Water management workshop summary

Held on : March 19th 2024

Held at: WSP Canada Inc. 7250 rue du Mile End, 3rd Floor.

Montreal, Quebec, H2R 3A4 Canada

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Appendix List

1.0 Context and objectives

Troilus Gold understands the importance of water management and present and future land use to the projects cree stakeholders/rightholders. In an effort to be as transparent as possible as well as to gather and address concerns, questions and recommendations upstream of the Impact assessment study. The water management workshop regroups engineering, impact assessment consultants, Cree stakeholders and Troilus Gold representatives. The workshop is held to provide an overview of the Troilus Gold project to cree stakeholder/rightholders to address concerns/questions and receive recommendations to adapt the project according to comments received.

The 2024 water management workshop is a continuation of the first water management workshop that took place in 2022 where several water management options (particularly as it pertains to the Bibou stream deviation) were presented to the cree stakeholders/rightholders to receive their concerns and comments and to better advance the project to satisfy conditions stated by cree stakeholders and rightholders.

The present document is a representation of the information exchanged and gathered as well as action items to be addressed.

1.1 Participant List

Name	Organization	Participation method
Willie Hamilton	AGP	In person
Étienne Hudon	Blumetric	In person
Léonard Agassonoun	Blumetric	In person
Michael Melay	Blumetric	Online
Rich Schmidt	Blumetric	In person
Sara Magdouli	Blumetric	In person
Catherine Dickson	Cree health board	In person
Farah Désiré	Cree health board	In person
Paul Meillon	Cree health board	Online
Pamela Mcleod	Cree nation of Mistissini	Online
Patrick Wapachee	Cree nation of Mistissini	Online
Anna Krupa	Grand council of the crees	In person
Aurora Hernandez	Grand council of the crees	In person
Graeme Morin	Grand council of the crees	Online
George Awashish	Land user (M-34)	In person
Kenny Awashish	Land user (M-34)	In person

Samantha Awashish	Land User (M-34)	In person
James Neeposh	Land user (M-39a)	Online ?
Tony Petawabano	Land user (M-40)	In person
Kristina Maud-Bergeron	MU Conseil	In person
Émilie Charest	Stantec	In person
Guylaine Bois	Stantec	Online
Julie Massicotte	Stantec	In person
Catherine Stretch	Troilus gold	In person
Jacqueline Leroux	Troilus gold	In person
Marc Tremblay	Troilus gold	Online
Mathieu Michaud	Troilus gold	In person
Carl Pedneault	WSP	In person
Jonathan Friebel	WSP	In person
Mathieu Gosselin	WSP	In person
Vlad Rojanschi	WSP	In person

1.2 Schedule

The 2024 workshop schedule was organized in the following manner:

Time slot	Subject	Presentor	Comments	Slides
8h-8h15	Opening remarks	Mathieu Michaud-Land user for opening prayer	Thank participants, Reiterate importance of building good relationships and acknowledge importance accorded to water and traditional land use.	1-2
8h15-8h20	General rules	Mathieu Michaud	Explain rules for workshop; ensure participants this is a safe space t share their thought, concerns, and questions.	Slide 3
8h20-8h40	Presentation of participants	All	Round table-introducing participants; name, company and role in the FS or IA	Slide 4

8h40-8h50	Review objectives /schedule	Mathieu Michaud	Present different parts of the project	Slide 5
8h50-9h20	Part 1 -recap 2022 workshop and comments	Mathieu Michaud	Present 3 options, comments, and recommendations	Slides 6-17
9h20-10h	AGP-Mining plan	Willie Hamilton	Explain mining and storage sequence	AGP presentation
10h-10h15	**Coffee break**			
10h20 -11h20	WSP- surface water management plan	Vlad Rojanschi/Jonathan Friedel		WSP presentation 28 slides
11h20-12	WSP-water treatment	Vlad Rojanschi/Jonathan Friedel		WSP presentation 12 slides
12-1 PM	**Lunch**			
13h-14h	WSP-tailings management and hydrogeology	Mathieu Gosselin		17 slides
14-14h45h	Recap project changes since 2022-environmental characterization - TLG	Mathieu Michaud		Slides 18-37
14h45-15h	**Afternoon break**			
15h-16h	Work groups	Mathieu Michaud	Separate into predefined groups to discuss concerns, comments, recommendations (in table form)	Slides 38-41
16h-16h30	Presentation of working group concerns	All	We will answer questions where possible and ensure participants that we will follow up on points that could not be addressed at present.	
16h30	Closing remarks/prayer	TLG-Land users	Thank participants, maintain communication lines open, summary of meeting will be	Slide 42

			provided for accuracy of information noted.	

2.0 Main concerns

A list of the main concerns expressed by the participants and the responses from Troilus Gold and their consultants are listed below. Comments and concerns are in red and responses are in black

C: Are the boundaries, the waste pad, pond, are they animal- and land user-friendly? Will we be able to use them? Moose were using the territory before, they had corridors. After the closure, some wildlife activity has started again.

R: There is still a lot of work to do on the reclamation plan that will need to be submitted to the authorities. Some slopes can be smoothed, part of the site will be revegetated.

C: Has the circulation of fishes between lake Amont and Lake A been evaluated?

R: Biologists have said that it is unlikely that fishes would travel from one lake to the other with the creek. Connectivity between the two lakes will nonetheless be preserved.

C: It would be important to confirm the fish circulation. On other projects, we've seen that fishes travel more than we thought. Better data is needed.

C: Is there life in the pond at the top of the tailings?

R: There are aquatic organisms, but when we organized fish captures, we did not catch any with the methodology we used. We did not consider if it was a fish habitat.

C: The point is to know what is going to happen with it at the end of closure.

R: The closure plan will specify that. It is still in development. For now, the plan is for the area to be revegetated, and the slopes of the TSF would be reshaped. A channel would connect it in the north to the pit lake.

C: How are the slopes of the channel?

R: The slopes are planned to be 2:1.

C: What is the profile of the channel?

R: It is a concept of rock ramps with 2% slopes, which are fairly mild, and allow the fish to swim where water velocity would be high without the ramp.

C: The lake in the pit, can it become a normal lake? It would be a man-made lake; can the fish adapt to that?

R: There are still things to assess, but the pit lake could become a fish habitat if the slopes are reworked to allow it.

C: It seems unlikely that making a fish habitat in a man-made lake will be successful.

R: There are other cases where this has been done with much success, TLG will provide further information

C: How long would it take for the lake to fill?

R: Calculations have not been made yet, but the timeframe is close to 10-15 years and more based on conditions we are seeing presently with actual pits.

C: Is dewatering of the pits happening?

R: Yes, it is needed to do some drilling at the bottom of the pits. Both will be emptied and it will start before August.

C: When there is wind, the current pond becomes turbid. There should be a barrier or some water treatment for that.

R: We know that the pond contains very small particules and that the wind makes them resuspended in the water. One concept would be to cover the bottom of the pond.

C: Where are the reference points to ensure monitoring?

R: For lake Amont, we now have another lake further south, and a regional sampling in another lake. For each proposed diversion structure, we have a monitoring point

C: How high would the new structure be (the TSF)?

R: Around 400 meters.

C: It would be almost as high as the highest mountain in the area. It is important to understand that when we travelled the land, we had reference points, and so this landscape would be *transformed – it would be a whole different way to look at the region, it would be different from what my ancestors looked at, it is a big change in land form. There was a trading post at the other mountain, and stories that come with that; that will change. There will be a bigger mountain, I'm not sure what I'll be able to say about it, is it gonna be good? Beautiful? Am I gonna be able to say that? I'm able to say that about some places in the current site, but not being able to use some places… it gets to our health.*

The expansion of the mine is causing anxiety. My grandchildren will be the users of this land. We'll have to teach to the future generations what's gonna be accessible to them. Is it going to freeze, we'll it be safe? To think 7 generations ahead, it is not easy in these conditions. There may also be sacred places or places where our ancestors are buried that could be touched or transformed by the mine and its infrastructures.

C: Is it common to put back tailings in pits?

R: Yes, there is the Westwood mine and Canadian Malartic mine that are doing this or planning to do it. It has been done elsewhere too, but it cannot be done everywhere. In this project, since there are multiple pits, backfilling one pit while the other is being dug is possible and advisable to contribute to the restauration of the site and to avoid having other sites for the deposition of tailings. It is also a stable way to dispose of tailings. Governments are more and more inclined to ask for the backfilling of pits, and if it is not done, it has to be explained. Many more mines will use this form of tailing disposal in the future.

C: Will there be waste on top of the tailings?

R: Not in the current concept, but it could be a possibility because our analysis show that there is no metal release or acid generation potential.

C: What is planned for dust contamination and how is it related to silica risk?

R: The new baseline study will give us a better idea. We know that metals particules have a limited deposition range because they are heavier particles than fine dust. Silica is very common in earth crust so there needs to be a good maintenance program to reduce erosion and transportation of dust starting at construction.

C: We have to make sure that the dust from the previous operation does not go into the air. Who are the best experts to tell us how dangerous it will be?

R: We don't have all the answers now. The feasibility and impact study will address these issues.

C: The current dust situation, has it become less of an issue?

R: It is generally under control in the TSF, but it took a long time. From the mineral pile, there is a high concentration. The concerns are with the ground water, potential seepage, animals… Historical Dust contamination from mineral pile will be something that is addressed in new project by ensuring mineral pile and conveyors are covered unlike previous operation. TSF deposition plan will address dust potential during operation and progressive restoration during operation will be looked at especially for TSF and certain waste piles.

C: For the new project, would a solution be to cover the mineral pile?

From experience, the biggest problem during operations was the mineral pile.

We were never listened to [to find solutions]. They could have made a dome…

For 2 years after closure, there was a big cloud of dust. (It took up to 5 years after closure to really address dust situation on TSF)

C: What will be the water temperature, considering that one lake will be much deeper?

R: There are different depths, there will be a stratification in the water. Our impact study for the dewatering of the pits addressed this for the actual dewatering project but new studies will need to be done for future pits. There is a thermal stratification in water bodies especially deep ones. It is possible to have structures that will be bring water temperature closer to ambient temperature when it is discharged, like waterfalls and cascades.

2.1 Main recommendations

Main recommendations issued by participants are stated below in red;

Maintaining the whole diversion channel would prevent another disruption for species that would have adapted to this new passage. It would be preferable than to redirecting them through another artificial passage, through the pit lake.

Organize a site visit with the consultants, to see what is happening on site and how it would change.

Do a fish contamination study to give us an idea of the situation before operations start again.

Keep the 2 lakes connected.

Disturbing the land is not well seen. If nature has already taken over, why change it again?

More information on man made fish habitat is required.

Animal passage through mine site must be considered and built into design: Large game like moose and bear should be able to travel through mine site without risk.

Consider progressive restoration for TSF and waste piles.

Ensure Waste piles slopes are not too steep.

Awashish camp relocation is key for project support; actual camps are way to close to actual mining infrastructure so future mining infrastructure would pose risk to present land users if not relocated.

2.2 Other comments & questions

Other comments and questions are listed below in red, when answers were given they are noted in black below.

C: Water is very important and Troilus operations can affect it in the long term. It is important to have the right planning for water and the mine, so that we can pass this land on to the next generations.

C: How was the design modified so that the dyke is eliminated, and the level of Lake Amont is not going to be elevated?

R: There was a better use of topography, slopes. The part of the stream that has to be dismantled for security aspects after closure is also a new aspect related to eliminating the proposed dyke.

C: How deep will the pit be in the end?

It will be 100 to 150 meters deep in the deepest part of J4-87 , with shallower parts if we go ahead with deposition of tailings in the pits. Southwest pit would be completely full and covered. If no deposition in pits, 87 pit would be around 500 meters deep.

C: Will the fresh water be pumped out of lake A?

R: Yes. The fresh water will be less than 10% of the total water feed.

C: Compared to the previous options that were presented to us, the channel connecting the 2 lakes is the best solution I've seen to keep the 2 lakes connected

C: There are hardly any migrating caribou in the area. Moose had a passage and are now again coming in. Moose would probably use a 15- to 30-meter-wide corridor if the slopes are gentle enough.

C: Even if we tried different things to hunt geese on the TSF pond, our natural hunting ponds are still better.

C: Bears eat grass in the spring, before that, they go to fish spawning sites.

C: It is established that the cabin at lake A will be moved by Troilus.

C: The noise has an impact on relaxation and hunting, some of the reasons why we go on the territory.

C: Traffic increases safety risks.

3.0 Action Items

Action items and their proposed timelines are described below

Action item	Timeline	Responsible	Comment
Identify the options to make the diversion channel permanent (for the part that was going to be decommissioned).	Impact study -2024	Troilus-WSP	We will present option analysis comparing the two options- Keeping northern part of deviation permanent would however be a long-term risk that might not be accepted by Ministry or satisfy engineering standards
Maximize backfilling the pits.	Impact study 2024	Troilus	Will be based on mining sequence and how to optimize disposal in pits
Revegetate the TSF as soon as possible.	Impact study-Closure plan	Troilus	Troilus will work on closure plan with progressive restoration option so that TSF could be revegetated during operation
Look at what can be done to facilitate wildlife access, allowing moose to cross.	Impact Study-Closure Plan	Troilus	
Study water temperature in the Environmental impact study.	Impact Study	Troilus	
Look at what can be done to have fish habitat in the pit lake.	Underway	Troilus	
Confirm there will be no acid drainage.	Underway	Troilus	

Confirm that vegetation can grow on tailings and waste rock piles	Impact study	Troilus	
Since the TSF pond is not seen as providing much value for land users keeping a basin on the TSF should be reevaluated	Impact study	Troilus	New project does not include basin on TSF at closure
Address the dust issue.	Impact study	Troilus	
Waste from the work camp needs to be reduced; compost and recycling could help.	Option analysis underway	Troilus	
Organize Mine site visit -comparable project to the one being proposed	Summer-fall 2024	Troilus	Malartic mine is open for visits-Trolus will look into potential dates and coordinate with advisory committee for visit
Organize site visit with land users and Troilus to look at proposed infrastructure on site	Summer-fall 2024	Troilus	Troilus will propose date for site visit sometime summer-fall 2024

Appendix A- AGP -Mining sequencing ppt

Troilus Mining Activities

March 19, 2024

Mining Summary

Mine life

- 2 years pre-production (before plant production)
- 21 years of mining in pits once plant in production
- Process rate is 50,000 tonnes per day
- Mill feed continues into Year 22 using stockpile ore

Equipment

- 230 tonne haul trucks
- 34 m^3 electric hydraulic front shovels
- Electric primary drills with diesel support drill

Open Pits

- 87 pit, expansion of existing pit
- SW pit, new mining area to south
- J pit, expansion of existing pit
- X22 pit, new mining area next to 87 pit

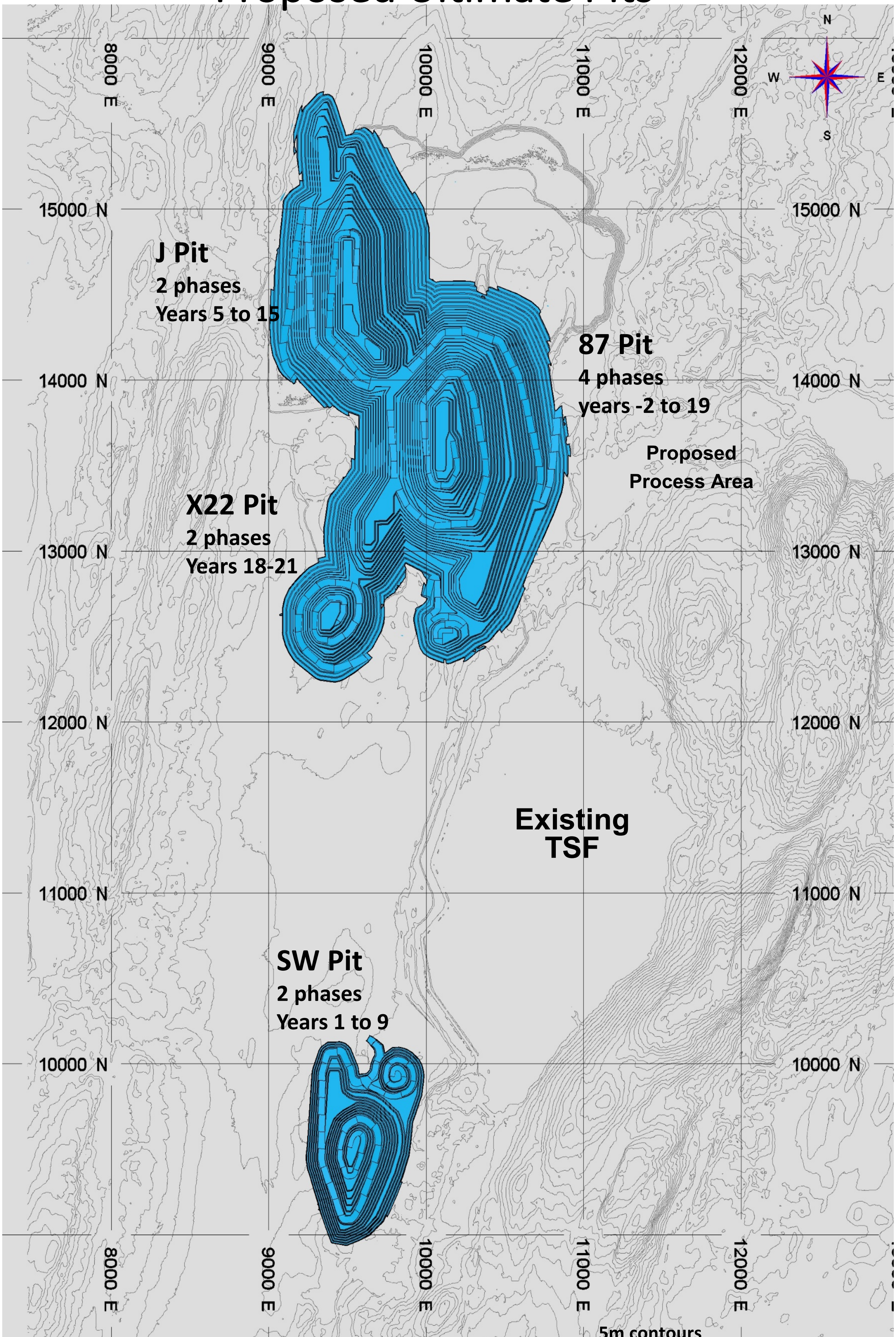
Material mined and processed

- 1,171 Mt waste (rock = 1099Mt, overburden = 72Mt)
- 380 Mt ore
  - 0.49 g/t gold
  - 0.06 % copper
  - 1.0 g/t silver

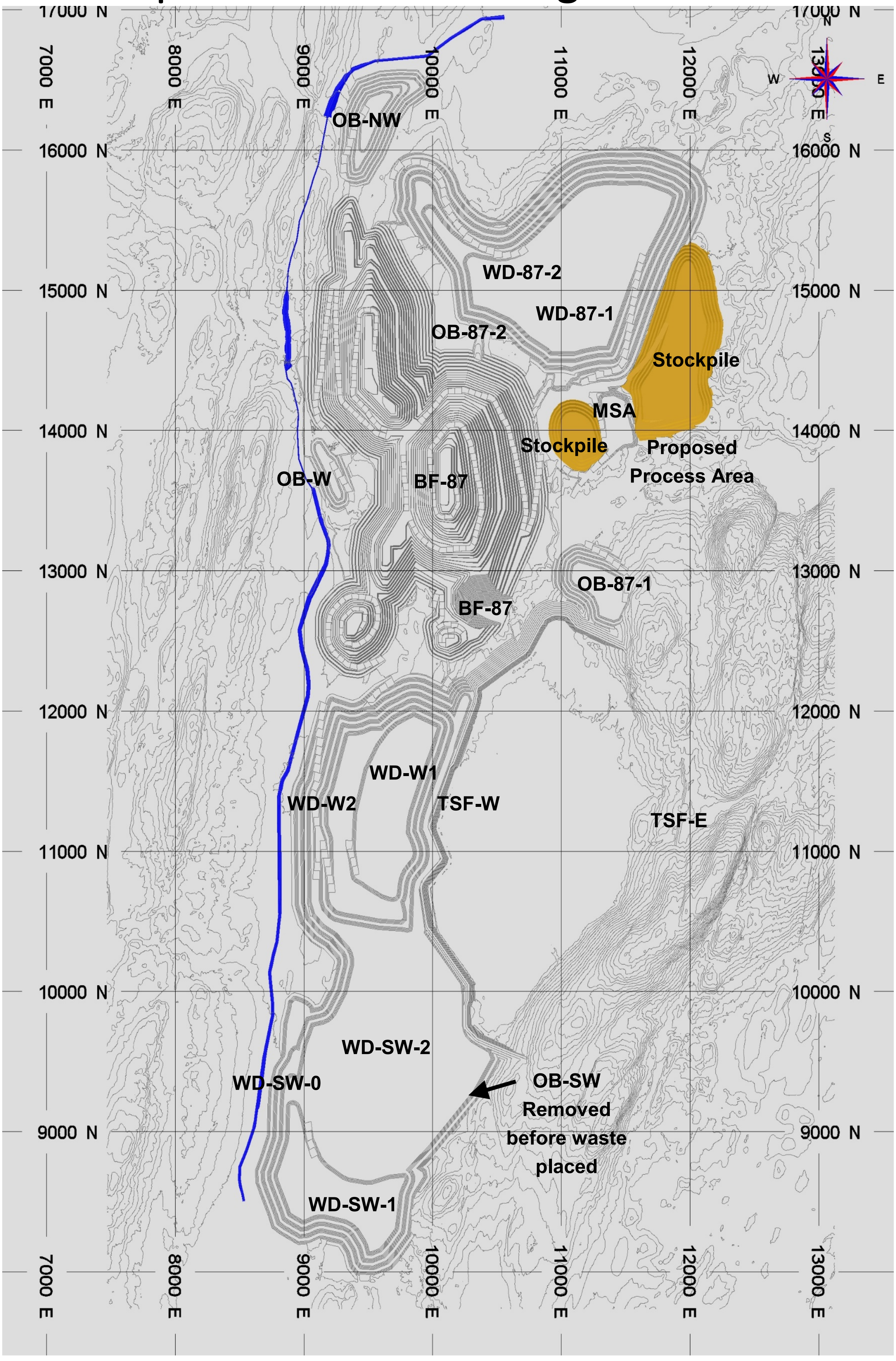
Stockpiles

- Small high-grade stockpile to west of plant
- Larger low-grade stockpile to northeast of plant

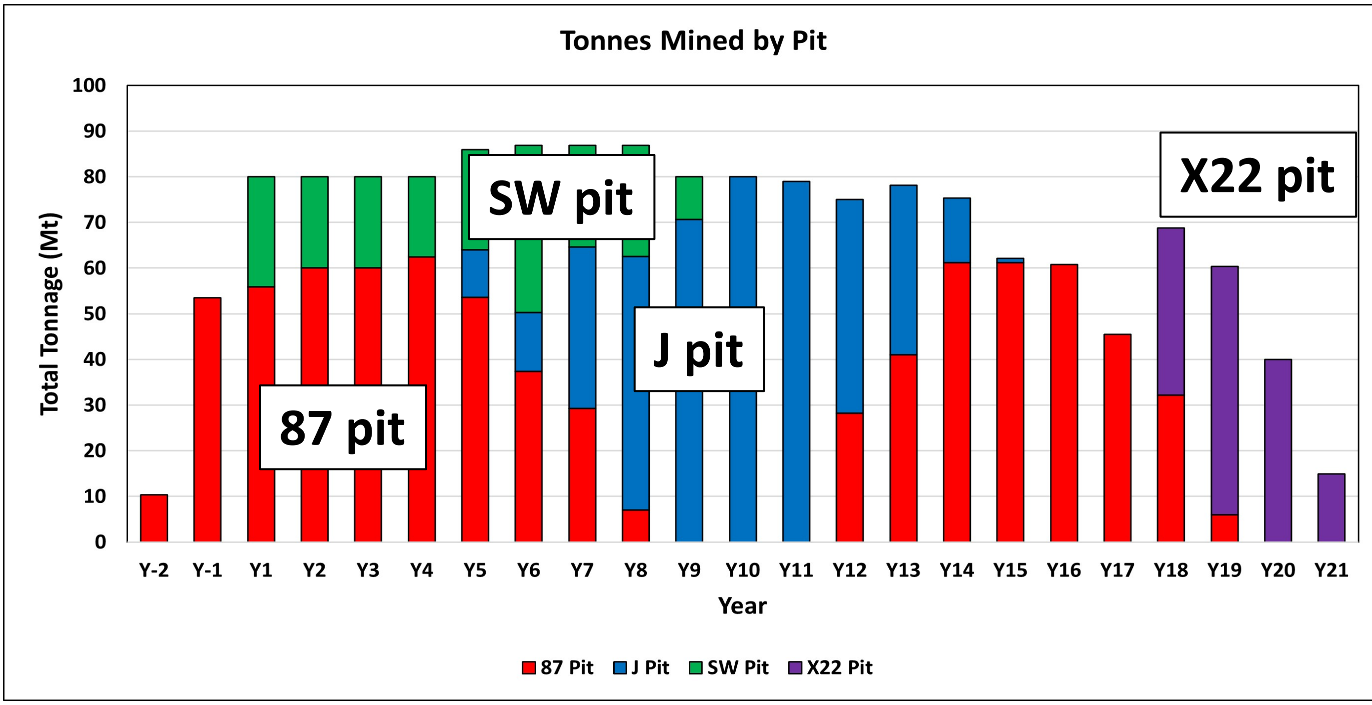
Proposed Ultimate Pits

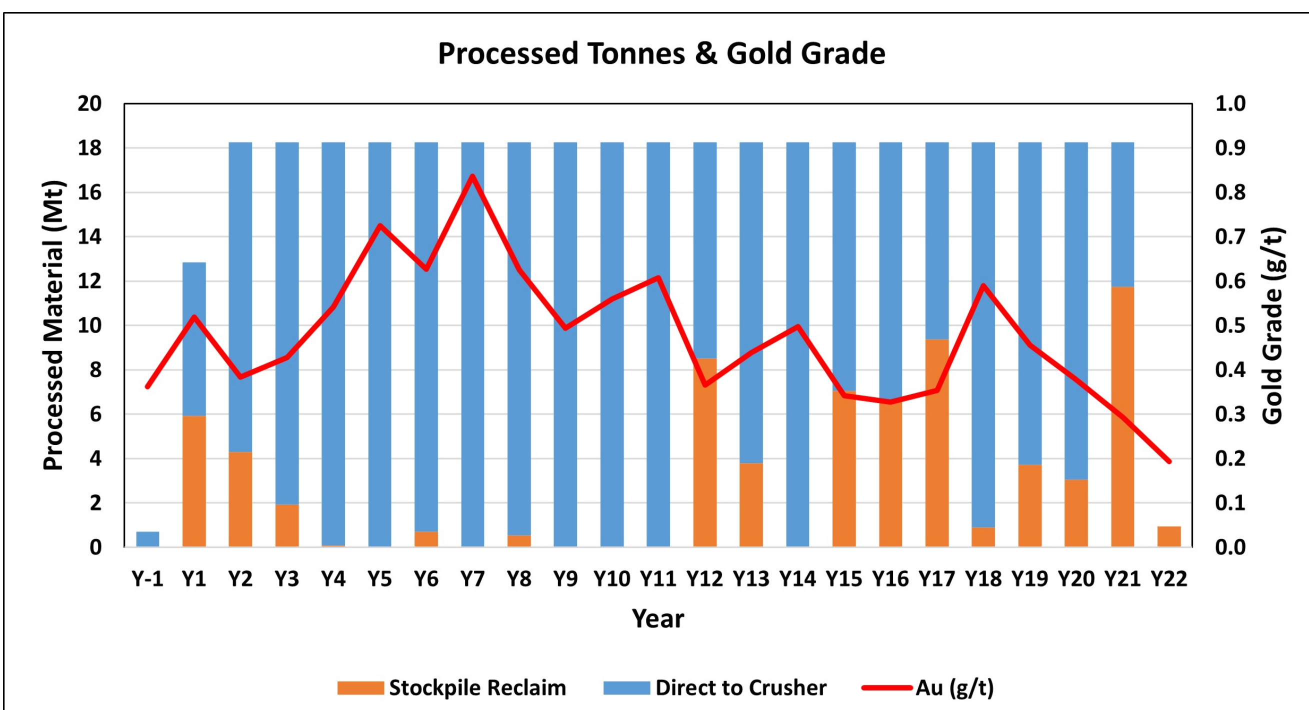


Proposed Material Storage Facilities



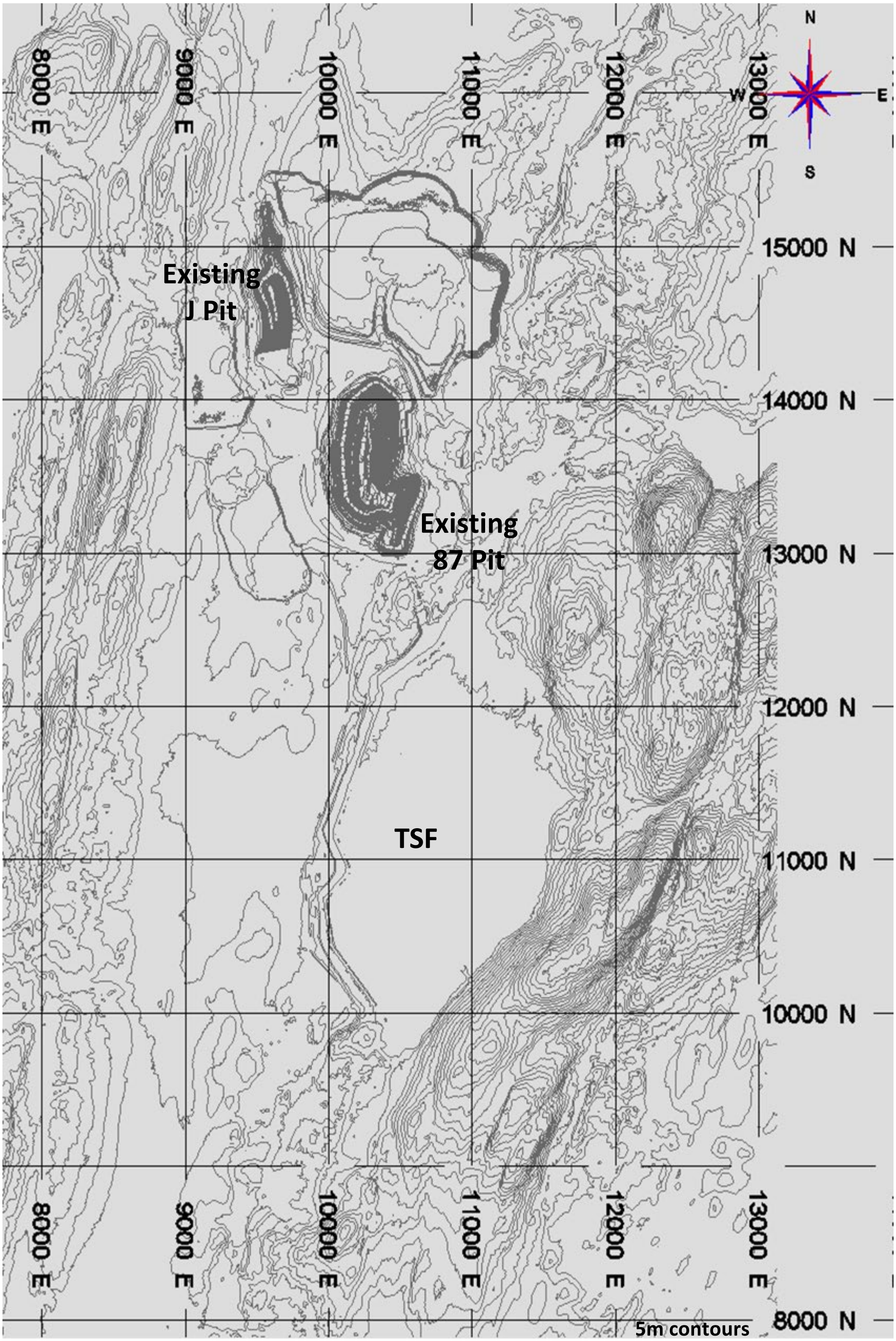
Mined and Process Tonnages



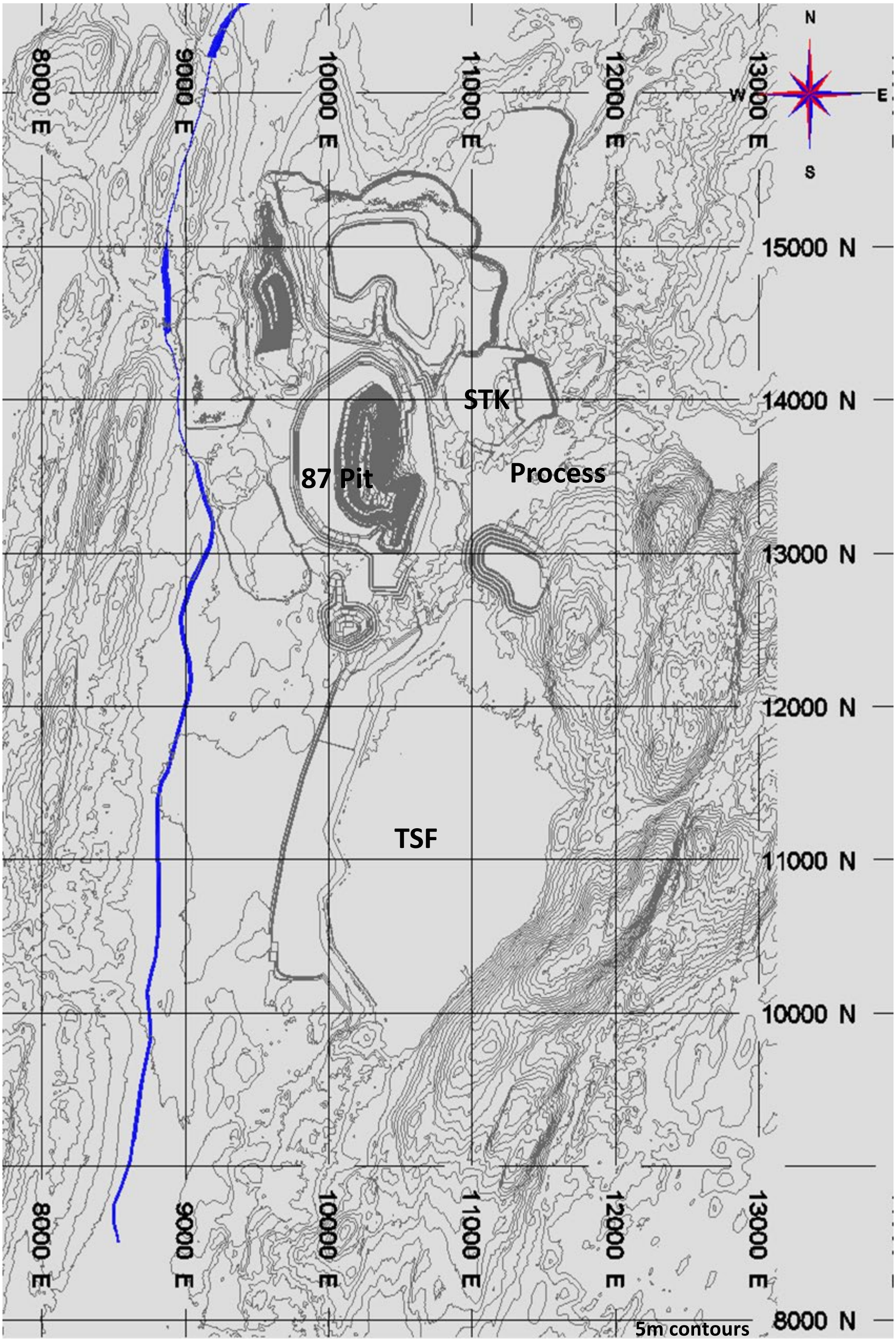


Mine Sequence

before mining

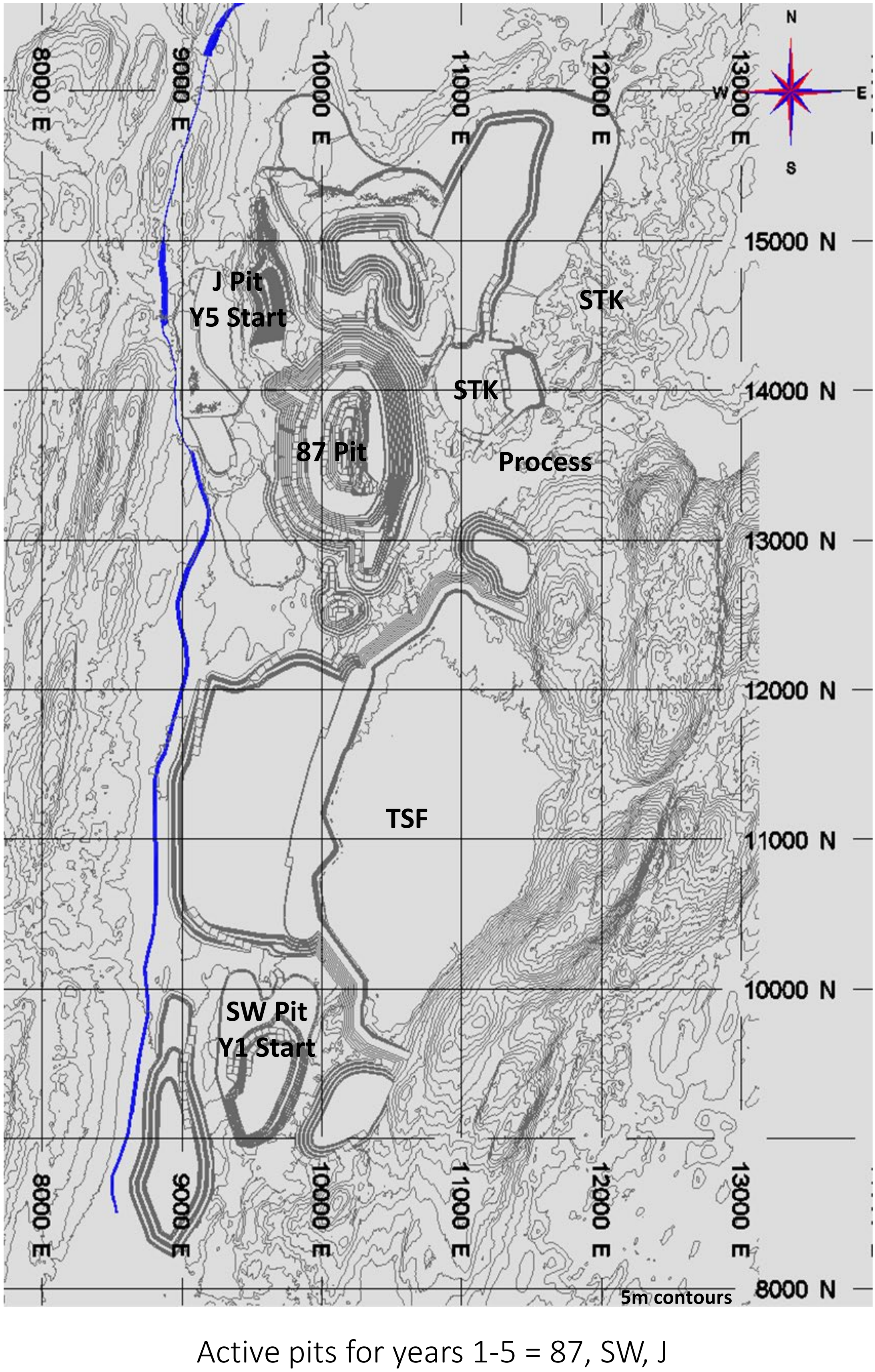


Year -1
(end of pre-production)



