-Closure). There are fewer open pits and undergrounds with only four mining areas remaining (3 open pits and 1 underground) at the Goose Property. Sabina notes that the open pits are slightly larger, and therefore, additional waste rock (approximately 33 Mt) will be generated and stored in the WRSAs. The originally permitted WRSAs footprints continue to provide sufficient storage capacity and the waste rock ratio of non-potentially acid generating (NPAG) to potentially acid generating (PAG) remains unchanged. The volume of NPAG available for closure has increased by approximately 46% which ensures closure objectives can more easily be met.

Table 3.1-1. Back River Project Mine Plan Comparison Table

Category	Type	Previously Permitted	2020 Modification Package
Project Schedule	Durations	Construction: 4 years Operations: 10 years Closure: 8 years Post-Closure: 5 years	Construction: 3 years Operations: 12 years Closure: 8 years Post-Closure: 5 years
	Life of Mine	27 Years	28 Years
Open Pit	Mining Areas	Umwelt Open Pit Llama Open Pit Goose Main Open Pit Echo Open Pit	Umwelt Open Pit Llama Open Pit Goose Main Open Pit
Underground	Mining Areas	Umwelt Underground Llama Underground Goose Main Underground Echo Underground	Umwelt Underground
Waste Rock Storage Areas (WRSAs)	Locations	Umwelt WRSA Llama WRSA TSF WRSA Echo WRSA	Umwelt WRSA Llama WRSA TSF WRSA
	Volumes	Waste Rock: 59.0 Mt Overburden: 5.3 Mt	Waste Rock: 86.6 Mt Overburden: 6.5 Mt
	NPAG/PAG Ratio	NPAG[1]: 24.7 Mt (~42%) PAG[2]: 34.3 Mt (~58%)	NPAG[1]: 36.2 Mt (~42%) PAG[2]: 50.4 Mt (~58%)
Tailings Management Facilities	Locations	Tailings Storage Facility Umwelt Tailings Facility Goose Main Tailings Facility	Tailings Storage Facility Llama Tailings Facility
	Volumes	19.8 Mt	12.4 Mt
Process Plant	Throughput	6,000 tpd	3,000 — 4,000 tpd

NPAG = Non-potentially acid generating; PAG = Potentially acid generating

Sabina has optimized the Process Plant for a smaller throughput (~3,000 — 4,000 tpd) than the previously permitted 6,000 tpd; as such the total volume of tailings have been reduced to 12.4 Mt. As a consequence of removing deposits and the reduced throughput Process Plant, Sabina has adjusted or eliminated some water management ponds and berms while still meeting all water management objectives and permitting requirements. Should Sabina choose to substantially increase or decrease the current Process Plant capacity (~3,000 — 4,000 tpd) in the future mine plan, Sabina will reconsider relevant aspects and potential impacts of this change and bring them forward to the NWB for their consideration.

All of the proposed optimizations associated with the Waste and Water Management Infrastructure modification are located within the previously assessed PDA (5,358 ha). Many involve only a re-positioning of the infrastructure depicted in the FEIS on a conceptual basis, where the possibility of re-location was clearly presented and considered during the assessment phase (Sabina 2015); this includes: Goose Plant

Site layout, Goose Fuel Farm, landfarm, sewage treatment plant, water intake and discharge, and the Ore Stockpile (Modification Package Figure 3). Additional details on Waste and Water Management Infrastructure, including an updated mine plan, revised timelines of waste and water management facility use, and updated figures, can be found in the WMP (Appendix B).

Sabina continues to advance Detailed Engineering and optimization of the waste rock and water management facilities. Final design and construction drawings will be provided 60 days prior to construction in accordance with Part D, Item 2 of the Back River Project Type A Water Licence (2AM-BRP1831).

3.1.4 Management and Mitigation

As a part of the Modification Package, Sabina conducted a comprehensive review of the approved management plans (PC No. 007 and Water Licence 2AM-BRP1831) to determine whether additional management and mitigation measures are necessary or appropriate given the proposed Project modifications. The approach taken in this review is provided in Section 1.3 of this Application.

Sabina has confirmed that the current, approved plans provide sufficient management and mitigation measures to address the proposed Waste and Water Management Infrastructure modification. Key management plans include:

- Water Management Plan (Appendix B);
- Saline Water Management Plan (Appendix C of the WMP);
- Mine Waste Rock Management Plan (2AM-BRP1831 Part B, Item 14j);
- Tailings Management Plan (2AM-BRP1831 Part B, Item 14o); and
- Ore Storage Management Plan (2AM-BRP1831 Part B, Item 14k).

The Project modification details associated with the Waste and Water Management Infrastructure at Goose Property will be included in the next iteration of these management plans. These revisions will be submitted as an addendum to the Annual Report in accordance with the NIRB Project Certificate (PC No. 007) or as directed by the NIRB (NIRB 2020). Sabina notes that an updated WMP has been included in the Modification Package for ease of regulatory review and in recognition of the importance of the WMP with respect to water use and discharge. The revised WMP is provided in Appendix B of in the Modification Package, and any further revisions will be subject to the direction of the NWB following regulatory review of the amendment application.

Sabina will also adopt and adhere to all applicable management and mitigation protocols described in the FEIS related to Waste and Water Management Infrastructure development, use, and closure. The potential effects of this modification are analogous in nature to previously assessed and approved activities, such as open pit and underground mining, water use, and waste rock and tailings management. As such, management and mitigation measures outlined in the Project Certificate (PC No. 007; NIRB File No. 12MN036) and the Type A Water Licence (2AM-BRP1831) remain suited to addressing the potential effects of this modification and have been retained in the updated WMP (Appendix B).

3.1.5 Community Engagement and Traditional Knowledge

3.1.5.1 Community Engagement

During the historic Project consultation process (2012 to 2017), general comments, questions, and concerns about mine waste, water use, and waste rock management were recorded. For example, several concerns about potential environmental exposure to harmful chemicals were noted and questions were asked about how such chemicals would be managed upon mine closure. Questions and concerns regarding tailings storage facilities pertained to their size, location, construction materials, and stability over time. Specifically, questions were raised about plans for managing and responding to spills and leakage, the use of fencing to keep birds and wildlife out, and whether permafrost instability was taken into consideration when planning tailings transport and storage infrastructure.

Additional questions on how waste rock will be transported and disposed of, whether waste rock is being tested for chemical composition, and whether acid rock drainage is expected to be an issue were noted. Questions about waste rock piles were also asked, including how high waste rock will be piled, how this might affect caribou migration, how the piles will be revegetated, and whether they are designed to withstand permafrost instability.

General comments, questions, and concerns about water treatment, containment, and spill response were also raised. For example, several questions pertained to how wildlife would be prevented from accessing water storage areas, as well as plans for preventing wind, rain, and snow from causing collection ponds to overflow, or transporting contaminants from containment areas into adjacent land and water resources. Other questions pertained to planned water treatment and filtration processes, and what would be done with contaminants removed from mine contact water.

Comments on the closure of tailings facilities were also documented, including whether there were plans to remove their contents after mine closure. Additional concerns were raised about the durability of water containment structures, and whether these structures could withstand the effects of climate change and permafrost instability. Some questions pertained to whether plans were in place to create water sampling stations and whether regular monitoring of water quality and soil health would be conducted.

No comments were made specific to the Waste and Water Management Infrastructure modification through more recent consultation (2018 to 2019). General questions regarding procedure for keeping lakes clean have been raised. Consultation specific to proposed Project modifications was carried out in September 2019. There were no questions or comments related to the proposed modification.

3.1.5.2 Traditional Knowledge

The Goose Property was included in the study area for TK studies that have been completed, and comprehensive information on Inuit land use and harvesting in the Project vicinity has been documented (see summary presented in Section 1.4). This includes information on water sources and quality (e.g., KIA 2012; 2014). While some historic travel, occupation, and wildlife harvesting in and around the Goose Property has been noted by KIA (2012; 2014), it was not identified as a major camp/gathering place, or described as a key destination for harvesting. Rather, Inuit land use activities reflected those also documented elsewhere in the broader study area. Land use baseline information provided in Sabina's FEIS (Sabina 2015) provides additional information on current Inuit land use activities in the Project vicinity. This information confirmed the Goose Property continues to be located within a much larger area accessed by Inuit for land use and harvesting activities; activities undertaken in and around the Goose Property reflect current land use patterns throughout the western Kitikmeot Region. Project monitoring results are consistent with the above and suggest no significant Inuit use of the Goose Property

is currently occurring. In the ten years Sabina has operated the Project, no Inuit land users have been observed in the vicinity of the Goose Property (i.e., when the camp has been open).

3.1.6 Effects Assessment

The Waste and Water Management Infrastructure modification effects assessment was guided by the same approach used for the Back River Project FEIS and FEIS Addendum (Sabina 2015, 2017b). This assessment evaluated the potential effects of the proposed modification on all Valued Ecosystem Components (VECs) and Valued Socio-Economic Components (VSECs) that were assessed in the FEIS.

Associated with the Waste and Water Management Infrastructure, Sabina identified the following notable interactions with VECs/VSECs: Archaeology, Air Quality, Noise and Vibration, Freshwater Quality, and Sediment Quality.

Potential effects on Archaeology relate to the relocation and alteration of infrastructure footprints impacting unidentified sites. All optimizations associated with the Waste and Water Management Infrastructure modification will be constructed in the area already assessed for potential development (i.e., within the PDA), and no archaeological sites have been identified at this location. Should a previously unidentified archaeological site be discovered in conflict with the any footprint of this modification, Sabina will address this prior to construction through appropriate GN processes.

Air Quality, and Noise and Vibration potential effects relate to mining activity from open pit expansions and waste rock requiring management. An assessment of the residual effects to these VECs/VSECs was made considering the application of management and mitigation measures outlined in see Section 3.1.4. It was determined that negligible, short-term, localized changes are anticipated to Air Quality or Noise and Vibration as the potential effects from open pits and waste rock generation were similar to those previously assessed and these potential effects have been appropriately addressed through management and mitigation measures.

Potential effects to Freshwater Quality and Sediment Quality are related to potential discharges from waste and water management areas. Sabina has mitigated this potential effect through appropriate water management practices. In alignment with original Project design, discharge to the environment will only occur on Project Closure. At that time, discharge will be provisional on attainment of the Site Specific Water Quality Objectives and established Water Licence criteria. No changes to these requirements are being proposed as a part of this modification. As a result, residual effects to Freshwater Water or Sediment Quality remain as predicted in the FEIS. These effects are anticipated to be negligible in nature and the significance rankings of the overall residual effect aspects remain unchanged from those predicted in the FEIS.

The Modification Package Effects Assessment Table (See Table 1.5-1) summarizes all potential interactions of the Project modifications with each VEC/VSEC. This table outlines whether each of these interactions are expected to result in any potential effects, any change to the residual effects, and whether these interactions resulted in a change to the Project's overall effect on each VEC/VSEC. VECs/VSECs with no interactions are explicitly identified within the table. This table can be found in Section 1.5.2 of the Introduction.

Sabina has determined that, with the inclusion of the Waste and Water Management Infrastructure modification, the overall effect of the Project on all VECs/VSECs remains Not Significant. The NIRB has agreed with this determination (NIRB 2020); refer to Section 1.7 for additional information.

3.1.7 Conclusion

The addition of the Waste and Water Management Infrastructure modification at the Goose Property to the previously approved Back River Project is expected to result in no significant residual negative effects to the atmospheric, terrestrial, freshwater, marine, and human environments and is deemed by Sabina to be a "Non-significant Amendment: NIRB Assessment Not Required". Sabina notes that no amendments are anticipated to the Type A Water Licence (2AM-BRP1831), nor the KIA Framework Agreement/Commercial Lease (KTCL-18D001). The NIRB has confirmed that the Back River Project 2020 Modification Package does not require changes to the existing terms and conditions of Project Certificate No. 007 (NIRB 2020).

4. Marine Laydown Area

The Modification Package Section 4 includes the following proposed Project modifications:

- 4.1. Marine Laydown Area (MLA) Fuel Transfer Area; and
- 4.2. MLA Airstrip Extension.

Details on individual Project modifications can be found in the sections below. Relevant figures can be found in Appendix A of the Project Modification Package.

4.1 MLA FUEL TRANSFER AREA

4.1.1 Overview

Sabina currently operates a staging area, called the MLA, where equipment, supplies, and fuel are stored for execution of the Back River Project (the Project). Bulk fuel is transported to the MLA over water by tankers or barges, which is then transferred to the MLA Bulk Fuel Storage Area via floating hose connected to a shore manifold and pipeline. Sabina has identified that the fuel vessels may not have the capability to pump from a mooring point in Bathurst Inlet directly to the MLA Bulk Fuel Storage Area due to topographic limitations. Sabina is proposing installation of an MLA Fuel Transfer Area, which would include an intermediate fuel pump station and single 500,000-L fuel tank staged near the Freight Storage Area (Modification Package Figure 4) to address this limitation.

4.1.2 Regulatory History and Consideration

Sabina currently operates twenty 30,000 L fuel tanks at the MLA and 1.1 ML in fuel tanks at the Goose Property. This fuel storage is currently approved, or are recently covered, under the following approvals:

- NIRB Project Certificate (NIRB PC No. 007);
- NIRB Screening Decision (NIRB 2009, 2012);
- Type B Water Licence (2BE-GOO1520);
- Type B Water Licence (2BC-BRP1819);
- Type A Water Licence (2AM-BRP1831); and
- KIA Back River Project Framework Agreement/Commercial Lease for the MLA (KTCL-18D002).

Sabina's FEIS and FEIS Addendum (Sabina 2015, 2017b) and Type A Water Licence Application (Sabina 2017a) for the Project included ISO double-walled tanks throughout the Project sites, with 60 ML of bulk fuel storage at the MLA. The KIA Back River Project Framework Agreement/Commercial Lease (KTCL-18D002) authorizes fuel storage at the MLA and details the applicable obligations.

Sabina also notes that the Project Description for the Back River Project, submitted to the NIRB in June 2012 (120614-12MN036-Back River Project Description), included bulk fuel storage at the MLA of up to 70 ML.

Moving forward, additional regulatory processes associated with the MLA Fuel Transfer Area, which may be required prior to construction, include the NWB and TC. Sabina will follow all appropriate processes associated with this modification and will work cooperatively with all interested parties to ensure regulatory compliance.

4.1.3 Modification Details

The proposed MLA Fuel Transfer Area would include an intermediate fuel pump station and single 500,000-L fuel tank near the MLA Freight Storage Area (Image 4.1-1). In addition, this modification will include dispensing stations for mobile equipment; a general arrangement drawing of the proposed MLA Fuel Transfer Area can be seen in Image 4.1-2. The MLA Fuel Transfer Area is located within the previously assessed area of impact (Potential Development Area; PDA) in the FEIS (653 ha) and is more than 31 m away from the high-water mark of the marine environment (Modification Package Figure 4).

The MLA Fuel Transfer Area will be constructed to conform with the Canadian Council of Ministers of the Environment (CCME) Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products (CCME 2013), and the Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations (SOR/2008-197). This fuel transfer facility will be bermed with HDPE liner and will provide capacity equal to the volume of 110% of the storage tank. Fuel storage areas will be equipped with standard instrumentation and controls to monitor and safely manage the fuel inventory. Supplemental spill response equipment will also be made available should the additional volume of storage warrant it.

Sabina is committed to providing detailed designs for construction of temporary and permanent fuel storage and fuel transfer facilities to the NWB at least sixty (60) days prior to construction of fuel storage facilities and associated infrastructure.

Image 4.1-1. Proposed MLA Fuel Transfer Area (in orange) adjacent to the MLA Freight Storage Pad, looking South

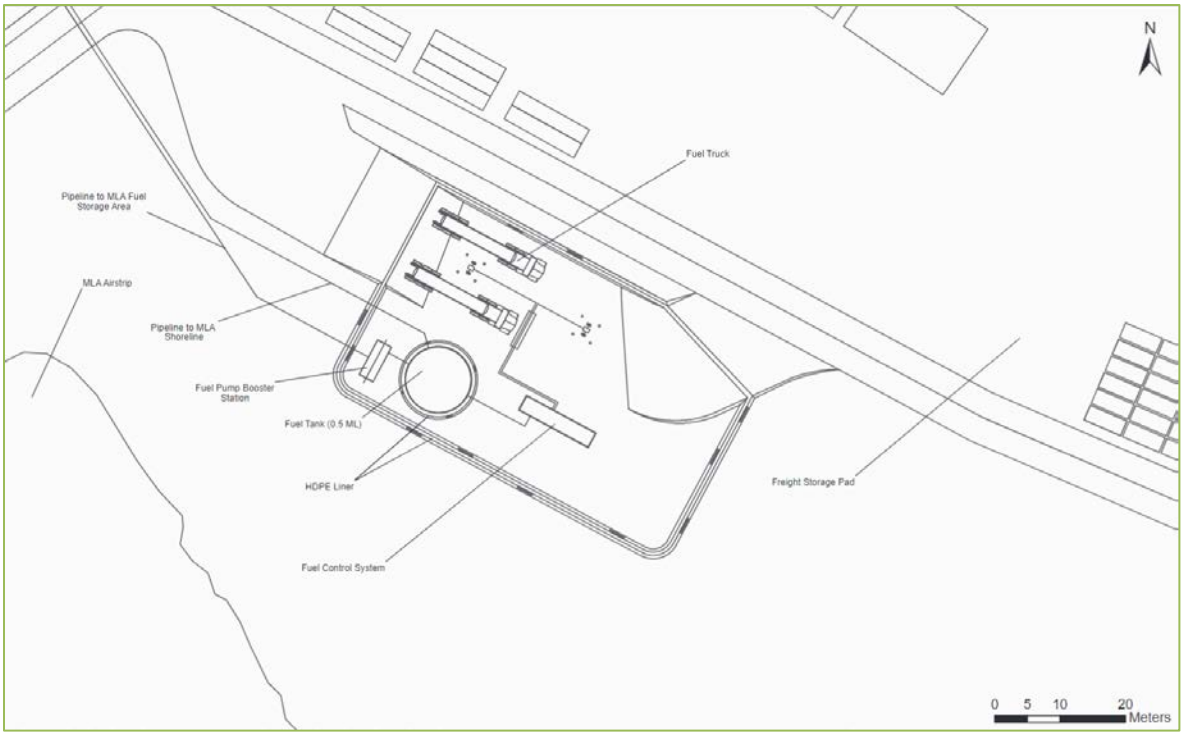


Image 4.1-2. Proposed MLA Fuel Transfer Area – Plan View

4.1.4 Management and Mitigation

As part of the Modification Package, Sabina conducted a comprehensive review of the approved management plans (PC No. 007 and Water Licence 2AM-BRP1831) to determine whether additional management and mitigation measures are necessary or appropriate given the proposed Project modifications. The approach taken in this review is provided in Section 1.3 of this Application.

Sabina has confirmed that the current, approved plans provide sufficient management measures to mitigate the proposed modification of the MLA Fuel Transfer Area. Key management plans include:

- Fuel Management Plan (2AM-BRP1831 Part B, Item 14d);
- Oil Pollution Emergency Plan (Sabina 2018b); and
- Spill Contingency Plan (2AM-BRP1831 Part B, Item 14n).

The Project modification details associated with the MLA Fuel Transfer Area will be included in the next iteration of these management plans. These revisions will be submitted as an addendum to the Annual Report in accordance with the NIRB Project Certificate (PC No. 007) or as directed by the NIRB (NIRB 2020). Any additional revisions will be subject to the direction of the NWB following regulatory review of the amendment application.

Sabina will also adopt and adhere to all applicable management and mitigation protocols described in the FEIS during the construction and operation of the MLA Fuel Transfer Area. As potential effects of this modification are equivalent in nature to previously proposed activities, such as the originally assessed fuel offload procedures and fuel storage facilities, management and mitigation measures outlined in the Project Certificate (PC No. 007; NIRB File No. 12MN036) and the Type A Water Licence (2AM-BRP1831) will continue to appropriately address potential effects of this modification.

4.1.5 Community Engagement and Traditional Knowledge

4.1.5.1 Community Engagement

During the historic Project consultation process (2012 to 2017), general comments, questions, and concerns related to fuel management at the Project were recorded. Comments specific to shipping and the shipping of fuel to the MLA have also been received, with concerns about potential fuel spills and their effects on the marine environment/wildlife being raised. Community members asked Sabina about spill avoidance and response measures that will be employed; spills that may occur during ship-to-shore fuel transfer were specifically discussed.

Interest was also expressed in containment measures (e.g., berms, liners) that will be used at MLA fuel storage sites, in addition to several other topics (e.g., how fuel will be transported to site, types of fuel to be used, quantities of fuel required, number of ships to be used, location of shipping route). One individual asked Sabina to ensure all MLA infrastructure was built on solid ground and for the MLA's muddy conditions to be considered when planning infrastructure. Likewise, a request was made from Bathurst Inlet for Sabina's support in helping them secure fuel supplies for community use.

No comments were made specific to the MLA Fuel Transfer Area modification through more recent consultation (2018 to 2019). Consultation specific to proposed Project modifications was carried out in 2019. Consultation specific to proposed Project modifications was carried out in September 2019. There were no questions related directly to the proposed modification.

4.1.5.2 Traditional Knowledge

The MLA was included in the study area for TK studies that have been completed, and comprehensive information on Inuit land use and harvesting in the Project vicinity has been documented. While some historic travel and wildlife harvesting in and around the MLA has been noted by KIA (2012; 2014), it was not identified as a major camp/gathering place, nor described as a key destination for harvesting. Rather, Inuit land use activities reflected those also documented elsewhere in the broader study area. Land use baseline information provided in Sabina's FEIS (Sabina 2015) provides additional information on current Inuit land use activities in the Project vicinity. This information confirmed the MLA continues to be located within a much larger area accessed by Inuit for land use and harvesting activities; activities undertaken in and around the MLA reflect current land use patterns throughout the western Kitikmeot Region. Project monitoring has not indicated significant use of the MLA by Inuit for harvesting; while some land use visitors were documented at the MLA in 2018/2019, harvesting does not appear to have been a primary motive for these visits.

4.1.6 Effects Assessment

The MLA Fuel Transfer Area effects assessment was guided by the same approach used for the Project FEIS and FEIS Addendum (Sabina 2015, 2017b). This modification assessment evaluated the potential effects of the proposed intermediate fuel transfer station on all VECs and VSECs that were assessed in the FEIS.

Associated with MLA Fuel Transfer Area, Sabina identified the following notable potential interactions with VECs/VSECs: Air Quality, Noise and Vibration, Vegetation and Special Land Features, and Archaeology. Potential effects to Vegetation and Special Land Features, and Archaeological sites may result from the expansion of footprint related to the fuel tank and associated pad. However, this footprint will be constructed in the area already assessed for potential development (i.e., within the PDA) and no archaeological sites have been identified at this location. As a result, no additional residual effects are anticipated beyond those already identified in the FEIS and FEIS Addendum (Sabina 2015, 2017b). Should a previously unidentified archaeological site be discovered to be in conflict with the MLA Fuel Transfer Area, Sabina will address this prior to construction of the fuel transfer pad through appropriate GN processes.

Identified potential air quality and noise effects are related to the construction of the MLA Fuel Transfer Area. In consideration of adherence to the mitigation and management measures outlined in the FEIS and applicable management plans (see Section 4.1.4), the residual effects to Air Quality, and Noise and Vibration are expected to be negligible, short-term, and localized. The addition of these residual effects to those assessed in the FEIS (Sabina 2015) is not predicted to change the significance of the cumulative Project residual effects. As a result, with the inclusion of the MLA Fuel Transfer Area, the overall effect of the Project on all VECs/VSECs remains Not Significant. The NIRB has agreed with this determination (NIRB 2020); refer to Section 1.7 for additional information.

The Modification Package Effects Assessment Table (See Table 1.5-1) summarizes all potential interactions of the Project modifications with each VEC/VSEC. This table outlines whether each of these interactions are expected to result in any potential effects, any change to the residual effects, and whether these interactions resulted in a change to the Project's overall effect on each VEC/VSEC. VECs/VSECs with no interactions are explicitly identified within the table. This table can be found in Section 1.5.2 of the Introduction.

4.1.7 Conclusion

The addition of the MLA Fuel Transfer Area modification to the previously approved Back River Project is expected to result in no significant residual negative effects to the atmospheric, terrestrial, freshwater, marine, and human environments and is deemed by Sabina to be a "Non-significant Amendment: NIRB Assessment Not Required". Sabina notes that no amendments are anticipated to the Type A Water Licence (2AM-BRP1831), nor the KIA Framework Agreement/Commercial Lease (KTCL-18D002). The NIRB has confirmed that the Back River Project 2020 Modification Package does not require changes to the existing terms and conditions of Project Certificate No. 007 (NIRB 2020).

4.2 MLA AIRSTRIP EXTENSION

4.2.1 Overview

Sabina currently operates land-based airstrips at the Goose Property and the MLA, as well as seasonal ice airstrips at both locations. Sabina is proposing a modification to the Project to allow an extension of the already permitted MLA all-weather 3,000-ft by 150-ft airstrip. Sabina intends to extend the permitted all-weather airstrip to 5,000 ft by 200 ft, which would allow aircraft to land year-round with an increased degree of success. This modification will provide greater flexibility in the movement of freight and people, and improve medivac capabilities at the MLA. Seasonal logistical constraints are one of the Project's most significant challenges; the MLA Airstrip Extension will allow Sabina to more safely and efficiently construct, operate, and close the Project (Modification Package Figure 4).

4.2.2 Regulatory History and Consideration

Sabina currently operates land-based airstrips at the Goose Property and the MLA. These airstrips are currently approved, or are recently covered, under the following approvals:

- NIRB Project Certificate (NIRB PC No. 007);
- NIRB Screening Decision (NIRB 2009, 2012);
- Type B Water Licence (2BE-GOO1520);
- Type B Water Licence (2BC-BRP1819);
- Type A Water Licence (2AM-BRP1831); and
- KIA Back River Project Framework Agreement/Commercial Lease for the MLA (KTCL-18D002).

Sabina's FEIS and FEIS Addendum (Sabina 2015, 2017b) and Type A Water Licence Application (Sabina 2017a) for the Project proposed using an existing all-weather road at the MLA as an airstrip. The KIA Back River Project Framework Agreement/Commercial Lease (KTCL-18D002) authorizes the construction of an all-weather airstrip at the MLA.

Moving forward, additional regulatory processes associated with the MLA Airstrip Extension, which may be required prior to construction, include: ECCC, TC, and GN. Sabina will follow all appropriate processes associated with this modification and will work cooperatively with all interested parties to ensure regulatory compliance.

4.2.3 Modification Details

The MLA Airstrip Extension would include an increased length of 2,000 ft (610 m) and an increased width of 50 ft (15 m) beyond the existing airstrip dimensions of 3,000 ft by 150 ft (Image 4.2-1). This extension is proposed in the same general location and orientation as the previously permitted and current MLA all-weather airstrip (Modification Package Figure 4). This increase in airstrip dimensions, which totals approximately 5 ha, remains within the previously assessed area of impact (PDA) in the FEIS (653 ha).

Image 4.2-1. Proposed MLA Airstrip Extension (in orange), overlaying the existing MLA All-weather Airstrip, looking South

4.2.4 Management and Mitigation

As part of the Modification Package, Sabina conducted a comprehensive review of the approved management plans (PC No. 007 and Water Licence 2AM-BRP1831) to determine whether additional management and mitigation measures are necessary or appropriate given the proposed Project modifications. The approach taken in this review is provided in Section 1.3 of this Application.

Sabina has confirmed that the current, approved plans provide sufficient management measures to mitigate the proposed modification of the MLA Airstrip Extension. Key management plans include:

- Air Quality Monitoring and Management Plan (Sabina 2019a); and
- Wildlife Mitigation and Monitoring Plan (Sabina 2019b).

The Project modification details associated with the MLA Airstrip Extension will be included in the next iteration of these management plans. These revisions will be submitted as an addendum to the Annual Report in accordance with the NIRB Project Certificate (PC No. 007) or as directed by the NIRB (NIRB 2020). Any additional revisions will be subject to the direction of the NWB following regulatory review of the amendment application.

Sabina will also adopt and adhere to all applicable management and mitigation protocols described in the FEIS during the construction and operation of the MLA Airstrip Extension. The potential effects of this modification are equivalent in nature to previously proposed activities, such as construction and use of the originally assessed and approved airstrips. As such, management and mitigation measures outlined

in the Project Certificate (PC No. 007; NIRB File No. 12MN036) and the Type A Water Licence (2AM-BRP1831) will continue to appropriately address potential effects of this modification.

4.2.5 Community Engagement and Traditional Knowledge

4.2.5.1 Community Engagement

During the historic Project consultation process (2012 to 2017), some general comments, questions, and concerns related to air traffic at the Project have been noted (See Section 2.1.5 – Goose Airstrip Extension). Comments specific to air traffic at the MLA have also been received. These included questions on the type of airstrip to be constructed at the MLA (e.g., land- or ocean-based) and types of aircraft to be used. Concerns about air traffic's potential effects on wildlife were noted, and one individual asked about the applicability of Sabina's wildlife mitigation plans to the MLA during its summer activities. One individual commented on the need for an airstrip at the MLA for safety/emergency evacuation purposes, while another asked Sabina to ensure all MLA infrastructure was built on solid ground and for the MLA's muddy conditions to be considered when planning infrastructure.

No comments were made specific to MLA Airstrip Extension modification through more recent consultation (2018 to 2019). Consultation specific to proposed Project modifications was carried out in September 2019. There were no questions related directly to the proposed modification.

4.2.5.2 Traditional Knowledge

The MLA was included in the study area for TK studies that have been completed, and comprehensive information on Inuit land use and harvesting in the Project vicinity has been documented (See Section 1.4).

4.2.6 Effects Assessment

The MLA Airstrip Extension effects assessment was guided by the same approach used for the Project FEIS and FEIS Addendum (Sabina 2015, 2017b). This modification assessment evaluated the potential effects of the proposed airstrip extension on all VECs and VSECs that were assessed in the FEIS.

Associated with MLA Airstrip Extension, Sabina identified the following notable potential interactions with VECs/VSECs: Air Quality, Noise and Vibration, Vegetation and Special Land Features, terrestrial wildlife, and Archaeology. Potential effects to Vegetation and Special Land Features, terrestrial wildlife and Archaeological sites may result from the expansion of airstrip footprint. However, this footprint will be constructed in the area already assessed for potential development (i.e., within the PDA), and no archaeological sites have been identified at this location. As a result, no additional residual effects are anticipated to Vegetation and Special Land Features, wildlife, or Archaeology beyond those already identified in the FEIS (Sabina 2015). Should a previously unidentified archaeological site be discovered in conflict with the airstrip expansion, Sabina will address this prior to construction through appropriate GN processes.

Identified potential Air Quality, and Noise and Vibration effects are related to the construction of the MLA Airstrip Extension. In consideration of adherence to the mitigation and management measures outlined in the FEIS and applicable management plans (see Section 2.1.4), the residual effects to Air Quality, and Noise and Vibration are expected to be negligible, short-term, and localized. The addition of these residual effects to those assessed in the FEIS (Sabina 2015) is not predicted to change the significance of the cumulative Project residual effects.

The Modification Package Effects Assessment Table (See Table 1.5-1) summarizes all potential interactions of the Project modifications with each VEC/VSEC. This table outlines whether each of these interactions are expected to result in any potential effects, any change to the residual effects, and whether these interactions resulted in a change to the Project's overall effect on each VEC/VSEC. VECs/VSECs with no interactions are explicitly identified within the table. This table can be found in Section 1.5.2 of the Introduction.

Sabina has determined that, with the inclusion of the MLA Airstrip Extension, the overall effect of the modification on all VECs/VSECs remains Not Significant. The NIRB has agreed with this determination (NIRB 2020); refer to Section 1.7 for additional information.

4.2.7 Conclusion

The addition of the MLA Airstrip Extension to the previously approved Back River Project is expected to result in no significant residual negative effects to the atmospheric, terrestrial, freshwater, marine, and human environments and is deemed by Sabina to be a "Non-significant Amendment: NIRB Assessment Not Required". Sabina notes that no amendments are anticipated to the Type A Water Licence (2AM-BRP1831), nor the KIA Framework Agreement/Commercial Lease (KTCL-18D002). The NIRB has confirmed that the Back River Project 2020 Modification Package does not require changes to the existing terms and conditions of Project Certificate No. 007 (NIRB 2020).

5. Marine Laydown Area – Shoreline Pad Extension

The Modification Package Section 5 includes the following proposed Project modification:

- 5.1. Marine Laydown Area (MLA) Shoreline Pad Extension.

Details on individual Project modifications can be found in the sections below. Relevant figures can be found in Appendix A of the Project Modification Package.

5.1 MARINE LAYDOWN AREA SHORELINE PAD EXTENSION

5.1.1 Overview

Sabina currently operates a staging area, called the MLA, where equipment, supplies, and fuel are stored for execution of the Back River Project. Sabina utilizes annual sealifts to bring equipment and supplies from southern locations, which are stored at the MLA until freight and fuel can be hauled on the annual Winter Ice Road (WIR) to the Goose Property where mining occurs. Sabina's offloading facilities currently consist of the MLA Shoreline Pad, a rockfill pad located above the high-water mark (Modification Package Figure 4). Lightering barges are brought into the shoreline directly seaward of the existing MLA Shoreline Pad and a metal bridge ramp is used to span the gap between the vessel and the pad, allowing offload or upload of materials (see Image 5.1-1).

Although this procedure was successfully used to offload vessels at the MLA in 2018 and 2019, the ability to do so is heavily influenced by tides, waves, and wind. The reliability and safety of offload would be greatly improved by extending the existing shoreline pad into the water to allow vessels to dock directly against it. This would minimize the gap between the vessels and the pad, and provide a more secure structure against which the lightering barges could anchor and be offloaded.

