



# Surface Water Management Challenges at the Grum Sulphide Cell (GSC) Cover, Faro Mine Complex, Yukon

Dustin Rainey, Ph.D. Geol. I.T.  
Project Manager - Yukon Government

Dec 1, 2011



Faro Mine Remediation Project  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)



# Contributors + Collaborators

- Yukon Government – Assessment & Abandoned Mines, Department of Energy, Mines & Resources
- Government of Canada – AANDC
- Ross River Dena Council
- Liard First Nation
- Selkirk First Nation
- Town of Faro
- SRK
- DES
- Pelly Construction
- Tim Moon Construction
- Merit Consultants
- Brodie Consulting
- YES Surveyors
- Zero Energy Institute
- Western Tank and Liner
- Boreal Engineering
- Chilkoot Geological Engineers
- EDI Environmental Dynamics
- BGC Engineering
- Gomm Environmental Engineering
- Superior Plastics
- Applied Soil Water Technologies
- Conestoga-Rovers & Associates
- Stratos
- RFP Solutions
- Common Ground Mediation and Consulting
- Environment Canada





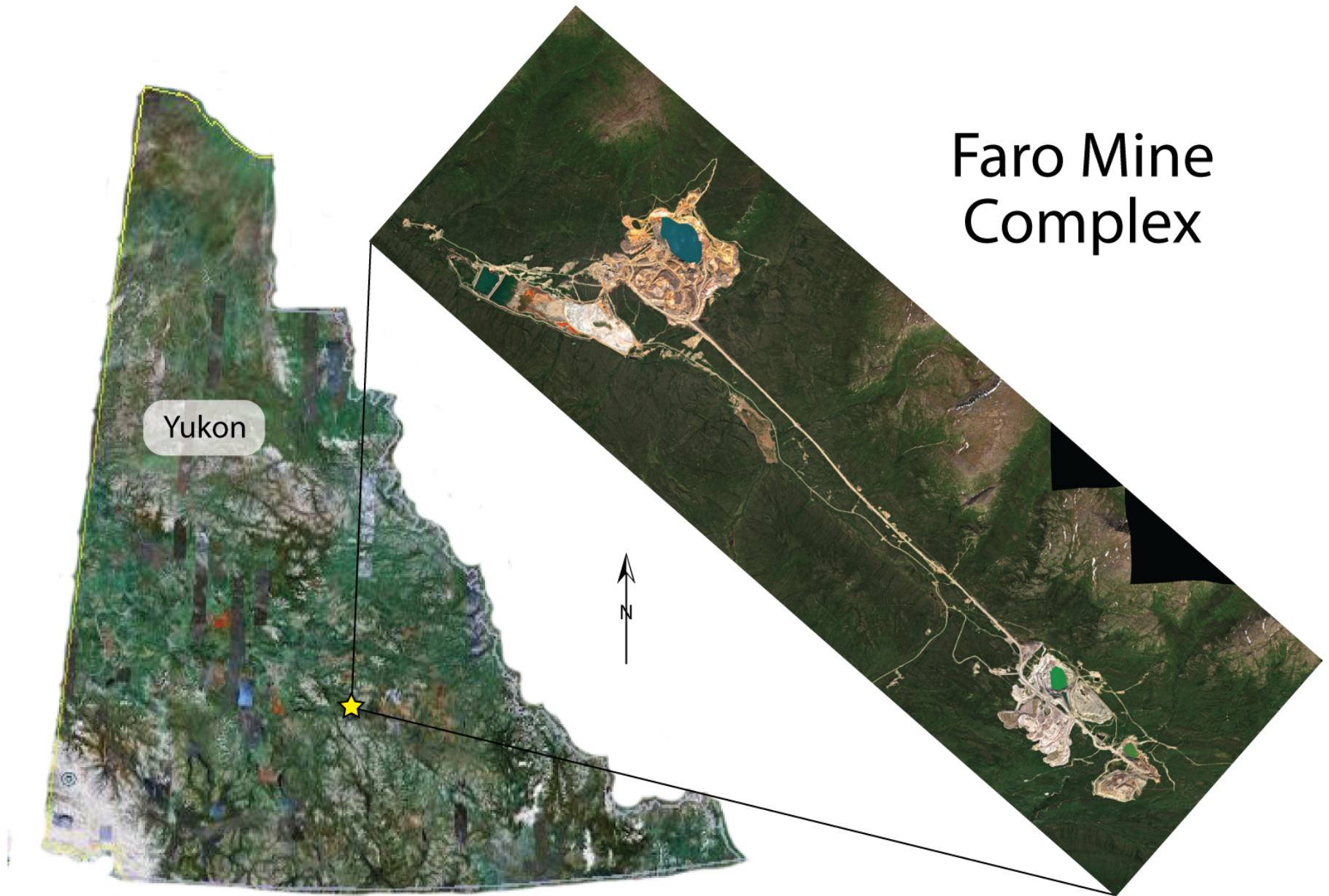
# Outline

- Faro Mine Complex Background
- GSC Cover Construction Design Rationale
- 2010 Construction
- Freshet 2011
- 2011 Construction
- Future Management of GSC Surface Water
- Lessons Learned





# Faro Mine Complex







Grum Waste  
Rock Dump



Grum Waste  
Rock Dump

Photo Credit: Peter Mather / Yukon Government



**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)



# Start June 24, 2010...



**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)



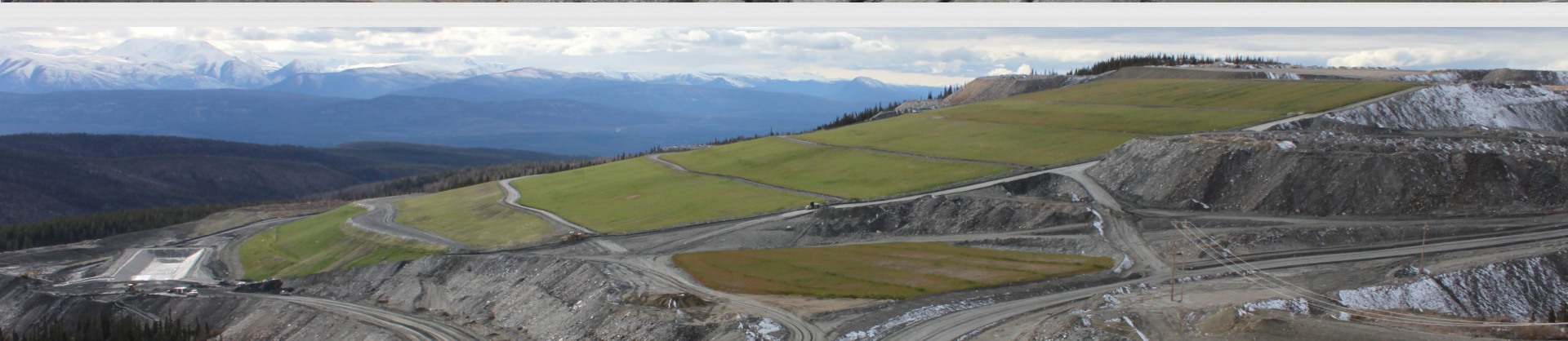
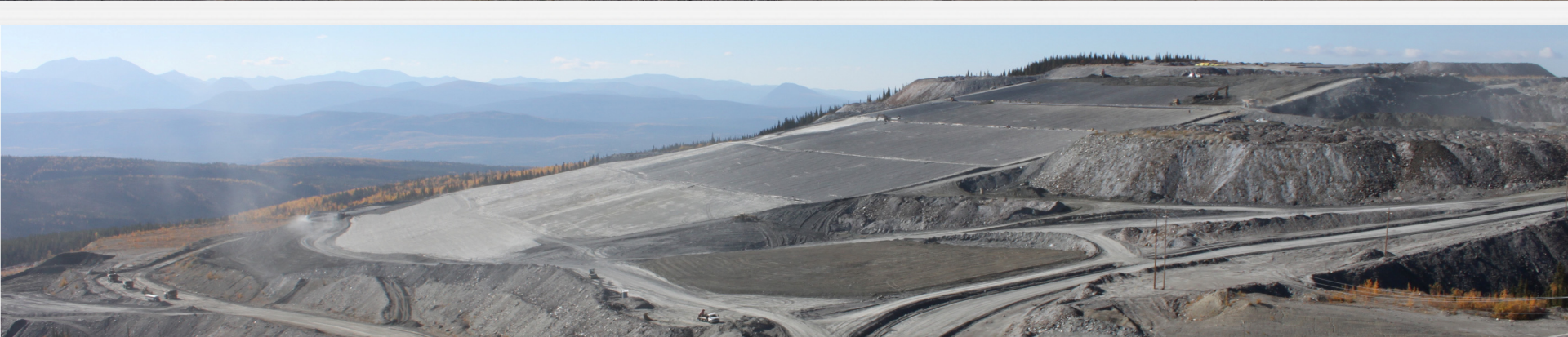
# About 1 year later...