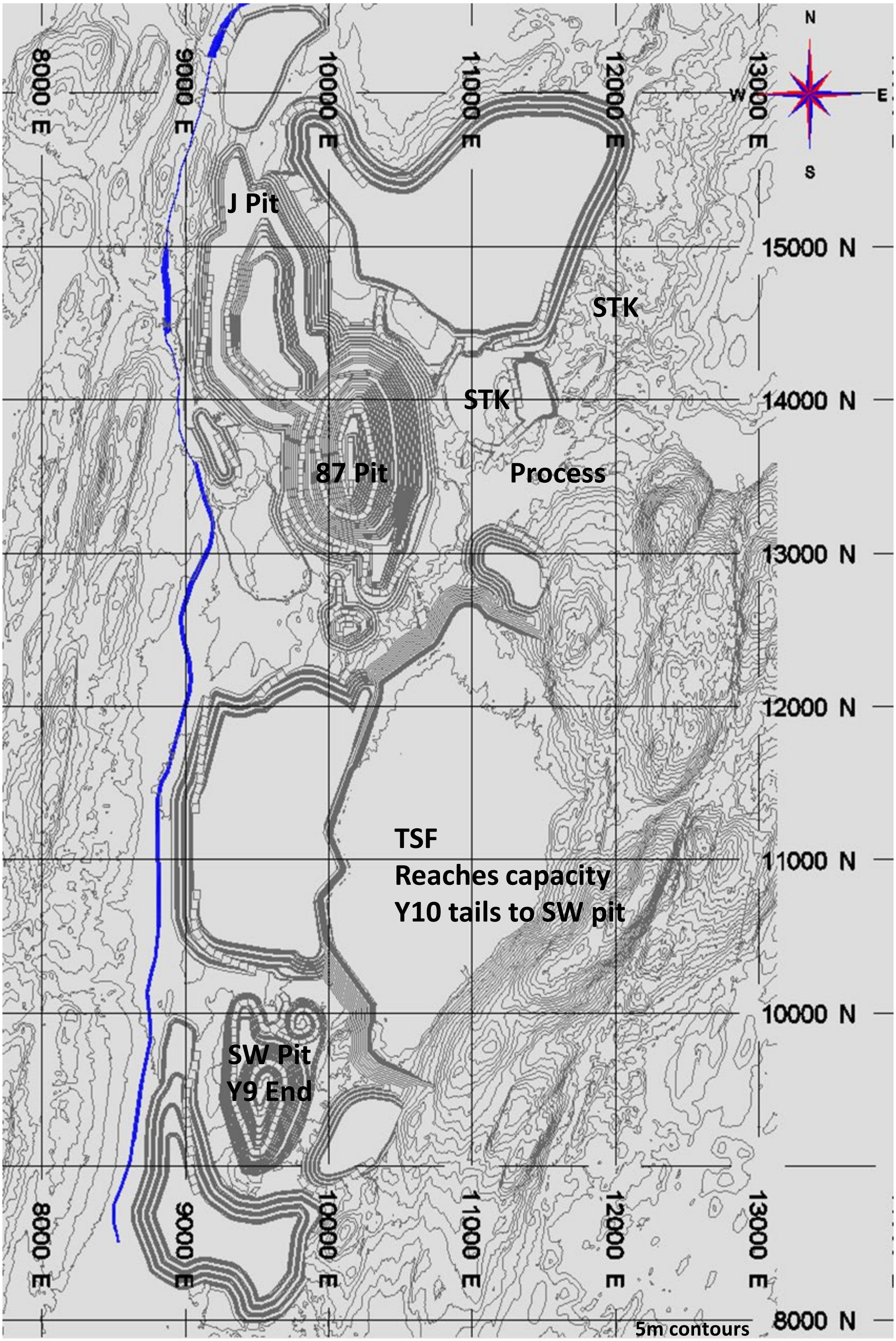
Active pit during pre-production = 87

Year 5



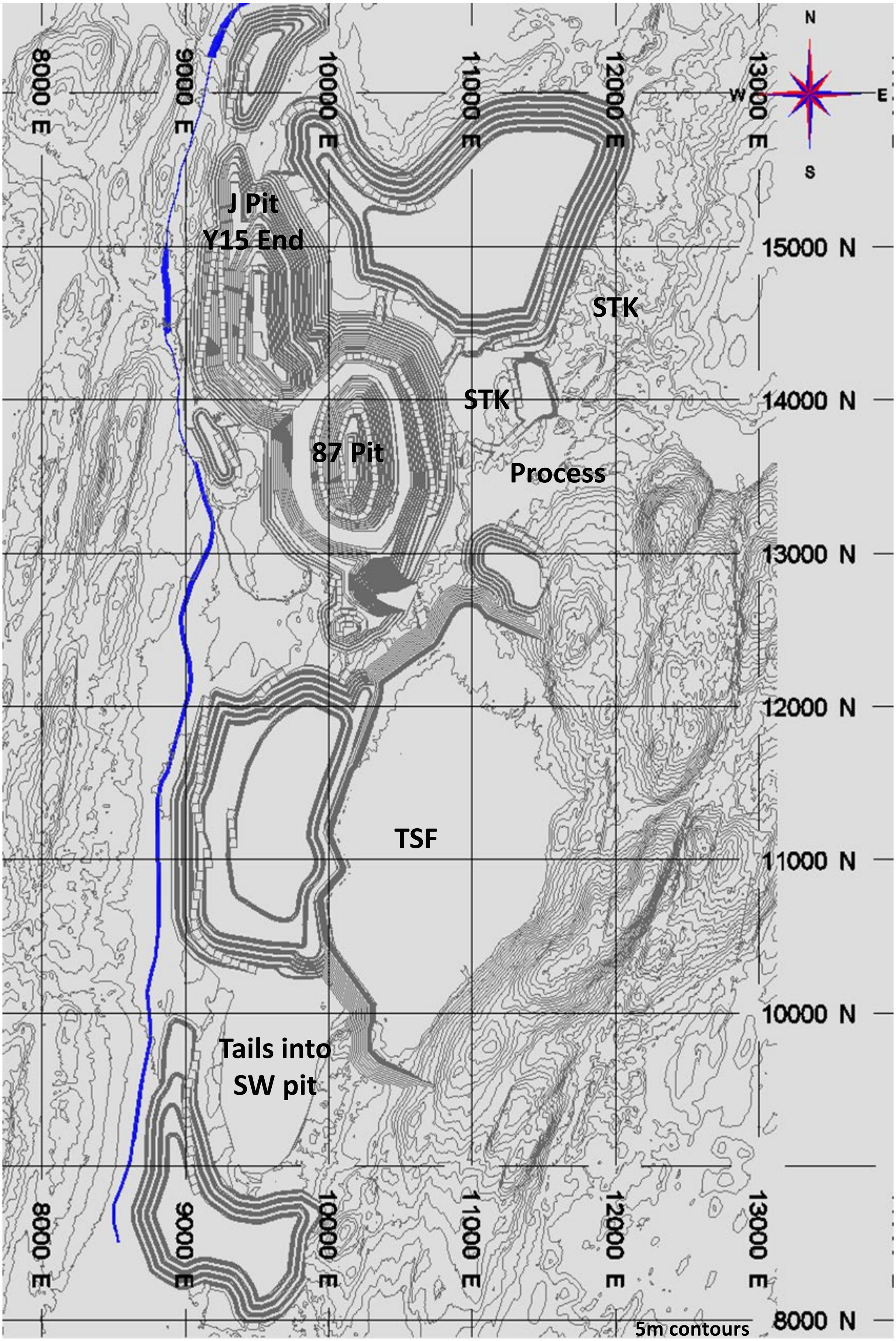
Active pits for years 1-5 = 87, SW, J

Year 10



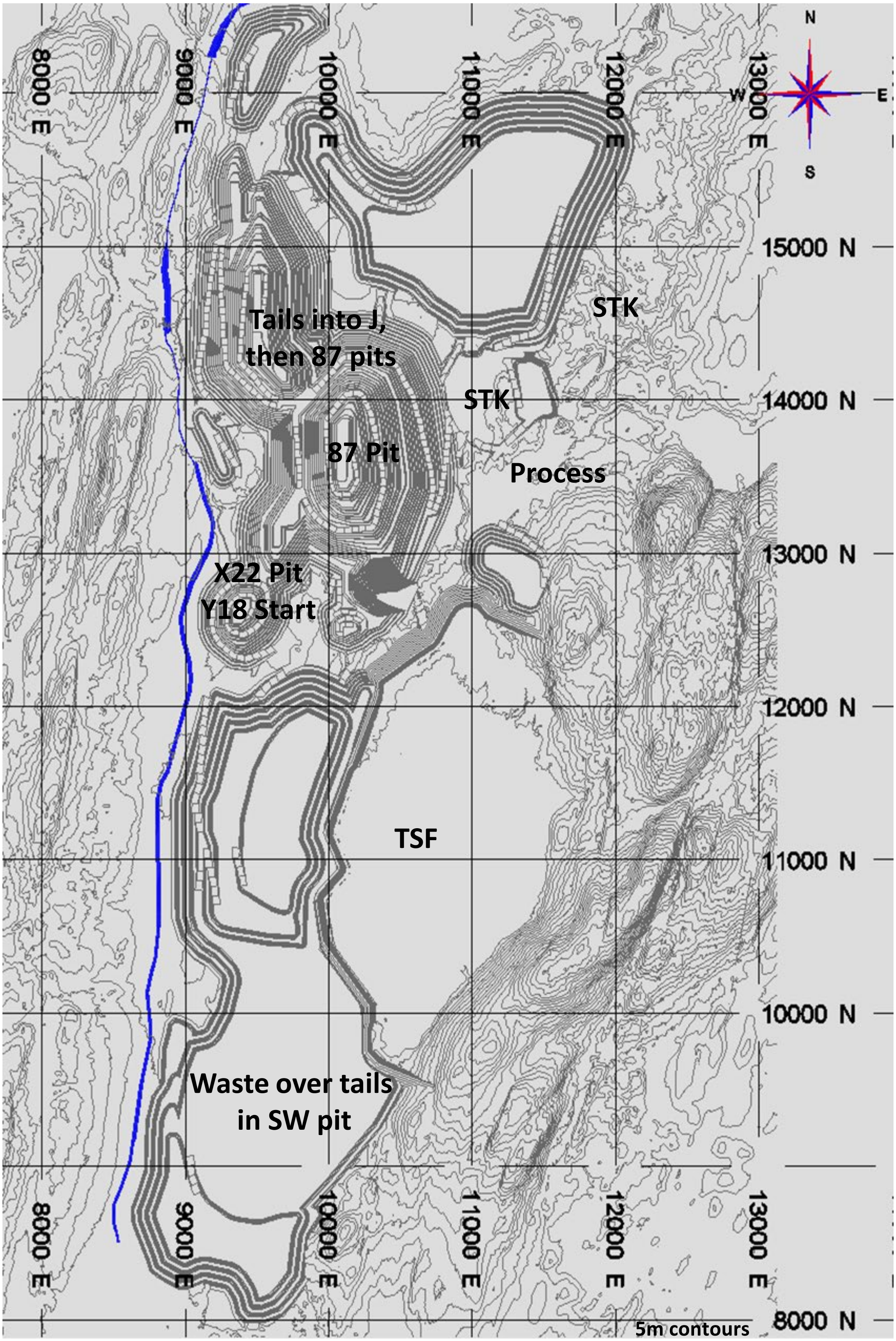
Active pits for years 6-10 = 87, SW, J

Year 15



Active pits for years 11-15 = 87, J

Year 21
Mining complete



Active pits for years 15-21 = 87, X22

Appendix B-Troilus gold ppt

WATER MANAGEMENT WORKSHOP 2024

Troilus Gold

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General Rules

1.) Be respectful to all participants
2.) Reserve comments and questions for QC period
3.) Use provided material to note questions and /or comments
4.) No judgement
5.) Staying on topic/time

Introduction & Round table

Troilus Gold	WSP	AGP	Blumetric/Stantec	GCC & CNM	Cree Health Borad	Land Users
Catherine Stretch	Carl Pednault	Willie Hamilton	Émilie Charest	Anna Krupa	Catherine Dickson	Charlie Awashish
Jacqueline Leroux	Mathieu Gosselin		Guylaine Bois	Aurora Hernandez	Farah Désiré	Eugene Neeposh
Marc Tremblay	Jonathan Friebel		Étienne Hudon	Graeme Morin	Paul Meillon	George Awashish
Mathieu Michaud	Vlad Rojanschi		Guylaine Bois	Pamela Macleod		James Neeposh
			Julie Massicotte			Kenny Awashish
			Émilie Charest			Tony Petawabano

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Objectives

- Recap 2022 workshop plans, comments, questions and recommandations

Part 1

- Present changes in project since 2022
- Present characterization done on site since 2018

Part 2

- Working groups
- Identify concerns, propose mitigation measures
- Identify areas of importance, name lakes/waterways other landmarks
- General discussion

Part 3

Part 1

Review of presentation and concepts presented in 2022

- Review of options presented in 2022
- Review of 2022 comments and concerns

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Options presented in 2022 workshop

- Deviation West of infrastructure-same watershed
- Maintain Bibou stream to Pit 87 and pump to Lake A
  - Bibou stream to J4 Pit and pump to Lake A
- Divert Bibou stream to neighbouring watershed

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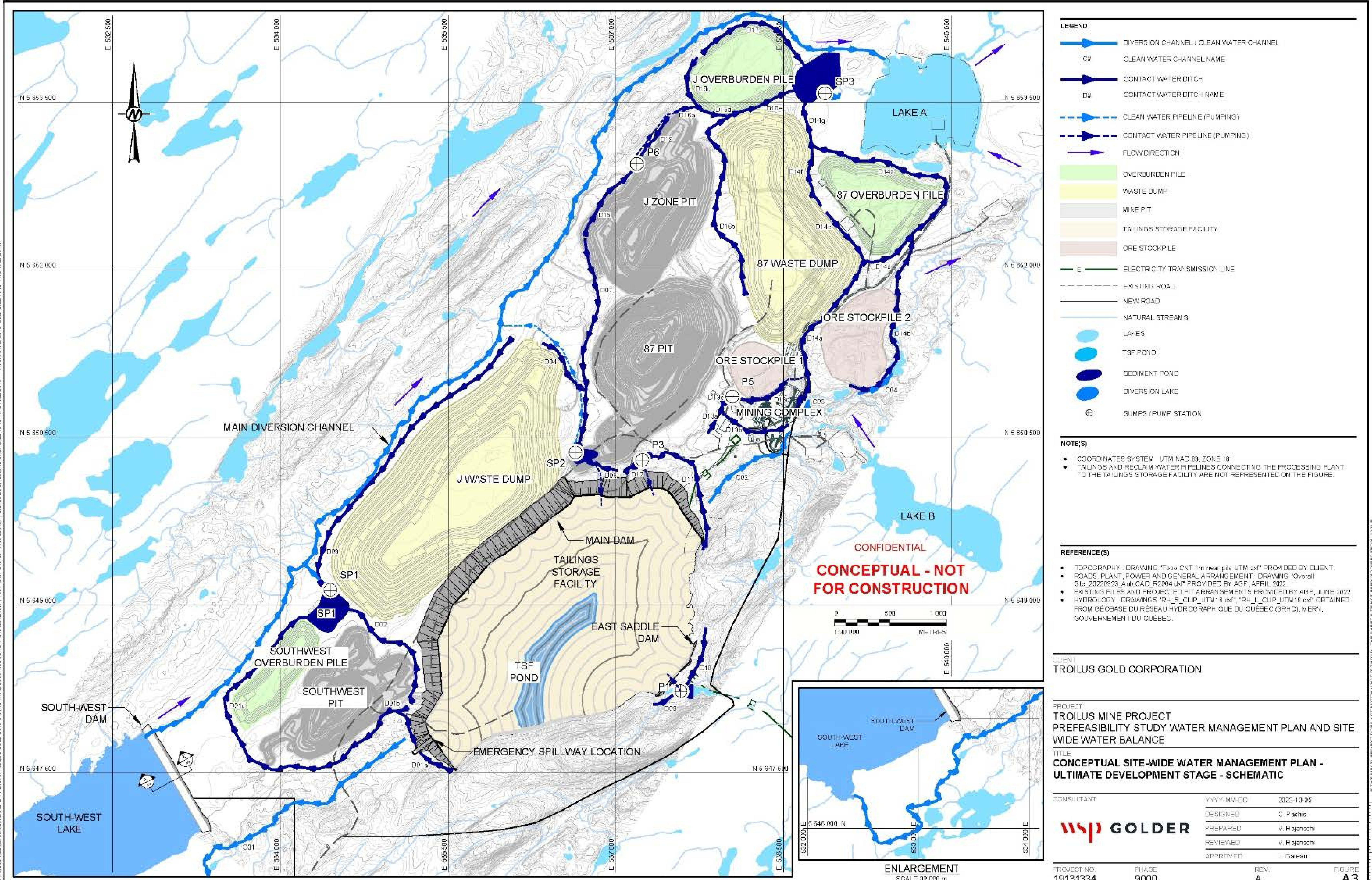
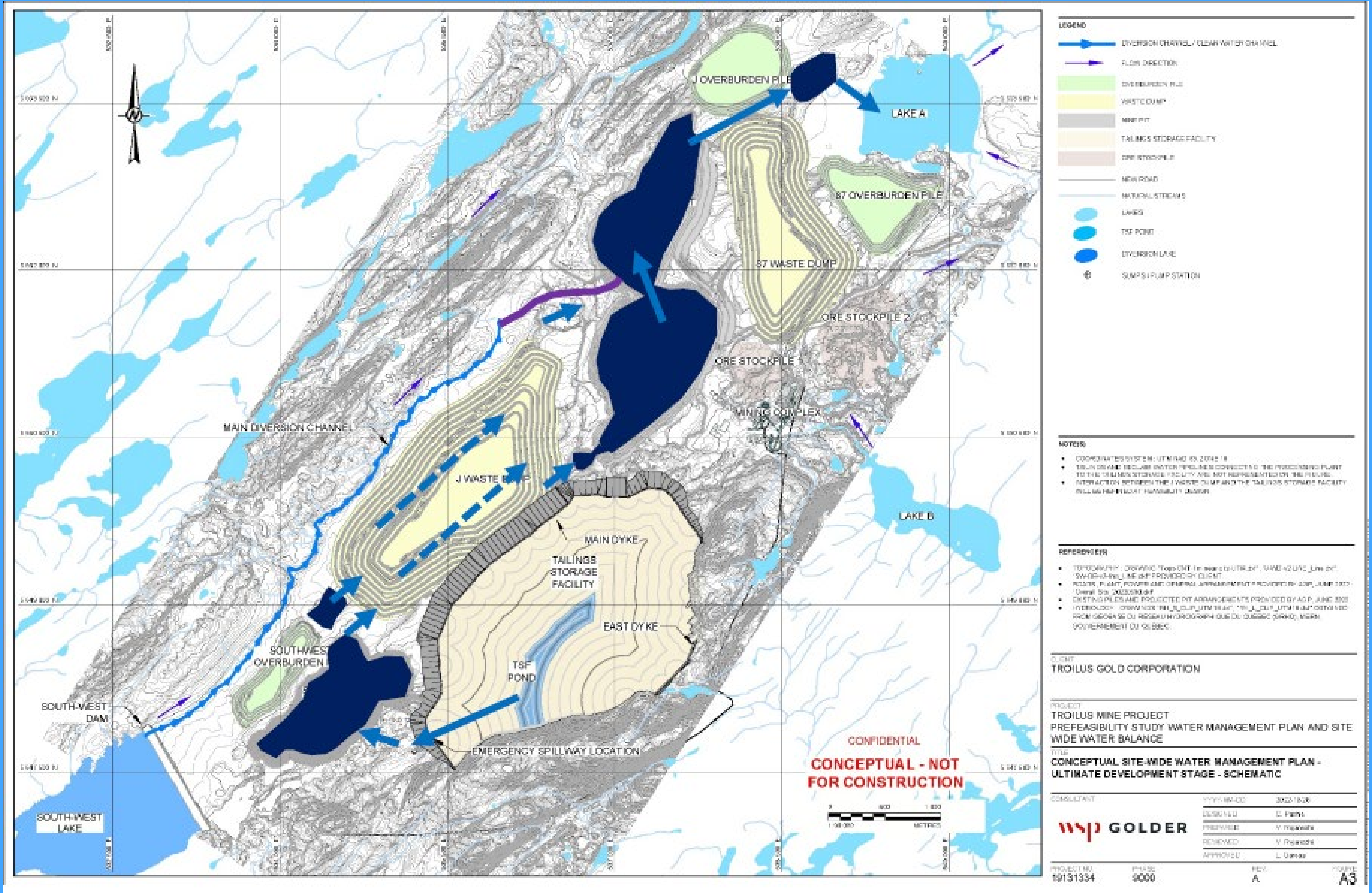
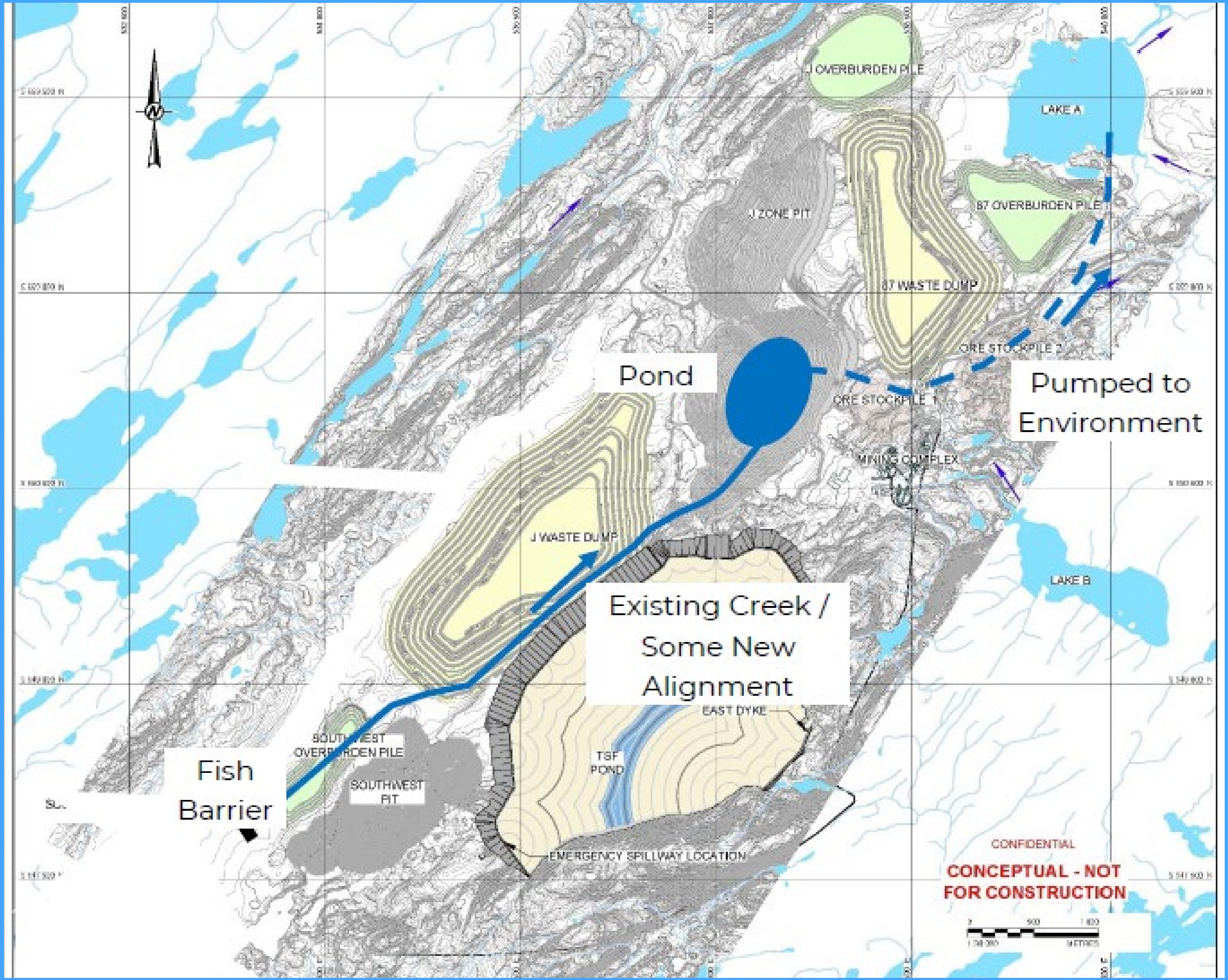
Option #1 - End of Life



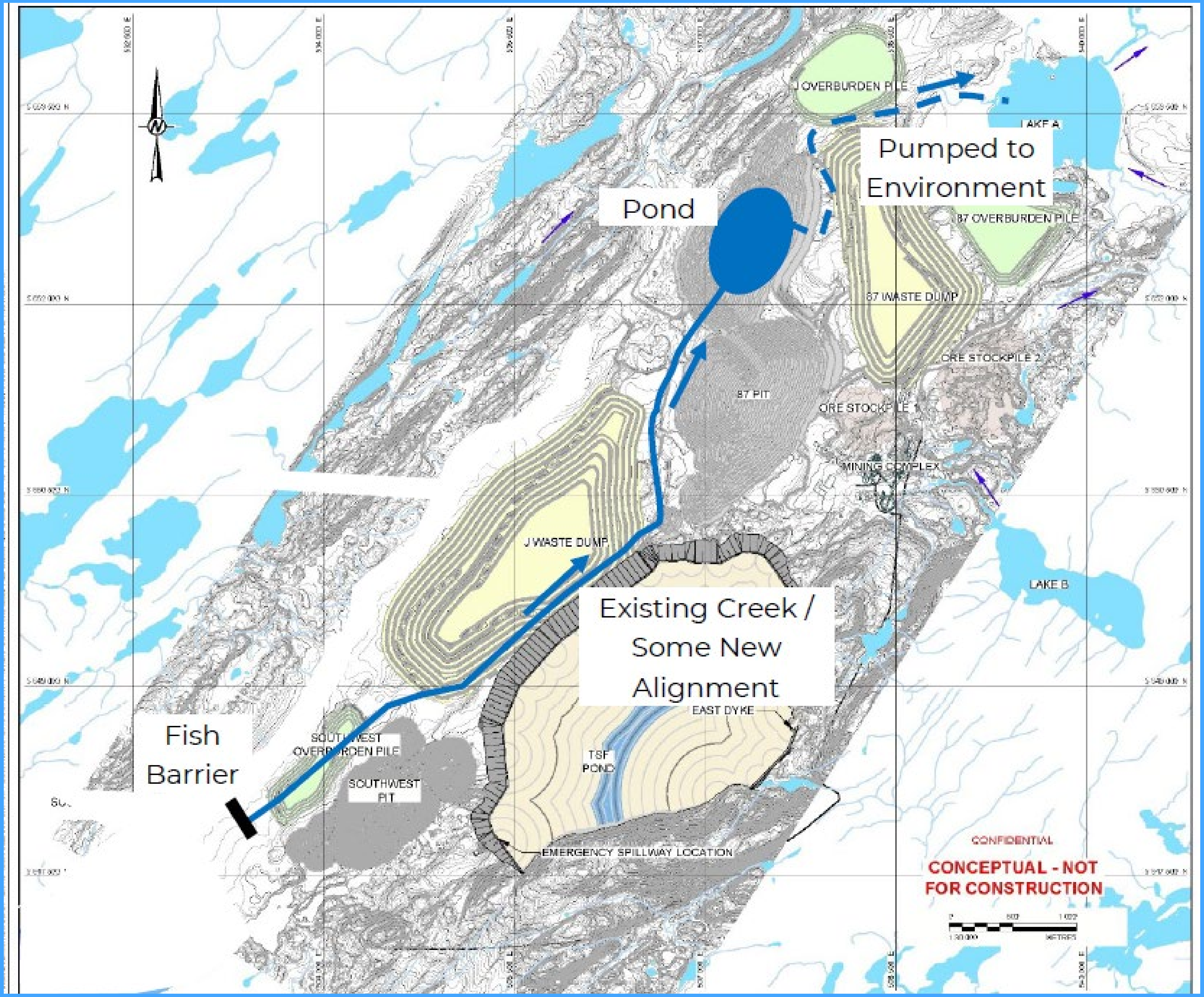
Option #1-Closure



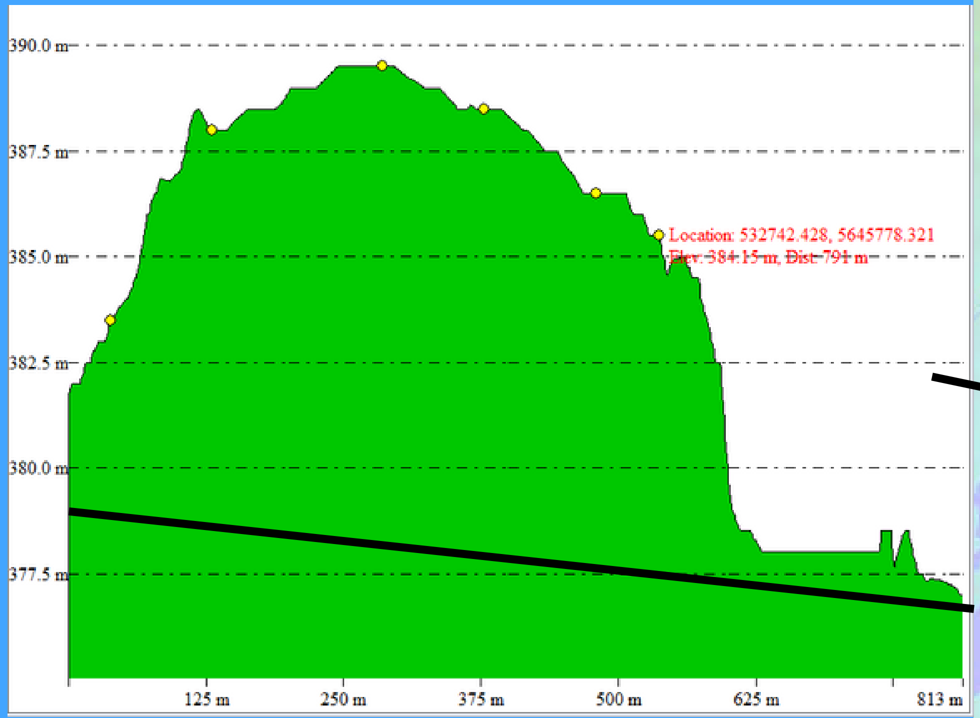
Option #2-exploiting J4



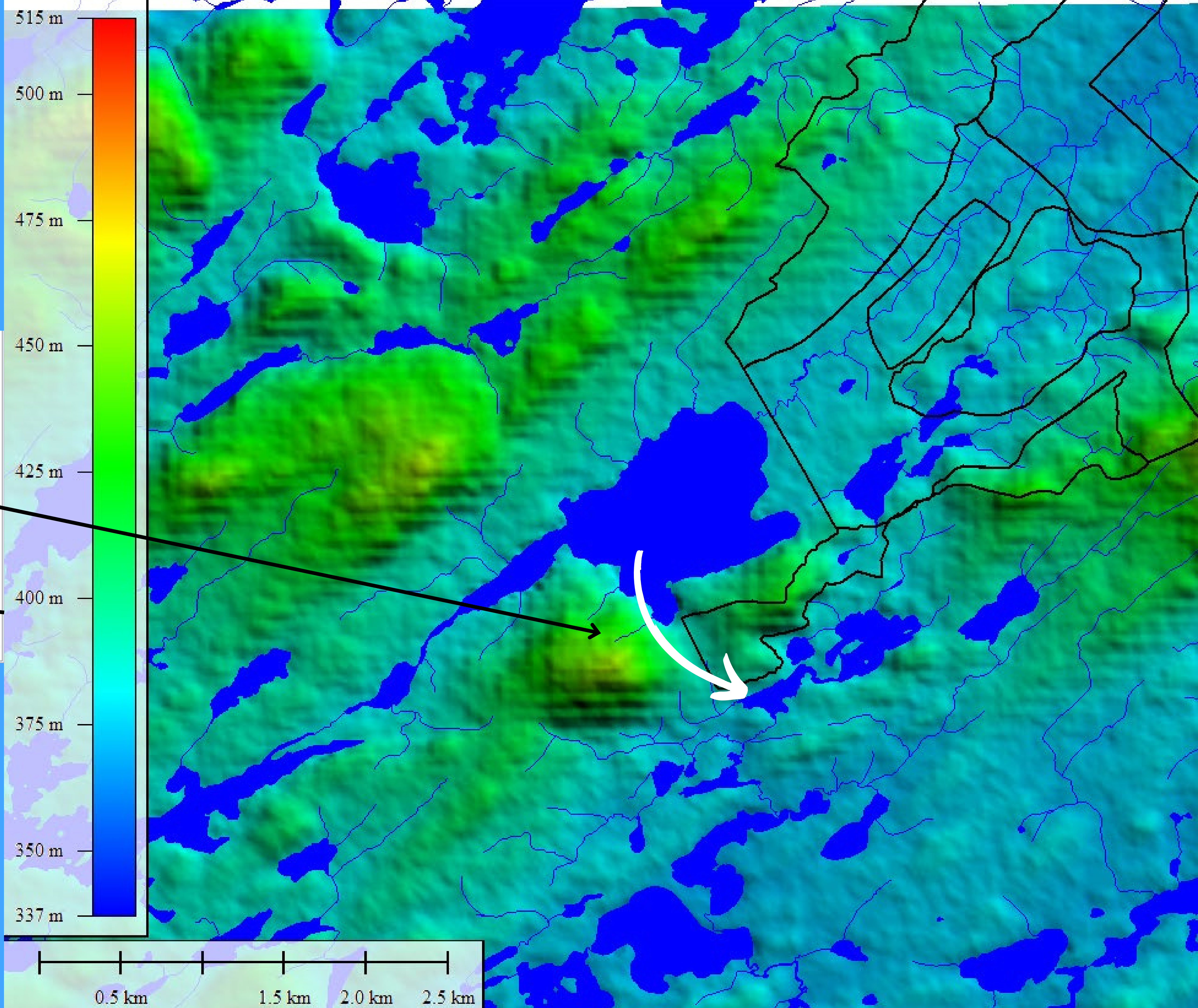
Option #2-exploiting 87



Option #3



390.0 m
387.5 m
385.0 m
382.5 m
380.0 m
377.5 m
Location: 532742.428, 5645778.321
Elev: 384.15 m, Dist 791 m
125 m
250 m
375 m
500 m
625 m
813 m



