

# Gold Ridge Tailings Storage Facility Assessment

## *Solomon Islands*



### United Nations Disaster Assessment and Coordination (UNDAC) Mission

Supported by the  
UN Office for the Coordination of Humanitarian Affairs  
United Nations Environment Programme  
European Commission's Department for Humanitarian Aid  
and Civil Protection through the  
European Union Civil Protection mechanism



# Presentation outline

- Mission Objective
- Findings
  - Dam safety
  - Dewatering
- Conclusions
- Recommendations



# Background

- Early April: Heavy rains and flooding
- 9 April: St Barbara leaves Gold Ridge
- 13-14 April: earthquakes
- 14 April: SIG request for assistance
  - *Dinsdag gebeld interesse*
  - *Woensdag 17:00 akkoord*
  - *Do + vrij pakken*
  - *Zaterdag vliegen*
- 21 April: UNDAC team arrives in Honiara



# Mission objective, team composition

- Rapid assessment of **dam safety** and **chemical hazards** posed by the Gold Ridge tailings storage facility (TSF) - focusing on possible impacts to human health and livelihoods
  - Dam stability and integrity
  - Environmental and health impacts of a potential release
- Team composition:
  - Emilia Wahlstrom, Team Leader, UNEP / OCHA
  - Niels Masselink, Sampling Expert, European Union Civil Protection Mechanism
  - Christina Winckler, Geotechnical Engineer, European Union Civil Protection Mechanism