**Faro Mine Remediation Project**  
Projet d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Projet d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Projet d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)



# \$13 million later And then it snowed...



**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)



# YUKON NEWS

## Faro struggling to deal with meltwater

By Chris Oke

Wednesday May 25, 2011



Recommend



Be the first of your friends to recommend this.

*Jeremy Warren/Yukon News*



The Faro minesite in July 2008.



**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)



# Freshet 2011 – What happened?



**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)



**Above  
average  
snowpack**

**+**

**Late  
Melt**

**+**

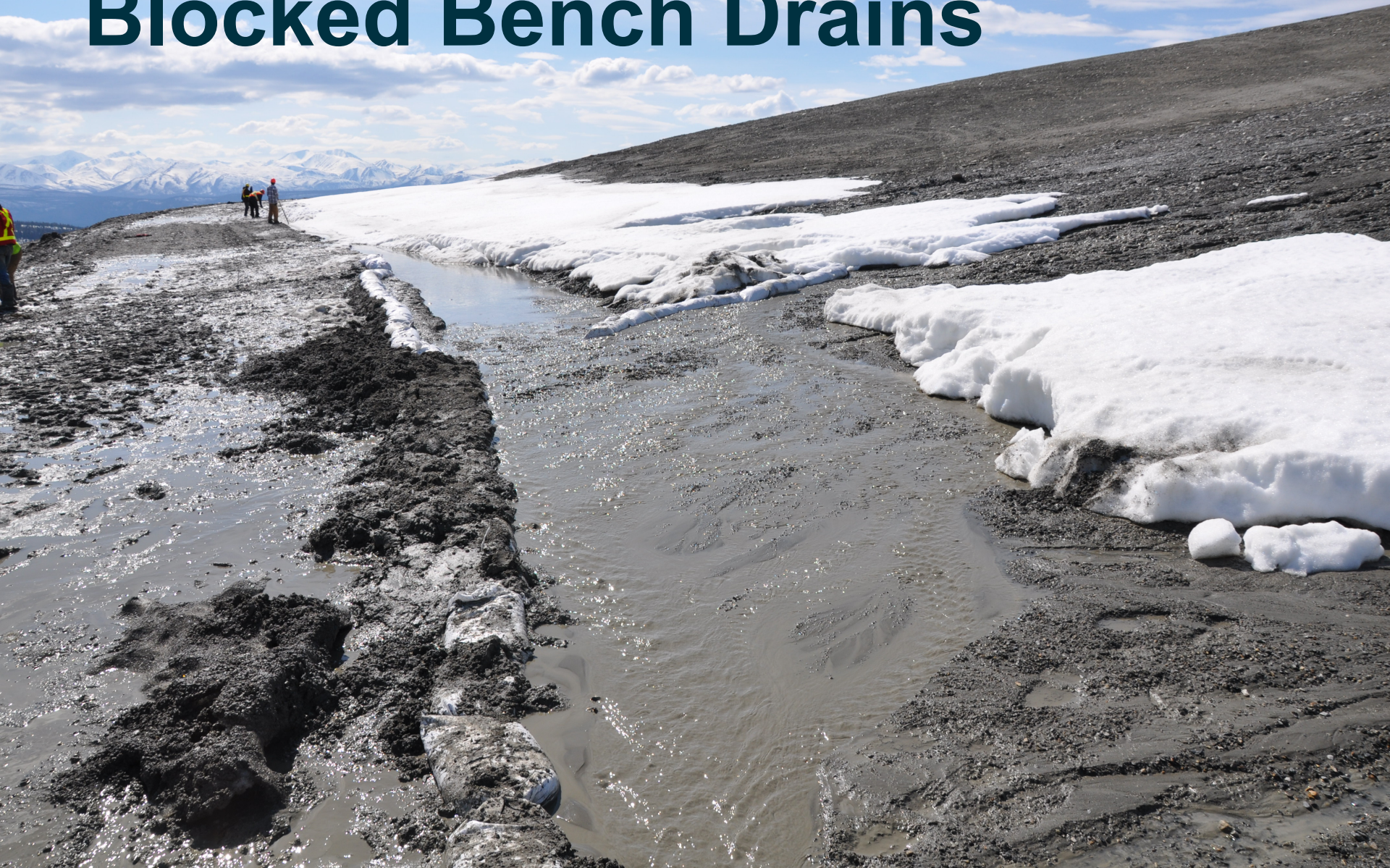
**May 18th  
Record of  