515 m
500 m
475 m
450 m
425 m
400 m
375 m
350 m
337 m
0.5 km
1.5 km
2.0 km
2.5 km

Summary of concerns/questions raised in 2022

Main Concerns	Recommendations	Questions
Avoid cyanide in recovery process	No name stream should be named Bibou stream	What will be impact in fish for different proposed water management options ?
Proposed infrastructure way too close to cree camps-should be displaced	Stream deviation should be done once at begginning and left as is afterwards	What will be done wilth current TSF exfiltrations ?
Design Mine so that machinary is not pushed to limit: limiting spills and accidents	Present actual and future infrastructures on map and plans	What will be done with iron concentration in TSF seepage ?
Avoid dam construction	Make sure to take into consideration proximity of overburden piles to infrastructure that will need to be restored, ex: TSF	What could water management plan look without dam on Lake Amont?
	Progressive restoration should be looked at	How will thickened tailings influence vegetation program and dust control?
		Is relocation of camps near Lake A downstream possible?

Summary of concerns/questions raised in 2022

Main Concerns	Recommendations	Questions
Project needs long term regional benefits	Ensure water management plan allows future land use; fishing, travelling, hunting.	Fish migration in Bibou stream ?
Important to concentrate on the safety and health of workers and land users.	River displacement should happen before year one and should not be modified afterwards.	
Importance of dust control; must be addressed so past impacts are not reproduced.	Studies should be done on fish migration	
	Make sur slopes are not to steep so that animals can pass through the site and get to their feeding zones.	
	Cree training programs must be put in place. Cree training is essential to the project's acceptability.	

Questions & Comments

Part 2

Changes in project since 2022

Present characterization done on site since 2018

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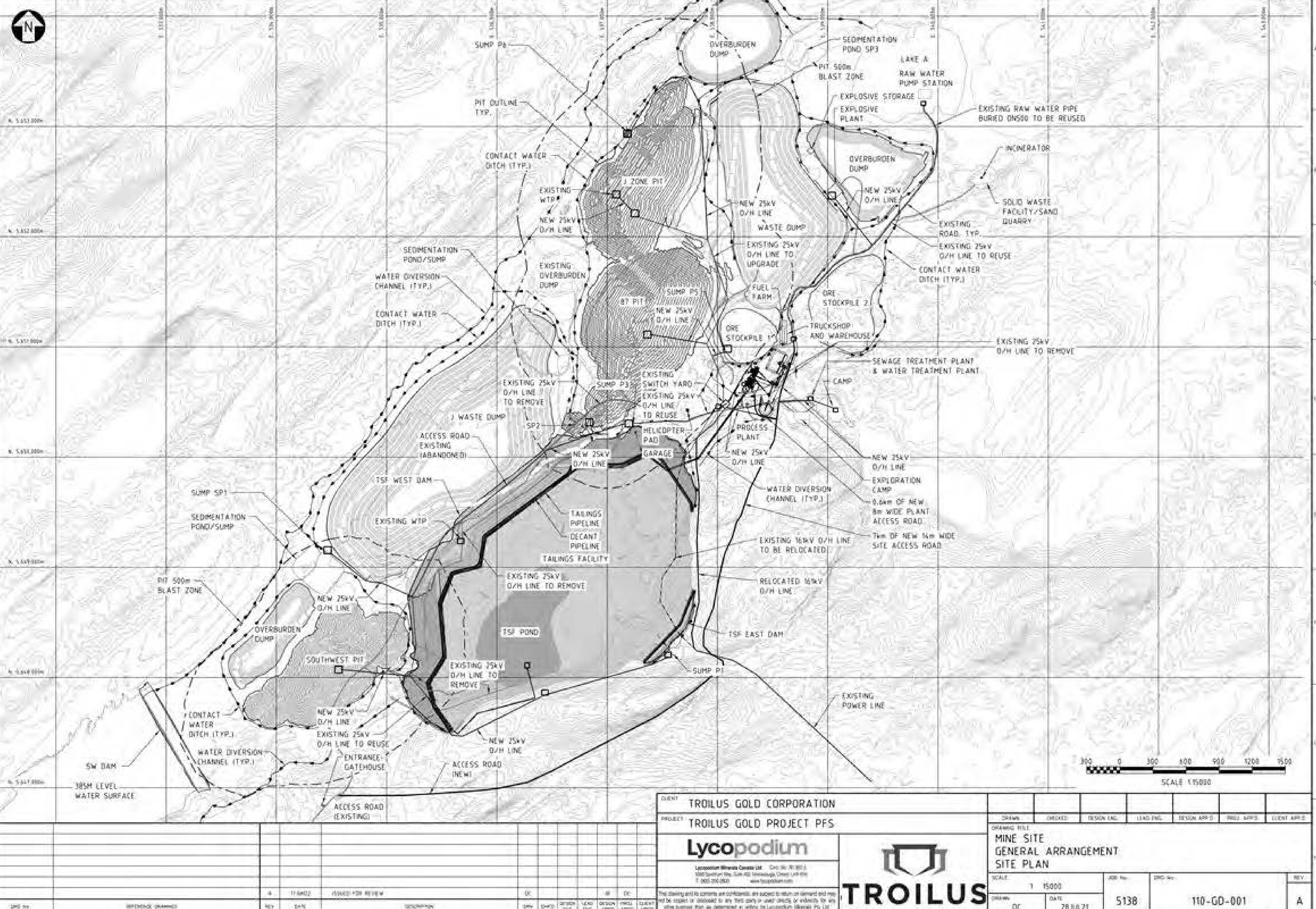
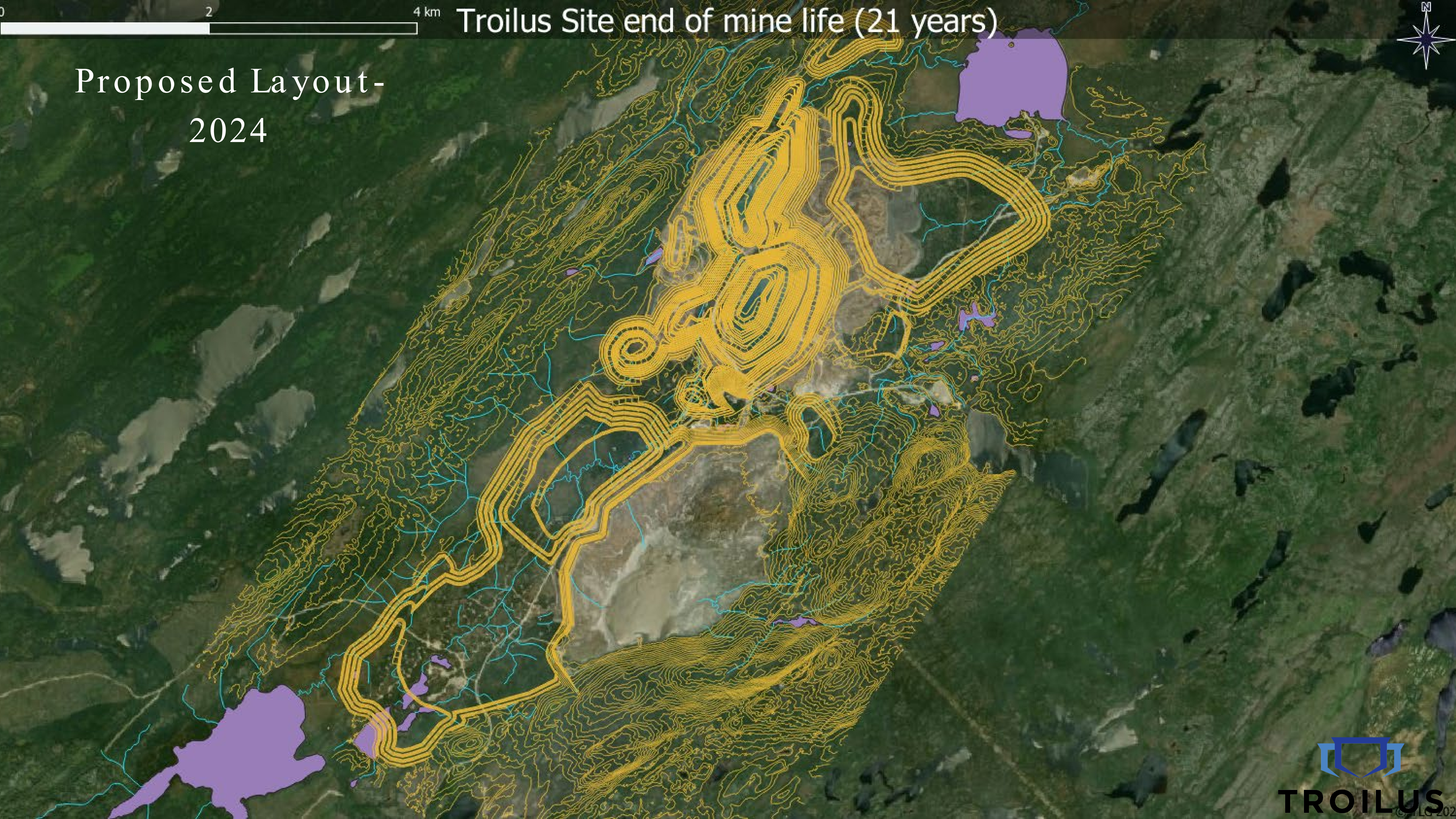
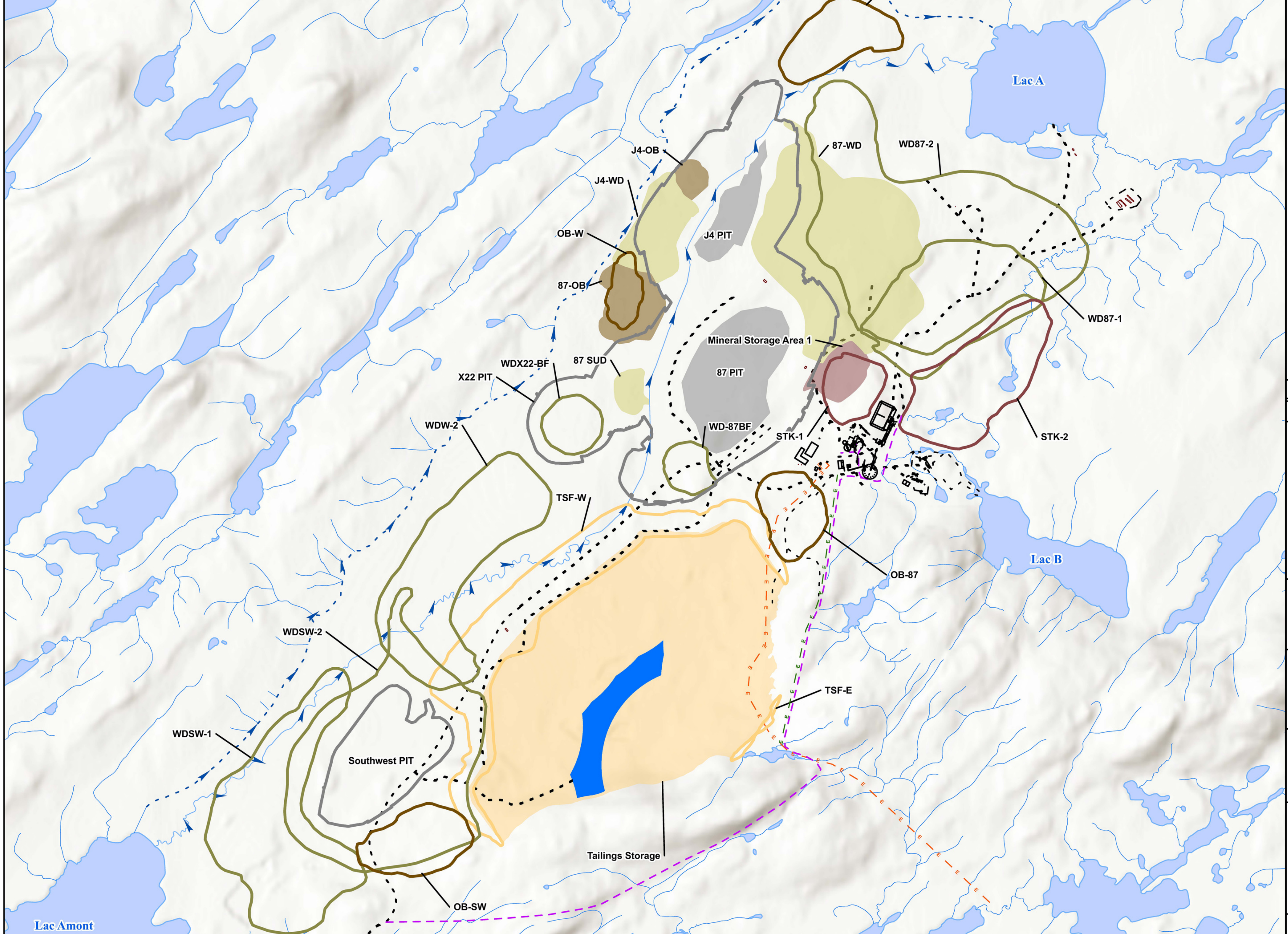
Site Layout - Proposed 2022




0
2
4 km
Troilus Site end of mine life (21 years)
N
Proposed Layout-
2024
TROILUS



Legend	
E — E	Existing Power Line Alignment
E — E	Proposed Power Line Alignment
	Existing Bibou Stream Diversion Channel
	Proposed Bibou Stream Diversion Channel
	Natural Watercourses
	Lakes
	Mine Infrastructure and Process Plant
	Existing Mine Pits
	Existing Ore Stockpiles
	Existing Overburden Piles
	Existing Waste Rock Piles
	Tailings Storage
	Tailings Pond
	Proposed Mine Pits
	Proposed Overburden Piles
	Proposed Ore Stockpiles
	Proposed Tailings Storage
	Proposed Waste Rock Piles

RÉV.	DESCRIPTION	AA/MM/JJ	PAR	VÉRIF.
1				

RÉFÉRENCES

RÉFÉRENCES

NOTES

CES INFORMATIONS NE PEUVENT ÊTRE REPRODUITE SANS L'AUTORISATION ÉCRITE DE BLUMETRIC ENVIRONMENTAL INC. NE PAS AGRANDIR ET RÉDUIRE LA TAILLE DE CE DESSIN. CE DESSIN A PEUT-ÊTRE ÉTÉ RÉDUIT. TOUTES LES ÉCHELLES ET ANNOTATIONS INDIQUÉES SONT BASÉES SUR UN FORMAT DE DESSIN DE 11"X17".

1:30,000 — 0 — 500 — 1,000 Mètres

ÉCHELLE (m)

LES DIMENSIONS DE CETTE ÉCHELLE DOIVENT ÊTRE UTILISÉES À TITRE D'INFORMATION SEULEMENT

N O E S

CLIENT

Troilus Gold Corp.

PROJET

Troilus Mine Infrastructure Options - Technical Analysis

TITRE

Existing and Option 3 Mine Infrastructure

BluMetric Environnement

1500 rue du Collège - Suite 200
Saint-Laurent (Québec) H4L 5G6
TEL: (514) 844-7199
FAX: (514) 841-9111
Courriel: montreal@blumetric.ca
Web: http://www.blumetric.ca

No PROJET | *DATE*

Main changes to project & proposed layout

- Removed Dyke on Lake Amont
- Discovery of new potential open pit (X22)
- Displaced Overburden piles closer to TSF
- New strategy for tailings deposition plan
- Production rate 35 ktpd to 50 ktpd
- 18 to 21 years LOM

TROILUS

Site Characterization

SITE CHARACTERIZATION STUDIES

TROILUS

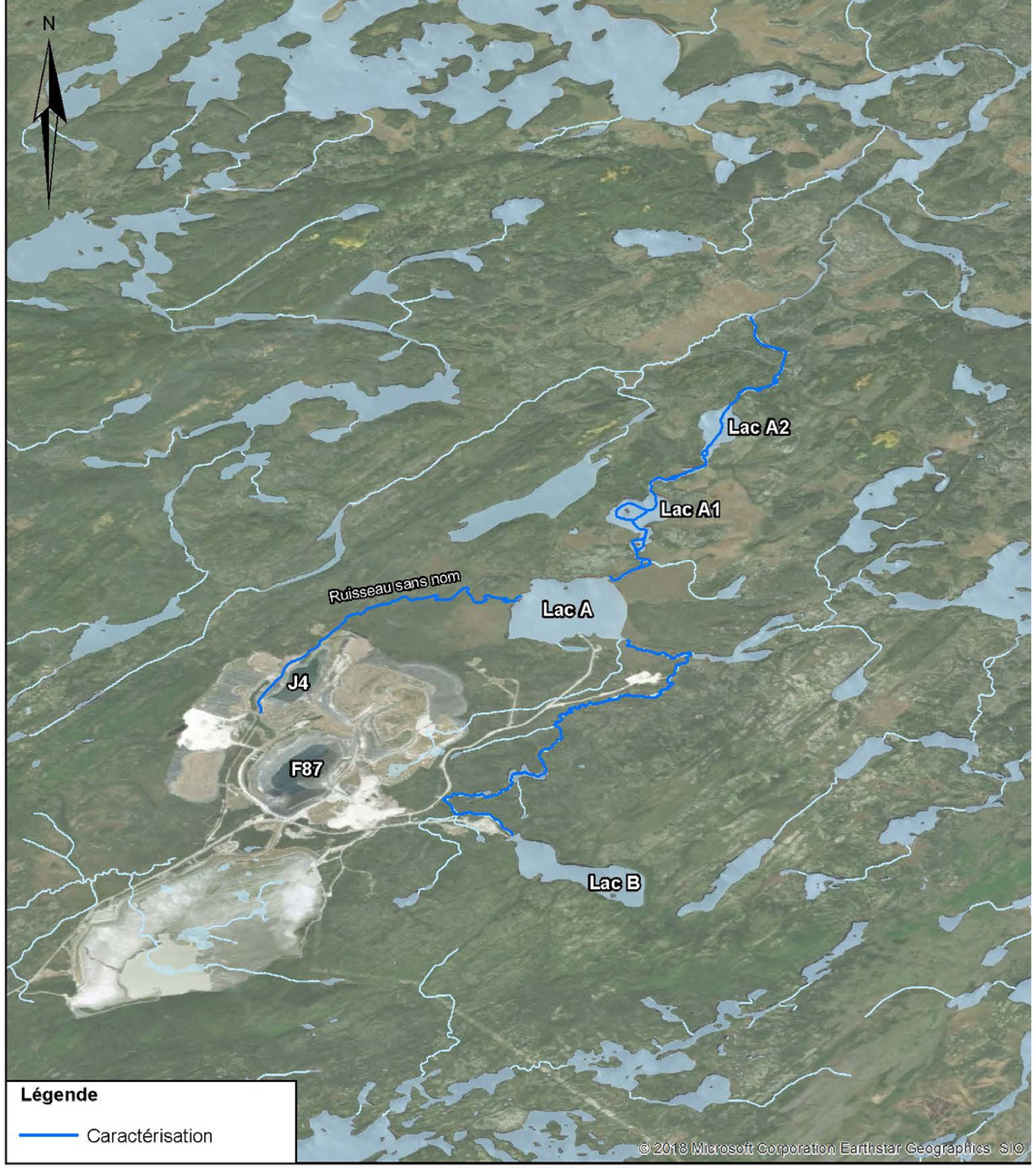
Surface water and sediment and Benthos quality	Underground water quality	Atmospheric quality	Hydrology	Soil quality
June 3-4, 26 2019 July 16-17 2019 August 13th 2019 September 4th, 25-26th 2019	Post-closure monitoring 2011-present	Noise baseline fall 2023	July 8th -13th 2019	Dust contamination characterization in 2022-2023
June 27th 2022 August 9-11th 2022 October 26-27th 2022	MAY 2022 October 2022	Planned summer 2024	October 9-11th 2019	Environmental characterization - Phase 1 update 2023
July 27th 2023 August 28th 2023 October 17th 2023	May 2023 October 2023	Complete with data from	Data loggers installed in 2022 and 2023 -Report exepcted march 2024	Soil quality characterization before project planned spring/summer 2024

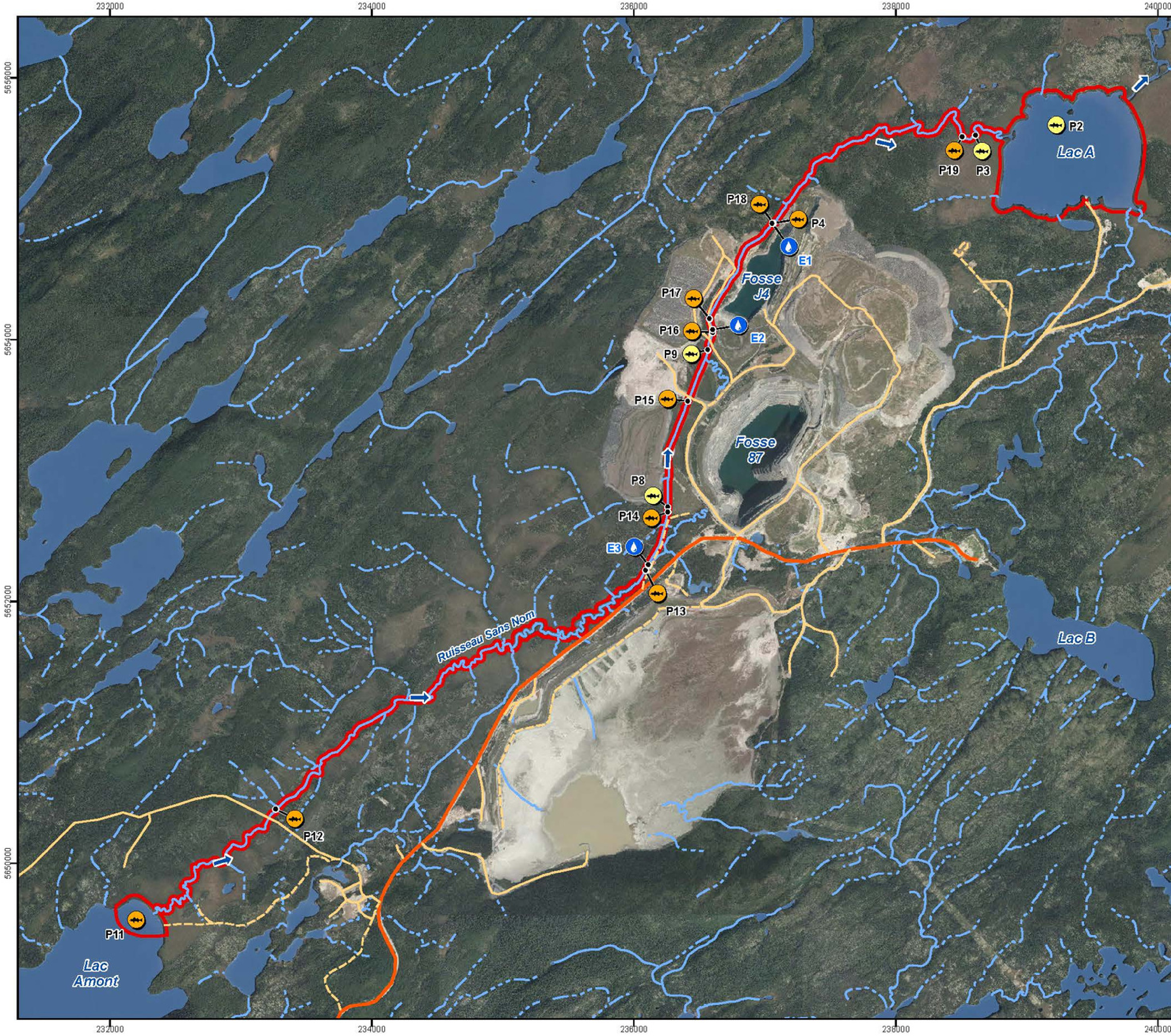
FAUNA AND FLORA INVENTORIES

Fish and Fish habitat	Birds and waterfowl	Bats	Big game	Vegetation	Herpetofauna	Micromammals
October 17-21 2018	June 12-19th 2019	8-15 july &3-9 september 2019	March 2019 Inventory	July 8-12 2019	June 14th to 20th 2019	March 23-25th 2019
July 15 -24 2019	May 21-29th 2021	September 3-9 2019	MELCCFP Data	Summer-Fall 2023	May 3-6th 2021	August 2020
May 10-13 2021	July 7-9th 2021	Sonometers summer 2022		Planned End of June early July 2024	July 6-9th 2021	September 3-9 2020
Spring-summer 2022	Winter 2022 &2023	Inventory planned summer 2024				
	Sonometers-2022-2024					

Fish and fish habitat Maps

TROILUS





750 375 0 750 Mètres 1:75 000

CLIENT
TROILUS GOLD

TITRE
LOCALISATION DU SITE

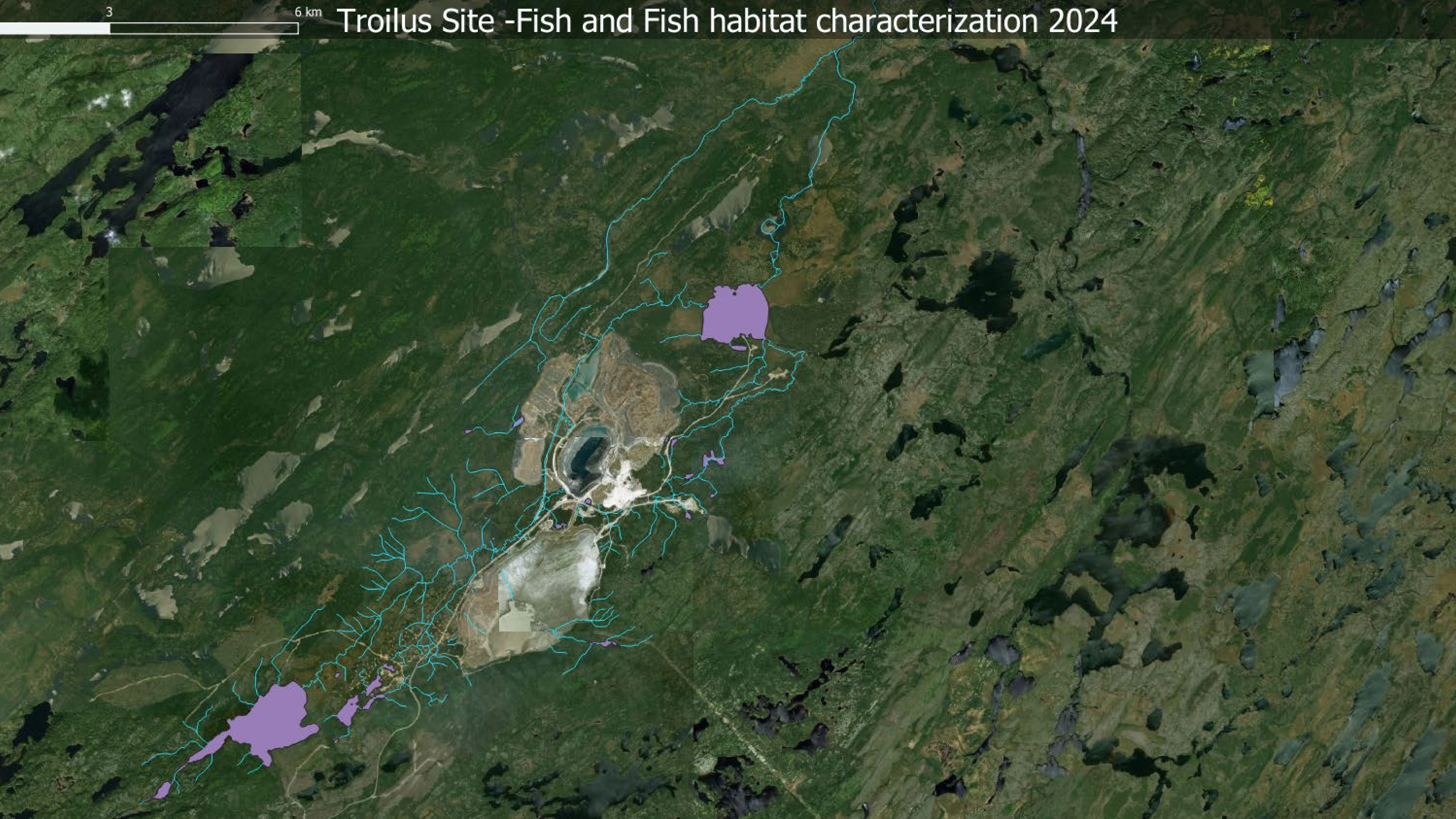
CONSULTANT
Wachiih

NOTES
Source: Inventaire terrain Wachiih 2018
Projet interne 141018001
Système de coordonnées géographiques:
GCS_WGS_1984
Orthophoto: Bing map

FICHIER

DATE

Troilus Site -Fish and Fish habitat characterization 2024



Surface water and sediment quality
Sampling points

TROILUS

Suivi de la qualité de l'eau de surface et des sédiments

Localisation des stations d'échantillonnage de l'eau de surface et des sédiments

Sources
BDTQ 1:20 000, MRNF Québec, 2012
BDGA 1:1 000 000, MERN Québec, 2020
Réseau routier, Adresse Québec, 2019-07
Inventaire, Wachiih, 2023
Orthophoto, World Imagery, Esri via the Community Maps Program, 2017-07