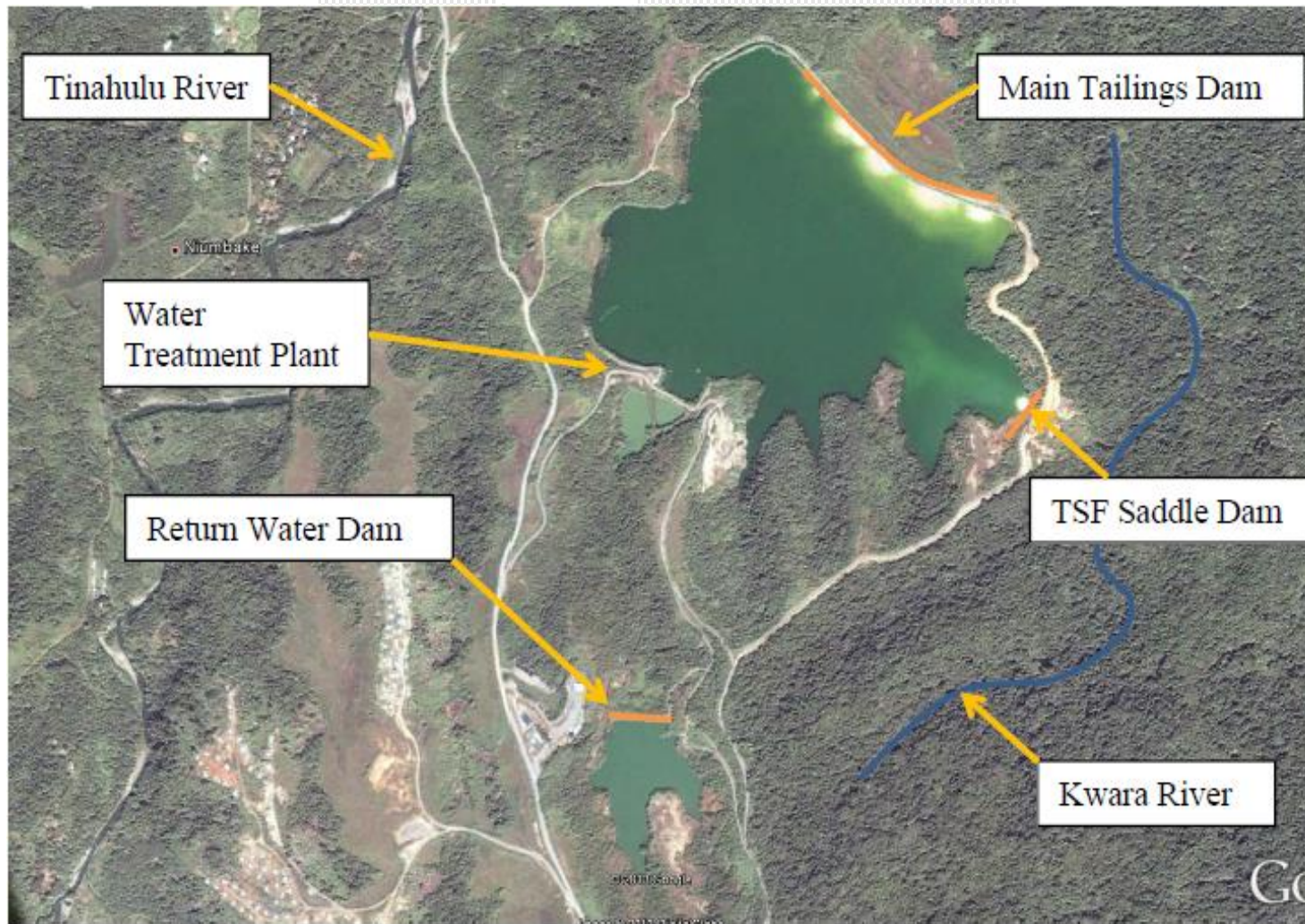


# Mission agenda

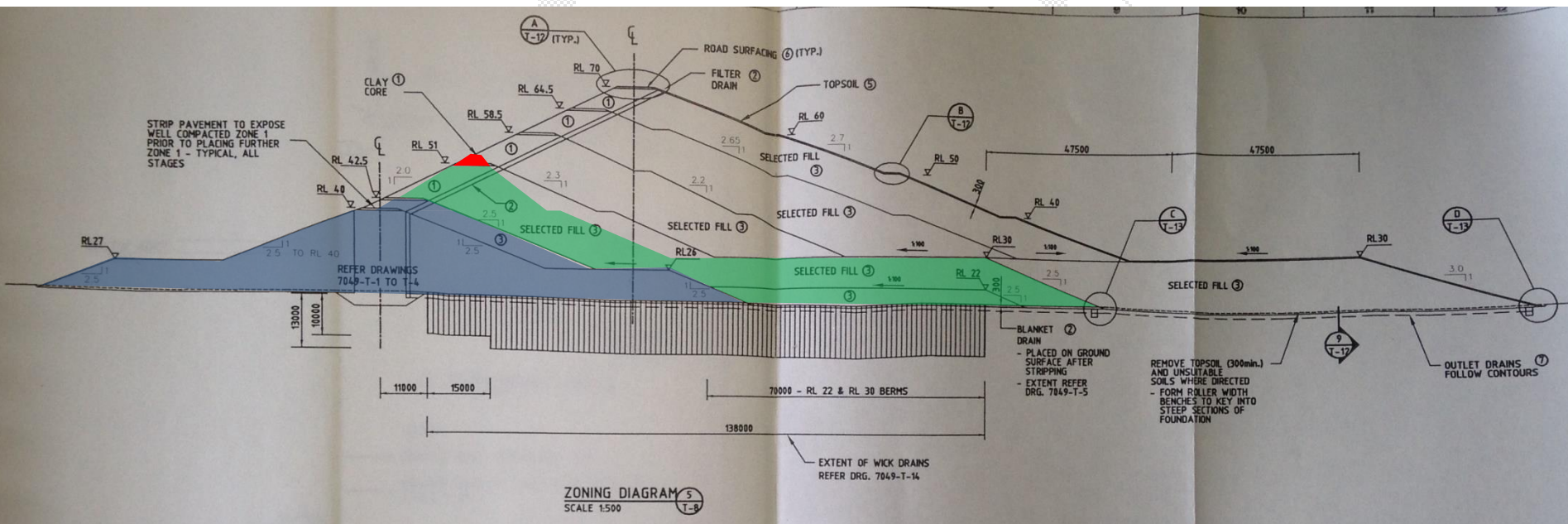
- Five site visits
- Discussions with Ministry representatives, company representatives, UN agencies, employees
- Review of background documentation
- Assessment of sampling analysis results



# Findings – Dam Safety



# 27 August 1998 Drawing



# July 2005 Water Levels in TSF

- December 2003: RL 44.5 (7 m below crest and 5 below spillway)
- July 2005: RL 46.3 (5.6 m below crest and 5 below spillway)