20°C**

**= TOO MUCH WATER!**





# Blocked Bench Drains



**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)



# Toe Berm Erosion







**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)













**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)

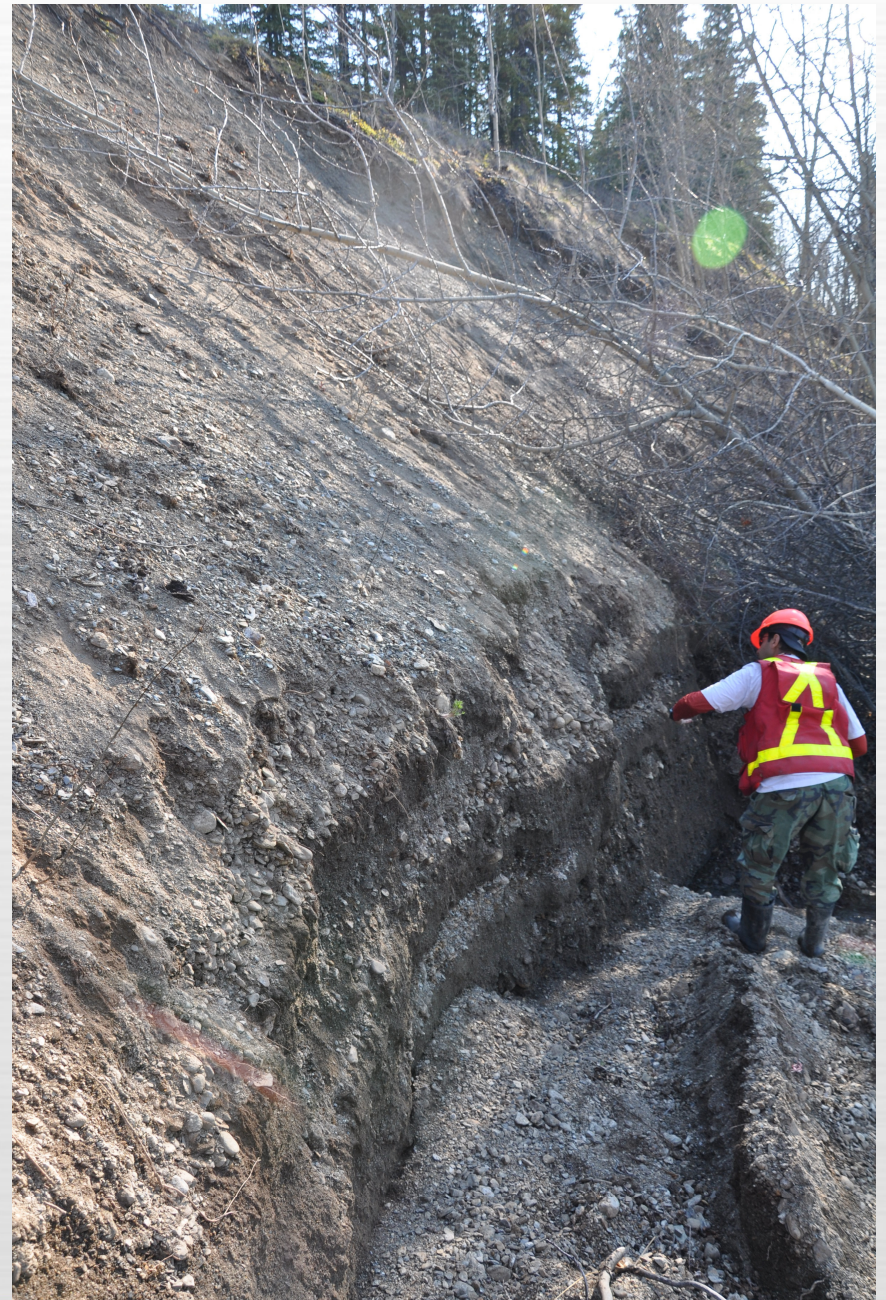




**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)









**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





Discharge

184 mg/L TSS

2.1 mg/L Zinc

Vangorda Creek

< 1 mg/L TSS

< 0.005 mg/L Zinc

Compliance

< 15 mg/L TSS

< 0.5 mg/L Zinc











**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)



# 2011 Work Plan

- Additional studies and investigations
- Erosion repairs and mitigations
- Surface water management upgrades
- Contaminated seep water management upgrades







