



## **APPENDIX V**

### **CDF AND DIKE DESIGNS**

- V-1 Co-disposal Facility (CDF) Pre-Feasibility Study Design Report Update
- V-2 Pre-Feasibility Design of Dikes
- V-3 Independent Geotechnical and Tailings Review Board (IGTRB) Supporting Documents
  - V-3.1 Community and Agency Letters regarding IGTRB
  - V-3.2 IGTRB CVs
  - V-3.3 IGTRB Report No. 1
  - V-3.4 IGTRB Report No. 2 – Review of CDF Design Report  
WSP Response to IGTRB Review of CDF Design Report  
IGTRB letter response to WSP responses**

# Springpole Project Independent Geotechnical and Tailings Review Board

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October 2, 2024

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Attn: Stephen Lines  
Vice President, Sustainability

**Re: Springpole Project  
Co-Disposal Facility  
Review of Pre-Feasibility Design Update Report**

Dear Steve:

This letter presents the Independent Geotechnical and Tailings Review Board (IGTRB) comments on the Springpole Project CDF Pre-Feasibility Design Update Report prepared by WSP, dated August 2024. The update report provides a design summary and addresses questions raised by the IGTRB at a project update meeting in Mississauga on May 29, 2024.

The key question raised by the IGTRB at the May 29, 2024, meeting was about details of the transition between the North and South Cells of the CDF with regard to seepage control. The rockfill divider dyke represented an unconfined seepage path through the southern ends of the North Cell embankment.

The update report presents details of the North/South Cells transition. The GCL-lined upstream slopes of the South Cell dams are proposed to be extended for a distance into the East and West dams of the North Cell Perimeter Dams to lengthen the seepage path, which would be through deposited tailings. The seepage path through the North Cell embankment would be eliminated. The IGTRB considers that the revision should provide adequate seepage control. The geometry of the transition zone, shown in Figure 1 below, is complicated and will require careful control during construction. The extent of the lined zone extending into the North Cell should be optimized in the next stage of design, employing 3D seepage modeling with sensitivity analyses varying hydraulic properties.

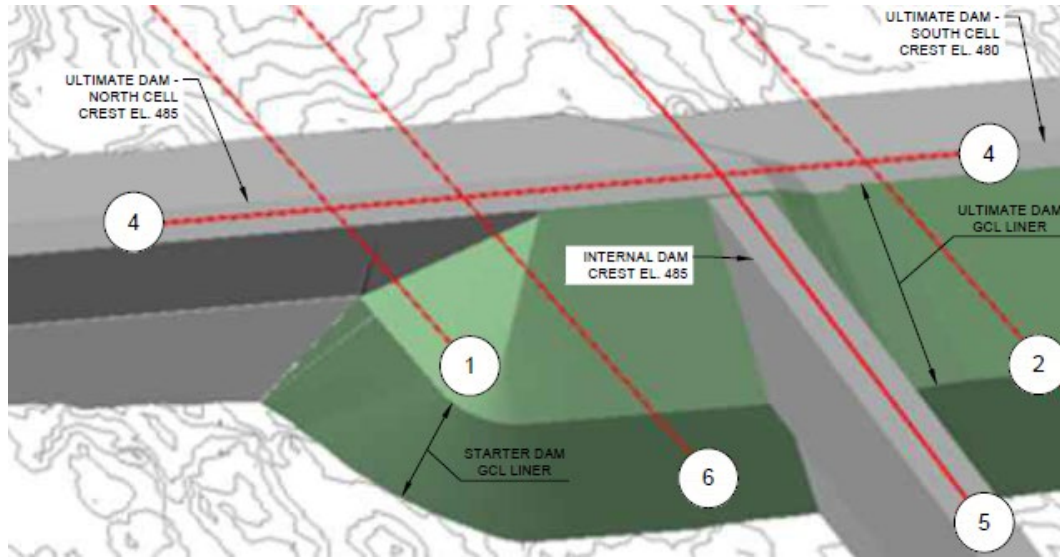


Fig. 1. Isometric view of the proposed transition between the North and South Cells

A revision has also been made to the design section of the North Cell dams. Above the Starter Dam the embankment is proposed to be raised by centreline construction, with a vertical transition and filter zone surrounded by transition zones upstream and downstream. The transition zones could be raised in thin lifts to facilitate near-continuous crest raising year-round. The filter zone could be constructed by trenching through the transition zone and backfilling the trench with filter material. The typical section is shown on Figure 2. The IGTRB supports this design section. There has been no revision to the South Cell Perimeter Dams from the previous version of the PFS design.