Image 5.1-1. Existing MLA Shoreline Pad Demonstrating Current Gap between Barge and Pad

5.1.2 Regulatory History and Consideration

Sabina's currently MLA Shoreline Pad and marine infrastructure is approved, or recently covered, under the following approvals:

- NIRB Project Certificate (NIRB PC No. 007);
- NIRB Screening Decision (NIRB 2012);
- Type B Water Licence (2BC-BRP1819);
- Type A Water Licence (2AM-BRP1831);
- CIRNAC Land Lease (Lease No. 76J/12-7-2);
- DFO Letter of Advice (File 18-HCAA-00971);
- TC Navigation Protection Act permissions (2012-600767-002, 2012-600767-003, and 2012-600767-006); and
- KIA Back River Project Framework Agreement/Commercial Lease for the for the MLA (KTCL-18D002).

Sabina's FEIS and FEIS Addendum (Sabina 2015, 2017b) and Type A Water Licence Application (Sabina 2017a) for the Project included consideration of in-water works at the MLA and seasonal installation of a grounded lightering barge terminal that would be removed at the end of each open water season. The terminal barge was proposed to be installed for an estimated 42 days each year and would represent a seasonal in-water footprint of approximately 380 m^2.

The FEIS and FEIS Addendum (Sabina 2015, 2017b) and Type A Water Licence Application (Sabina 2017a) also described an in-water marine footprint related to the installation of permanent desalination plant intake and discharge pipelines. These two, approximately 150-m long pipelines, were to be trenched into the seafloor and covered with a 20-m wide strip of either natural substrate or quarried rock fill for a total estimated in-water footprint of 9,900 m^2. Sabina notes that the limited seasonal water supply needs of the MLA have proven to be easily supported with the use of small diameter flexible pipes for desalination. These pipes are laid out on an as-needed basis, either on the ice (in winter) or directly into the nearshore water (during the open-water season) to supply the desalination plant. These current desalination pipes thereby eliminate the need for permanent lines and their associated footprint. Sabina notes that an amendment to the CIRNAC Land Lease (Lease No. 76J/12-7-2) will likely be required in consideration of this modification.

Sabina also notes that the Project Description for the Back River Project, submitted to the NIRB in June 2012 (120614-12MN036-Back River Project Description), included in-water structures, such as a dock, jetty, moorings, and buoys, whose design would depend on the vessels used and shipping requirements at the MLA.

Moving forward, additional regulatory processes associated with the MLA Shoreline Pad Extension, which may be required prior to construction, include: DFO, TC, and CIRNAC. Sabina will follow all appropriate processes associated with this modification and will work cooperatively with all interested parties to ensure regulatory compliance.

5.1.3 Modification Details

The MLA Shoreline Pad Extension consists of a seaward expansion off the northern portion of the existing MLA Shoreline Pad (Image 5.1-2). This modification would extend this pad into the intertidal and shallow subtidal zone to a depth of 1 to 2 m. This extension will result in a sea-floor footprint of approximately 420 m^2 with a lesser above-water area, based on the bathymetry and side slopes of the pad. This extension is proposed in the same general location and orientation as the permitted and current MLA shoreline pad (Modification Package Figure 4). This increase in pad dimensions, which totals approximately 0.04 ha, remains within the previously assessed area of impact (Potential Development Area; PDA) in the FEIS (653 ha).

The MLA Shoreline Pad Extension would be constructed of clean quarried rock fill or concrete blocks placed on geogrid, which will act to mitigate differential settlement of the pad. The final slopes may be armoured with riprap as protection against wave erosion and ice plucking. The pad driving surface will be covered with 0.15 m of surfacing material if required for tire protection. Additional engineering details and drawings of this modification are provided in the Back River Project: MLA Shoreline Pad Extension – Preliminary Design (Appendix D).

Image 5.1-2. Proposed MLA Shoreline Pad Extension (in orange) adjacent to the existing MLA Shoreline Pad, looking West

5.1.4 Management and Mitigation

As a part of the Modification Package, Sabina conducted a comprehensive review of the approved management plans (PC No. 007 and Water Licence 2AM-BRP1831) to determine whether additional management and mitigation measures are necessary or appropriate given the proposed Project modifications. The approach taken in this review is provided in Section 1.3 of this Application.

Sabina has confirmed that the current, approved plans provide sufficient management measures to mitigate the proposed modification of the MLA Shoreline Pad Extension. Key management plans include:

- Shipping Management Plan (Sabina 2018c);
- Marine Monitoring Plan (Sabina 2018d); and
- Oil Pollution Prevention Plan and Oil Pollution Emergency Plan (Sabina 2018b).

The Project modification details associated with the MLA Shoreline Pad Extension will be included in the next iteration of these management plans. These revisions will be submitted as an addendum to the Annual Report in accordance with the NIRB Project Certificate (PC No. 007) or as directed by the NIRB (NIRB 2020). Any additional revisions will be subject to the direction of the NWB following regulatory review of the amendment application.

The Marine Monitoring Plan has been designed to capture long-term effects related to the MLA infrastructure and activities, as well as the desalination plant discharge. As the proposed MLA Shoreline Pad Extension remains in the area already targeted, no monitoring changes are necessary to the Marine Monitoring Plan.

Many of the potential effects of this modification relate to in-water construction activities. This in-water work could cause short-term disruption and suspension of sediments, influence water quality, and alter fish and fish habitat (see Section 5.1.6). The following supplementary, construction-specific, management, mitigation and monitoring measures were therefore included in Sabina's 'Request for Review' application to DFO (Dec 2018):

1. If construction occurs during the open water season, the area will be isolated using silt curtains located outside the work footprint. If construction occurs during the frozen conditions, all works will occur within the ground-fast sea ice extent and will not require sediment control devices.
2. Removal of marine sediment is not required prior to construction and no dredging works will be carried out, minimizing sediment suspension and waste generation.
3. Construction work will be carried out during calm water periods to minimize any turbidity effects due to the re-suspension of sediment.
4. Total Suspended Solids (TSS) and turbidity levels will be monitored outside the silt curtain throughout construction and work will be delayed if TSS levels and turbidity become too high.
5. In-water blasting is not planned.
6. In water construction will not take place from mid-July through mid August during the Capelin spawning migration.
7. The structure will be left in place a closure to minimize additional environmental disturbance, the structure is not a navigation hazard.

Sabina will also adopt and adhere to all applicable management and mitigation protocols outlined in the FEIS and FEIS Addendum (Sabina 2015, 2017b) during the construction and operation of the MLA Shoreline Pad Extension, such as avoidance of sensitive time periods during in-water construction, use of clean rock and silt curtains, and the development of a sediment and erosion plan. The potential effects of this modification are similar in nature to previously proposed activities, such as the construction of the existing MLA shoreline pad and the permitted desalination plant uptake and discharge pipelines. As such, management and mitigation measures outlined in the Project Certificate (PC No. 007; NIRB File No. 12MN036) and the Type A Water Licence (2AM-BRP1831) are appropriate to address potential effects related to this modification.

5.1.5 Community Engagement and Traditional Knowledge

5.1.5.1 Community Engagement

During the historic Project consultation process (2012 to 2017), some general comments, questions, and concerns related to port activities at the MLA were noted. Interest was expressed in the type of docking infrastructure to be constructed at the MLA, what potential dock structures might look like (e.g., size, extension into the water, building materials used), and if a seasonal or permanent facility would be built. One individual questioned whether the port would be strong enough for the docking of ships if piers were not built.

Shallow water conditions at the MLA (and elsewhere in Bathurst Inlet) were identified as potential shipping challenges, and ongoing observations of receding ocean levels were shared. Other questions and comments pertained to the details of Sabina's shipping program (e.g., size/type/number of ships to be used, whether year-round shipping would be used, length of shipping season, how invasive species and ballast water issues would be managed), the relocation of the MLA from an earlier proposed site within Bathurst Inlet, and whether Sabina had considered the use of other proposed port sites (e.g., BIPR, Gray's Bay).

No comments were made specific to the MLA Shoreline Pad Extension modification through more recent consultation (2018 to 2019). Consultation specific to proposed Project modifications was carried out in September 2019. There were no questions or comments related to the proposed modification.

5.1.5.2 Traditional Knowledge

The MLA was included in the study area for TK studies that have been completed, and comprehensive information on Inuit land use and harvesting in the Project vicinity has been documented[4]. While some historic travel and wildlife harvesting in and around the MLA has been noted by KIA (2012; 2014), it was not identified as a major camp/gathering place, or described as a key destination for harvesting. Rather, Inuit land use activities reflected those also documented elsewhere in the broader study area. Land use baseline information provided in Sabina's FEIS (Sabina 2015) provides additional information on current Inuit land use activities in the Project vicinity. This information confirmed the MLA continues to be located within a much larger area accessed by Inuit for land use and harvesting activities; activities undertaken in and around the MLA reflect current land use patterns throughout the western Kitikmeot Region. Project monitoring has not indicated significant use of the MLA by Inuit for harvesting; while some land use visitors were documented at the MLA in 2018 and 2019, harvesting does not appear to have been a primary motive for these visits.

5.1.6 Effects Assessment

The MLA Shoreline Pad Extension effects assessment was guided by the same approach used for the Project FEIS and FEIS Addendum (Sabina 2015, 2017b). This modification assessment evaluated the potential effects of the proposed pad extension on all VECs and VSECs that were assessed in the FEIS.

[4] The MLA shoreline pad extension will be located directly adjacent to the MLA. While outside the original Project Development Area (PDA), the new proposal area was still encompassed by the TK studies that were completed. Inuit land use and harvesting activities thus remain well-defined for this area.

In the FEIS (Sabina 2015) Sabina identified notable interactions with the MLA marine infrastructure and the following VECs/VSECs: Water Quality, Sediment Quality, Fish and Fish Habitat, Seabirds and Seaducks, and Ringed Seals. These same VECs were also identified as having potential notable interactions related to the MLA Shoreline Pad Extension modification.

There are potential adverse effects arising from the habitat loss under the footprint of the MLA Shoreline Pad Extension. Additionally, any shoreline in-water structure, such as this modification, may also affect the re-distribution of near-shore sediments by changing the water movement patterns immediately surrounding the pad. This may result in localized and low magnitude changes in sediment build-up or erosion around the MLA Shoreline Pad Extension. The anticipated loss of intertidal and subtidal habitat from the MLA Shoreline Pad Extension (0.04 ha) remains within the previously assessed area of potential impact and is estimated to represent 0.006% of the MLA PDA (653 ha). The in-water footprint of the MLA Shoreline Pad Extension (420 m^2) is also small in size in comparison to the desalination plant pipelines which will no longer be built, and is similar in size to the previously assessed seasonal barge terminal footprint (380 m^2). Sabina notes the footprint affected by the MLA Shoreline Pad Extension also consists of the most common and abundant shoreline substrate and habitat along western Bathurst Inlet (sand and cobble). The in-water surface area of the MLA Shoreline Pad Extension will also be colonized by benthic invertebrates and algae naturally with no intervention, offsetting some of the lost fish habitat footprint. As a result, although the habitat loss and alteration associated with the in-water footprint will occur, residual effects on Sediment Quality, Fish Habitat and marine wildlife are of low magnitude and limited in scale and are predicted to be Not Significant based on consideration of the above.

The MLA Shoreline Pad Extension could also result in direct fish mortality during construction due to crushing or smothering if they are unable to escape the construction area. Sabina notes that direct mortality is highly unlikely due to: (1) The highly mobile nature of adult Arctic Char, (2) The timing and approach to construction, which would either be in ground-fast ice to avoid less mobile arctic char life stages or outside of the capelin spawning season, and (3) sedimentation curtains will be used (if summer construction), which would exclude fish from re-entering the construction area and would serve to keep suspended sediments from leaving the construction zone and thereby prevent smothering effects. Construction will also be outside of the capelin spawning season. These measures will ensure that any residual effects to Water Quality as well as Fish are within those previously characterized and Not Significant in nature. Lastly, the use of clean non-acid generating rock in the MLA Shoreline Pad Extension will allow the establishment of complex intertidal and sub-tidal habitat around the pad and may increase productivity.

Modification effects were also assessed with consideration of the application of management and mitigation measures, as well as continued adherence to those outlined in Sabina's management plans (see Section 5.1.4). Therefore, Sabina has determined that the overall effect of the MLA Shoreline Pad Extension modification on all VECs/VSECs remains Not Significant. The NIRB has agreed with this determination (NIRB 2020); refer to Section 1.7 for additional information.

The Modification Package Effects Assessment Table (See Table 1.5-1) summarizes all potential interactions of the Project modifications with each VEC/VSEC. This table outlines whether each of these interactions are expected to result in any potential effects, any change to the residual effects, and whether these interactions resulted in a change to the Project's overall effect on each VEC/VSEC. VECs/VSECs with no interactions are explicitly identified within the table. This table can be found in Section 1.5.2 of the Introduction.

5.1.7 Conclusion

The addition of the MLA Shoreline Pad Extension to the previously approved Back River Project is expected to result in no significant residual negative effects to the atmospheric, terrestrial, freshwater, marine, and human environments and is deemed by Sabina to be a "Non-significant Amendment: Screening Not Required; Implications for NIRB Monitoring Program". No amendments are identified as necessary to the Type A Water Licence (2AM-BRP1831), or the KIA Framework Agreement/Commercial Lease (KTCL-18D002). The NIRB has confirmed that the Back River Project 2020 Modification Package does not require changes to the existing terms and conditions of Project Certificate No. 007 (NIRB 2020).

6. Winter Ice Road

The Modification Package Section 6 includes the following proposed Project modifications:

- 6.1. Winter Ice Road (WIR) Subbase Upgrade;
- 6.2. WIR Service/Emergency Camps; and
- 6.3. WIR Total Water Use Increase.

Details on the individual Project modifications can be found in the sections below. Relevant figures can be found in Appendix A of the Project Modification Package.

6.1 WINTER ICE ROAD SUBBASE UPGRADE

6.1.1 Overview

Sabina currently operates a staging area, called the MLA, where equipment, supplies, and fuel are stored for execution of the Back River Project. A seasonal WIR is used to haul equipment and supplies annually from the MLA to the Goose Property where mining occurs. Sabina has learned through the construction and operation of the inaugural WIR in winter of 2019 that some minor WIR sections were difficult to build and maintain due to steep grades, dense boulder fields, undulating terrain, limited snow cover, and areas with reduced access to water. These sections are difficult to traverse and operate, and pose increased safety, environmental, and operational risks to success of the annual WIR hauling program. Sabina proposes to upgrade select WIR sections through the placement of aggregate along key areas of the approximately 160-km alignment. These limited discontinuous upgrades, representing less than 10% of the total WIR length, will improve WIR driving conditions, reduce seasonal construction costs, and reduce the risk associated with being unable to navigate these areas in some years due to limitations in snow and/or water access (Modification Package Figure 2 and 5).

6.1.2 Regulatory History and Consideration

Sabina has successfully constructed, operated, and maintained the inaugural WIR at the Back River Project in winter of 2019. The WIR is currently approved, or is recently covered, under the following approvals:

- NIRB Project Certificate (NIRB PC No. 007);
- NIRB Screening Decision (NIRB 2012);
- Type A Water Licence (2AM-BRP1831);
- CIRNAC Land Use Permit (N2018F0017); and
- KIA Back River Project Framework Agreement/Commercial Lease for the Winter Ice Road (KTCL-18D003).

Sabina's FEIS and FEIS Addendum (Sabina 2015, 2017b) and Type A Water Licence Application (Sabina 2017a) for the Project included an annual WIR of approximately 160 km connecting the MLA and the Goose Property. The KIA Back River Project Framework Agreement/Commercial Lease (KTCL-18D003) authorizes the annual construction of a WIR at the Project site. Sabina notes that an amendment to the CIRNAC Land Lease (Lease No. 76J/12-7-2) will likely be required in consideration of this modification.

Additionally, both the FEIS (Sabina 2015) and Type A Water Licence Application (Sabina 2017a) stated that aggregate may be required along the WIR over rough terrain or where there is insufficient snow cover to create a smooth, level driving surface for highway legal loads (e.g., B-trains). The KIA Back River Project Framework Agreement/Commercial Lease (KTCL-18D003) also authorizes placement of aggregate on a pre-determined length along the WIR alignment.

Moving forward, additional regulatory processes associated with the WIR Subbase Upgrade, which may be required prior to construction, include: KIA, CIRNAC, the NWB, and GN. Sabina will follow all appropriate processes associated with this modification and will work cooperatively with all interested parties to ensure regulatory compliance.

6.1.3 Modification Details

The WIR Subbase Upgrade would include the placement of aggregate over approximately 15 km of the WIR which represents approximately 9% of the alignment (Modification Package Figure 5). Sabina proposes these upgrades to address some minor WIR sections that were difficult to build and maintain due to steep grades, dense boulder fields, undulating terrain, limited snow cover, as well as areas with reduced access to water (Image 6.1-1 and 6.1-2). These upgrades are proposed to be approximately 10 m in width and 1 m in thickness and would be located in the same general location and orientation as the currently permitted WIR. In total, it is estimated that approximately 150,000 m^3 of material will be used for this modification. This geochemically suitable material would be sourced from borrow pits and/or quarries located along the road alignment. Several potential quarries have been identified for use along the WIR; approximate quarry locations can be seen in Modification Package Figure 5. It is anticipated that not all of these potential quarries will be utilized due to construction optimizations and needs, as well as potential environmental constraints (e.g., identification of wildlife dens or archaeological sites) or the possible identification of geochemically unsuitable material. A mobile crusher may be used to generate aggregate of appropriate size for road surfacing.

Sabina acknowledges that quarry sources along the WIR alignment, which would have a minimal cumulative footprint, will need to meet the requirements of any quarry associated with the Project. A summary of these requirements is outlined in Section 6.1.4; further details can be found in Section 6.1.4 and the Borrow Pits and Quarry Management Plan (2AM-BRP1831 Part D, Item 1).

The WIR Subbase Upgrade areas that total approximately 15 ha, combined with the quarry footprints, would remain within the previously assessed WIR area of impact (Local Study Area; WIR Sub-LSA) in the FEIS (83,310 ha) and represent only 0.02% of the WIR Sub-LSA.

The WIR Subbase Upgrade areas do not include any water crossings but may include some approaches to waterbodies. In these circumstances, no aggregate will be placed within the bankful width (in the case of streams) or below the high-water mark (with respect to lakes) of these waterbodies; ice and snow will instead continue to be used to seasonally bridge and cross any waterbodies.

Image 6.1-1. Section of WIR showing typical grades, dense boulders, and undulating terrain

Image 6.1-2. Section of WIR showing typical steep grades

6.1.4 Management and Mitigation

As part of the Modification Package, Sabina conducted a comprehensive review of the approved management plans (PC No. 007 and Water Licence 2AM-BRP1831) to determine whether additional management and mitigation measures are necessary or appropriate given the proposed Project modifications. The approach taken in this review is provided in Section 1.3 of this Application.

Sabina has confirmed that the current, approved plans provide sufficient management measures to mitigate the proposed modification of the WIR Subbase Upgrade. Key management plans include:

- Road Management Plan (2AM-BRP1831 Part B, Item 14m);
- Vegetation Monitoring Plan (Sabina 2020);
- Borrow Pits and Quarry Management Plan (2AM-BRP1831 Part B, Item 14b); and
- Wildlife Mitigation and Monitoring Plan (Sabina 2019b).

The Project modification details associated with the WIR Subbase Upgrade will be included in the next iteration of these management plans. These revisions will be submitted as an addendum to the Annual Report in accordance with the NIRB Project Certificate (PC No. 007) or as directed by the NIRB (NIRB 2020). Any additional revisions will be subject to the direction of the NWB following regulatory review of the amendment application.

The Road Management Plan outlines the management and mitigation practices to be used during ice road construction, as well as all-weather road construction, including sediment and erosion control measures. The Road Management Plan also includes the potential use of suitable granular fill along portions of the WIR, and wildlife protection measures related to road construction. The Borrow Pits and Quarry Management Plan outlines the parameters for quarry development, including setbacks from water (31 m), geochemical confirmation of material suitability, and assessment of archaeological, vegetation and/or wildlife status. This plan also outlines management and mitigation measures to be employed to minimize impacts to water quality and drainage, air quality, and permafrost.

These management and mitigation measures include protocols for identification of appropriate quarry and borrow pit material for construction to minimize potential effects related to acid rock drainage or metal leaching which will be adhered to. In addition, to these mitigation measures, potential quarry locations will be assessed prior to construction for denning use by bear, wolves, wolverine or fox, as well as for presence of archaeological sites. Mitigation measures may include adjustment of the road alignment or, in the case of an archaeological conflict, mitigation of the site. Should archaeological mitigation be necessary, appropriate mitigation measures would be determined in consultation with the GN.

Sabina will also adopt and adhere to all applicable management and mitigation protocols described in the Water Licence, 2AM-BRP1831, as well as the FEIS during the construction and operation of the WIR Subbase Upgrade. The potential effects of this modification are equivalent in nature to previously proposed activities, such as construction and use of the originally assessed and approved WIR, all-weather roads, and quarries and borrow pits. As such, management and mitigation measures outlined in the Project Certificate (PC No. 007; NIRB File No. 12MN036) and the Type A Water Licence (2AM-BRP1831) will continue to appropriately address potential effects related to the WIR Subbase Upgrade.

6.1.5 Community Engagement and Traditional Knowledge

6.1.5.1 Community Engagement

During the historic Project consultation process (2012 to 2017), some general comments, questions, and concerns were raised about the impact of winter ice roads on caribou migration and safety, the damage these roads might do to the land, the logistics of road construction, and road lifespan. Specifically, concerns were recorded on whether the WIR would affect caribou migration and calving patterns, whether strategically placed caribou crossings would be installed, and whether roadside snowbanks would be sloped such that hunters, travelers, and wildlife could safely cross without injury. One community member commented that caribou crossing areas are effective and have been used on winter ice roads at other mining sites without incident.

Other concerns were raised about the impact of road construction on the land (e.g., damage and visual impacts have been observed by Inuit from other winter roads in the region), whether construction waste would be removed to avoid harming wildlife in the area, and about invasive species being transported by vehicles along the WIR corridor. A preference for routing the road over ice rather than land surfaces was also expressed, to avoid damaging the land. Several questions specific to road construction were asked, including what materials would be used to build the road, the amount of traffic the road would receive, how less snow (recently observed by Inuit) would affect road construction, and how climate change and permafrost instability might affect the operation and lifespan of the road.

No comments were made specific to the WIR Subbase Upgrade modification through more recent consultation (2018 to 2019). Consultation specific to proposed Project modifications was carried out in September 2019. There were no questions or comments related to the proposed modification.

6.1.5.2 Traditional Knowledge

The WIR corridor was included in the study area for TK studies that have been completed, and comprehensive information on Inuit land use and harvesting in the Project vicinity has been documented. Some historic travel, occupation, and wildlife harvesting in and around the WIR corridor has been noted by KIA (2012; 2014). Similar land use activities were also documented elsewhere in the broader study area. Land use baseline information provided in Sabina's FEIS (Sabina 2015) provides additional information on current Inuit land use activities in the Project vicinity. This information confirmed the WIR corridor continues to be located within a much larger area accessed by Inuit for land use and harvesting activities; activities undertaken in and around the WIR reflect current land use patterns throughout the western Kitikmeot Region. Project monitoring results do not suggest significant Inuit use of the WIR is currently occurring. Only one (non-Inuit) public use of the WIR was documented in 2019.

6.1.6 Effects Assessment

The WIR Subbase Upgrade effects assessment was guided by the same approach used for the Project FEIS and FEIS Addendum (Sabina 2015, 2017b). This modification assessment evaluated the potential effects of the proposed placement of minor fill quantities on all VECs and VSECs that were assessed in the FEIS.

Associated with the WIR Subbase Upgrade, Sabina identified the following notable interactions with VECs/VSECs: Vegetation and Special Land Features, Archaeology, Air Quality, Noise and Vibration, Surface Hydrology, Freshwater Water Quality, and terrestrial wildlife. Potential effects to Vegetation and Special Land Features, as well as Archaeology and wildlife den effects, relate to direct interaction from the subbase upgrade and associated quarrying activity footprints. It is anticipated that this modification will result in a cumulative loss of 15 ha within the WIR LSA. This represents 0.02% of the WIR Sub-LSA, and 0.01% of the Project LSA. Wildlife may also be affected by quarrying and construction

activities which is anticipated to produce dust and noise, potentially altering Air Quality, as well as natural Noise and Vibration levels. Potential Surface Hydrology and Freshwater Water Quality effects relate to construction near waterbodies and potential sediment runoff as well as the construction and use of ice spur roads which may affect flow at stream crossings during spring freshet.

The Project was assessed in the FEIS based on having a 6011 ha footprint (the Potential Development Area outlined in the FEIS) which represented 4.8% of the Project LSA. For the purposes of the assessment of vegetation effects in the FEIS, a loss of vegetation between 1% and 10% of the LSA (134,370 ha) was characterized as having low effect. The proposed WIR Subbase Upgrade footprint of approximately 15 ha represents 0.01% of the Project LSA, resulting in a negligible amount of additional footprint. Sabina also notes that the FEIS conservatively assessed the loss of the full Goose PDA and MLA PDA as Project footprint; in actuality, it is anticipated that less than a quarter of this area will ultimately be disturbed. In consideration of the mitigation measures identified in Section 6.1.4, including the screening and avoidance or mitigation of denning and archaeological sites, as well as the facts that 1) the additional footprint area is of a negligible quantity relative to the WIR Sub-LSA, 2) Project cumulative total footprint remains well below that previously assessed (6011 ha), and 3) the FEIS previously identified that aggregate may be needed along the WIR, there are no predicted changes to the residual effects identified in the FEIS related to the loss of habitat.

Potential effects on Surface Hydrology and Freshwater Water Quality are predicted to be addressed through implementation of the management and mitigation measures. This includes the use of geochemically suitable rock, and silt fences where required to reduce effects to water quality. As a result of these measures, no residual effects on Surface Hydrology and Freshwater Water Quality are anticipated.

Implementation of pre-established management and mitigation measures (Section 6.1.4) related to quarrying activity will ensure that only suitable rock will be used and that wildlife effects will be minimized, reducing related potential effects to water quality and terrestrial wildlife. Sabina notes its predicted that quarrying activities will result in residual effects to Air Quality, Noise and Vibration, and terrestrial wildlife. These residual effects are predicted to be of negligible and localized effect, short-term duration, and reversable in nature. The addition of these residual effects to those identified in the FEIS does not alter the significance rankings for any of these VECs.

Sabina has determined that, with the proposed modification of the WIR Subbase Upgrade, the overall effect of the modification on all VECs/VSECs remains Not Significant. The NIRB has agreed with this determination (NIRB 2020); refer to Section 1.7 for additional information.

The Modification Package Effects Assessment Table (See Table 1.5-1) summarizes all potential interactions of the Project modifications with each VEC/VSEC. This table outlines whether each of these interactions are expected to result in any potential effects, any change to the residual effects, and whether these interactions resulted in a change to the Project's overall effect on each VEC/VSEC. VECs/VSECs with no interactions are explicitly identified within the table. This table can be found in Section 1.5.2 of the Introduction.

6.1.7 Conclusion

The addition of the WIR Subbase Upgrade to the previously approved Back River Project is expected to result in no significant residual negative effects to the atmospheric, terrestrial, freshwater, marine, and human environments and is deemed a Non-significant Amendment: NIRB Assessment Not Required. Sabina notes that no amendments are anticipated to the Type A Water Licence (2AM-BRP1831), nor the KIA Framework Agreement/Commercial Lease (KTCL-18D003).The NIRB has confirmed that the Back River Project 2020 Modification Package does not require changes to the existing terms and conditions of Project Certificate No. 007 (NIRB 2020).

6.2 WINTER ICE ROAD SERVICE/EMERGENCY CAMPS

6.2.1 Overview

Sabina currently operates a staging area, called the MLA, where equipment, supplies, and fuel are received and stored for execution of the Project. A seasonal WIR is used to haul equipment and supplies from the MLA to the Goose Property each winter. During the inaugural WIR season of 2019, a mobile camp/emergency shelter was used to support WIR construction and operation. This mobile camp was repositioned as needed throughout WIR season. Sabina has identified that permanent WIR Service/Emergency Camps would increase worker safety, reduce construction and operational risks, and increase overall efficiencies during the annual WIR construction and operation periods. Sabina is proposing that three permanent WIR camps be installed along the approximately 160-km WIR alignment (Modification Package Figure 5).

6.2.2 Regulatory History and Consideration

Sabina has successfully constructed, operated, and maintained a WIR at the Back River Project during the winter of 2019, which included a mobile camp/emergency shelter. The WIR and emergency shelters are currently approved, or are recently covered, under the following approvals:

- NIRB Project Certificate (NIRB PC No. 007);
- NIRB Screening Decision (NIRB 2012);
- Type A Water Licence (2AM-BRP1831);
- CIRNAC Land Use Permit (N2018F0017); and
- KIA Back River Project Framework Agreement/Commercial Lease for the Winter Ice Road (KTCL-18D003).

Sabina's FEIS and FEIS Addendum (Sabina 2015, 2017b) and Type A Water Licence Application (Sabina 2017a) for the Project included construction and operation of an annual winter ice road of approximately 160 km connecting the MLA and the Goose Property. The KIA Back River Project Framework Agreement/Commercial Lease (KTCL-18D003) authorizes the annual construction of a winter ice road at the Project.

Additionally, the FEIS (Sabina 2015) and Type A Water Licence Application (Sabina 2017a) both committed that emergency shelters would be placed approximately every 60 km along the WIR, and that these shelters will have the necessary safety supplies to allow stranded travelers to wait out an event, such as a prolonged blizzard. In the Project Certificate (NIRB PC No. 007), it's stated that Sabina shall include consideration for worker safety during winter ice road operations, particularly during periods of adverse weather conditions (PC T&C No. 88).

Moving forward, additional regulatory processes associated with the WIR Subbase Upgrade, which may be required prior to construction, include: KIA, CIRNAC, and NWB. Sabina will follow all appropriate processes associated with this modification and will work cooperatively with all interested parties to ensure regulatory compliance.

6.2.3 Modification Details

The proposed WIR Service/Emergency Camps modification would include the permanent installation of three camps spaced along the approximately 160-km WIR alignment (Modification Package Figure 5). Sabina anticipates that the WIR Service/Emergency Camps will be similar in size and layout to the mobile camp/emergency shelter employed during the 2019 WIR season (approximately 100 m x 100 m each); see

Image 6.2-1 for an example layout. The 2019 mobile camp may continue to be utilized to support construction of this modification, as well as ongoing support during annual WIR advancement. These camp installations would include a kitchen, camp dry, sleeping and office space, communication capabilities, fuel storage in secondary containment berms equipped with rain drain filters, equipment maintenance warming shop, incinerator, spill response equipment, and material and supply storage. These facilities would be placed on aggregate pads of geochemically suitable material.

Image 6.2-1. WIR Mobile Camp/Emergency Shelter, 2019 Season

The proposed camp installations will use Pacto or incinerating toilets. Pacto-waste, as well as acceptable food waste, paper waste, and untreated wood products will be disposed of in an on-site incinerator or be backhauled for incineration at the MLA or Goose Property. These measures for management of waste are consistent with Sabina's current waste management strategies utilized over the past two decades during the Project's Exploration activities. All camp infrastructure will be positioned at least 31 m away from any waterbody. All greywater would be discharged at a distance of at least 31 m above the ordinary high-water mark of any waterbody, at a location where direct flow into a waterbody is not possible. Water to support camp activities will be metered and sourced from waterbodies proximal to the WIR; this volume is considered as water to support WIR construction and operation activities (2AM-BRP1831 Part E, Item 5).

The WIR Service/Emergency Camps would be sufficiently sized to accommodate the WIR users (e.g., operators, drivers, management). Sabina currently estimates that 20 to 50-person camps would be required. These proposed camp installations are anticipated to represent a total footprint area of approximately 3 ha. Pad material will be sourced from the same WIR quarry and borrow pits identified and assessed in Section 6.1 of this Application. The proposed camps will remain within the previously assessed WIR area of impact (Local Study Area; WIR Sub-LSA) in the FEIS (83,310 ha).

6.2.4 Management and Mitigation

As part of the Modification Package, Sabina conducted a comprehensive review of the approved management plans (PC No. 007 and Water Licence 2AM-BRP1831) to determine whether additional management and mitigation measures are necessary or appropriate given the proposed Project modifications. The approach taken in this review is provided in Section 1.3 of this Application.

Sabina has confirmed that the current, approved plans provide sufficient management measures to mitigate the proposed modification of the WIR Service/Emergency Camps. Key management plans include:

- Road Management Plan (2AM-BRP1831 Part B, Item 14m);
- Spill Contingency Plan (2AM-BRP1831 Part B, Item 14n);
- Risk Management and Emergency Response Plan (Sabina 2018e);
- Water Management Plan (Appendix B);
- Hazardous Materials Management Plan (2AM-BRP1831 Part B, Item 14e); and
- Wildlife Mitigation and Monitoring Plan (Sabina 2019b).

The Project modification details associated with the WIR Service/Emergency Camps will be included in the next iteration of these management plans. These revisions will be submitted as an addendum to the Annual Report in accordance with the NIRB Project Certificate (PC No. 007) or as directed by the NIRB (NIRB 2020). Any additional revisions will be subject to the direction of the NWB following regulatory review of the amendment application.