**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)













**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





Faro Mine Remediation Project  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





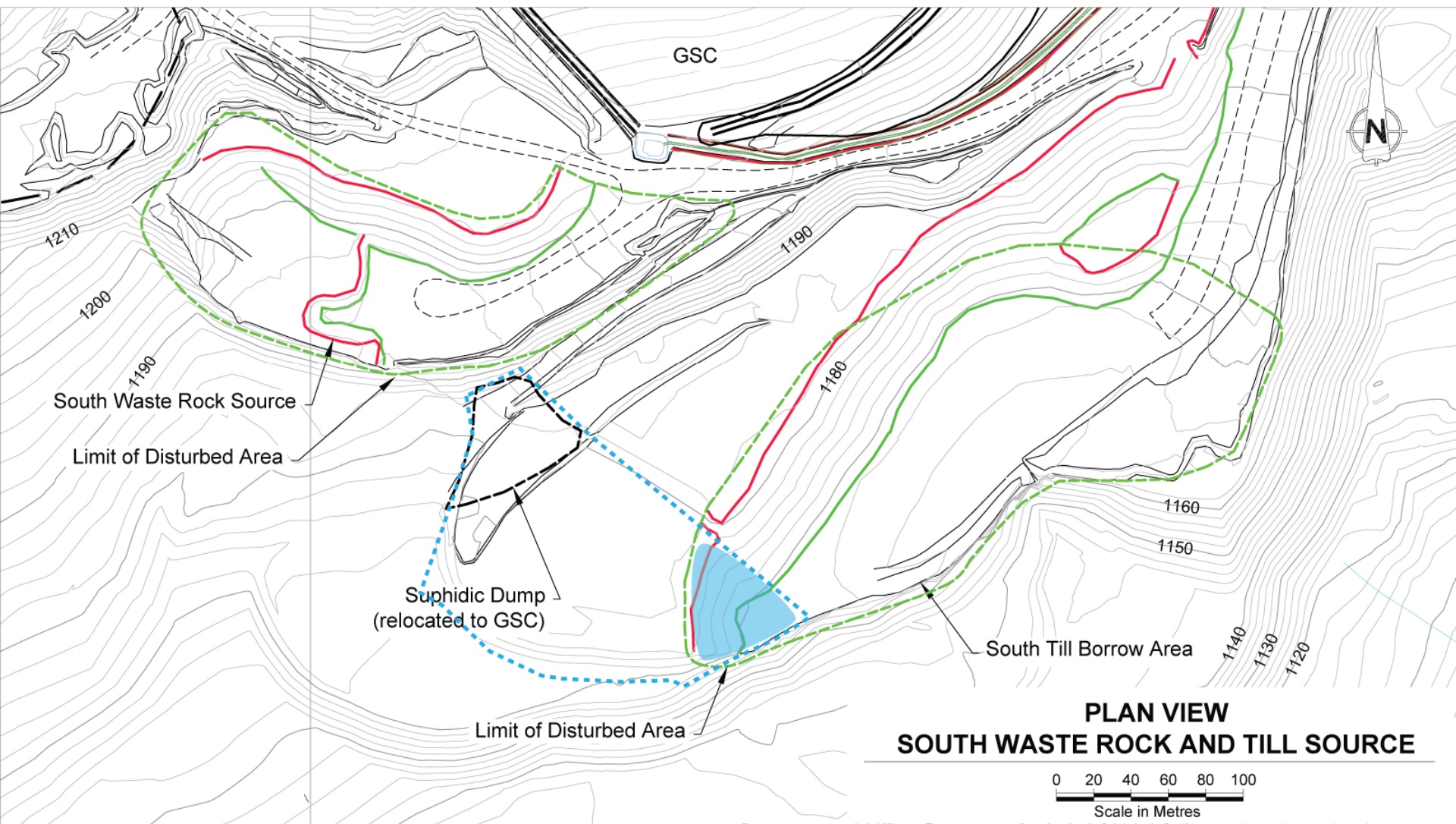


--- Limit of Disturbed Area

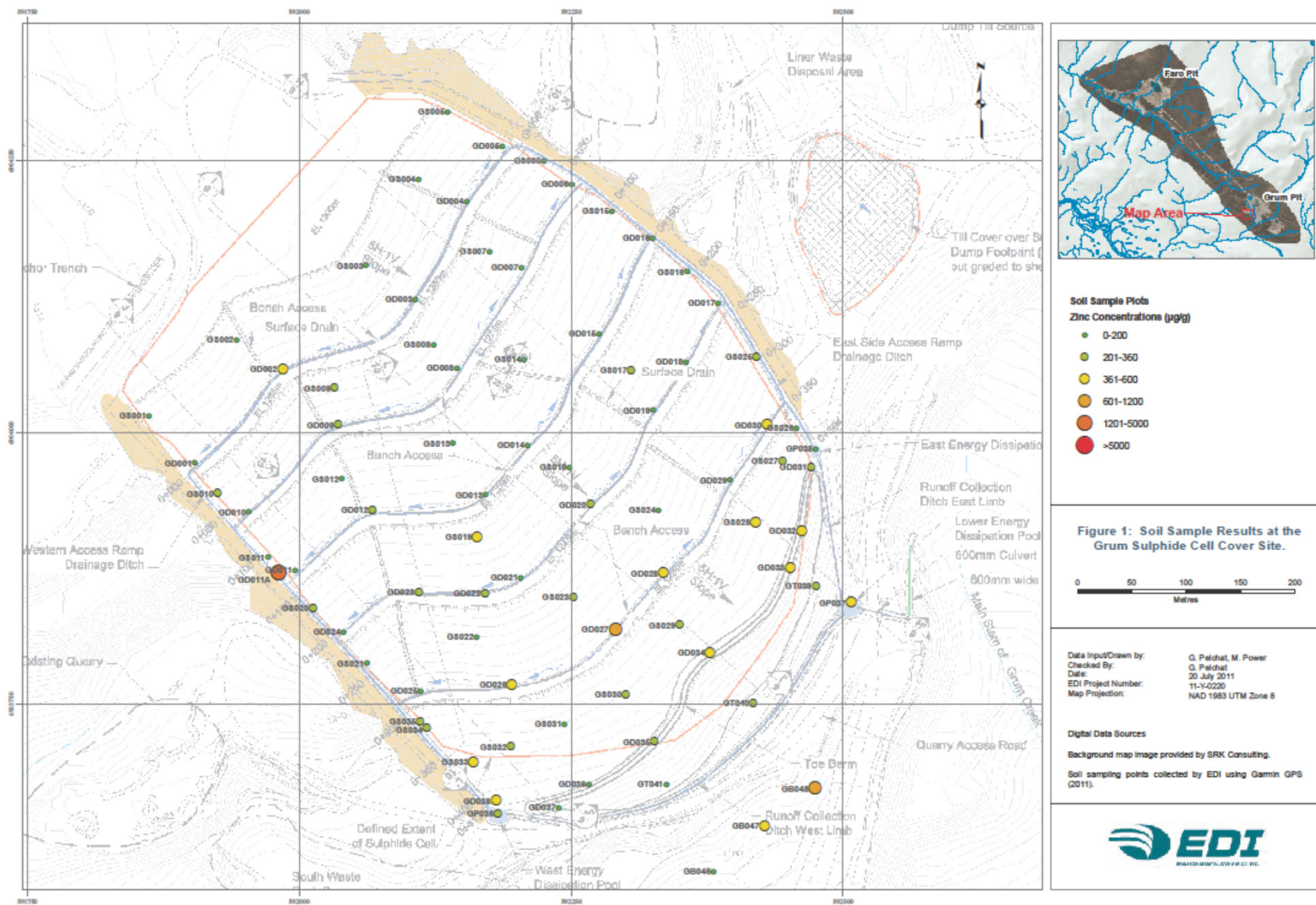
.... Free dumps of till with some sulphide waste