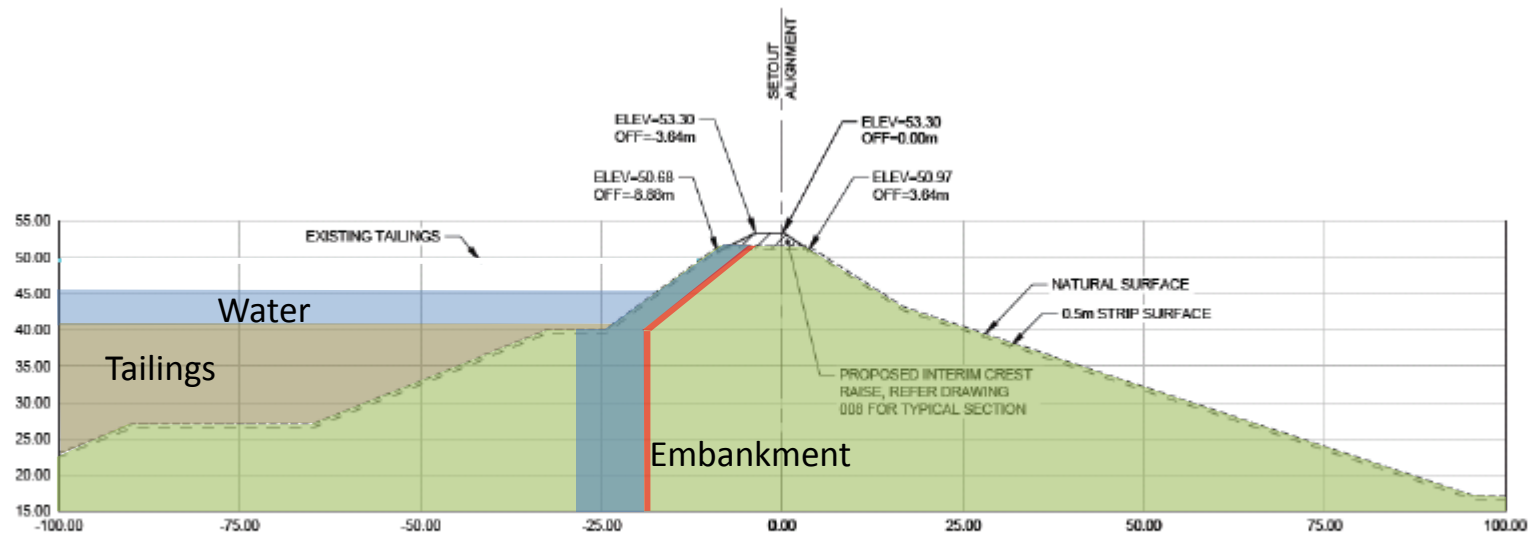


Figure 6 - Cross section of current crest raise. (Golders, 2013)





# April 2014 Water Levels in TSF

- Design drawings tailings not above 46 mRL
- Water level estimate at 51.6 mRL (5.6 of water)
- 0.9 of vertical water on section without filter