Fichier : 22_0243_C2_LocalisationStations_20240123.mxd

0 700 1 400 m

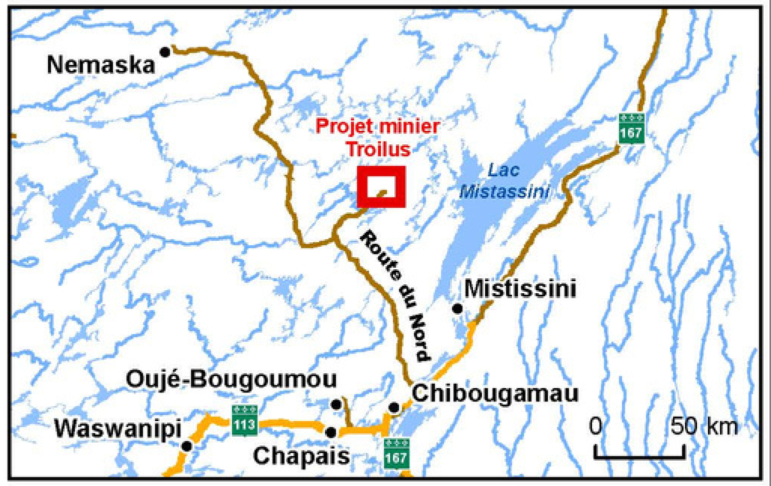
Projection : MTM fuseau 8, NAD83

N O E S

Carte 2

WACHIIH RESOURCES — TROILUS

Janvier 2024



Limite
- Zone d'étude

Hydrographie
- Sens de l'écoulement
- Cours d'eau intermittent
- Cours d'eau permanent
- Plan d'eau
- Bassin versant

Station d'échantillonnage

Eau de surface
- Qualité de l'eau 2023
- Qualité de l'eau 2022
- Qualité de l'eau 2019
- Qualité de l'eau 2013, 2014, 2015 et 2018

Sédiments
- Qualité des sédiments 2023
- Qualité des sédiments 2022
- Qualité des sédiments 2019
- Qualité des sédiments 2013, 2014, 2015 et 2018

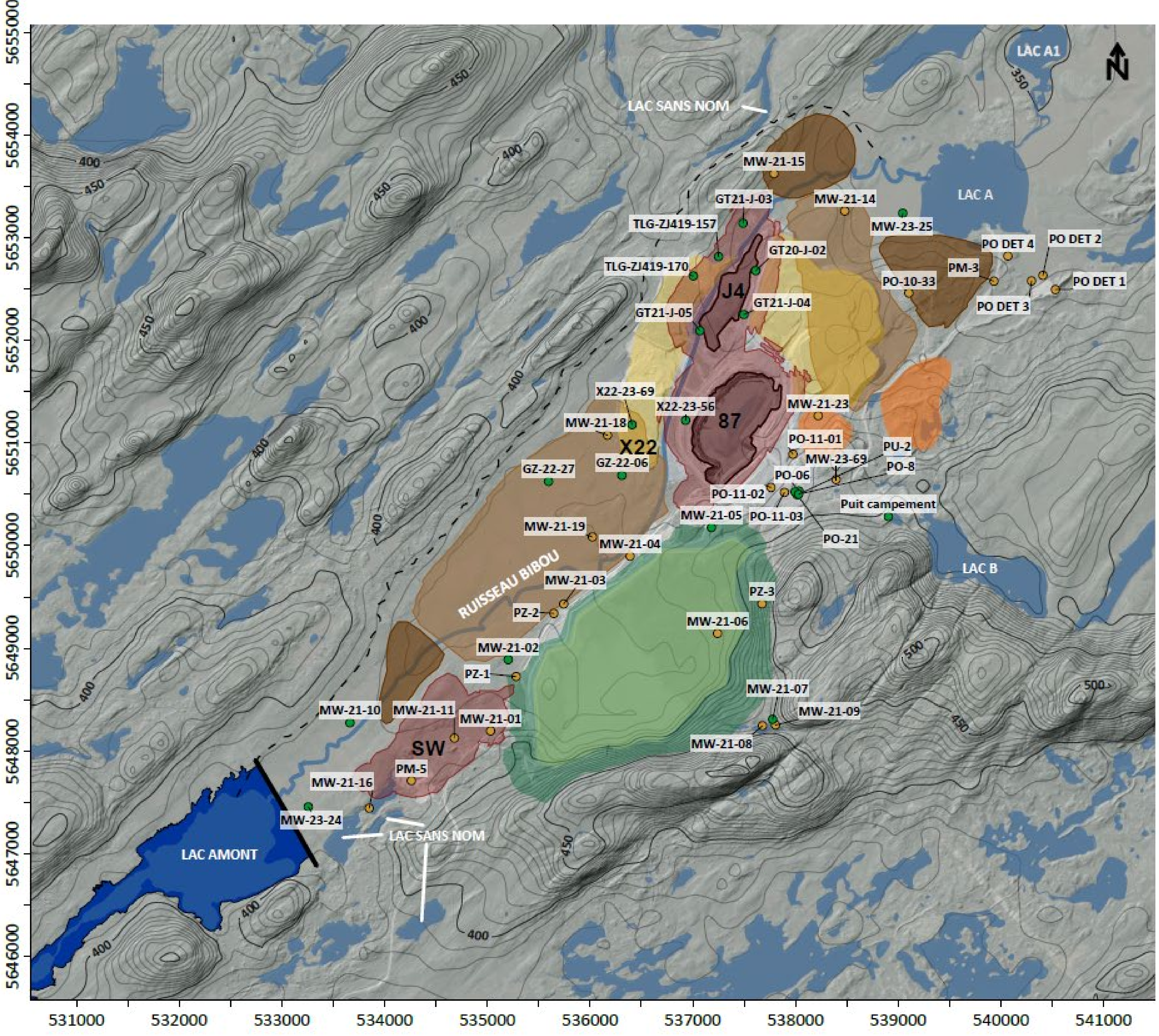
Infrastructure
- Bâtiment d'exploration
- Camp d'exploration
- Guérite
- Ligne de transport d'électricité

Composante du projet
- Ancien site minier
- Bassin de sédimentation
- Dépotoir
- Fosse de mine
- Installation de stockage de résidus
- Stock de minerai

Réseau routier
- Route d'accès
- Chemin carossable
- Chemin non carossable

Underground water sampling points

TROILUS



LÉGENDE

INFRASTRUCTURE

- FOSSE EXISTANTE
- FOSSE PROJETÉE
- HALDE À STÉRILES EXISTANTE
- HALDE À STÉRILE PROJETÉE
- PARC À RÉSIDUS EXISTANT
- PARC À RÉSIDUS PROJETÉ
- HALDE À MORT-TERRAIN PROJETÉE
- RÉSERVE DE MINERAI

TOPOGRAPHIE

- COURBE TOPOGRAPHIQUE (5 M)

UNITÉ HYDROLOGIQUE

- LAC
- RÉSERVOIR PROJETÉ
- RUISSEAU BIBOU
- BARRAGE PROJETÉ
- PROPOSITION DE DÉTOURNEMENT DU RUISSEAU BIBOU
- PUITS D'OBSERVATION DANS LES DÉPÔTS MEUBLES
- PUITS D'OBSERVATION DANS LE ROC

Kilomètres

0 1 2

SOURCE
GÉOGRATIS, DÉPARTEMENT DES RESSOURCES NATURELLES DU CANADA

SYSTÈME DE RÉFÉRENCE GÉOGRAPHIQUE
NAD 1983 UTM 18N

PROJET

ÉTAT DE RÉFÉRENCE DE LA QUALITÉ DE L'EAU SOUTERRAINE AU SITE MINIER TROILUS EN 2023

TITRE

CARTE TOPOGRAPHIQUE DU SITE TROILUS

N° PROJET	REV	FIGURE	RAPPORT
2257554007	A	1	2257554007-MTF-RevA

CLIENT

TROILUS GOLD Inc.

CONSULTANT

AAAA-MM-JJ	2024-01-31
DESSINÉ: MARIE-PIERRE CHAMPAGNE	
PRÉPARÉ: MARIE-PIERRE CHAMPAGNE	

Questions & Comments

Part 3

Discussion in working groups

Objective #1

- Clarify concepts
- Present comments/questions
- Present concerns & recommendations

Objective #2

- Discuss Mitigation measures/closure concepts/compensation plans
- Identify areas of importance
- Identify names of water ways/lakes /landmarks (if applicable)

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Example of group report for general discussion

Source	Concern	Proposed mitigation measures
Waste rock	Proximity of waste piles to land users: noise, dust, light safety	Relocate camps out of impact area
TSF Restoration	Dust control at end of TSF use	Progressive restauration
Traditional activities	Impact on areas used for fishing	construct access for land users to unimpacted areas

Proposed Groups

Org	Group 1	Group 2	Group 3	Group 4	Group 5	Online
WSP/Agp	Mathieu Gosselin	Vlad Rojanchi	Carl Pednault	Jonathan Freibel	Willie Hamilton	
Stantec/Blumetric	Émilie Charest	Guylaine Bois	Julie Massicotte	Sara Magdouli	Léonard Agassanoun/Rich Schmidt	
Troilus	Jacqueline Leroux	Catherine Stretch	Mathieu Michaud			
Land Users	Charlie Awashish	George Awashish	Eugene/James Neeposh	Kenny Awashish	Tony Petawabano	
CHB/GCC/CNM	Anna Krupa	Aurura Hernandez	Catherine Dickson	Paul Meillon	Farah Désiré	Pamela Macleod/Graeme Morin

Group Discussions

Closing remarks

TROILUS

Additional Information

IA guidelines

Baseline Conditions

Requirements listed here are in a sequence corresponding to the steps of a generic groundwater–surface water characterization study.

The Impact Statement must:

- provide hydrometeorological (temperature, precipitation, evapotranspiration) and hydrological information and discuss how the selected data sets are applicable to the project in terms of
  - geographic proximity;
  - similarity of sites (e.g., watershed size, elevation, and wetlands);
  - record period (e.g., more than 30 years, if possible);
  - applicability to the project period (e.g., timeliness of data, presence of trends or cyclicity);
  - any trade-offs between the above;
- describe and illustrate on one or more topographic maps, at appropriate scales, the drainage basins in relation to key project components. On the map(s), identify all waterbodies and watercourses, including intermittent streams, flood risk areas, wetlands, watershed and sub-watershed boundaries, and direction of flow;
  - if applicable, indicate the intended locations of water crossing and watercourse diversions;
- provide a list of all water bodies and watercourses (permanent and intermittent) that may be directly or indirectly affected by the project. Existing pits are considered to be water bodies. Provide a table that groups water bodies and watercourses by sub-watershed and provides the following information about each:
  - type of watercourse impacted (e.g. lotic or lentic system, lake, river, pond, temporary or permanent stream);
  - size of the waterbodies and watercourses, as applicable (e.g. width at the natural high water mark, length or area);
- provide flow hydrographs and corresponding water levels for nearby streams and rivers showing the full range of seasonal and inter-annual variations including base flow and low flow. rticular attention should be paid to the impacts of the Bibou Creek diversion and the receiving watershed. Describe the water levels and flow velocities, average, low and high flows, before and after the diversion;
  - hydrographs may be based on data from nearby or on-site hydrometric stations if appropriate justification is provided as to its applicability;
  - approach used should take into account the need to provide information for use in fish habitat characterization and effects assessment in accordance with the Canadian Science Advisory Secretariat's Science Advisory Report, Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada;
- provide stage hydrographs for lakes expected to be affected by the project showing the full range of seasonal and inter-annual water level variations;
- for each waterbody and watercourse potentially affected by the project, provide a description of ice cover, thickness and conditions and the timing of freeze-thaw cycles;
- provide for each waterbody potentially affected by the project, bathymetry, maximum and mean depths, vertical profile information, information on stratification and turnover, and sediment composition (e.g. particle size analysis and sediment quality);
- using traditional field and mapping techniques, provide a delineation and characterization of groundwater–surface water interactions, including an identification of groundwater-dependent ecosystems, wetlands, and discharge and recharge areas that are potentially affected by the project;
  - use this information to calibrate and verify numerical flow modelling;
  - consider the potential effect of changes in groundwater-surface water interactions on fish and fish habitat;
- in northern regions, describe permafrost conditions and their influence on groundwater–surface water interactions with consideration to potential for effects on surface water quality;

IA guidelines

Baseline Conditions

develop a quantitative surface water balance for watersheds potentially affected by the project, detailing water intake and outflow to the new project environment as well as those made for site restoration;

- describe the surface water, ground water and sediment quality baseline characterization program, including sampling site selection and locations, monitoring duration and frequency, sampling methodology, and analytical protocol, including quality assurance and quality control measures. The characterization should include sampling sites influenced by the former mine;
- describe the incorporation of any applicable historical data or existing information;
- characterization program should include sampling locations within the project area, the local and regional study areas, and should include reference locations that are unlikely to be impacted by the project;
- provide baseline data for relevant physicochemical parameters and chemical constituents for surface water, groundwater and sediment quality;
- physicochemical parameters may include temperature, pH, electrical conductivity, dissolved oxygen, turbidity, total suspended solids, total hardness, total dissolved solids;
- relevant chemical constituents may include major and minor ions, total and dissolved trace metals, radionuclides, total mercury, methylmercury, polycyclic aromatic compounds, nutrients, organic and inorganic compounds, or other compounds of potential concern, including those present as a result of the former mine;
- water sample collection and analysis should use appropriately sensitive detection limits and the data should illustrate the seasonal and inter-annual variability in surface water quality with sufficient years of baseline data to fully characterize natural variability, including possible variabilities due to groundwater–surface water interactions.
- describe baseline concentrations for relevant physicochemical parameters and chemical constituents in relation to applicable water quality and sediment guidelines;
- identify springs and any other potable surface water resources within the local and regional project areas and describe their current use, potential for future use, and whether their consumption has Indigenous cultural importance;
- identify domestic, communal, or municipal water wells within the local and regional areas, and provide information on their depth, distance from the project, stratigraphy, screened hydrostratigraphic unit and piezometric level and capacity, and describe their current use, potential for future use, and whether their consumption has any Indigenous cultural importance;
- identify groundwater-producing strata (coarse-grained sediments and permeable bedrock) that may be affected by the project. Where current domestic, communal, or municipal water wells access these strata, their distance from the project must also be marked and added to the map;
- provide a summary of key groundwater monitoring wells within the regional study area used to inform the conceptual model, and identify their location, groundwater quality information, and monitoring frequency. Provide representative hydrographs showing the range of seasonal and inter-annual water level variations and indicate any spatial variation in the local study area to support the assessment of groundwater effects with respect to fish and fish habitat. Information in the regional study area should be provided, if necessary, to support the development of the conceptual groundwater flow model;

IA guidelines

Baseline Conditions

provide a groundwater level and quality follow-up plan with monitoring wells in bedrock upstream and downstream of each potential source of contamination, taking into account the flow directions according to mine phase (initial state, operation, and end of reclamation period - steady state). It is important to link the observation wells to the flow directions to better understand the origin of potential contamination. The use of a numerical model with particle tracing (inverse) could be useful. The same is true for particle tracing (direct) from potentially polluting locations;

describe the hydrostratigraphic units (aquifers, aquitards, aquicludes) of the hydrogeological environment in both bedrock and overburden. Provide a piezometric map showing heads groundwater elevations, sources and the direction of groundwater flow for the various hydrostratigraphic units, including pre-project, operation, and post-closure (steady state). For each stage, include particle tracing directly from potentially polluting locations and inversely for sensitive environments;

describe the structural geology of the hydrogeological environment, including major faults, fracture density and orientation with respect to groundwater flow directions;

describe the groundwater flow boundaries of the hydrogeological environment, including groundwater divides and boundaries with surface water;

provide the hydraulic properties of the hydrostratigraphic units, including data on hydraulic conductivity, specific storage, transmissivity, saturated thickness, porosity, and free-flow capacity data, as applicable, and provide 3D statistical and spatial variability in hydraulic conductivity for each unit;

provide hydrogeological maps and cross-sections of the study area showing hydrostratigraphic units, water table elevations, potentiometric contours, interpreted groundwater flow directions, groundwater divides, and areas of recharge and discharge for different hydrogeologic settings;

present a conceptual model of the hydrogeological environment, including a discussion of geomorphic, hydrostratigraphic, hydrologic, climatic, and anthropogenic controls on groundwater flow;

present a 3-dimensional numerical groundwater flow model developed for the project area based on the conceptual model of the hydrogeological environment;

state limitations and assumptions in the modelling approach, including calibration methods, model validation, and accuracy, describe and justify the model boundary and initial conditions, and then validate the model on water levels and base flows;

calibrate the numerical model to baseline hydrogeological conditions using groundwater level and stream flow monitoring data, along with the delineation and characterization of groundwater-surface water interactions from the field data. Provide metrics and graphs describing the quality of the calibration that was achieved and discuss how spatial variability is considered in model calibration;

analyse the sensitivity of key model outputs to hydraulic properties and climatic parameters such as recharge. Quantify the uncertainty of modelling results;

using the calibrated numerical model, provide a baseline groundwater budget including baseflow discharge to wetlands, groundwater discharge to / recharge from waterbodies and watercourse, particularly those identified in the delineation of groundwater-surface water interactions, and any anthropogenic withdrawals;

present a conceptual model for the hydrological environment, as appropriate, to describe baseline conditions for surface waters (the hydrologic model may be integrated with the hydrogeologic model). The model should be developed to support the assessment of potential changes to water and sediment quantity and quality in water bodies, waterways, and wetlands, with input from regulators and Indigenous groups; and

explain how baseline data was gathered, and modelling developed, at a scale and resolution that allows for the application of results about groundwater and surface water to the assessment of interrelated VCs, notably for fish, birds and other wildlife, their habitat and their health, human health as well as the current use of land and resources for traditional purposes..

IA guidelines

Effects

Impact Statement must:

- if applicable, describe groundwater and surface water issues (e.g., water quality in Lake A) observed during the operation of the former Troilus Mine by Inmet Mining Corporation (1996–2010), explain how they were resolved, and present lessons learned that may be relevant to this project;
- describe the effects of the project on surface and ground water (quality and quantity), including effects related to:
  - project use of surface water or groundwater resources;
  - changes to water flow as a result of the diversion of Bibou Creek and the diversion of other watercourses, if applicable;
  - discharge of water, effluent, wastewaters or other substances to the environment;
- provide a project-specific water use assessment. Identify and describe the quantity and quality of resources likely to be affected by the project, including any water withdrawal requirements from local water bodies and watercourses used as a source of supply, the flow rate or volume of water available in water bodies, and how and where wastewater would be disposed of;
- describe the effects of concrete-related activities, including those from the discharge of wash water from concrete mixers or concrete preparation equipment, if applicable;
- quantify project effects on surface water bodies and watercourses, and on resources at each phase of the project, including effects resulting from the use or diversion of water for the project on seasonal watercourse flows and local water body and watercourse levels and temperatures. Quantification of project effects should include water intake and discharge to the environment, change in surface water use, and watercourse diversion, and should consider how and where wastewater and diverted water would be discharged;
- describe how the effects of climate change are taken into account in the evaluation of the project effects;
- discuss changes to watersheds, including alignment and condition of water bodies, watercourses, and wetlands, whether permanent or temporary, including those created, destroyed, or altered by the project;
- discuss the effect on the watershed of the overprinting of surface water characteristics by the project infrastructure, i.e., percent change in instantaneous flows, and on water flows and levels (e.g., high water, low water, average, monthly);

IA guidelines

Effects

quantify the extent of hydrological changes that will result from disturbances to aquifers and surface water features, taking into account climate change (see also Sections 8.12 Climate change and 12 Effects of the environment on the project). This includes changes to the quantity or timing of surface flow, water levels, ice thickness or extent, sediment input, and channel regime in watercourses, and water levels in affected waterbodies;

- present an integrated site water balance model incorporating surface and groundwater fluxes to or from all major project components, for all project phases. Include estimates of surface water runoff rates for major project components;
- indicate the groundwater and surface water withdrawal requirements during all phases and specify:
  - the timing, quantity and quality of water withdrawn from the environment (flow rates and annual volumes);
  - any treatment carried out on these waters (e.g. addition of a tracer); and
  - the conditions under which this water is released into the receiving environment;
- present key flow rates for all project components and water management structures, including inflow, outflow, or surface run-off from pits, storage piles, contaminated material storage, and tailings management facilities;
- determine temperature changes in surface waters due to groundwater-surface water interactions;
- determine and characterize current and projected water levels and flows in Bibou Creek, as well as in water bodies upstream and downstream of Bibou Creek, including any water bodies that may be affected by the future diversion;
- present a water balance and comprehensive site water management plans considering the entire mine site operations for the entire life cycle of the project, including the major phases of the construction phase. This should include, but not be limited to:
  - water inflows and outflows from project site;
  - water diversion;
  - watering of roads;
  - the concrete plant, if applicable;
  - truck washing;
  - process water;
  - storm water;
  - water within the project site;
  - mine water;
  - pit flooding strategies including determining the watercourse to which the pit water will flow after filling;
  - any water input or loss at the site (evaporation and precipitation, including snow accumulation);

IA guidelines
Effects

present a 3-dimensional numerical groundwater flow model of the hydrogeological system that incorporates all major project features such as open pits, underground workings, waste rock piles, tailings management facilities, dewatering wells, and water diversion ditches:

- the model should be based on the calibrated model used to describe baseline conditions;
- the use of telescopically refined groundwater flow models is recommended in the vicinity of open pits and tailings management facilities;
- using the 3- dimensional numerical groundwater flow model,
- estimate key project fluxes, including open pit or mine inflow rates, pit or mine dewatering rates, pit or mine flooding rates, and tailings seepage rates during operations and the post-closure period;
- use the numerical groundwater flow model to estimate changes to surface and groundwater flow regimes during facility operations and the post-closure period, including effects of mine dewatering on lake levels, effects on watercourse baseflow, effects on wetlands, effects on perennial flow and discharge, effects on drinking water supplies, and effects on natural flow divides;
- estimate seasonal changes to surface water and groundwater regimes during operations and the post-closure period, including effects of depressurization of the basal aquifer and dewatering of surficial deposits, effects on baseflow in rivers and streams, effects on wetlands, effects on groundwater-surface water interactions related to fish habitat, drinking water supply, and natural flow divides;
- describe the contaminants associated with the project, their spatial and temporal locations and their potential flow paths (e.g. groundwater seepage pathways and how they relate to potential receptors). Characterize how they could affect surface and groundwater quality, including information on the source(s) of any contaminants, and their transport and fate in the water environment;

describe the downgradient flow of groundwater affected by the project, with the use of figures showing groundwater piezometric contours and particle tracking results,

- describe the potential effects on surface water flow or water levels caused by groundwater drawdown;
- describe the contaminant attenuation capacity within the hydrogeological units in the project area. With this input, assess the potential for off-site groundwater and surface water contamination. Alternatively, the proponent may conservatively assume no attenuation capacity, but must still describe, in detail, potential degradation products that may result from attenuation and other processes during groundwater flow;
- describe the potential changes to surface water, groundwater or sediment quality related to the project including;
- potential changes to surface water quality due to surface erosion and sedimentation, from the removal of vegetation and changes to riparian, wetland, and terrestrial environments;
- potential changes to surface water quality due to aerial deposition of fugitive dust and particulate matter and any contaminants they contain, such as metal(loids), mercury, and methylmercury;
- changes to surface water and groundwater quality due to all discharges and effluents from the project, including changes to physicochemical parameters, and relevant chemical constituents;

IA guidelines

Effects

present a 3-dimensional numerical groundwater flow model of the hydrogeological system that incorporates all major project features such as open pits, underground workings, waste rock piles, tailings management facilities, dewatering wells, and water diversion ditches:

- the model should be based on the calibrated model used to describe baseline conditions;
- the use of telescopically refined groundwater flow models is recommended in the vicinity of open pits and tailings management facilities;
- using the 3- dimensional numerical groundwater flow model,
- estimate key project fluxes, including open pit or mine inflow rates, pit or mine dewatering rates, pit or mine flooding rates, and tailings seepage rates during operations and the post-closure period;
- use the numerical groundwater flow model to estimate changes to surface and groundwater flow regimes during facility operations and the post-closure period, including effects of mine dewatering on lake levels, effects on watercourse baseflow, effects on wetlands, effects on perennial flow and discharge, effects on drinking water supplies, and effects on natural flow divides;
- estimate seasonal changes to surface water and groundwater regimes during operations and the post-closure period, including effects of depressurization of the basal aquifer and dewatering of surficial deposits, effects on baseflow in rivers and streams, effects on wetlands, effects on groundwater-surface water interactions related to fish habitat, drinking water supply, and natural flow divides;
- describe the contaminants associated with the project, their spatial and temporal locations and their potential flow paths (e.g. groundwater seepage pathways and how they relate to potential receptors). Characterize how they could affect surface and groundwater quality, including information on the source(s) of any contaminants, and their transport and fate in the water environment;

describe the downgradient flow of groundwater affected by the project, with the use of figures showing groundwater piezometric contours and particle tracking results,

- describe the potential effects on surface water flow or water levels caused by groundwater drawdown;
- describe the contaminant attenuation capacity within the hydrogeological units in the project area. With this input, assess the potential for off-site groundwater and surface water contamination. Alternatively, the proponent may conservatively assume no attenuation capacity, but must still describe, in detail, potential degradation products that may result from attenuation and other processes during groundwater flow;
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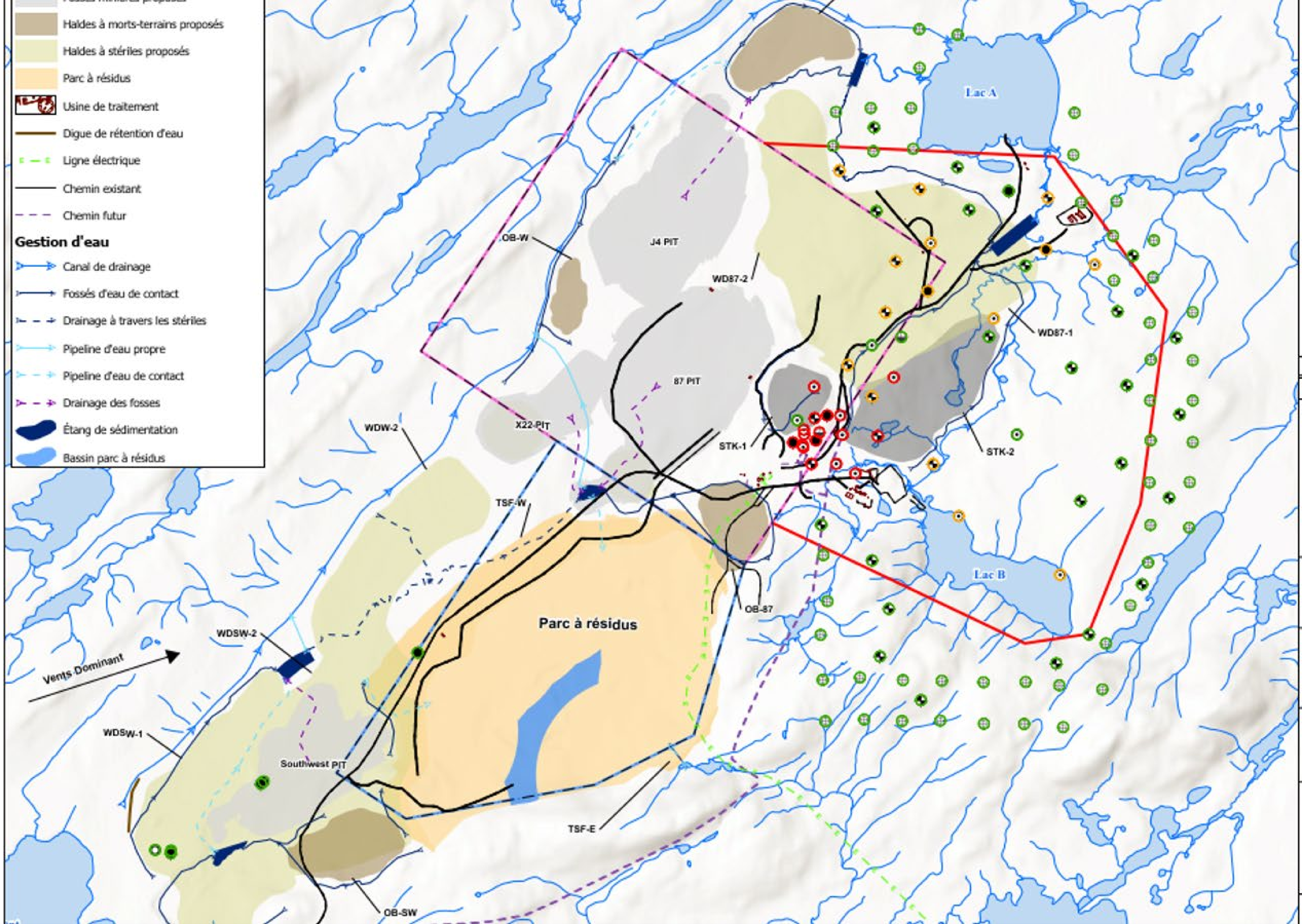
- potential changes to surface water quality due to surface erosion and sedimentation, from the removal of vegetation and changes to riparian, wetland, and terrestrial environments;
- potential changes to surface water quality due to aerial deposition of fugitive dust and particulate matter and any contaminants they contain, such as metal(loids), mercury, and methylmercury;
- changes to surface water and groundwater quality due to all discharges and effluents from the project, including changes to physicochemical parameters, and relevant chemical constituents;

IA guidelines

Effects

- changes in surface water quality, including changes due to project discharges and effluents, as well as changes due to project acidifying emissions and acid deposition, using the information provided to meet the requirements under Section 8.5.2, Effects to Atmospheric, Acoustic and Visual environment;
- potential changes in sediment quality and composition due to effluent discharge and other project-related wastewater discharges to surface waters;
- compare any changes to surface or groundwater quality to applicable guidelines, objectives or standards;
- describe the quantity and quality of all effluent streams from the site and going to the receiving environment, including effluent from treatment facilities (e.g., process water, mine water), seepage, and surface run-off from project components and site. Include the location of the effluent discharge point(s);
- compare the quality of all effluent streams to applicable guidelines, objectives or standards to better identify possible adverse effects on the receiving environment;
- using the integrated chemical mass balance model, at a minimum for the worst-case scenario, describe the predicted worst case, base case, and sensitivity scenario changes caused by project activities to surface water, groundwater, and sediment quality in the receiving environment, for both physicochemical parameters and chemical constituents, including but not limited to:
- chemical loadings associated with acid rock drainage, neutral mine drainage, and/or metal(loid) leaching described in Section 8.3.2, Effects to chemical release rates;
- seepage from piles of material and tailings (including cyanide for gold mines);
- watercourse and waterbody crossings, blasting, diversions, dewatering, water withdrawal, wastewater return, overflows from excavation, and surface runoff;
- compare the predicted worst, base, and sensitivity case scenario changes to groundwater, surface and sediment quality to baseline and applicable guidelines, objectives or standards;
- provide an assessment for off-site migration pathways for impacted groundwater, and an analysis of contaminant attenuation capacities within the hydrogeological units of the project study area;
- describe locations at which potential changes to water or sediment quality will be assessed, including:
- all point and diffuse sources of discharges;
- immediate receiving environment for any point of diffuse sources of discharges from the project;
- at outer boundary of mixing zone;
- where the water quality from the immediate receiving environment begins to meet Water Quality Guidelines, or background levels for that contaminant
- at project boundary;
- at Local Study Area boundary,
- at Regional Study Area boundary; and
- analyze and describe changes to surface and groundwater at a scale and resolution that allows for the application of results to the assessment of interrelated VCs, notably for fish and fish habitat and human health. Carry forward the assessment of potential changes in water quality, as required in the following sections of the Guidelines.

Dust contamination area



Sondage (SNC-Lavalin, 2018)
Sondage (STAVIBEL, 2013)
Sondage (Troilus Gold, 2021)
Limite de lot
Limite du secteur identifié pour la mise à jour de l'avis de contamination
Limite du bail de surface du parc à residus
Limite du bail minier
Lacs ultime
Cours d'eau ultime

Sommaire de la qualité environnementale des sols

Concentrations inférieures ou égales aux critères B du MELCCFP
Concentrations dans la plage B-C des critèteres du MELCCFP
Concentrations supérieures aux critères C du MELCCFP et inférieures aux valeurs limites de l'annexe I du RESC (Critères génériques «D»)

RÉV.	DESCRIPTION	AA/MM/JJ	PAR	VÉRIF.
1				

RÉFÉRENCES

LOCALISATIONS DES ZONES DE STÉRILES SUR L'AIRE INDUSTRIEL, STAVIBEL, AVRIL 2012
CARACTÉRISATION COMPLÉMENTAIRE - POUSSIÈRES AÉROPORTÉES - SITE MINIER TROILUS GOLD, WSP, FÉVRIER 2023

NOTES

CES INFORMATIONS NE PEUVENT ÊTRE REPRODUITE SANS L'AUTORISATION ÉCRITE DE BLUMETRIC ENVIRONMENTAL INC. NE PAS AGRANDIR ET RÉDUIRE LA TAILLE DE CE DESSIN. CE DESSIN A PEUT-ÊTRE ÉTÉ RÉDUIT. TOUTES LES ÉCHELLES ET ANNOTATIONS INDIQUÉES SONT BASÉES SUR UN FORMAT DE DESSIN DE 11"X17".

1:30,000 — 0 — 500 — 1,000 Mètres

ÉCHELLE (m)

LES DIMENSIONS DE CETTE ÉCHELLE DOIVENT ÊTRE UTILISÉES À TITRE D'INFORMATION SEULEMENT

CLIENT

Troilus Gold Corp.