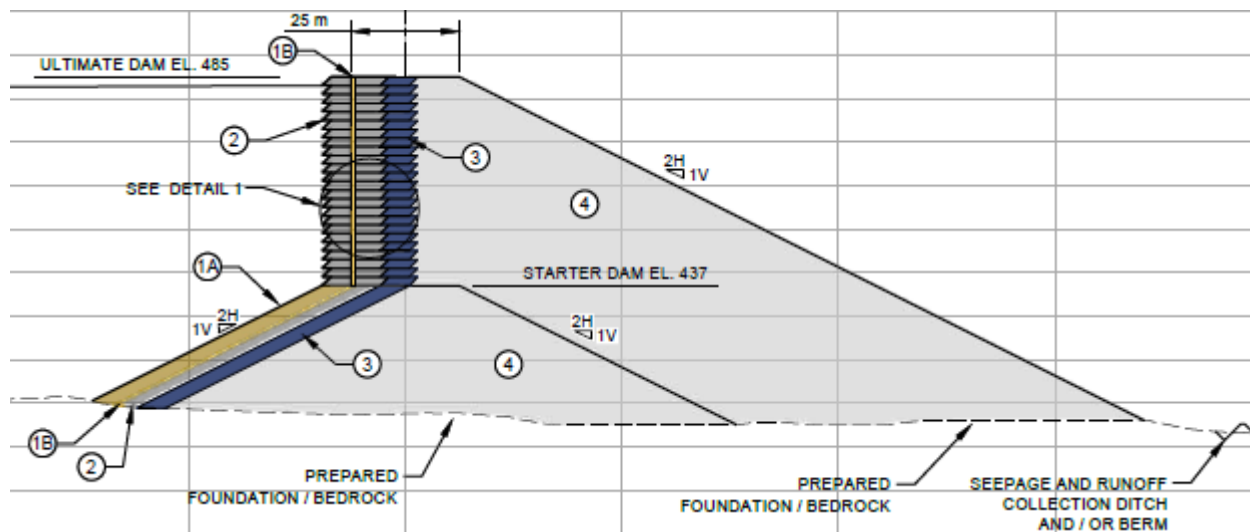


Fig. 2. Proposed typical section of the North Cell dams.

Figure 3 below shows the results of a seepage analysis through the North Cell dams. This analysis shows that the phreatic surface is expected to be very low, with seepage exiting through the shallow bedrock zone. This is an expected outcome, given that the upstream slope of the starter dam is unlined. The IGTRB cautions that seepage may be higher during first filling, before the tailings beach develops. It may be prudent to provide upstream lining to some height along the topographic low on the SE side of the North Cell to prevent excessive seepage in this location where water may initially pool.

With the expected low phreatic surface, there will be minimal hydraulic gradient across the filter and transition zones, with little flow that could carry tailings into the rockfill. This may allow simplification of the filter and transition zones, perhaps to a single, well graded material such as the Low RQD NAG (“Sand Zone”) material from the open pit. More characterization of the Sand Zone should be carried out in the next phase of design.