Sabina will adopt and adhere to all applicable management and mitigation protocols described in the Water Licence, 2AM-BRP1831, as well as the Project Certificate (PC No. 007) during the construction and operation of the WIR Service/Emergency Camps. The potential effects of this modification are analogous in nature to previously proposed activities, such as construction and use of the originally assessed and approved Project all-weather pads and the MLA camp. As such, management and mitigation measures outlined in the Project Certificate (PC No. 007; NIRB File No. 12MN036) and the Type A Water Licence (2AM-BRP1831) will continue to appropriately address potential effects of this modification.

6.2.5 Community Engagement and Traditional Knowledge

6.2.5.1 Community Engagement

Some comments pertaining to the need for emergency camps along the WIR were recorded through historic Project consultation (2012 to 2017), and general questions were asked about the construction of these camps. Requests were made for safety and emergency response stations to be established along trucking routes. This would include sites for fueling up, changing oil, doing repairs, and taking shelter in bad weather, as well as sites equipped to respond to accidents involving hazardous substances and/or explosives. Some questions were asked about the proposed number and capacity of camps, and whether there would be enough camps to prevent drivers from being caught between stations in bad weather. A request was also made for all vehicles traveling the WIR to be equipped with mobile phones to facilitate communications in emergency situations.

No comments were made specific to the proposed WIR Service/Emergency Camps modification through more recent consultation (2018 to 2019). Consultation specific to proposed Project modifications was carried out in September 2019. There were no questions or comments related to the proposed modification.

6.5.2.2 Traditional Knowledge

The WIR corridor was included in the study area for TK studies that have been completed, and comprehensive information on Inuit land use and harvesting in the Project vicinity has been documented (see Section 1.4 and Section 6.1.5 – WIR Subbase Upgrade).

6.2.6 Effects Assessment

The WIR Service/Emergency Camps effects assessment was guided by the same approach used for the Project FEIS and FEIS Addendum (Sabina 2015, 2017b). This modification assessment evaluated the potential effects of the proposed camp installations on all VECs and VSECs that were assessed in the FEIS.

Associated with the WIR Service/Emergency Camps, Sabina identified the following notable interactions with VECs/VSECs: Vegetation and Special Land Features, Archaeology, Air Quality, Noise and Vibration, wildlife, and Freshwater Water Quality.

Potential effects to Vegetation and Special Land Features, Archaeology, and wildlife den effects relate to direct interactions from the camp footprints. The Project was assessed in the FEIS based on having a 6011-ha footprint (the PDA outlined in the FEIS) which represented 4.8 % of the Back River Project LSA. For the purposes of the assessment of vegetation effects in the FEIS, a loss of vegetation between 1% and 10% of the LSA (134,370 ha) was characterized as having low effect. The proposed WIR Service/Emergency Camps footprint of approximately 3 ha represents less than 0.01% of the LSA, resulting in a negligible amount of additional footprint. Sabina also notes that the FEIS conservatively assessed the loss of the full PDA as Project footprint; in actuality, it is anticipated that less than a quarter of this area will ultimately be disturbed. In consideration of the mitigation measures identified in Section 6.1.4, including the screening and avoidance or mitigation of denning and archaeological sites, as well as the facts that 1) the additional proposed footprint area is of a negligible quantity relative to the LSA, and 2) Project cumulative total footprint remains well below that previously assessed (6011 ha), there are no predicted changes to the residual effects identified in the FEIS related to the loss of habitat.

Potential effects on Freshwater Water Quality relate to the discharge of camp greywater, berm water, as well as pad runoff. With the implementation of Back River Project management and mitigation measures, including the sourcing of geochemically suitable aggregate, maintenance of a 31-m buffer from any waterbodies, and use of rain drain (or similar) hydrocarbon filters on fuel berms, no residual effects on Water Quality are anticipated.

Sabina identified potential Air Quality, and Noise and Vibration related to the construction of the WIR Service/Emergency Camps, including the aggregate pads. In consideration of adherence to the mitigation and management measures outlined in the FEIS and applicable management plans (see Section 1.3), the residual effects to Air Quality, and Noise and Vibration are expected to be negligible, short-term, and localized. The addition of these residual effects to those assessed in the FEIS (Sabina 2015) is not predicted to change the significance of the cumulative Project residual effects.

Sabina notes that effects associated with the quarrying of camp pad material have been captured and assessed in Section 6.1 of this Application. Similarly, camp water use will be a component of the WIR water allocation; these effects have been considered and assessed in Section 6.3 of this Application.

Sabina has determined that, with the proposed modification of the WIR Service/Emergency Camps, the overall effect of the modification on all VECs/VSECs remains Not Significant. The NIRB has agreed with this determination (NIRB 2020); refer to Section 1.7 for additional information.

The Modification Package Effects Assessment Table (See Table 1.5-1) summarizes all potential interactions of the Project modifications with each VEC/VSEC. This table outlines whether each of these interactions are expected to result in any potential effects, any change to the residual effects, and whether these interactions resulted in a change to the Project's overall effect on each VEC/VSEC. VECs/VSECs with no interactions are explicitly identified within the table. This table can be found in Section 1.5.2 of the Introduction.

6.2.7 Conclusion

The addition of the WIR Service/Emergency Camps to the previously approved Back River Project is expected to result in no significant residual negative effects to the atmospheric, terrestrial, freshwater, marine, and human environments and is deemed a Non-significant Amendment: NIRB Assessment Not Required. Sabina notes that no amendments are anticipated to the Type A Water Licence (2AM-BRP1831), nor the KIA Framework Agreement/Commercial Lease (KTCL-18D003). The NIRB has confirmed that the Back River Project 2020 Modification Package does not require changes to the existing terms and conditions of Project Certificate No. 007 (NIRB 2020).

6.3 WINTER ICE ROAD TOTAL WATER USE INCREASE

6.3.1 Overview

Sabina currently operates a staging area, called the MLA, where equipment, supplies, and fuel are stored for execution of the Project. Sabina utilizes a seasonal WIR to haul equipment and supplies annually from the MLA to the Goose Property where mining occurs. Sabina has learned through the execution of the first WIR in winter of 2019 that additional water is necessary to effectively and efficiently construct, maintain, and operate the annual approximate 160-km WIR. The inaugural WIR was intentionally a smaller version of a full-scale winter road; Sabina chose to pioneer a narrower route to increase execution success of the previously untested route, and to accommodate a smaller than typical WIR haul volume. Through water use tracking during the 2019 season, Sabina noted that this smaller WIR utilized higher than anticipated water volumes, given the width of the route constructed. Sabina proposes the WIR Total Water Use Increase to ensure sufficient water is available for tundra protection under the full-scale WIR. This additional water will allow for repeatable and successful construction, operation, and closure of the WIR throughout the life of the Project (Modification Package Figure 1).

6.3.2 Regulatory History and Consideration

Sabina successfully constructed, operated, and maintained the inaugural WIR at the Back River Project in winter of 2019. The WIR is currently approved, or is recently covered, under the following approvals:

- NIRB Project Certificate (NIRB PC No. 007);
- NIRB Screening Decision (NIRB 2012);
- Type A Water Licence (2AM-BRP1831);
- DFO Letter of Authorization (DFO 2018);
- CIRNAC Land Use Permit (N2018F0017); and
- KIA Back River Project Framework Agreement/Commercial Lease for the Winter Ice Road (KTCL-18D003).

Sabina's FEIS and FEIS Addendum (Sabina 2015, 2017b) and Type A Water Licence Application (Sabina 2017a) for the Project included construction and operation of an annual winter ice road of approximately 160 km connecting the MLA and the Goose Property. The KIA Back River Project Framework Agreement/Commercial Lease (KTCL-18D003) authorizes the annual construction of a winter ice road at the Project.

Specifically related to water use for the annual WIR, Sabina is authorized to withdraw a total combined WIR water use of 675 m^3 per year per kilometer of road (2AM-BRP1831 Part E, Item 5). This amounts to approximately 108,000 m^3/year for the construction, maintenance, and operation of the approximately 160-km WIR alignment. Under the Type A Water Licence, Sabina is required to submit a Winter Ice Road Water Withdrawal Technical Memorandum which outlines approximate annual routing, as well as water sources and predicted volumes of water use 60 days in advance of each WIR construction (2AM-BRP1831 Part E, Item 13).

Moving forward, additional regulatory processes associated with WIR Total Water Use Increase, which may be required prior to implementation, include: DFO authorization or letter of advice, and a (NWB Type A Water Licence amendment. Sabina acknowledges that an amendment to the Type A Water Licence (2AM-BRP1831) is required for this proposed modification. Sabina will follow all appropriate Nunavut Water Board processes and will work cooperatively with DFO and all interested parties to ensure regulatory compliance.

6.3.3 Modification Details

The WIR Total Water Use Increase modification proposes updating the total volume of water authorized in the Type A Water Licence for WIR construction and operation to 324,000 m^3 (2,025 m^3/km) from the currently authorized total volume of 108,000 m^3 (675 m^3/km).

Two memos are included for regulatory consideration of the proposed WIR Total Water Use Increase:

- Winter Ice Road Modifications – Total Water Availability Assessment (Appendix E); and
- 2018 Winter Ice Road Water Withdrawal Evaluation (Golder 2018).

Sabina's WIR Water Withdrawal Evaluation (Golder 2018) to the NWB identified 55 waterbodies, and their individual volumes, that Sabina could utilize for water withdrawal without expected measurable residual effects to fish and fish habitat based on the DFO protocol for mitigating water withdrawal effects on fish in ice-covered waterbodies in the North (DFO 2010). Sabina notes that the 108,000 m^3/year equates to approximately 0.2% of the available under-ice water identified in accordance with these DFO Guidelines.

As part of this Modification Package, Sabina has included a second memo which reviews the 55 waterbodies, and their individual volumes, against the proposed WIR Total Water Use Increase volume of 324,000 m^3 (Golder 2020b). This second memo concluded that:

> *"Based on total water withdrawals along the WIR, it is not expected that 324,000 m³ of annual winter water withdrawal will have measurable residual effects to fish and fish habitat, providing that total annual withdrawals from individual lakes do not exceed values calculated for nil or negligible risk of spawning habitat loss."*

Sabina will continue to adhere to the calculated maximum waterbody-specific withdrawal volumes for waterbodies with nil or negligible risk of spawning habitat loss (Golder 2020b) and the guidance provided in the DFO Letter of Authorization (DFO 2018). Water sources for withdrawal are expected to be the same waterbodies utilized in the 2019 inaugural WIR season. Specifics regarding waterbodies and predicted volumes of water use will continue to be provided to the NWB 60 days in advance of constructing the WIR (2AM-BRP1831 Part E, Item 13).

6.3.4 Management and Mitigation

As part of the Modification Package, Sabina conducted a comprehensive review of the approved management plans (PC No. 007 and Water Licence 2AM-BRP1831) to determine whether additional management and mitigation measures are necessary or appropriate given the proposed Project modifications. The approach taken in this review is provided in Section 1.3 of this Application.

Sabina has confirmed that the current, approved plans provide sufficient management measures to mitigate the proposed modification of the WIR Total Water Use Increase. Key management plans include:

- Road Management Plan (2AM-BRP1831 Part B, Item 14m); and
- Water Management Plan (Appendix B).

The Road Management Plan describes ice road construction and water use and specifies that DFO guidance on under ice water withdrawal volumes will be adhered to and that water source volumes must be identified in advance for this purpose. The WMP also outlines pertinent DFO guidance related to WIR water withdrawal and outlines environmental protection measures to be employed to protect the freshwater environment. This plan includes the use of screens on water uptake lines to prevent the

impingement and entrainment of fish. Both of these plans continue to appropriately address Project effects and do not require any modifications to their monitoring programs or mitigation measures described.

Sabina notes that an updated WMP has been included in the Modification Package for ease of regulatory review (Appendix B).

Sabina will also continue to adhere to all applicable management and mitigation protocols described in the FEIS, as well as in Water Licence, 2AM-BRP1831. The potential effects of this modification are equivalent in nature to previously proposed activities, such as the originally assessed and approved WIR water uses. As such, management and mitigation measures outlined in the Project Certificate (PC No. 007; NIRB File No. 12MN036) and the Type A Water Licence (2AM-BRP1831) remain suited to addressing the potential effects of this modification.

6.3.5 Community Engagement and Traditional Knowledge

6.3.5.1 Community Engagement

During the historic Project consultation process (2012 to 2017), some general questions and concerns were raised on the impact of road operations on the quality of adjacent freshwater and marine environments, and the health of local fish and wildlife. It was also noted that Inuit historically used freshwater sources along the WIR corridor for drinking water purposes. Concerns were raised about fuel leaks and spills on the WIR contaminating surrounding water bodies when the road melts, the effect this could have on wildlife and fish, and what plans were in place to respond to such incidents. Some commentators noted that seals may establish their dens under the ice and that Sabina would need to take this into consideration when building the WIR, particularly in March and early April when seal pups are typically born. Other questions were asked about the number of water bodies that would be affected by WIR construction and whether the route would change annually. Concerns about the impact of climate change on water resources were also noted, and observations of declining water levels in the ocean, rivers, and lakes in the Bathurst Inlet area were described.

No comments were made specific to the WIR Total Water Use Increase modification through more recent consultation (2018 to 2019). Consultation specific to proposed Project modifications was carried out in September 2019. There were no questions or comments related to the proposed modification.

6.3.5.2 Traditional Knowledge

The WIR corridor was included in the study area for TK studies that have been completed, and comprehensive information on Inuit land use and harvesting in the Project vicinity has been documented (see Section 1.4 and Section 6.1.5 – WIR Subbase Upgrade). This includes information on water sources and quality (e.g., KIA 2012, 2014).

6.3.6 Effects Assessment

The WIR Total Water Use Increase effects assessment was guided by the same approach used for the Project FEIS and FEIS Addendum (Sabina 2015, 2017b). This modification assessment evaluated the potential effects of the additional water withdrawal on all VECs and VSECs that were assessed in the FEIS.

Associated with the WIR Total Water Use Increase, Sabina identified the following notable interactions with VECs/VSECs: Fish and Fish Habitat, and Surface Hydrology. These potential effects were related to possible drawdown of the water sources. However, in consideration of the management and mitigation measures outlined in Section 6.3.4, no residual effects are expected on Fish and Fish Habitat. The WIR Total Water Use Increase represents an additional water volume of 216,000 m^3 (0.4% of the total identified available water volume) beyond the previously permitted water withdrawal volume of 108,000 m^3 (0.2%). The cumulative water volume to be taken from any one WIR water source will also never exceed 10% of the available water in the waterbody. For hydrology effects associated with the additional water withdrawal, the modification will result in negligible, short-term, localized changes to residual effects, prior to them returning to baseline levels. There are no predicted changes to the significance of the residual effects identified in the FEIS related to Surface Hydrology.

Sabina has determined that, with the proposed modification of the WIR Total Water Use, the overall effect of the modification on all VECs/VSECs remains Not Significant. The NIRB has agreed with this determination (NIRB 2020); refer to Section 1.7 for additional information.

The Modification Package Effects Assessment Table (See Table 1.5-1) summarizes all potential interactions of the Project modifications with each VEC/VSEC. This table outlines whether each of these interactions are expected to result in any potential effects, any change to the residual effects, and whether these interactions resulted in a change to the Project's overall effect on each VEC/VSEC. VECs/VSECs with no interactions are explicitly identified within the table. This table can be found in Section 1.5.2 of the Introduction.

6.3.7 Conclusion

The addition of the WIR Total Water Use Increase to the previously approved Back River Project is expected to result in no significant residual negative effects to the atmospheric, terrestrial, freshwater, marine, and human environments and is deemed by Sabina to be a "Non-significant Amendment: NIRB Assessment Not Required". Sabina notes that no amendments are anticipated to the nor the KIA Framework Agreement/Commercial Lease (KTCL-18D003). The NIRB has confirmed that the Back River Project 2020 Modification Package does not require changes to the existing terms and conditions of Project Certificate No. 007 (NIRB 2020). Sabina acknowledges that an amendment to the Type A Water Licence (2AM-BRP1831) is required for this proposed modification, and Sabina will follow all of the appropriate NWB processes.

7. References

CCME (Canadian Council of Ministers of the Environment). 2013. Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products.

DFO (Fisheries and Oceans Canada). 2010. DFO Protocol for Winter Water Withdrawal from Ice-Covered Waterbodies in the Northwest Territories and Nunavut. Prepared June 20, 2010. 3 pp

DFO. 2018. Letter of Authorization. Re: Implementation of mitigation measures to avoid and mitigate serious harm to fish and fish habitat during the construction of the Winter Ice Road for the Back River Project, Dec 2018

Golder (Golder Associates Ltd.). 2018. Winter Ice Road Water Withdrawal Evaluation – Back River Project. Prepared for Sabina Gold & Silver Corp. November 2018. Reference No. 1776921_021_MEM_Rev0

JPCSL (Jason Prno Consulting Services Ltd.). 2019. 2018 Socio-Economic Monitoring Report for the Back River Project. Prepared for Sabina Gold & Silver Corp. April 30, 2019.

KIA (Kitikmeot Inuit Association). 2012. Inuit Traditional Knowledge of Sabina Gold & Silver Corp. Back River (Hannigayok) Project, Naonaiyaotit Traditional Knowledge Project (NTKP). Prepared for Sabina Gold & Silver Corp. by Kitikmeot Inuit Association: Kugluktuk, NU.

KIA. 2014. Naonaiyaotit Traditional Knowledge Project – Hannigayok (Sabina Gold & Silver Corp. Proposed Back River Project), Results from Data Gaps Workshops, Final Report. Prepared for Sabina Gold & Silver Corp. by the Kitikmeot Inuit Association: Kugluktuk NU.

MDMER. 2017. Canada Gazette. Regulations Amending the Metal Mining Effluent Regulations. Canada Gazette Part 1, Vol 151, No. 19. 2017-05-13. Available at: http://www.gazette.gc.ca/rp-pr/p1/2017/2017-05-13/pdf/g1-15119.pdf

NIRB (Nunavut Impact Review Board). 2009. Screening Decision for Dundee precious metals Inc.'s "Beechy Lake Area Mineral Exploration" Project Proposal, March 3, 2009.

NIRB. 2012. Screening Decision for Sabina Gold & Silver Corp.'s Back River Project Proposal, Kitikmeot Region, 12MN036, September 25, 2012.

NIRB. 2013. Guidelines for the Preparation of an Environmental Impact Statement for Sabina Gold & Silver Corp.'s Back River Project (NIRB File No. 12MN036). Issued April 2013 by the Nunavut Impact Review Board: Cambridge Bay, NU.

NIRB. 2017a. Nunavut Impact Review Board Revised Final Hearing Report Back River Gold Mine Project. Sabina Gold & Silver Corp. NIRB File No. 12MN036. July 2017.

NIRB. 2017b. NIRB Project Certificate [NO.: 007]. December 19, 2017.

NIRB. 2018. Nunavut Impact Review Board Modification Guideline: Approaches to Assessment of Proposed Amendments to Approved Projects, April 6, 2018.

NIRB. 2020. Direction Regarding the "Back River Project 2020 Modification Package" submitted by Sabina Gold & Silver Corp. in relation to the Back River Project (K. Kaluraq to M. Pickard, dated August 11, 2020, NIRB File No. 12MN036.

NWB (Nunavut Water Board). 2018a. Water Licence No. 2AM-BRP1831 Reasons for Decision Including Record of Proceedings. September 2018.

NWB. 2018b. Water Licence No. 2AM-BRP1831. November 2018.

Sabina (Sabina Gold & Silver Corp.). 2015. The Back River Project, Final Environmental Impact Statement. Submitted to the Nunavut Impact Review Board. November 2015.

Sabina. 2017a. Revised Type A Water Licence Application for Sabina Gold & Silver Corp. Back River Project. Submitted to the Nunavut Water Board. October 4, 2017.

Sabina. 2017b. Final Environmental Impact Statement Addendum. Submitted to the Nunavut Impact Review Board. February 2017.

Sabina. 2018a. Community Involvement Plan. Version 2. Updated December 2018. Provided to the NIRB on Dec.20, 2018.

Sabina. 2018b. Back River Project Marine Laydown Area Oil Handling Facility Oil Pollution Emergency Plan. Version 3. August 2018.

Sabina. 2018c. Back River Project Shipping Management Plan. Version 2. August 2018.

Sabina. 2018d. Back River Project Marine Monitoring Plan. Version 1.1. May 2018.

Sabina. 2018e. Back River Project Risk Management and Emergency Response Plan. Version 3. August 2018.

Sabina. 2018f. Back River Project Socio-Economic Monitoring Plan. Version 2. December 2018.

Sabina. 2019a. Back River Project Air Quality Monitoring and Management Plan. Version 2. July 2019.

Sabina. 2019b. Back River Project Wildlife Mitigation and Monitoring Program Plan. Version 10. October 2019.

Sabina. 2019c. Back River Project Fish Offsetting Plan. Version 3. Prepared by Golder Associates Ltd. June 2019.

Sabina. 2020. Back River Vegetation Monitoring Plan. Version 2. January 2020.

Appendix A. 2020 Modification Package Figures

105°0'0"W

N

68°0'0"N

67°0'0"N

66°0'0"N

Ekaluktutiak
(Cambridge Bay)

Kugluktuk

Omingmaktok
(Bay Chimo)

Kingaok
(Bathurst Inlet)

Marine
Laydown
Area

Main
Map

Nunavut

Northwest
Territories

Goose
Property
Area

Yellowknife

1:7,000,000

Koignuk River

Angimajuq River

1:60,000

Tahikafalok Nahik
(Propeller Lake)

Attituq
(Goose Lake)

Tahikyuak
(Big Lake)

1:85,000

Kingaok
(Bathurst Inlet)

Ayapakpaktovik (Burnside River)

Marine
Laydown
Area

Queen Maud Gulf
Watershed

George
Exploration Camp

Goose
Property
Area

Hanningayok (Beechey Lake)

Back
Watershed

Community/Settlement
Existing Exploration Camp
Watershed Boundary
Winter Ice Road
Potential Development Area (PDA)

Water Shed Areas

(NWR, Sched. 4)

Queen Maud Gulf
Back

1:1,050,000

0 25 50

Kilometres

Projection: NTKP Lambert Conformal Conic

Sabina
GOLD & SILVER CORP.

Nunavut Water Management Areas of the Back River Project
2020 Modification Package

Figure 1

GIS # BR_FEIS_NA_tab_WinterIceRoadCorridor_WL W:\BackRiver\04_Exploration\BackRiverRegion\GIS_Products\ESRI_MXD\Water_Permitting\BASE FIGURES\BR_FEIS_NA_tab_WinterIceRoadCorridor_WL.mxd April 30 2020

360000 400000 440000

7400000 7360000 7320000 7280000

N

Marine Laydown Area

Ekalokhiokvik

Kilogiktok (Bathurst Inlet, Southern Arm)

Tahikafalok (Bathurst Lake)

Kilokgiktok (Western River)

George Exploration Camp

Tikigak

Hanningayok (Back River)

Hanningayuk (Beechey Lake)

Tahikafalok Nahik (Propeller Lake)

Goose Property Area

Ekaluktutiak (Cambridge Bay)

Kugluktuk

Omingmaktok (Bay Chimo)

Kingaok (Bathurst Inlet)

Marine Laydown Area

Nunavut

Northwest Territories

Goose Property Area

Yellowknife

1:10,000,000

Existing Exploration Camp

Winter Ice Road

Potential Development Area (PDA)

Inuit Owned Land (IOL)

Crown Land

1:450,000

0 10 20

Kilometres

Projection: NAD 1983 UTM Zone 13N

Sabina GOLD & SILVER CORP.

Back River Project
Winter Ice Road Corridor Overview
2020 Modification Package

Figure 2

425050 430050 435050

7270500

N

Llama WRSA Pond
Mam Lake
Llama Pit
Llama WRSA
Llama Lake
Primary Pond
Giraffe Lake
Tahikafalok Nahik (Propeller Lake)
Goose Property Area
Giraffe Outflow
Goose Outflow
Pipeline and Service Road
Umwelt WRSA
Umwelt Pit
AN Storage and AN Facility
Attituq (Goose Lake)
Saline Water Pond
Plant Site Pond
Water Intake Pipeline
Water Intake Pipeline
Tahikyuak (Big Lake)
Treated Effluent Water Discharge
Umwelt Underground
Goose Main Pit
Gander Pond
Goose Plant Site
Ore Stockpile
Airstrip
Echo Lake
IOL
CROWN LAND
TSF/TSF WRSA
Fox Lake
Rascal Lake
IOL
CROWN LAND

Goose PDA = 5,358 ha
Goose Infrastructure Footprint = 471 ha

- Culvert
- Existing Exploration Camp
- Treated Effluent Water Discharge
- Underground Portal
- 10 m Contour Interval
- Service Road
- Haul Road
- Winter Ice Road
- Water Intake Pipeline
- Water Management Structure
- Existing Infrastructure
- Proposed Airstrip
- Underground Laydown Area
- Open Pit
- Camp/Plant Site
- Ore Stockpile
- TSF Containment Dams
- Water Management Structure
- Tailings Storage Facility/ Waste Rock Storage Area
- Landfarm
- Tailings Emergency Pond
- Potential Development Area (PDA)
- Inuit Owned Land (IOL)
- IOL and Crown Land Border
- Crown Land

1:32,000
0 0.5 1
Kilometres

Projection: NAD 1983 UTM Zone 13N

425050 430050 435050

Sabina GOLD & SILVER CORP.

Back River Project - Goose Property Area
Potential Development Area and Layout
2020 Modification Package

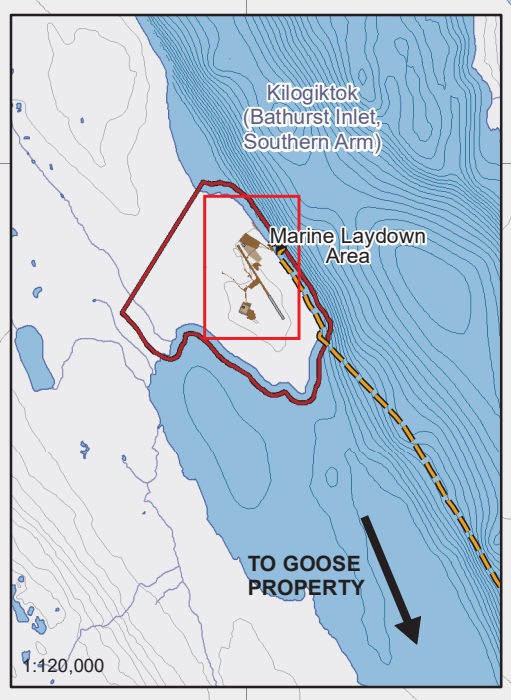
Figure 3

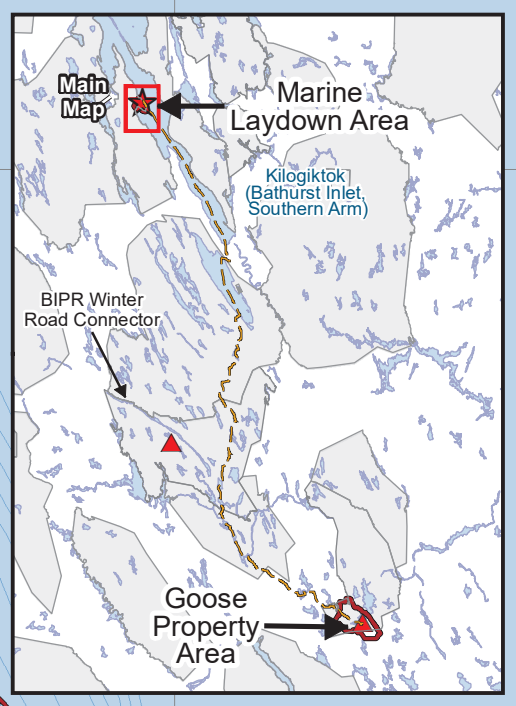
GIS # BR_FEIS_NA_tab_MLASiteLayout_WL2020 V:\BackRiver\04_Exploration\BackRiverRegion\GIS_Products\ESRI_MXD\Water_Permitting\BR_FEIS_NA_tab_MLASiteLayout_WL2020.mxd April 28 2020

380500 381000 381500

7395500 7395000 7394500 7394000 7393500

N





Freight Storage Pad

MLA Shoreline Pad
Extension

MLA Fuel Transfer
Area

Shoreline
Pad

Camp Area

Temporary Fuel
Storage Area

Explosive
Magazines

Airstrip

MLA Fuel Storage Area
(1 Tank Constructed)

Construction
Laydown Pad

MLA Airstrip Extension

Existing Quarry

Marine Laydown Area PDA = 653 ha

Marine Laydown Area
Infrastructure Footprint = 18 ha

Legend

- Existing Infrastructure
- Proposed Modification Footprint
- Permitted Footprint
- Potential Development Area (PDA)
- Contours 5 m
- Inuit Owned Land (IOL)

1:6,000

NAD83 UTM Zone 13N

Figure 4

Sabina
GOLD & SILVER CORP.

**Back River Project - Marine Laydown Area
Potential Development Area and Layout
2020 Modification Package**

C:\Arc Temp\Carl\COVID_Backup_MXDs\Overview_fwdCamp_Layouts.mxd

N

Marine Laydown Area

Bathurst Inlet

25 km

Bathurst Lake

50 km

75 km

100 km

125 km

150 km

George Exploration Camp

Goose Property Area

Bathurst Inlet

Bathurst Lake

46km

61km

Subbase Upgrade Options

104km

Adjusted Alignment

Subbase Upgrade Options

71km

141km

Legend

- WIR Service/Emergency Camp Location
- Potential Quarry Source
- Km markers
- Existing Exploration Camp
- WIR Subbase Upgrades
- Adjusted Alignment
- WIR 2019 As Built
- Potential Development Area
- Water
- Rivers

NU Inuit Owned Lands

- Surface
- Subsurface and Surface

NAD83 UTM Zone 13N

1:350,000

0 2.5 5 10 15

Kilometers

Figure 5

Back River Project - Winter Ice Road 2020 Modification Package
WIR Subbase Upgrade Areas
and WIR Service/Emergency Camp Locations

Sabina
GOLD & SILVER CORP.

Appendix B. Water Management Plan

Appendix C. Goose Property Water Availability Memo

TECHNICAL MEMORANDUM

DATE 13 March 2020 **Project No.** 18114181-057-TM-Rev0

TO Merle Keefe, EIT
Sabina Gold & Silver Corp.

CC Catherine Paul, Matthew Pickard (Sabina) and Dionne Filiatrault (Golder)

FROM Johannes Kloeckes and Curtis VanWerkhoven **EMAIL Curtis_VanWerkhoven@Golder.com**

HYDROLOGICAL ASSESSMENT OF EFFECTS FROM INCREASED GOOSE LAKE AND BIG LAKE WITHDRAWALS

1.0 INTRODUCTION

Sabina Gold & Silver Corp. (Sabina) requested Nuqsana Golder Engineering and Environment Inc. (Nuqsana Golder) review the potential for additional water withdrawal availability at the Back River Project (the Project). The nature of this request was to complete hydrologic modeling for Goose Lake and Big Lake to consider increased total water withdrawals above those proposed in the FEIS (Final Environmental Impact Statement). To assess the effects from increased Goose Lake and Big Lake water withdrawals, the following assessment tasks were completed and are presented in the subsequent sections:

- Review and summary of relevant sections of the FEIS and received information
- Description of methods used to update the daily time-step hydrologic model received from ERM
- Presentation of hydrologic indices results from the daily time-step model at the assessment nodes
- Summary and conclusions for the Project Modifications

This assessment determined that 1500 m³/day of year-round water withdrawal with an additional 400 m³/day during the months of June to October from Goose Lake and 750 m³/day of year-round water withdrawal from Big Lake would not change the resulting surface water hydrology Valued Ecosystem Component (VEC) magnitude category for effects to hydrological indicators (streamflows and lake volumes) at assessed waterbodies from the FEIS (Sabina 2015). Furthermore, all hydrological indicators had a low magnitude category for effects and predicted changes remained within acceptable environmental guidelines at the Local Study Area (LSA) boundaries.

2.0 SUMMARY OF FEIS AND RECEIVED INFORMATION

The FEIS was prepared to determine the environmental and social effects of the Project (Sabina 2015). The data from the FEIS hydrology baseline programs were the main inputs into the modeling analysis of the Project components (e.g., water withdrawal, water diversion, water storage, drainage modifications, and dewatering). It is through this modeling that the Project effects on surface water hydrology were established. The FEIS provides an assessment of predicted effects to streamflows, water levels, and lake volumes for planned Project activities but does not include a determination of a maximum allowable withdrawal from the Project waterbodies.

Golder Associates Ltd.
16820 107 Avenue, Edmonton, Alberta, T5P 4C3, Canada T: +1 780 483 3499 F: +1 780 483 1574

Details on the Hydrology Baseline Program, including all information collected at the monitoring stations, are found in the FEIS (Volume 6 Appendices 6-1A through 6-1D) (Sabina 2015). The modeling of effects on surface hydrology is described in Volume 6, Section 1.5 and Volume 6 Appendices 6-1E and 6-1F, using the following methods:

- Water Balance Model – The model was developed using monthly streamflow data in GoldSim and was used to determine the effects of the Project components on streamflows.
- Spreadsheet Model (Daily Time-Step Model) – This model, originally completed by Environmental Resources Management (ERM) during the FEIS, was used to refine the effects that the Project components had on lake volumes and outflows. Daily Time-Step data were inserted into the spreadsheet to improve the effects assessment of the water withdrawal. This spreadsheet accounted for sub-monthly characteristics such as lake outlet opening in May that could not be modeled with a monthly timestep.

The water withdrawal schedule from Goose Lake and Big Lake, as reported in the FEIS, is summarized in Table 1.