PROJET

PRÉLIMINAIRE

Mise à jour du plan de réhabilitation - Plan de suivi et plan de contigence

TITRE

Plan préliminaire - Infrastructure minière projetée et sommaire de la qualité environnementale des sols- Zone de contamination aéroportée

BluMetric® Environnement
1500 rue du Collège - Suite 200
Saint-Laurent (Québec) H4L 5G6
TEL: (514) 844-7199
FAX: (514) 841-9111
Courriel: montreal@blumetric.ca
Web: http://www.blumetric.ca

No PROJET 230138

DATE 02/ 27/ 2024

Monitoring Plan

Monitoring plan	Vegetation	Surface water	Underground water
Frequency	2*/year	2*/year	2*/year
Duration	Until Notice of decontamination	Until Notice of decontamination	Until Notice of decontamination
Sampling stations	Dust accumulation zone, contaminated soil zone (2 sectors), reference zone	4 stations (downstream, upstream and reference zone)	8 stations (downstream, upstream and refernce zone)
Parameters	Density, health, metals	Mtals: arsenic, baryum, cadmium, cuivre, étain, chrome, cobalt, nickel, zinc.	Métaux dissous : arsenic, baryum, cadmium, cuivre, étain, chrome, cobalt, nickel, zinc.
Contingency Plan triggers	Upwards trend in vegetation metal concentration (5 years). Metal concentration over 20% than reference zone	Upwards trend in surface water metal concentration (5 years). Metal concentration over 20% than reference zone	Upwards trend in underground water metal concentration (5 years). Metal concentration over 20% than reference zone

Végétaux	CYCLE 1		CYCLE 2	CYCLE 3	CYCLE 4
	Exposition Éloignée	Exposition Rapprochée			
	Ampleur de l'effet				
Densité	Non significatif	Non significatif	Non significatif	Non significatif	Non significatif
Nécrose	Significatif				
Métaux	significatif				

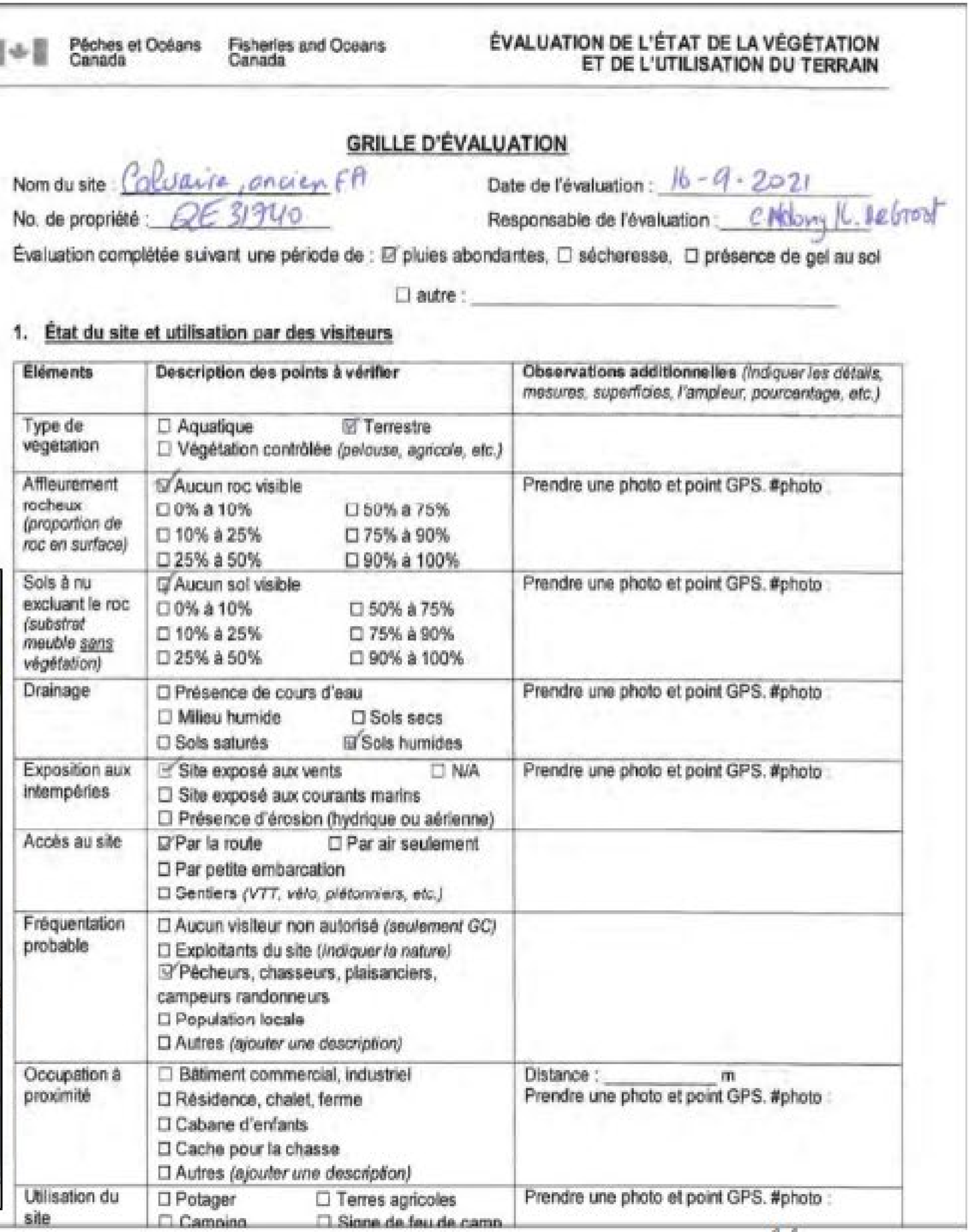
Perte de feuilles

Chlorose

Nécrose

Déformation des feuilles, décoloration

Mauvais développement des racines



Pêches et Océans Canada | Fisheries and Oceans Canada

ÉVALUATION DE L'ÉTAT DE LA VÉGÉTATION ET DE L'UTILISATION DU TERRAIN

GRILLE D'ÉVALUATION

Nom du site : Calvaire, ancien FA　Date de l'évaluation : 16-9-2021

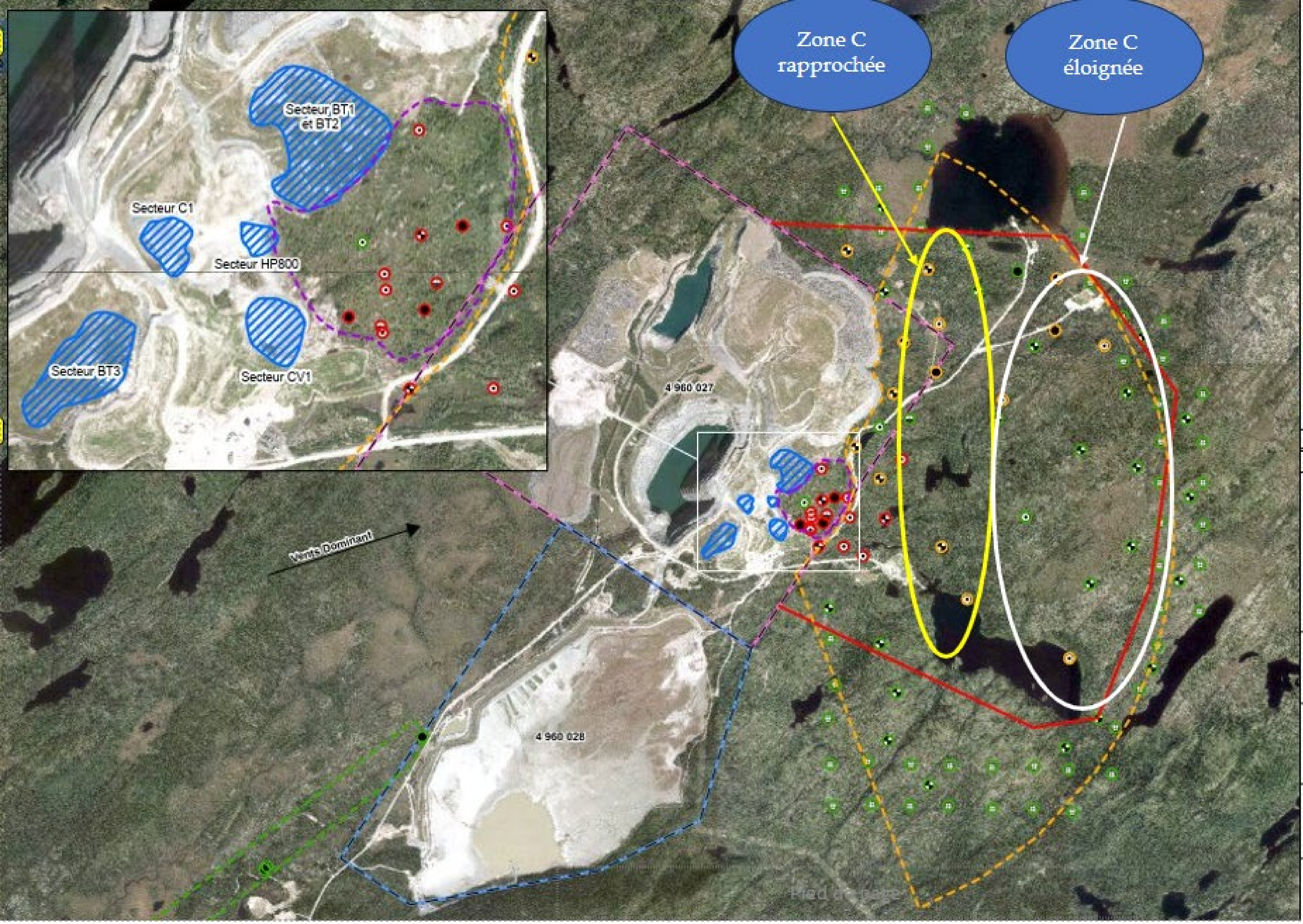
No. de propriété : QE 31940　Responsable de l'évaluation : [illegible]

Évaluation complétée suivant une période de : ☑ pluies abondantes, ☐ sécheresse, ☐ présence de gel au sol

☐ autre : ____

1. **État du site et utilisation par des visiteurs**

Éléments	Description des points à vérifier	Observations additionnelles *(Indiquer les détails, mesures, superficies, l'ampleur, pourcentage, etc.)*
Type de végétation	☐ Aquatique ☑ Terrestre ☐ Végétation contrôlée *(pelouse, agricole, etc.)*	
Affleurement rocheux *(proportion de roc en surface)*	☑ Aucun roc visible ☐ 0% à 10% ☐ 50% à 75% ☐ 10% à 25% ☐ 75% à 90% ☐ 25% à 50% ☐ 90% à 100%	Prendre une photo et point GPS. #photo
Sols à nu excluant le roc *(substrat meuble sans végétation)*	☑ Aucun sol visible ☐ 0% à 10% ☐ 50% à 75% ☐ 10% à 25% ☐ 75% à 90% ☐ 25% à 50% ☐ 90% à 100%	Prendre une photo et point GPS. #photo
Drainage	☐ Présence de cours d'eau ☐ Milieu humide ☐ Sols secs ☐ Sols saturés ☑ Sols humides	Prendre une photo et point GPS. #photo
Exposition aux intempéries	☑ Site exposé aux vents ☐ N/A ☐ Site exposé aux courants marins ☐ Présence d'érosion (hydrique ou aérienne)	Prendre une photo et point GPS. #photo
Accès au site	☑ Par la route ☐ Par air seulement ☐ Par petite embarcation ☐ Sentiers *(VTT, vélo, piétonniers, etc.)*	
Fréquentation probable	☐ Aucun visiteur non autorisé *(seulement GC)* ☐ Exploitants du site *(indiquer la nature)* ☑ Pêcheurs, chasseurs, plaisanciers, campeurs randonneurs ☐ Population locale ☐ Autres *(ajouter une description)*	
Occupation à proximité	☐ Bâtiment commercial, industriel ☐ Résidence, chalet, ferme ☐ Cabane d'enfants ☐ Cache pour la chasse ☐ Autres *(ajouter une description)*	Distance : ______ m Prendre une photo et point GPS. #photo
Utilisation du site	☐ Potager ☐ Terres agricoles ☐ Camping ☐ Signe de feu de camp	Prendre une photo et point GPS. #photo



LÉGENDE

- Sondage Golder, 2022
- Sondage (SNC-Lavalin, 2014)
- Sondage (SNC-Lavalin, 2014 et Troilus Gold, 2019)
- Sondage (SNC-Lavalin, 2018)
- Sondage (STAVIBEL, 2013)
- Sondage (Troilus Gold, 2021)
- Limite de lot
- Limite du bail de surface du parc à résidus
- Limite du bail minier

Sommaire de la qualité environnementale des sols

- Concentrations inférieures ou égales aux critères B du MELCCFP
- Concentrations dans la plage B-C des critères du MELCCFP
- Concentrations supérieures aux critères C du MELCCFP et inférieures aux valeurs limites de l'annexe I du RESC (Critères génériques «D»)
- Limite du secteur identifié pour la mise à jour de l'avis de contamination

Codes des Résultats des stériles miniers - cuivre

- Annexe II-D (C-D)
- Annexe I-II (B-C)
- <Annexe I (A-B)
- (<A)

Anciennes limites des zones A, B, et C

- A - Zone témoin
- B - Zone d'accumulation de poussière
- C - Zone de sols contaminés

RÉV.	DESCRIPTION	AA/MM/JJ	PAR	VÉRIF.
1				

RÉFÉRENCES

NOTES

1:30,000 — 0 — 500 — 1,000 Mètres

ÉCHELLE (m)

CLIENT

Troilus Gold Corp.

PROJET

Mise à jour du plan de réhabilitation - Plan de suivi et plan de contigence

TITRE

PRELIMINAIRE

Limites actuelles et anciennes zone de contamination aéroportée

BluMetric
1500 rue du Collège, Suite 200
Saint-Laurent (Québec) H4L 5G6
TEL: (514) 844-7199

Appendix C-WSP-Surface water management plan ppt

Troilus

Surface Water Management Plan

March 19, 2024

071-2257554004-RevA Water Workshop SWM

Structure of presentation

- Objectives of the surface water management plan
- Presentation of operational water management plan
- Design concept for the main diversion channel
- Presentation of closure water management plan

Background

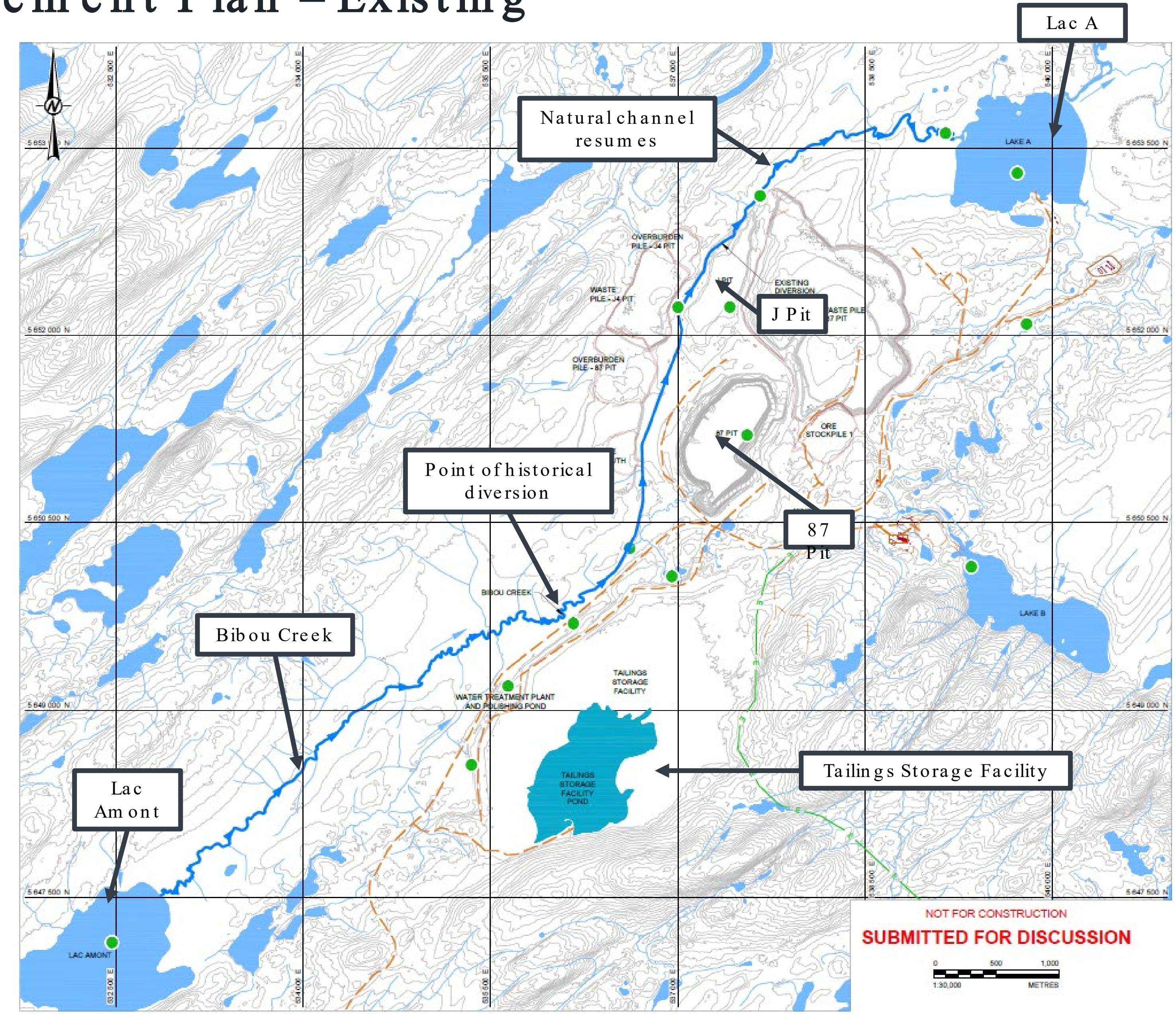
After the completion of the Pre-Feasibility Study (PFS) in 2022, the Troilus Gold Project Surface Water Management Plan (SWMP) was advanced to the Feasibility Study (FS) level.

The plan integrates the latest mine plan and considers past feedback.

Surface Water Management Plan – Existing Conditions

Key Points

- Bibou Creek connects Lac Amont and Lac A
- Historical diversion routed flow around TSF, 87 Pit and J Pit



Bibou Creek - Overview

- Connects Lac Amont with Lac A
- Twelve km long meandering channel; includes 3.5 km diversion around TSF and past J Pit
- 0.3 m to 1.2 m water depth
- 1 m to 4 m channel width

Bibou Creek Looking Upstream at Lac Amont

Bibou Creek near J Pit

Photos by Jonathan Friebel

Bibou Creek Overview

- A fish survey of Bibou Creek was conducted by Troilus and the following fish species were found:
  - Mottled Scuplin
  - Cisco
  - Walleye
  - Lake Whitefish
  - Northern Pike
  - Burbot
  - Minnow
  - Toru Perch
  - Longnose Dace
  - Brook Trout
- Of the fish found in the creek, the Burbot was identified as the fish with the lowest swimming capabilities, and Walleye was identified as the fish most likely to use the channel during spring freshet.

Burbot

Walleye

Minnow

Photos from Wachiih (2021), *État de référence du milieu récepteur*

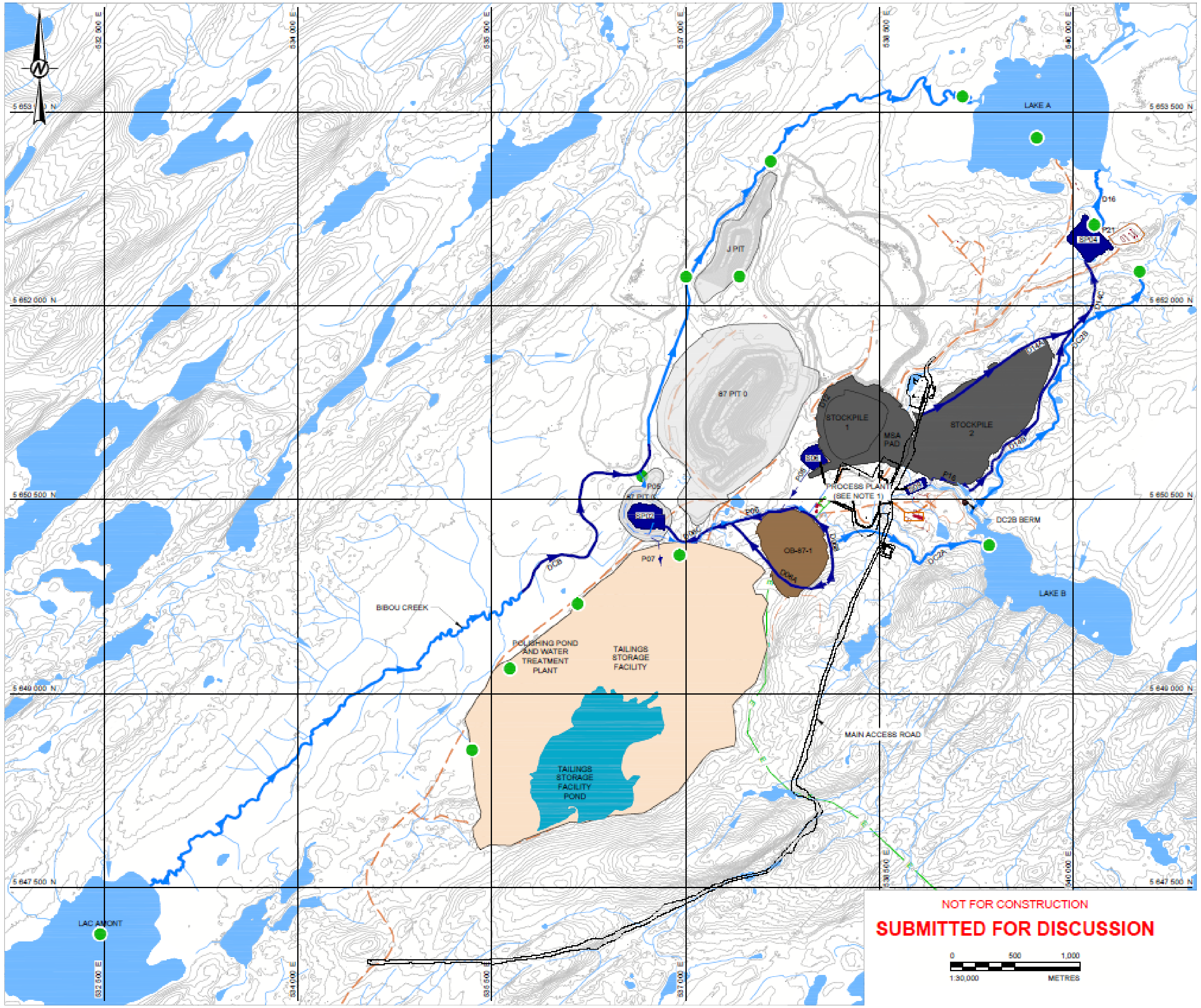
Objectives

- Divert natural flows around the site and maintain existing hydraulic and fish connectivity between upstream and downstream lakes
- Manage mine contact water to:
  - Maximize recycling for process water use and provide a secure process water supply
  - Meet regulatory requirements for water releases to the environment
  - Reduce on-site water handling requirements

Surface Water Management Plan – Year -2

Key Points

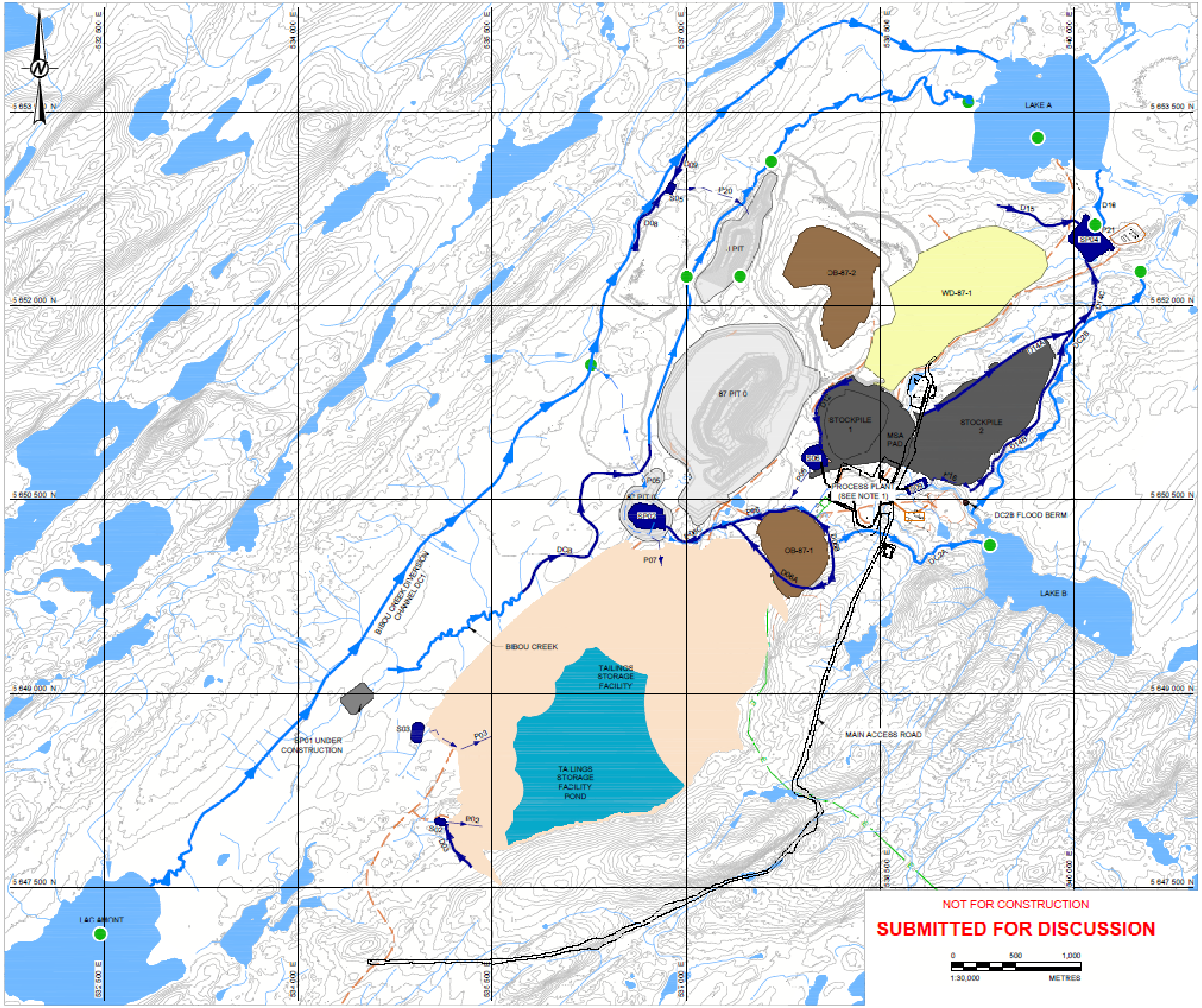
- Existing diversion will be routed around the first pit expansion
- Plant site development
- Development of contact water management in the north-east end of the site



Surface Water Management Plan – Year -1

Key Points

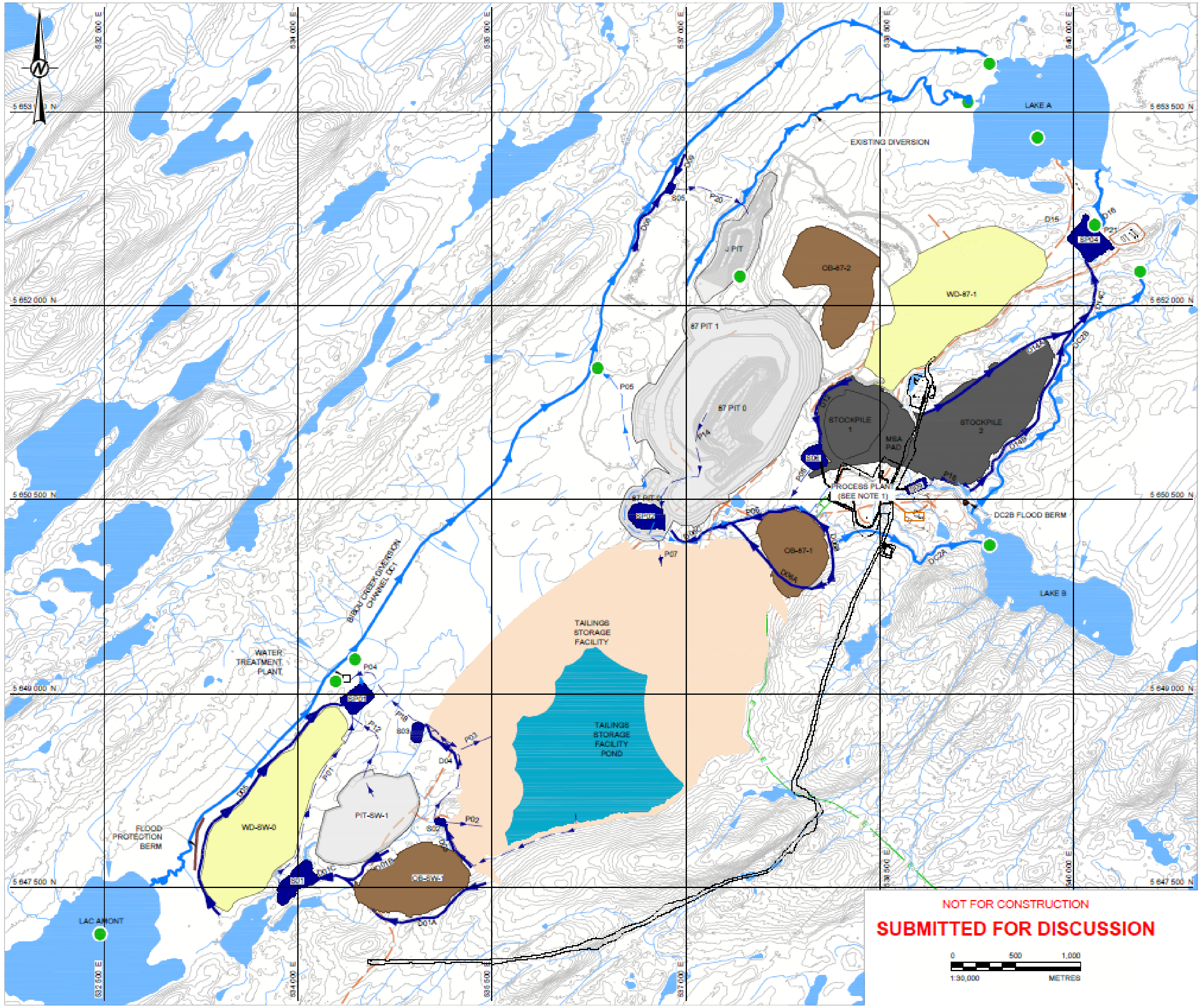
- Construction of new stream diversion "DC1"
- Development of water management on the south side of the Tailing Storage Facility as it expands



Surface Water Management Plan – Year 1

Key Points

- Construction of water management infrastructure around the South-West Pit

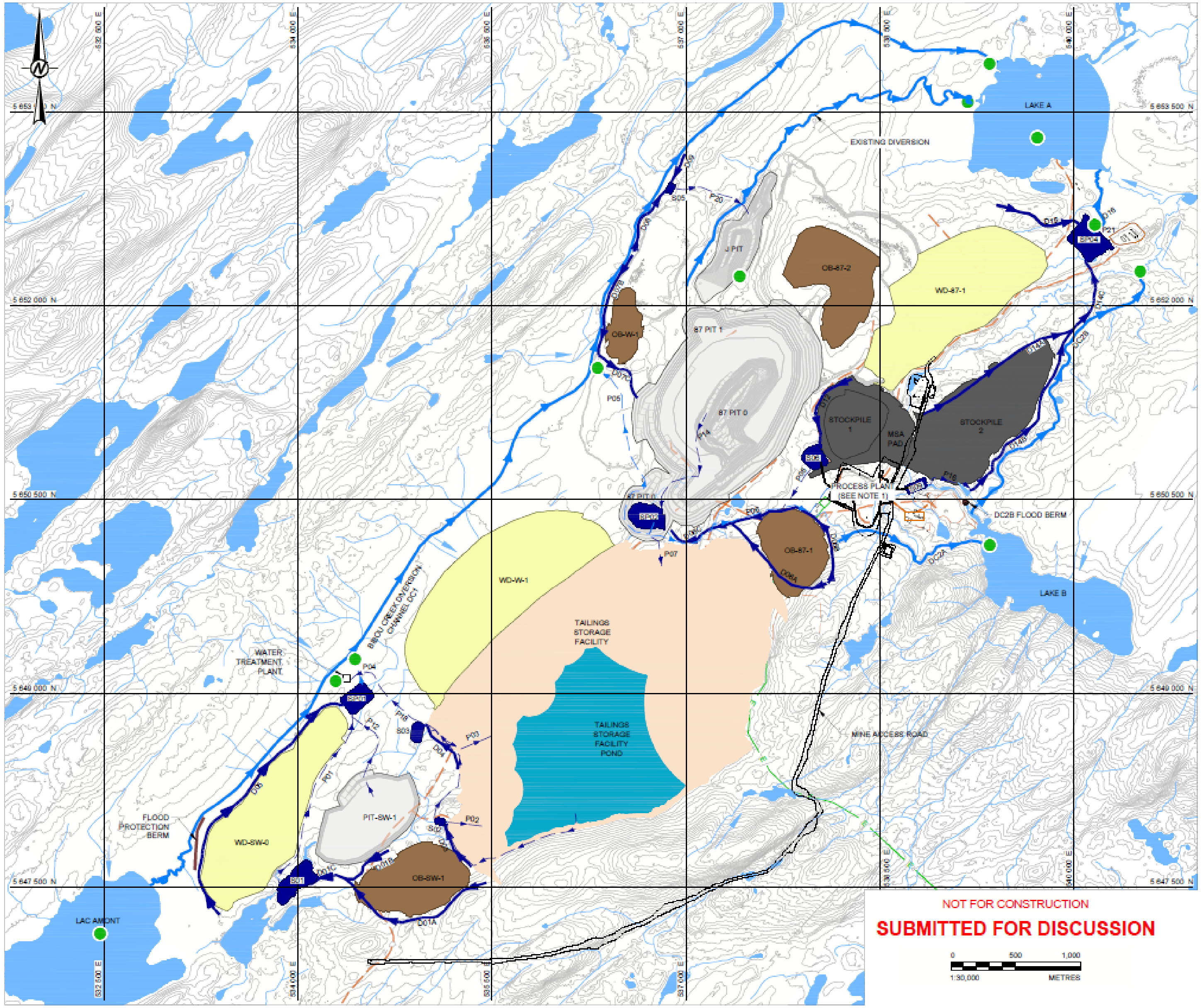


Troilus Project Feasibility Study – Surface Water Management Plan
071-2257554004-RevA Water Workshop SWM