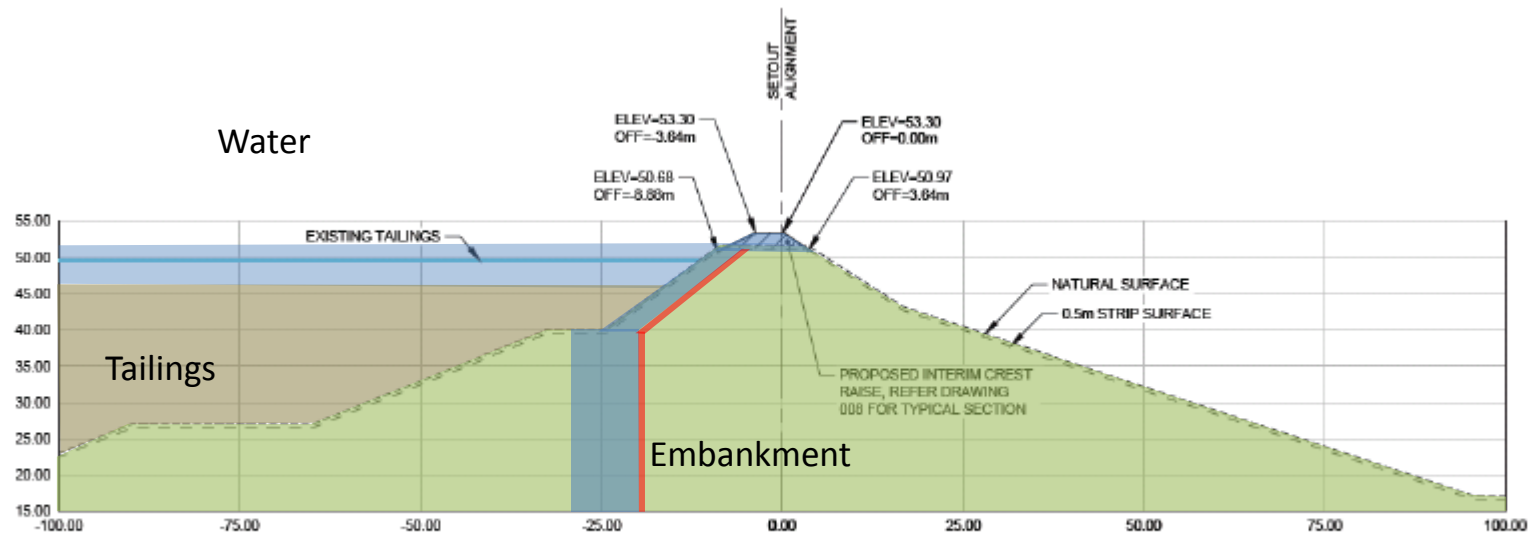


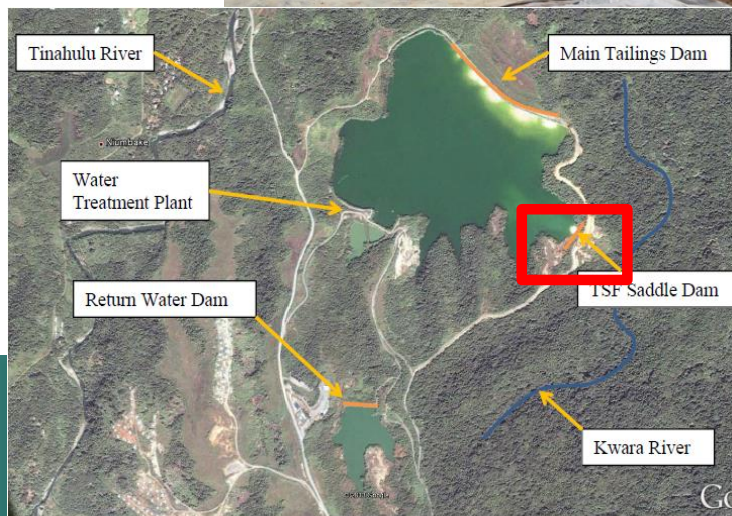