— Crest

— Toe









# Erosion Repairs and Erosion Mitigation



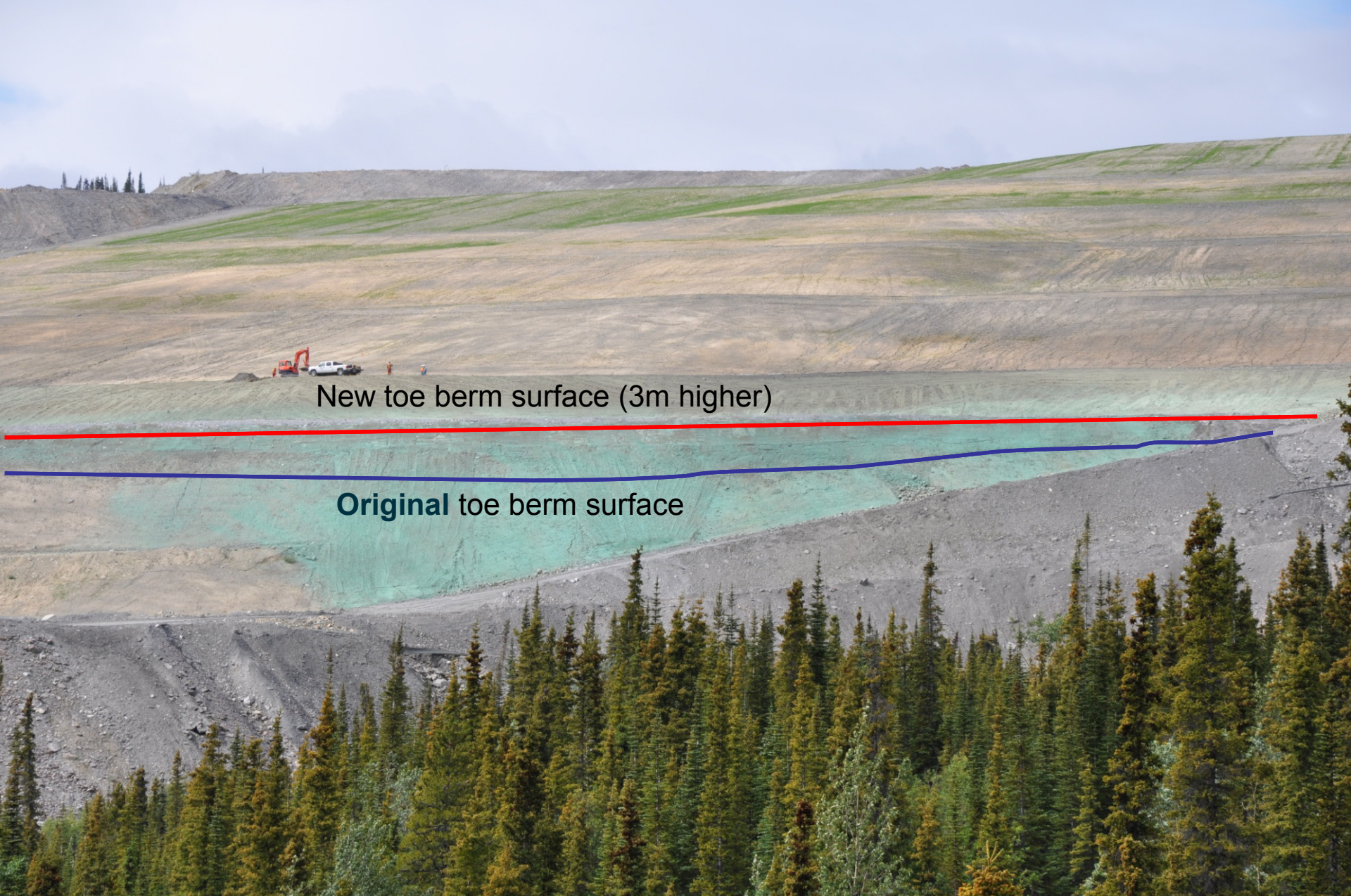




**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





New toe berm surface (3m higher)

**Original** toe berm surface







**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Projet d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)



# Surface Water Management Upgrades







**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**Faro Mine Remediation Project**  
Project d'assainissement de la mine Faro

[www.faromine.ca](http://www.faromine.ca)  
[info@faromine.ca](mailto:info@faromine.ca)