Surface Water Management Plan – Year 2

Key Points

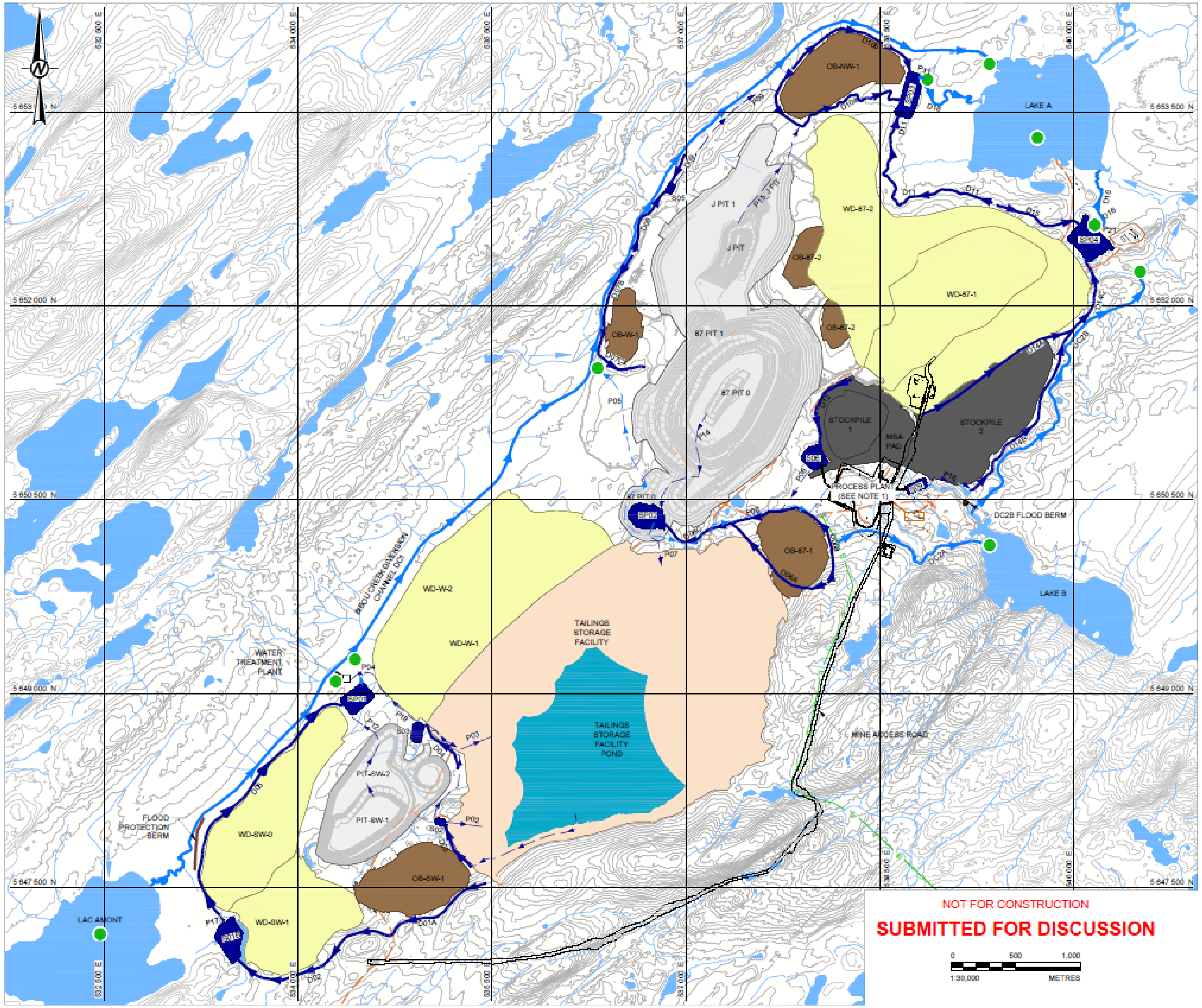
- Expansion of rock dumps and pits



Surface Water Management Plan – Year 6

Key Points

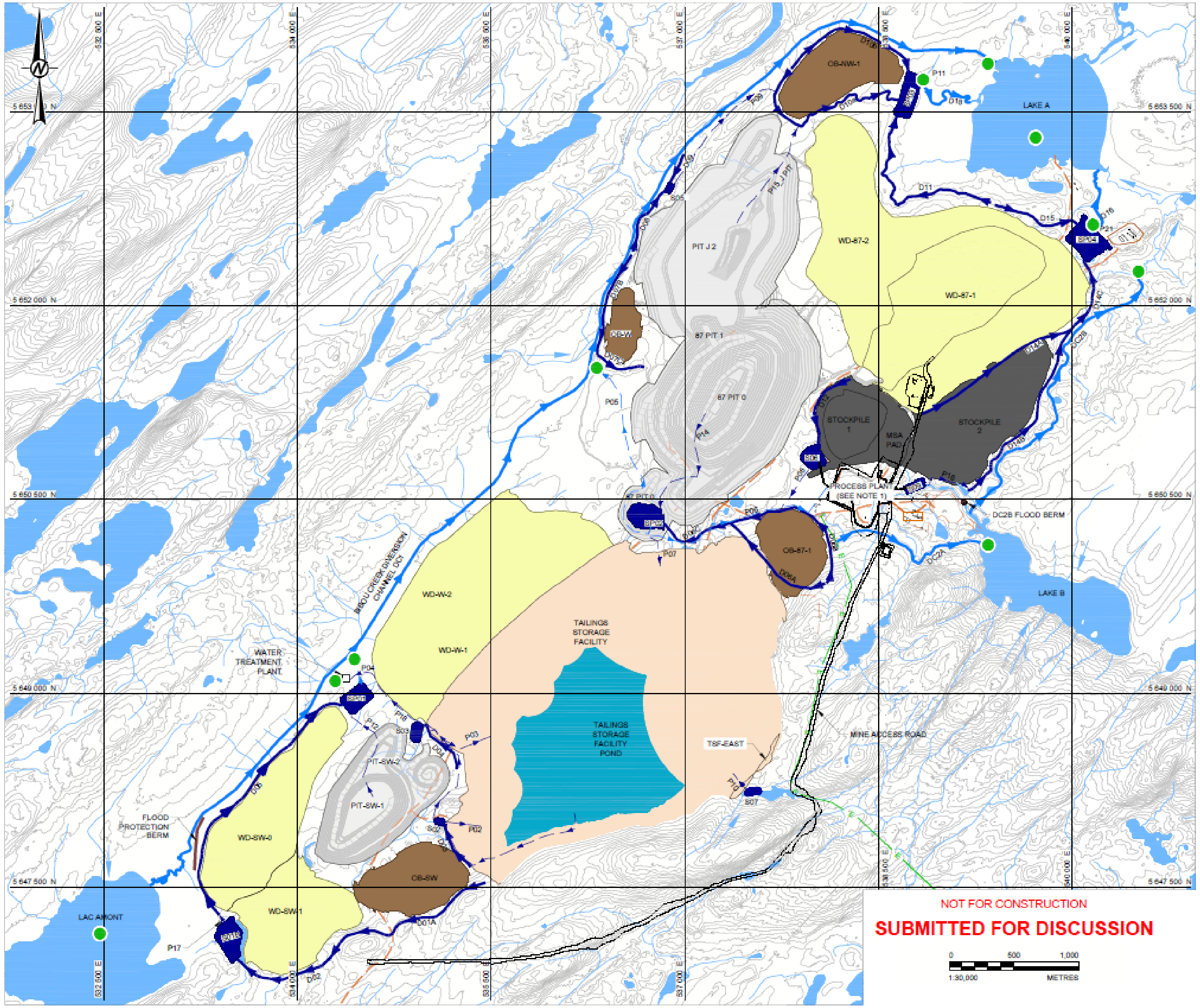
- Construction of surface water management infrastructure in the north of the site to manage drainage from overburden and waste rock piles
- Expansion of the south-west waste rock dumps and modifications to water management infrastructure



Surface Water Management Plan – Year 8

Key Points

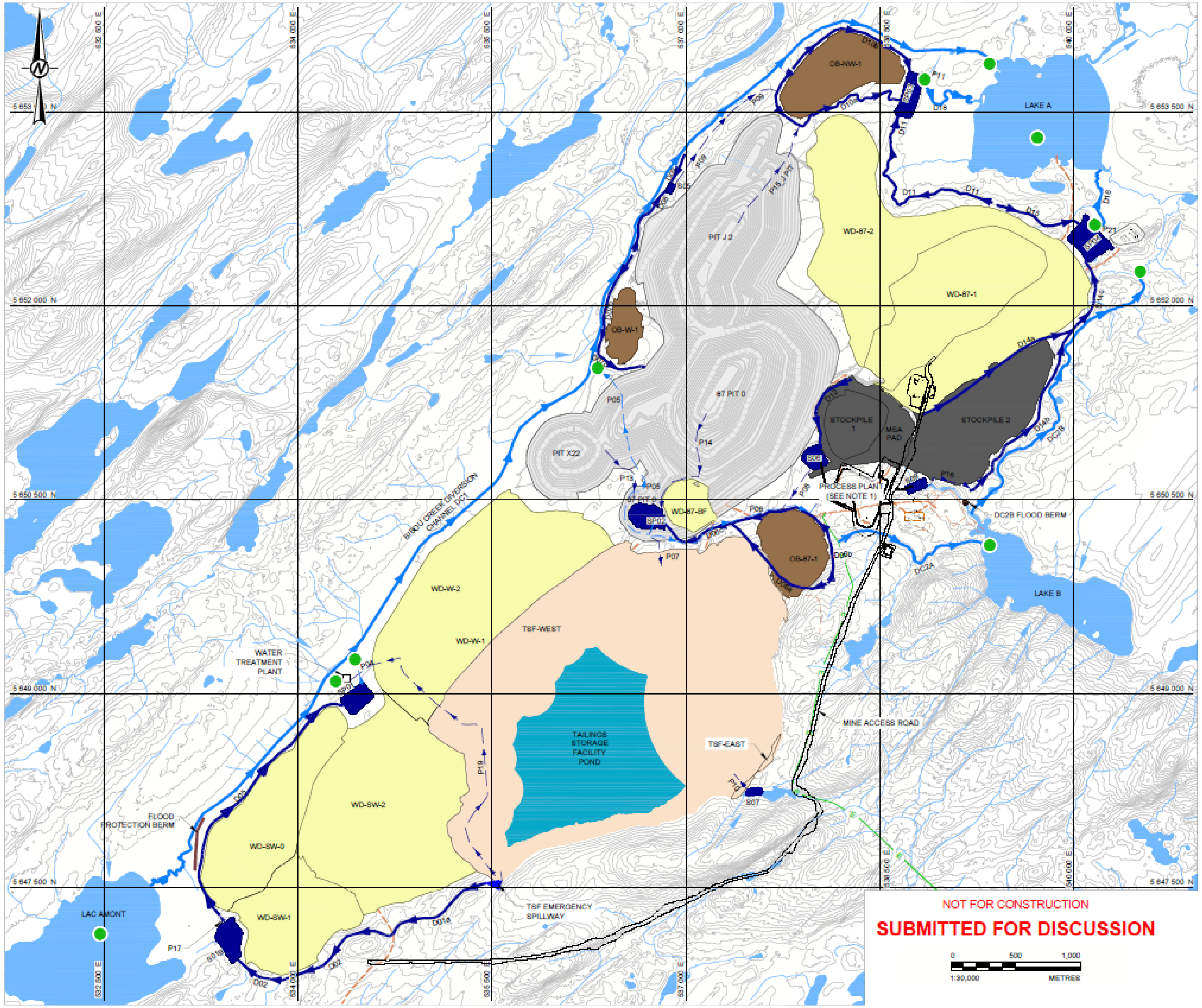
- Continued expansion of dumps and pits



Surface Water Management Plan – End-of-Mine

Key Points

- Full developed footprint



DC1 Diversion - Design Principles

- Convey the 100-year flood flow from Lac Amont to Lake A
- Provide fish passage between Lac Amont and Lake A
- Provide smooth transition from operational period to closure

Designing for Fish Passage

- Fish passage must be provided between the 7Q10 low flow and 14Q2 high flow conditions:
  - 7Q10 refers to the annual minimum 7-day average flow rate with a 10-year occurrence interval (May to October)
  - 14Q2 refers to the annual maximum 14-day average flow rate with a 2-year occurrence interval
- The channel must also contain the 100-year flood event
- Based on the hydrology assessment conducted for the project area the following flow rates were used in the design:

Flow Event	Upstream Flow Rate (m^3/s)	Downstream Flow Rate (m^3/s)
7Q10 Low Flow	0.03	0.04
Average Annual Flow	0.56	0.70
14Q2 High Flow	2.5	2.8
100-year Flood Event	17	26

Fish Passage Criteria

Burbot and walleye were selected as the design species

- Burbot have lower swimming ability compared to other known species
- Walleye are the main species that will make use of the channel during spring freshet

The following criteria were implemented :

- Maintain minimum water depth of 10-20 cm for 7Q10 low flow.
- Maximum channel velocity should allow Walleye passage between the 7Q10 low and 14Q2 high flow from Lac A to Lac Amont as per Table 1 below.
- Provide frequent shelter places to consider Burbot's smaller swimming abilities.

Table 1: Maximum distance over which Burbot and Walleye can travel without shelter given the flow velocity during high flow events (Katopodis, 2016)

Distance (m)	Max. Velocity for Burbot (m/s)	Max. Velocity for Walleye (m/s)
3	1	2.2
25	-	1.0
100 - 300	0.1	0.4

Create Fish Habitat

- Use boulders to create frequent areas of shelter
- Use wood logs and weirs to increase backwater and overall water depth
- Use cobble, gravel, and boulders to increase channel roughness and reduce velocity of water

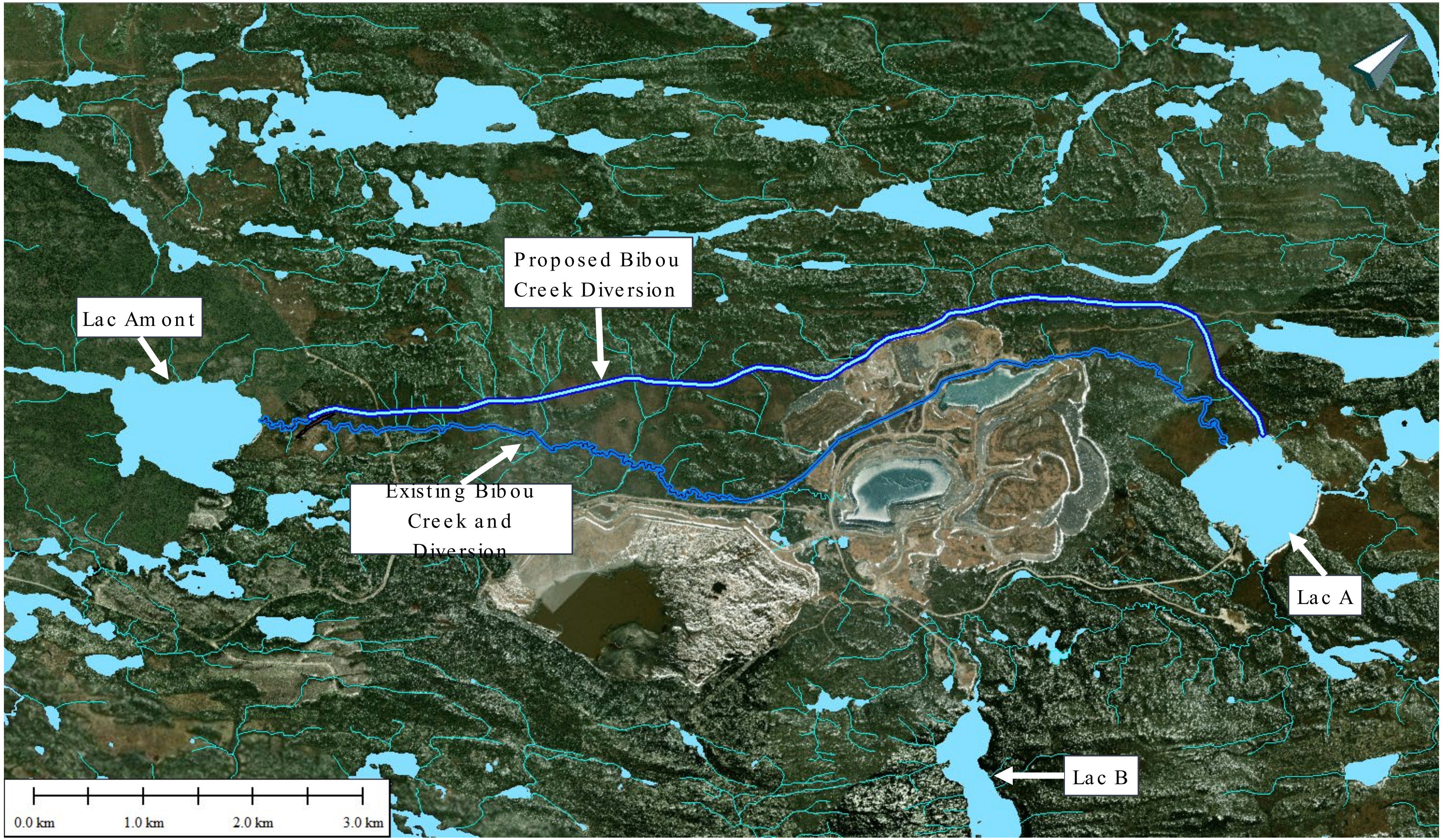
Boulders in Stream

Retrieved from:
https://megamanual.geosyntec.com/npsmanual/boulderclustersrockriffles.aspx

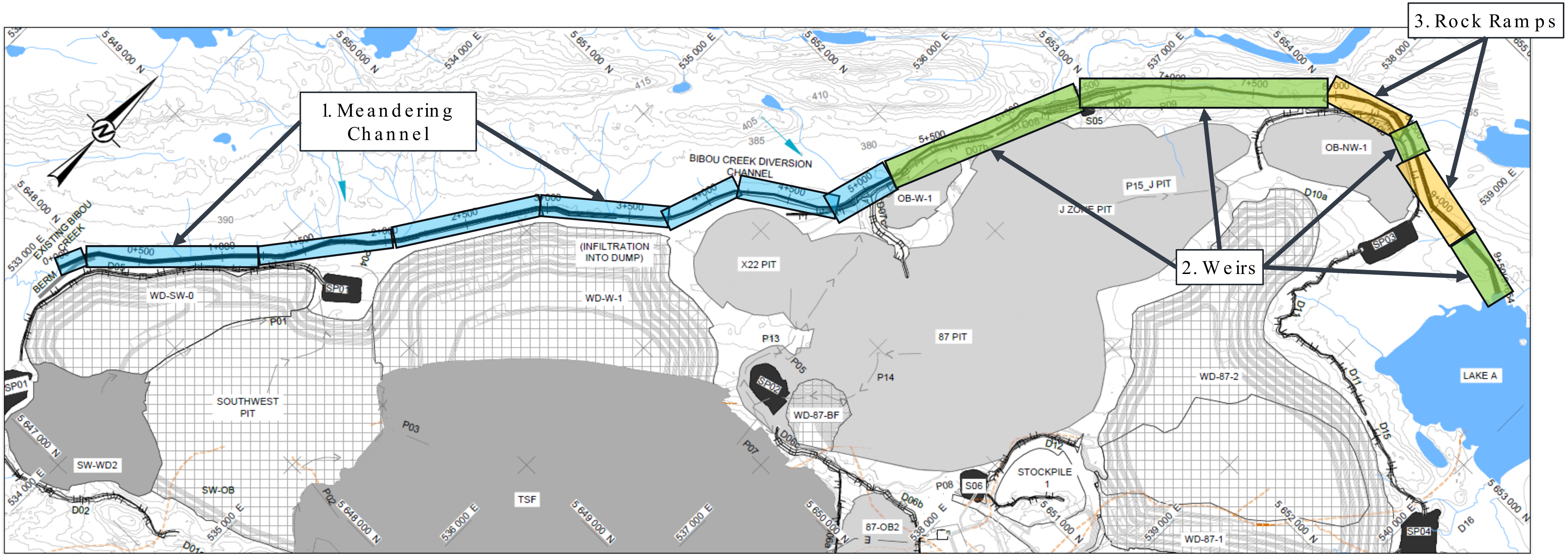
Wooden Debris in Stream

Photo by Jonathan Friebel

Proposed Stream Diversion Alignment



Stream Diversion Schematic



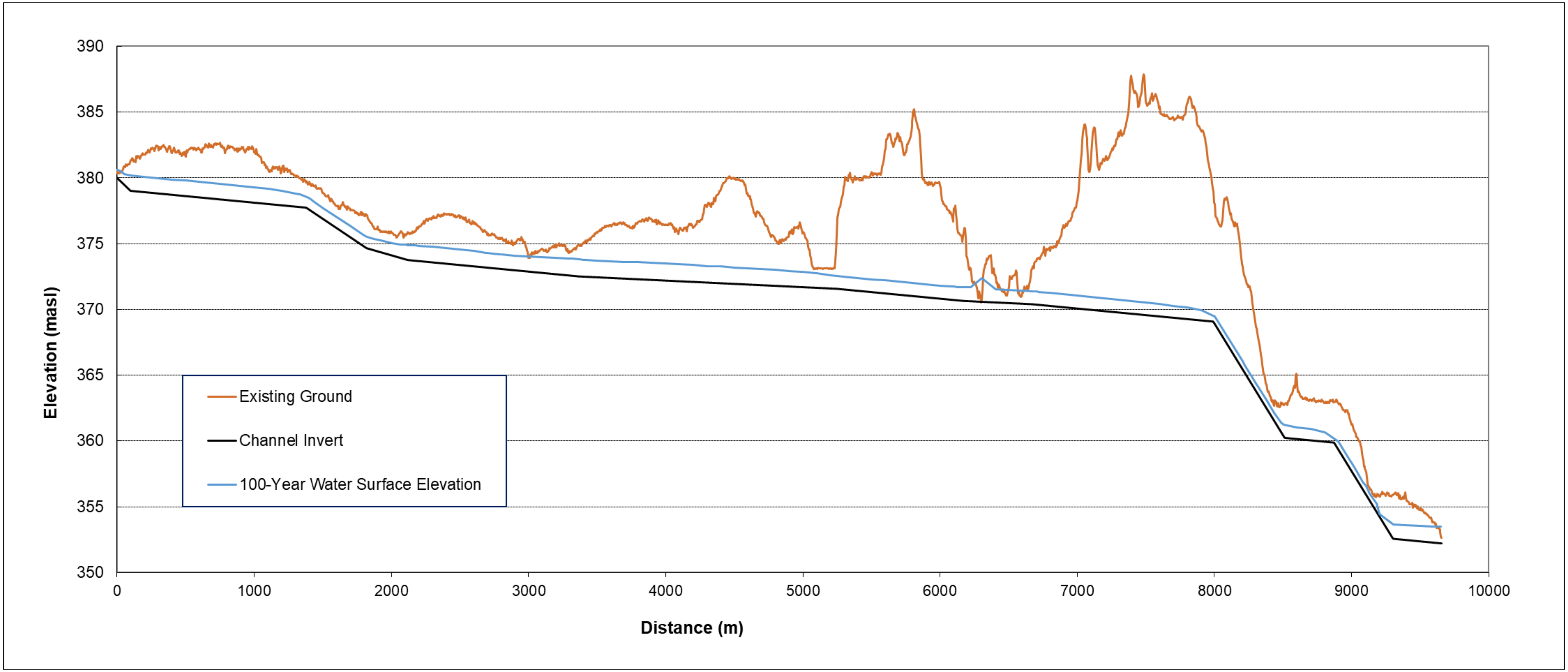
PLAN - BIBOU CREEK DIVERSION CHANNEL DC1

SCALE 1:15,000

Proposed Stream Diversion Overview

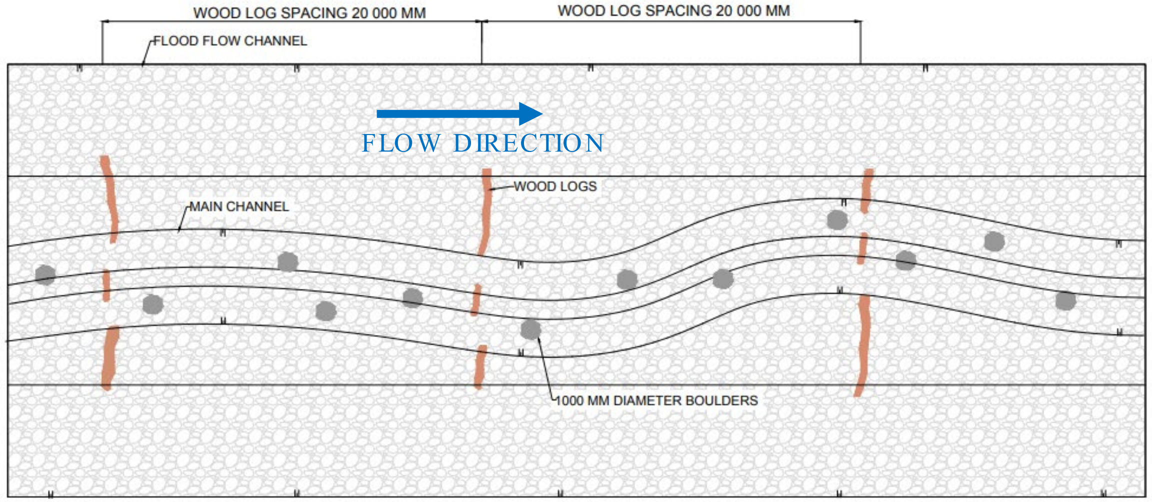
- The proposed stream diversion is 9.7 km long.
- The upstream portion of the channel (the first 5.3 km) will remain in place after mine closure.
- The entire channel is designed to maintain fish passage:
  - Special consideration must be taken for the portion of the channel remaining after closure to limit the amount of maintenance required.
- The channel is composed of 16 different segments which each have 1 of 3 design types:
  - Type 1 – Meandering Channels
  - Type 2 – Flat Segments with Small Weirs
  - Type 3 - Rock Ramps

Diversion Channel Profile

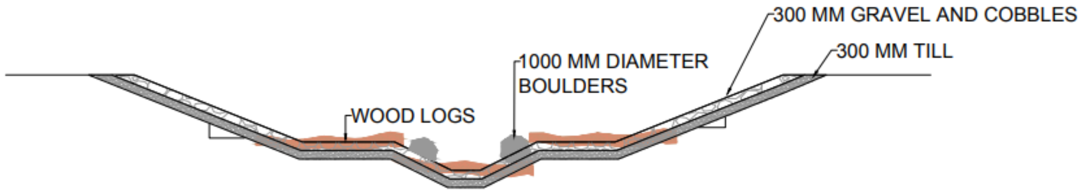


Stream Diversion Design

- Type 1 – Meandering Channel



Channel Plan View



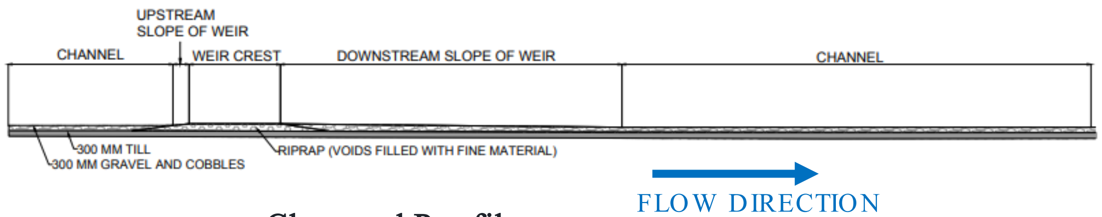
Channel Cross Section

Meandering channel lined with boulders and wood debris.

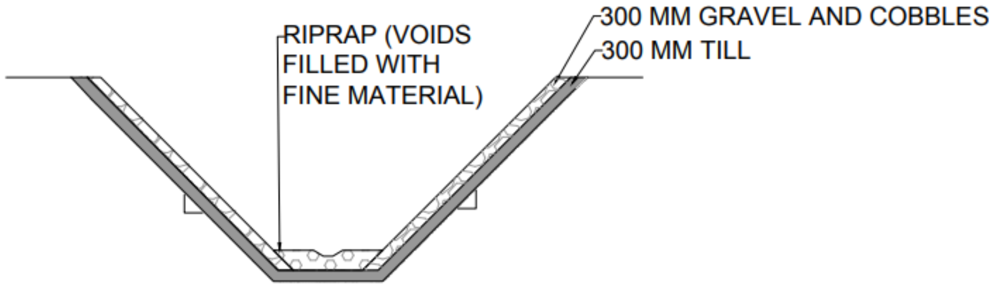
Northern Virginia Regional Commission, https://www.novaregion.org

Stream Diversion Design

- Type 2 – Flat Segment with Small Weirs



Channel Profile



Weir Cross Section

Gravel lined channel with low weirs to preserve a minimum low flow water depth.

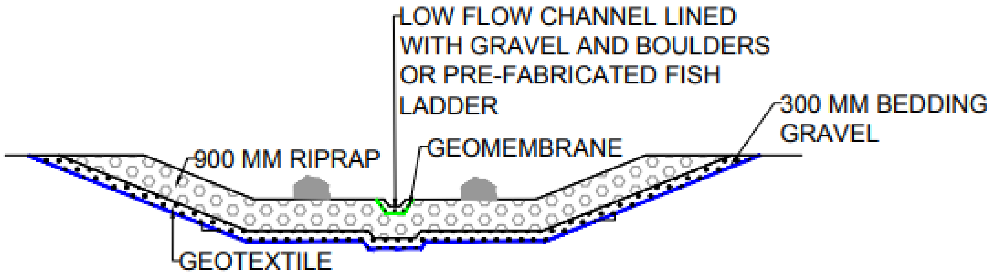
By Petitcodiac Watershed Alliance

Troilus Project Feasibility Study – Surface Water Management Plan
071-22575554004-RevA Water Workshop SWM

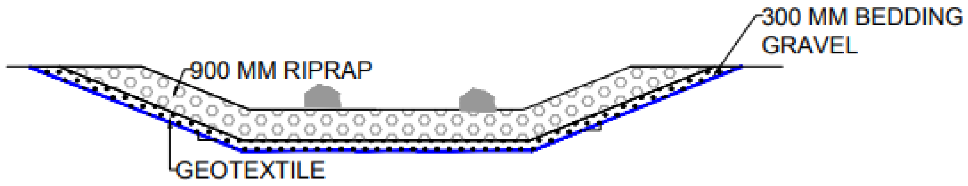
Stream Diversion Design

- Type 3 – Steep Channel with Rock Ramps

Sequence of rock ramps and pools to allow fish passage across steeper channel segment. Design to add low flow



Rock Ramp Cross Section



Pool Cross Section

Rock ramp fishway (Department of Environment, Science and Innovation) (des.qld.gov.au)

Contact Water Management - Settling Ponds and Sumps

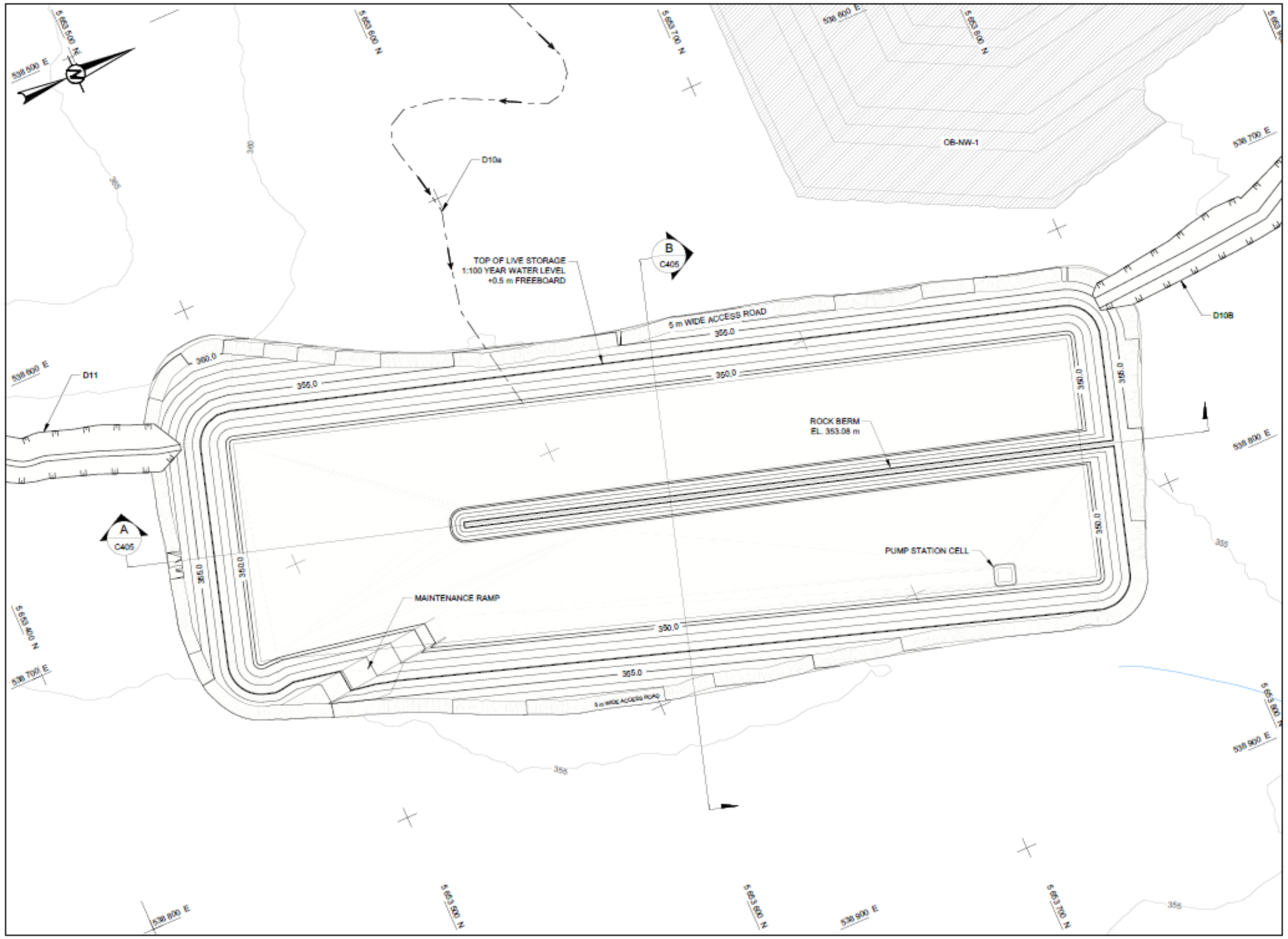
Sedimentation Ponds contain and removes suspended solids from site runoff before release to the environment

Release is by pumping

Water quality is monitored at each release point

Sumps are designed to collect surface runoff at natural low points and convey the runoff (by pumping) to a downstream Settling Pond

There are four settling ponds and nine sumps

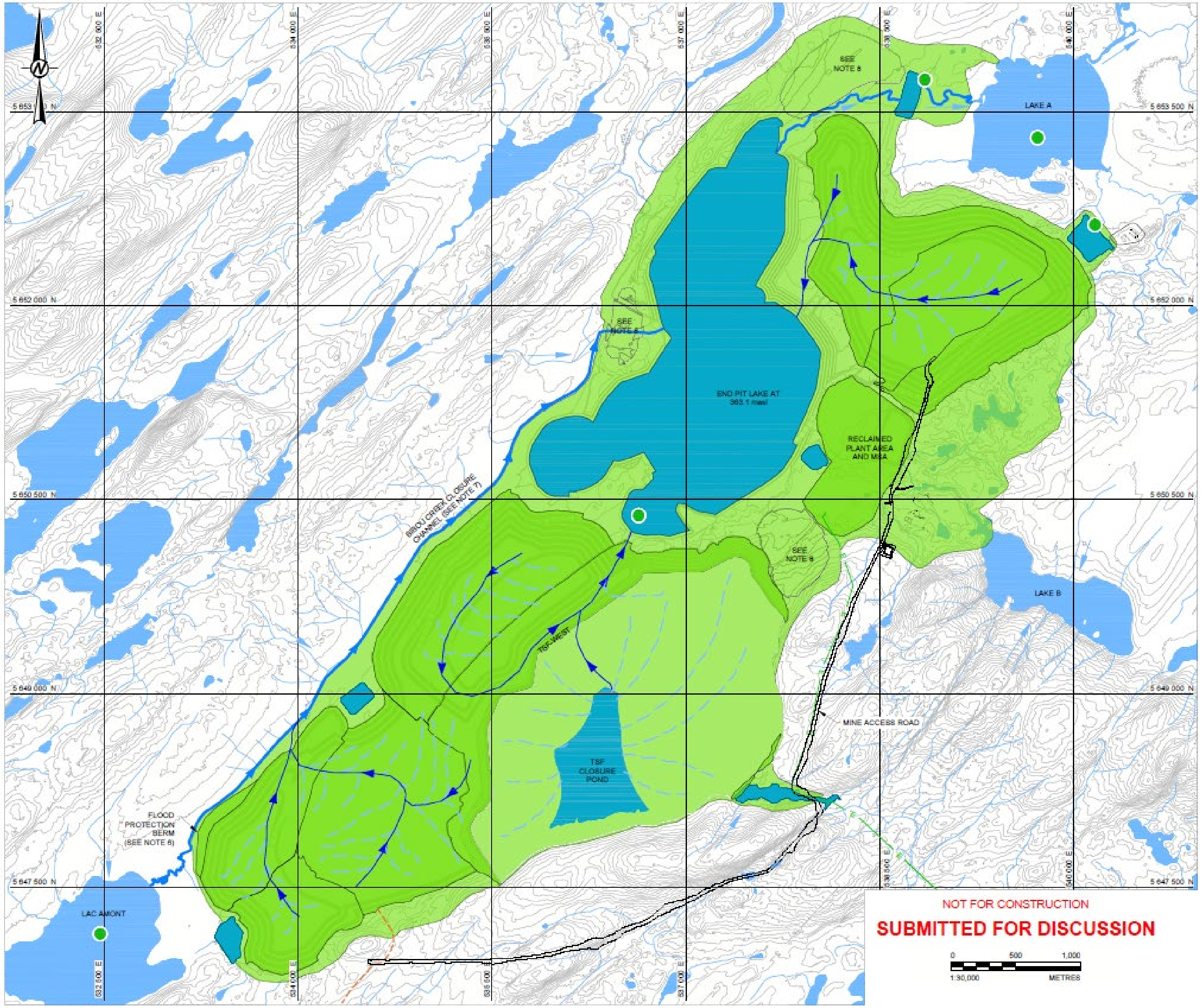


Example – Sedimentation Pond 3 (SP03)

Surface Water Management Plan – Closure

Key Points

- Upstream 5 km of diversion remains in place. Rest is decommissioned, backfilled and reclaimed
- Diversion is routed through pit lake
- Pit flows through reclaimed Bibou Creek to Lac A
- Waste rock dumps are reclaimed and contoured to drain to environment
- Sumps and ponds remain in place as shallow water bodies



Thank you

wsp.com

Appendix D-WSP Water treatment ppt

Troilus

Water Treatment Plant

March 19, 2024

072-2257554004-RevA Water Workshop WTP

Background

Since the previous Troilus Mine operations to present, a water treatment plant has been used to remove fine suspended solids from the surplus TSF Pond water before its discharge to the environment.