Table 1: FEIS Water Withdrawal from Goose Lake and Big Lake (Volume 6, Section 1.4.2.1)

Assessed Lake	Location	Annual Withdrawal (m^3/day)	Additional June to October Withdrawal (m^3/day)
Goose Lake	Within LSA	900 (For Mill Operation and Other Industrial Uses)	400 (For Dust Suppression)
Big Lake	Within LSA	350 (For Domestic Uses)	N/A

Surface water hydrology VEC in the FEIS analysis that affect fish/aquatic habitat include streamflows and lake volumes. The magnitude of the effects on VECs surface water hydrology are ranked on a four-point scale (Negligible, Low, Moderate, and High) in the FEIS as shown in Table 2.

Table 2: FEIS Surface Water Hydrology VEC Indicators and Magnitude Categories (Volume 6, Section 1.5.1)

VEC	Indicator	Magnitude	Description
Surface Water Hydrology	Streamflow	Negligible	The change in streamflow is not detectable (i.e., less than 1% of baseline flow)
		Low	The change in streamflow is less than 10% of baseline flow
		Moderate	The change in streamflow is between 10% and 50% of baseline flow
		High	The change in streamflow is greater than 50% of baseline flow
	Lake Volumes	Negligible	The change in lake volume is not detectable (i.e., less than 1% of baseline volume)
		Low	The change in lake volume is less than 10% of baseline volume
		Moderate	The change in lake volume is between 10% and 50% of baseline volume
		High	The change in lake volume is greater than 50% of baseline volume

According to the FEIS analysis (Volume 6, Section 1.5.1), lake and streamflow reduction magnitudes are determined from an environmental standpoint and the Department of Fisheries and Oceans Canada (DFO) fish habitat guidelines and protocols. In agreement with the DFO (2013) guidelines, a variation of 10% from baseline streamflow conditions was assumed to be within the natural variability of the riverine system, and therefore have low magnitude effects. For winter conditions, the DFO (2010) protocol provides guidance that the reduction in the volume of waterbodies should not exceed 10% of the available water volume after adjusting for the maximum predicted ice thickness. These DFO protocols and guidelines are in place to provide guidance on minimizing the effects to fish and fish habitat through oxygen depletion, loss of overwintering habitat and/or reductions in littoral habitat from changes in water levels or streamflows. In the FEIS Addendum Appendix V6-6G (Sabina 2017a), predicted changes in water levels were assigned a level of risk for spawning habitat loss as shown in Table 3. For the FEIS analysis, the winter months are defined as the months of October to May.

Table 3: Under-Ice Water Withdrawal Risk Level Framework for Spawning Shoal Habitat for Fall-Spawning Fish[(a)]

Risk of Spawning Habitat Loss	Change in Water Elevation Under Ice (m)	Rationale
Nil or negligible	Less than 0.22	The reduction in water level lies within the average change in ice thickness (i.e., within normal variation)
Low	0.22 to less than 0.42	The reduction in water level remains within 1 SD of the average
Medium	0.42 to 0.80	The reduction in water level remains between 1 and 2 SD of the average
High	Greater than 0.80	The reduction in water level is beyond 2 SD of average and there is less than a 5% chance for this occurring naturally

a) includes coregonid species, such as Lake Whitefish (*Coregonus clupeaformis*), and Lake Trout (*Salvelinus namaycush*); SD = standard deviation

In addition to the FEIS and the FEIS Addendum, the 2017 Back River Project Water Management Plan that was submitted as part of the Type A Water Licence Application (Sabina 2017b) was also reviewed to check assumptions made in the Daily Time-Step Model that was completed for the FEIS. The reported average annual runoff and the 1-in-20-year dry annual runoff in the 2017 Back River Project Water Management Plan were consistent with the values used in the FEIS assessment.

3.0 HYDROLOGICAL ASSESSMENT FOR PROJECT MODIFICATIONS

Golder reviewed the ERM Daily Time-Step Model, which calculated the predicted effects on lake volumes and streamflows at locations affected by water withdrawal from Goose Lake and Big Lake. The ERM Daily Time Step Model was described in Volume 6: Appendices 6-1E and 6-1F of the FEIS (Sabina 2015).

Golder updated the ERM Daily Time-Step Model results using an iterative approach at the lake outflow nodes (river and lake nodes), and the river nodes. The iterative method involved revising the water withdrawals for Big Lake and Goose Lake, and compiling the predicted effects to streamflows and lake volumes. Withdrawals were limited based on the following criteria: (1) to avoid a volume reduction of greater than 10% of the available water volume under the maximum predicted ice thickness (DFO 2010); (2) to remain within nil or negligible reduction in water levels (<0.22 m) (Sabina 2017a); and (3) to have low or moderate changes to streamflows (reductions not greater than 10% to 50%) at outflows of lakes directly affected by withdrawals (DFO 2013; Sabina 2015) and to have low changes to streamflows (reductions less than 10%) at and downstream of the LSA boundary. The predicted changes in hydrologic indices (i.e., streamflows, water levels, and volumes) due to the withdrawals at Goose Lake and Big

Lake were then evaluated against the magnitude categories for the effects to fish and fish habitat presented in the FEIS.

The selected increased withdrawals assessed in this study include:

- 1500 m³/day of year-round water withdrawal for mill operation and other industrial uses, with an additional 400 m³/day for dust suppression during the months of June to October (5 months total) from Goose Lake.
- 750 m³/day of year-round water withdrawal for domestic or mill operation and other industrial uses from Big Lake.

Overall, Golder used the same methods and approach as in the FEIS to assess the hydrologic effects at, and downstream of, Goose Lake and Big Lake due to the Project withdrawals. The hydrological regime for baseline and Project cases were analyzed for the following nodes:

- Goose Lake Outflow (PN03)
- Propeller Lake Outflow (PN02)
- Ellice River (PN01)
- Big Lake Outflow (PN14)
- LSA Boundary (PN05)

The modified Daily Time-Step Model applied the following assumptions to calculate the predicted effects from the Project:

- All disturbed Project areas are not assumed to contribute runoff to Goose Lake or Big Lake, therefore resulting in a decrease to the natural watershed area contributing to Goose Lake and Big Lake.
- According to the 2011 bathymetry survey (Rescan 2012), the volume of Goose Lake is 10.7 Mm^3 when full and the volume is 5.4 Mm^3 below 2.0 m of ice.
- According to the 2012 bathymetry survey (Rescan 2012), the volume of Big Lake is 12.1 Mm^3 when full and the volume is 5.0 Mm^3 below 2.0 m of ice.
- The Goose Property Airstrip Extension modification was included in the disturbed catchment area and reduced the natural watershed area by 0.18 km^2. Minor potential changes in drainage area associated with the other 2020 Project modifications were not considered in the assessment. The airstrip extension did not measurably reduce the total Goose Lake natural watershed area; therefore, 11% natural catchment area disturbance (same as in FEIS) was used in Golder's analysis.
- Lake outflow channels were assumed to be frozen to bottom in winter; therefore, no streamflow from the lakes was modeled as occurring in the winter.
- If the outflows from the lakes were below the flow threshold of 30% of the mean annual baseline discharge, then the flow was considered negligible in calculations of number of days flowing.

3.1 Goose and Propeller Lake Results

3.1.1 Goose Lake Outflow

The natural catchment area of Goose Lake Outflow node (PN03) is 95 km^2 and the effects of the planned withdrawals for average and dry conditions are shown in Table 4. The assessment considers that 11% of the natural catchment is disturbed and that contact water from disturbed catchment areas does not contribute to runoff into Goose Lake.

Table 4: Predicted Hydrologic Indices at Goose Lake Outflow (PN03) for Baseline and Modified Project Conditions

Lake	Parameter		Average Condition	1-in-20 Year Dry Condition
Goose Lake	Mean annual lake outflow	Baseline (m^3/s)	0.45	0.23
		Modified Project Affected (m^3/s)	0.38	0.18
		Flow Reduction (m^3/s)	0.07	0.05
		Flow Reduction (% of Baseline Flow)	15.6%	21.7%
	Date at onset of lake outflow	Baseline	24-May	25-May
		Modified Project Affected	30-May	3-Jun
		Delayed Onset (days)	6	9
	Date at flow ceasing	Baseline	27-Oct	19-Oct
		Modified Project Affected	24-Oct	13-Oct
		Accelerated Ceasing (days)	3	6
	Total number of flow days	Baseline	156	147
		Modified Project Affected	147	132
		Reduction of Flow Days (days)	9	15
	Decrease of minimum lake level in winter	Reduction from Baseline (m)	0.10	0.10
	Maximum winter withdrawal	(% of under ice volume)	6.1%	6.5%

Goose Lake Outflow (PN03) is predicted to have a reduction in mean annual flow of 15.6% during average conditions and 21.7% during dry conditions, due to the 11% reduction in catchment area and updated water withdrawals from Goose Lake, resulting in moderate changes in streamflows. Withdrawal during the winter months will result in a water level that is below the elevation necessary for lake outflow. During average conditions, the onset of flow above the flow threshold of 30% of the baseline mean annual discharge (consistent with approach used in the FEIS [Sabina 2015]) is predicted to be delayed by 6 days and cease 3 days earlier, therefore, the extent of the open-water season is expected to be decreased by 9 days from baseline conditions. During 1-in-20-year dry conditions, the onset of flow is predicted be delayed by 9 days and the flow is estimated to cease 6 days earlier, therefore, the extent of the open-water season is expected to be decreased by 15 days from baseline conditions. The decrease in lake elevation in the winter, compared to the baseline condition, is 0.10 m and the maximum winter withdrawal (% of under ice volume) is 6.1% during average conditions and 6.5% during dry conditions, which are within DFO (2010) protocol. All results above are compared to baseline conditions.

The baseline and the Project affected flows at Goose Lake Outflow (PN03) are shown in Figure 1 (adapted from Sabina [2015]), based on an average hydrograph distribution presented in the FEIS.

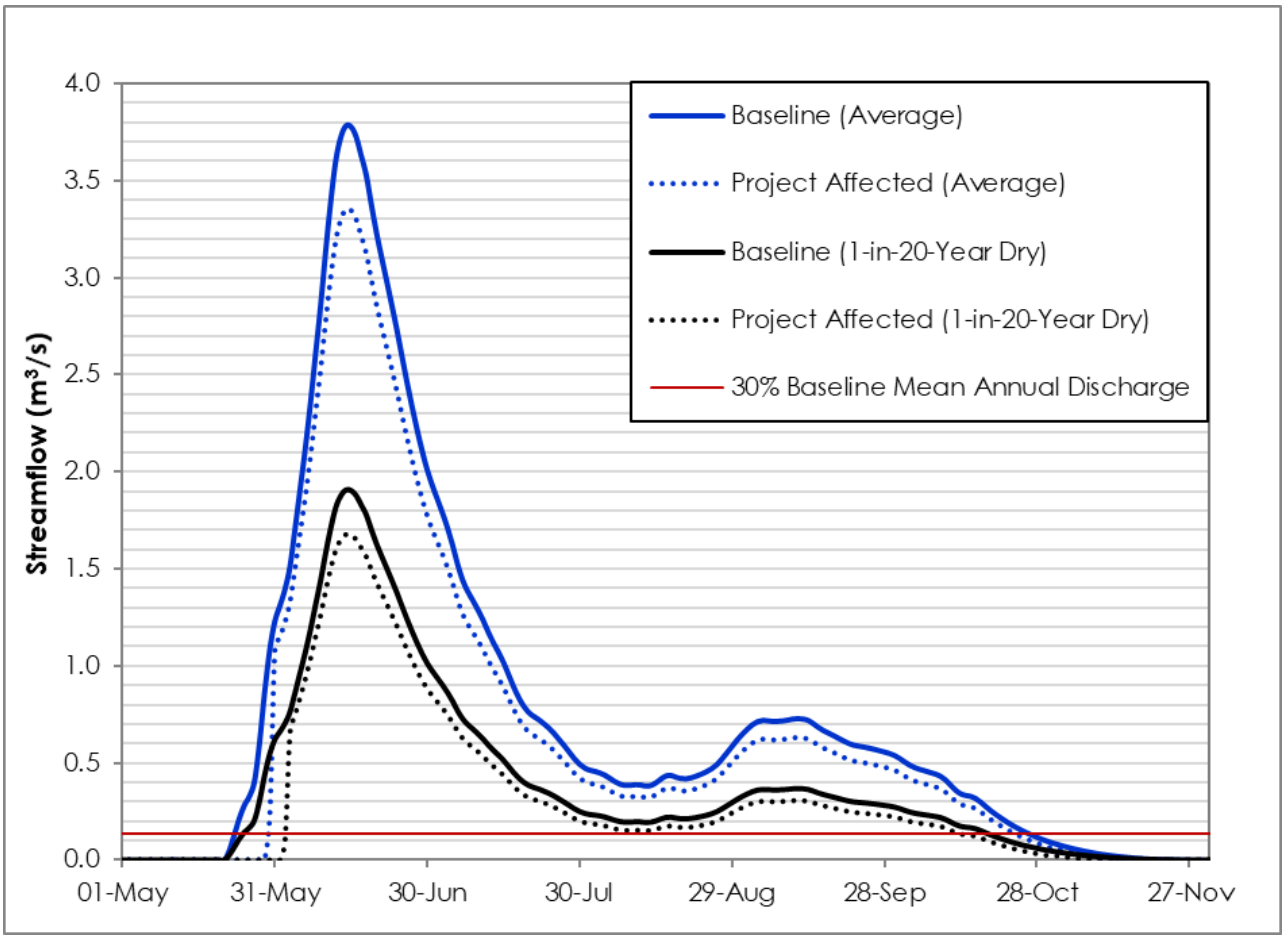


Figure 1: Baseline and The Project Affected Flows at Goose Lake Outflow (PN03)

3.1.2 Propeller Lake Outflow

The catchment area of Propeller Lake Outflow node (PN02) is 205 km^2, which is approximately twice that of the Goose Lake Outflow. Therefore, effects of the Project on Propeller Lake Outflow flows and water levels are reduced compared to the effects at Goose Lake Outflow. The effects of the planned withdrawals for average and dry conditions are shown in Table 5.

Table 5: Predicted Hydrologic Indices at Propeller Lake Outflow (PN02) for Baseline and Modified Project Conditions

Lake	Parameter		Average Condition	1-in-20 Year Dry Condition
Propeller Lake	Mean annual lake outflow	Baseline (m^3/s)	0.97	0.49
		Modified Project Affected (m^3/s)	0.90	0.44
		Flow Reduction (m^3/s)	0.07	0.05
		Flow Reduction (% of Baseline Flow)	7.2%	10.2%
	Date at onset of lake outflow	Baseline	24-May	25-May
		Modified Project Affected	25-May	28-May
		Delayed Onset (days)	1	3
	Date at flow ceasing	Baseline	27-Oct	19-Oct
		Modified Project Affected	26-Oct	17-Oct
		Accelerated Ceasing (days)	1	2
	Total number of flow days	Baseline	156	147
		Modified Project Affected	154	142
		Reduction of Flow Days (days)	2	5
	Decrease of minimum lake level in winter	Reduction from Baseline (m)	0.00	0.00
	Maximum winter withdrawal	(% of under ice volume)	N/A	N/A

Propeller Lake Outflow (PN02) is predicted to have a reduction in mean annual flow of 7.2% during average conditions and 10.2% during dry conditions, due to the upstream Project effects, resulting in low magnitude changes to streamflows at the LSA boundary and within guidelines for changes to streamflows (DFO 2013). The reduced streamflows from the upstream Goose Lake Outflow are expected to delay the onset of flow and cease the flow earlier at Propeller Lake Outflow. During average conditions, the delay is predicted to be 1 day and the flow is estimated to cease 1 day earlier, therefore, the extent of the open-water season is expected to be decreased by 2 days from baseline conditions. During 1-in-20-year dry conditions, the onset of flow is predicted to be delayed 3 days and the flow is estimated to cease 2 days earlier, therefore, the extent of the open water season is expected to be decreased by 5 days from baseline conditions. Due to no water withdrawal in Propeller Lake and no lake outflow during winter, the decrease in Propeller Lake elevation due to withdrawals in upstream Goose Lake is expected to be negligible. All results above are compared to baseline conditions.

The baseline and the Project affected flows at Propeller Lake Outflow (PN02) are shown in Figure 2 (adapted from Sabina [2015]), based on an average hydrograph distribution presented in the FEIS.

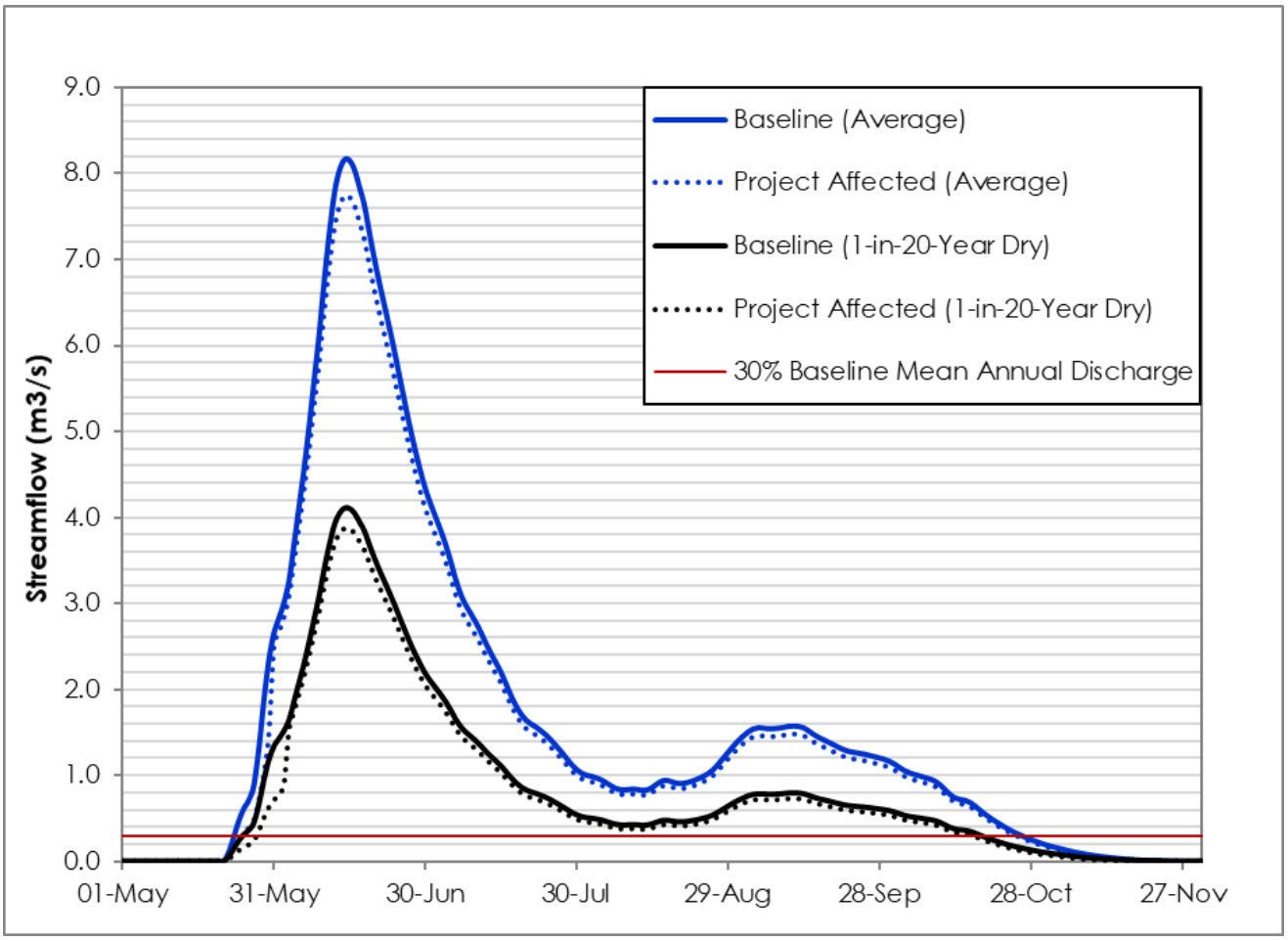


Figure 2: Baseline and The Project Affected Flows at Propeller Lake Outflow (PN02)

3.1.3 Ellice River and Regional Study Area Boundary

The catchment area of Ellice River node (PN01) is 6,655 km^2, which is approximately 70 times larger than the Goose Lake Outflow catchment area. The effects of the planned withdrawals for average and dry conditions are shown in Table 6.

Table 6: Predicted Hydrologic Indices at Ellice River (PN01) for Baseline and Modified Project Conditions

Lake	Parameter		Average Condition	1-in-20 Year Dry Condition
Ellice River	Mean annual flow	Baseline (m^3/s)	31.44	15.83
		Modified Project Affected (m^3/s)	31.38	15.78
		Flow Reduction (m^3/s)	0.07	0.05
		Flow Reduction (% of Baseline Flow)	0.2%	0.3%
	Date at onset of flow	Baseline	24-May	25-May
		Modified Project Affected	24-May	25-May
		Delayed Onset (days)	0	0
	Date at flow ceasing	Baseline	27-Oct	19-Oct
		Modified Project Affected	27-Oct	19-Oct
		Accelerated Ceasing (days)	0	0
	Total number of flow days	Baseline	156	147
		Modified Project Affected	156	147
		Reduction of Flow Days (days)	0	0

No water is withdrawn from Ellice River and the catchment area is substantially larger than Goose Lake Outflow, therefore, the predicted effect of the Project on Ellice River mean annual flow is negligible (0.2%). The effects of the withdrawals and the reduction of the natural watershed area within the overall Ellice River (PN01) watershed are negligible; therefore, flows are expected to be within 1% of baseline flows. The onset and cease of flow are predicted to be similar to baseline conditions. All results above are compared to baseline conditions. As the predicted changes to hydrologic indices from baseline values are negligible, the Ellice River hydrograph is not shown.

3.2 Big Lake Results

3.2.1 Big Lake Outflow

The catchment area of Big Lake Outflow node (PN14) is 37 km^2 and the results of the planned withdrawals for average and dry conditions are shown in Table 7. No large-scale disturbance to the natural drainage conditions is expected in the Big Lake watershed.

Table 7: Predicted Hydrologic Indices at Big Lake Outflow (PN14) for Baseline and Modified Project Conditions

Lake	Parameter		Average Condition	1-in-20 Year Dry Conditions
Big Lake	Mean annual lake outflow	Baseline (m^3/s)	0.175	0.088
		Modified Project Affected (m^3/s)	0.166	0.079
		Flow Reduction (m^3/s)	0.009	0.009
		Flow Reduction (% of Baseline Flow)	5.1%	10.2%
	Date at onset of lake outflow	Baseline	24-May	25-May
		Modified Project Affected	31-May	3-Jun
		Delayed Onset (days)	7	9
	Date at flow ceasing	Baseline	27-Oct	19-Oct
		Modified Project Affected	25-Oct	17-Oct
		Accelerated Ceasing (days)	2	2
	Total number of flows days	Baseline	156	147
		Modified Project Affected	147	136
		Reduction of Flow Days (days)	9	11
	Decrease of minimum lake level in winter	Reduction from Baseline (m)	0.04	0.04
	Maximum winter withdrawal	(% of under ice volume)	3.3%	3.4%

Big Lake Outflow (PN14) is predicted to have a reduction in mean annual flow of 5.1% during average conditions and 10.2% during dry conditions, due to the water withdrawal from Big Lake compared to baseline conditions. During average conditions, the onset of flow, above the flow threshold of 30% of the baseline mean annual discharge, is expected to be delayed by 7 days and cease 2 days earlier, therefore, the extent of the open water season is estimated to be decreased by 9 days from baseline conditions. During 1-in-20-year dry conditions, the onset of flow is predicted to be delayed by 9 days and cease 2 days earlier, therefore, the extent of the open water season is expected to be decreased by 11 days from baseline conditions. The decrease in lake elevation in the winter, compared to the baseline condition, is 0.04 m and the maximum winter withdrawal (% of under ice volume) is 3.3% during average conditions and 3.4% during dry conditions, therefore, complying with the DFO (2010) protocol. All results above are compared to baseline conditions.

The baseline and the Project affected flows at Big Lake Outflow (PN14) are shown in Figure 3 (adapted from Sabina [2015]), based on an average hydrograph distribution presented in the FEIS.

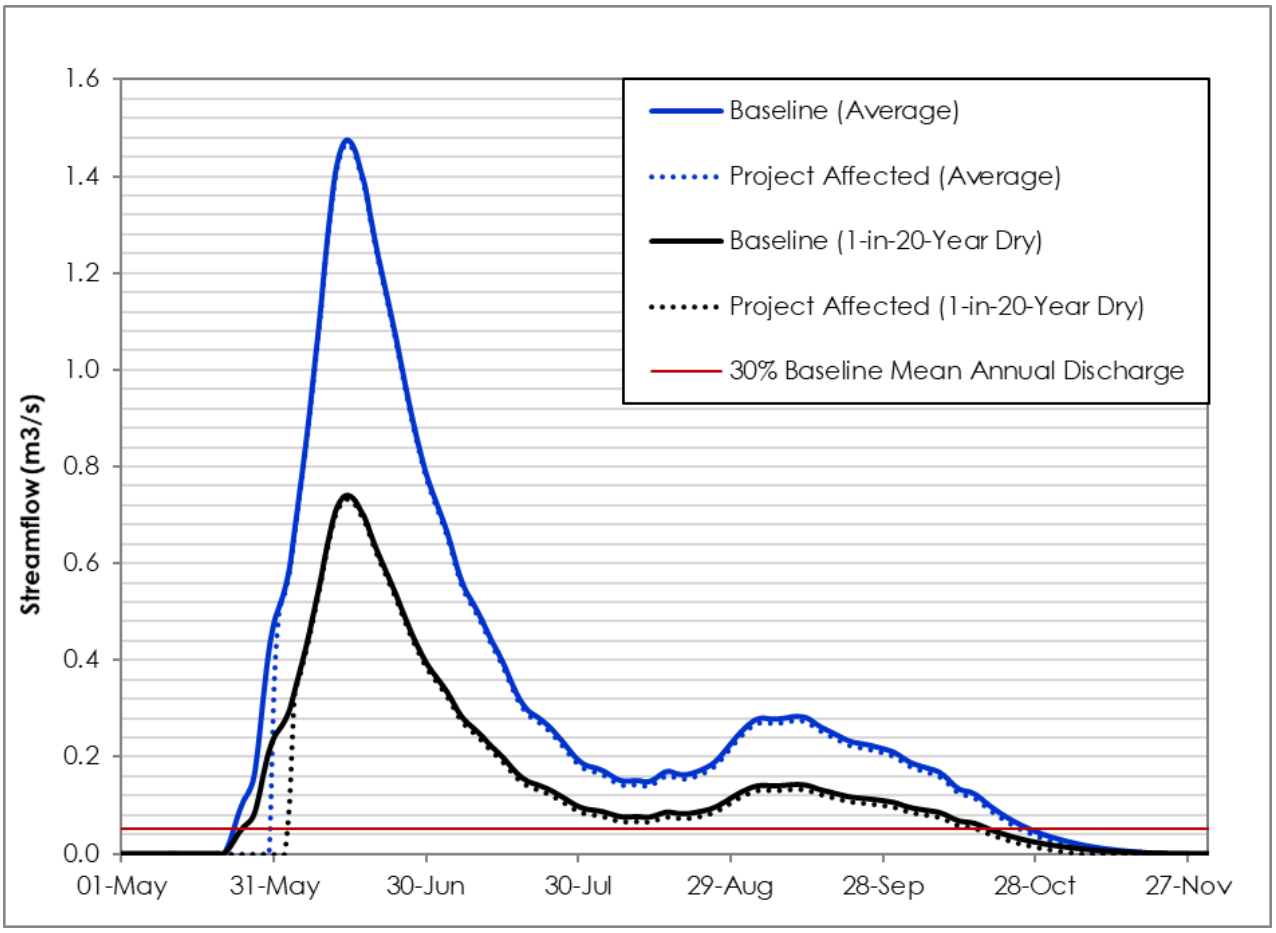


Figure 3: Baseline and The Project Affected Flows at Big Lake Outflow (PN14)

3.2.2 PN05 and LSA Boundary

The catchment area of the LSA Outflow node (PN05) downstream of Big Lake is 158.5 km^2 which is approximately four times larger than the catchment area of Big Lake Outflow. The results of the proposed withdrawals are shown in Table 8.

Table 8: Predicted Hydrologic Indices at LSA Outflow (PN05) for Baseline and Modified Project Conditions

Lake	Parameter		Average Condition	1-in-20 Year Dry Conditions
BL-H2	Mean annual flow	Baseline (m^3/s)	0.749	0.377
		Project Affected (m^3/s)	0.740	0.368
		Flow Reduction (m^3/s)	0.009	0.009
		Flow Reduction (% of Baseline Flow)	1.2%	2.4%
	Date at onset of flow	Baseline	24-May	25-May
		Project Affected	24-May	27-May
		Delayed Onset (days)	0	2
	Date at flow ceasing	Baseline	27-Oct	19-Oct
		Project Affected	27-Oct	19-Oct
		Accelerated Ceasing (days)	0	0
	Total number of flow days	Baseline	156	147
		Project Affected	156	145
		Reduction of Flow Days (days)	0	2

No water is withdrawn downstream of Big Lake, and the LSA Outflow catchment area is substantially larger than Big Lake Outflow; therefore, the effects of the upstream withdrawals on the LSA Outflow flows and water levels are reduced compared to the effects at Big Lake Outflow. The reduction in mean annual flow at the LSA boundary, compared to baseline conditions, is 1.2% during average conditions and 2.4% during dry conditions. Due to the water withdrawal from Big Lake, during average conditions, the onset of flow is not estimated to be delayed and the flow is not predicted to cease earlier, therefore, the extent of the open-water season is not expected to change from baseline conditions. During 1-in-20-year dry conditions, the onset of flow is expected to be delayed by 2 days and the flow is not expected to cease earlier, therefore, the extent of the open-water season is predicted to decrease by 2 days from baseline conditions. All results above are compared to baseline conditions. As the predicted changes to hydrologic indices from baseline value are negligible, the LSA Boundary (PN05) hydrograph is not shown.

4.0 SUMMARY OF INCREASED WITHDRAWALS AT GOOSE AND BIG LAKES

Golder used methods consistent with the FEIS to model and predict the hydrological effects at, and downstream of, Goose Lake and Big Lake due to increased lake water withdrawals required for the 2020 Project modifications. The Daily Time-Step Models were used iteratively to increase withdrawals above the FEIS values, while predicted changes to hydrological indices (i.e., streamflows, lake levels, and lake volumes) remained within acceptable environmental guidelines at the LSA boundaries.

At Goose Lake, 1500 m³/day of year-round water withdrawal for mill operation and other industrial uses, with an additional 400 m³/day for dust suppression during the months of June to October, from Goose Lake (PN03) was assessed. The results of the study for Goose Lake (PN03) and the downstream nodes are the following:

- The mean annual discharge will be reduced below baseline conditions by 15.6% during average conditions, and by 21.7% during dry conditions, at Goose Lake Outflow (PN03). Downstream of Goose Lake at the LSA boundary (Propeller Lake Outflow, PN02), the mean annual discharges are predicted to be reduced below baseline conditions by 7.2% for average and 10.2% for dry conditions. Negligible changes to streamflows are predicted downstream at the RSA boundary (Ellice River, PN01).
- The decrease in the under-ice Goose Lake water level, compared to the baseline condition, is predicted to be 0.10 m, and the Goose Lake winter withdrawal (% of under ice volume) is predicted to be less than 6.5% for both average and dry conditions.
- Winter withdrawal protocols (DFO 2010) and guidelines (Sabina 2017a) related to lake water levels and withdrawal volumes are met at Goose Lake and all downstream waterbodies.
- The predicted changes in streamflows at Goose Lake Outflow (reductions of 15.6% for average conditions and 21.7% for dry conditions from baseline values) exceed guidelines of a 10% reduction in streamflows (DFO 2013). These predicted changes result in a moderate reduction in streamflows at Goose Lake Outflow and a low reduction in streamflows at the LSA boundary. These results are consistent with the magnitude of changes predicted in the FEIS and represent small incremental changes, as the reduction in average streamflows from baseline conditions at Goose Lake Outflow were 13.3% for average conditions and 17.4% for dry conditions from baseline values in the FEIS.
- The surface water hydrology VEC magnitude of effects to indicators (streamflows and lake volumes) did not change from the FEIS. The VEC magnitude category for Goose Lake is moderate for streamflows and low for lake volumes. At assessment nodes downstream of Goose Lake, all indicators have a low magnitude of effects.

At Big Lake, 750 m³/day of year-round water withdrawal for domestic or mill operation use and other industrial uses from Big Lake (PN14) was assessed. The results of the study for Big Lake (PN14) and the downstream nodes are the following:

- The mean annual discharge reductions below baseline conditions are within 10% for both average and dry conditions at Big Lake Outflow (PN14). Downstream of Big Lake at the LSA boundary (PN05), the mean annual discharge is within 3% of baseline conditions for both average and dry conditions.
- The decrease in the under-ice Big Lake water level, compared to the baseline condition, is 0.04 m and the Big Lake winter withdrawal (% of under ice volume) is less than 3.4% for both average and dry conditions.
- Winter withdrawal protocols (DFO 2010) and guidelines (Sabina 2017a) related to lake water levels, and guidelines for reduction in streamflows (DFO 2013), are met at, and downstream of, Big Lake.

- The surface water hydrology VEC magnitude of effects to indicators (streamflows and lake volumes) did not change from the FEIS. The VEC magnitude category for Big Lake and downstream assessment nodes is low for streamflows and lake volumes.