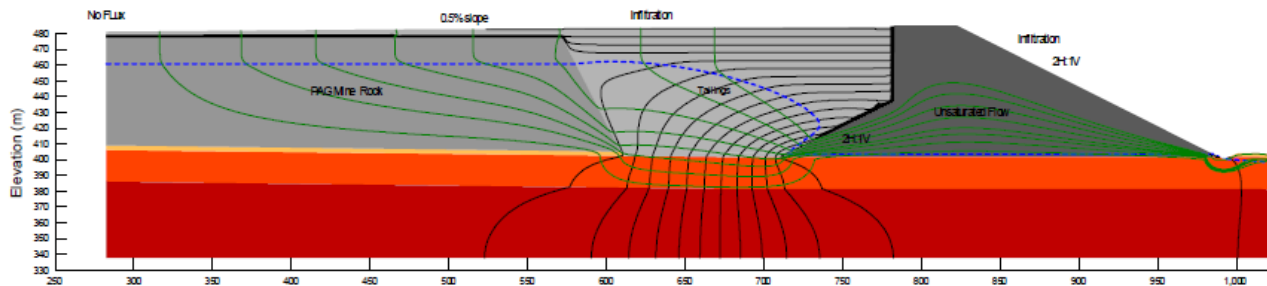


Fig. 3. Seepage Analysis Model, Typical Section North Cell Perimeter Dam

Revised water balance calculations indicate that the CDF will have an overall negative water balance, with the voids of the PAG waste and tailings absorbing most of the water entering the North Cell. A 4 m deep water pond is proposed to be maintained in the South Cell, to provide cover over PAG tailings to prevent oxidation of sulphides. The IGTRB questions the need for the water cover, given that exposed PAG tailings beach surfaces will be continuously covered by successive lifts of tailing deposition. The IGTRB considers the 4m water cover to be potentially unnecessary and it further imposes a seepage head. The IGTRB suggests that the South Cell could be operated with a minimal water pool, sufficient only to allow operation of reclaim pumping, and that a beach could be maintained along the Internal Dam to minimize seepage.

The IGTRB has previously stated that the level of geotechnical site investigation and characterization appears appropriate for a PFS level design, with additional detailed site investigation for feasibility and detailed design phases. One area that will require additional site investigation is the Southwest Corner of the CDF South Cell, where a thick silty clay deposit over 7 m depth was encountered. This area should be characterized as it could be necessary to adjust the dam alignment to avoid deep excavation or to allow downstream space for buttressing the dam slope.

In summary, the IGTRB considers the updated PFS to have resolved our main concerns with the CDF design and to have positively advanced design concepts. The IGTRB supports the revised design section of the North Cell dams. The CDF dams will be founded on competent andesite bedrock which will provide

ample foundation stability. With a negative water balance and no external runoff catchment, there would be essentially no risk of overtopping the dams. Additional areas of study and investigation have been appropriately identified to be addressed in the feasibility study phase.

Yours truly,

**Springpole Project Independent Geotechnical and Tailings Review Board**



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## MEMO

**TO:** Michael O’Flaherty, Steve Lines (FMG)  
**FROM:** Ganan Nadarajah and David Bleiker (WSP)  
**CC:** Marci Mehl (WSP)  
Shane Hayes, Meghan Bertenshaw (FMG)  
**SUBJECT: CDF Pre-Feasibility Design Update Report  
Clarification and Responses to IGTRB Review Report**  
**PROJECT NO.:** CA-EI-OMGM2215  
**DATE:** October 10, 2024

On August 23, 2024, WSP Canada Inc. (WSP) submitted a Pre-Feasibility Design Update Report for the proposed Springpole Project Co-Disposal Facility (CDF). The report included design optimization and update of previously prepared Pre-Feasibility Study (PFS) Design (Knight Piésold March 2021 and Sept 2021). The report also attempted to address questions raised during the Independent Geotechnical and Tailings Review Board (IGTRB) meeting held on May 29, 2024.

The IGTRB reviewed the Pre-Feasibility Design Update Report and provided their comments and recommendation in a letter dated October 02, 2024.

This letter provides clarifications and responses to address the key comments identified in the IGTRB review letter. For easy reference, IGTRB’s comments are provided in italics followed by WSP’s responses.

### **Clarifications**

#### **Item 1:**

*IGTRB: The extent of the lined zone extending into the North Cell should be optimized in the next stage of design, employing 3D seepage modeling with sensitivity analyses varying hydraulic properties.*

WSP: Agreed. It is planned to perform 3D seepage analyses, including sensitivity analyses, during permitting and later design stages to define and optimize required extension of the lined South Cell dam into the North Cell.