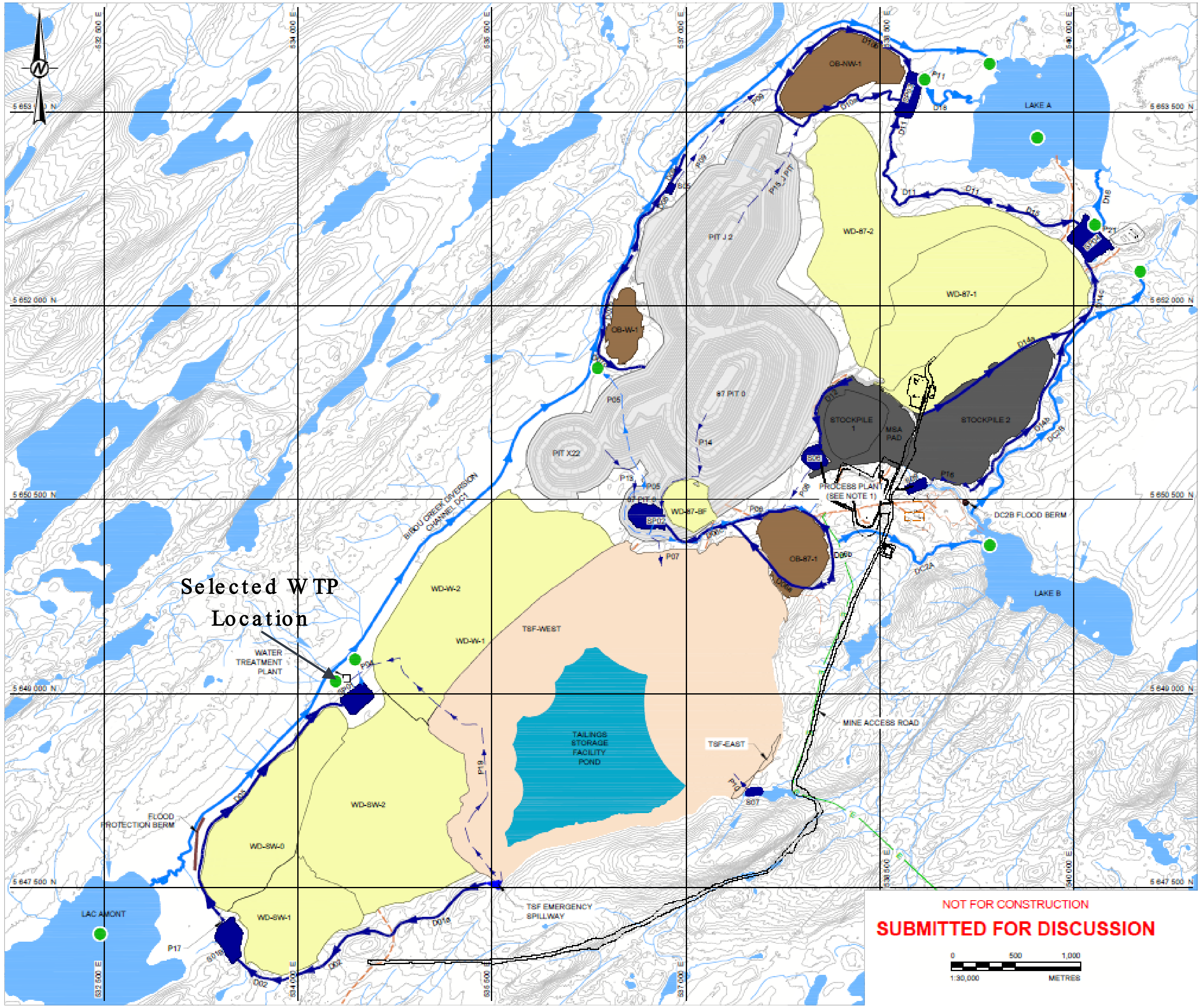
The current plant has a 1,200 m^3/hour treatment rate. The plant is approaching the end of its operational life. The Troilus Project, currently at the feasibility study stage, includes the plant replacement with a similar plant.

Water balance analysis confirmed that a 1,200 m^3/hour plant would still control adequately the TSF Pond water levels.

Water Treatment Plant - Location

Key Points

- Selected location based on
  - closeness to the diversion channel allowing for gravity discharge
  - closeness to a contact water pond allowing for backup gravity discharge
  - closeness to the TSF Pond allowing for economic water transfer



Water Treatment Plant - Design

Key Assumptions

- 1,200 m^3/h maximum design flow.
- 30 to 300 mg/L influent TSS concentrations based on historical data.
- 15 mg/L monthly average, 30 mg/L maximum limit design targets based on regulatory guidelines.
- Up to 35 years operational life.

Water Treatment Plant - Design

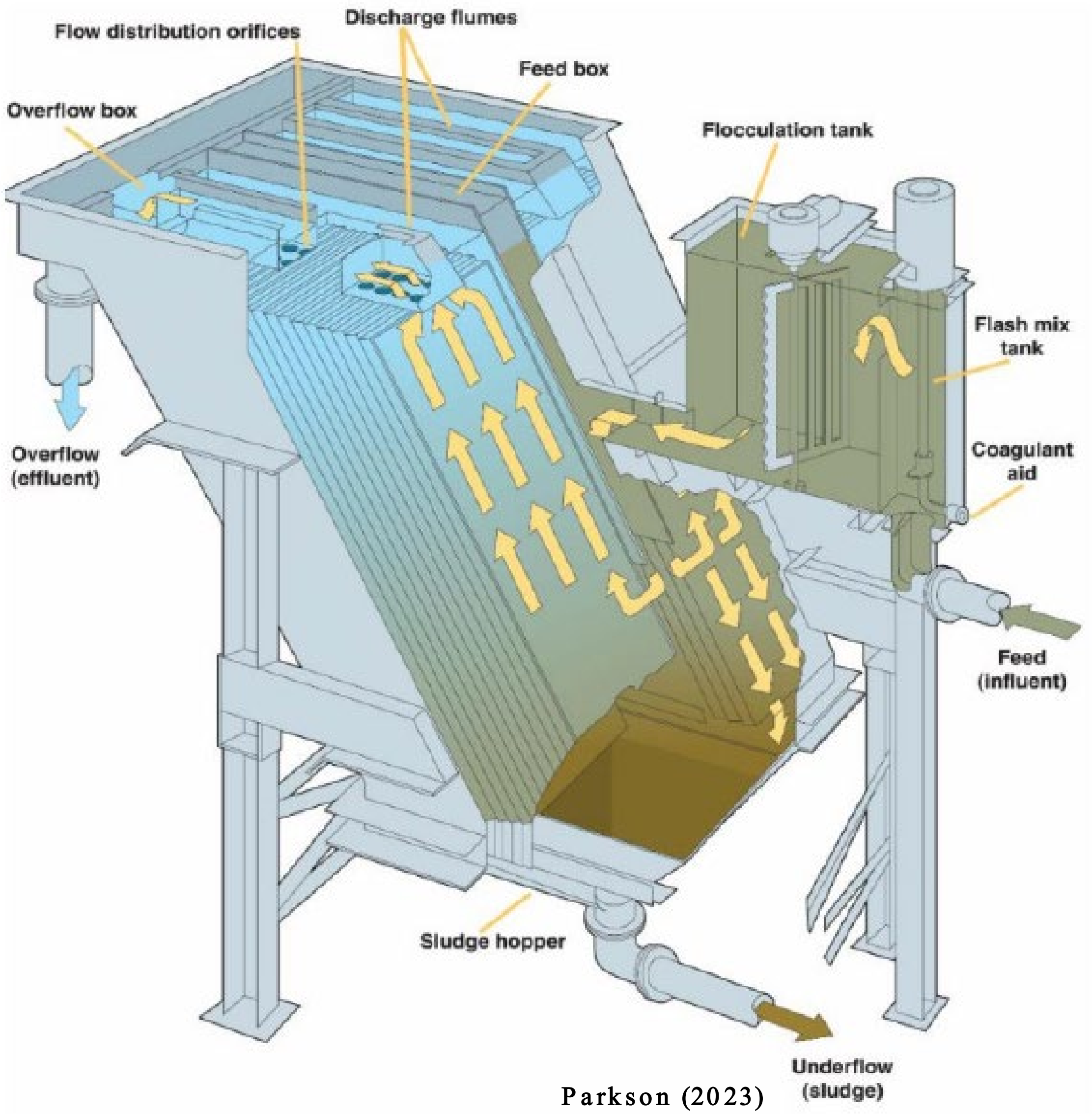
Comparison of four treatment technologies

- Gravity separation with specific core technology
  - Lamella clarifier
  - Ballasted-flocculation lamella clarifier
- Filter separation with specific core technology
  - Disc filter
  - Ultrafiltration

Water Treatment Plant - Design

Technology 1: Gravity separation with lamella clarifier

It relies on inclined plates or tubes to increase the surface area for solids settling.

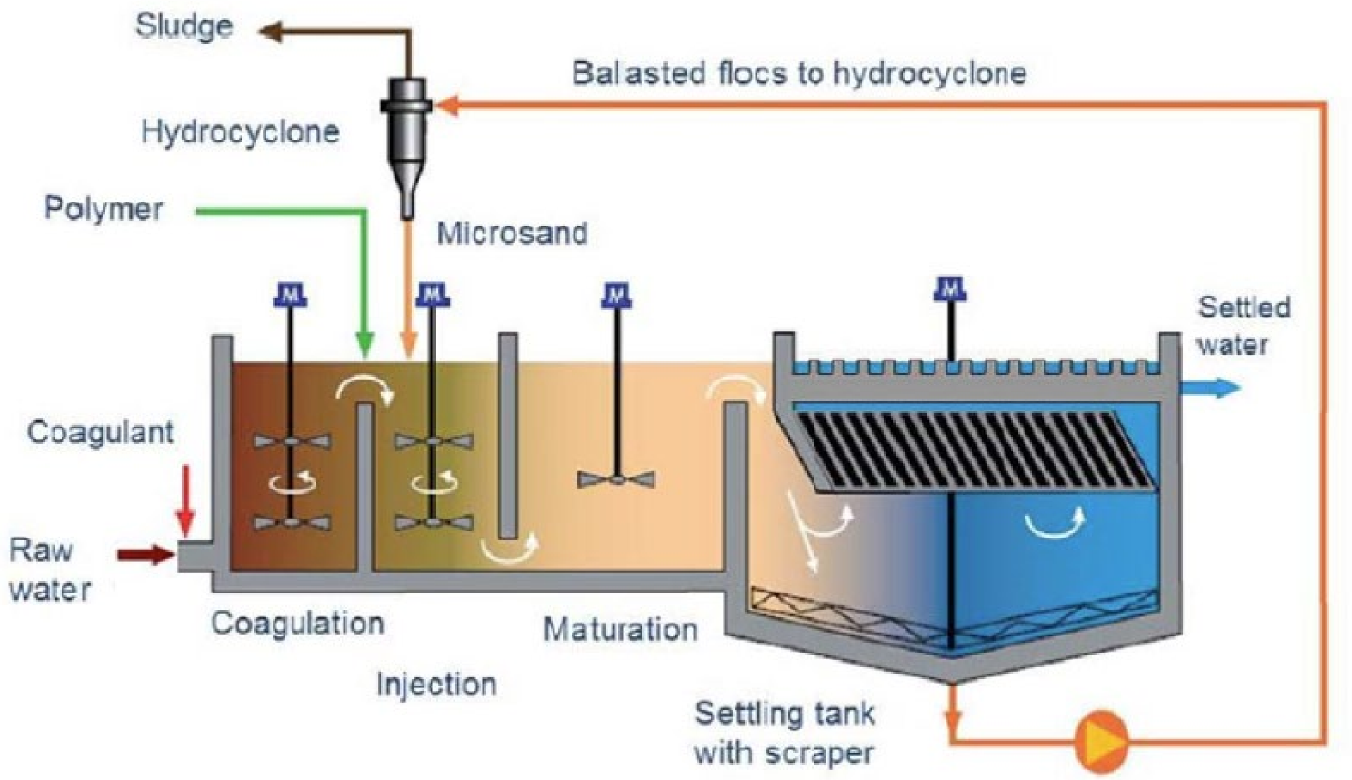


Parkson (2023)

Water Treatment Plant - Design

Technology 2: Gravity separation with ballasted-flocculation and lamella clarifier

It add a ballast material like micro-sand to facilitate settling of suspended solids in the lamella clarifier



Veolia (2023)

Water Treatment Plant - Design

Technology 3: Filter separation - Disc filter

Filter separation relies on the physical capture of solids particles in a fibre mesh.

In a disc filter, the influent passes through submerged rotating discs covered in filter cloth. The filter cloth is continuously scraped to remove particle accumulation. Also, backwash cycles are triggered to maintain filtration efficiency.

Water Treatment Plant - Design

Technology 4: Filter separation - Ultrafiltration

In ultrafiltration (UF), influent water is pumped through semi-permeable membranes, allowing clean permeate through while particles are retained on the membrane surface. Periodic or continuous backwashing and cleaning are performed to restore membrane performance.

Water Treatment Plant - Design

Technology Comparison

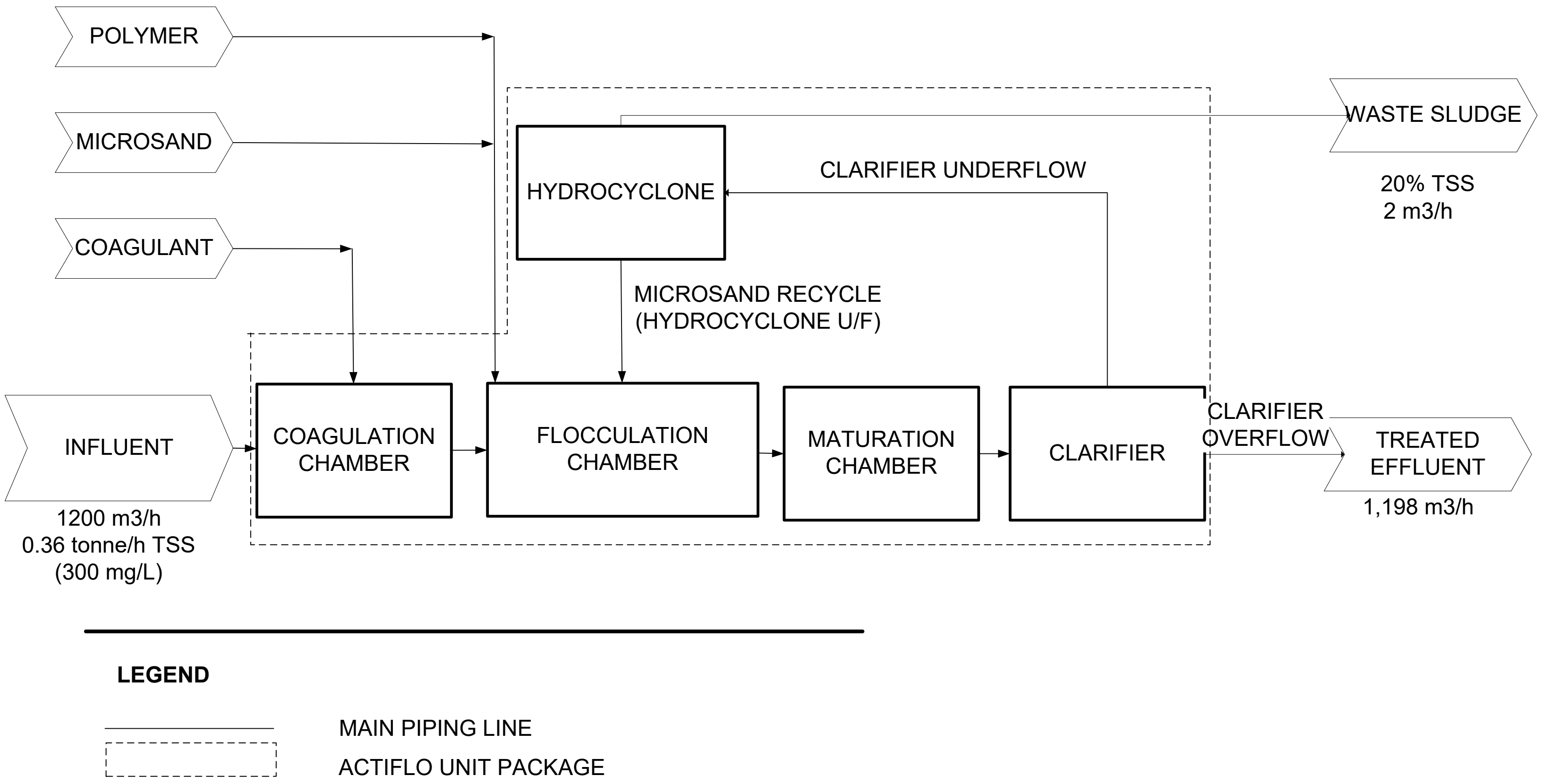
Qualitative scores from 1 to 5 (best)

	LAMELLA CLARIFIER	BALLASTED FLOCCULATION + LAMELLA CLARIFIER	DISC FILTERS	ULTRAFILTRATION
Treatment Efficiency	3	5	5	5
Reliability	5	5	5	3
Complexity	5	4	4	2
Maintenance Requirements	5	5	4	2
Tolerance to changing influent water quality/concentration	3	5	4	2
TOTAL SCORE	**21**	**24**	**22**	**14**

The ballasted flocculation with lamella clarified was the recommended technology.

Water Treatment Plant - Design

Selected Technology: Gravity separation with ballasted-flocculation lamella clarifier



Thank you

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Appendix E-WSP Tailings handling and storage ppt

Water Management Workshop - Tailings Management & Hydrogeology

2024-03-19

069-2257554003-PPT-RevA

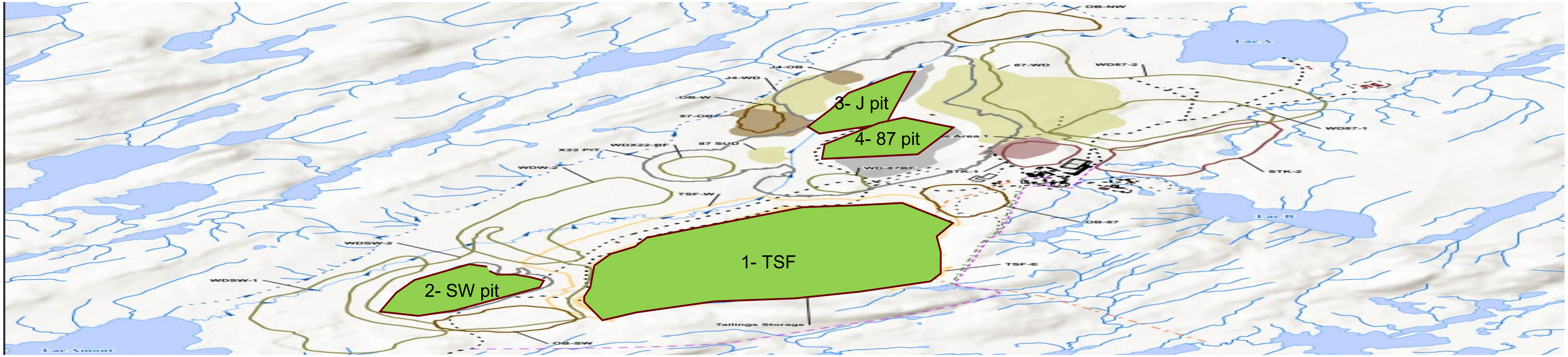
FOR DISCUSSION

Structure of the Presentation

- Tailings production and disposition over the Mine Life
- TSF Tailings Storage
- In-Pit Tailings Disposal
- Hydrogeology

Tailings Storage Over the Mine Life

	Year																						
Location	Pre-Production 1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20	Y21	Y22
1 - TSF (167 Mt)	■	■	■	■	■	■	■	■	■	■	■												
2 - SouthWest Pit (93 Mt)											■	■	■	■	■	■							
3 - J Pit (39 Mt)																■	■	■					
4 - 87 Pit (81 Mt)																		■	■	■	■	■	■



Design Criteria – Adherence to Global Industry Standard for Tailings Management and Criteria of Directive 019

General and Slope Stability Design Criteria

General Design Criteria			
Parameter	Value	Units	Source
Mine Plan			
Assumed mine life (Process Ore)	22	Years	AGP
Mill nominal tailings production rate	50,000	tpd	AGP
Total tailings production	380/252 (22 years of processing)	Mt/Mm^3	AGP
Total tailings to be deposited in the TSF	167/111 (9 years of production)	Mt/Mm^3	WSP
Total tailings to be deposited in pits	213/141 (13 years of production)	Mt/Mm^3	WSP
Deposition Method	Deposition by multiple spigots	-	-
Tailings Properties			
Tailings geochemichal classification (D019)	Low Risk Short or Long Term Potentially Acid Generator	-	Troilus
Tailings % solid (w/w)	55	%	Lycopodium
Tailings Dry density	1.5	t/m^3	WSP

Design Criteria for Slope Stability Analysis		
Parameter	Value	Source
Earthquake		
Design earthquake event	1:10,000 Annual Exceedance Probability (AEP)	GTR (2020)
Stability acceptance criteria		
Safety factor static – peak strength	1.5	Directive 019, CDA
Safety factor static – post-peak strength [(a)]	1.3	WSP
Safety factor Pseudo-static	1.1	Directive 019
Safety factor post-earthquake [(b)]	1.3	Directive 019
Deformation (only required if pseudo-static criteria not met)	≤1-2% Strain	WSP

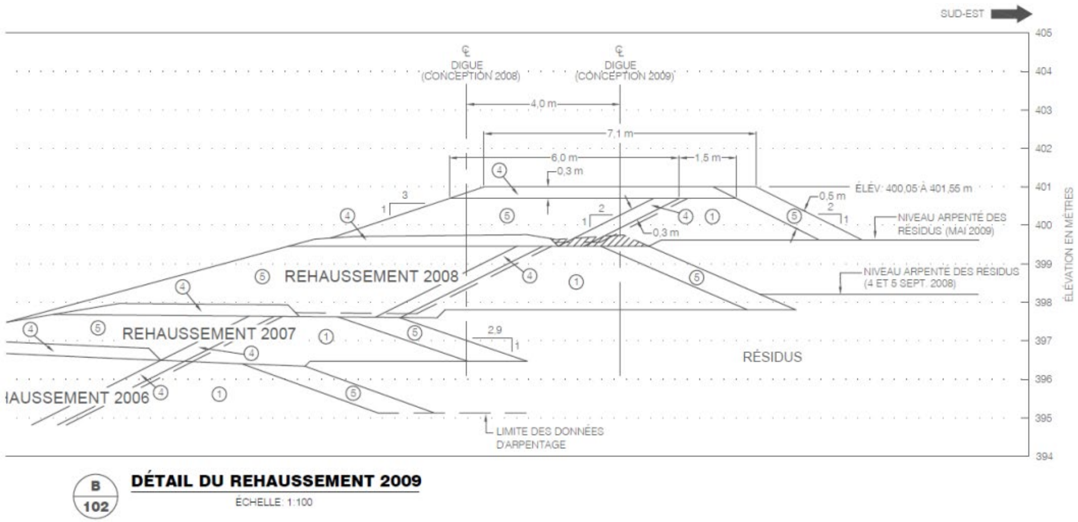
a) This analysis case considers the post-peak (or residual or liquefied) resistance for materials that are susceptible to strain softening or static liquefaction.
b) This analysis case considers the post-peak (or residual or liquefied) resistance for materials that are susceptible to strain softening, and static and dynamic liquefaction.

Tailings Mass Balance

Option to Store Tailings	Mass (Mt)	Volume (Mm^3)	Source
Total tailings production	**380**	**253**	**AGP**
Total tailings to be deposited in the TSF	167	111	WSP
Total tailings to be in-pit disposed in SW pit (elev. 367m)	93	62	WSP
Total tailings to be in-pit disposed in J pit (elev. 169m to saddle with 87 pit)	39	26	WSP
Total tailings to be in-pit disposed in 87 pit (elev. 98m)	81*	54*	WSP

*Potential to store up to 429Mt/286 Mm^3 at elev. 345 m.

Tailings Storage Facility (TSF) Existing Conditions

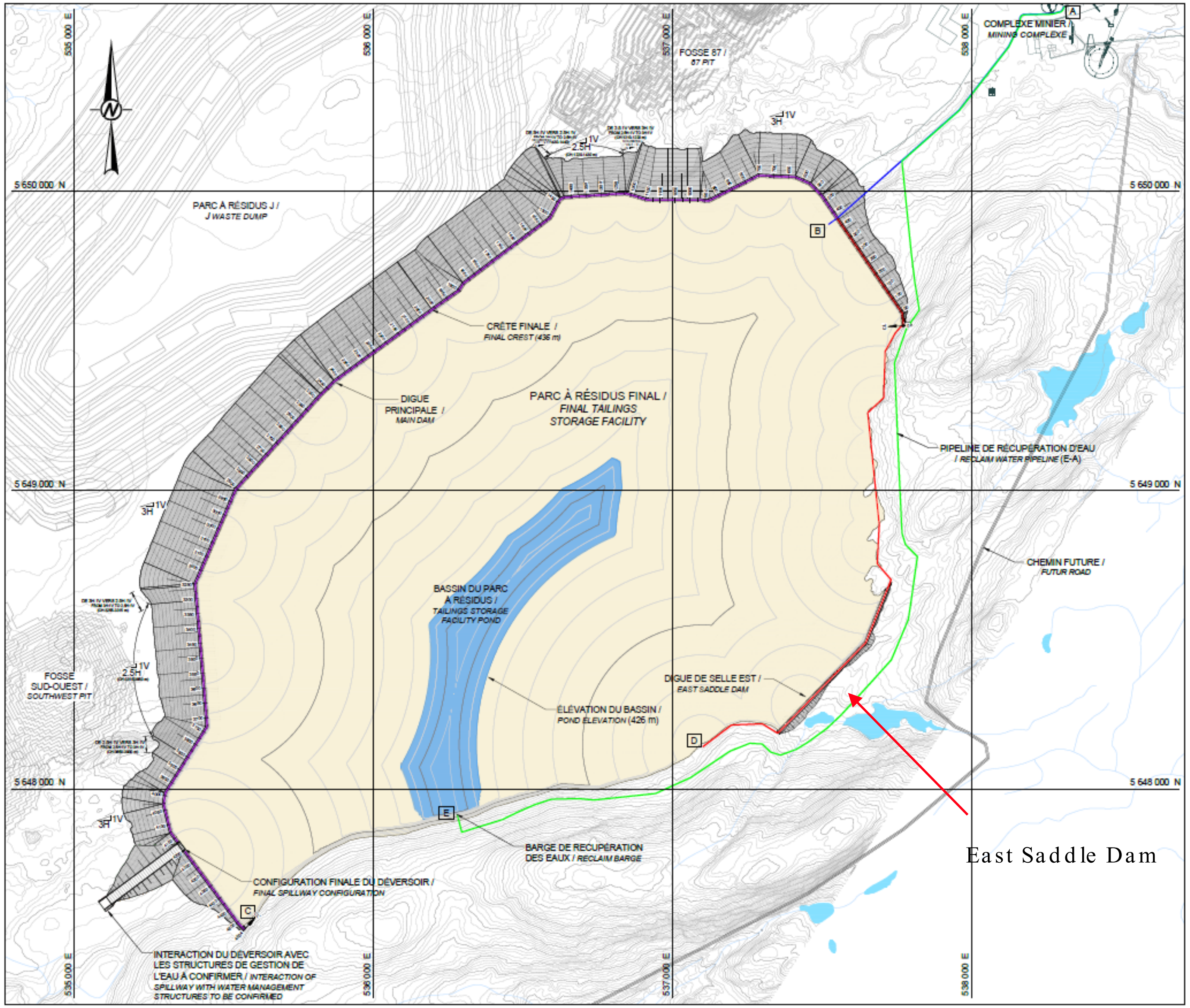


- Existing TSF is an upstream raise facility, approximately 20 m high.
- Starter dam was constructed from till with till cut-offs through esker materials and a cement-bentonite cutoff through thick alluvial sand or silt.
- Designed as a “leaky dam” to encourage lowering of water pressures against the embankment.
- A 30 m toe berm was constructed in 2005 to increase stability and economically dispose of waste rock.
- Slurry deposition (approx. 45%wt solid) with a water reclaim barge protected by a berm.

TSF Feasibility Design

Overall design description

- The TSF will be raised annually for 9 years in 4 m downstream raises.
- Once the tailings reach an elevation of 428 m the East Saddle Dam will be constructed, as tailings can no longer be naturally contained against the mountain.
- Downstream slopes are 3H:1V, except adjacent to pits where they are 2.5H:1V, if needed.

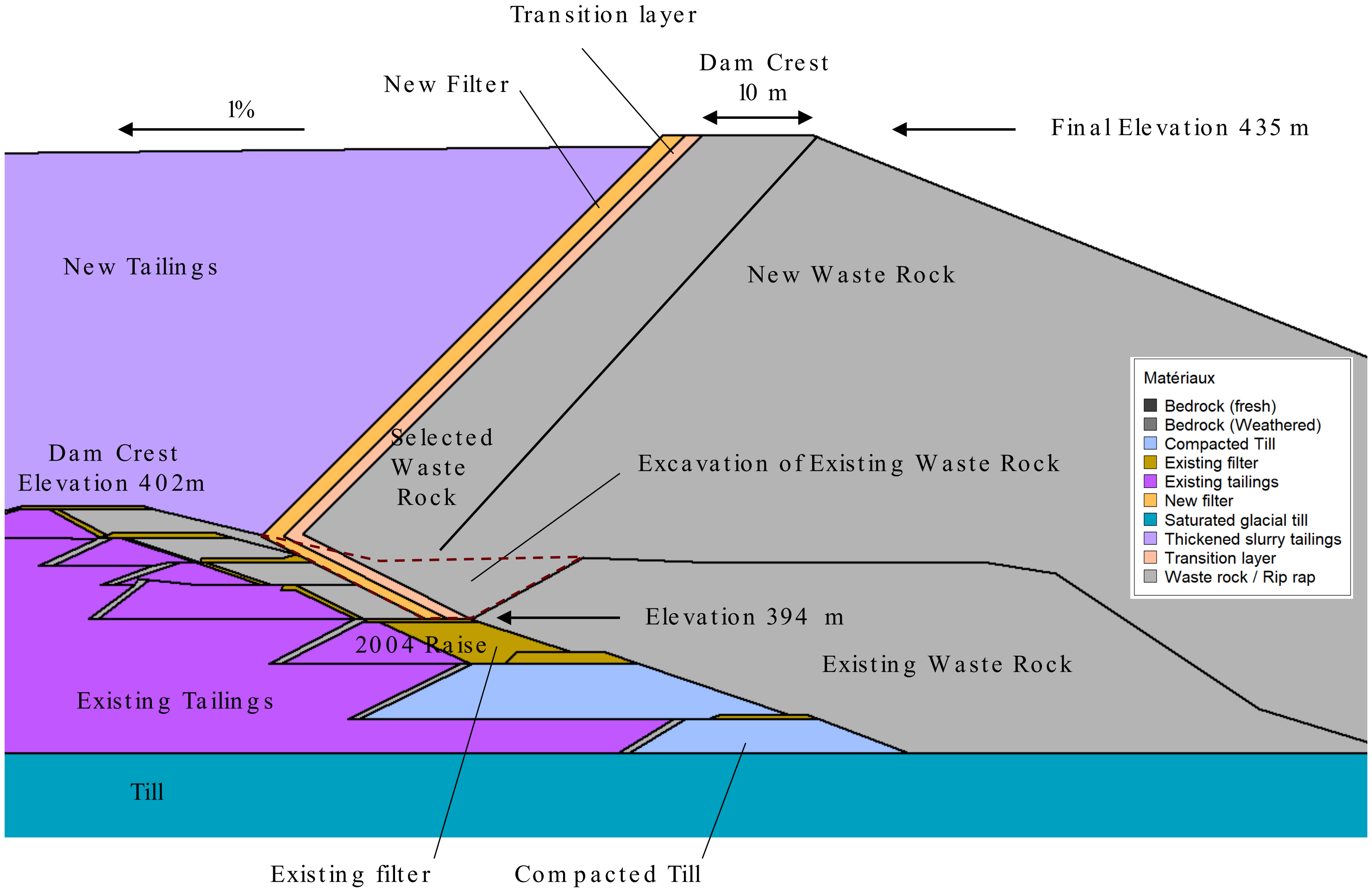


FOR DISCUSSION

TSF Feasibility Design

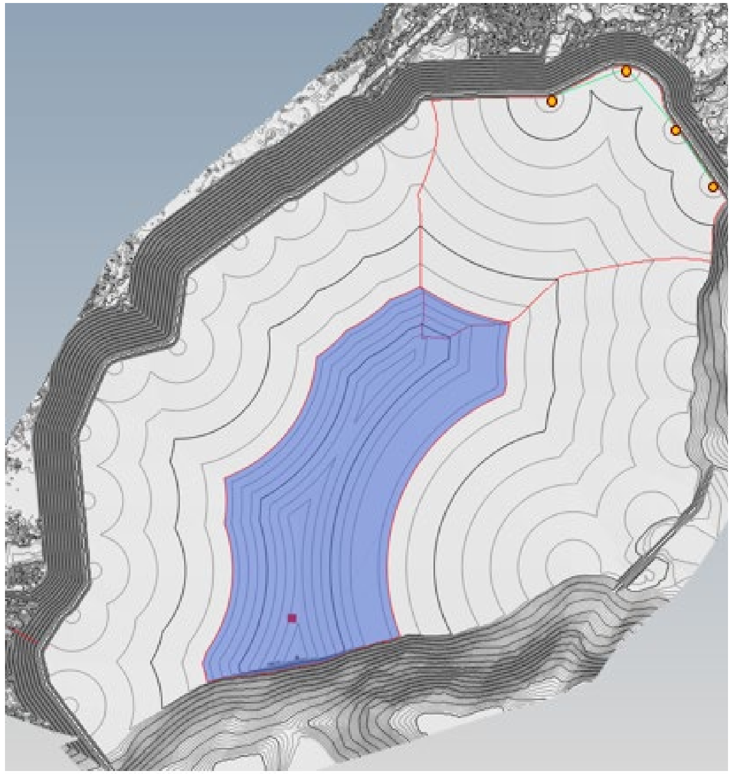
TSF construction sequence

- Downstream raise construction, resulting in improved geotechnical stability and providing additional storage capacity.
- Continue the design concept of a 'leaky dam', with upstream filters.
- FS design to elevation 435 m retains 167 Mt of tailings.
- In-pit disposal for additional 213Mt of tailings
- Excavate downstream material to expose 2004 filter and connect to new filter and transition layer.