CLOSURE

We trust that this report provides the information required by Sabina Gold & Silver Corp. at this time. If there are any questions or require further detail, please contact the undersigned.

Yours truly,

GOLDER ASSOCIATES LTD.

Johannes Kloeckes
Water Resources Specialist

Curtis VanWerkhoven, MASc
Water Resources Specialist

Nathan Schmidt, PhD, PEng (NWT/NU)
Principal, Senior Water Resources Engineer

REGISTERED PROFESSIONAL ENGINEER
13 MAR 20
N.P. SCHMIDT
LICENSEE
N.W.T.

JK/CV/NS/jr

https://golderassociates.sharepoint.com/sites/101666/technical work/6000_modification_packages/01-goose_property/goose & big lake increased withdrawal assessment/rev0/18114181-057-tm-projecteffectsfromincreasedwithdrawals-rev0.docx

PERMIT TO PRACTICE
GOLDER ASSOCIATES LTD.
Signature
Date 13 MARCH 2020
PERMIT NUMBER: P 049
NT/NU Association of Professional Engineers and Geoscientists

REFERENCES

DFO (Fisheries and Oceans Canada). 2010. DFO Protocol for Winter Water Withdrawal from Ice-Covered Waterbodies in the Northwest Territories and Nunavut. Prepared June 20, 2010. 3 pp.

DFO. 2013. Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada, Science Advisory Report 2013/017, May 2013.

Sabina (Sabina Gold & Silver Corp.). 2015. Back River Project: Final Environmental Impact Statement Supporting Volume 6: Freshwater Environment. November 2015.

Sabina. 2017a. Final Environmental Impact Statement Addendum. Submitted to Nunavut Impact Review Board. February 2017.

Sabina. 2017b. Back River Project: Water Management Plan. October 2017.

Appendix D. MLA Shoreline Pad Extension Memo

SRK Consulting (Canada) Inc.
2200–1066 West Hastings Street
Vancouver, BC V6E 3X2

T: +1.604.681.4196
F: +1.604.687.5532

vancouver@srk.com
www.srk.com

Memo

To:	Merle Keefe, Catherine Paul	**Client:**	Sabina Gold & Silver Corp
From:	Cameron Hore, CPEng, PEng John Kurylo, MSc, PEng	**Project No:**	1CS020.016
Reviewed By:	*Review of previous 2018 revision from the late* Maritz Rykaart, PhD, PEng	**Date:**	June 5, 2020 *2020 update by John Kurylo*
Subject:	Back River Project: MLA Shoreline Pad Extension – Preliminary Design – *Rev01 - June 2020*		

1 Introduction

1.1 General

The Marine Laydown Area (MLA) is the primary offloading facility for annual resupply of Sabina Gold and Silver's Back River Project in Nunavut. The MLA is located on Bathurst Inlet and is seasonally connected to the Goose site, 130 kilometers to the south where the mining activity will take place.

The Shoreline Pad is the landing facility for lightering barges during the summer sealift. The initial construction for the Shoreline Pad was constructed in the spring of 2018, based on Sabina's modified designs, and commissioned during the later summer 2018 sealift. Shallow bathymetry necessitates grounding of the lightering barges to ensure safe offloading.

1.2 Objective

This memo provides a preliminary design for extending the Shoreline Pad (i.e. Shoreline Pad Extension) a nominal distance into the ocean. The original version of this memo was produced in December 2018 and then updated in June 2020 based on the latest feedback and development plans that were provided by Sabina. This scope and focus of this memorandum is the Shoreline Pad Extension only, and not any of the existing or other infrastructure Sabina plans to construct at the MLA.

2 Design Concept

2.1 Approach

The design concept for the Shoreline Pad Extension is to build out the Shoreline Pad into the ocean through in-water construction, nominally extending its footprint onto the seabed. The in-water portion of the Shoreline Pad Extension will be constructed on geogrid to minimize differential settlement and improve overall safety of the facility.

2.2 Topographic Data

Design of the Shoreline Pad Extension is based on the following topographical and survey data:

- Off-shore: 1.0 m vertical resolution bathymetry data collected by ERM (formally Rescan) in 2012. In the summer of 2018 Sabina site staff completed field bathymetry checks, depth measurements, to correct this original bathymetry data.
- On-shore: Approximately 0.3 m vertical resolution 2018 as-built pad and original ground topography. This information was collected by Nuna Logistics site survey crews using Global Navigation Satellite System (GNSS) equipment.

Additional information on the data sources are presented in the Issue for Permit drawings (Attachment 1).

2.3 Foundation Conditions

SRK previously undertook a geotechnical assessment for the MLA (SRK, 2018b). Around the Shoreline Pad location, the general foundation conditions indicate weak ground conditions in the active layer (non frozen) soils that could be prone to excess pore pressure buildup if loadings rates are not controlled throughout construction and operation. As outlined n this assessment the foundation soils around the Shoreline Pad area was logged as a sand, but based on lab testing, should be classified as silty to clayey sand. From the available data (SRK 2015, Golder 2017) permafrost is expected to extend over the Shoreline Pad area with an estimated active layer depth in the range of 2m (below original ground). SRK has assumed that the shallow sub-sea foundation conditions beneath the Shoreline Pad Extension will be consistent to those onshore in the area of the Shoreline Pad.

No offshore geotechnical investigation has been completed and is not considered necessary due to the small extent of the proposed Shoreline Pad Extension. Typically, in this region submarine permafrost can be present in areas with an average water depth of 1 m or less.

3 Design

3.1 Design Criteria

The design criteria for the Shoreline Pad Extension, based on the operational requirements stipulated by Sabina, are as follows:

- The total marine environmental footprint should not exceed 500 m^2; and
- The pad should have a minimum 35-m width for stability purposes, and in consideration of the foundation conditions.
- Construction must be done at a slow rate and loadings controlled (including barge offloading) to ensure that foundation pore pressures in the unfrozen active layer foundation soils do not generate excess pore pressures and exhibit a loss of strength.

3.2 Design

The Shoreline Pad Extension will have a variable fill height which will be configured to allow a smooth transition from the existing Shoreline Pad. This means the final crest elevation at the perimeter will range from approximately 1 m to 3 m. The Shoreline Pad Extension will be constructed with run-of-quarry (ROQ) material as the bulk fill. Prior to placing the ROQ, two layers of bi-axial geogrid will be placed to mitigate against excessive differential settlement on the weak foundation soils. The pad side slopes will be 1.5H:1V for fill areas less than 2 m in height, and at 2H:1V for fill slopes equal to or greater than 2 m. The final slopes may be armoured with riprap as protection against wave erosion and ice plucking. The pad driving surface will be covered with 0.15 m of surfacing material, if required for tire protection. Preliminary design drawings are included as Attachment 1.

4 Construction

Construction fill materials will be obtained from local geochemically suitable permitted quarries or run-of-mine waste rock brought in from the Goose site. Surfacing (32 mm minus) material will be produced at an on-site crusher at either the MLA or Goose site. About 400 m^3 of ROQ, 50 m^3 of surfacing material, and 1200 m^2 of geogrid are estimated to be required (rounded neat-line quantities with overlap included / considered for the geogrid).

The construction fleet will consist of mobile equipment already staged at the MLA and is expected to include rock trucks (30 and 40T), dozers (D8 or smaller), excavators, compactor, and a crusher plant (not currently on site).

Prior to placement of ROQ, two layers of biaxial geogrid will be placed on seabed, extending approximately 3 m beyond the design footprint. ROQ is then placed from land, working from the existing Shoreline Pad, onto the geogrid. Construction rate and sequencing will be adjusted to ensure appropriate time is allowed for pore pressure dissipation of the marine sediments to ensure safe working conditions. Removal of the marine sediments is not required prior to construction and therefore no dredging of marine sediments will be carried out. Surfacing material and rip rap will not be placed until the ROQ material layer is at design grade and level. All construction will be performed in accordance with approved Technical Specifications (SRK 2018a).

Construction may occur in winter or summer, i.e. frozen or open water conditions. For open water conditions, prior to construction, the entire perimeter of the Shoreline Pad will be encircled by a silt curtain deployed approximately 20 m from the footprint of the Shoreline Pad Extension and will remain in place throughout construction. Summer construction will require careful screening of the shoreline for nesting birds, and modifications to the construction schedule may be required to avoid disturbing nesting populations. If construction during fisheries restricted activity timing windows cannot be avoided, additional mitigation measures will be discussed with Fisheries and Oceans Canada.

For frozen conditions, sediment control will not be required as all construction will occur within the ground-fast sea ice extent. Any sea ice in the footprint of the Shoreline Pad Extension will be excavated and placed adjacent to the excavation on top of the sea ice. Rockfill placement will follow ice excavation and geogrid placement. The work will progress along the length of the

existing Shoreline Pad in an ordered method by slowly working from one end of the pad to the other, and then restarting at the original end to best spread out the working face and allow the most time between subsequent foundation loading. Temporary construction routes should aim to not repeatedly drive over the same area but be continually moving around the pad with placement. The rate of barge offloading should be considered and carefully monitored; e.g. are multiple barges going to be offloaded back to back which could potentially impact foundation pore pressure build up. Safe work plans should be developed by Sabina for this construction, which should consider the inspection recommendations below.

4.1 Inspection Recommendations

Due to the close proximity to, and minimal in-water works, at least daily inspections should be completed during construction, and every day the Shoreline Pad (including extension) is used for offloading.

Note that work area should be cleared of snow, ice and any other debris prior to being inspected. For these inspections, the crests of the areas that are being worked on, the areas immediately adjacent to these areas, and the ground immediately in front (downslope) of the advancing rock placement should be examined for signs of cracking, settling, slope movement, changes in material type or moisture contact of the material being placed, and surface deflection from equipment.

Any areas which experience consistent/frequent or identifiable erosion or tension cracking, any bulging by the toe or release of pore water from the foundation, should be recorded and work should be temporarily paused in this area to allow it to stabilize.

4.2 Monitoring Recommendations

- During construction ongoing surveys should be completed over any original ground before material placement and after each lift placed. A full as-built will also be completed once the Shoreline Pad Extension has been constructed.

5 Closure

Due to the nominal extent of the Shoreline Pad Extension, Sabina intends to leave the structure in place at closure, similar to the other roads, pads and existing Shoreline Pad. This will result in minimal environmental disturbance, and the structure is not a navigation hazard.

6 References

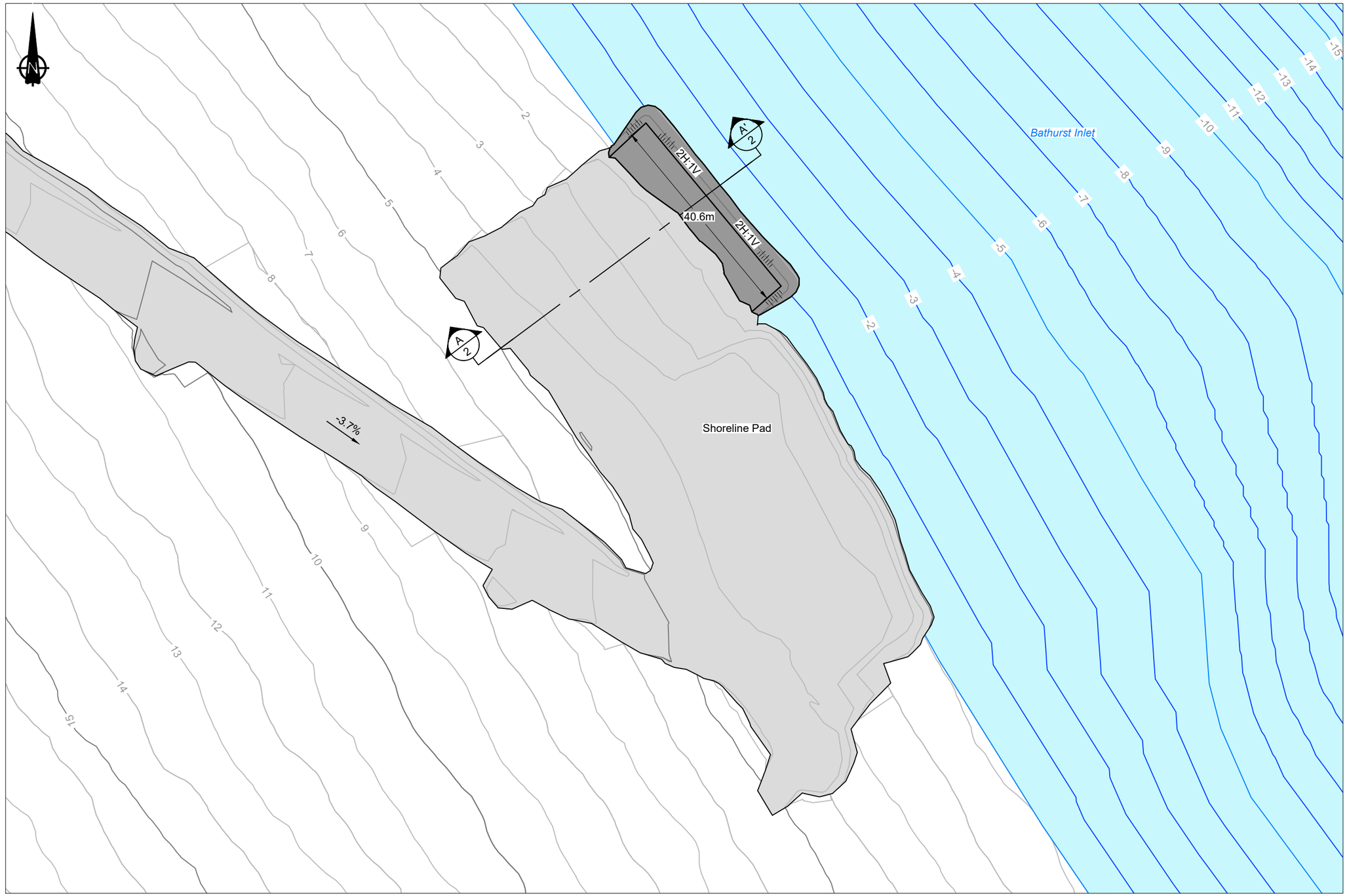
Golder Associates. 2017. Back River Project – Marine Laydown Area (MLA) – Geotechnical Factual report. Report prepared for Sabina Gold and Silver Corp. November 2017. Sabina reference number SBR5GAL-7000-G-RPT-0001. Golder reference number 17774320-036-RPT-Rev0.

SRK Consulting (Canada) Inc. 2015. Marine Laydown Area – 2015 Overburden geotechnical Investigation Program. Report prepared for Sabina Gold & Silver Corp. December 2015. Project No. 1CS020.009.

SRK Consulting (Canada) Inc. 2018a. Technical Specifications – Earthworks and geotechnical Engineering – Back River Gold Project, Nunavut Canada – Revision 0 - Issued for Construction. Prepared for Sabina. SRK job number 1CS020.016. April 2018.

SRK Consulting (Canada) Inc. 2018b. Back River Project: MLA Shoreline Pad Geotechnical Assessment. Memorandum prepared for Sabina. SRK job number 1CS020.016. June 2018.

Attachment 1: Permitting Drawings for the Shoreline Pad Extension



LEGEND

- Shoreline Pad Extension
- 2018 MLA As-Built (by others / Sabina)

NOTES

1. Contours shown at 1.0m intervals.
2. All dimensions in meters unless otherwise stated.
3. It is the Contractor's responsibility to ensure that the geogrid is installed in advance of the construction fill
4. being placed.
5. Significant settlement of placed ROQ into the sea bed is expected during placement, even with geogrid installation.
6. The Contractor is responsible for silt and sediment control during construction (specifically if construction done during the open water season).
7. Notes listed on each drawing apply to all drawings in the package.
8. Existing Shoreline Pad by other - designed and constructed by Sabina.

REFERENCE

- NAD83 UTM Zone 13.
- Existing topographic contours generated from data provided by Sabina Gold and Silver Corp. File: 'bathurst_inlet_1m_dem_tile26 to tile39.xyz', dated 2012-20-13.
- Available bathymetric data (blue contours) provided by Sabina on 2018/04/19 (CAD file 'BathymetryBathurst.dwg'). This data set was collected by ERM (formerly Rescan).
- As-Built Shoreline Pad survey provided by Sabina August 18, 2018. File name: Site 180818MLA Jetty.dwg
- Consideration of risk, such as rapid construction not allowing foundation pore pressures to dissipate, outlines in more detail in SRK June 2018 memo "Back River Project: MLA Shoreline Pad Geotechnical Assessment", project number 1CS020.016.

MATERIAL QUANTITIES AND AREAS

Shoreline Pad In-water Extension: 420m²
Bulk Pad Fill: 365m³

All volumes reported are calculated to neat lines. No bulking / shrinking factors have been utilized in volume determination.

0m 3 6 9 12

DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
- -	- -	- -	- -	- -
A	Issued for Permit	JBK	CP	20/06/03

REVISIONS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN:	DRAWN:	REVIEWED:
CH/JBK	TH	EMR
CHECKED:	APPROVED:	DATE:
JBK	CP	June 2020

FILE NAME: 1CS020.018 - Shoreline Pad - opt 2.dwg

Sabina GOLD & SILVER CORP

Back River Project

SRK JOB NO.: 1CS020.018

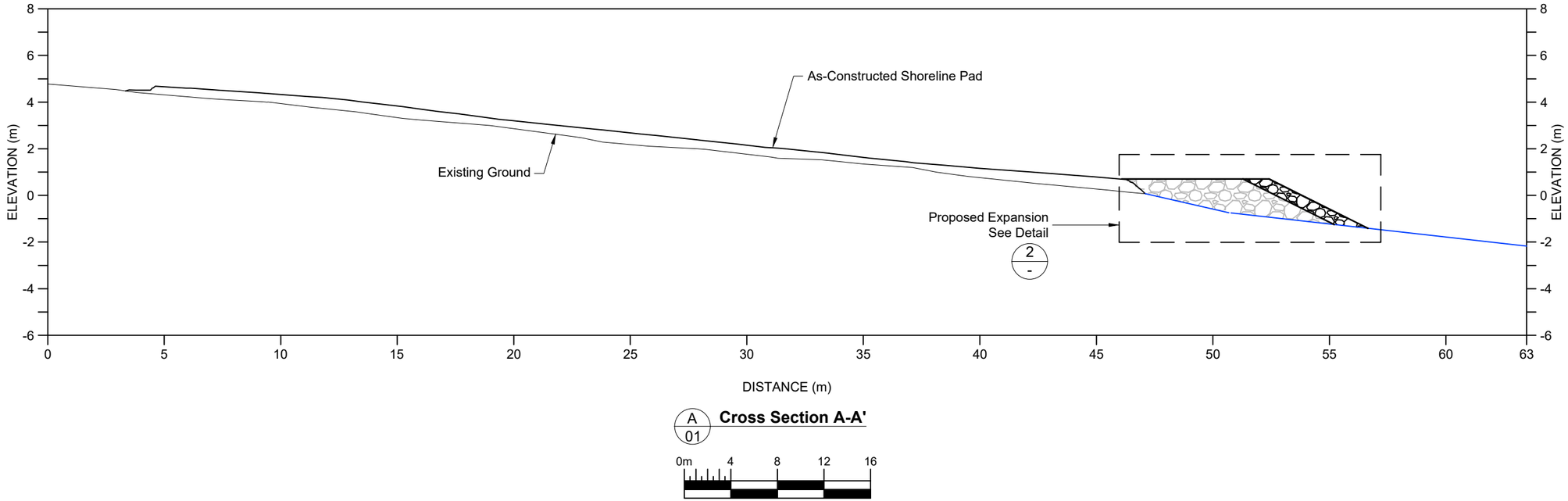
Marine Laydown Area

DRAWING TITLE:

Shoreline Pad Extension

DRAWING NO.	SHEET	REVISION NO.
01	1 OF 2	A

P:\Projects\01_SITES\Back River\1040_AutoCAD\Marine Laydown Area\2020 Shoreline Pad Tradeoff\1CS020.018 - Shoreline Pad - opt 2.dwg



A/01 **Cross Section A-A'**

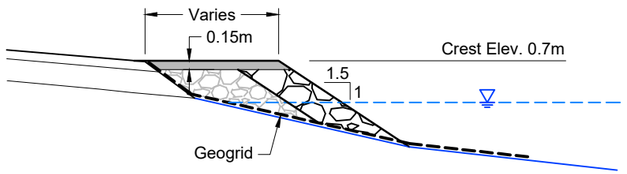
0m 4 8 12 16

LEGEND

- Bathymetric Surface
- Approximate Water Line
- Geogrid
- Rip rap
- Run of Quarry (ROQ) Material
- Surfacing Material

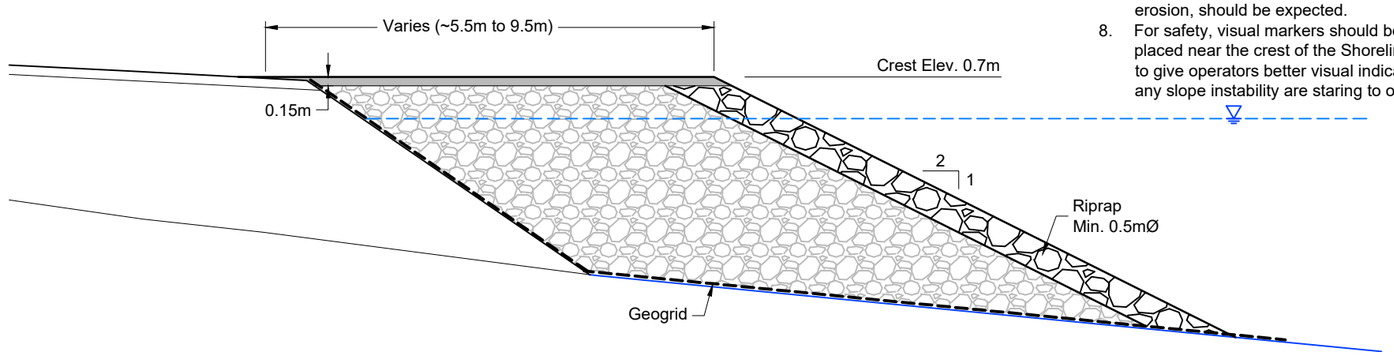
NOTES

1. All dimensions in meters unless otherwise stated.
2. For the geogrid the minimum longitudinal overlap must be 0.5m and minimum transverse overlap must be 5m.
3. All geogrid joints will be permanently secured using heavy duty zip ties at a minimum spacing 1.0m. Heavy duty zip ties will have a minimum tensile strength of 175lbs.
4. The Contractor is responsible for silt and sediment control during the construction (specifically if done during the open water season).
5. ROQ material must be coarse with limited sand and fines content. See "Technical Specifications Earthworks and Geotechnical Engineering, Back River Gold Project, Nunavut Canada. Revision 0", dated April 2018.
6. Approximate water line shown is based solely on the provided bathymetric information. No data was provided to estimate the average, high or low water levels and no assessment was done on publicly available data sets to estimate these ranges.
7. Loading within 5m of the crest should be kept to a minimum, and/or avoided wherever possible. Slope relaxation of the outside slope is expected and ongoing maintenance, due to wave and ice erosion, should be expected.
8. For safety, visual markers should be placed near the crest of the Shoreline Pad to give operators better visual indication if any slope instability are staring to occur.



1/- **Typical Section for Sections of Extension less than 2.0m in height**

0m 1 2 3 4



2/- **Typical Section for Sections of Extension greater than 2.0m in height**

0m 1 2 3 4

DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS	

NO.	DESCRIPTION	CHK'D	APP'D	DATE
--	--	--	--	--
A	Issued for Permit	JBK	CP	20/06/03

REVISIONS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN:	DRAWN:	REVIEWED:
CH/JBK	TH	EMR
CHECKED:	APPROVED:	DATE:
JBK	CP	June 2020

FILE NAME: 1CS020.018 - Shoreline Pad - opt 2.dwg

Sabina GOLD & SILVER CORP.

Back River Project

SRK JOB NO.: 1CS020.018

Marine Laydown Area

DRAWING TITLE:
Shoreline Pad Extension
Cross Sections

DRAWING NO.	SHEET	REVISION NO.
02	2 OF 2	A

P:\Projects\01_SITES\Back River\040_AutoCAD\Marine Laydown Area\2020 Shoreline Pad Tradeoff\1CS020.018 - Shoreline Pad - opt 2.dwg

Appendix E. WIR Water Increase Memo

NUQSANA GOLDER
ENGINEERING AND ENVIRONMENTAL INC.

TECHNICAL MEMORANDUM

DATE 11 March 2020 **Project No.** 18114181-054b-TM-Rev1

TO Merle Keefe, EIT
Sabina Gold & Silver Corp.

CC Catherine Paul (Sabina) and Dionne Filiatrault (Golder)

FROM Johannes Kloeckes and Curtis VanWerkhoven **EMAIL Curtis_VanWerkhoven@golder.com**

RE: WINTER ICE ROAD MODIFICATIONS – TOTAL WATER AVAILABILITY ASSESSMENT

1.0 INTRODUCTION

Sabina Gold & Silver Corp. (Sabina) requested Nuqsana Golder Engineering and Environment Inc. (Nuqsana Golder) review the potential for additional water withdrawal availability along the winter ice road (WIR) for the Back River Project (the Project). This technical memorandum summarizes this review to confirm if the increase in annual WIR water withdrawal volume from 108,000 m³ to 324,000 m³ remains within volumes anticipated to avoid measurable residual effects to fish and fish habitat.

2.0 PREVIOUS 2018 WINTER ICE ROAD WATER WITHDRAWAL EVALUATION

Provided as Appendix A, Nuqsana Golder evaluated potential water sources for the approximately 160 km-long winter ice road from Goose Property at Goose Lake to the Marine Laydown Area at Bathurst Inlet (Golder 2018). Available winter water withdrawal for winter ice road construction was assessed using bathymetry data for 118 waterbodies derived from satellite imagery analysis. Of potential sources, 55 waterbodies were identified as being deep enough for under ice withdrawal without expected measurable residual effects to fish and fish habitat based on the Fisheries and Oceans Canada (DFO) protocol for mitigating water withdrawal effects on fish in ice-covered waterbodies in the North (DFO 2010). The lakes that did not meet the depth criteria (maximum depths less than 3.5 m) were screened out and were not included in the analysis of lakes available for winter water withdrawal. The DFO (2010) protocol is the basis for the analysis of available winter water withdrawal and screening of lakes that do not meet the following criteria from DFO 2010:

- In one ice-covered season, total water withdrawal from a single waterbody is not to exceed 10% of the available water volume calculated using a maximum expected ice thickness of 2.0 m for lakes above the tree line in the North.
- Only waterbodies with maximum depths that are 1.5 m greater than their corresponding maximum expected ice thickness of 2.0 m for lakes above the tree line in the North should be considered for water withdrawal.
- Any waterbody with a maximum expected ice thickness that is greater than, or equal to, its maximum depth (as determined from a bathymetric survey) is exempt from the 10% maximum withdrawal limit. These waterbodies are expected to freeze to bottom and are therefore assumed to be non-fish bearing.

Golder Associates Ltd.
16820 107 Avenue, Edmonton, Alberta, T5P 4C3, Canada T: +1 780 483 3499 F: +1 780 483 1574

Furthermore, the 55 lakes screened as having maximum depths greater than 3.5 m were also assessed for water level changes from water withdrawals. As it was assumed that all waterbodies deeper than 3.5 m support large-bodied fish, predicted changes in water levels were assigned a level of risk for spawning habitat loss as per FEIS Addendum Appendix V6-6G (Sabina 2017). At all 55 lakes with maximum depths greater than 3.5 m, if a 10% water withdrawal resulted in changes in water levels greater than those associated with a risk of spawning habitat loss of nil or negligible (changes in water levels greater than 0.22 m), the allowable water withdrawal (less than 10%) was calculated for drawdowns of 0.22 m. Table 2 of Appendix A provides the calculated recommended maximum withdrawal volume for the 55 lakes identified as being deep enough for under-ice withdrawals based on the initial screening.

3.0 WATER AVAILABILITY FOR INCREASED WITHDRAWALS AT LAKES PREVIOUSLY INDENTIFIED

Sabina requested Nuqsana Golder confirm if increasing annual water withdrawal from 108,000 m³ to 324,000 m³ along the WIR is possible while avoiding measurable residual effects to fish and fish habitat. Based on the previous study (Golder 2018), a total of over 57 million m^3 of under-ice water is available in the 55 lakes, and the 108,000 m^3/year equates to approximately 0.2% of the available under-ice water identified while adhering to the DFO protocol (2010) and resulting in expected nil or negligible risk of spawning habitat loss (See Appendix A, Table 2). Based on total water withdrawals along the WIR, it is not expected that increasing the annual WIR water withdrawal volume from 108,000 m^3 to 324,000 m³ will have measurable residual effects to fish and fish habitat, providing that total annual withdrawals from individual lakes do not exceed values previously calculated for nil or negligible risk of spawning habitat loss (See Appendix A, Table 2).

CLOSURE

We trust that this report provides the information required by Sabina Gold & Silver Corp. at this time. If there are any questions or require further detail, please contact the undersigned.

Yours truly,

GOLDER ASSOCIATES LTD.

Johannes Kloeckes
Water Resources Specialist

Curtis VanWerkhoven, MASc
Water Resources Specialist

Nathan Schmidt, PhD, PEng (NWT/NU)
Principal, Senior Water Resources Engineer

JK/CV/NS

https://golderassociates.sharepoint.com/sites/101666/technical work/6000_modification_packages/06-wir/water availability tm/rev1/18114181-054b-tm_wir_modification_rev1_total water.docx

REFERENCES

DFO (Fisheries and Oceans Canada). 2010. DFO Protocol for Winter Water Withdrawal from Ice-Covered Waterbodies in the Northwest Territories and Nunavut. Prepared June 20, 2010. 3 pp

Golder. 2018. Winter Ice Road Water Withdrawal Evaluation – Back River Project. Prepared for Sabina Gold & Silver Corp. November 2018. Reference No. 1776921_021_MEM_Rev0

Sabina (Sabina Gold & Silver Corp.). 2017. Final Environmental Impact Statement Addendum. Submitted to Nunavut Impact Review Board. February 2017.

IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Standard of Care: Golder Associates Ltd. (Golder) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

Basis and Use of the Report: This report has been prepared for the specific site, design objective, development and purpose described to Golder by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. Any change of site conditions, purpose, development plans or if the project is not initiated within eighteen months of the date of the report may alter the validity of the report. Golder can not be responsible for use of this report, or portions thereof, unless Golder is requested to review and, if necessary, revise the report.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, Golder may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client can not rely upon the electronic media versions of Golder's report or other work products.

The report is of a summary nature and is not intended to stand alone without reference to the instructions given to Golder by the Client, communications between Golder and the Client, and to any other reports prepared by Golder for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. Golder can not be responsible for use of portions of the report without reference to the entire report.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

APPENDIX A

2018 WINTER ICE ROAD WATER WITHDRAWAL EVALUATION – BACK RIVER PROJECT

TECHNICAL MEMORANDUM

DATE November 8, 2018 **REFERENCE No.** 1776921_021_MEM_Rev0

TO Merle Keefe
Sabina Gold & Silver Corp.

CC Matthew Pickard, Dionne Filiatrault

FROM Cam Stevens **EMAIL** cameron_stevens@golder.com

WINTER ICE ROAD WATER WITHDRAWAL EVALUATION – BACK RIVER PROJECT

Golder Associates Ltd. (Golder) was retained by Sabina Gold & Silver Corp. (Sabina) to provide an evaluation of potential water sources for winter ice road construction along the proposed 160 km-long winter road corridor from the Goose Property at Goose Lake to the Marine Laydown Area at Bathurst Inlet. Potential water sources are waterbodies deeper than 3.5 m (i.e., lakes) and available water volumes in those waterbodies are no more than 10% of the under ice volume, as per the Fisheries and Oceans Canada (DFO) protocol for mitigating water withdrawal effects on fish in ice-covered waterbodies in the North (DFO 2010).

The information provided in this technical memorandum (memo) fulfills commitments made during the environmental review of the Back River Project (the Project) (see Addendum Appendix V6-6G in Sabina [2017]), and provides Sabina with the necessary information to minimize, if not eliminate, any potential effects to overwintering fish and fish habitat, including spawning shoal habitat, during the construction of the winter ice road. The current plan for the winter ice road requires 108,000 m^3 of water per season (675 m^3 per km) to maintain ice thickness as per the Project Description (Volume 2 in Sabina [2017]).

The following sections of the memo provide methods and results for the available under-ice water volumes, the volumes representing 10% of available under-ice water, and the reduction in water depth associated with withdrawals of 10% of the available under-ice water per each lake in the winter road corridor. The memo also evaluates changes in water depths in terms of risk to spawning shoal habitat loss in lakes as per methods outlined in Addendum Appendix V6-6G in Sabina (2017). Based on that evaluation, recommended volumes for water withdrawal that present negligible risk of habitat loss are provided.

1.0 METHODS

Bathymetric digital elevation models were generated by Aeroquest Mapcon (Aeroquest) for 118 waterbodies within the winter road corridor using stereo-photogrammetric interpretation methods of stereo, 8 band, 50 cm satellite imagery; imagery was collected in August 2017 by DigitalGlobe's Worldview-2 satellite (Legleiter et al. 2014; Dörnhöfer and Oppelt 2016). For each waterbody, surrounding terrain characteristics were used to interpret slopes entering the waterbody at the shorelines, where the slopes were then extrapolated into the waterbody to connect with the lake bottom topography visualized through 'coastal blue', 'blue' and 'green' (spectral) bands in the imagery in a Geographic Information System (GIS). These spectral bands allow the identification of detailed lakebed topography to a depth of 30 m.