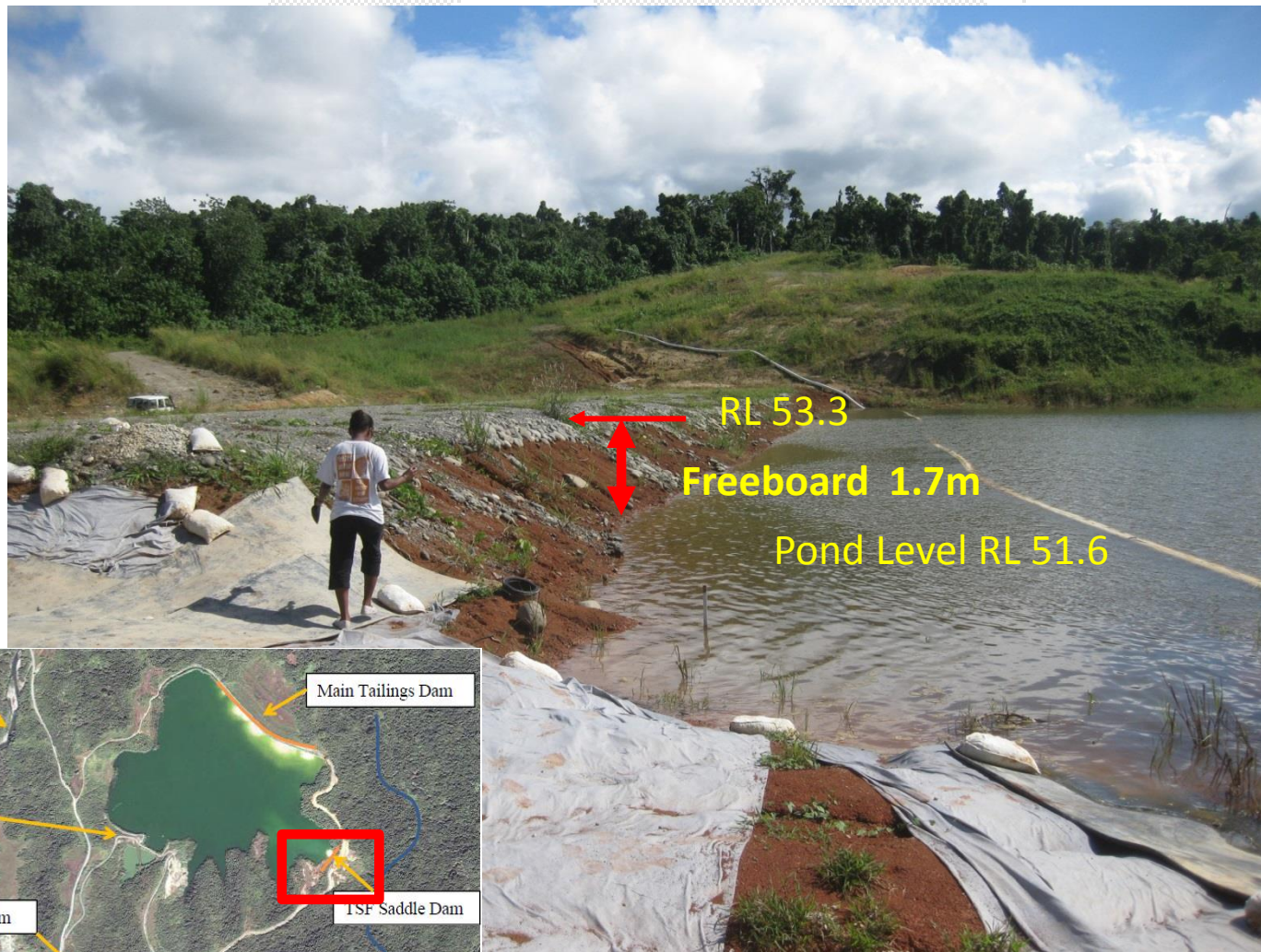
Figure 6 - Cross section of current crest raise. (Golders, 2013)