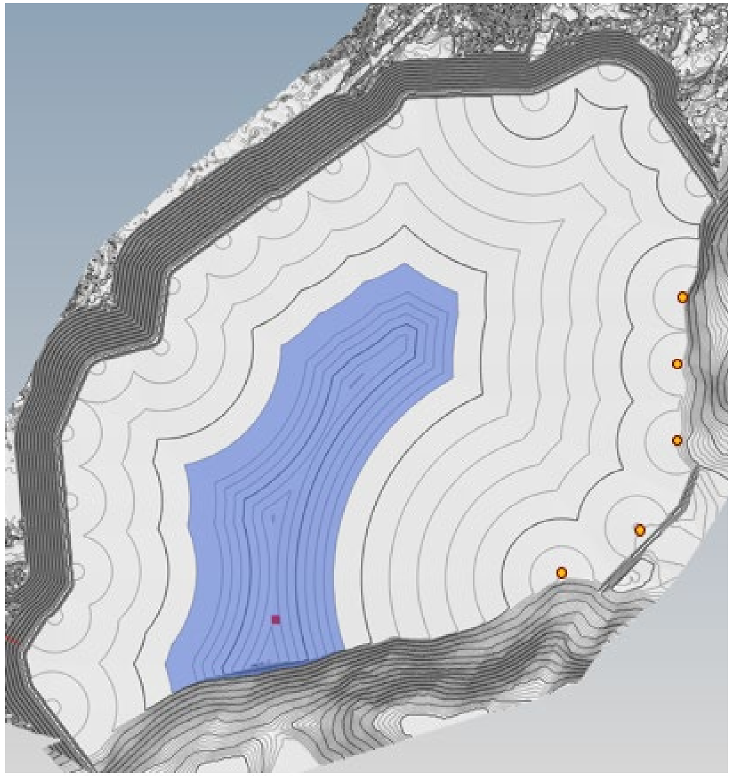


Tailings TSF Deposition – Example During 12 months Period

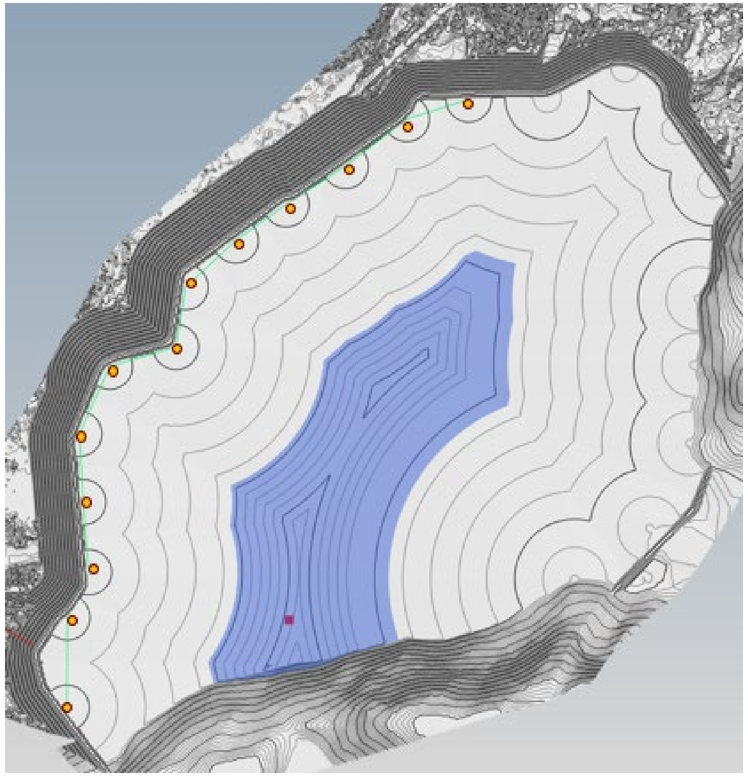
0-2 Months



2-6 Months



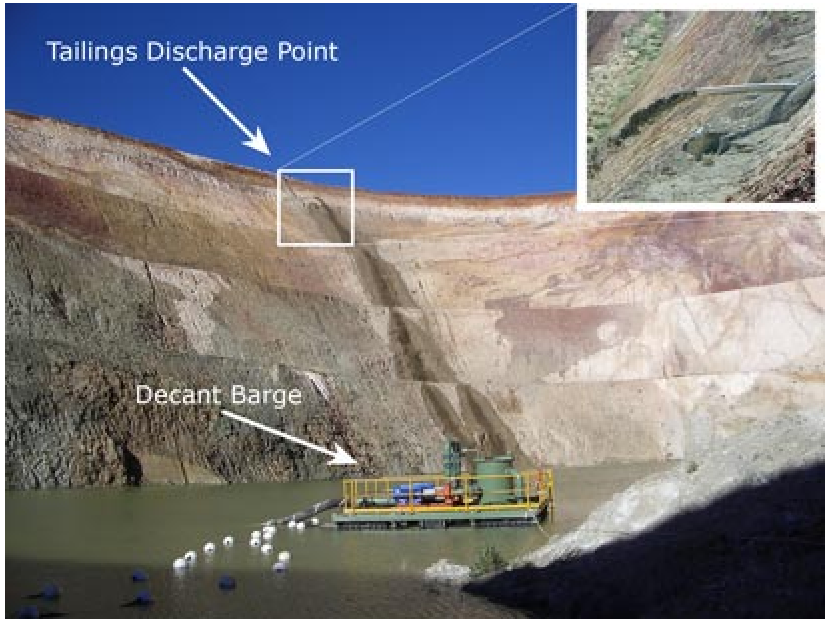
6-12 Months

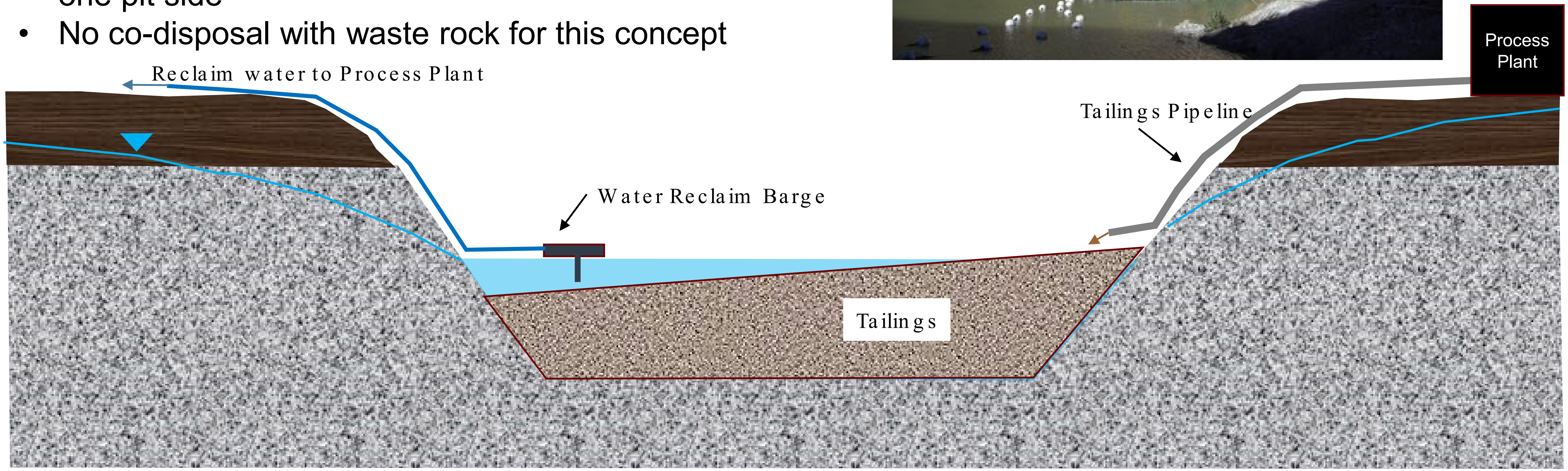


FOR DISCUSSION

Conceptual In-Pit Disposal for Troilus

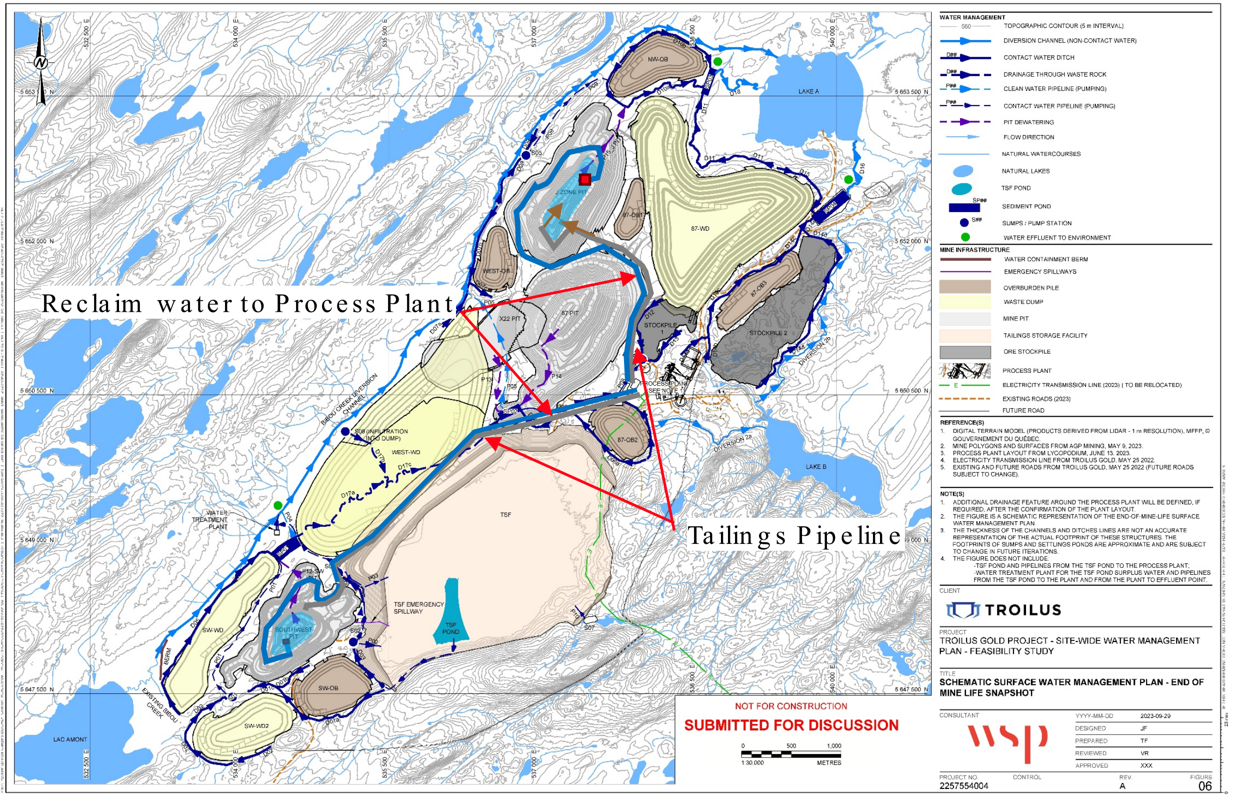
- Deposition Method: Sub-aerial deposition (Pit bottom or top)
- Water Management: Reclaim barge
- Tailings Discharge: Multiple points (3-4) discharge on one pit side
- No co-disposal with waste rock for this concept



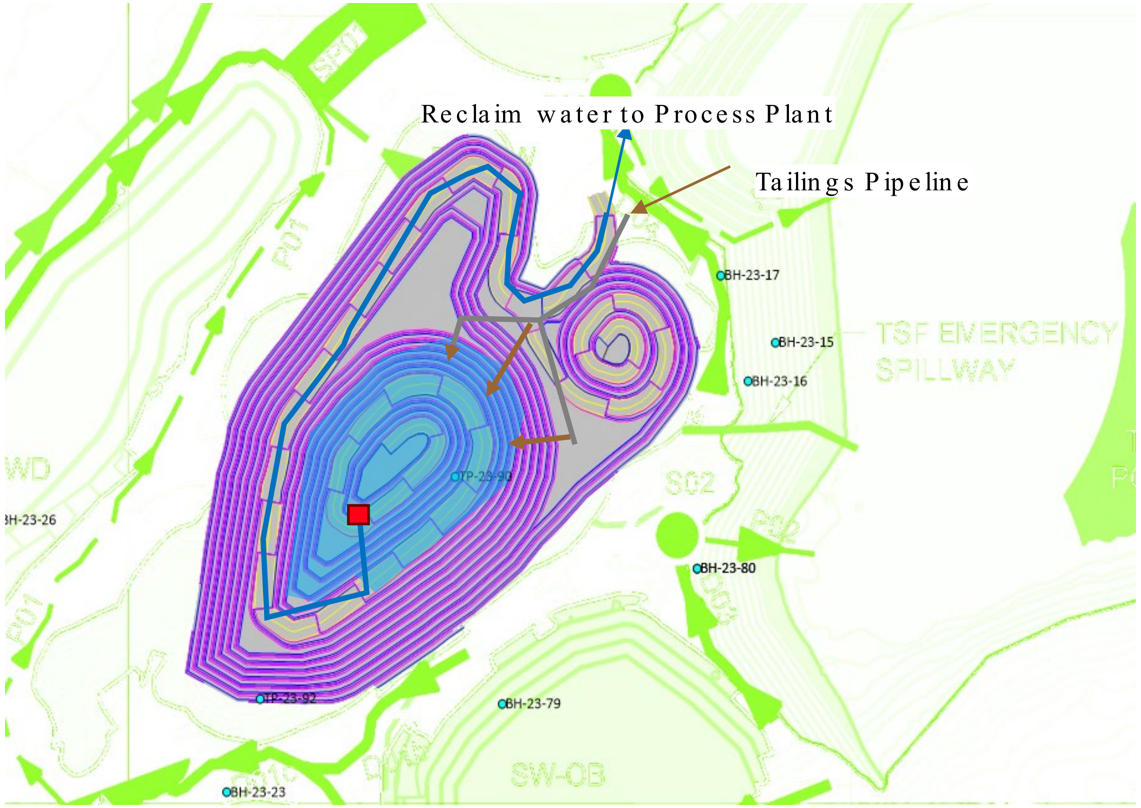


FOR DISCUSSION

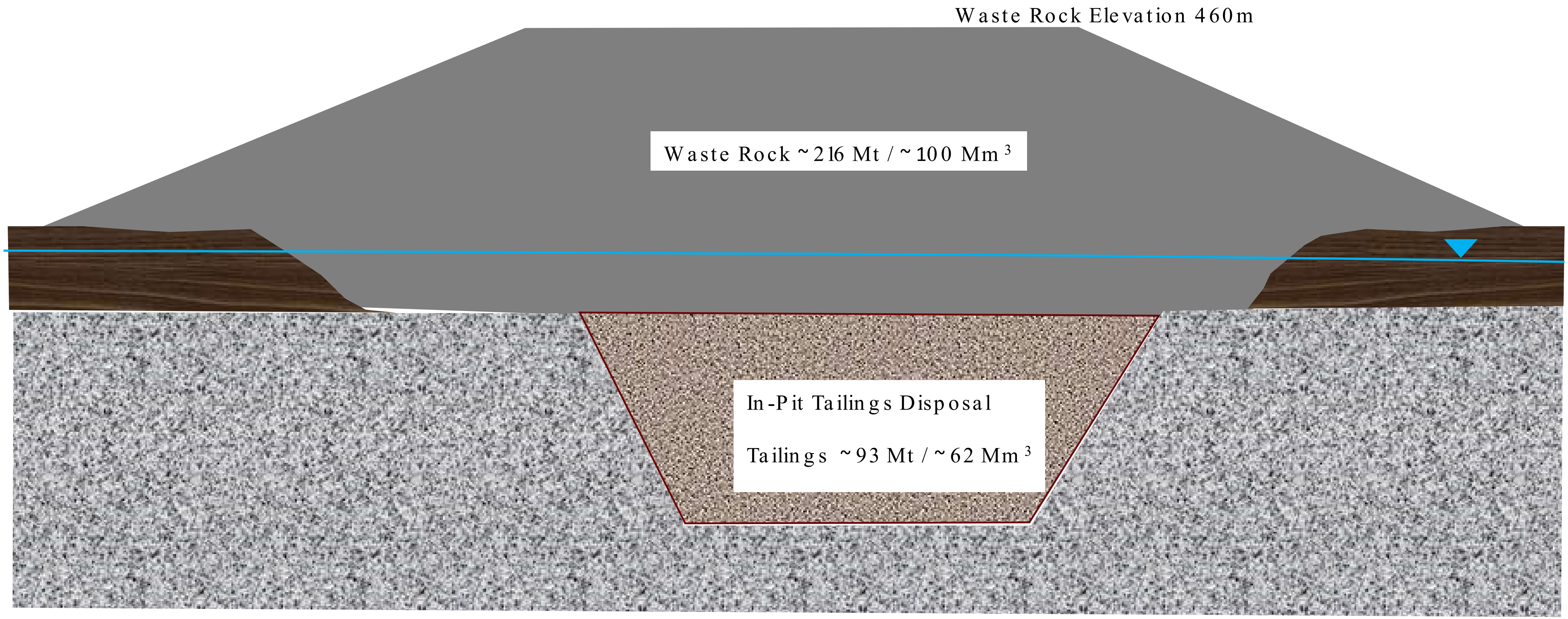
Water and Tailings Conveyance Plan View



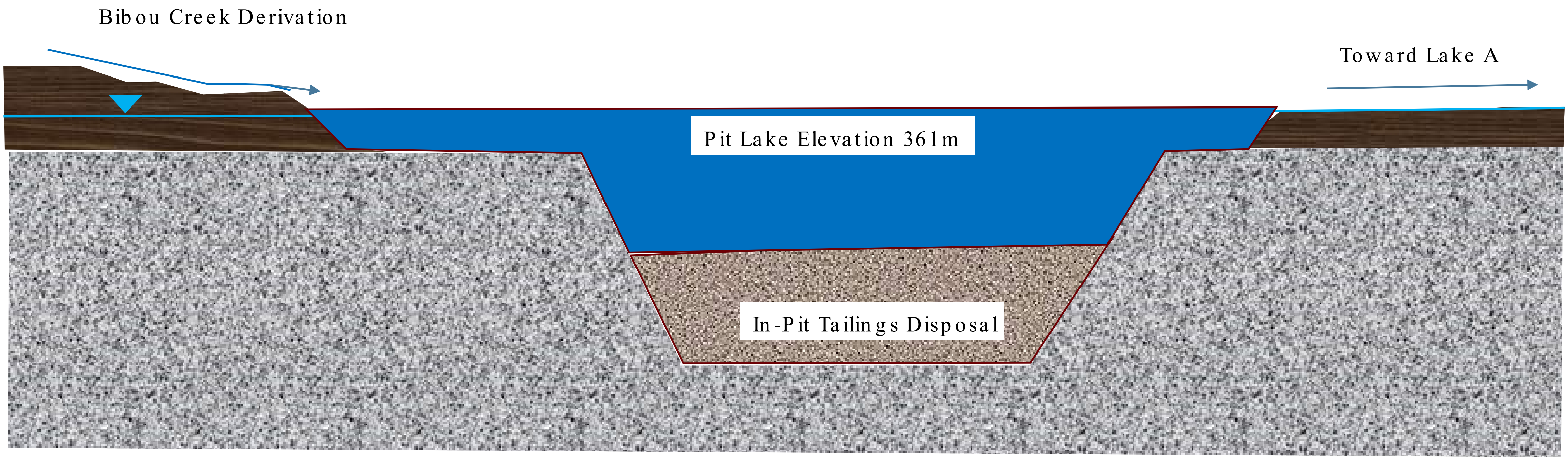
SW In-Pit Tailings Disposal Example



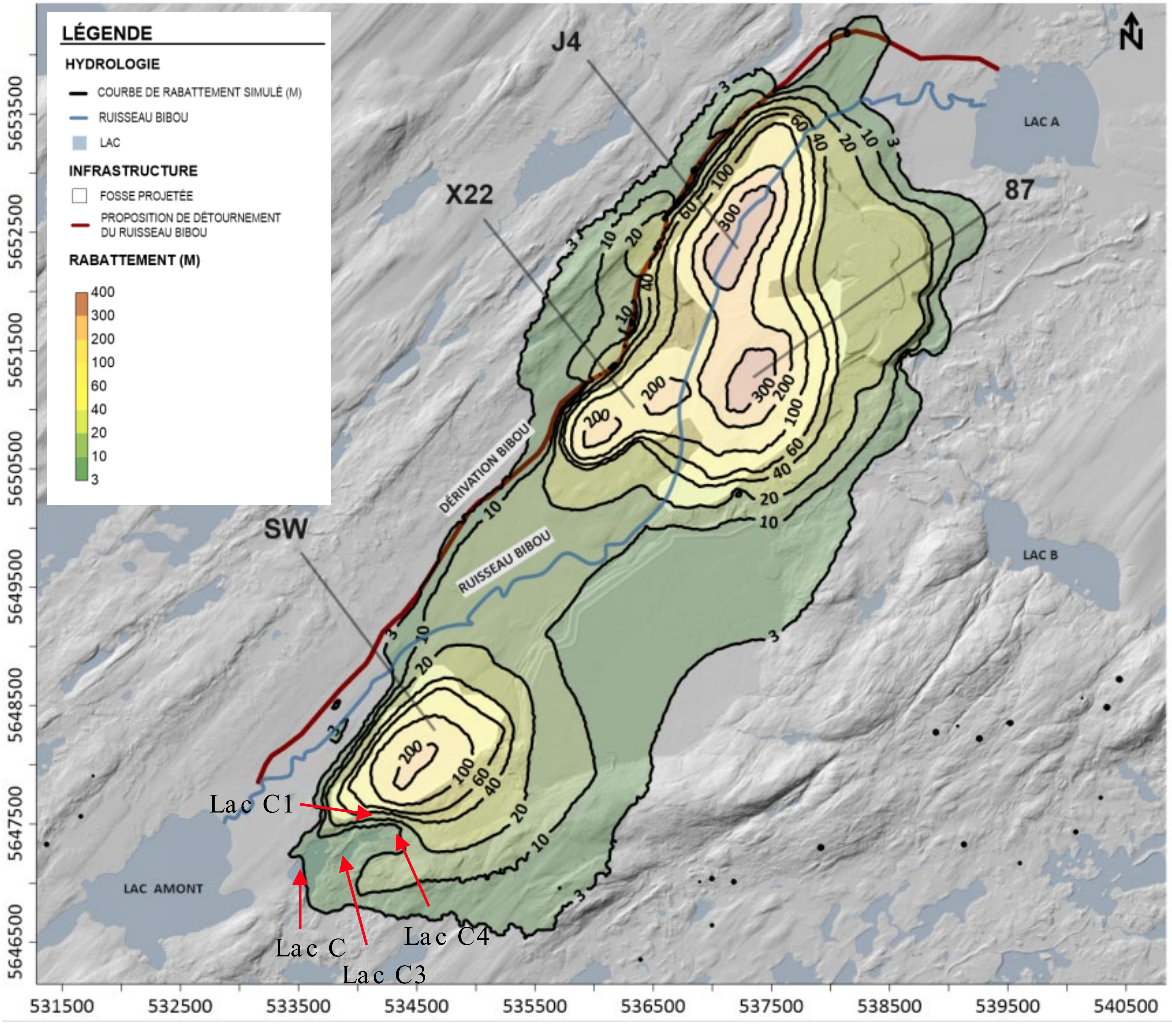
Waste Rock Storage Above South-West pit after Year 15



Conceptual Closure for 87 and J pits with Pit Lake



Hydrogeology - Potential extent of groundwater drawdown



The potential extent of the drawdown zone greater than 3 m would reach four lakes and the proposed alignment of the Bibou Creek diversion.

If the alignment of the diversion is above the level of the groundwater table, the drawdown caused by the dewatering of the pits will not impact the flow regime in the stream.

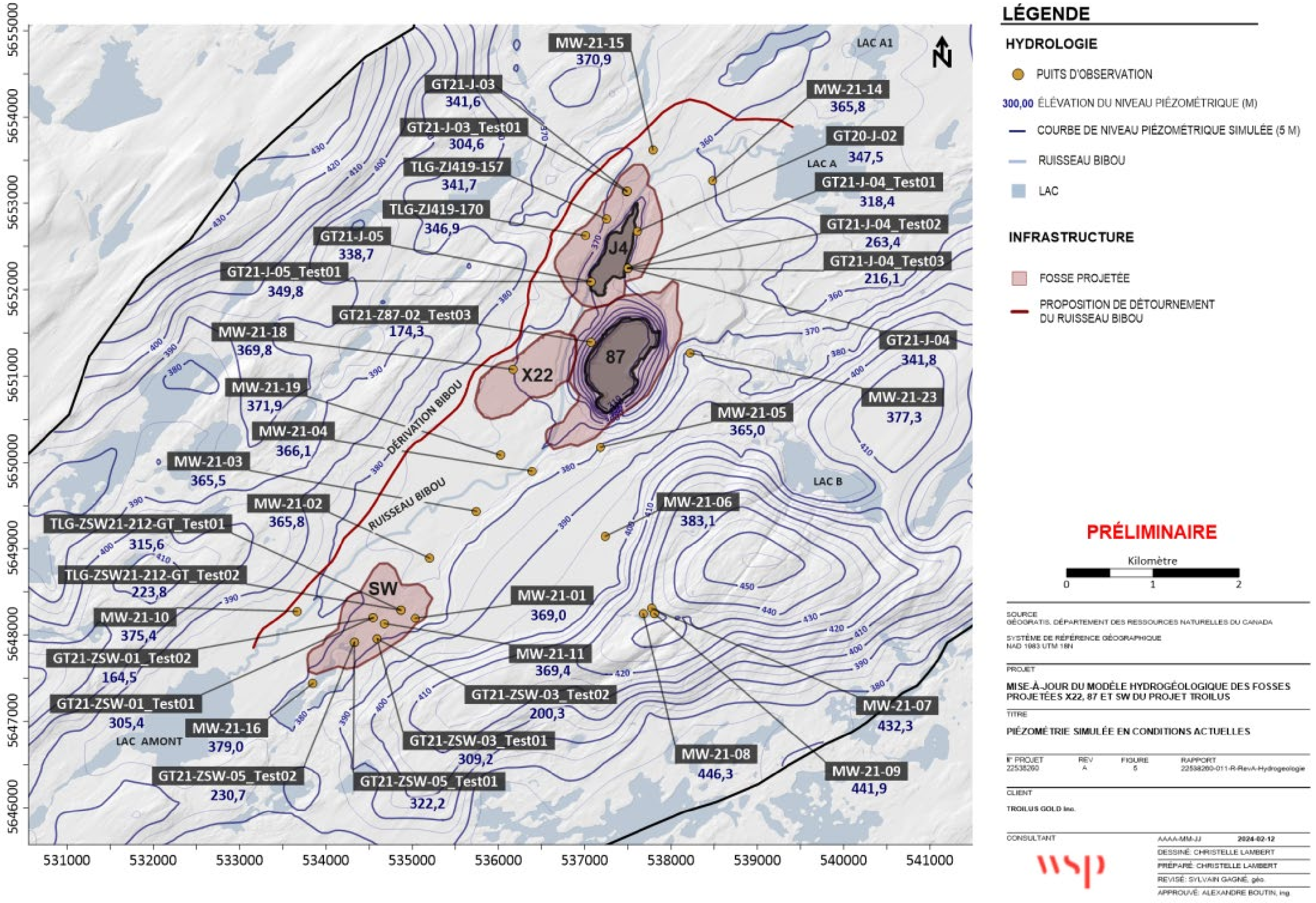
While the diversion is expected to be above the water table given its location on a hillside where groundwater could, locally, not contribute (seepage) to the stream, at this stage of the project, there is no groundwater level data along the proposed alignment of the Bibou Creek diversion to establish whether it will be above or below of the groundwater table.

Pit	Groundwater inflow in Steady State condition (m^3/d)
87 Pit	3100
J Pit	3800
X22 Pit	4100
SW Pit	3800

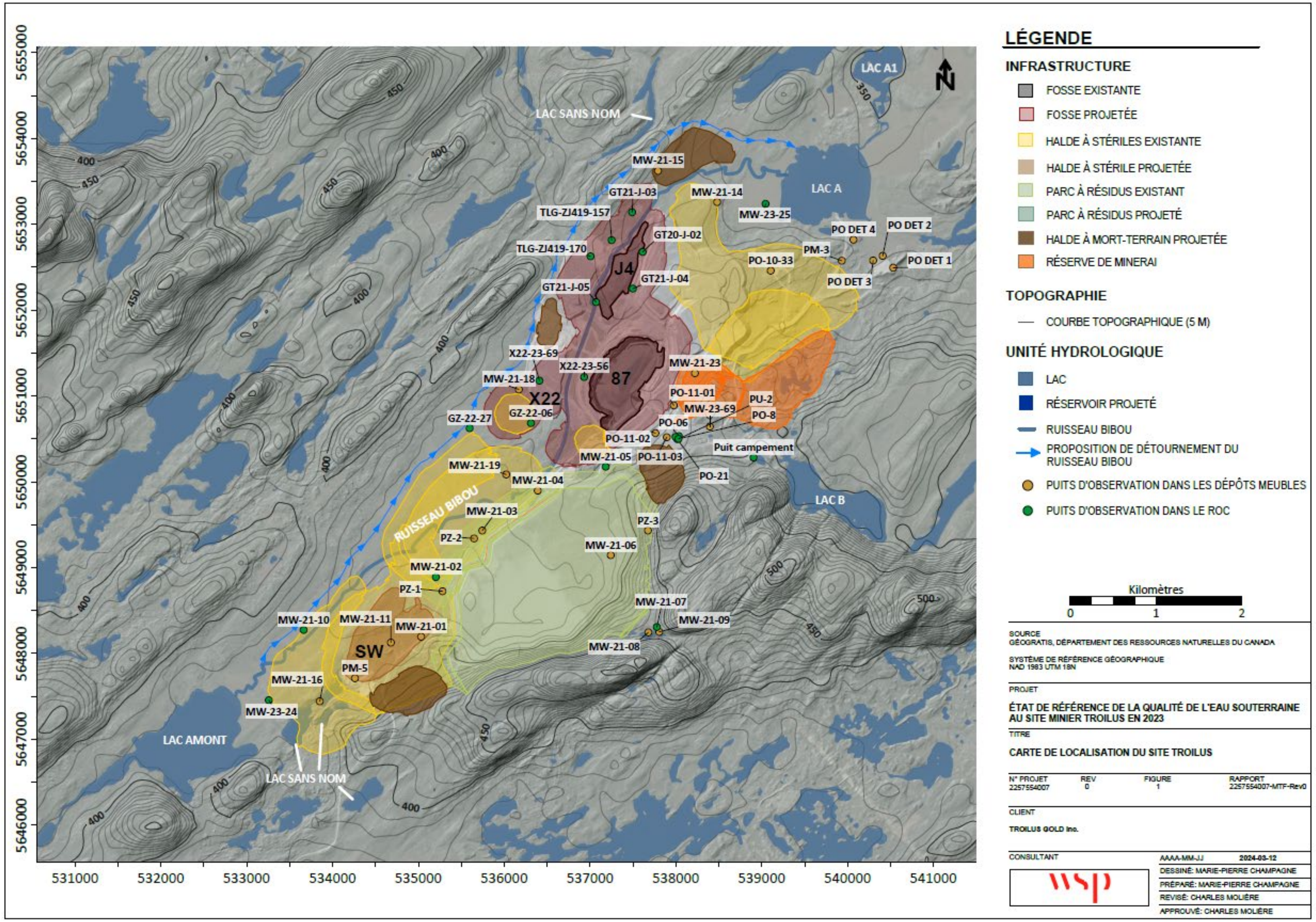
FOR DISCUSSION

wsp

Hydrogeology – Simulated Groundwater Level



Hydrogeology - Groundwater Monitoring Program



FOR DISCUSSION

Thank you