Bathymetric models of each waterbody were provided to Golder in raster format for analyses of volume and area per depth in a GIS platform for each waterbody deeper than 3.5 m. Tables produced from the raster analysis (see Appendix A) were used to estimate available under-ice water volumes for ice road construction for each source lake (i.e., 10% of under ice volume); where it was assumed that the maximum ice thickness is 2 m (DFO 2010). Changes in water levels from water withdrawals were also estimated. As it was assumed that all waterbodies deeper than 3.5 m support large-bodied fish, predicted changes in water levels were assigned a level of risk for spawning habitat loss as per Addendum Appendix V6-6G in Sabina (2017) (Table 1). Waterbodies with a potential risk of spawning habitat loss from a 10% under-ice volume reduction were identified as sources where water withdrawals should be reduced, particularly during below-average precipitation years. Recommended volumes for water withdrawal that present negligible risk of habitat loss were then calculated for these waterbodies.

Table 1: Water Withdrawal Risk Level Framework for Spawning Shoal Habitat for Fall-Spawning Fish[(a)]

Risk of Spawning Habitat Loss	Change in Water Elevation Under Ice (m)	Rationale
Nil or negligible	Less than 0.22	The reduction in water level lies within the average change in ice thickness (i.e., within normal variation)
Low	0.22 to less than 0.42	The reduction in water level remains within 1 SD of the average
Medium	0.42 to 0.8	The reduction in water level remains between 1 and 2 SD of the average
High	Greater than 0.8	The reduction in water level is beyond 2 SD of average and there is less than a 5% chance for this occurring naturally

a) includes coregonid species, such as Lake Whitefish (*Coregonus clupeaformis*), and Lake Trout (*Salvelinus namaycush*); SD = standard deviation

A characterization of whether bathymetric data are representative of below-average, average, or above-average water level conditions was provided using precipitation statistics for the region. Statistics were derived for both 2017 and 30-year (1981-2010) 'normal' data, obtained from a representative monitoring station in west-central Nunavut (station name: Kugluktuk A; see Government of Canada 2017).

The evaluation of satellite imagery results (volumes) also included a comparison with results generated by bathymetric (sonar) surveys previously performed in the field for a subset of seven lakes (Appendix V6-3A in Sabina [2017]; Rescan 2014). The lakes with existing bathymetric data included five lakes surveyed in early July 2014 (Fold Lake, Winter Road Lake 01, Winter Road Lake 02, Winter Road Lake 05, and Winter Road Lake 06) and two lakes surveyed in August 2010 (Llama Lake and Chair Lake). All lakes were less than 30 m depth, the extent to which accurate detection of the spectral bands in the satellite imagery is known to be effective. It was assumed that the previously conducted surveys of each lake were performed consistent with methods described by DFO (2010), and included one longitudinal transect (connecting the two farthest shorelines) and a minimum of two perpendicular transects evenly spaced on the longitudinal transect at maximum intervals of 500 m. Project lakes with existing bathymetric data that were excluded from the comparison were either outside the boundary of the winter road corridor, or had insufficient data to provide a reliable volume estimate.

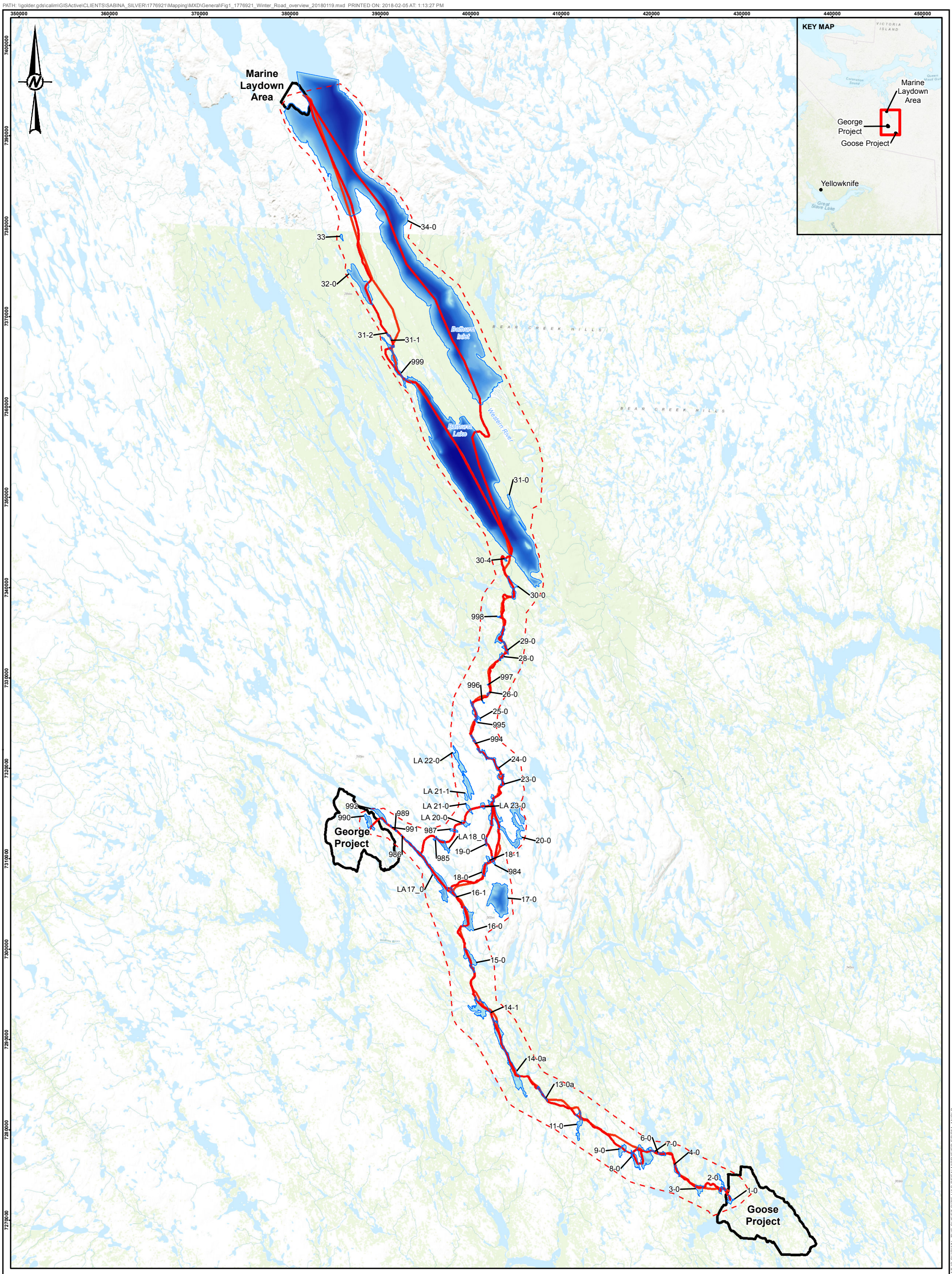
2.0 RESULTS AND DISCUSSION

Of the 118 waterbodies examined for use for winter ice road construction, 55 lakes were identified as being deep enough (greater than 3.5 m) for under-ice water withdrawal (Table 2; Figure 1; Appendix B). Overall, source lakes were determined to provide a median capacity of 39,637 m^3 of water per lake for winter ice road construction, where available 10% under-ice volumes may range from 683 m^3 for Lake 996 to 301,075,442 m^3 for Lake 34-0 (i.e., lower Bathurst Inlet). The provided volume statistics for lakes in the winter road corridor are expected to represent average lake level conditions, given that cumulative precipitation levels in August 2017 totalled 208.4 mm, just 1 mm below normal totals for that time of the year when the imagery was acquired (Figure 2). It is expected that available water volumes for winter ice road construction is lower during below-average precipitation years and higher during above-average precipitation years.

Table 2: Water Sources, Bathymetry Statistics, and Available Volumes for Winter-Ice Road Construction for the Back River Project

Waterbody ID	North. UTM	East. UTM	Surface Area (SA) (m^2)	Volume (V) (m^3)	V:SA ratio (m)	Under Ice Volume Below 2 m Depth (m^3)	10% Volume Below 2 m Depth (m^3)	Predicted Water Level Change (m)	Risk of Habitat Loss For 10% Guideline	Calculated Volume for Nil Risk (m^3)
Lake 1-0	7272263	428691	348,021	951,009	2.7	396,025	39,603	0.19	Nil	39,603
Lake 2-0	7273318	427649	598,077	1,487,839	2.5	535,068	53,507	0.17	Nil	53,507
Lake 3-0	7273459	425284	557,865	1,738,708	3.1	793,748	79,375	0.21	Nil	79,375
Lake 4-0	7275521	422778	349,596	705,486	2.0	193,786	19,379	0.13	Nil	19,379
Lake 8-0	7276631	418218	765,711	2,427,790	3.2	1,137,977	113,798	0.20	Nil	113,798
Lake 7-0	7277136	419314	2,211,876	8,325,456	3.8	4,336,453	433,645	0.22	Low	424,972
Lake 6-0	7277346	421197	224,514	614,579	2.7	253,622	25,362	0.19	Nil	25,362
Lake 9-0	7277741	416761	620,172	1,581,371	2.5	537,030	53,703	0.14	Nil	53,703
Lake 11-0	7280643	411983	885,771	2,406,329	2.7	981,876	98,188	0.19	Nil	98,188
Lake 13-0a	7284074	407857	290,376	597,123	2.1	151,117	15,112	0.12	Nil	15,112
Lake 14-0a	7287885	404204	3,942,630	10,415,812	2.6	3,597,800	359,780	0.16	Nil	359,780
Lake 14-1	7293431	401036	2,221,497	4,779,159	2.2	881,912	88,191	0.08	Nil	88,191
Lake 15-0	7298909	399919	1,441,269	5,027,754	3.5	2,373,270	237,327	0.19	Nil	237,327
Lake 16-0	7303281	399696	2,068,272	12,016,309	5.8	8,139,725	813,973	0.40	Low	447,685
Lake 17-0	7305916	402441	5,913,261	61,932,318	10.5	50,372,624	5,037,262	0.90	High	1,239,167
Lake 16-1	7306279	398021	319,815	812,512	2.5	260,311	26,031	0.14	Nil	26,031
Lake LA17-0	7308172	395986	3,193,056	18,907,975	5.9	12,865,851	1,286,585	0.43	Med.	643,293
Lake 18-0	7308843	401524	635,085	2,886,128	4.5	1,690,494	169,049	0.28	Low	128,478
Lake 984	7309759	402495	153,108	296,424	1.9	71,739	7,174	0.17	Nil	7,174
Lake 18-1	7310007	401912	161,253	426,414	2.6	150,589	15,059	0.15	Nil	15,059
Lake LA18-0a	7311590	396960	714,708	4,368,027	6.1	3,006,955	300,695	0.36	Low	128,478
Lake 19-0	7311911	401691	160,065	360,221	2.3	98,274	9,827	0.12	Nil	9,827
Lake 985	7312109	395983	40,914	106,234	2.6	35,130	3,513	0.13	Nil	3,513
Lake 986	7312574	392342	16,299	37,926	2.3	12,753	1,275	0.14	Nil	1,275
Lake 989	7313114	391719	29,322	62,690	2.1	17,580	1,758	0.13	Nil	1,758
Lake 987	7313141	398133	206,199	760,584	3.7	393,753	39,375	0.21	Nil	39,375
Lake 991	7313599	391191	36,702	76,595	2.1	21,030	2,103	0.13	Nil	2,103

Waterbody ID	North. UTM	East. UTM	Surface Area (SA) (m^2)	Volume (V) (m^3)	V:SA ratio (m)	Under Ice Volume Below 2 m Depth (m^3)	10% Volume Below 2 m Depth (m^3)	Predicted Water Level Change (m)	Risk of Habitat Loss For 10% Guideline	Calculated Volume for Nil Risk (m^3)
Lake LA20-0	7313887	399363	324,144	940,089	2.9	389,431	38,943	0.18	Nil	38,943
Lake 990	7314076	388751	761,706	3,456,788	4.5	2,130,011	213,001	0.41	Low	115,021
Lake 20-0	7314226	404075	5,757,903	24,053,493	4.2	14,139,389	1,413,939	0.29	Low	1,060,454
Lake 992	7314853	389975	893,646	3,525,249	3.9	1,938,558	193,856	0.24	Low	178,347
Lake LA21-0	7315592	399777	256,878	761,896	3.0	309,761	30,976	0.18	Nil	30,976
Lake LA23-0	7315882	401330	265,968	1,013,844	3.8	524,720	52,472	0.23	Low	51,947
Lake LA21-1	7316914	399454	204,606	406,055	2.0	129,313	12,931	0.16	Nil	12,931
Lake LA22-0	7317386	399995	2,393,802	5,635,137	2.4	1,697,105	169,711	0.16	Nil	169,711
Lake 23-0	7318800	403392	498,888	1,218,007	2.4	396,365	39,637	0.14	Nil	39,637
Lake 24-0	7321054	402094	876,762	2,011,377	2.3	599,951	59,995	0.13	Nil	59,995
Lake 994	7323246	400275	136,197	276,346	2.0	61,034	6,103	0.11	Nil	6,103
Lake 995	7325353	400617	103,959	233,491	2.2	75,975	7,597	0.17	Nil	7,597
Lake 25-0	7326281	400452	483,390	1,713,886	3.5	868,241	86,824	0.23	Low	80,746
Lake 996	7327338	401382	26,253	43,840	1.7	6,832	683	0.09	Nil	683
Lake 26-0	7328257	401915	59,454	181,351	3.1	97,110	9,711	0.30	Low	6,992
Lake 997	7329276	401911	17,280	41,763	2.4	15,122	1,512	0.17	Nil	1,512
Lake 28-0	7332392	403397	265,680	653,963	2.5	239,515	23,951	0.18	Nil	23,951
Lake 29-0	7334245	403433	1,174,887	5,393,491	4.6	3,246,825	324,682	0.34	Low	211,044
Lake 998	7336793	403071	46,809	125,763	2.7	53,343	5,334	0.20	Nil	5,334
Lake 30-0	7340003	404631	927,360	1,683,771	1.8	566,741	56,674	0.21	Nil	56,674
Lake 30-4	7343073	403851	48,825	101,926	2.1	28,590	2,859	0.15	Nil	2,859
Lake 31-0	7351852	400718	82,758,231	2,779,474,304	33.6	2,616,978,541	261,697,854	3.39	High	17,010,361
Lake 999	7364930	391663	1,645,029	13,130,162	8.0	10,124,845	1,012,485	0.76	Med.	293,621
Lake 31-1	7367584	391134	34,803	70,470	2.0	16,035	1,604	0.12	Nil	1,604
Lake 31-2	7367973	390840	55,377	137,368	2.5	52,909	5,291	0.22	Low	5,185
Lake 32-0	7373635	387860	3,747,375	21,976,529	5.9	14,966,675	1,496,668	0.37	Low	868,067
Lake 33-0	7378706	385690	124,371	270,935	2.2	86,426	8,643	0.17	Nil	8,643
Lake 34-0	7380542	390639	157,216,248	3,320,662,011	21.1	3,010,754,419	301,075,442	2.03	High	32,516,148



LEGEND

- WINTER ROAD
- PROJECT AREA
- LAKE EXTENT (DEPTH > 3.5M)
- PROJECT BOUNDARY

BATHYMETRY (1 M INTERVAL)

0
-13
-26
-39
-52
-65

0 10 20
1:400,000 KILOMETRES

REFERENCE(S)

SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
PROJECTION: UTM ZONE 13 DATUM: NAD 83

CLIENT
SABINA GOLD & SILVER CORP.

PROJECT
BACK RIVER PROJECT

TITLE
OVERVIEW OF WATER SOURCES FOR WINTER ICE ROAD CONSTRUCTION FOR THE BACK RIVER PROJECT

CONSULTANT
Golder Associates

YYYY-MM-DD	2018-02-05
DESIGNED	BW
PREPARED	JG
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
1776921	1300/1320	A	1

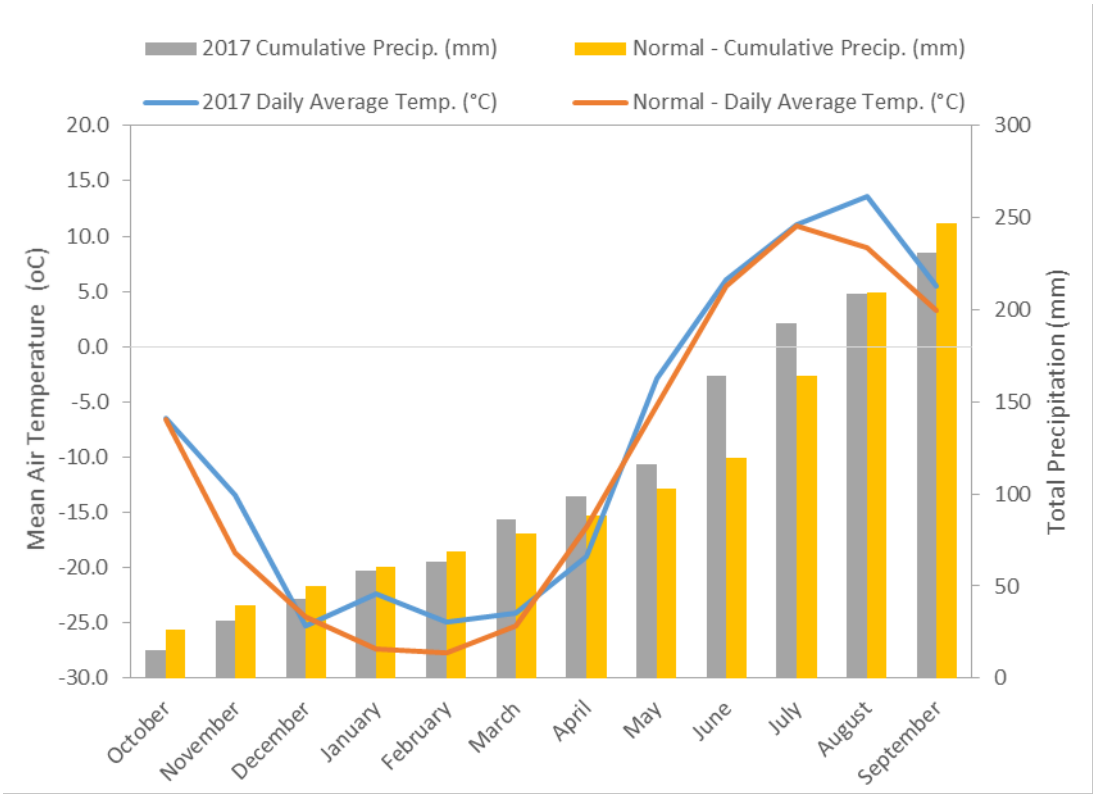


Figure 2: A Comparison of Monthly Total Precipitation and Mean Air Temperature for 2017 versus 'Normals' (1981-2010)

No measurable effects are predicted for fish and fish habitat for most of the identified source lakes if using the 10% under-ice volume guideline for water withdrawal (Table 2). However, potential effects to fish and fish habitat may result for some lakes with large volumes of water relative to the surface area of the lake (i.e., lakebeds profiled as a deep 'bathtub' or 'bowl' shape). For example, minor effects to fish habitat may result in Lake LA17-0 and Lake 999 where predicted water levels may be reduced by 0.43 m, and 0.76 m, respectively, during water withdrawal. To avoid effects to fish and fish habitat (e.g., exposing incubating eggs on shoals) in these two lakes, it is recommended that volumes less than the 10% under ice volume be withdrawn (e.g., approximately 5% for Lake LA17-0, and 3% for Lake 999). A similar recommendation is made for Lake 31-0 (Bathurst Lake) where moderate to major effects to fish habitat may result from water withdrawals unless reduced below the DFO guideline. Given that predicted water levels may drop by 3.39 m if extracted volumes are 10% the under-ice volume, it is recommended that approximately 1% of the under ice volume be withdrawn from Lake 31-0 for road construction. Although the available under ice volume for Lake 34-0 (i.e., lower Bathurst Inlet) for winter ice road construction may be larger than that reported in Table 2 because of receiving under-ice flows from the Western River, the reported under ice volume is recommended without additional hydrological study as a protective measure for fish and fish habitat.

The lake volume statistics generated by the satellite imagery interpretation method were similar to those generated from a field-based sonar survey of lakes. Lake volumes generated by the satellite imagery interpretation method were only marginally higher (by 9.2%) than the previously estimated volumes (Table 3). Differences may be a result of annual or seasonal changes in lake conditions, and also a result of differences underlying the two methods. Although a field-based sonar survey can collect accurate elevation details using a depth sounder, coverage is often limited in spatial extent due to time or logistical constraints. Furthermore, DFO's protocol

recommends only one longitudinal transect (connecting the two farthest shorelines) and a minimum of two perpendicular transects evenly spaced on the longitudinal transect at maximum intervals of 500 m (DFO 2010). The spatial extent of topographic detail collected in the field can clearly be much less than what can be provided by satellite imagery, and recent studies suggest that accurate elevation data (within 0.2 m) can be achieved using high-quality imagery and stereo-photogrammetry interpretation methods (Ehses and Rooney 2015; Mohamed et al. 2016).

Table 3: Comparison of Volume Estimates for Field Survey-Derived Bathymetry versus Satellite Imagery-Derived Bathymetry

Analysis ID	Existing ID	Maximum Depth (m)	Field-Derived Volume (m^3)	Satellite-Derived Volume (m^3)	Volume % Difference
Lake 990	Fold Lake	15.4	2,970,486[(a)]	3,456,788	16.4
Lake 4-0	Winter Road Lake 01	8.5	664,318[(a)]	705,486	6.2
Lake 13-0a	Winter Road Lake 02	5.4	435,046[(a)]	597,123	37.3
Lake 25-0	Winter Road Lake 05	11.3	1,482,102[(a)]	1,713,886	15.6
Lake 26-0	Winter Road Lake 06	10.5	190,557[(a)]	181,351	-4.8
Lake 1-0	Llama Lake	13.6	1,130,613[(b)]	951,009	-15.9
Lake 2-0	Chair Lake	10.3	1,355,660[(b)]	1,487,839	9.8
				Mean Difference	9.2

a) Rescan (2014)
b) Appendix V6-3A in Sabina (2017)

In summary, the recommended (negligible risk to fish habitat) under-ice water volumes to be withdrawn for the construction of the winter ice road (in Table 2) are expected to be more protective of fish and fish habitat than the DFO 10% under-ice volume guideline. Furthermore, actual volumes of water to be withdrawn from each lake during construction are expected to be much less than the recommended volumes. The current plan for the winter ice road requires only 108,000 m^3 of water in total, which is lower than the recommend volume for some of the individual source lakes and is considerably lower than the combined recommended volumes in Table 2-1. However, water withdrawal targets should be re-evaluated annually for lakes if and when climate-related changes influence lake conditions beyond the baseline characterization described in this memo.

3.0 CLOSURE

We trust the above meets your needs, if you have any questions or concerns, please do not hesitate to contact the undersigned.

Sincerely,

Cam Stevens
Associate, Fisheries Biologist

Nathan Schmidt
Principal, Senior Water Resources Engineer

CS/NS/jr

REFERENCES

Dörnhöfer K, N Oppelt. 2016. Remote sensing for lake research and monitoring–Recent advances. Ecological Indicators, 64:105-22.

DFO (Fisheries and Oceans Canada) 2010. DFO protocol for winter water withdrawal from ice-covered waterbodies in the Northwest Territories and Nunavut. Prepared June 20, 2010. 3 pp.

Ehses JS, JJ Rooney. 2015. Depth derivation using multispectral WorldView-2 satellite imagery. U.S. Dep. Commer., NOAA Tech. Memo., NOAA-TM-NMFS-PIFSC-46, 24p.

Government of Canada 2017. Historical Climate Data. See http://climate.weather.gc.ca/. Visited December 2017.

Legleiter CJ, M Tedesco, LC Smith, AE Behar, BT Overstreet. 2014. Mapping the bathymetry of supraglacial lakes and streams on the Greenland ice sheet using field measurements and high-resolution satellite images. The Cryosphere, 8:215-28.

Mohamed H, A Negm, M Zahran, OC Saavedra. 2016. Bathymetry Determination from High Resolution Satellite Imagery Using Ensemble Learning Algorithms in Shallow Lakes: Case Study El-Burullus Lake. International Journal of Environmental Science and Development, Vol. 7, No. 4.

Rescan. 2014. Back River Project: 2014 Bathymetric Survey Data Report. Prepared for Sabina Gold & Silver Corp. by Rescan Environmental Services Ltd., an ERM company.

Sabina (Sabina Gold & Silver Corp.). 2017. Final Environmental Impact Statement Addendum. Submitted to Nunavut Impact Review Board. February 2017.

APPENDIX A

Bathymetry Results for Source Lakes for Winter Ice Road Construction

LIST OF TABLES

Table 1: Lake 1-0 (Llama Lake)

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	951,009	348,021
-0.5	786,774	311,913
-1	638,670	270,801
-1.5	510,448	242,370
-2	396,025	214,992
-2.5	295,643	186,885
-3	208,840	155,556
-3.5	138,458	126,351
-4	82,119	96,138
-4.5	39,609	74,187
-5	7,540	11,493
-5.5	2,876	7,317

Table 2: Lake 2-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	1,487,839	598,077
-0.5	1,206,147	536,076
-1	950,662	482,616
-1.5	726,548	414,567
-2	535,068	343,089
-2.5	378,487	284,283
-3	250,032	213,183
-3.5	156,529	162,261
-4	86,311	83,394
-4.5	49,066	65,880
-5	20,279	29,286
-5.5	8,028	20,043

Table 3: Lake 3-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	1,738,708	557,865
-0.5	1,471,400	515,466
-1	1,222,799	476,883
-1.5	996,480	428,517
-2	793,748	372,249
-2.5	618,754	328,077
-3	465,410	282,915
-3.5	334,237	242,181
-4	222,877	186,147
-4.5	139,473	148,266
-5	73,867	108,693
-5.5	28,801	72,639

Table 4: Lake 4-0 (Winter Road Lake 01)

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	705,486	349,596
-0.5	543,299	302,454
-1	402,231	248,976
-1.5	288,067	208,080
-2	193,786	155,061
-2.5	123,756	125,640
-3	67,658	90,612
-3.5	28,424	66,951

Table 5: Lake 8-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	2,427,790	765,711
-0.5	2,062,180	704,376
-1	1,722,511	639,504
-1.5	1,416,714	584,028
-2	1,137,977	505,422
-2.5	896,624	460,161
-3	677,996	390,681
-3.5	498,982	325,350
-4	352,629	232,290
-4.5	247,406	188,874
-5	163,374	136,503
-5.5	102,089	109,107
-6	53,617	70,497
-6.5	22,787	53,226

Table 6: Lake 7-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	8,325,456	2,211,876
-0.5	7,247,255	2,110,995
-1	6,213,087	2,021,373
-1.5	5,238,844	1,876,698
-2	4,336,453	1,730,376
-2.5	3,503,990	1,599,210
-3	2,737,090	1,432,809
-3.5	2,067,760	1,242,540
-4	1,496,684	974,259
-4.5	1,053,454	800,208
-5	694,516	599,229
-5.5	427,598	469,224
-6	224,290	284,922
-6.5	101,840	206,397
-7	15,882	24,579
-7.5	5,966	15,507

Table 7: Lake 6-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	614,579	224,514
-0.5	508,726	201,150
-1	413,116	181,332
-1.5	327,974	159,327
-2	253,622	137,583
-2.5	189,913	117,333
-3	136,266	94,599
-3.5	93,626	76,032
-4	60,191	56,196
-4.5	35,098	44,199
-5	15,937	25,083
-5.5	5,842	15,588

Table 8: Lake 9-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	1,581,371	620,172
-0.5	1,283,776	574,164
-1	1,006,749	525,564
-1.5	757,986	469,674
-2	537,030	405,927
-2.5	348,525	348,795
-3	187,488	260,631
-3.5	77,135	184,167

Table 9: Lake 11-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	2,406,329	885,771
-0.5	1,986,081	803,664
-1	1,602,079	709,965
-1.5	1,270,068	619,065
-2	981,876	521,703
-2.5	738,637	452,313
-3	528,555	382,608
-3.5	353,075	319,824
-4	208,294	199,395
-4.5	120,846	151,551
-5	55,599	80,262
-5.5	22,085	54,639

Table 10: Lake 13-0a (Winter Road Lake 02)

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	597,123	290,376
-0.5	462,061	254,862
-1	342,054	215,253
-1.5	240,406	191,115
-2	151,117	156,141
-2.5	81,631	122,094
-3	28,802	37,107
-3.5	13,126	26,073
-4	2,450	3,024
-4.5	1,081	2,412

Table 11: Lake 14-0a

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	10,415,812	3,942,630
-0.5	8,508,701	3,706,839
-1	6,707,236	3,413,583
-1.5	5,076,385	3,109,680
-2	3,597,800	2,447,298
-2.5	2,465,903	2,080,647
-3	1,517,173	1,296,630
-3.5	925,510	1,073,889
-4	439,353	581,913
-4.5	186,010	435,573

Table 12: Lake 14-1 (Winter Road Lake 03)

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	4,779,159	2,221,497
-0.5	3,696,902	2,121,723
-1	2,656,345	1,995,939
-1.5	1,713,762	1,775,016
-2	881,912	1,167,093
-2.5	391,958	793,134
-3	87,827	148,545
-3.5	30,358	84,393

Table 13: Lake 15-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	5,027,754	1,441,269
-0.5	4,320,561	1,395,918
-1	3,631,480	1,355,472
-1.5	2,978,026	1,258,470
-2	2,373,270	1,149,336
-2.5	1,834,521	1,003,284
-3	1,372,339	795,123
-3.5	1,001,136	690,291
-4	681,553	501,993
-4.5	452,038	416,331
-5	265,208	302,211
-5.5	132,056	231,246
-6	33,062	53,973
-6.5	11,835	32,049

Table 14: Lake 16-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	12,016,309	2,068,272
-0.5	10,997,464	2,014,488
-1	10,001,007	1,967,616
-1.5	9,044,365	1,860,210
-2	8,139,725	1,742,535
-2.5	7,289,399	1,658,664
-3	6,480,762	1,575,414
-3.5	5,717,933	1,476,243
-4	5,004,215	1,375,101
-4.5	4,341,201	1,277,172
-5	3,726,880	1,167,093
-5.5	3,169,045	1,065,015
-6	2,661,580	959,958
-6.5	2,202,731	875,907
-7	1,785,082	786,681
-7.5	1,413,523	700,362
-8	1,084,083	605,790
-8.5	799,103	534,645
-9	548,721	457,002
-9.5	345,505	357,075
-10	190,492	247,329
-10.5	81,526	189,459

Table 15: Lake 17-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	61,932,318	5,913,261
-0.5	58,988,355	5,863,014
-1	56,069,074	5,813,217
-1.5	53,191,478	5,696,244
-2	50,372,624	5,540,463
-2.5	47,635,707	5,406,192
-3	44,967,408	5,241,510
-3.5	42,391,708	5,060,475
-4	39,906,981	4,851,423
-4.5	37,526,172	4,672,242
-5	35,233,773	4,421,880
-5.5	33,077,330	4,204,242
-6	31,029,091	3,975,948
-6.5	29,091,298	3,775,158
-7	27,253,008	3,540,456
-7.5	25,520,934	3,388,428
-8	23,863,695	3,223,233
-8.5	22,287,815	3,080,664
-9	20,782,317	2,938,743
-9.5	19,345,963	2,806,947
-10	17,974,529	2,677,734
-10.5	16,665,221	2,559,897
-11	15,413,919	2,444,607
-11.5	14,219,600	2,332,719
-12	13,080,745	2,222,280
-12.5	11,997,651	2,110,113
-13	10,970,236	1,999,755
-13.5	9,998,631	1,886,976
-14	9,082,514	1,775,952
-14.5	8,221,505	1,668,375
-15	7,413,747	1,562,508
-15.5	6,656,587	1,466,451
-16	5,946,799	1,372,005
-16.5	5,284,027	1,279,431
-17	4,666,741	1,189,449
-17.5	4,093,761	1,102,932
-18	3,563,254	1,017,972
-18.5	3,075,495	933,507
-19	2,629,259	848,709
-19.5	2,225,377	767,574
-20	1,861,215	682,425

Table 15: Lake 17-0 (continued)

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
-20.5	1,538,744	607,680
-21	1,252,962	524,637
-21.5	1,005,985	463,815
-22	788,650	398,403
-22.5	603,012	344,385
-23	443,520	277,704
-23.5	316,488	231,093
-24	211,662	181,017
-24.5	131,801	138,987
-25	71,788	97,299
-25.5	29,713	71,325

Table 16: Lake 16-1

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	812,512	319,815
-0.5	656,628	303,615
-1	508,692	286,110
-1.5	375,239	248,013
-2	260,311	207,252
-2.5	165,049	174,015
-3	86,367	90,900
-3.5	46,432	69,156
-4	16,902	25,299
-4.5	6,517	16,578

Table 17: Lake LA17-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	18,907,975	3,193,056
-0.5	17,331,869	3,111,678
-1	15,795,680	3,029,634
-1.5	14,305,839	2,929,986
-2	12,865,851	2,812,185
-2.5	11,491,012	2,686,905
-3	10,179,056	2,553,057
-3.5	8,937,258	2,414,124
-4	7,764,886	2,272,824
-4.5	6,660,229	2,145,879
-5	5,618,749	2,013,453
-5.5	4,657,451	1,832,022
-6	3,786,398	1,600,722
-6.5	3,030,687	1,422,720
-7	2,363,514	1,175,598
-7.5	1,816,893	1,011,708
-8	1,351,204	752,112
-8.5	1,004,902	634,284
-9	715,587	488,862
-9.5	494,721	395,442
-10	319,267	258,894
-10.5	204,715	200,232
-11	118,230	119,160
-11.5	67,019	86,382
-12	31,037	44,217
-12.5	12,445	30,618