#### **Item 2:**

*IGTRB: The results of a seepage analysis through the North Cell dam shows that the phreatic surface is expected to be very low, with seepage exiting through the shallow bedrock zone. This is an expected outcome, given that the upstream slope of the starter dam is unlined. The IGTRB cautions that seepage may be higher during first filling, before the tailings beach develops. It may be prudent to provide upstream lining to some height along the topographic low on the SE side of the North Cell to prevent excessive seepage in this location where water may initially pool.*

WSP: Agreed. North Cell starter dam segments will be considered in more detail at later design stages with the modelling proposed in Item 1. This will include consideration of a suitable low permeability zone to control seepage and facilitate water management at start-up. Active pumping from North Cell to South Cell would also be required at start-up. As IGTRB noted, it is expected that the tailings beach zone, once established, will provide the low permeability zone reducing the seepage across the North Cell dam.

As discussed above, additional seepage analyses (including sensitivity analyses) will be performed at each subsequent design stage considering potential range of hydraulic conductivity of tailings, bedrock, filter and protection zones to assess phreatic surface variation across North Cell dam and optimize the design as required to meet the mitigation requirements.

**Item 3:**

*IGTRB: More characterization of the Sand Zone should be carried out in the next phase of design.*

WSP: Agreed. Additional characterization of the Low RQD Sand Zone is planned during permitting and future design stages and will help refine and optimize the transition and filter zones design.

**Item 4:**

*IGTRB: A 4 m deep water pond is proposed to be maintained in the South Cell, to provide cover over PAG tailings to prevent oxidation of sulphides. The IGTRB questions the need for the water cover, given that exposed PAG tailings beach surfaces will be continuously covered by successive lifts of tailing deposition. The IGTRB considers the 4m water cover to be potentially unnecessary and it further imposes a seepage head. The IGTRB suggests that the South Cell could be operated with a minimal water pool, sufficient only to allow operation of reclaim pumping, and that a beach could be maintained along the Internal Dam to minimize seepage.*

WSP:

Based on the PAG tailings geochemistry and recommendations from the project geochemists, the PAG tailings (20% sulphide concentrate) need to be maintained saturated. This is the rationale for a subaqueous deposition during operations and is generally consistent with management of sulphide concentrates at other similar projects. Subaqueous deposition requires sufficient depth of water however we agree that additional refinement for the operational water cover depth requirement will be considered during the future design stages and with on-going geochemical testing through life of mine. For closure, the operational water cover will be replaced with an engineered soil cover design.

**Item 5:**

*IGTRB: Southwest corner of the CDF should be characterized as it could be necessary to adjust the dam alignment to avoid deep excavation or to allow downstream space for buttressing the dam slope.*

WSP: Agreed. It is planned to further investigate the Southwest area with borehole drilling, testing and sampling, Nilcon Vane testing and CPT testing. Further, Shelby tube sampling and advanced laboratory testing are also planned to be carried out to characterize the overburden at this area. This plan has been previously presented and confirmed by the IGTRB.

# Springpole Project Independent Geotechnical and Tailings Review Board

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October 11, 2024

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Vice President, Sustainability

**Re: Springpole Project Co-Disposal Facility Pre-Feasibility Design Update Report  
Response to CDF Clarification and Responses to IGTRB Review Report**

Dear Steve:

In a memo dated October 10, 2024, Ganan Nadarajah and David Bleiker of WSP provided responses to the IGTRB's recommendations re the Co-Disposal Facility (CDF) Pre-Feasibility Design Update Report in its letter dated October 2, 2024. The responses confirmed that WSP agrees with 4 of the 5 recommendations made by the IGTRB.

The single outstanding IGTRB recommendation in question is, *"The IGTRB suggests that the South Cell could be operated with a minimal water pool, sufficient only to allow operation of reclaim pumping, and that a beach could be maintained along the Internal Dam to minimize seepage."* WSP stated that it considers it is necessary to maintain a pond in the South Cell for subaqueous deposition of PAG tailings during operation. WSP stated, however, that additional refinement for the operational water cover depth requirement will be considered during the future design stages and with on-going geochemical testing through life of mine. The IGTRB considers that the additional study proposed is a reasonable approach that should help define the optimal operating scenario for the South Cell.

In summary, the IGTRB considers that the responses to our review recommendations will satisfactorily resolve its concerns with the CDF. Additional areas of study and investigation have been appropriately identified to be addressed in the feasibility study phase.

Yours truly,

**Springpole Project Independent Geotechnical and Tailings Review Board**



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