**~8,000 m<sup>3</sup> storage in lined pond  
(3 Olympic-sized swimming pools)**







# Unlined Contingency Dépression (9,000 m<sup>3</sup>)





# Contaminated Seep Water Management Upgrades







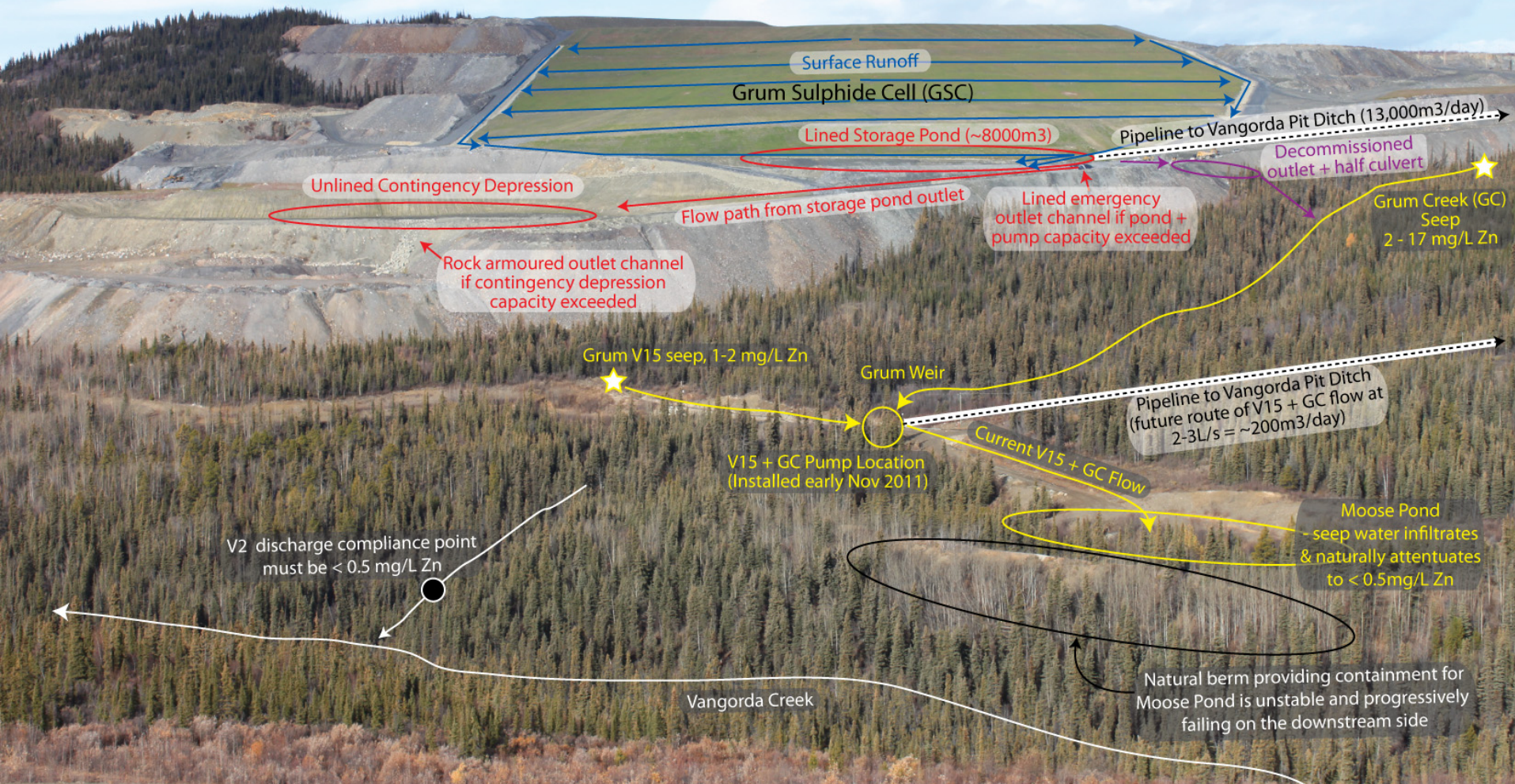






# Faro Mine Complex - Grum Waste Rock Dump

## 2012 Surface and Seep Water Management





# Lessons Learned

- Plan to manage surface runoff for at least one year following construction
- Thoroughly characterize the geochemical nature of your borrow sources
- Take your time. Don't rush. Think the project through. Then review...





“Make sure you have somewhere for water to go during strange events.”

- Brent

“People grossly underestimate the amount of time and money required to maintain covers.”

- Bill







# **Faro Mine Remediation Project**

---

## **Projet d'assainissement de la mine Faro**



**Canada**