Table 18: Lake 18-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	2,886,128	635,085
-0.5	2,571,908	622,143
-1	2,263,916	608,175
-1.5	1,968,603	573,255
-2	1,690,494	537,786
-2.5	1,432,519	494,226
-3	1,196,240	445,176
-3.5	983,789	404,523
-4	792,166	352,332
-4.5	627,040	308,979
-5	482,366	266,328
-5.5	357,855	232,326
-6	249,488	196,920
-6.5	160,328	160,461
-7	88,190	123,966
-7.5	35,648	87,174

Table 19: Lake 984

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	296,424	153,108
-0.5	222,837	141,282
-1	154,983	116,604
-1.5	105,469	82,350
-2	71,739	46,314
-2.5	50,654	38,205
-3	33,417	29,034
-3.5	20,565	22,446
-4	10,796	15,111
-4.5	4,391	10,665

Table 20: Lake 18-1

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	426,414	161,253
-0.5	347,889	152,856
-1	273,423	144,927
-1.5	206,642	122,508
-2	150,589	101,844
-2.5	103,121	88,371
-3	62,127	74,511
-3.5	28,085	61,884

Table 21: Lake LA18-0a

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	4,368,027	714,708
-0.5	4,014,611	699,075
-1	3,668,821	682,677
-1.5	3,332,711	661,842
-2	3,006,955	640,116
-2.5	2,693,523	613,575
-3	2,393,308	579,033
-3.5	2,112,672	543,897
-4	1,849,433	507,033
-4.5	1,606,085	466,578
-5	1,382,725	425,655
-5.5	1,179,964	385,632
-6	996,976	336,573
-6.5	835,437	309,663
-7	687,154	277,686
-7.5	556,205	246,411
-8	440,264	209,835
-8.5	341,992	183,456
-9	256,581	156,249
-9.5	184,461	132,399
-10	123,961	107,064
-10.5	75,973	85,185
-11	38,628	51,327
-11.5	16,249	38,412

Table 22: Lake 19-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	360,221	160,065
-0.5	283,395	147,330
-1	212,794	133,866
-1.5	150,823	114,210
-2	98,274	94,680
-2.5	55,599	76,140
-3	21,703	31,635
-3.5	8,554	21,276

Table 23: Lake 985

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	106,234	40,914
-0.5	86,360	38,592
-1	67,644	36,297
-1.5	50,480	32,436
-2	35,130	28,764
-2.5	22,038	23,598
-3	11,445	17,559
-3.5	4,342	11,160

Table 24: Lake 986

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	37,926	16,299
-0.5	30,295	14,220
-1	23,650	12,348
-1.5	17,841	10,917
-2	12,753	9,513
-2.5	8,385	8,046
-3	4,704	6,048
-3.5	2,032	4,653

Table 25: Lake 989

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	62,690	29,322
-0.5	48,842	26,073
-1	36,561	22,338
-1.5	26,256	18,891
-2	17,580	14,976
-2.5	10,895	11,817
-3	5,699	8,595
-3.5	2,181	5,616

Table 26: Lake 987

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	760,584	206,199
-0.5	660,430	194,562
-1	565,753	183,537
-1.5	476,918	171,882
-2	393,753	160,596
-2.5	318,065	142,254
-3	251,463	116,433
-3.5	197,446	100,071
-4	150,792	83,763
-4.5	112,205	70,776
-5	79,776	58,113
-5.5	53,942	45,423
-6	34,115	32,454
-6.5	20,002	24,156
-7	9,785	14,814
-7.5	3,695	9,630

Table 27: Lake 991

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	76,595	36,702
-0.5	59,409	32,085
-1	44,450	27,594
-1.5	31,736	23,274
-2	21,030	19,152
-2.5	12,573	14,697
-3	6,223	9,414
-3.5	2,372	6,093

Table 28: Lake LA20-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	940,089	324,144
-0.5	783,490	302,679
-1	637,283	271,242
-1.5	507,698	247,482
-2	389,431	222,093
-2.5	284,596	197,334
-3	192,027	157,527
-3.5	120,826	127,575
-4	64,244	90,423
-4.5	25,810	63,693

Table 29: Lake 990 (Fold Lake)

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	3,456,788	761,706
-0.5	3,087,385	716,427
-1	2,739,717	656,919
-1.5	2,423,106	609,525
-2	2,130,011	545,661
-2.5	1,870,827	491,571
-3	1,638,121	400,167
-3.5	1,453,581	339,399
-4	1,297,348	285,903
-4.5	1,158,719	268,677
-5	1,028,661	251,361
-5.5	907,323	233,991
-6	794,532	216,981
-6.5	689,551	202,869
-7	591,575	188,604
-7.5	500,912	173,979
-8	417,561	159,345
-8.5	341,565	144,666
-9	272,818	129,204
-9.5	213,107	109,845
-10	162,911	87,579
-10.5	122,816	72,927
-11	89,990	56,997
-11.5	64,197	46,296
-12	43,700	33,516
-12.5	28,675	26,550
-13	17,063	17,811
-13.5	9,378	13,059
-14	3,909	6,435
-14.5	1,383	3,843

Table 30: Lake 20-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	24,053,493	5,757,903
-0.5	21,274,098	5,359,257
-1	18,694,202	4,914,081
-1.5	16,327,151	4,554,369
-2	14,139,389	4,160,286
-2.5	12,143,103	3,824,901
-3	10,313,817	3,444,399
-3.5	8,671,863	3,124,656
-4	7,188,577	2,734,920
-4.5	5,892,489	2,450,403
-5	4,736,646	2,011,113
-5.5	3,800,296	1,737,054
-6	2,996,722	1,430,307
-6.5	2,332,005	1,230,615
-7	1,764,101	958,626
-7.5	1,324,398	802,566
-8	958,983	612,387
-8.5	682,383	495,297
-9	462,115	355,122
-9.5	303,961	279,081
-10	181,373	194,058
-10.5	96,468	146,736
-11	33,608	44,649
-11.5	14,164	33,363

Table 31: Lake 992 (Lower Long Lake)

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	3,525,249	893,646
-0.5	3,090,884	843,894
-1	2,681,132	794,889
-1.5	2,296,727	742,455
-2	1,938,558	684,441
-2.5	1,609,868	630,351
-3	1,308,061	570,294
-3.5	1,037,696	511,290
-4	796,388	428,427
-4.5	600,504	355,113
-5	441,327	242,514
-5.5	331,443	197,631
-6	243,202	131,913
-6.5	183,033	109,143
-7	133,905	84,798
-7.5	95,742	68,004
-8	65,674	49,887
-8.5	43,530	38,835
-9	26,637	26,559
-9.5	14,968	20,178
-10	6,340	9,612
-10.5	2,417	6,255

Note: results represent approximately half of the lake

Table 32: Lake LA21-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	761,896	256,878
-0.5	636,798	243,540
-1	518,164	230,571
-1.5	408,466	208,323
-2	309,761	184,896
-2.5	223,571	160,011
-3	149,502	131,949
-3.5	90,275	105,246
-4	43,945	61,821
-4.5	17,741	43,488

Table 33: Lake LA23-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	1,013,844	265,968
-0.5	883,593	255,177
-1	758,619	244,926
-1.5	638,981	233,838
-2	524,720	223,182
-2.5	417,547	205,551
-3	319,059	188,469
-3.5	231,584	161,847
-4	156,958	135,342
-4.5	97,169	104,409
-5	51,964	72,063
-5.5	21,204	51,399

Table 34: Lake LA21-1

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	406,055	204,606
-0.5	313,083	167,463
-1	238,330	125,316
-1.5	179,826	108,810
-2	129,313	92,871
-2.5	87,933	72,837
-3	56,168	50,058
-3.5	33,938	39,006
-4	17,084	25,722
-4.5	6,464	16,857

Table 35: Lake LA22-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	5,635,137	2,393,802
-0.5	4,482,867	2,216,070
-1	3,417,646	2,004,201
-1.5	2,486,972	1,719,324
-2	1,697,105	1,305,063
-2.5	1,119,971	1,006,281
-3	687,345	499,131
-3.5	461,891	403,263
-4	283,219	234,945
-4.5	178,423	184,986
-5	97,282	137,520
-5.5	38,910	96,624

Table 36: Lake 23-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	1,218,007	498,888
-0.5	978,980	457,965
-1	759,688	413,127
-1.5	565,653	363,042
-2	396,365	304,857
-2.5	255,928	256,743
-3	139,356	190,107
-3.5	57,778	137,799

Table 37: Lake 24-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	2,011,377	876,762
-0.5	1,593,705	794,241
-1	1,216,306	707,499
-1.5	885,350	616,248
-2	599,951	502,839
-2.5	370,232	417,114
-3	182,194	251,559
-3.5	74,529	180,648

Table 38: Lake 994

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	276,346	136,197
-0.5	211,157	124,704
-1	151,661	108,810
-1.5	101,855	90,432
-2	61,034	64,206
-2.5	33,180	47,628
-3	13,069	19,656
-3.5	4,999	12,825

Table 39: Lake 995

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	233,491	103,959
-0.5	184,607	91,971
-1	141,616	80,118
-1.5	105,172	65,538
-2	75,975	49,248
-2.5	53,340	41,301
-3	34,509	32,976
-3.5	19,729	26,199
-4	8,207	12,276
-4.5	3,137	8,127

Table 40: Lake 25-0 (Winter Road Lake 05)

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	1,713,886	483,390
-0.5	1,479,292	454,887
-1	1,258,717	423,630
-1.5	1,055,229	390,429
-2	868,241	330,912
-2.5	712,176	293,499
-3	574,202	257,418
-3.5	451,816	232,380
-4	341,796	204,354
-4.5	246,870	175,221
-5	166,488	126,810
-5.5	109,103	103,149
-6	63,042	61,848
-6.5	36,204	45,756
-7	16,933	11,070
-7.5	12,052	8,469
-8	8,414	6,066
-8.5	5,663	4,896
-9	3,483	3,753
-9.5	1,874	2,709
-10	757	1,224
-10.5	278	765

Table 41: Lake 996

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	43,840	26,253
-0.5	31,678	22,446
-1	21,286	18,900
-1.5	12,971	14,409
-2	6,832	8,010
-2.5	3,481	5,508
-3	1,240	2,079
-3.5	436	1,233

Table 42: Lake 26-0 (Winter Road Lake 06)

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	181,351	59,454
-0.5	154,336	48,852
-1	132,265	39,654
-1.5	113,597	35,064
-2	97,110	30,897
-2.5	82,370	28,089
-3	69,005	25,425
-3.5	57,094	22,320
-4	46,686	19,287
-4.5	37,659	16,812
-5	29,834	14,472
-5.5	23,043	12,771
-6	17,092	10,998
-6.5	12,014	9,297
-7	7,753	5,436
-7.5	5,320	4,320
-8	3,393	3,141
-8.5	2,024	2,358
-9	1,010	1,593
-9.5	372	1,017

Table 43: Lake 997

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	41,763	17,280
-0.5	33,611	15,246
-1	26,461	13,284
-1.5	20,335	11,277
-2	15,122	9,513
-2.5	10,772	7,875
-3	7,193	6,390
-3.5	4,381	4,842
-4	2,264	3,240
-4.5	911	2,214

Table 44: Lake 28-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	653,963	265,680
-0.5	528,349	236,736
-1	417,104	207,198
-1.5	321,078	177,165
-2	239,515	140,265
-2.5	174,734	119,358
-3	119,751	93,681
-3.5	77,451	75,375
-4	44,548	49,707
-4.5	23,042	36,387
-5	8,010	11,835
-5.5	3,093	7,965

Table 45: Lake 29-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	5,393,491	1,174,887
-0.5	4,817,050	1,131,201
-1	4,262,173	1,080,720
-1.5	3,737,917	1,015,686
-2	3,246,825	921,393
-2.5	2,804,519	847,629
-3	2,399,386	757,305
-3.5	2,039,176	683,649
-4	1,715,040	594,387
-4.5	1,432,061	537,903
-5	1,176,592	472,086
-5.5	955,205	414,081
-6	761,770	348,588
-6.5	600,293	298,143
-7	462,858	233,271
-7.5	355,325	197,280
-8	264,767	151,047
-8.5	195,440	126,801
-9	137,826	102,753
-9.5	92,119	80,523
-10	56,906	52,065
-10.5	34,308	38,700
-11	17,925	26,217
-11.5	7,001	17,721

Table 46: Lake 998

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	125,763	46,809
-0.5	103,848	40,851
-1	84,747	35,496
-1.5	68,045	31,401
-2	53,343	27,126
-2.5	40,766	23,247
-3	30,037	19,116
-3.5	21,351	15,615
-4	14,376	12,312
-4.5	8,942	9,630
-5	4,748	6,426
-5.5	1,948	4,725

Table 47: Lake 30-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	1,683,771	927,360
-0.5	1,258,362	778,509
-1	900,580	370,440
-1.5	724,696	333,720
-2	566,741	294,957
-2.5	429,027	256,815
-3	309,111	201,456
-3.5	216,433	169,920
-4	138,546	127,656
-4.5	81,453	101,151
-5	36,825	50,634
-5.5	15,061	36,639

Table 48: Lake 30-4

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	101,926	48,825
-0.5	79,011	42,921
-1	58,908	37,179
-1.5	42,092	30,240
-2	28,590	23,796
-2.5	18,087	18,225
-3	10,211	10,035
-3.5	5,873	7,398
-4	2,787	4,374
-4.5	1,021	2,718

Table 49: Lake 31-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	2,779,474,304	82,758,231
-0.5	2,738,286,322	81,993,276
-1	2,697,479,161	81,173,871
-1.5	2,657,060,478	80,500,122
-2	2,616,978,541	79,766,712
-2.5	2,577,275,942	79,043,760
-3	2,537,934,427	78,270,867
-3.5	2,498,976,729	77,559,606
-4	2,460,374,524	76,781,853
-4.5	2,422,167,580	76,045,545
-5	2,384,328,503	75,273,336
-5.5	2,346,852,319	74,632,995
-6	2,309,694,851	73,976,832
-6.5	2,272,843,941	73,428,219
-7	2,236,266,110	72,845,262
-7.5	2,199,978,270	72,306,963
-8	2,163,957,904	71,748,549
-8.5	2,128,208,323	71,249,652
-9	2,092,707,373	70,744,662
-9.5	2,057,462,312	70,235,793
-10	2,022,471,385	69,723,927
-10.5	1,987,739,440	69,204,159
-11	1,953,266,573	68,684,013
-11.5	1,919,046,272	68,198,400
-12	1,885,068,199	67,705,983
-12.5	1,851,334,569	67,228,920

Table 49: Lake 31-0 (continued)

Lake Volume and Surface Area Per Depth		
-13	1,817,838,881	66,697,659
-13.5	1,784,611,758	66,210,417
-14	1,751,627,867	65,717,829
-14.5	1,718,882,776	65,263,140
-15	1,686,364,164	64,808,766
-15.5	1,654,084,897	64,309,302
-16	1,622,054,442	63,761,085
-16.5	1,590,297,568	63,265,374
-17	1,558,788,025	62,746,614
-17.5	1,527,535,319	62,264,043
-18	1,496,522,874	61,762,707
-18.5	1,465,765,321	61,268,445
-19	1,435,253,763	60,769,143
-19.5	1,404,995,684	60,263,793
-20	1,374,989,744	59,751,288
-20.5	1,345,249,489	59,210,694
-21	1,315,778,729	58,660,461
-21.5	1,286,584,459	58,117,185
-22	1,257,661,383	57,566,655
-22.5	1,229,012,381	57,030,012
-23	1,200,631,288	56,477,808
-23.5	1,172,533,740	55,912,635
-24	1,144,717,715	55,346,733
-24.5	1,117,200,617	54,721,701
-25	1,089,995,211	54,093,960
-25.5	1,063,111,477	53,442,306
-26	1,036,552,135	52,792,983
-26.5	1,010,316,014	52,152,156
-27	984,399,486	51,509,538
-27.5	958,815,565	50,828,094
-28	933,570,502	50,145,750
-28.5	908,670,006	49,457,457
-29	884,111,981	48,772,368
-29.5	859,900,511	48,074,625
-30	836,036,328	47,279,367
-30.5	812,565,571	46,607,166
-31	789,426,176	45,925,938
-31.5	766,625,128	45,280,584
-32	744,143,346	44,571,042
-32.5	722,006,980	43,975,332
-33	700,167,379	43,382,241
-33.5	678,627,297	42,778,629

Table 49: Lake 31-0 (continued)

Lake Volume and Surface Area Per Depth		
-34	657,388,064	42,176,700
-34.5	636,455,412	41,554,566
-35	615,832,872	40,931,937
-35.5	595,521,309	40,315,581
-36	575,516,794	39,702,060
-36.5	555,810,028	39,125,016
-37	536,390,699	38,547,693
-37.5	517,270,174	37,934,649
-38	498,455,270	37,322,379
-38.5	479,949,509	36,701,775
-39	461,752,823	36,082,944
-39.5	443,862,015	35,480,250
-40	426,271,732	34,876,053
-40.5	408,991,697	34,243,875
-41	392,027,236	33,613,353
-41.5	375,357,554	33,065,784
-42	358,961,388	32,516,379
-42.5	342,841,389	31,964,148
-43	326,996,676	31,414,347
-43.5	311,425,290	30,871,422
-44	296,124,835	30,327,417
-44.5	281,090,826	29,809,215
-45	266,315,475	29,291,625
-45.5	251,799,364	28,772,748
-46	237,542,200	28,252,341
-46.5	223,568,690	27,641,682
-47	209,899,524	27,030,564
-47.5	196,562,608	26,317,629
-48	183,580,647	25,575,021
-48.5	171,007,519	24,720,444
-49	158,858,197	23,844,411
-49.5	147,142,961	23,019,183
-50	135,836,868	22,053,330
-50.5	125,044,753	21,117,474
-51	114,717,209	20,171,889
-51.5	104,882,606	19,168,425
-52	95,546,830	18,123,930
-52.5	86,725,970	17,161,929
-53	78,382,597	16,124,526
-53.5	70,550,222	15,209,154
-54	63,168,664	14,290,947
-54.5	56,242,766	13,416,732

Table 49: Lake 31-0 (continued)

Lake Volume and Surface Area Per Depth		
-55	49,748,780	12,454,083
-55.5	43,766,641	11,480,868
-56	38,262,036	9,984,519
-56.5	33,494,892	9,088,650
-57	29,168,416	8,002,602
-57.5	25,342,406	7,304,724
-58	21,860,302	6,573,060
-58.5	18,694,822	6,091,542
-59	15,766,101	5,604,417
-59.5	13,077,313	5,153,346
-60	10,610,749	4,659,732
-60.5	8,406,393	4,161,825
-61	6,444,473	3,645,792
-61.5	4,756,378	3,111,633
-62	3,327,705	2,489,598
-62.5	2,211,484	1,981,539
-63	1,340,252	1,264,635
-63.5	787,502	952,182
-64	382,210	551,313
-64.5	151,366	377,046

Table 50: Lake 999

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	13,130,162	1,645,029
-0.5	12,324,390	1,578,249
-1	11,551,678	1,504,566
-1.5	10,819,036	1,426,212
-2	10,124,845	1,342,953
-2.5	9,471,923	1,269,396
-3	8,855,337	1,192,131
-3.5	8,273,597	1,134,972
-4	7,720,226	1,074,447
-4.5	7,196,013	1,022,535
-5	6,697,821	965,898
-5.5	6,227,583	914,967
-6	5,782,681	855,180
-6.5	5,366,913	807,948
-7	4,974,531	749,808
-7.5	4,608,981	712,206
-8	4,261,919	667,332
-8.5	3,936,614	633,996
-9	3,627,776	599,787
-9.5	3,336,031	567,324
-10	3,060,269	515,619
-10.5	2,809,077	489,231
-11	2,571,030	460,863
-11.5	2,346,590	437,148
-12	2,133,688	397,755
-12.5	1,939,590	378,657
-13	1,754,894	358,821
-13.5	1,580,047	340,425
-14	1,414,333	322,128
-14.5	1,257,609	304,803
-15	1,109,556	287,262
-15.5	969,988	271,035
-16	838,528	254,754
-16.5	715,437	237,744
-17	600,816	219,321
-17.5	494,990	203,760
-18	396,851	188,118
-18.5	306,567	173,007
-19	223,659	112,086
-19.5	170,397	100,881
-20	122,628	81,927

Table 50: Lake 999 (continued)

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
-20.5	84,113	72,216
-21	50,359	62,487
-21.5	22,284	50,175

Table 51: Lake 31-1

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	70,470	34,803
-0.5	53,923	31,437
-1	39,034	28,197
-1.5	26,274	22,941
-2	16,035	14,895
-2.5	9,540	11,124
-3	4,806	6,885
-3.5	1,913	4,752

Table 52: Lake 31-2

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	137,368	55,377
-0.5	111,092	49,734
-1	87,524	43,290
-1.5	68,169	34,299
-2	52,909	22,995
-2.5	42,007	20,646
-3	32,218	18,522
-3.5	23,705	15,561
-4	16,557	12,969
-4.5	10,708	10,467
-5	6,040	8,172
-5.5	2,505	5,985

Table 53: Lake 32-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	21,976,529	3,747,375
-0.5	20,130,753	3,636,045
-1	18,339,977	3,518,766
-1.5	16,617,299	3,372,615
-2	14,966,675	3,218,004
-2.5	13,385,314	3,107,889
-3	11,858,153	2,995,722
-3.5	10,405,325	2,816,910
-4	9,039,923	2,641,860
-4.5	7,770,292	2,437,587
-5	6,601,351	2,226,348
-5.5	5,542,465	2,010,033
-6	4,590,286	1,790,037
-6.5	3,742,287	1,602,801
-7	2,986,697	1,408,995
-7.5	2,329,723	1,219,779
-8	1,766,071	1,032,291
-8.5	1,282,680	901,386
-9	864,349	742,716
-9.5	533,637	582,318
-10	280,019	383,598
-10.5	114,906	278,631

Table 54: Lake 33-0

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	270,935	124,371
-0.5	212,600	108,945
-1	161,855	87,570
-1.5	121,111	75,402
-2	86,426	58,716
-2.5	59,865	47,709
-3	38,572	36,459
-3.5	22,604	27,396
-4	11,012	15,255
-4.5	4,521	10,881

Table 55: Lake 34-0 (Lower Bathurst Inlet)

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
0	3,320,662,011	157,216,248
-0.5	3,242,285,412	156,296,529
-1	3,164,357,277	155,139,363
-1.5	3,087,175,952	153,595,260
-2	3,010,754,419	152,013,132
-2.5	2,935,337,834	149,661,963
-3	2,861,083,384	147,317,517
-3.5	2,787,866,353	145,558,773
-4	2,715,516,461	143,831,412
-4.5	2,644,168,880	141,559,281
-5	2,573,955,889	138,770,010
-5.5	2,505,117,971	136,589,616
-6	2,437,357,360	134,425,800
-6.5	2,370,739,815	132,051,222
-7	2,305,297,954	129,707,748
-7.5	2,241,084,611	127,158,525
-8	2,178,127,683	124,601,346
-8.5	2,116,626,591	121,407,669
-9	2,056,715,484	117,836,145
-9.5	1,998,611,273	114,569,469
-10	1,942,156,521	111,006,765
-10.5	1,887,443,003	107,868,915
-11	1,834,265,954	104,774,184
-11.5	1,782,515,939	102,239,658
-12	1,732,011,025	99,746,091
-12.5	1,682,747,632	97,322,355
-13	1,634,673,468	94,934,628
-13.5	1,587,841,099	92,418,390
-14	1,542,232,067	89,901,333
-14.5	1,497,855,760	87,615,594
-15	1,454,603,280	85,344,021
-15.5	1,412,437,213	83,337,822
-16	1,371,248,955	81,401,391
-16.5	1,330,951,001	79,797,096
-17	1,291,444,162	78,208,425
-17.5	1,252,743,067	76,603,950
-18	1,214,832,755	75,027,555
-18.5	1,177,719,168	73,436,157
-19	1,141,389,022	71,869,878
-19.5	1,105,835,767	70,359,318
-20	1,071,012,696	68,925,483

Table 55: Lake 34-0 (Lower Bathurst Inlet) (continued)

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
-20.5	1,036,903,801	67,520,178
-21	1,003,484,304	66,104,001
-21.5	970,767,886	64,767,087
-22	938,711,950	63,413,928
-22.5	907,299,980	62,239,320
-23	876,467,854	61,008,156
-23.5	846,253,173	59,857,542
-24	816,602,873	58,743,063
-24.5	787,524,687	57,575,763
-25	759,021,754	56,434,914
-25.5	731,092,489	55,285,002
-26	703,733,181	54,154,953
-26.5	676,913,254	53,126,199
-27	650,604,821	52,108,326
-27.5	624,783,781	51,175,593
-28	599,428,816	50,244,048
-28.5	574,533,210	49,339,089
-29	550,088,651	48,440,565
-29.5	526,087,209	47,566,152
-30	502,521,118	46,698,912
-30.5	479,422,657	45,698,769
-31	456,818,707	44,721,144
-31.5	434,722,343	43,668,513
-32	413,149,392	42,626,592
-32.5	392,102,798	41,562,108
-33	371,585,866	40,507,344
-33.5	351,609,916	39,399,894
-34	332,180,732	38,242,395
-34.5	313,348,528	37,089,666
-35	295,088,704	35,925,381
-35.5	277,429,392	34,716,213
-36	260,368,854	33,488,091
-36.5	243,935,626	32,248,809
-37	228,116,039	31,007,007
-37.5	212,876,735	29,953,134
-38	198,160,274	28,905,912
-38.5	183,963,137	27,884,169
-39	170,275,692	26,857,386
-39.5	157,100,529	25,846,137
-40	144,428,510	24,823,413
-40.5	132,289,859	23,734,530

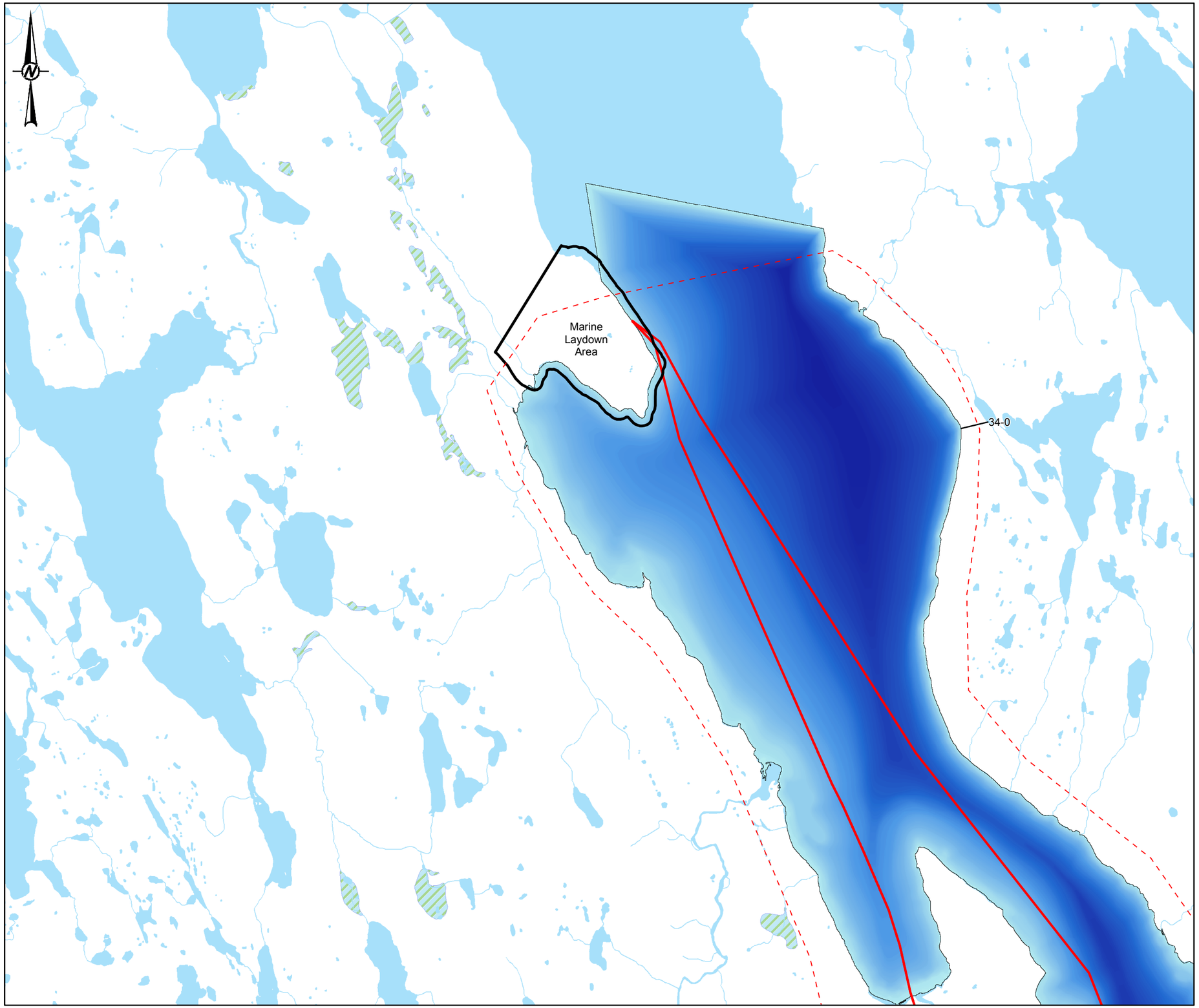
Table 55: Lake 34-0 (Lower Bathurst Inlet) (continued)

Lake Volume and Surface Area Per Depth

Elevation (m)	Cumulative Volume (m^3)	Cumulative Area (m^2)
-41	120,690,883	22,664,268
-41.5	109,614,224	21,645,522
-42	99,042,791	20,349,549
-42.5	89,120,186	19,343,151
-43	79,696,709	18,260,478
-43.5	70,870,760	17,047,413
-44	62,645,297	15,560,451
-44.5	55,193,891	14,252,175
-45	48,387,157	12,141,720
-45.5	42,569,731	11,134,899
-46	37,245,670	9,563,436
-46.5	32,665,660	8,762,805
-47	28,476,533	7,786,719
-47.5	24,748,249	7,133,058
-48	21,336,650	6,211,449
-48.5	18,354,386	5,719,374
-49	15,616,131	5,217,471
-49.5	13,113,823	4,793,148
-50	10,821,496	4,370,733
-50.5	8,744,070	3,940,920
-51	6,878,964	3,476,700
-51.5	5,234,537	3,103,515
-52	3,772,989	2,650,050
-52.5	2,559,532	2,208,681
-53	1,559,990	1,605,843
-53.5	840,334	1,277,856
-54	276,818	410,859
-54.5	107,940	270,522

APPENDIX B

Map of Water Sources for Ice Road Construction



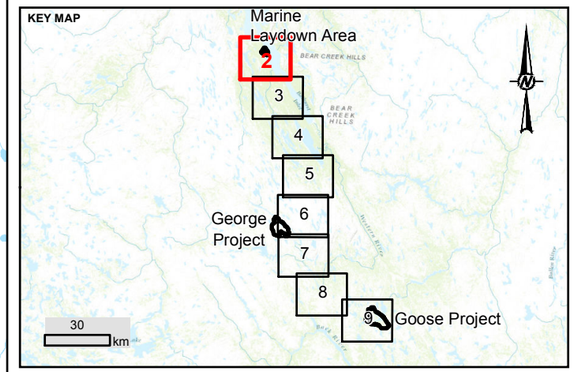
LEGEND

- MARINE LAYDOWN AREA
- WINTER ROAD
- WATERCOURSE
- LAKE EXTENT (DEPTH > 3.5M)
- PROJECT BOUNDARY
- WATERBODY
- WETLAND

BATHYMETRY (1 M INTERVAL)

0
-13
-26
-39
-52
-65

KEY MAP



0 1.5 3

1:75,000 KILOMETRES

NOTE(S)

1. TSF WRSA POND BREACHED TO GOOSE MAIN TF.

REFERENCE(S)

BATHYMETRY DATA PROVIDED BY AEROQUEST. HYDROGRAPHY DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY.

PROJECTION: UTM ZONE 13N DATUM: NAD 83

YYYY-MM-DD	2018-02-05
DESIGNED	BDW
PREPARED	JG/RC
REVIEWED	
APPROVED	

CLIENT
SABINA GOLD & SILVER CORP.