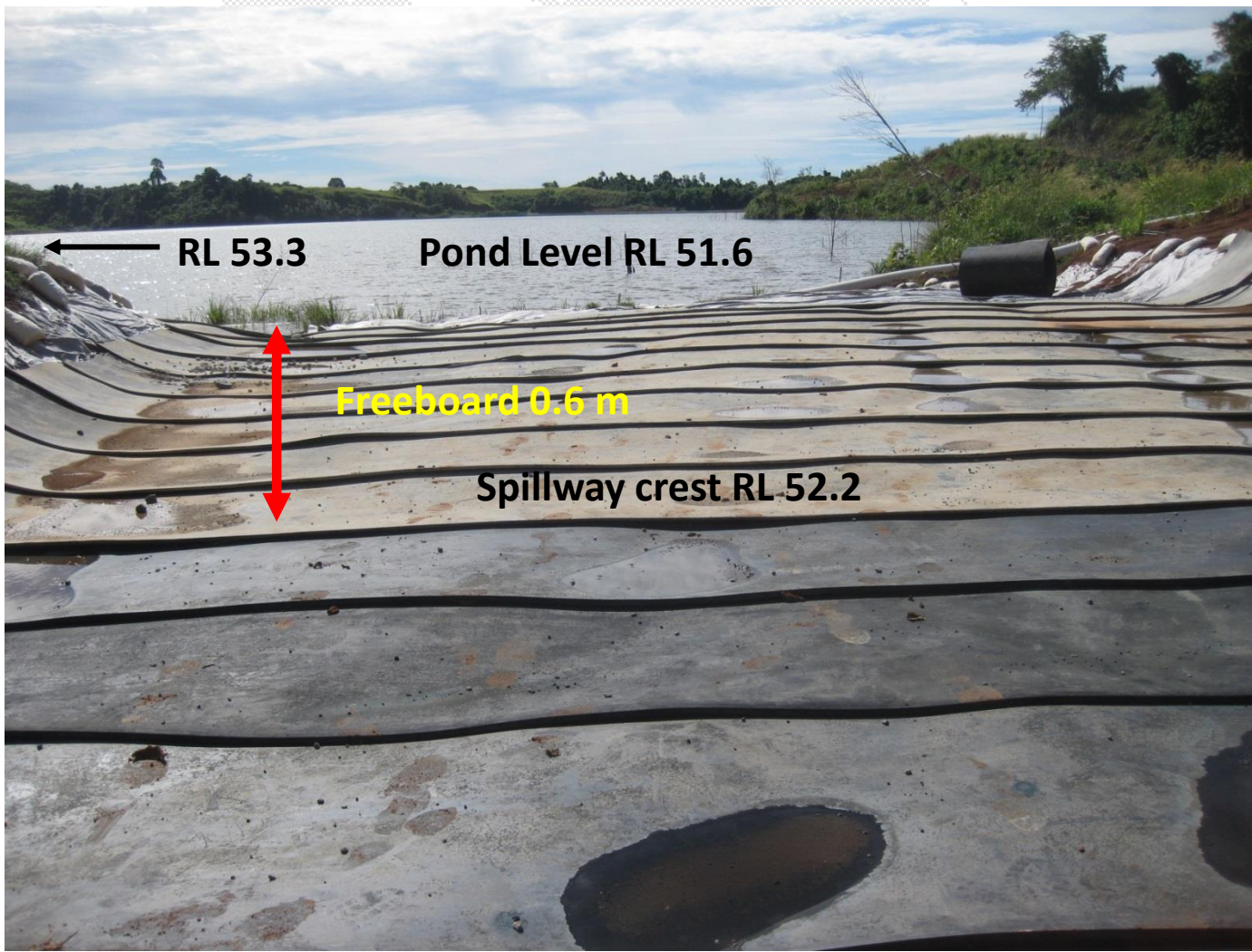
# TSF Upstream Slope



# Saddle Dam Upstream Slope, April 26, 2014



# Spillway Section: April 26, 2014



# Unlined Spillway Channel



# Findings – dewatering

- Acute need to dewater
- Could be done without treatment, but safe level of dewatering depends on many factors, including:
  - Arsenic and cyanide concentrations in TSF
  - Pump intake level
  - River water flow (rainy vs. dry season)

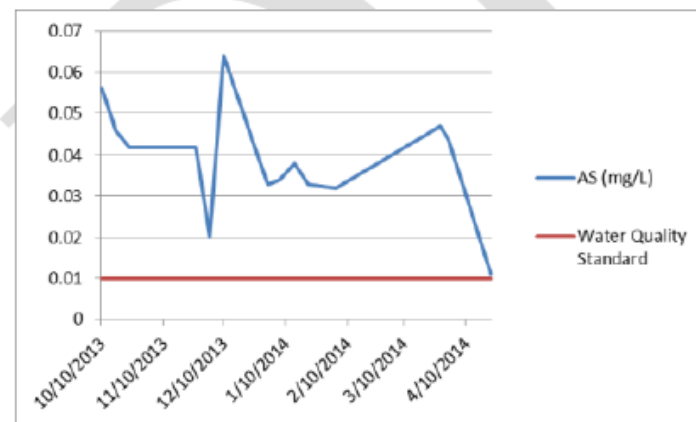


Chart 1: Arsenic levels in the DP pond

Levels measured 22 April, 2014

	TSFP02	TSFP03	TDP	Limit value
Arsenic (mg/L)	<b>0.013</b>	<b>0,014</b>	<b>0,017</b>	0,01
Cyanide, free (mg/L)	<0,004	<0,004	0,007	0,07



# Findings - dewatering

- Dewatering without treatment as emergency action only:
  - License, pump reparations, installment, continuous water quality monitoring, community informing/notification
  - Would take approx. 160 days (at safe dilution level)
- Dewatering with treatment
  - Preferred option
  - Re-commission water treatment plant
  - Find a solution for storage and analysis of treated water prior to release



# Sampling and monitoring goes on...





But safety and long-term sustainability remain a concern...



# Recommendations - immediate

1. Taking into account the substantive time needed to lower water levels: Commence preparations for dewatering and apply for a discharge license
2. Engage on site management of experienced mining company
3. Re-commission the water treatment plant
4. Monitor site continuously and after each natural hazard event, and perform additional geometric survey



# Recommendations - immediate

4. Continue dewatering sampling and monitoring program as laid out in discharge license, with the inclusion of additional sampling points
5. Construct tailings storage facility to design drawings or conduct analysis for the current design



# Recommendations – mid-term

7. Maintain dewatering monitoring program and establish an emergency notification system
8. Remove return water dam spillway section
9. Install dam monitoring on embankment
10. Improve and implement tailings management monitoring programme
11. Perform detailed dam stability and integrity assessment using physical monitoring results
12. Upgrade existing structures to prudent dam safety requirements
13. Conduct a dam safety review and risk assessment of the facility



# Recommendations – long-term

14. Include key environmental emergency response actions and corresponding responsibilities into legislation
15. Raise key authority institutional capacities for monitoring and enforcement





OCHA UNEP



OCHA UNEP