CONSULTANT
Golder Associates

PROJECT
BACK RIVER PROJECT

TITLE
WATER SOURCES FOR WINTER ICE ROAD CONSTRUCTION FOR THE BACK RIVER PROJECT

PROJECT NO.	FIGURE	REV.
1776921/1300/1320	B2	A

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

PATH: \\golder.gds\calm\GIS\Active\CLIENT\SSA\BNA_SILVER\1776921\Mapping\MXD\General\Fig2-9_1776921_Winter_Road_Mapbook_20180119.mxd PRINTED ON: 2018-02-05 AT: 1:13:24 PM

33

32-0

34-0

31-2

31-1

999

31-0

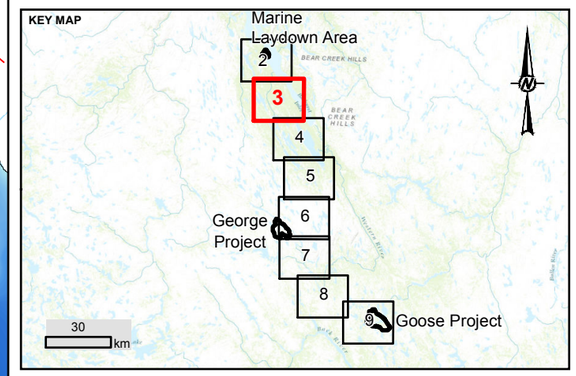
LEGEND

- WINTER ROAD
- WATERCOURSE
- LAKE EXTENT (DEPTH > 3.5M)
- PROJECT BOUNDARY
- WATERBODY
- WETLAND

BATHYMETRY (1 M INTERVAL)

0
-13
-26
-39
-52
-65

KEY MAP



0 1.5 3

1:75,000 KILOMETRES

NOTE(S)

1. TSF WRSA POND BREACHED TO GOOSE MAIN TF.

REFERENCE(S)

BATHYMETRY DATA PROVIDED BY AEROQUEST. HYDROGRAPHY DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY.

PROJECTION: UTM ZONE 13N DATUM: NAD 83

YYYY-MM-DD	2018-2-05
DESIGNED	BDW
PREPARED	JG/RC
REVIEWED	
APPROVED	

CLIENT
SABINA GOLD & SILVER CORP.

CONSULTANT
Golder Associates

PROJECT
BACK RIVER PROJECT

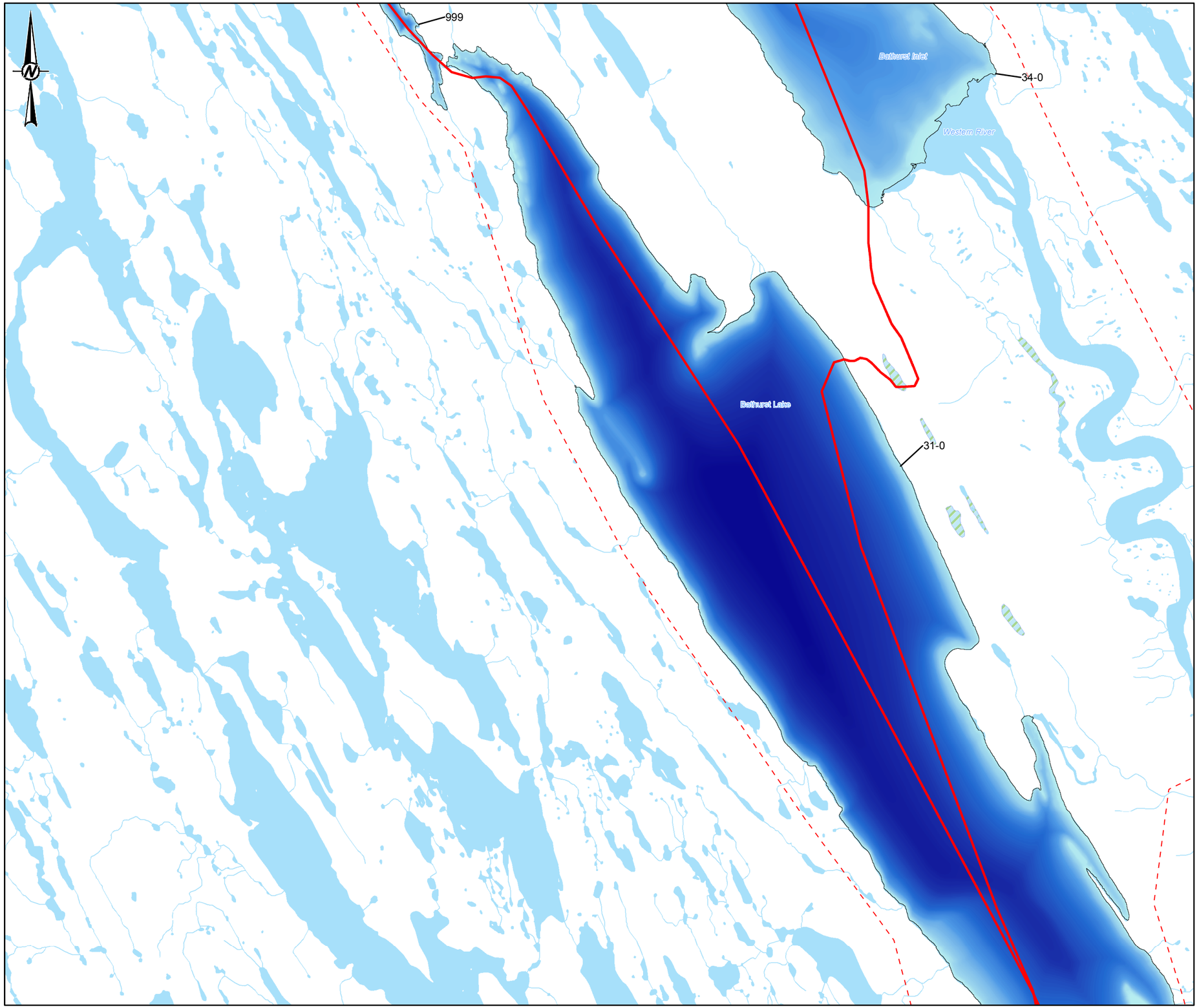
TITLE
WATER SOURCES FOR WINTER ICE ROAD CONSTRUCTION FOR THE BACK RIVER PROJECT

PROJECT NO.	FIGURE	REV.
1776921/1300/1320	B3	A

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

PATH: \\golder.gds\calm\GIS\Active\CLIENTS\SABINA_SILVER\1776921\Mapping\MXD\General\Fig2-9_1776921_Winter_Road_Mapbook_20180119.mxd PRINTED ON: 2018-02-05 AT: 1:13:54 PM

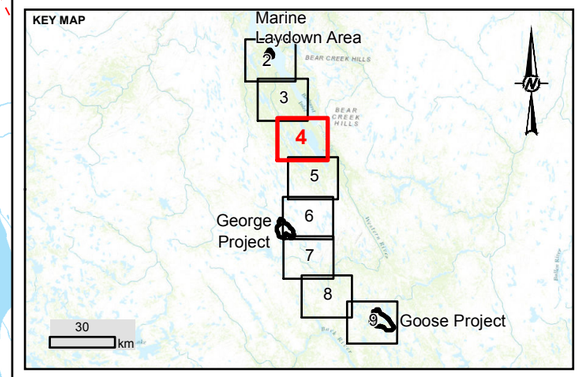


LEGEND

- WINTER ROAD
- WATERCOURSE
- LAKE EXTENT (DEPTH > 3.5M)
- PROJECT BOUNDARY
- WATERBODY
- WETLAND

BATHYMETRY (1 M INTERVAL)

0
-13
-26
-39
-52
-65



0 1.5 3

1:75,000 KILOMETRES

NOTE(S)

1. TSF WRSA POND BREACHED TO GOOSE MAIN TF.

REFERENCE(S)

BATHYMETRY DATA PROVIDED BY AEROQUEST. HYDROGRAPHY DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY.

PROJECTION: UTM ZONE 13N DATUM: NAD 83

YYYY-MM-DD	2018-02-05
DESIGNED	BDW
PREPARED	JG/RC
REVIEWED	
APPROVED	

CLIENT
SABINA GOLD & SILVER CORP.

CONSULTANT
Golder Associates

PROJECT
BACK RIVER PROJECT

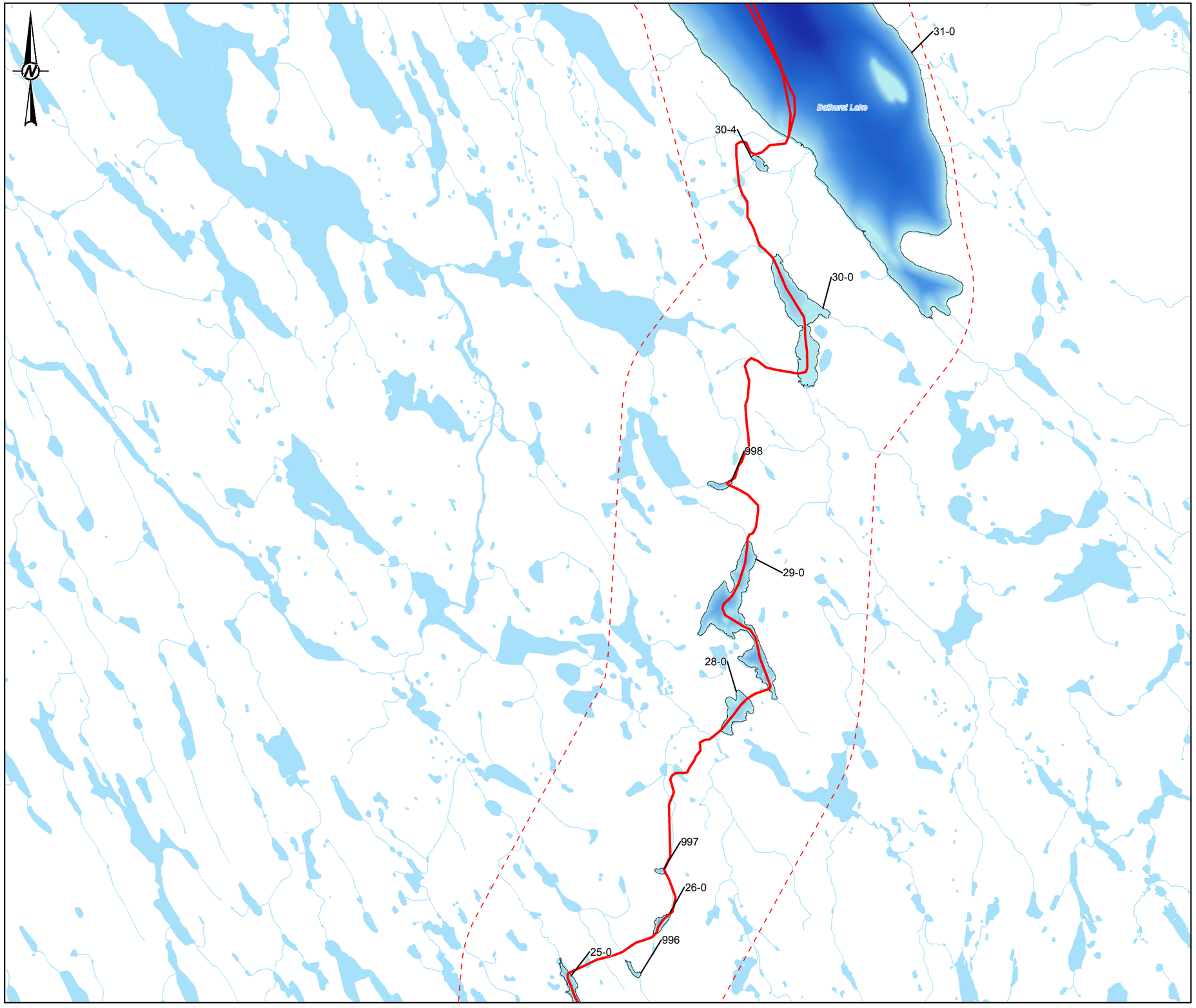
TITLE
WATER SOURCES FOR WINTER ICE ROAD CONSTRUCTION FOR THE BACK RIVER PROJECT

PROJECT NO.	FIGURE	REV.
1776921/1300/1320	B4	A

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

PATH: \\golder.gds\calm\GIS\Active\CLIENTS\SABINA_SILVER\1776921\Mapping\MXD\General\Fig2-9_1776921_Winter_Road_Mapbook_20180119.mxd PRINTED ON: 2018-02-05 AT: 1:14:23 PM



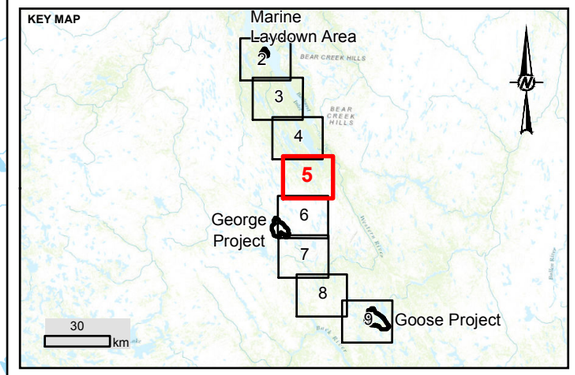
LEGEND

- WINTER ROAD
- WATERCOURSE
- LAKE EXTENT (DEPTH > 3.5M)
- PROJECT BOUNDARY
- WATERBODY
- WETLAND

BATHYMETRY (1 M INTERVAL)

0
-13
-26
-39
-52
-65

KEY MAP



0 1.5 3

1:75,000 KILOMETRES

NOTE(S)

1. TSF WRSA POND BREACHED TO GOOSE MAIN TF.

REFERENCE(S)

BATHYMETRY DATA PROVIDED BY AEROQUEST. HYDROGRAPHY DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY.

PROJECTION: UTM ZONE 13N DATUM: NAD 83

YYYY-MM-DD	2018-02-05
DESIGNED	BDW
PREPARED	JG/RC
REVIEWED	
APPROVED	

CLIENT
SABINA GOLD & SILVER CORP.

CONSULTANT
Golder Associates

PROJECT
BACK RIVER PROJECT

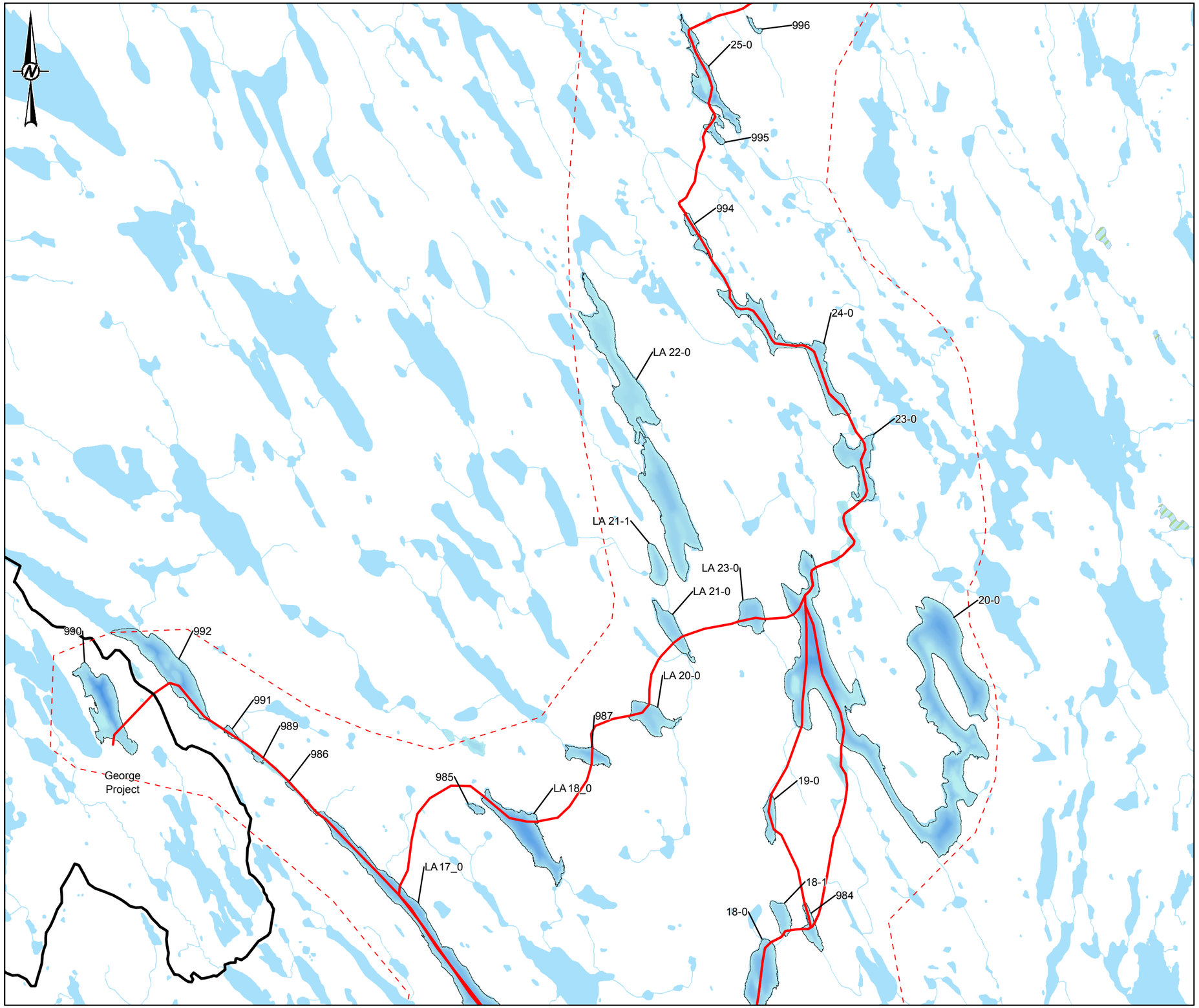
TITLE
WATER SOURCES FOR WINTER ICE ROAD CONSTRUCTION FOR THE BACK RIVER PROJECT

PROJECT NO.	FIGURE	REV.
1776921/1300/1320	B5	A

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

PATH: \\golder.gds\calgm\GIS\Active\CLIENTS\SAB\NA_SILVER\1776921\Mapping\MXD\General\Fig2-9_1776921_Winter_Road_Mapbook_20180119.mxd PRINTED ON: 2018-02-05 AT: 1:14:37 PM

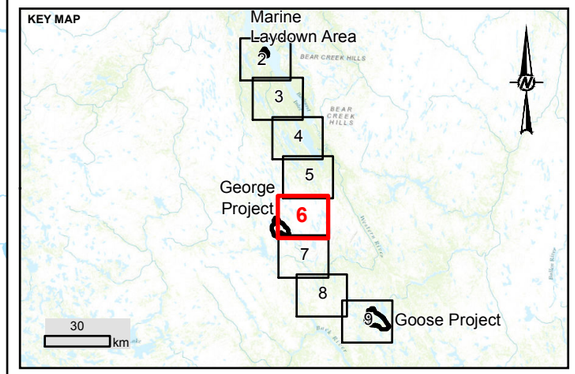


LEGEND

- GEORGE PROPERTY AREA
- WINTER ROAD
- WATERCOURSE
- LAKE EXTENT (DEPTH > 3.5M)
- PROJECT BOUNDARY
- WATERBODY
- WETLAND

BATHYMETRY (1 M INTERVAL)

0
-13
-26
-39
-52
-65



0 1.5 3

1:75,000 KILOMETRES

NOTE(S)

1. TSF WRSA POND BREACHED TO GOOSE MAIN TF.

REFERENCE(S)

BATHYMETRY DATA PROVIDED BY AEROQUEST. HYDROGRAPHY DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY.

PROJECTION: UTM ZONE 13N DATUM: NAD 83

YYYY-MM-DD	2018-02-05
DESIGNED	BDW
PREPARED	JG/RC
REVIEWED	
APPROVED	

CLIENT
SABINA GOLD & SILVER CORP.

CONSULTANT
Golder Associates

PROJECT
BACK RIVER PROJECT

TITLE
WATER SOURCES FOR WINTER ICE ROAD CONSTRUCTION FOR THE BACK RIVER PROJECT

PROJECT NO.	FIGURE	REV.
1776921/1300/1320	B6	A

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

0

PATH: \\golder.gds\cal\m\GIS\Active\CLIENTS\SABINA_SILVER\1776921\Mapping\MXD\General\Fig2-9_1776921_Winter_Road_Mapbook_20180119.mxd PRINTED ON: 2018-02-05 AT: 1:14:51 PM

George Project

George Project

984

18-0

LA17_0

16-1

17-0

16-0

15-0

14-1

14-0a

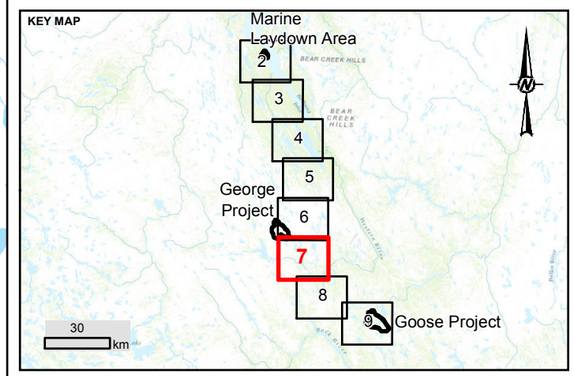
LEGEND

- GEORGE PROPERTY AREA
- WINTER ROAD
- WATERCOURSE
- LAKE EXTENT (DEPTH > 3.5M)
- PROJECT BOUNDARY
- WATERBODY
- WETLAND

BATHYMETRY (1 M INTERVAL)

0
-13
-26
-39
-52
-65

KEY MAP



0 1.5 3

1:75,000 KILOMETRES

NOTE(S)

1. TSF WRSA POND BREACHED TO GOOSE MAIN TF.

REFERENCE(S)

BATHYMETRY DATA PROVIDED BY AEROQUEST. HYDROGRAPHY DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY.

PROJECTION: UTM ZONE 13N DATUM: NAD 83

YYYY-MM-DD	2018-02-05
DESIGNED	BDW
PREPARED	JG/RC
REVIEWED	
APPROVED	

CLIENT
SABINA GOLD & SILVER CORP.

CONSULTANT
Golder Associates

PROJECT
BACK RIVER PROJECT

TITLE
WATER SOURCES FOR WINTER ICE ROAD CONSTRUCTION FOR THE BACK RIVER PROJECT

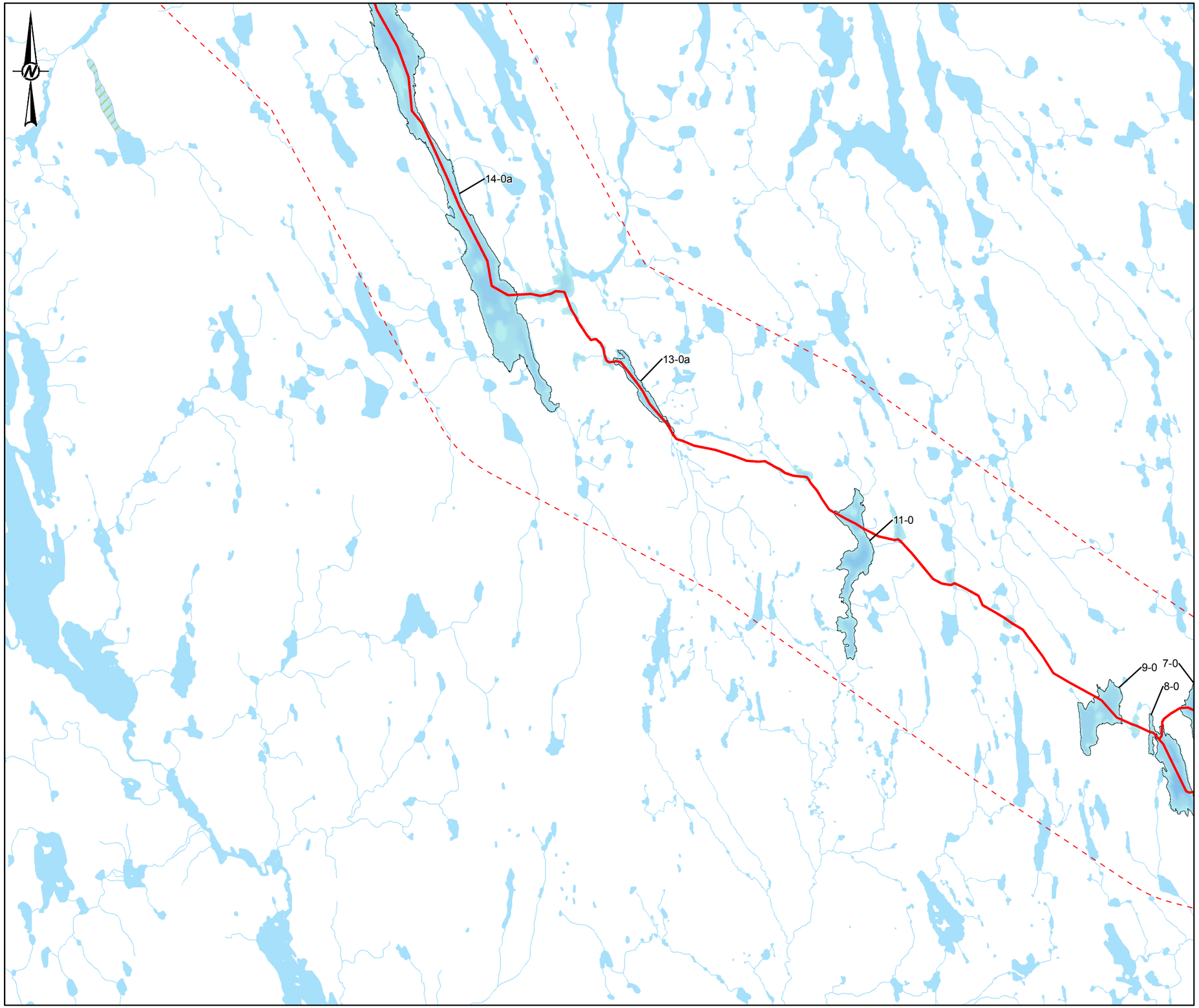
PROJECT NO.	FIGURE	REV.
1776921/1300/1320	B7	A

PATH: \\golder.gds\calmin\GIS\Active\CLIENTS\SABINA_SILVER\1776921\Mapping\MXD\General\Fig2-9_1776921_Winter_Road_Mapbook_20180119.mxd PRINTED ON: 2018-02-05 AT: 1:15:05 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

0



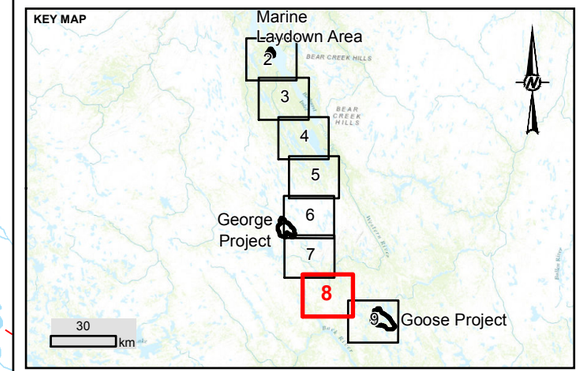
LEGEND

- WINTER ROAD
- WATERCOURSE
- LAKE EXTENT (DEPTH > 3.5M)
- PROJECT BOUNDARY
- WATERBODY
- WETLAND

BATHYMETRY (1 M INTERVAL)

0
-13
-26
-39
-52
-65

KEY MAP



0 1.5 3

1:75,000 KILOMETRES

NOTE(S)

1. TSF WRSA POND BREACHED TO GOOSE MAIN TF.

REFERENCE(S)

BATHYMETRY DATA PROVIDED BY AEROQUEST. HYDROGRAPHY DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY.

PROJECTION: UTM ZONE 13N DATUM: NAD 83

YYYY-MM-DD	2018-02-05
DESIGNED	BDW
PREPARED	JG/RC
REVIEWED	
APPROVED	

CLIENT
SABINA GOLD & SILVER CORP.

CONSULTANT
Golder Associates

PROJECT
BACK RIVER PROJECT

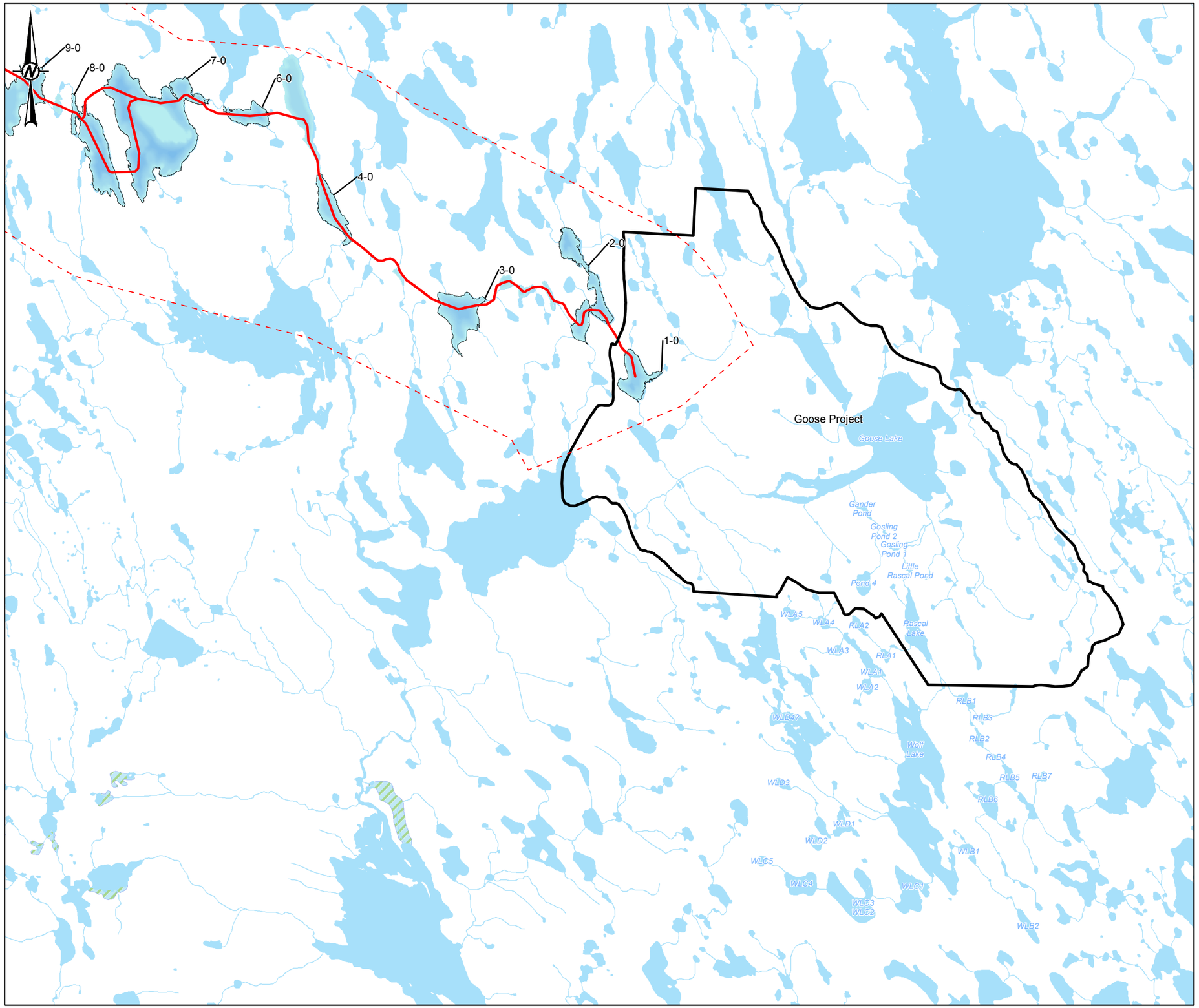
TITLE
WATER SOURCES FOR WINTER ICE ROAD CONSTRUCTION FOR THE BACK RIVER PROJECT

PROJECT NO.	FIGURE	REV.
1776921/1300/1320	B8	A

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

PATH: \\golder.gds\calim\GIS\Active\CLIENTS\SABINA_SILVER\1776921\Mapping\MXD\General\Fig2-9_1776921_Winter_Road_Maybrook_20190119.mxd PRINTED ON: 2018-02-05 AT: 1:15:19 PM



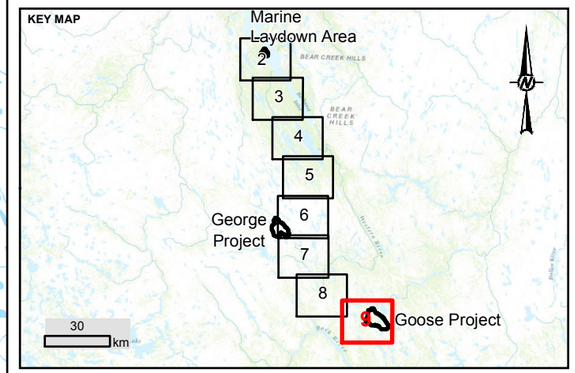
LEGEND

- GOOD PROPERTY AREA
- WINTER ROAD
- WATERCOURSE
- LAKE EXTENT (DEPTH > 3.5M)
- PROJECT BOUNDARY
- WATERBODY
- WETLAND

BATHYMETRY (1 M INTERVAL)

0
-13
-26
-39
-52
-65

KEY MAP



0 1.5 3

1:75,000 KILOMETRES

NOTE(S)

1. TSF WRSA POND BREACHED TO GOOSE MAIN TF.

REFERENCE(S)

BATHYMETRY DATA PROVIDED BY AEROQUEST. HYDROGRAPHY DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY.

PROJECTION: UTM ZONE 13N DATUM: NAD 83

YYYY-MM-DD	2018-02-05
DESIGNED	BDW
PREPARED	JG/RC
REVIEWED	
APPROVED	

CLIENT
SABINA GOLD & SILVER CORP.

CONSULTANT
Golder Associates

PROJECT
BACK RIVER PROJECT

TITLE
WATER SOURCES FOR WINTER ICE ROAD CONSTRUCTION FOR THE BACK RIVER PROJECT

PROJECT NO.	FIGURE	REV.
1776921/1300/1320	B9	A

PATH: \\golder.gds\calim\GIS\Active\CLIENTS\SABINA_SILVER\1776921\Mapping\MXD\General\Fig2-9_1776921_Winter_Road_Maybook_20180119.mxd PRINTED ON: 2018-02-06 AT: 1:15:34 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm